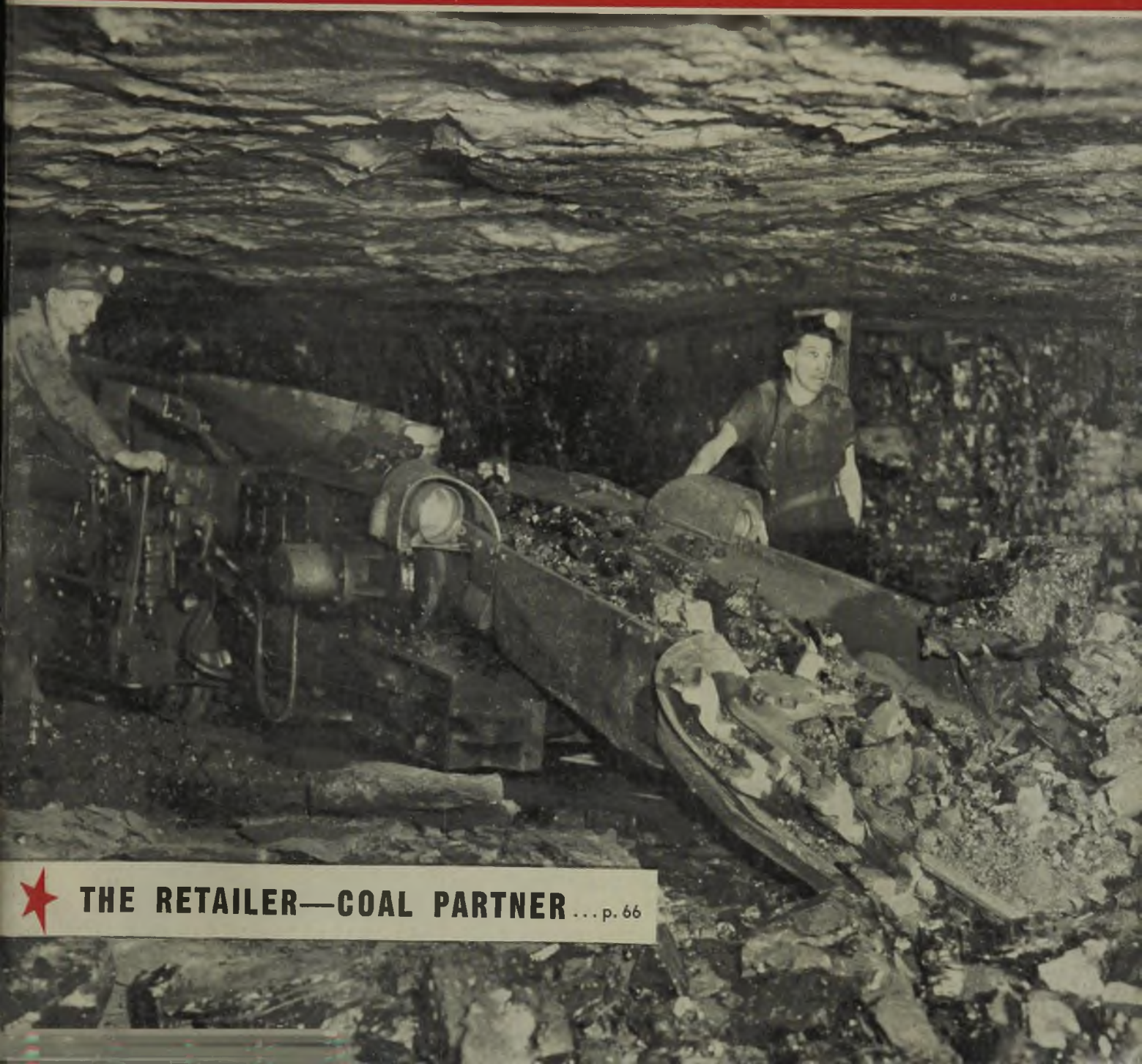


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Coal Age

OCT 28 1946

OCTOBER, 1946



★ THE RETAILER—COAL PARTNER ... p. 66



A SWITCH TO *Lower* COSTS

SUN MINE LUBRICANTS ...

Keep Cars Rolling Easily; Cut Down Time Spent on Maintenance and Lubrication

A big Pennsylvania mine was lubricating mine car bearings every other week. But the grease was separating and not providing adequate lubrication. Instead of being free and easy, cars were hard to push.

Complaints stopped when the mine changed to a special "Job-Proved" Sun grease. Now, cars are lubricated only three or four times a year, instead of every two weeks. They roll easily. There have been big savings in time and lubricant costs.

Sun mine car lubricants have proved their qualities on thousands of jobs. They have no tendency to dry up, harden, or separate. They keep dust and water out of car bearings, keep cars moving easily, keep bearings in A-1 condition.

For long service, for minimum maintenance, for maximum production, specify "Job-Proved" Sun lubricants for all your mine machinery. Call in the Sun Engineer near you, today.

SUN OIL COMPANY • Philadelphia 3, Pa.

Sponsors of the Sunoco News-Voice of the Air - Lowell Thomas

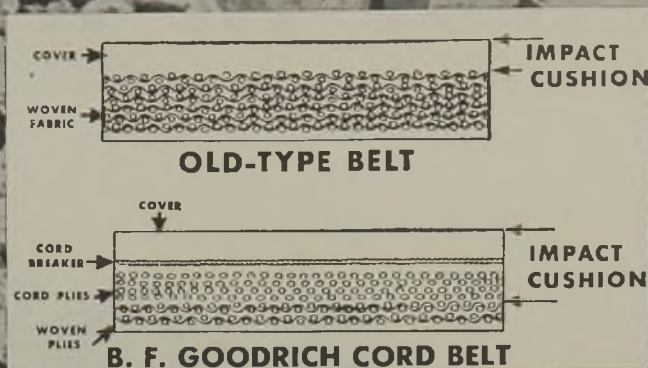
SUN

— **SUNOCO** —

INDUSTRIAL PRODUCTS



A development of
B.F. Goodrich
FIRST IN RUBBER



B. F. Goodrich cord conveyor belt reduces handling costs, lowers maintenance expense, gives long life with minimum upkeep

Developed for heavy-duty materials handling service

MANY B.F. Goodrich cord conveyor belts have carried 6, 7, 10 million tons of material without appreciable signs of wear. One mine operator in Minnesota reports savings of \$30,000 per year by the elimination of transfer points, plus saving all the time and cost formerly wasted in shutdowns and repairs. The cord belt's long life and superior performance result from shock absorbing action that is built into the carcass of the belt.

In this new construction, each cord in each ply is completely surrounded

by rubber. Then a layer of parallel cords called a transverse breaker, also embedded in rubber, is laid across the belt—floating in rubber above the carcass and covered at the surface by another rubber layer.

Because each cord is embedded in rubber, the impact cushion, as shown in the diagram, is nearly 3 times thicker than in conventional belt construction—impact resistance is nine times as great. The transverse cord breaker absorbs the impact over a

greater area and increases adhesion of cover to carcass by at least 50%.

Your service requirements may not call for a heavy duty belt like the cord belt. So remember that there is a B. F. Goodrich belt for *every* kind of service. Be sure to specify B. F. Goodrich. Call your B. F. Goodrich distributor for *all* conveyor belt needs. *The B. F. Goodrich Company, Industrial Products Division, Akron, Ohio.*

B.F. Goodrich
 RUBBER and SYNTHETIC products

First in its Field....



W H A L I N G . . . T H E F I R S T G R E A T A M E R I C A N I N D U S T R Y

In 1854 Whaling, the first great American Industry, reached its peak, with New Bedford, Mass., producing 60,000 barrels of sperm and 12,000 barrels of whale oil. Over 400 whaling vessels (more than half those in the entire industry) made that port their headquarters; 70,000 people were engaged in the fishery, its fleet valued at \$20,000,000. The first sperm whale was captured by a Nantucket whaler about 1712.

Coal mining machinery reaches the peak of efficiency when you lubricate it with HULBURT QUALITY GREASE. HULBURT ENGINEERS will go right down into your mine to strike at the heart of your lubrication problems with expert advice — and when the drums of HULBURT QUALITY GREASE arrive and that GREASE goes on your coal mining equipment it will do a whale of a lot more and better work for you!

HULBURT OIL & GREASE COMPANY—PHILADELPHIA, PENNA.

Specialists in Coal Mine Lubrication



HULBURT

Quality **GREASE**

THE "FIRST NAME" IN

HAZASHEATH SPIRALWEAVE

... underground cable with
TRIPLE PROTECTION

Hazasheath Spiralweave cable is protected against moisture encountered in conduit, direct burial in the ground, and in hanging inside the mine. Mechanical protection is also afforded by these three construction features.

1. Hazard Submarine rubber insulation of high rubber and low sulphur content, developed particularly for non-leaded underground cables; strong, resilient, moisture-resisting insulation.

2. A tough, thick, long lived, mold-cured rubber jacket of dense Hazasheath, similar to a solid truck tire in strength and wear-resistance. It resists chemicals, heat and rough handling as well as moisture. It is proof against the effects of soil acids and alkalies and is extremely tough. Cushions the insulated conductors against falling rock or other injury.

3. Loom-woven Spiralweave covering, treated for fungus-resistance, and thoroughly waterproofed, forms a strong outer protective covering of Fire-hose type. Neither lead sheath nor wire armor is required making Hazasheath lighter in weight, easier to handle, and moderate in cost.

Ask a Hazard sales engineer to tell you how Hazasheath Spiralweave Cables will render you more efficient operation. Hazard Insulated Wire Works, Division of The Okonite Company, Wilkes-Barre, Pa.

HAZARD



insulated wires and cables for every mining use



4384

Coal Age

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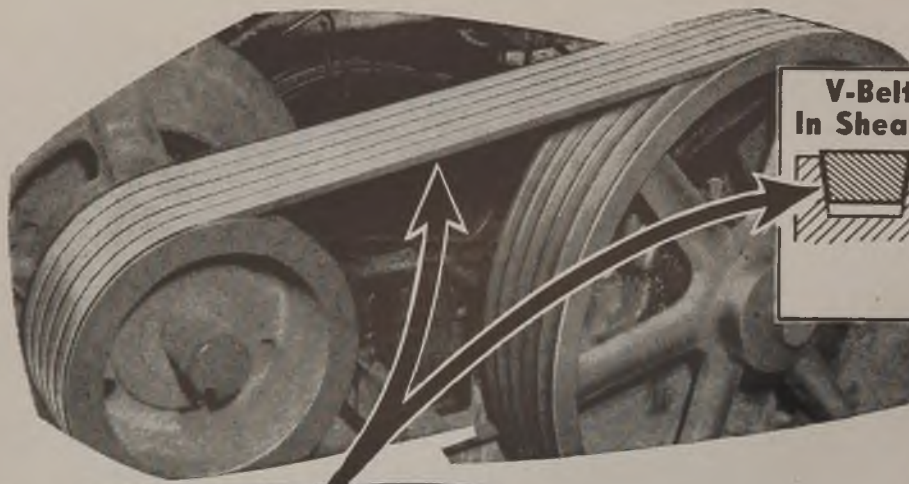
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Old Address

New Address

New Company Connection.....

New Title or Position



V-Belt In Sheave



Clearly, it's the sides of a V-Belt that do all the gripping on the pulley and get all the wear against the sheave-groove wall. That's why longer life for the sides means longer life for the belt!



The **SIDEWALL** of Your V-Belt

does **MORE** Work **NOW** than ever before!

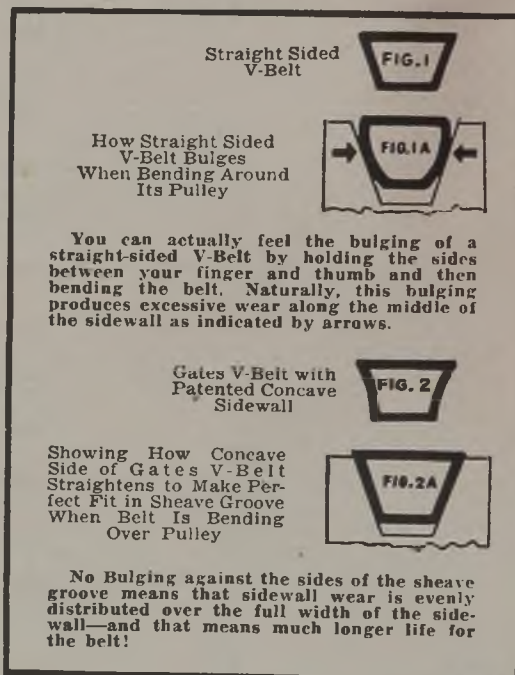
--that's why the **CONCAVE SIDE**
has become **Even MORE IMPORTANT!**

The moment you think about it you realize, of course, that the *sidewall* is the part of a V-Belt that really gets the wear.

It's the *sidewall* that has to grip the pulley. It has to pick up all the power from the driver pulley, transmit that power to the tension member and then deliver to the driven pulley all the power that pulley ever receives.

That is the perfectly natural reason why you have always noticed that the sidewall of the *ordinary* V-Belt is the part that wears out first. Clearly, anything that lengthens the life of the sidewall will lengthen the life of the belt.

The simple diagrams on the right show clearly why the ordinary, *straight-sided* V-Belt gets excessive wear along the middle of the sides. They show also why the Patented Concave Side greatly reduces sidewall wear in Gates Vulco Ropes. That is the simple reason why your Gates Vulco Ropes are giving you so much longer service than any straight-sided V-Belts can possibly give.



4610

Stronger Tension Members in Today's Belts Put Even **GREATER LOAD** on SIDEWALLS!

Now that Gates *Specialized* Research has resulted in V-Belts having much stronger tension members—tension members of Rayon Cords and Flexible Steel Cables, among others—the sidewall of the belt is often called upon to transmit to the pulley much heavier loads. Naturally, with heavier loading on the sidewall the life-prolonging Concave Side is more important today than ever before!

THE GATES RUBBER COMPANY

DENVER, U. S. A.

World's Largest Makers of V-Belts



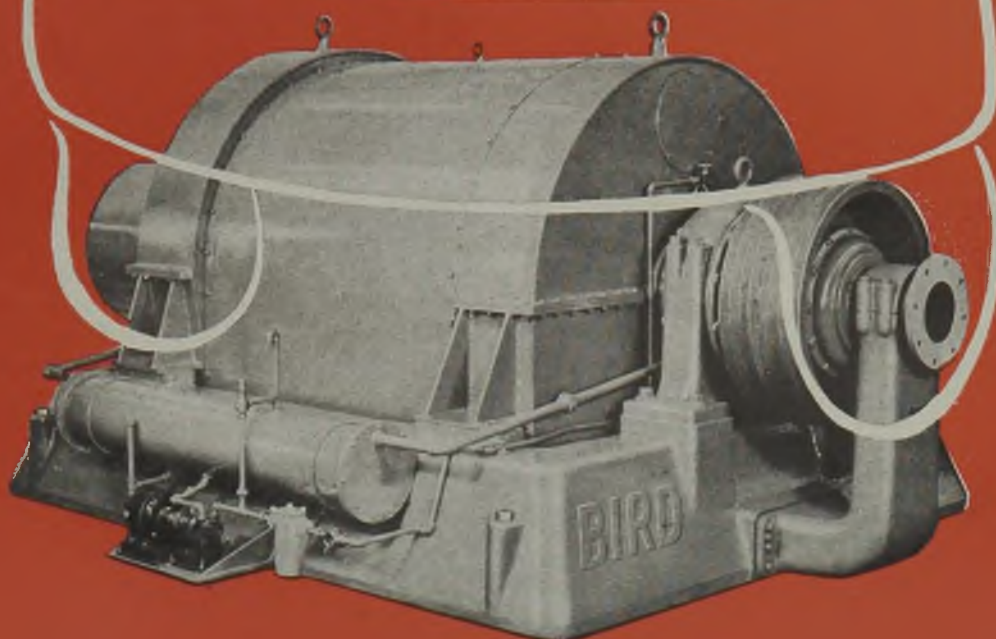
THE MARK OF SPECIALIZED RESEARCH

GATES VULCO ROPE DRIVES

Engineering Offices
and Jobber Stocks

IN ALL INDUSTRIAL CENTERS of the U. S. and
71 Foreign Countries

This BIRD Belongs On Your Team



**FOR HANDLING FINE COAL WITH
HIGH EFFICIENCY AT LOW COST**

No matter what cleaning system you use, the Bird Continuous Centrifugal Filter provides the best way to dry the fines. Pre-screening is not required. It delivers them ready for blending with the larger sizes. The coal is dry and whole. The water is so clean it's ready for immediate re-use.

One small Bird Filter turns out 40 tons or more per hour. Operating as well as maintenance costs are very low.

Let us tell you more about this machine and what it can save you. Write Bird Machine Company, South Walpole, Massachusetts.

MAINTENANCE IS NO PROBLEM

The BIRD does the job *continuously*, without parts replacements or overhaul for months on end. One unit has run for two years, handling 407,000 tons of rock-like material without a maintenance shutdown.

The BIRD

**Continuous
Centrifugal**

FILTER

Step-Up Coal Output

WITH ALLIS-CHALMERS MACHINE EFFICIENCY!

NO LONGER IS IT TRUE that equipment — plus the power to run it — plus manpower — equals big coal production. Today even more is needed. The factor of higher efficiencies must be added to the production process if coal operation is to be profitable. That's where Allis-Chalmers can help you . . . with cost-cutting mechanization!

From long experience in building equipment for the coal industry, Allis-Chalmers knows how to team

efficiency and equipment together to best advantage . . . can materially help you step up production to new tonnage records. Because Allis-Chalmers builds a wide range of basic processing machinery *and* a complete line of power and auxiliary equipment for coal, its recommendations are unbiased, engineering responsibility rests solidly with one manufacturer. For practical, *usable* help, call nearby A-C office or write, ALLIS-CHALMERS, MILWAUKEE 1, WISCONSIN.

Basic Coal Processing Equipment



Speed up coal dewatering . . . save space, money . . . with the modern A-C Low-Head Vibrating Screen, with end-tensioned deck. The compact Low-Head fits into much smaller space because it operates horizontally . . . saves installation and remodeling costs.

New end-tensioned deck—used extensively in the sink-float process—is an improvement that tensions screens longitudinally instead of horizontally. This results in a more uniform bed depth of coal on screen . . . in maximum utilization of screening area . . . in higher ca-

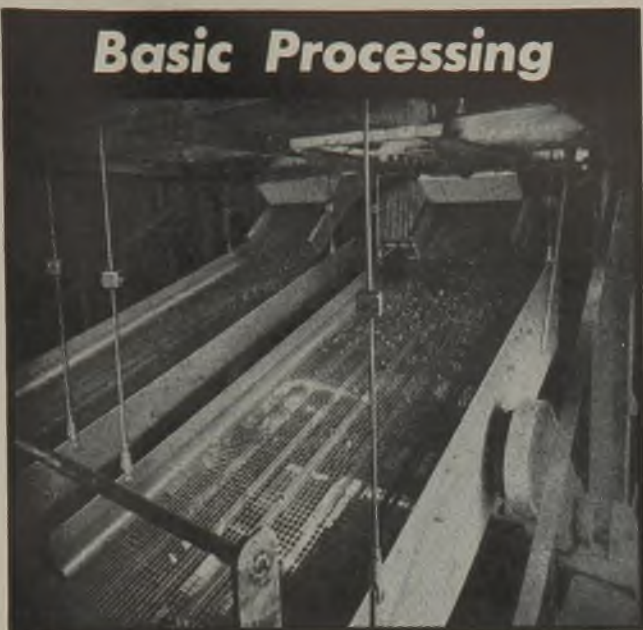
capacity and *better dewatering efficiency*. And screen surfaces can be reversed to double screen life!

Most important feature of the Low-Head Screen is the rugged strength that A-C builds into every part. It can resist vibration stress year after year . . . because all welded parts are "*stress-relieved*", making entire structure uniformly strong. Vibrating mechanism is totally enclosed. Sizes: 3 x 6 to 6 x 16 ft. With 1, 2, or 3 decks. Send for Bulletins B6330 and B6321A.

ALLIS CHALMERS

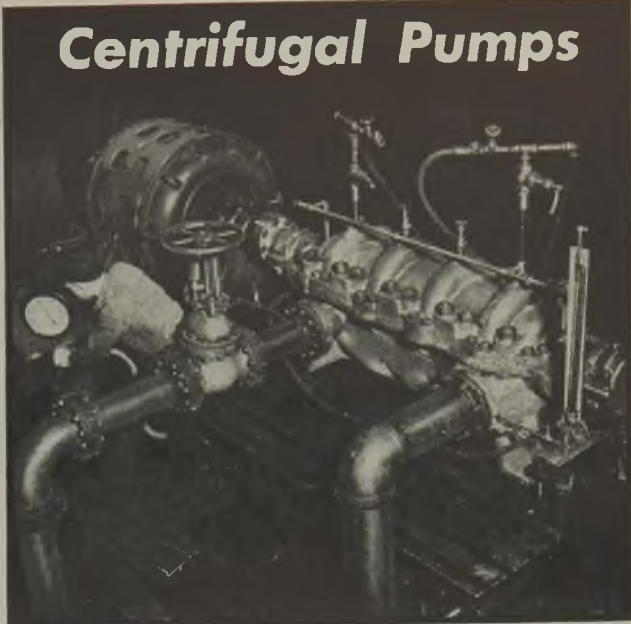
One of the Big 3 in Electric Power Equipment—Biggest of All in Range of Industrial Products

Basic Processing



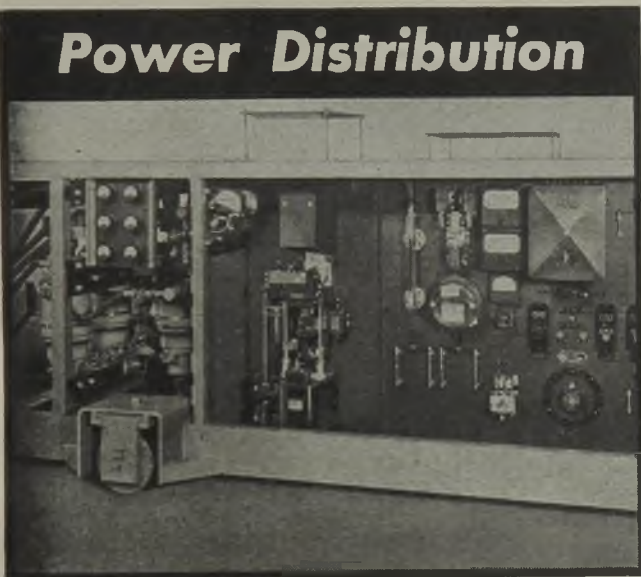
For run-of-mine coal, reduce your screening costs, step up output, with Ripl-Flo, the vibrating screen with the perfect circle throw. As in the Low-Head, all Ripl-Flo welded parts are "stress-relieved" for uniform, lasting strength. Every Ripl-Flo is tested before shipment for throw, balance, bearing temperatures. Only *two* bearings to lubricate instead of four! Screen surfaces quickly changed or tensioned by means of convenient clamping plates. Sizes: 3 x 6 to 6 x 16 ft. **Bulletin B6151B.**

Centrifugal Pumps



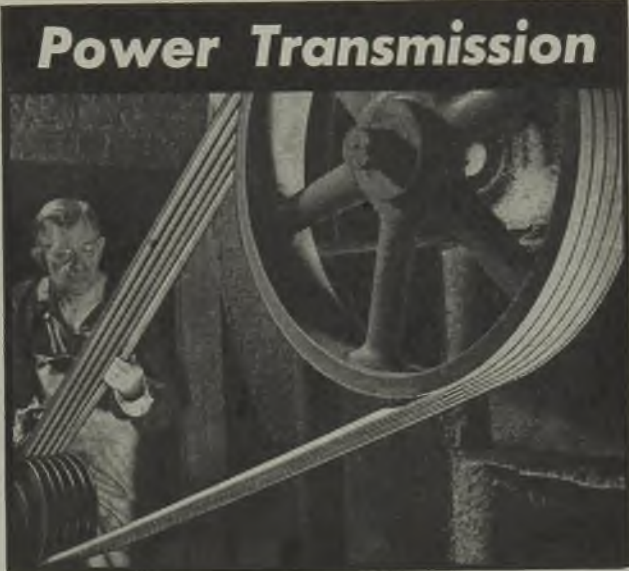
Need mine dewatering capacity? This A-C Type "MI" four-stage pump has capacity of 2100 gpm and 720 ft. head... is built for continuous operation... long service. Impellers are of the double suction enclosed type... are made of acid-resisting bronze, as are all pump parts coming in contact with liquid. A-C construction principle results in maximum regain of pressure between stages... *greater pumping capacity per hp demand!*

Power Distribution



Power where you want it is provided by the Allis-Chalmers 3-car Excitron mobile mine unit substation. Efficient a-c to d-c power conversion *boosts* face voltage... results in increased coal production and substantially reduced power costs. Flexible, all-automatic d-c power at load centers saves copper and current, provides much better power service continuity. It's both safe and simple to operate — control panel is shown on d-c car, above. Wheels can be easily adjusted to any track gauge. Excitron ratings are 200, 300, 400, and 500 Kw. Get complete details from your nearby Allis-Chalmers office.

Power Transmission



Ventilation is vital to mine modernization. Dependable A-C Texrope V-belt Drives on fans and blowers is a safe, *sure* way to provide ventilation efficiency. Tough Super-7 V-belt Drives resist dust, grit, and moisture... are economical and long-lasting. Texrope Drives are made in five types, including the Oil-Proof Super-7 and Static-Resisting Super-7 for coal mines. A-C Vari-Pitch Sheaves and Vari-Pitch Speedchangers make it easy to adjust speeds accurately. Cut power transmission costs—get A-C engineering advice on Texrope Super-7 Drive installations. Send today for **Bulletin B6051D.** A 2049

...builds for COAL

SLOPE BELTS

make 23-year record



**Handle 6,612,638 tons
before first replacement**

The super-economy and dependability of slope conveyor belts in mine haulage are strikingly demonstrated by the record of one of the nation's oldest installations serving a West Virginia coal company.

This veteran conveyor was installed in 1923 on specification of the G.T.M.—Goodyear Technical Man. It travels downhill from the portal on the mountainside to the rail tipple—a total run of 1,868 feet with a net drop of 448 feet. It consists of two flights of Goodyear 8-ply conveyor belting, 36" wide, operating at 150 F.P.M. and carrying 150 tons per hour.

Today, after 23 years' continuous service in which 6,612,638 tons of mine-run coal

GOODYEAR



have been handled, one of these original belts has at long last reached the point of replacement—and in all these years it has required only minor repair.

SPECIFY "COAL-FLO" UNDERGROUND

Outstanding as this performance record is, it is only a sample of what may be expected from Goodyear belts today. Since 1923, Goodyear has pioneered numerous improvements in belt design and construction that make still larger tonnages and longer hauls a certainty.

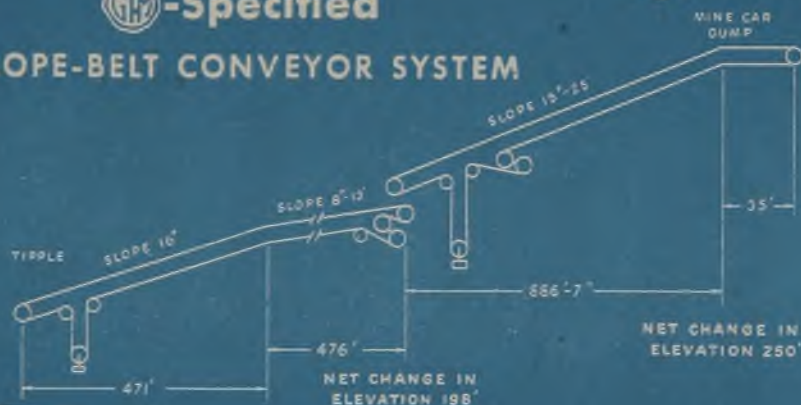
First among these is the Goodyear line of "Coal-Flo" belts—first choice for underground operations because of their resistance to mildew and mine acids that insures far longer life. "Coal-Flo" belts are equally standouts in resisting edge-wear, cutting, stripping and bruising, thanks to exclusive construction features.

Best proof is the fact that of many hundreds of thousands of feet of Goodyear belts in coal service underground, more than 95% are still in use after 6 to 8 years on the job. That's why it will pay you to consult the G.T.M., if you want lowest cost haulage. Write: Goodyear, Akron 16, Ohio, or Los Angeles 54, California.

**FOR HOSE, BELTING,
MOLDED GOODS,
PACKING**

built to the world's
highest quality stand-
ard, phone your
nearest Goodyear
Industrial Rubber
Products Distributor.

-Specified SLOPE-BELT CONVEYOR SYSTEM

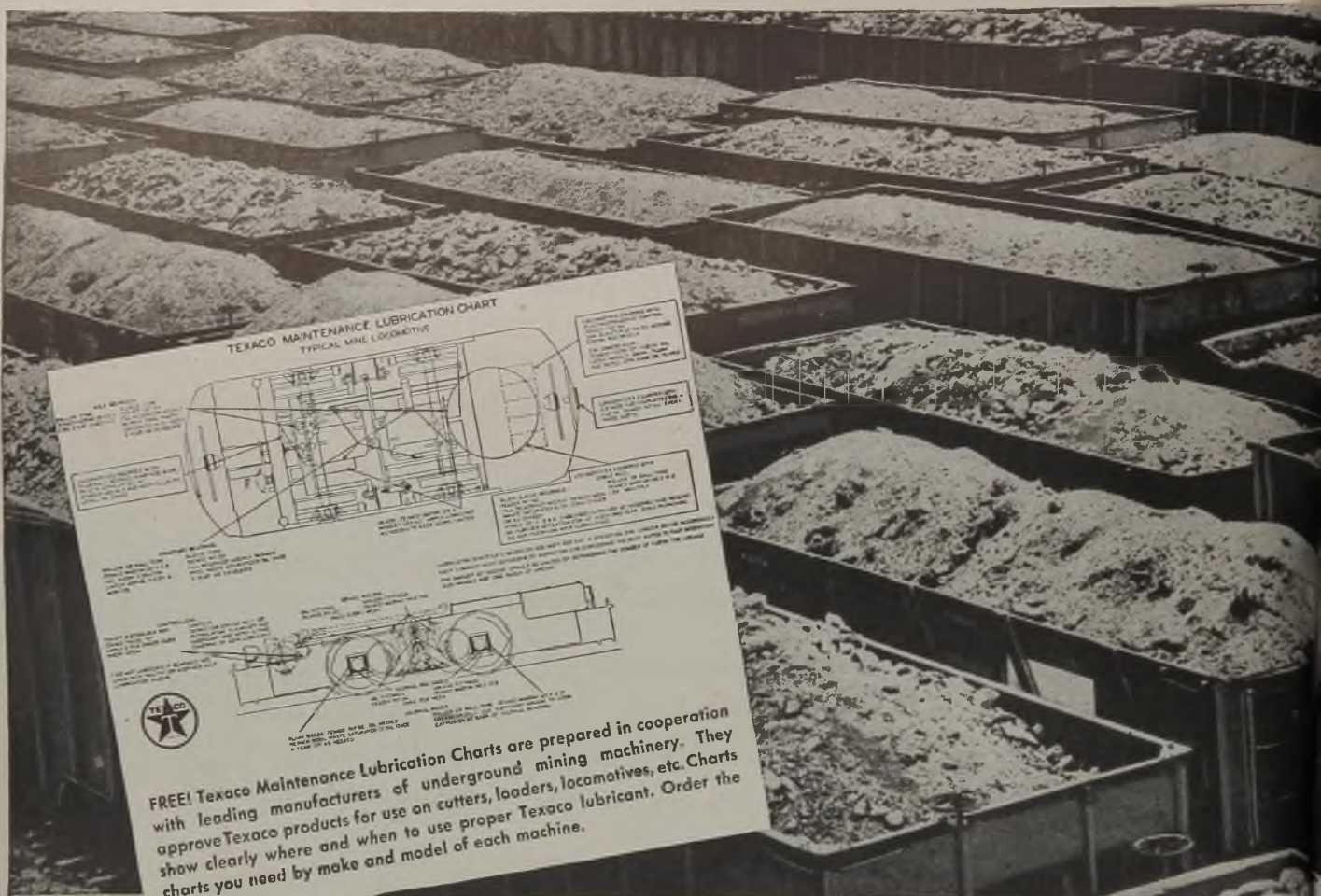


INDUSTRIAL RUBBER PRODUCTS

"Coal-Flo"—T.M. The Goodyear Tire & Rubber Company

GOODYEAR

THE GREATEST NAME IN RUBBER



TONNAGE

assure it by making
equipment more productive

TUNE IN THE
TEXACO STAR THEATRE
EVERY SUNDAY NIGHT
— CBS



TEXACO LUBRICANTS



MARFAK STAYS PUT. Hit it as hard as you can. Marfak cushions the blow, doesn't splatter — stays in the chassis bearings.



GREASE SPLATTERS. Hit ordinary chassis lubricant and it flies in all directions — leaving parts unprotected.



MARFAK IS COHESIVE. See how Marfak holds together — stretch-est. Seals out dirt and moisture — protects parts longer.



GREASE SEPARATES. Ordinary grease is not cohesive, has no stretch. It permits entrance of dirt and moisture — fails to protect parts.

ONE simple, inexpensive, sure way to make your equipment more productive is to keep every machine more steadily and more efficiently on the job, through effective lubrication — *Texaco*.

Texaco Marfak, for example, is widely used to assure maximum efficiency from both plain and anti-friction heavy-duty bearings. An extremely tough lubricant, *Marfak* stays in the bearings despite shocks, heavy loads, and temperature extremes. It seals itself in, seals out dirt and

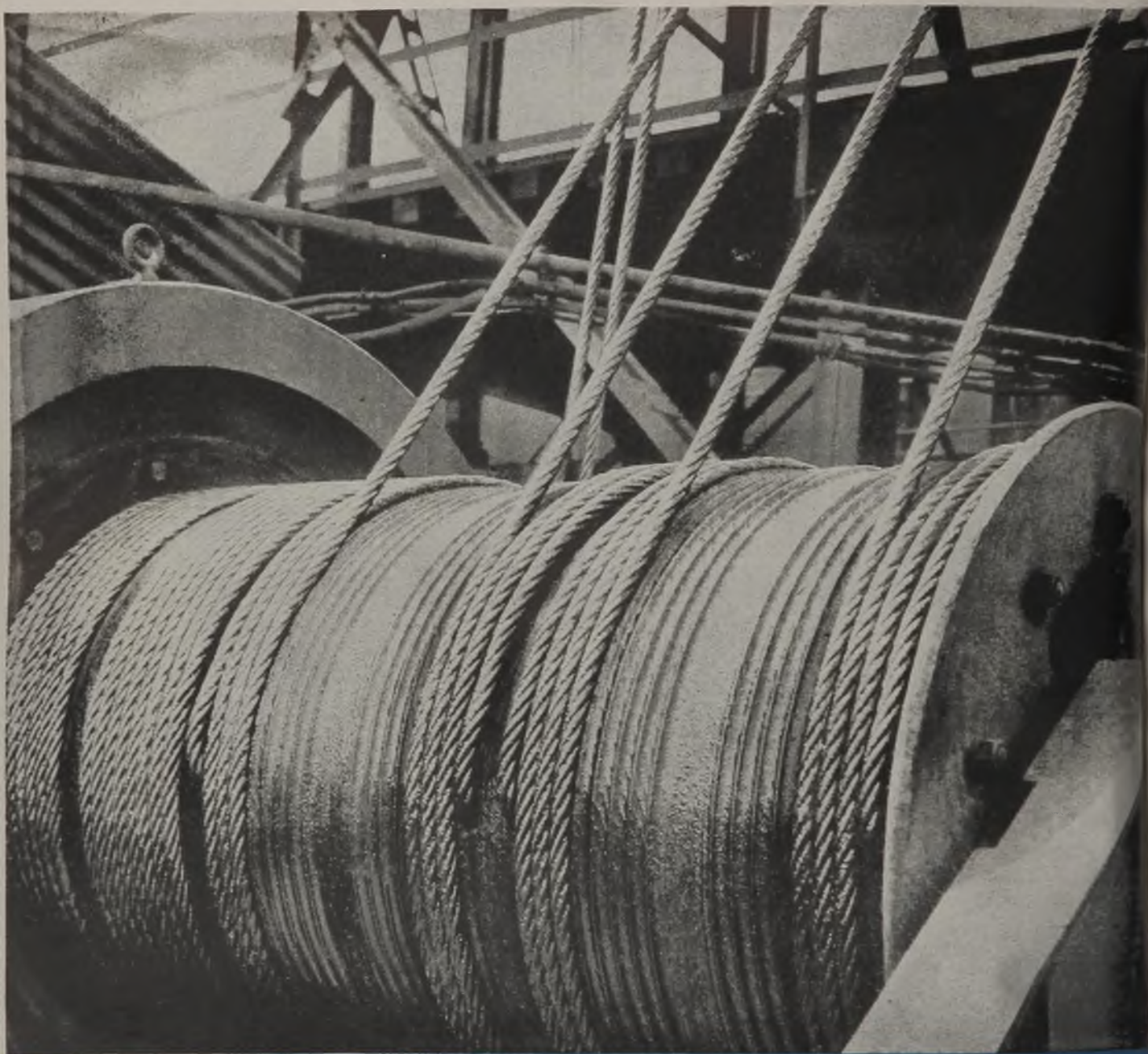
moisture, gives greater protection.

You'll find, as have operators everywhere, that *Texaco*-lubricated equipment lasts longer, runs more efficiently, requires less repair and maintenance. As a result, you get higher tonnage at lower cost.

For *Texaco* Products and Lubrication Engineering Service, call the nearest of the more than 2300 *Texaco* distributing plants in the 48 States, or write The *Texaco* Company, 135 East 42nd Street, New York 17, N. Y.

For the Coal Mining Industry

GET MORE SERVICE



MANUFACTURERS OF

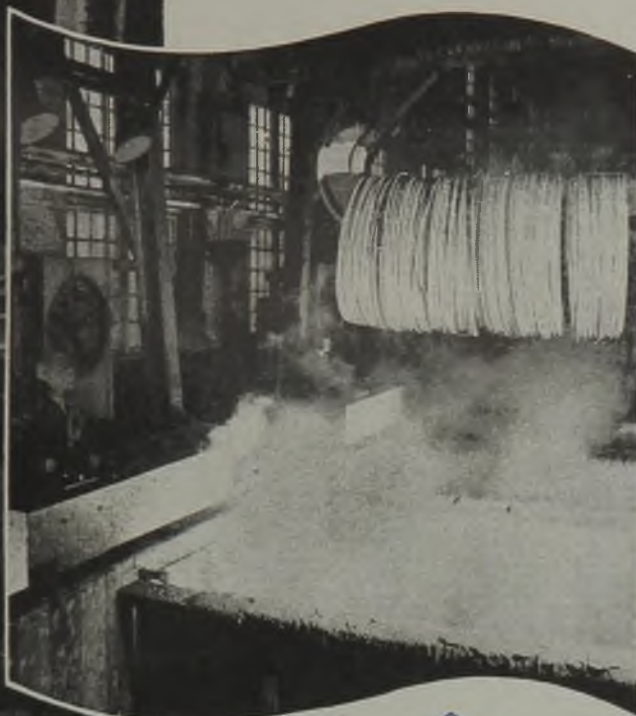
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Aircraft Terminals and Air Controls • Suspension
Bridges and Cables • Aerial Wire Rope Systems • Ski
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Tempered High and Low Carbon Wire and Specialty
Wire, Flat Wire, Cold Rolled Strip and Cold Rolled
Spring Steel • Screen, Hardware and Industrial Wire
Cloth • Lawn Mowers

ROE

PACEMAKER IN

PER DOLLAR...

with the RIGHT wire rope!



There's only one wire rope that is right for any one job. Of all the wire ropes manufactured only one is the right size, the right material, the right construction. And whether it proves to be preformed or non-preformed, you'll find the *right* rope for your job in Roebling's complete line.

FOR EXAMPLE:

Roebling "Blue Center" Steel Wire Rope alone can be supplied in literally hundreds of sizes and constructions . . . either preformed or non-preformed.

EXPERT ADVICE

Get the right rope working for you. A Roebling Field Engineer will be glad to help you choose it. Call him at our nearby branch office or through one of our distributors . . . and get more service for your wire rope dollars.

JOHN A. ROEBLING'S SONS COMPANY

TRENTON 2, NEW JERSEY

Branches and Warehouses in Principal Cities

↑
Straight line wire cleaning—cleaning and lubricating wire for further drawing—is only one of many special methods used in the Roebling mills to insure longest rope service on the job.

← You can find the right rope . . . the correct balance of strength and flexibility plus peak fatigue and abrasion resistance . . . by choosing a Roebling "Blue Center" Steel Wire Rope.

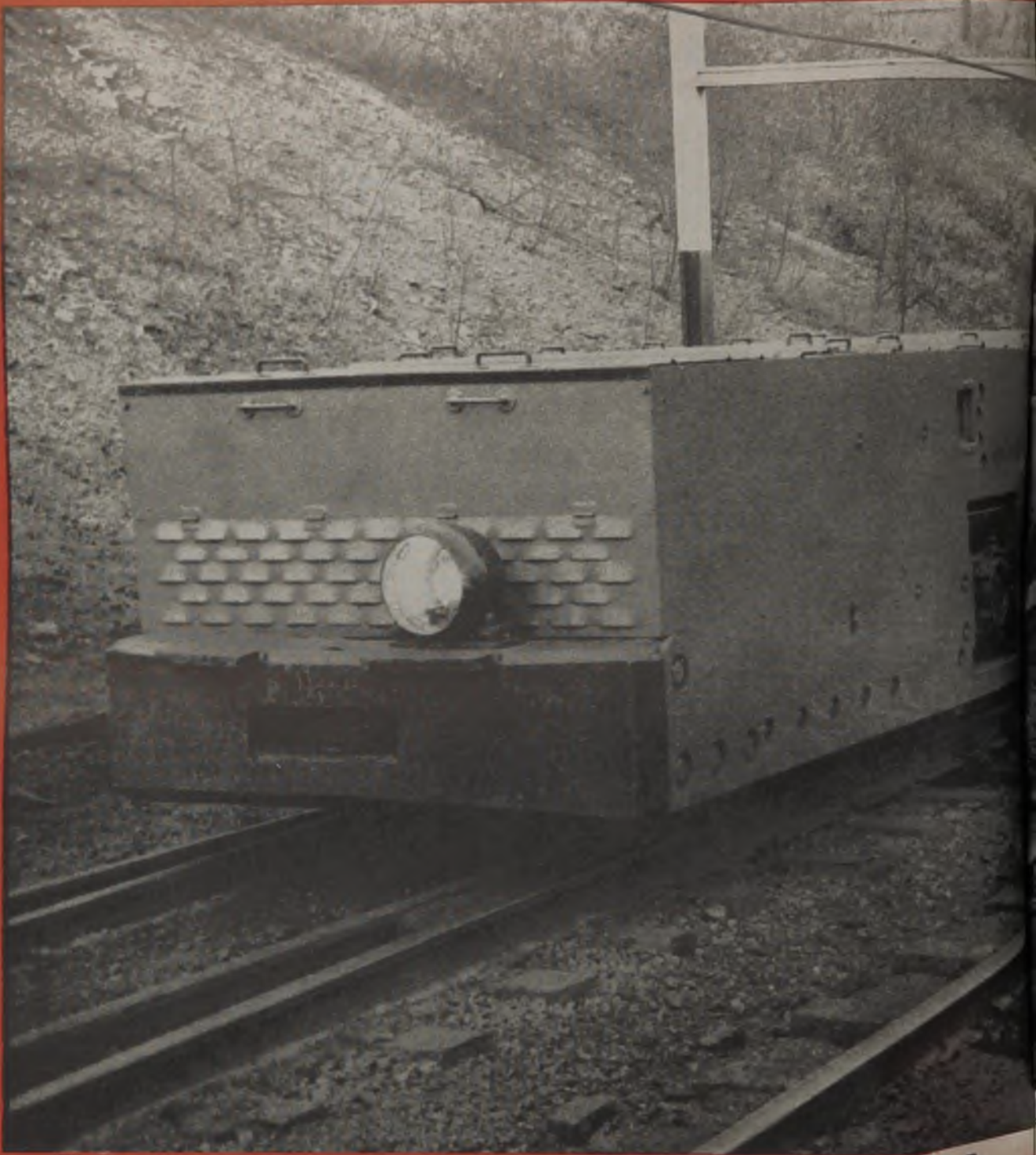
PREFORMED • NON-PREFORMED



ROEBLING

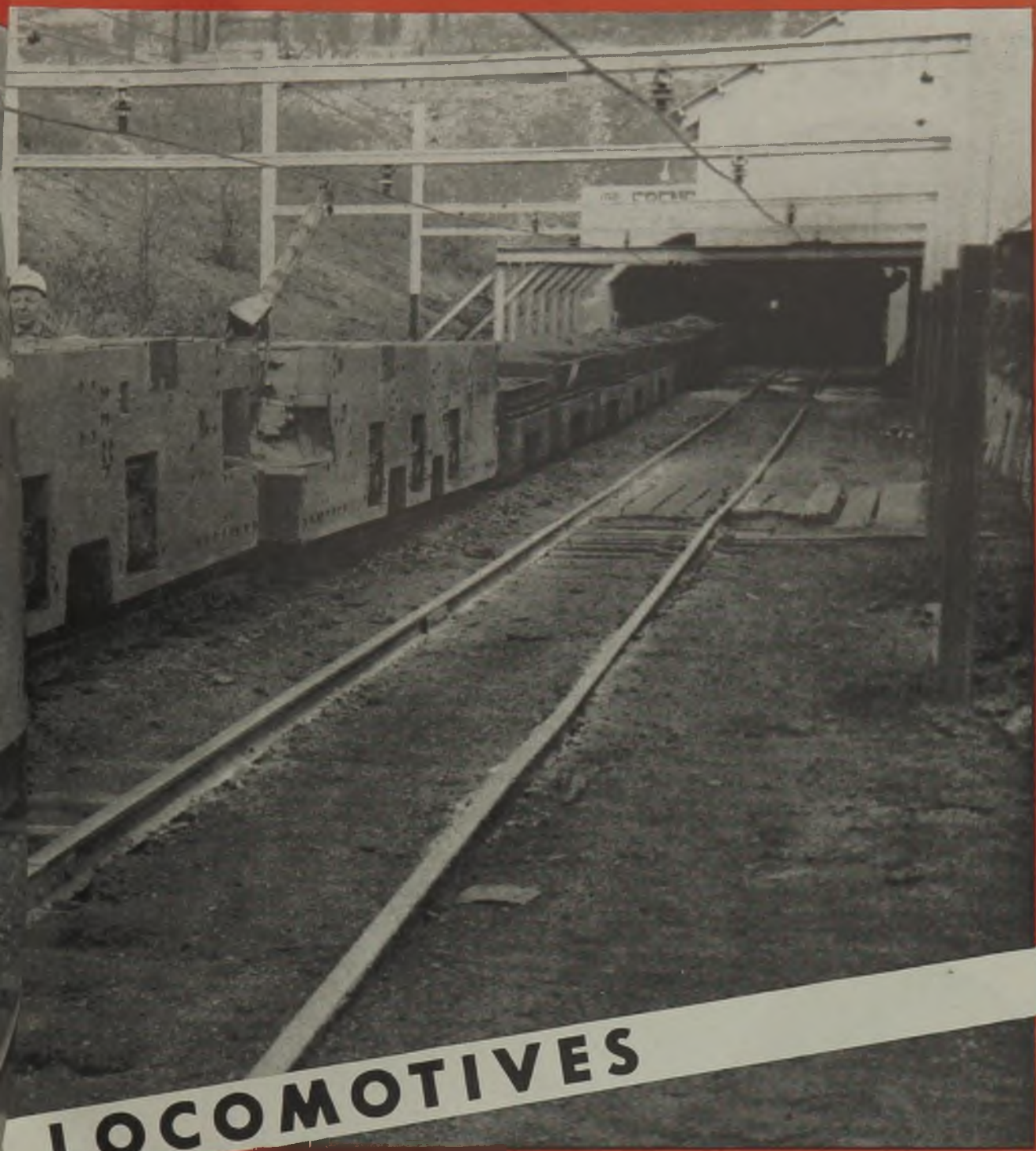
WIRE PRODUCTS





16734

GOODMAN TANDEM



LOCOMOTIVES

This powerful 40-ton tandem unit of 720 horsepower is used on a main line haul of over two miles with a 55.5% grade against the load for the entire distance.

GOODMAN MANUFACTURING COMPANY
CHICAGO 9, ILLINOIS

FOR TODAY'S *Tougher Jobs...*



Where It's Wet

Even the toughest, wettest weather doesn't bother the new totally enclosed Tri-Clad motors. Cast-iron end shields are machined to provide a tight seal. Motor leads are sealed in a nonshrinking compound. Long, close-running fits, and a rotating labyrinth seal, keep moisture from entering the motor along the shaft.



Where It's Corrosive

Acids, alkalis, corrosive fumes, and vapors are kept out of these sturdy new Tri-Clads by tight joints treated with special sealants. Corrosion-resisting screws hold conduit-box covers tightly. Tough Glyptal* paint gives protection from corrosion.



Where It's Dirty

Dirt and dust that cut motor efficiency and shorten motor life can't get into these sealed, totally enclosed Tri-Clad motors. Smooth easy-to-clean surfaces and rounded contours enable these Tri-Clads to look good even in dirty surroundings.



Where Iron Dust Flies

Harmful iron dust and metallic filings can't get past the inner wall of these new Tri-Clads. Bearings are safe from gritty dust in cast-iron housings cast integral with end shields. Long, close-running fits and a rotating labyrinth seal stop dust infiltration along the shaft.



Where Space Is Tight

When space is limited for a totally enclosed motor, you'll appreciate the trim, extra compactness of the new Tri-Clads. A diagonally split conduit box, mounted on either side of the frame, adds little to over-all motor width. These motors do a big job in a little space.



Where Explosion Hazards Exist

The new Tri-Clad totally enclosed motor is available in explosion-proof and dust-explosion-proof constructions with special features that make it suitable for Class I, Group C (through 15 hp) and Group D, and Class II, Groups E, F, and G, locations. All sizes tested and listed by Underwriters' Laboratories, Inc. Also in Bureau of Mines construction (Schedule 2E).

HERE'S A NEW *Tougher Motor*

THE G-E **TRI-CLAD** TOTALLY ENCLOSED MOTOR

1 to 1000 Hp

Enthusiastic reception of the Tri-Clad open motor, with its *extra protection* features, proved that industry was waiting for a motor with protection built in. And, since 1940, more Tri-Clad motors have gone into service than any other integral-horsepower motor.

Now General Electric is ready with a new line of Tri-Clad motors—totally-enclosed, fan-cooled motors—the toughest motors we've ever built.

These new Tri-Clads are designed and built specifically for use in many adverse atmospheres—in iron dust, out of doors, in hazardous areas, and chemical atmospheres. *We believe that they are industry's most dependable motors.*

Their scope of application is as wide as the field of industrial motor use. Safeguarded against most sources of motor damage, their longer life and lower maintenance will make them a sound investment on almost every job.

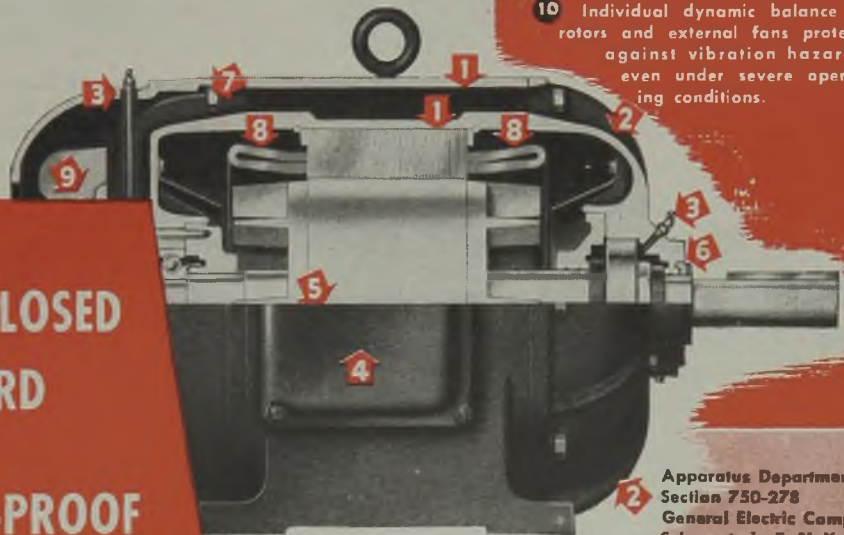
**Trade-mark Reg. U.S. Pat. Off.*

10-POINT PROTECTION

- 1 A cast-iron, double-wall frame completely encloses and protects the windings and punchings.
- 2 Corrosion-resistant cast-iron end shields are machined to provide a tight seal, and protect the motor from dust, dirt, and moisture. Primer and finish coat of protective Glyptal affords high rust-resistance.
- 3 A pressure-relief greasing system, which can be packed with long-life lubricant, protects the bearings.
- 4 The cast-iron conduit box is diagonally split for easy wiring. Boxes are independently explosion-proof on Class I motors.
- 5 Nonshrinking compound around motor leads protects motor interiors from dust and moisture at the point where leads pass through the frame.
- 6 Rotating labyrinth seal further protects motor interior from damage by foreign matter.
- 7 Large air passages provide adequate protection from overheating. Easy to keep clean and open, too.
- 8 Modern, "ageless" insulation treatment includes windings of Formex[®] magnet wire.
- 9 Removable external fan is of the nonsparking type in explosion-proof motors.
- 10 Individual dynamic balance of rotors and external fans protects against vibration hazards, even under severe operating conditions.



**TOTALLY ENCLOSED
STANDARD
and
EXPLOSION-PROOF
MOTORS**



Apparatus Department,
Section 750-278
General Electric Company
Schenectady 5, N. Y.

**FOR THE
COMPLETE STORY**

Please send me GEA-4400, which describes the new Tri-Clad totally enclosed motors. Please send me GEA-4141, "Motors and Control for Hazardous Locations."

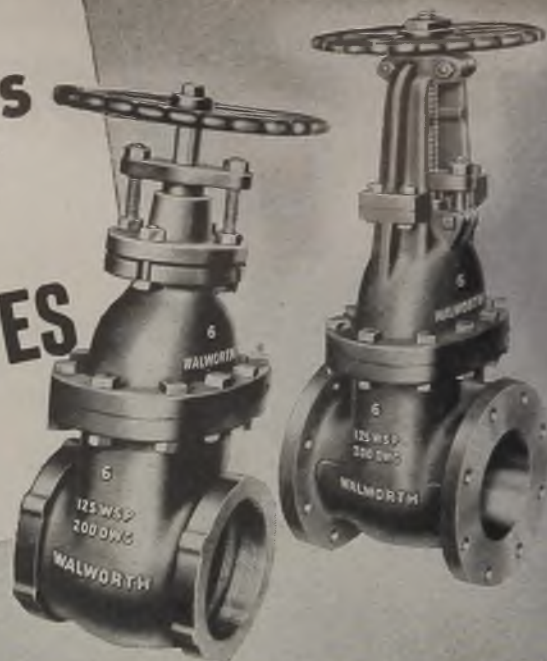
NAME.....

COMPANY.....

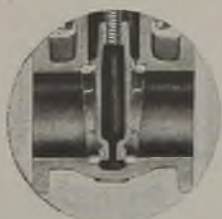
ADDRESS.....

GENERAL  ELECTRIC

WALWORTH PRESENTS
A New Line of
IRON BODY GATE VALVES
 with screwed or flanged ends



... 8 Outstanding Features



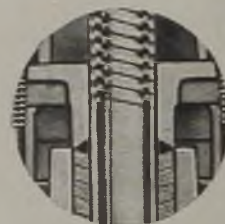
Straight-Flow Port Design reduces fluid turbulence to a practical minimum.



Seat Rings of end-seated type are screwed into the body.



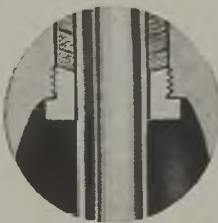
Sure-Grip Malleable handwheel for non-skid gripping even with heavy gloves.



Brass Liner on Glands assures greater resistance to corrosion and scoring.



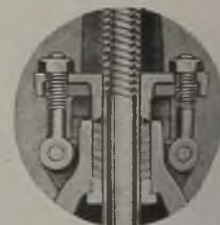
T-head disc-to-stem connection on OS&Y types provides stronger connection, prevents loosening of disc by corrosion.



Bronze back-seat bushings in bonnets of OS&Y valves. (As soon as W.P.B. Limitation order permits.)



Solid Web Type disc in OS&Y valves for greater strength and longer service.



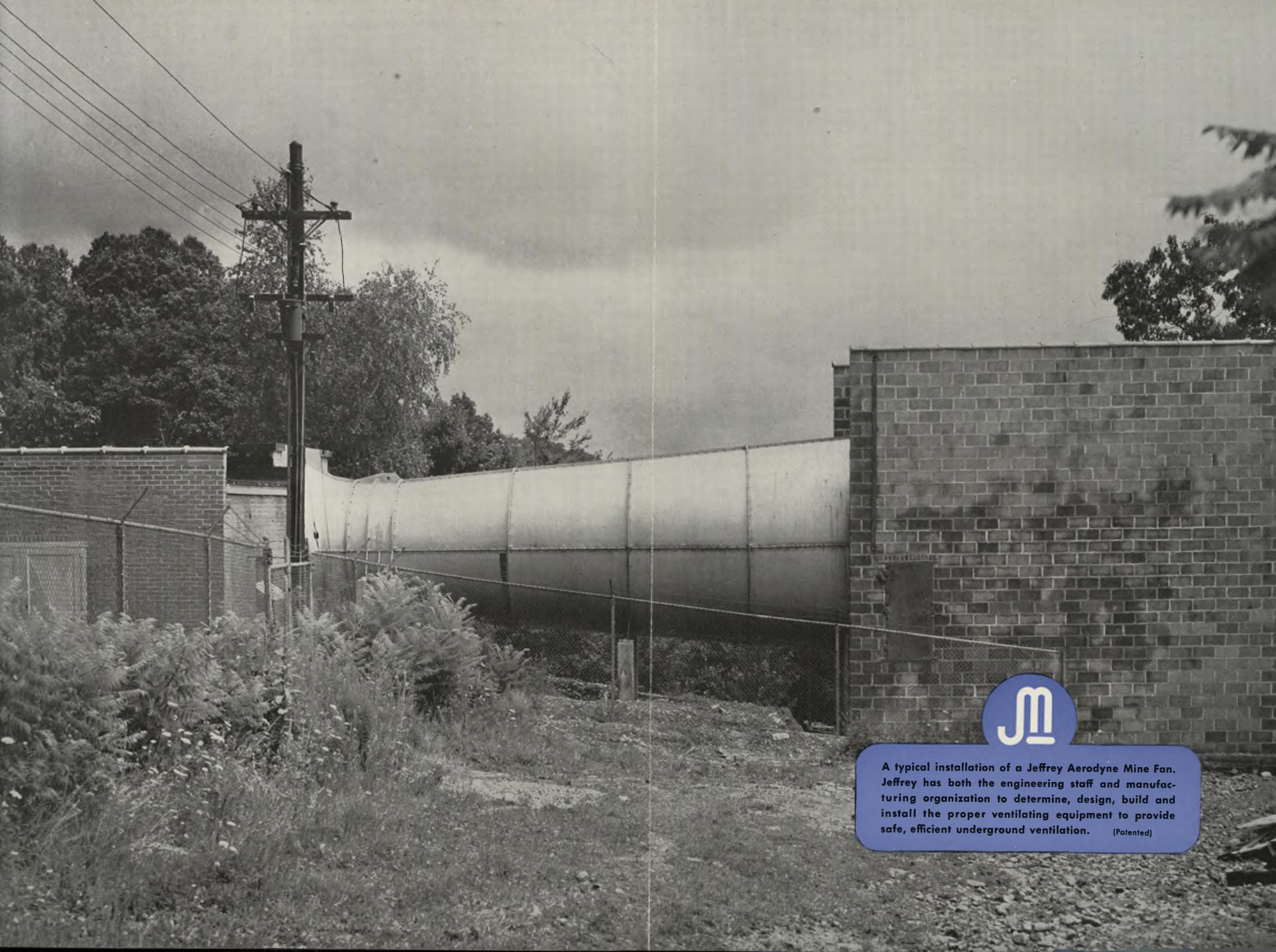
Hinged Gland Eye-Bolts on OS&Y valves permit faster, easier repacking under full pressure.

WALWORTH
 valves and fittings

60 EAST 42nd STREET, NEW YORK 17, N. Y.

DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD

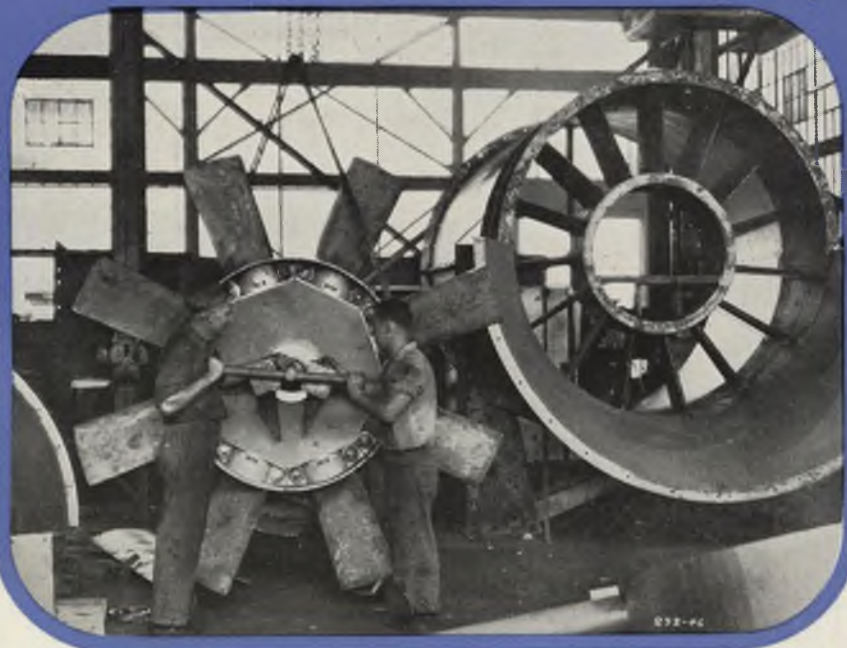
For Complete Information on these new Walworth Iron Body Valves, write for bulletin 106.



A typical installation of a Jeffrey Aerodyne Mine Fan. Jeffrey has both the engineering staff and manufacturing organization to determine, design, build and install the proper ventilating equipment to provide safe, efficient underground ventilation. (Patented)

DELIVERING FRESH AIR

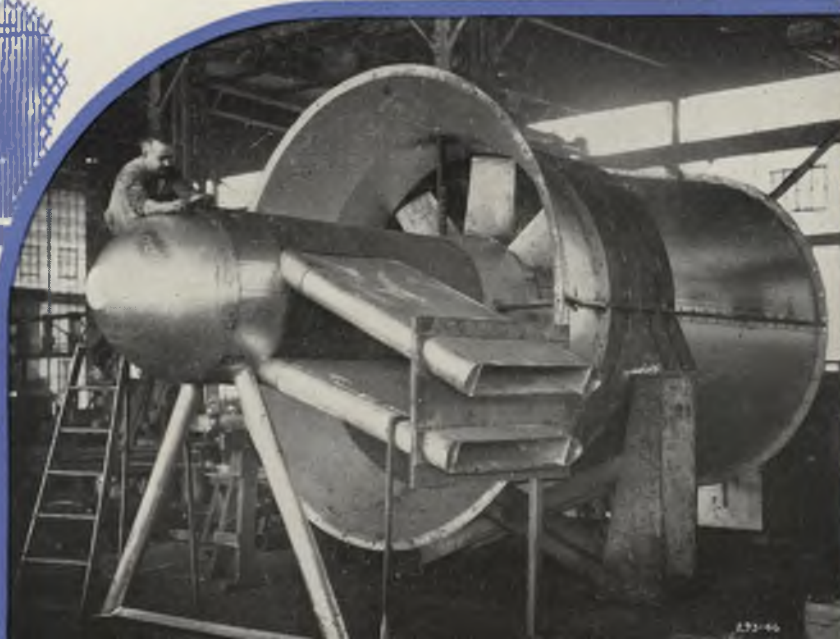
where it's needed most underground



● That is the function of Jeffrey Aerodyne Fans. That is one of the vital jobs of modern, mechanical mining if high production is to be maintained.

On this page we look behind the scenes—showing two stages of manufacture and some of the men responsible for the unfailing performance of these fans. It is the skill of these employees—their experience and their careful workmanship which assures efficient operation of fans in actual service.

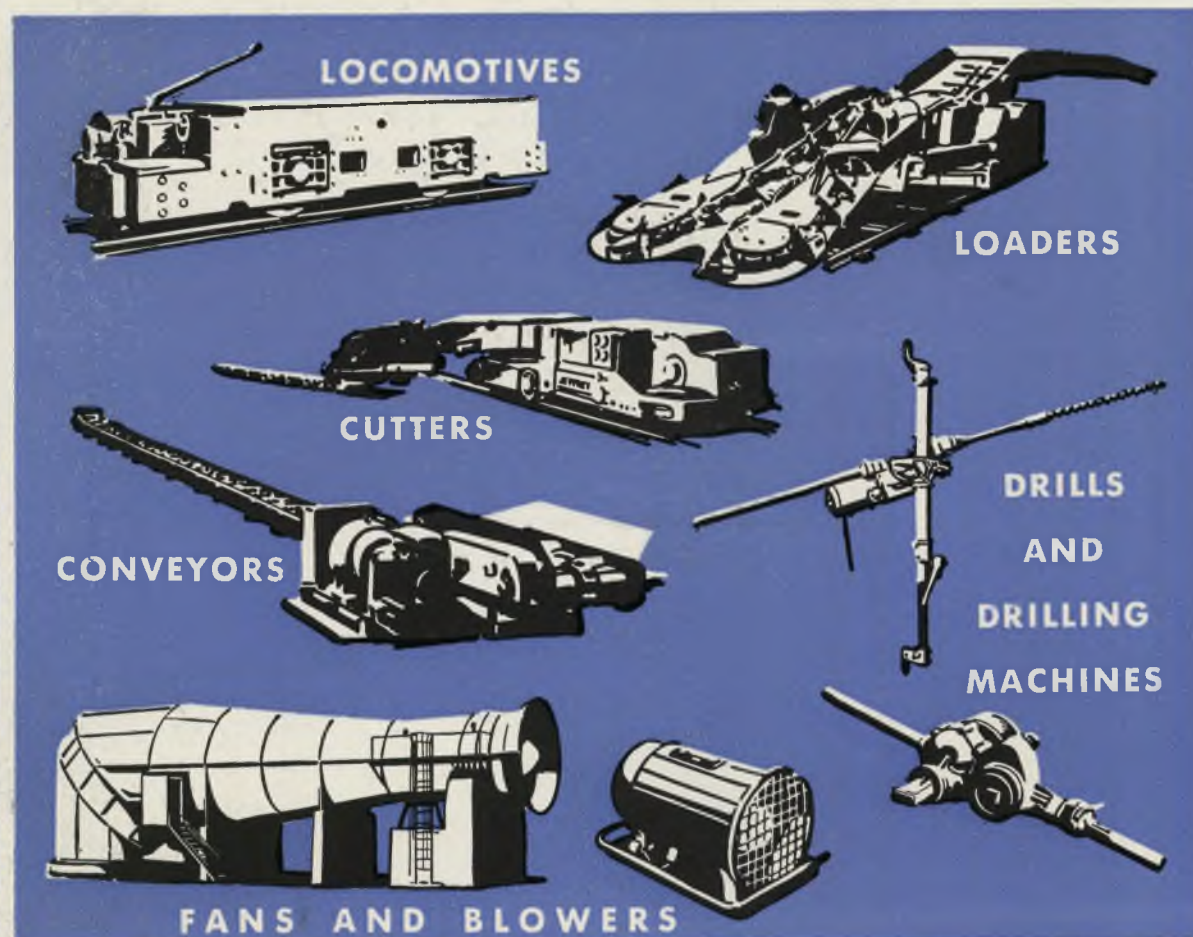
It is also their strict adherence to Jeffrey standards of quality that has gained such a favorable acceptance for Jeffrey mining equipment in the coal mines of the country. "Designed and Built by Jeffrey" really means something. To you—a guarantee of fine workmanship and long, dependable service. To us—the satisfaction of being of real service to the industry.



Jeffrey

EQUIPMENT FOR COAL MINES

JEFFREY SERVICE TO THE COAL MINES
MEANS SERVICE TO ALL INDUSTRY



THE JEFFREY MANUFACTURING COMPANY

Established in 1877

912-99 NORTH FOURTH STREET, COLUMBUS 16, OHIO

Sales Offices:

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Salt Lake City

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St. Louis

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W. Va.

Scranton

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Montreal, Quebec

British Jeffrey-Diamond, Ltd.
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Jeffrey-Galion (Pty), Ltd.
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Ashland's



PERMATREAT COAL SPRAY

More Lasting Protection Against Dust and Freezing

Permatreat Coal Spray holds down dust until coal is consumed; wins dealer and consumer acclaim. No corrosive action — your equipment and customers' heating plants are protected.

The location of **Ashland** in the heart of the coal-producing region offers service and shipping advantages. Our representative will give you the facts.

Laboratory Service Provided

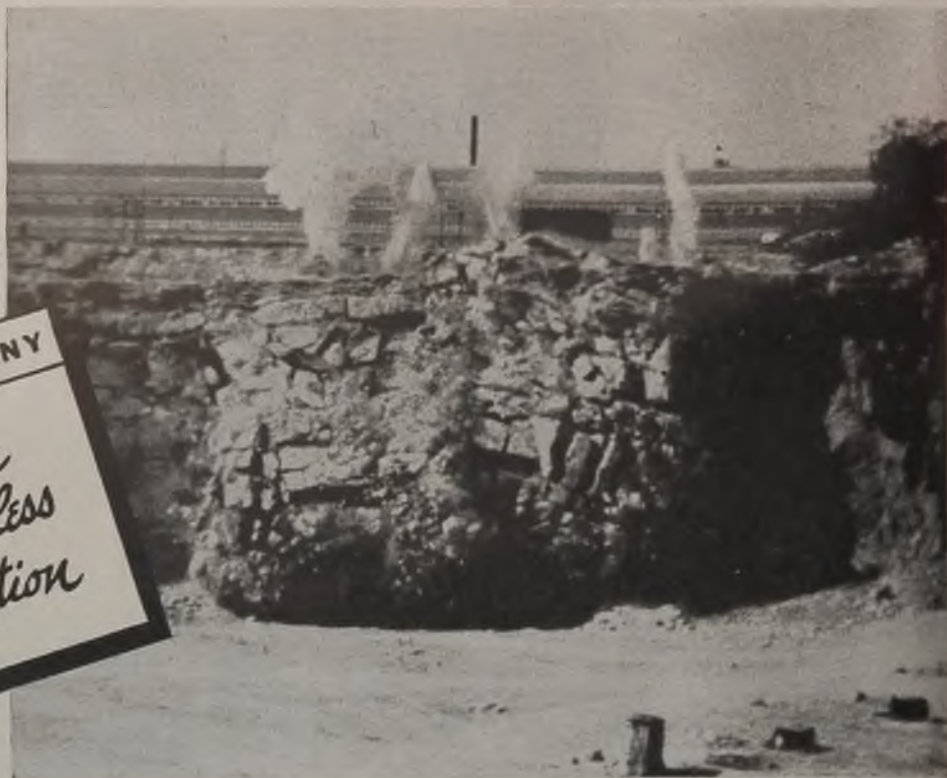
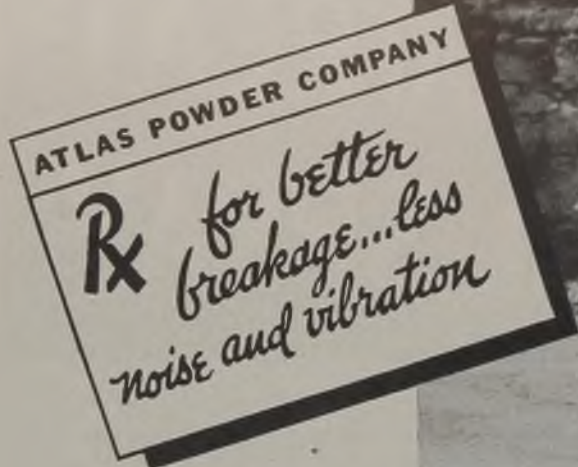
Our engineers make tests right at the mine with portable dust-index laboratory. Conditions are studied and specific recommendations made on grade, amount and method of applying **Ashland** Permatreat Coal Spray for low-cost, lasting protection.

Check ✓
THESE ADVANTAGES . . .

- ☐ DUSTPROOFS
- ☐ PERMANENT EFFECT
- ☐ ODORLESS TREATMENT
- ☐ EASILY ACCESSIBLE SUPPLY
- ☐ FREEZEPROOFS
- ☐ LESS WINDAGE LOSS
- ☐ BETTER STOKER FEED
- ☐ NO CORROSIVE ACTION
- ☐ HELPS SALES



ASHLAND OIL & REFINING COMPANY
INCORPORATED
ASHLAND, KENTUCKY



The **ROCKMASTER** Blast Prescription is Compounded Especially for Your Job

What is Rockmaster? It's a sensational new blasting system that enables you to time the delay elements of your shot in thousandths of a second—giving you a new degree of timing control never before possible.

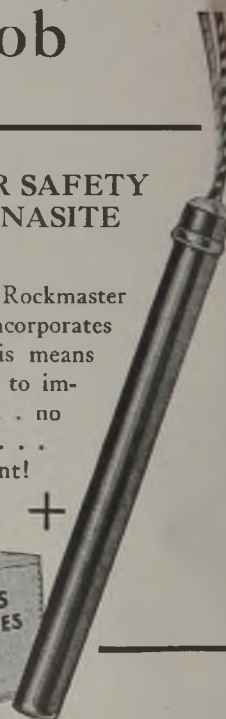
More important, Rockmaster is a system that's *especially* "compounded" to fit each job. Drilling, spacing, type of explosives and timing of detonation are carefully selected to get the most from each shot. Explosives do more work on the rock, and less energy is expended in the air.

That's why your Atlas representative can refer you to users who have increased rock fragmentation by as much as 30% with Rockmaster. That's why, too, in many cases, Rockmaster has totally eliminated complaints about noise and vibration—even when more holes have been fired than formerly.

Frankly, the Rockmaster System is not the answer to every blasting problem. But with our knowledge of explosives and your knowledge of the job, the chances are that it will work for you. If so—you'll actually have to *see* the results to believe them possible! Call in the Atlas representative.

THE GREATER SAFETY OF ATLAS MANASITE DETONATORS

Remember, the Atlas Rockmaster Blasting System also incorporates Atlas Manasite. This means decreased sensitivity to impact and friction . . . no sacrifice of economy . . . less chance of accident!



ROCKMASTER: Trade Mark

ATLAS

EXPLOSIVES

"Everything for Blasting"



ATLAS POWDER COMPANY, Wilmington 99, Del. • Offices in principal cities • Cable Address—Atpowco

Solving a difficult coal handling problem

WITH

TIMKEN BEARINGS



The Belfry Coal Company in the Williamson, W. Va. field, was faced with a transportation problem — how to move coal over difficult terrain from their new mine in Kentucky across the Tug River to the Norfolk & Western Railroad in West Virginia.

The Industrial Division of Continental Gin Company, Birmingham, Alabama, solved their problem by designing a 680' belt conveyor system with Continental Timken Bearing Equipped idlers carried on a suspension bridge as shown in the photographs.

Today Timken Tapered Roller Bearings help move 150 tons of coal each hour at a speed of 200 feet per minute. Timken Bearings were used in the conveyor system because the idlers had to be free-rolling while carrying radial, thrust and combined loads under all speeds and operating conditions. Timken Bearings gave assurance to the Belfry Coal Company that moving parts would be kept in correct and constant alignment; lubrication would be simplified and greatly reduced, thus giving years of smooth, dependable performance at low maintenance cost.

Make sure you are getting these advantages by specifying Timken Bearings for your new equipment. Look for the trade-mark "TIMKEN" on every bearing you buy. The Timken Roller Bearing Company, Canton 6, Ohio.



48

YEARS OF ENGINEERING AND METALLURGICAL DEVELOPMENT

Now...

for more effective Public Relations in the Bituminous Coal Industry

... A STRENGTHENED BITUMINOUS COAL INSTITUTE

● For some time it has been increasingly evident that the public relations work of the Bituminous Coal Institute could be made even more effective and the efficiency of its operation improved *by closer coordination with the National Coal Association.*

To accomplish this, on last August 1st, the B.C.I. Board of Directors unanimously adopted the recommendations of its Policy Committee to:

1. Transfer the headquarters of the Bituminous Coal Institute from New York City to Washington, D. C.
2. Replace the office of General Manager of B.C.I. by a Director of Public Relations coordinating with the Executive Secretary of the National Coal Association.
3. Reorganize and redefine the set-up and functions of the Bituminous Coal Institute staff so as to accomplish the greatest possible degree of effectiveness in its activities.

The move from New York and the reorganization of the B.C.I. staff have been completed and the Institute is now in operation in Washington, in offices in the Southern Building.

Ralph C. Mulligan, for many years on the staff of the National Coal Association, has been chosen as the Institute's Director of Public Relations.

Making Friends Through Understanding

For its three years of existence, the Bituminous Coal Institute has a record of solid accomplish-

ment in improving the public relations of the Bituminous Coal industry, by making the facts about it known to the public. Now the work of building friendship for the industry should be accelerated.

While there is unmistakable evidence that the coal industry has gained friends, there is still a big job to be done—and the industry's public relations program, which has been so well begun, must now be continued more vigorously and zealously than ever.

B. C. I. Is Important to YOU

You . . . and every member of every branch of our industry . . . will reap the benefit of the Bituminous Coal Institute's public relations program.

The B.C.I. will . . . and *must* . . . deal with many of the important public relations problems that confront the coal industry on a national basis. And although these problems may be national in scope, they are local in effect. As you can appreciate, they relate to your business—whether you are a producer, a wholesaler, or a retailer of Bituminous Coal.

And the *amount of benefit* you . . . or anybody in the coal business . . . will ultimately derive from the B.C.I.'s public relations activities depends in large measure upon the *amount of support* these activities receive.

The forward-looking operators who now finance the Bituminous Coal Institute will welcome, and should have, the active financial and moral support of every Bituminous Coal producer.

BITUMINOUS COAL

BITUMINOUS COAL INSTITUTE

Affiliated with NATIONAL COAL ASSN., Washington, D. C.

BITUMINOUS COAL . . . LIGHTS THE WAY . . . FUELS THE FIRES . . . POWERS THE PROGRESS OF AMERICA



15 YEARS OF RUGGED SERVICE. . . THAT'S THE RECORD OF
THIS BW H TRANSMISSION BELT!

Day-in and day-out for fifteen years, this tough BW H Transmission Belt has powered a Beater drive in one of America's great paper mills.

Made by the famous Rotocure process of continuous vulcanization — which eliminates potential trouble spots and increases operating life — this belt proved it could take it . . . under high stress . . . difficult operating conditions . . . and on peak load starting.

The success stories of BULL DOG Transmission Belts are matters of record in ore-crushing, refinery, paper, lumber, and textile industries . . . to name a few. So look to BW H for dependable ruggedness . . . BW H distributors for dependable service!

HAVE YOU A JOB WHERE STAMINA COUNTS?

Bring us your toughest problems . . . we're specialists in solving them. Consult your nearest BW H distributor, or write to BW H direct.

BOSTON WOVEN HOSE & RUBBER COMPANY

Distributors in All Principal Cities

WORKS: CAMBRIDGE, MASS., U. S. A. + P. O. BOX 1071, BOSTON 3, MASS.



COAL INDUSTRY

Served by

UNION PACIFIC

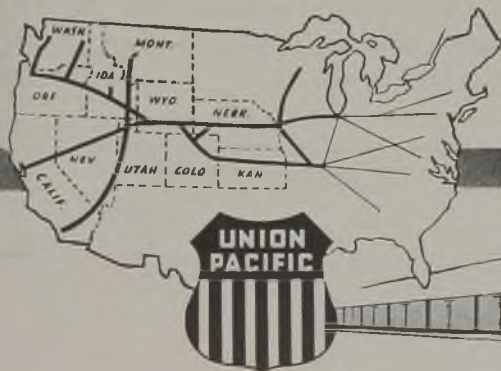
Your industry is one of hundreds served by Union Pacific. Every shipper is assured of efficient, dependable transportation when materials or merchandise are earmarked for the Strategic Middle Route, uniting the East with the Midwest, Intermountain, and Pacific Coast States.

Union Pacific provides specifically designed cars, various services and departments, to assure proper handling of a wide diversity of products.

Union Pacific's facilities and equipment are ready to meet the heaviest needs of commerce. Traffic experts are stationed from coast-to-coast. They will help you with that *next* shipment—and every shipment.

For dependable, fast freight service always . . .

be Specific -
say "Union Pacific"



★ Union Pacific will gladly furnish confidential information regarding available industrial sites having trackage facilities in the territory it serves. Address Industrial Dept., Union Pacific Railroad, Omaha 2, Nebraska.

UNION PACIFIC RAILROAD

The Strategic Middle Route

IN WIND, RAIN, SNOW OR HAIL • YOUR FREIGHT GETS THERE BY RAIL

FIRST

in Mining



TIGER BRAND
takes dirty work
in its stride!



... it's tougher than the job!

MADE of high tensile wire from select U-S-S Steel, TIGER BRAND is extra tough, extra flexible. Whether you're quarrying, stripping, or operating underground, it will help you reduce maintenance and replacement costs.

In Excellay Preformed construction TIGER BRAND is easy to handle . . . can be installed quickly . . . has less ten-

dency to loop and kink . . . has higher resistance to bending fatigue, features which insure longer life and improved performance. It is safer, too. Crown wires lie flat and in position when broken and do not stick out to injure handlers.

You can't buy finer wire rope at any price, so get in touch with your nearest supplier today.

*Excellay
Preformed*



AMERICAN STEEL & WIRE COMPANY
Cleveland · Chicago · New York

COLUMBIA STEEL COMPANY, San Francisco
Tennessee Coal, Iron & Railroad Company, Birmingham, Southern Distributors
United States Steel Export Company, New York

UNITED STATES STEEL



U.S.S. AMERICAN
TIGER BRAND

*Wire
Rope*

Solve
LA-DEL

Below is a La Del Troller high pressure Vane-Axial flow fan, 5' diameter, coupled to a drift opening. Circulates

pure, fresh air in mine workings to promote safety, greater production and better morale at low operating cost.



Ventilation Troubles!

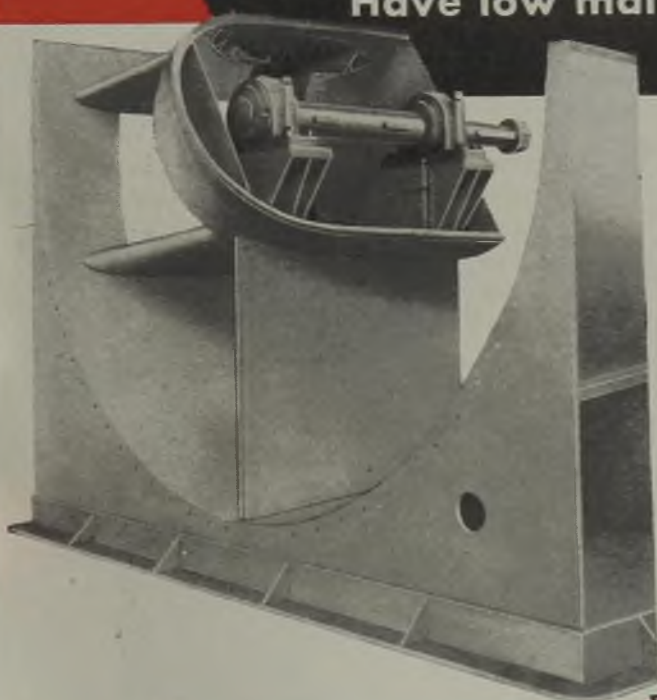
AXIAL FLOW FANS

(TROLLER DESIGNED)

Give quiet, smooth air flow . . .

Use less power . . .

Have low maintenance . . .



The split nosing on this 10' diameter high pressure Vane-Axial flow fan affords easy access to bearings and shaft assembly. Streamlined belt fairings protect belts from the air stream.



The complete rotor assembly of a 10' diameter high pressure fan shows how adjustable pitch propeller blades are statically balanced on specially designed La Del machines.

JOY LOADERS
load more
tonnage
faster!



Consult a Joy Engineer

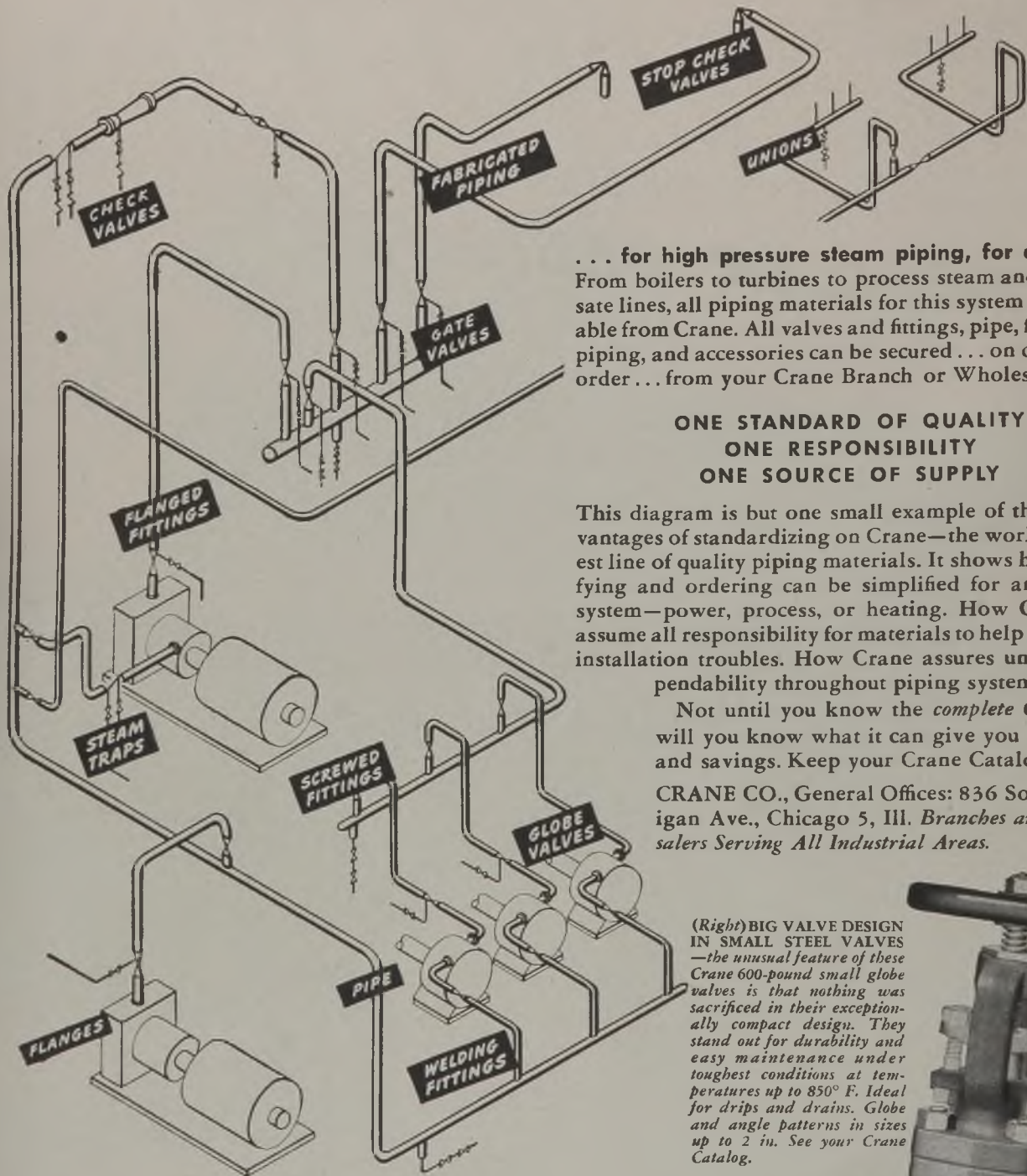
LA-DEL Division

JOY MANUFACTURING CO.

LOCATIONS: HENRY W. OLIVER BUILDING • PITTSBURGH, PA.

ONE ORDER TO CRANE...

Covers All Piping Materials



... for high pressure steam piping, for example. From boilers to turbines to process steam and condensate lines, all piping materials for this system are available from Crane. All valves and fittings, pipe, fabricated piping, and accessories can be secured ... on one single order ... from your Crane Branch or Wholesaler.

**ONE STANDARD OF QUALITY
ONE RESPONSIBILITY
ONE SOURCE OF SUPPLY**

This diagram is but one small example of the big advantages of standardizing on Crane—the world's greatest line of quality piping materials. It shows how specifying and ordering can be simplified for any piping system—power, process, or heating. How Crane can assume all responsibility for materials to help you avoid installation troubles. How Crane assures uniform dependability throughout piping systems.

Not until you know the *complete Crane line* will you know what it can give you in service and savings. Keep your Crane Catalog handy.

CRANE CO., General Offices: 836 South Michigan Ave., Chicago 5, Ill. *Branches and Wholesalers Serving All Industrial Areas.*

(Right) BIG VALVE DESIGN IN SMALL STEEL VALVES—the unusual feature of these Crane 600-pound small globe valves is that nothing was sacrificed in their exceptionally compact design. They stand out for durability and easy maintenance under toughest conditions at temperatures up to 850° F. Ideal for drips and drains. Globe and angle patterns in sizes up to 2 in. See your Crane Catalog.



EVERYTHING FROM ...

VALVES • FITTINGS
PIPE • PLUMBING
HEATING • PUMPS

CRANE

FOR EVERY PIPING SYSTEM

R.O.M. COAL

Plus R & S PREPARATION Equals

COAL PROFITS



- Mechanical coal cleaning in surface plants with R & S Equipment permits mechanized mining under ground—at lower cost.
- R & S Hydro-Separators for coarse coal 6" x $\frac{3}{4}$ " and R & S Hydrotators for fine coal $\frac{1}{4}$ " x 0" open broader market areas—make coal worth more.
- R & S Hydrotators—in fine coal preparation plants—increase the recovery of marketable

coal as much as 50% over other processes—turn waste into profit.

More and more mines are turning to R & S for high efficiency and low cost.



ROBERTS and SCHAEFER CO.

303 North Michigan Avenue, Chicago

2221 Oliver Building
PITTSBURGH 22, PA.

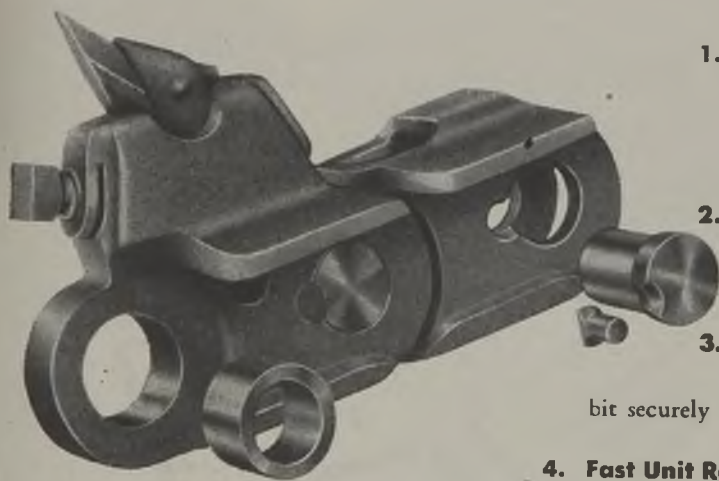
P. O. Box 570
HUNTINGTON, W. VA.

Let **FABRI-FORGED** cutter bars and chains help you meet today's higher mining costs

Higher wages, higher freight rates, higher costs generally cut the spread between mining cost and price ceilings. The only answer is greater efficiency, economy and dependability in your mining equipment.

Here is how Bowdil Fabri-Forged Cutter Chain and Bars and Bowdil Concave Bits supply that answer . . . help you keep operating profits up.

FABRI-FORGED cutter chain saves time, cuts costs

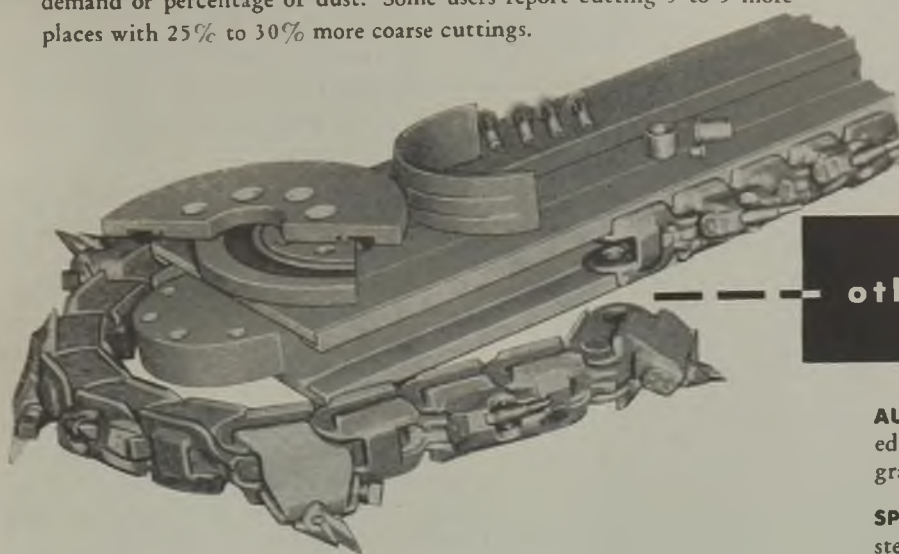


1. **Eliminates Damaged Guides and Wearing Strips.** Bowdil's true-running radial track guide makes the chain circle the head at the correct angle. Smooth, wobble-free run prevents damage to guide or wearing strips.
2. **Extra Strength.** Drop-forged lug body and symmetrical connector are of equal strength . . . strong enough to withstand many times normal loads.
3. **Easy to Maintain.** Bowdil design makes connection, removal and replacement quick and easy. One-piece bit holder, wedging bit securely to lug projection, can be quickly inserted by anyone.
4. **Fast Unit Repairs.** Bowdil's simple bit holder and ingenious rivet lock permit quick replacement of bits or entire links without removing chain from machine.
5. **Long Life.** Large pin and bushing, heat treated for maximum wearing life, take the wear. Heavy shoulders on links and lugs carry the load and shock . . . distribute stress . . . lengthen life and increase efficiency of entire cutting end of machine.

coal mining equipment...The

Bowdil concave cutter bits give 15% to 20% longer life

Actual operating records prove Bowdil Concave Cutter Bits give 15% to 20% longer life than ordinary bits . . . plus important power savings. The concave face permits Bowdil Bits to function efficiently when worn down 25% farther than others without increasing power demand or percentage of dust. Some users report cutting 3 to 5 more places with 25% to 30% more coarse cuttings.



other BOWDIL cost cutters

AUGERS AND DRILL BITS specially heat treated, give longer service . . . eliminate grabbing.

SPROCKETS of long-wearing, tough alloy steel specially heat-treated for hard service. Sprockets in stock for all popular makes of machines.

AUGER BITS. Tough, long-wearing. Fish tail, four point and two point clay bits.

BOWDIL ROPE SOCKET. Safe, easily installed, easily removed, light, strong, protects the rope by providing a straight pull.

SPIKE PULLER. Detachable claws, easily removed for replacement of change of spike size. Won't bend spikes.

MINERS' PICKS. Replaceable points heat-treated for long service. Designed for ideal weight and balance.

BOWDIL CHOKE-ARC TRANSFER SWITCH. Instantaneous in operation, dependable, trouble free.

TWO-POLE CABLE AND REEL SWITCH. Sturdy, dependable, durable.

FABRI-FORGED cutter bars give longer service, produce more coarse cuts, save power

- 1. Longer Life.** Fabri-Forged Cutter Bars are popular with machine runners, foremen, maintenance men and operators alike because they give longer, trouble-free service . . . eliminate shut-downs for repairs. Built throughout of high-strength alloy steels with larger bearing surfaces, they stand up longer in tough service.
- 2. Stronger.** All-welded construction eliminates rivet holes in the body, retaining full strength of the material.
- 3. Less Deflection.** Actual tests show that while conventional bars 4" thick will bend under 25 to 35 tons pressure between three foot centers, Fabri-Forged Bars 3" thick will withstand 40 to 45 tons before bending. Fabri-Forged Cutter Bars are available to fit 75 different types of short wall, long wall, arcwall and track cutting machines of all popular makes.

BOWDIL COMPANY
ANTON, OHIO

FIELD MEN AND REPRESENTATIVES IN
Whitesburg, Kentucky; West Frankford, Ill.;
Charleroi, Pa.; Denver, Colo.; Big Stone
Gap, Va.; Williamson, W. Va.; Canton,
Ohio; Birmingham, Ala.; Helper, Utah;
Kansas City, Mo.; Centerville, Iowa;
Topeka, Kansas; New Castle, England.

This Piece of Rope is Doomed

(NEXT TIME THEY'LL USE IWRC)

Too bad. It was a good wire rope, and it could have lived a long, useful life.

Instead, it's doomed to an early scrapping—and all because of crushing on the drum. The crushing was hastened by very poor spooling, which will shorten the life of any rope.

IWRC
would have helped
prevent this

In some rope service, even with the best of spooling, it is difficult to avoid heavy, crushing pressures. But you can help counteract such pressures by purchasing rope with an IWRC (independent wire rope center).

An independent wire rope center is a separate little rope in itself—a rope within a rope. It performs the same duty as the conventional hemp core, but is naturally stronger, less yielding under pressure.

With IWRC, you may sacrifice a minor amount of flexibility. Nevertheless, where the hazard of crushing is present, IWRC should be specified. Under these conditions, it will substantially prolong rope life.

Why not review your roping needs with a Bethlehem engineer? If he finds you need IWRC, he'll recommend it—but only where it will actually work to your advantage.

BETHLEHEM STEEL COMPANY
Bethlehem, Pa.

On the Pacific Coast Bethlehem products are sold by
Bethlehem Pacific Coast Steel Corporation

An independent wire rope center gives added support to the strands which lie around it.

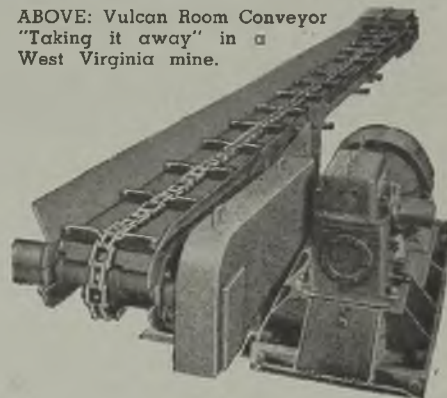


When you think WIRE ROPE . . . think BETHLEHEM

You can do it . . . with a Vulcan Chain Conveyor



ABOVE: Vulcan Room Conveyor
"Taking it away" in a
West Virginia mine.



Complete assembly of Vulcan Room Conveyor showing drop-forged flights, with integral chain links, which cannot become loose in service. The fully enclosed drive unit can be powered by either an electric or compressed-air motor.

WHEN the coal is ready and the cars are waiting — you can load a Vulcan Chain Conveyor up to the limit and she'll carry it away without turning a hair. There's an extra margin of strength built into every working part to take care of just such overloads as shown in the illustration above. If overloaded so badly that something **MUST** go, it's usually the shear pin in the head sprocket which can easily be replaced.

Write us regarding any requirement for underground conveyors — either Chain or Shaking Chute. We manufacture both types in a wide range of sizes, together with a complete line of Pans, Rollers, Jacks and other modern accessories. Bulletins containing complete working data mailed promptly on request.

VULCAN IRON WORKS

Established 1849

Main Office and Works

WILKES-BARRE, PA., New York Office 50 Church

Heavy-Duty Electric Hoists
Self-Contained Hoists
Scraper Hoists
Car-Spotting Hoists
Room Hoists

Shaking-Chute Conveyors
Chain Conveyors
Cast-Steel Sheaves and Gears
Cages, Skips and Gunboats
Coal-Preparation Equipment

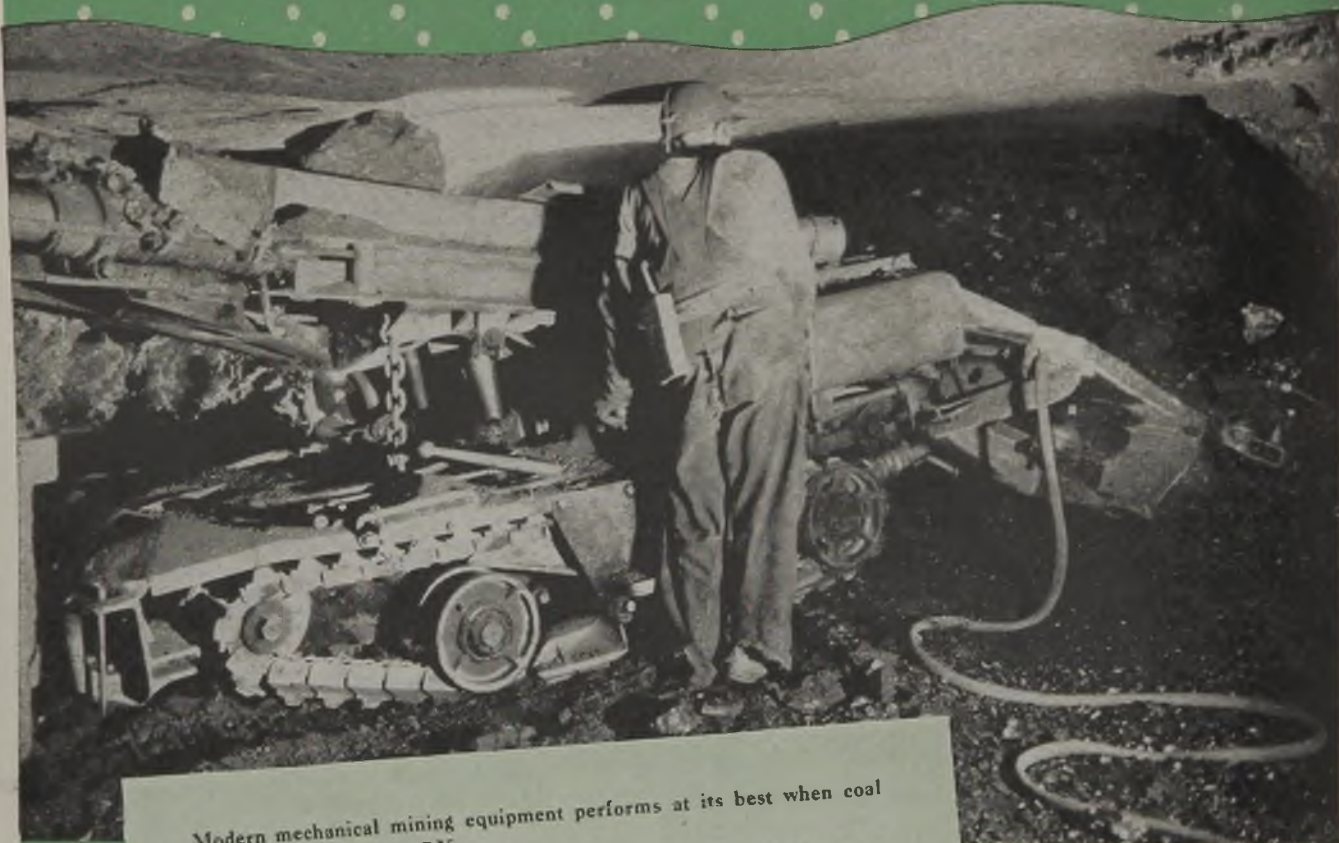
Steam Locomotives
Diesel Locomotives
geared and electric drive
Gasoline Locomotives
geared and electric drive

Load-Carrying Larries
Rotary Kilns, Coolers and Dryers
Crushing Rolls and Pulverizers
Briquetting Machines
Ball, Rod and Tube Mills

Keep Production on the Move *with*

CARDOX

THE NON-EXPLOSIVE MINING METHOD



Modern mechanical mining equipment performs at its best when coal is dislodged by CARDOX.

The slow heaving action of CARDOX rolls coal forward for faster loading . . . with less wear and tear on mechanical loaders.

Loaders and other mechanical units are productive more hours each shift. Since CARDOX does not produce smoke or noxious fumes, work can be resumed immediately after the face has been dislodged.

The gentle action of CARDOX produces coarse sizes that are most economical to handle and clean. CARDOX-mined coal retains its inherently firm structure, greatly reducing degradation.

Since the pressure exerted by CARDOX is only a fraction of that generated by explosives . . . and there is no shattering detonation . . . the effect on a mine roof is very mild, reducing the hazards, costs and delays of roof falls.

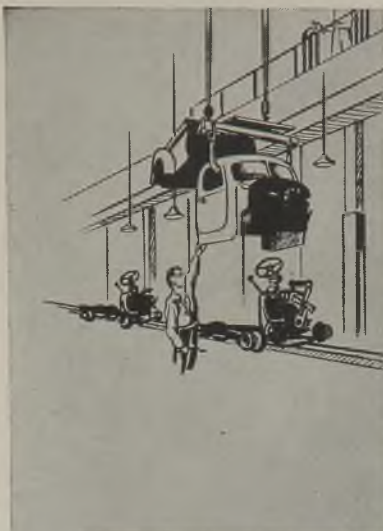
A test of CARDOX in your own mine will reveal many more worthwhile benefits. Write for full details on free demonstration.

CARDOX

Hardrock Drilling Equipment

Complete line of drilling equipment designed to give you the maximum in drilling efficiency.

CARDOX CORPORATION • BELL BUILDING • CHICAGO 1, ILLINOIS



**BUILT
TO
TAKE
IT**

and Come Back for More

The dominant position of International Trucks in the heavy-hauling field results from just one thing — performance.

And the *performance* of International Trucks results from the way they are designed, engineered and built — plus more than 40 years of truck manufacturing experience.

Of great importance is the fact that new improvements and features are incorporated in Internationals as fast as they are proved worthy — without fanfare or boasting.

The result is that Internationals are constantly

in the process of being better designed, better engineered and better built. And that means performance dividends for current purchasers.

No matter what your truck transport problem, there is an International to do the job, because the International Line is *complete*. Service facilities are unsurpassed, both from International Branches, the nation's largest company-owned truck-service organization, and thousands of International Dealers.

Motor Truck Division
INTERNATIONAL HARVESTER COMPANY
180 North Michigan Avenue Chicago 1, Illinois



Tune in "Harvest of Stars" Every Sunday, NBC Network.
See newspapers for time and station.



INTERNATIONAL Trucks

WHEN A *Coal Mine Executive* THINKS OF

IMPROVING HIS PRODUCT

He has a practical vision of a plant built upon functional lines. From this plant he expects the empty coal cars that go in today to roll out the same day . . . filled with specification fuel for an eager-to-buy market.

By improving his product he has earned the right to a profit. In every bituminous coal field in the Western Hemisphere these money-making plants are to be seen. Streamlined structures distinguished by flat top, set-back architecture, with gleaming glass in continuous sash. They are the plants exclusively designed and built by

McNally Pittsburg during its 25 years of service to the coal mining industry.

A McNally Pittsburg Preparation Plant is tailor-made for you . . . to beneficiate your coal . . . to improve your product . . . to fit the needs of your markets.

From laboratory tests of your coal to a complete plant designed especially for you, McNally Pittsburg technicians can bring you documented evidence that properly prepared coal produces very well satisfied customers and worthwhile dividends.



McNALLY  PITTSBURG
MANUFACTURERS OF EQUIPMENT TO MAKE COAL A BETTER FUEL

Courtesy Logan County Coal Corp., McGregor Mine, Stagle, West Va.

McNally Pittsburg Manufacturing Corporation, Pittsburg, Kansas; Morrow Manufacturing Co., Subsidiary, Wellston, Ohio.
Engineering & Sales Offices: Pittsburg, Kans.; Chicago (1), Ill.; Pittsburgh (22), Penna.; Columbus, Ohio; W

An improved product depends upon synchronized flow from Dump Point to Loading Booms

Production executives at the mine visualize a plant that will enable them to meet customer and sales department specifications . . . a plant that operates smoothly and efficiently.

Raw coal, brought in on the run-of-mine conveyor, moves along at a fast clip . . . through the plant's crushing, screening, and washing circuits, driers, and classifiers.

Operations are automatic, rapid . . . without waste motion . . . down to the final loading of the finished specification product into the waiting cars.

The layout of a plant such as this is a matter of individualized, precision engineering. Each plant differs. Each has a special coal-grooming problem. Our technical staff will be glad to discuss product improvement by preparation . . . at your convenience.



The McNally-Vissac Dryers, wet coal from 2 in. down to $\frac{1}{8}$ mm is dried rapidly and economically. Dried sizes can then be screened and loaded as premium prepared stoker coal or blended in other sizes. A patented pulsator feature squeezes free moisture from coal, reducing necessary drying temperatures and saving fuel.



One man at a push-button station can operate a set of multiple loading booms, delivering coal of various sizes to the proper cars. He operates the car retarders, moving the cars into position to receive the load from the booms. Loading booms are manufactured in apron, flight, and rubber belt types; open or with canopy tops.



Wet coal passes through a section of the wash floor in a McNally Pittsburgh-equipped plant. Plants produce upwards of 100 cars of washed coal a day. It is here that coal's impurities are removed in sizes from 6 in. down to 0 in. Power consumption of the washer is small. Units are compact . . . each part readily accessible for inspection.



With Stoker Coal Crushers, operators fill orders without delays. Three types . . . light, standard, heavy . . . in 17 sizes. They reduce egg and nut sizes to $1\frac{1}{4}$ in., 1 in., or $\frac{3}{4}$ in., with lowest possible production of fines. Also available are Primary Breakers in heavy and standard double-roll types for primary reduction of big lumps.

McNALLY PITTSBURG

MANUFACTURERS OF EQUIPMENT TO MAKE COAL A BETTER FUEL

McNally Pittsburgh Manufacturing Corporation, Pittsburg, Kansas; Morrow Manufacturing Company, Subsidiary, Wellston, Ohio; Pittsburgh (22), Penna.; Columbus, Ohio; Wellston, Ohio; Caixa Postal 1310, Rio de Janeiro, Brazil.



ROCK or DIRT
DUMPED INSTANTANEOUSLY

Moving rock or dirt at high speed requires speed in all operations. Koehring Dumpers save seconds every time the load is dumped . . . instantaneously. Seconds saved speed production. Rock or dirt is dumped equally fast and the load is dumped clean every time . . . ready for a full load every trip. KOEHRING DUMPTORS HAUL ROCK OR DIRT FASTER THAN ANY OTHER METHOD.

KOEHRING COMPANY
Milwaukee 10, Wisconsin



HEAVY-DUTY CONSTRUCTION EQUIPMENT

TRACTION + STAMINA = Firestone

ROCK GRIP EXCAVATOR

*The Toughest Traction Tire
Ever Built*



EARTH MOVER

Designed to give maximum flotation to free-rolling wheels on drawn earthmoving scrapers, wagons and buggies.

GROUND GRIP

Delivers greatest possible traction to drive wheels of earthmoving equipment operating in loose fill or soft ground.

WHEN the really tough jobs send "pretty good" tires to the graveyard there is one tire, the Firestone Rock Grip Excavator, that stands the gaff and is always ready for more. It's the toughest traction tire ever built for construction work, strip mining, quarrying and logging.

Its cord body is of the heaviest, strongest rayon. Four extra tread plies are built into its Gum-Dipped cord body to cushion and absorb impact blows. Tread and sidewalls of the tire are made of extra tough Vitamic rubber especially compounded to resist rutwear, cutting and snagging. Because the massive chevron tread bars provide a balanced, stable design, the Rock Grip cannot side-slip on crowned roads or fills, endangering personnel or equipment.

To get the maximum in traction and stamina put the Firestone Rock Grip Excavator on your equipment. It will take more punishment and deliver greater traction for more hours of operation than any tire ever built.

Firestone

OFF-THE-HIGHWAY TIRES

Copyright, 1946, The Firestone Tire & Rubber Co.

SERVING YOU THROUGH SCIENCE



COORDINATED ENGINEERING

Pays Off

in low-cost conveyor haulage

It will pay you to investigate the efficiency and economy of belt conveyor systems built on the principle of Coordinated Engineering. This means engineering teamwork between the mine engineer, the equipment engineer and the United States Rubber Company belting engineer, to provide a tailor-made system of conveying that assures low-cost haulage.



UNITED STATES RUBBER COMPANY

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Dirt stays out... bearings stay in... with

SUPERLA
GREASES

Lubricants on screen eccentric bearings get a "dirty deal" in more ways than one. Continually surrounded by abrasive coal dust, pounded incessantly by the loaded screen, subjected to wide variations of heat and cold, many greases soon give up the job and break down.

That's why Superla Greases have surprised so many mine men who've been accustomed regularly to replace eccentric bearings that have been cut out by coal dust, or

have failed because of overheating and breakdown of the grease.

Superla keeps bearings cool even under shock loads, it seals out dirt and resists separation. These qualities will reduce not only screen eccentric maintenance but many bearing lubricating jobs in tippie, shovel and underground equipment. Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.

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CONC

STANDARD OIL COMPANY (INDIANA)

**STANDARD
SERVICE**

If You ARE ON THE MAP *You Get* GOULD SERVICE

Lead is still critically short, so you must conserve your batteries. Call Gould and ask for a Gould service man. He will help you set up simple and effective charging and maintenance schedules that lengthen battery life.



Gould Factories
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For further information write Gould Storage Battery Corporation, Depew, New York. Gould manufactures all types of industrial storage batteries.

GOULD KATHANODE and Plante' BATTERIES

The Battery Picked by Engineers

Running to Ruin

...SO THAT YOU WILL GET LONGER LIFE FROM EVERY TEXROPE V-BELT

THIS MACHINE tests TEXROPE Super-7 V-Belts — runs them at varying speed and load until they give out. A trained operator records results: How long did they last? What broke down first: Cords? Cover? Rubber compound? Does destructive heat develop?

Out of tests like this have come stronger cords — tougher, more wear-resistant covers — resilient, cooler-running rubber — vital improvements in design and construction. TEXROPE Super-7 V-Belts are today the BEST in 20 years of V-Belt experience.

A-C FOR COMPLETE V-BELT SERVICE

Call your nearest Allis-Chalmers office or dealer for ALL your V-Belt drive needs — TEXROPE Super-7 V-belts all types, all sizes; TEXSTEEL, TEXDRIVE and "Magic-Grip" Sheaves; VARI-PITCH Sheaves and SPEED CHANGERS. They're all engineered and backed by the originators of the Multiple V-Belt Drive for industry. ALLIS-CHALMERS, MILWAUKEE 1, WIS.

A 2099

PICK YOUR SUPER-7 V-BELT



Heat-Resisting Super-7

Stands temperatures up to 180°. The TEXROPE V-Belt for most drives.



Oil-Resisting Super-7

Neoprene cover protects core against moderately oily or greasy conditions.



Oil-Proof Super-7

Made of Neoprene throughout. Use it when the belt must swim in oil.



Static-Resisting Super-7

Recommended where explosion hazard exists. Static-conducting element throughout cover won't wear off.

TEXROPE Super-7 V-Belts result from the co-operative research of two great companies—Allis-Chalmers and B. F. Goodrich—and are sold exclusively by A-C.

ALLIS-CHALMERS

One of the Big 3 in Electric Power Equipment —
Biggest of All in Range of Industrial Products

TEXROPE V-BELT DRIVES

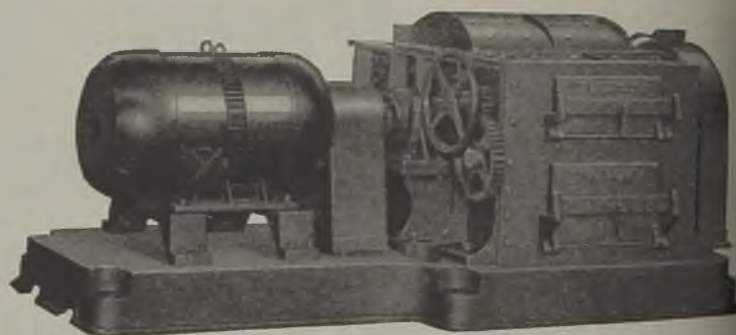
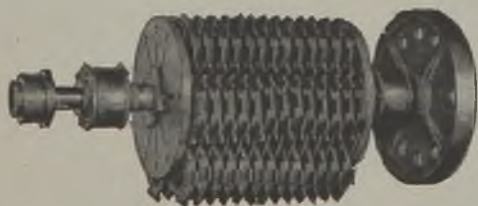


AMERICANS MINIMIZE FINES AND PRODUCE UNIFORM SIZING



ONLY AMERICANS HAVE THE SPLITTING ACTION OF THE SHREDDER RINGS

Each shredder ring (shown above) has 20 cutting edges. The many shredder rings, on the heavy rotor (shown below), revolve freely, each on its own shaft. They deflect from tramp metal—eliminating the bother with shear pins or conventional safety devices.



Nothing could better demonstrate why *American Shredder Ring Crushers* produce fewer fines—than the example of splitting coal with a pick-axe compared to crushing it with a sledge hammer.

It's the *splitting* action of the cutting edges of American's shredder rings that produces uniform sizes with a minimum of fines—and no oversize.

The *high tonnage* output of Americans is attained by the very rapid reducing action of the many cutting edges in motion. American's low power consumption (less than $\frac{1}{2}$ hp per ton) is achieved through its use of *doubled* centrifugal force—the rotor revolutions *plus* the independently revolving shredder rings.

Americans operate at a total cost of less than 1c per ton!

Send now for the "AC" bulletin on coal crushing data and crusher specifications.

American

PULVERIZER COMPANY

*Originators and Manufacturers of
Ring Crushers and Pulverizers*

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MARION 4161

**Eats Its
Way Through
100 Feet of
Rock at
Tuscarora
Stripping Co.**

In reopening anthracite coal bearing property on the Mammoth Vein in Pennsylvania, which had previously been worked up to the 50' limit, Tuscarora Stripping Company had a tough rock problem. To do this work a heavy duty - high capacity - close coupled machine was necessary. A MARION 4161 has provided the perfect solution.

What is your coal stripping problem?

MARION

POWER SHOVEL COMPANY

MARION, OHIO, U. S. A.

Offices and Warehouses in all Principal Cities • Established 1884



*My pipe—
a COAL burner?*

A MOLDY joke? Not at all. *All* tobacco pipes are COAL burners, in a way. At any rate, the tobacco processing industry in the United States uses *hundreds of thousands of tons* of coal every year.

But what industry doesn't? The food products industries use nearly *twelve million tons* of coal yearly. The textile industry, *eight million tons*. The chemical industries, *twenty million tons*. Automobile plants, *four million tons*.

Every day in the year American industries and American homes use over a *million tons* of coal for steam, power, and heat. That's a lot of coal. But science knows that there are still greater values in coal. More and more coal is being used as raw material for the manufacture of things for comfort and beauty—for food and shelter—for business and pleasure—for almost every human need.

Things ranging from shimmering textiles woven from synthetic fibers to tar paints for waterproofing cellars—from symphonic recordings to plastic printing plates—from mothproofing chemicals to the heady perfumes of beautiful women.

The railroad industry uses about 23 per cent of the nation's annual coal supply—over *one hundred million tons* each year. Chesapeake and Ohio itself is one of the largest users of coal. When you ship via Chesapeake and Ohio, you know your coal is being hauled exclusively by coal burning locomotives.



THE CHESAPEAKE AND OHIO RAILWAY

"The 100% Coal Railroad"



PERMISSIBLE EXPLOSIVES

FOR EITHER MECHANICAL
OR HAND LOADING

THROUGH intensive research, chemical control, inspection and unremitting care in manufacture this list of permissibles has been designed to provide an explosive fitted to any seam of coal and for both hand and mechanical loading. There is a complete range of velocities and densities and in the list will be found one particularly adapted to your blasting problem.

AMERICAN explosives and AMERICAN electric blasting caps have proved their merits through years of service in representative coal mines. Through well located plants and distributing points prompt delivery service is assured.

NON-GELATINOUS

FAST	MEDIUM	SLOW
American 22	American 11	American 1
American 23	American 12	American 2
American 24	American 12A	American 3
American 25	American 14	American 3A
American 26	American 14A	American 4
Genite A	Burton A	American 5
		American 112

GELATINOUS

Permigel 1
Permigel 2A
Permigel 3

• Capable field engineers are available at your call.

AMERICAN CYANAMID COMPANY



30 ROCKEFELLER PLAZA • NEW YORK 20, N. Y.

EXPLOSIVES DEPARTMENT

SALES OFFICES: PITTSBURGH, Pa.

Bluefield, West Va.

Scranton, Pa.

Chicago, Ill.

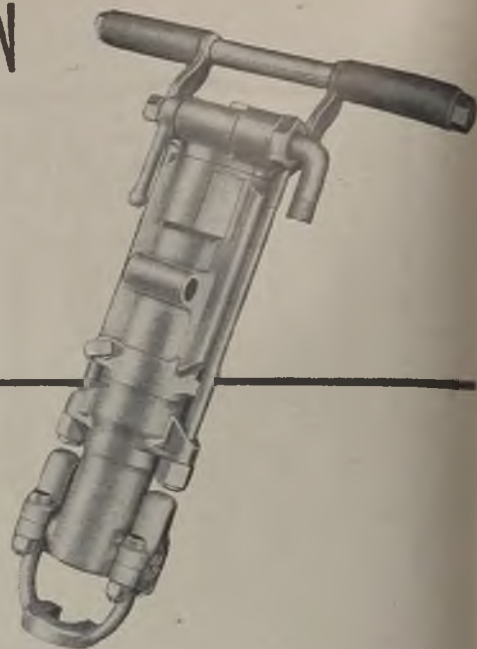
Pottsville, Pa.

Maynard, Mass.

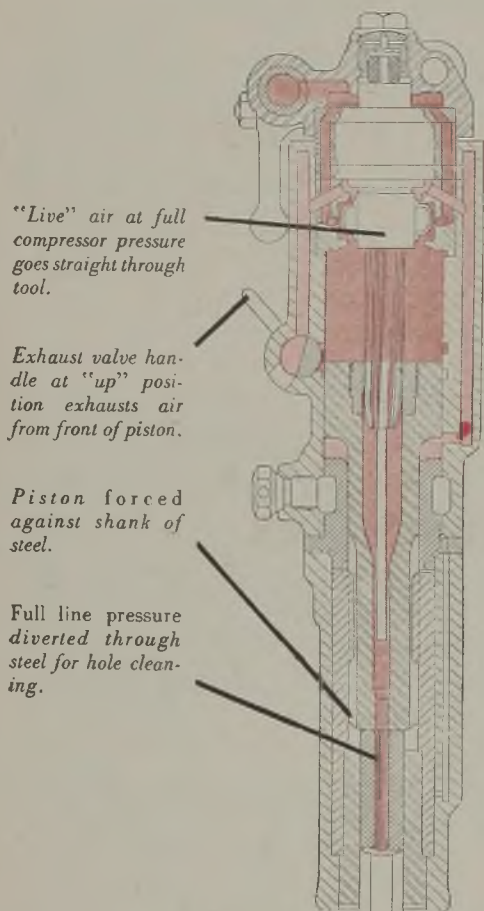
WHY LEADING MINING MEN SPECIFY

Thor

ROCK DRILLS



DETAIL DRAWING SHOWS
Thor SINKER ROCK DRILL
IN "BLOWING" ACTION



*The FOREMAN knows
Thor's "Straight-line" design
provides extra blowing
power to keep the hole
clean and speed drilling*

Exceptional Hole Cleaning ability is a major reason why Thor Sinker Rock Drills perform at peak efficiency to give more footage per shift. "Straight-line" design, as shown at the left, puts compressed air at full pressure directly through the center of the steel to the drilling face. This heavy blast—controlled by the drill runner—blows the hole clean and adds to the penetration rate. This efficient blowing prevents "stuck steels."

This same efficient use of air power, automatically controlled through Thor's short-travel, tubular valve, provides powerful rotation and harder piston-hammer blows that result in superior drilling speed. Prove this yourself on your own work. Your nearby Thor distributor will be glad to arrange a demonstration.

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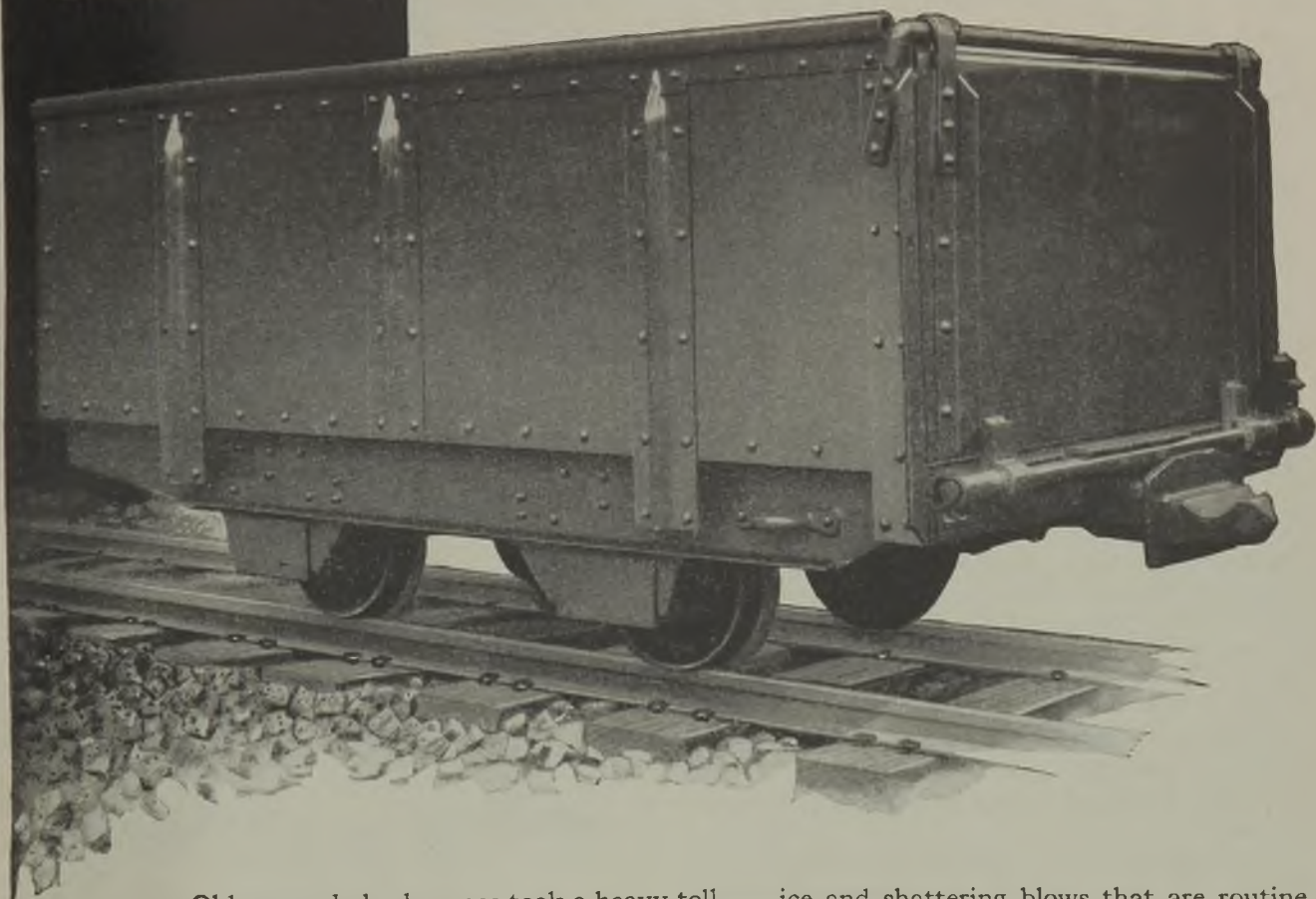
Thor

PORTABLE POWER

TOOLS

PNEUMATIC TOOLS • UNIVERSAL AND HIGH FREQUENCY ELECTRIC TOOLS • MINING AND CONTRACTORS TOOLS

ORDER STEEL MINE CARS NOW



Old age and obsolescence took a heavy toll of mine cars during the war years. Much equipment cheated the scrapyard only because it couldn't be replaced while the war was in progress.

When you order your new mine cars, be sure you specify all-steel construction . . . Bethlehem-built. Bethlehem is a veteran at designing cars for every kind of system. Whether you want end-dump, rotary-dump, high- or low-side types, we'll give you a long-lasting job that will meet your specifications in every respect.

There's no question of the benefits derived from an all-steel mine car. It's a money-saver—it lasts far longer. It will stand up for years under the gruelling serv-

ice and shattering blows that are routine in coal mines. Your Bethlehem all-steel car is designed for the cruelest kind of beating.

And don't forget that a Bethlehem all-steel mine car is Bethlehem all the way, including the wheels and axles. Check *now* with Bethlehem engineers so that your car order will move with a minimum of delay.





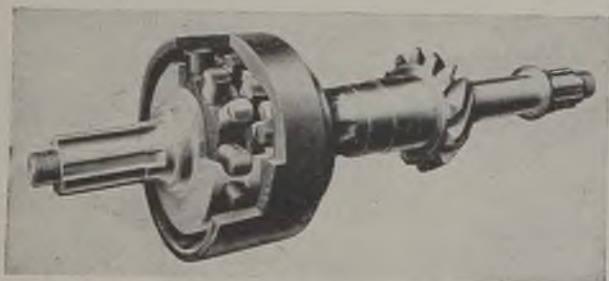
ARE HARD, TROUBLE-FREE WORKERS!

Here's a bogie that's a leader in the field today. It provides increased flexibility, efficiency and durability. It does away with bogie hopping, unequal tire wear and hard steering. Torque reaction is balanced out, eliminating weight transfer and assuring equal traction on all wheels.

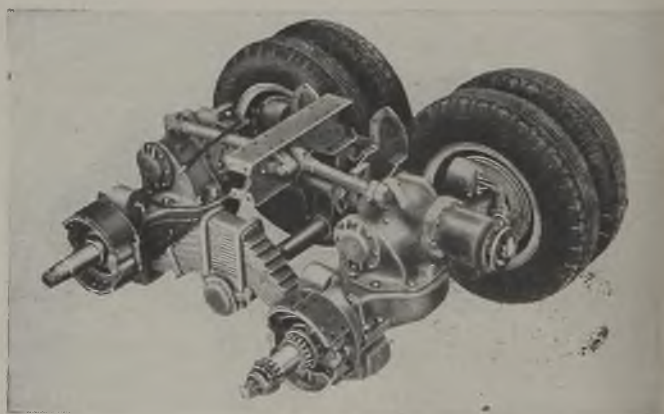
Furthermore, it's not added weight or complicated parts that give these advantages . . . it's perfected balancing. The Mack bogie is actually simplified and lightened.

Most important among its many features are two Mack exclusives: One, the Mack Power Divider, preserves traction on slippery ground without over-stress on any part, and prevents wheel fight and tire wear. The other, Mack rubber Shock Insulators, makes twisting of the springs impossible even over roughest roads.

The Mack bogie is only one of the reasons Mack 6-wheelers are preferred where the hauls are tough.



THE MACK POWER DIVIDER, a third differential which transmits torque to whichever axle maintains the most traction. Prevents wheel fight, tire wear, and over-stress on parts.



THE MACK BOGIE is rugged, yet unusually simple and accessible. Perfected balancing makes bogie hopping, wheel fight and tire scuffing unknown.

Mack

TRUCKS
FOR EVERY PURPOSE



PERFORMANCE COUNTS!

Mack Trucks, Inc., Empire State Building, New York 1, New York. Factories at Allentown, Pa.; Plainfield, N. J.; New Brunswick, N. J.; Long Island City, N. Y. Factory branches and dealers in all principal cities for service and parts.



"Mine car operation Stepped up"

With Tycol mine car greases

- Life of bearings prolonged . . .**
- Power requirements slashed . . .**
- Less lubricants needed . . .**
- Production accelerated . . .**
- Operating costs lowered . . .**

Like mining engineers everywhere, you, too, will find that the *new* Tycol Mine Car Greases are expressly engineered for more efficient mine car operation . . . in or out of the mine . . . under all weather conditions.

For details concerning the full benefits of Tycol Mine Car Greases, call your nearest Tide Water Associated Office today.

LUBRICATION—"ENGINEERED TO FIT THE JOB"

COAL AGE • October, 1946



**Boston • Charlotte, N. C.
Pittsburgh • Philadelphia**



WALTER TRACTOR TRUCKS

DO A BIG JOB in All Three

① COAL HAULING

Speed 30 ton payloads in single trailers, 60 ton payloads in tandem trailers. Provide higher tonnage per truck per day. Haul in worst weather and running conditions.



② OVERBURDEN REMOVAL

Haul fully-loaded 20 cu. yd. side dump trailers across broken ground, loose dirt, deep mud, slippery surfaces and grades. Speed up overburden removal, cut its cost tremendously.

③ MINE WASTE DISPOSAL

ONE Walter 20 Ton Dumper has eliminated FOUR trucks previously required at a certain mine. It handles the entire waste removal job at huge savings in fuel, operation and maintenance. Easily climbs 16% grades and slippery surfaces to dumping point.



Here's why! The unique Walter Four Point Positive Drive provides super traction to keep going under running conditions that stop anything else on wheels. Three automatic locking differentials proportion engine power to the FOUR driving wheels according to the traction of each wheel at any instant. There is no wheel spinning to bog down loads, rip up roads or wear tires.

This exclusive feature, plus suspended double reduction drive, tractor type transmission, short wheelbase, air brakes and hydraulic steering, make Walter Tractor Trucks the standout for heavy duty hauling under difficult conditions. Write for full story.

WALTER MOTOR TRUCK COMPANY

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WALTER TRACTOR TRUCKS

SOAKEROO



Like the hide on the amphibious old fellow above, the jacket for U.S. Royal Mining Machine and Locomotive Cables is tough and waterproof. It has to be to give the service mine engineers expect when they specify "U.S. Royal".

We make sure of it by submerging these cords and cables, hour after hour, in a bath that is a real "soakeroo". You could safely use them if your mine

was at the bottom of the ocean!

Rough treatment is the rule for a whole series of tests our scientific inspectors make of U.S. Royal Cords and Cables. They are heated, frozen, compressed, stretched, bent. And they have to pass with a mark of 100%. That's why they have all the qualities you need... no matter how tough the conditions are at your mining property.

THE NEW U. S. ROYAL *Safety Tested*
MINING MACHINE AND LOCOMOTIVE CABLES

UNITED STATES RUBBER COMPANY

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SERVING THROUGH SCIENCE



WITH ELECTRICAL CABLES



Over 200 railroads in the United States use Gulf lubricants and fuels—and get the benefit of the co-operative service extended by Gulf's trained lubrication engineers.



The recommendations and practical suggestions of Gulf Lubrication Engineers are adopted by scores of leading power plants in 30 states from Maine to New Mexico.



Gulf Lubrication Engineers consult regularly with textile mill officials and operating men to help insure efficient production and low maintenance costs.



The paper mill Superintendent in the picture says, "We get greater tonnage and keep maintenance costs down by following Gulf Engineering recommendations."



Gulf Lubrication Engineers are welcome visitors in hundreds of coal mines as they make their periodic calls to insure efficient lubrication and lower operating costs.

Adopt Gulf Periodic Consultation Service

to insure efficient lubrication
the year-round, lower costs—

HERE are two easy steps you can take to help keep your plant up to maximum efficiency: Call in a Gulf Lubrication Engineer and let him work with your operating and maintenance men to install improved lubrication practice; then adopt Gulf Periodic Consultation Service to insure efficient lubrication the year round.

After you adopt this practical, money-saving plan, a trained Gulf Lubrication Engineer will make periodic service calls at your plant. He will make additional recommendations to meet changed conditions and keep your plant men informed on latest developments in lubricants and application methods. At all times he will seek to further improve your lubrication practice, increase production, and reduce costs.

Act now to get the many benefits that can be obtained through Gulf Periodic Consultation Service. Write, wire, or phone your nearest Gulf office.

Gulf Oil Corporation • Gulf Refining Company

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Helps make machines produce more at lower cost

1. FLAME-RESISTANCE!

The specially compounded Neoprene Jacket, plus heat-resistant insulation, makes Securityflex the safest cable possible. Meets specifications of Pennsylvania Act 206.

2. NO LOOSE JACKETS!

Special bonding process eliminates cable failures from loose jackets.

3. BREAKER STRIP!

Minimizes shorting under extreme heating or compression, and also anchors jacket, prevents loosening of conductors.

1.

2.

3.

FIGHT FIRE HAZARD

3 WAYS

* MORE CABLE PER REEL — made possible by small diameter, flat parallel sides.

Everything that can be engineered into a cable to help prevent outbreak and spread of fire is built into Securityflex*. These features plus toughness, durability, flexibility and freedom from kinking and twisting make Securityflex "the best buy in

mining cable." For help on cable problems consult Anaconda engineers. Anaconda Wire & Cable Company, Subsidiary of Anaconda Copper Mining Company, 25 Broadway, New York 4, N. Y. Sales Offices in Principal Cities.

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ANACONDA

*Securityflex**

CABLE

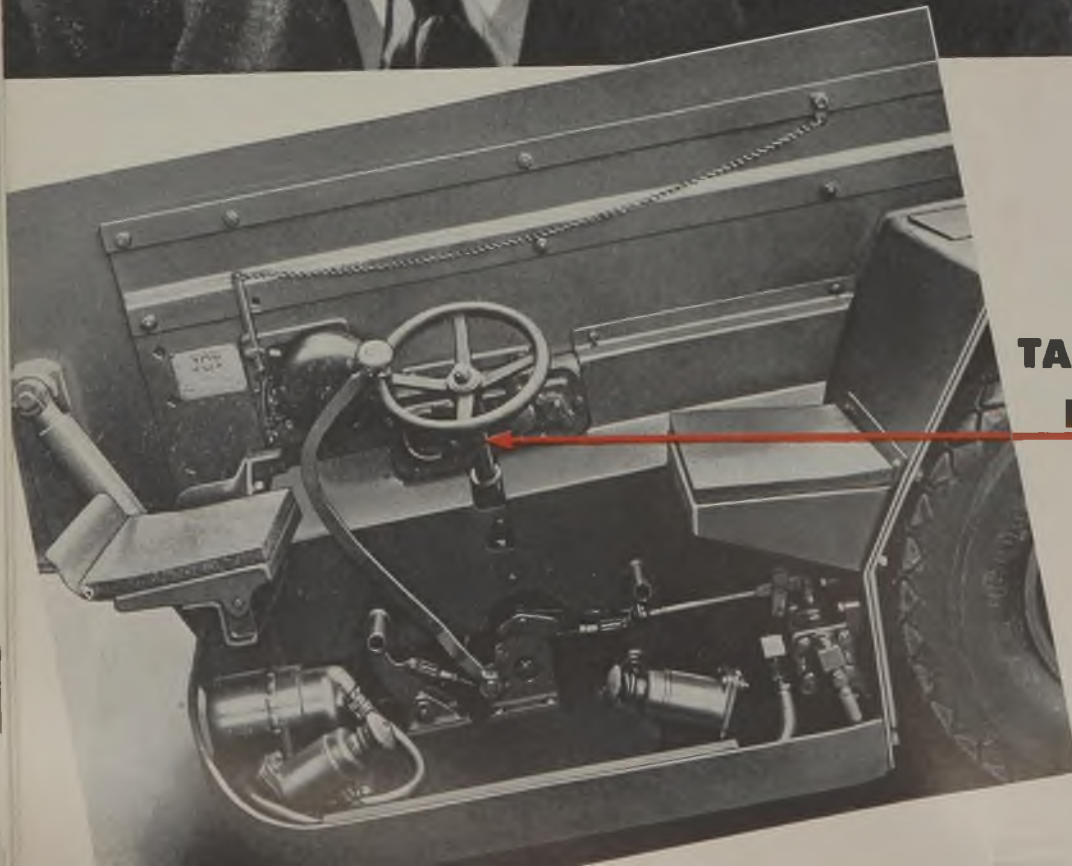


*Reg. U. S. Pat. Off.

CUT, LOAD AND MOVE COAL WITH

JOY

**FOR A
STEADY STREAM
OF COAL AND
PROFITS**



**JOY
SHUTTLE CARS
TAKE SHARP TURNS
IN STRIDE WITH
HYDRAULIC
STEERING**

Four wheel drive and four wheel steering enable Joy Shuttle Cars to turn smoothly and easily with full loads. Finger-tip controls and newly designed seats enable operators to work more comfortably.

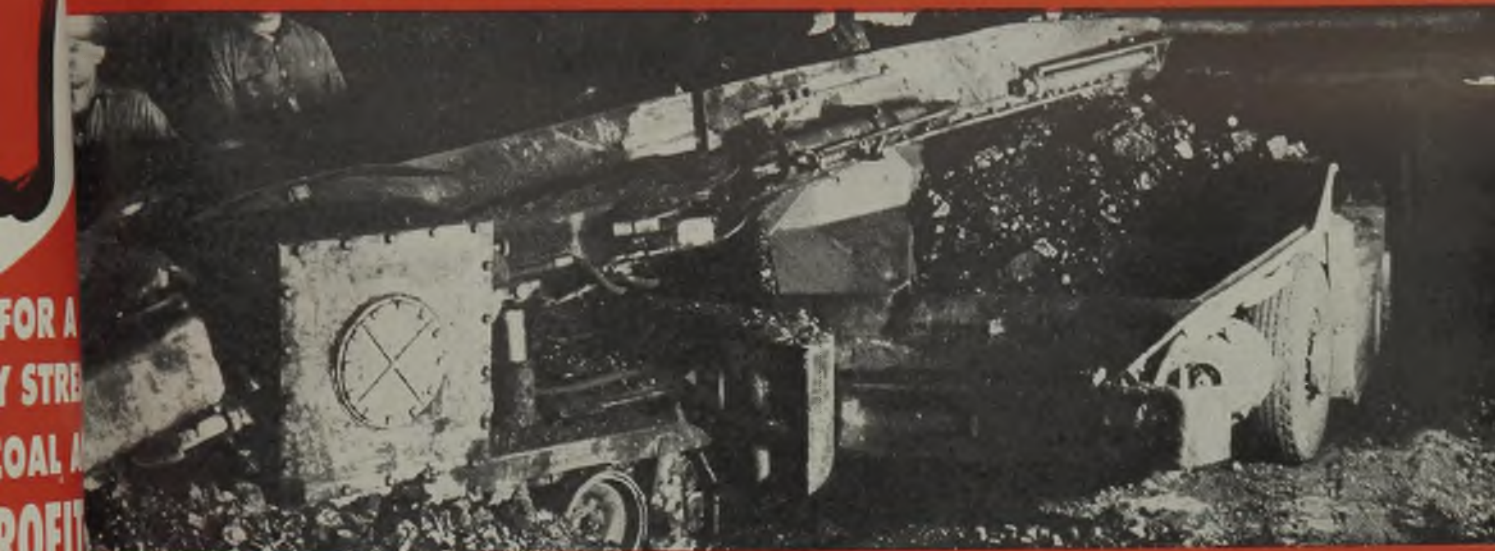
Write for full details.

THE SUMMITT 1000 FOR SHEAR MACHINE CUTS TOP AND BOTTOM AND SHEARS SIDES WITH EQUAL EASE



Registered under the patents of E. C. Morgan No's 1,706,961—1,708,962—1,709,135 and 1,711,111

JOY LOADERS ARE SUITED FOR ALL CONDITIONS . . . LOAD FROM 1 TON TO 8 TONS PER MINUTE



JOY AND LA-DEL BELT, CHAIN OR SHAKER CONVEYORS MOVE COAL QUICKLY, ECONOMICALLY



drive and four
huttle Cars to
with full loads.
specially designed
work more com
for full details

JOY MANUFACTURING CO.

GENERAL OFFICES: HENRY W. OLIVER BLDG., PITTSBURGH, PA.





GET TO THE COAL

Faster

WITH
PRIMACORD

Overburden is "dead-load." It's good business to get down to the coal faster, *and show savings in labor and materials as well.*

Here's how Primacord can help you:

- You hook up Primacord simply and quickly with square knots and half-hitches. Always in plain sight, every connection is easily checked.
- You get more work from explosives since Primacord detonates *every* cartridge in *every* hole *with the added force of a primer cartridge.*
- You get good fragmentation from Primacord's efficient shot sequence, relieving burden from row to row. Shovels and draglines have good digging.

SP-33

Stripping with Primacord means reduced hazards, too. Primacord is not sensitive to stray currents, never requires a cap in the hole. The initiating cap is never attached to the main line until all is ready-for the shot.

Also
ENSIGN-BICKFORD
SAFETY FUSE
Since 1836

THE ENSIGN-BICKFORD COMPANY • Simsbury, Connecticut

PRIMACORD-BICKFORD

Detonating
• Fuse •

October, 1946 • COAL AGE



OCTOBER, 1946



Ivan A. Given, EDITOR

High Time

ADJOURNMENT of the September conference between the bituminous negotiating committee and John L. Lewis left the seizure situation fundamentally unchanged. Having interfered once more in the process of "collective bargaining," the government now expects the operators to pay the price to end control of the industry rooted in perverted use of wartime powers with overtones of the fiat action beloved of the New Deal. Seizure solved nothing and, in addition, set back once more the attainment of a better basis for relations between employers and union leaders. Further, it furnished the excuse for another attempt to fasten on the coal-mining industry contractual provisions that will make it even more difficult for it to function with the efficiency that will be absolutely necessary in the years of keen competition ahead.

Fundamentally, recent federal action in coal and other industries proves once more that the New Deal has nothing to offer in labor relations but interference, partiality, appeasement and arbitrary procedure. The fruits are decreased productivity, greater difficulty in supplying nation-wide demands for goods and services, higher costs and unnecessary price rises. It is long past the time for a reformation of federal policy in labor matters. It is time, in fact, for the administration to quit interfering solely on a vote-getting basis. It is time, also, for federal officials to begin obeying the law. They might start by turning the mines back to their owners under the 60-day clause of the Selective Service Act.

Not Too Soon

IS atomic power going to push coal out of the picture in the near future? Will it ever? In spite of surmise and opinion represented in various "studies" and reports, including that submitted recently to the United Nations Atomic-Energy Commission, the answers to both questions still are no more than "perhaps"—if that. The situation might change, but a careful examination of the material so far available does not warrant assuming that the split atom will be elbowing coal out in, say, five years—or ten—or twenty—in spite of suggestions that it might be used for generation of elec-

tricity, locomotive power, ship propulsion, aircraft operation, heating, etc.

True, it theoretically is possible to use atomic power in all these directions, provided cost, protection and engineering can be worked out. Working out one might be relatively simple, although most experts postulate \$10 or \$15 coal—something rather remote at the present time—when they talk of competing in the industrial and power-generating fields, but working them all out to a practical point apparently is a job that will not be completed in a jiffy. Even then, many authorities see atomic power not as a competitor with old, established fuels but as a supplement in new fields or in fields to which coal is not well adapted. For quite a distance into the future, therefore, coal can reasonably expect that not atomic power but its old foes—oil and natural gas—will continue to be the real trouble-makers.

Still Good

WITH the accent on getting out enough fuel to meet continued heavy demands—and on what to do about an unwelcome partner who got that way by muscling in—coal possibly has not had too much time to scan the future in detail. But since the recent behavior of the stock market has provoked some forward looking, perhaps coal, too, might join in. Many theories have been advanced to explain the market dip. Basically, however, in spite of the drop in stock prices, since partially recovered, the demand for goods and services should—in fact, almost must—remain at a high level for quite a few years to come.

However, as one banker sees it, the action of the stock market must mean something because it always has. Perhaps there is reason to accept tentatively his opinion that the market was forecasting the fact that while business should be good the profit margin might be small for well-known reasons and his further guess that, possibly in 1947, there would be downward readjustment of the price level, business taking off from there, rather than from the present peak, on several years of active operation. Perhaps 1947 may bring a bump but, as previously pointed out, demand is a long way from being satisfied. So business should be good and when business is good, coal mining is good.

THE RETAILER: Partner in Coal Prosperity

Stiffer competition in coal's prime market — home heating — finds the retailer in the front line. What is he doing about competition himself? What help does he feel he needs? To get the answers to these questions, Coal Age surveyed opinion and activity in several big consuming areas. They point up the need for a joint program and intensified effort in merchandising, cost reduction and quality.

A SPIRITED NEW MERCHANDISING philosophy among the nation's coal retailers, typified by dealers, secretaries of coal merchants' associations and producers' sales executives, promises to reshape the sale of coal for home heating and augurs well for coal's competitive position in the home-fuel market. This conclusion grows out of a Coal Age survey of dealer opinion and resources in advance of implementation of the National Coal Association's nation-wide plan for coal-heat service.

The determination of retailers in such cities as Cincinnati, Dayton, Indianapolis, Chicago, Kansas City and St. Louis to meet and beat competition from oil and natural gas by streamlined salesmanship geared to a modern age is making itself felt all along the line and is being voiced in language like that of Larry Foster, executive director, Dayton Coal Exchange, who declares, "Retailers in our city already are interested in better yards, better personnel, better delivery, better service and better telephone salesmanship." In the same spirit Frank J. Donovan, president, Rutter Coal Co., Chicago, says, "The successful coal merchant can't afford the merchandising technique of the undertaker, who waits for his customer to come in eventually. The coal dealer must go after the customer." They are an enthusiastic crowd, these association secretaries and retailers of coal, and they believe, most of them, that the retail coal business is going places.

By W. A. STANBURY JR.
Assistant Editor, Coal Age

But though dealers and retail association directors are enthusiastic, they are not blind to certain puzzling problems. Survivors of frequent and often injurious economic and industrial dislocations, they have been schooled in the classroom of realism and they face the facts as they see them. The job, they say, will not be easy. They do not expect measurable results overnight; in fact, they believe it may be two years before clear results can be weighed. The job is complex. The obstacles differ from city to city and shadows are cast on the over-all problem from many angles. Moreover, the job is huge, requiring for local fulfillment a nation-wide integration of thinking and a centralized driving force beyond the resources of any one retailer or any local association of retailers.

Dealers, association directors, coal-yard managers and coal-sales executives see problems that break down pretty well into seven categories: yard and delivery operations and replacement of outworn equipment; recruiting and training of driver personnel; the public's opinion of the coal industry and of coal as a home fuel; competition from oil and natural gas; producer-retailer relations; the mounting cost of coal to the householder; and uncertain supply

and substandard quality. These obstacles must be cleared away to assure the industry of a domestic market consuming enough coal to keep profitable operations going in the retail yards and in the mines.

Admittedly, some of these problems must be solved by the retailers alone without help from outside. They are digging into these problems with foresight and energy, in spite of mounting costs and short supply of yard machinery and trucks. Storage facilities in many yards are outmoded and trucks, which have been irreplaceable for five years, are badly beaten and scarred. A great deal of their conveying equipment is just this side of breakdown. Maintenance costs on such yard and delivery equipment are excessive and are cutting into profit margins that already were narrow. But funds earmarked for new yard construction, handling equipment and trucks are in the bank and dealers are prepared to put their cash on the line when long-standing orders are delivered.

As their share in modernizing retail merchandising, wide-awake dealers, like the George Lill Coal Co., Chicago, are repainting and scrubbing trucks and are sticking close to a schedule for polishing shiny name-plates on truck panels. Other dealers, like the Hoosier Coal Co., Indianapolis, are building storage silos as fast as construction materials appear on the market and thus are realizing plans for more efficient operation that were nursed along in

blueprints for more than four years. Still others, like the Hawthorne Coal Co., St. Louis, and Rutter of Chicago, who completed yard construction projects before war broke out, are pointing the way for postwar coal yards with reports on economies effected by mechanical handling equipment, silo storage and high-speed truck-loading facilities. Rutter, for example, reports a reduction in handling costs from 11 to 4c. per ton, not to mention savings due to reduction of degradation by weatherproof storage. These plans and achievements represent a determination to keep coal in the domestic fuel market and an eagerness to modernize merchandising methods.

The prickly problem of recruiting drivers, like yard and delivery-equipment problems, can be solved only at the local level. For five years of labor shortages, while the best workmen went to war plants or into the armed services, undesirable "floater" labor in many cities drove coal trucks and put coal into consumers' bins, often doing a careless, dirty job and in many instances marking up such a high rate of absenteeism as to delay badly needed home deliveries. The patience and good will of coal customers

has been strained. They would agree with W. H. Brackmann, manager, Coal Equipment Service Co., Inc., Kansas City, who says, "Poor delivery of coal, a surly or dirty truckman, a driver who is discourteous in traffic, a service man who does a dirty or careless job, does irreparable damage to the dealer."

Seek Better Deliveries

Though the labor market has eased since the end of the war, the best labor still shies away from coal delivery, because it is a dingy, unpleasant job unless fully mechanized. For that reason coal dealers may be among the last groups of business men whose labor needs are satisfactorily filled. Unhappily, labor unions in some cities are doing little if anything to help. In Chicago, for example, a medieval union rule forbids the use of a mechanical conveyor if the distance from truck to consumer's bin is more than 14 ft. Short-range union thinking of this type effectively repels workmen who seek a clean, streamlined job.

Dealers face a curious problem in Cincinnati, where the custom of curb deliveries, honored by long practice

but nevertheless injurious to public opinion of coal as a home fuel, forces the buyer to hire an independent shovel or wheelbarrow man, in no way representative of or answerable to the dealer, to move the coal from curb to basement. It should be said in extenuation that the larger sizes of coal customarily preferred by Cincinnati consumers and the steep slopes of the residential areas make mechanical deliveries difficult if not impossible. Yet the customer pays a charge of 75c. to \$1.50 per ton above the quoted price of his coal to have it moved into his bin, and he pays it to a man who is not responsible to the dealer for the cleanliness or even the completion of his job. The system attracts a shoddy type of labor whom the buyer unfairly but inescapably associates with the coal industry. A first-class repair job, both in personnel and in public opinion, is indicated here.

There are hopeful signs that point to the improvement of driver labor, even in Cincinnati, where, says Walter Busch, executive secretary, Cincinnati Coal & Coke Merchants' Association, some retailers have proposed to share the costs of bin delivery with their customers, hiring their own shovel and

KEEPING CUSTOMERS SOLD

How One Dealer—Wiedenman-Simpson Coal Co., Kansas City—Does It With an Instruction Sheet for Drivers

SATISFIED CUSTOMERS PAY YOUR WAGES

1. Sell clean, well-prepared coal: Richelieu Lump, hand-picked from car or pile; Richelieu grate, forked clean from car or pile; Black Ace lump or Bonanza lump, hand-picked; Black Ace furnace or Bonanza furnace, forked from car or pile; Fair-play, forked clean as it comes; Red Wing, forked clean; all coke, forked clean, except egg-run; Broken Aro, forked clean; Cherokee lump and nut, forked clean unless otherwise specified; Tiger lump, forked clean; semi-nut, screened clean. Watch very carefully for impurities when loading any kind of coal.

2. Be sure labels are on coal that should have them.

3. Wet all loads thoroughly, unless instructed otherwise.

4. Always keep the customer's premises in mind. Always use your tarpaulin—for steam or domestic delivery. Sweep up clean after unloading. Never shake tarpaulin on the customer's property. The place for that is at the yard.

5. On arrival at a customer's house, go to the back door for instructions about placing the coal and get your ticket signed. A dirty front porch caused by your tracks always puts the customer in a bad frame of mind. Be sure that the coal door in the basement is closed before unloading. See that the coal window is closed after delivery. When the delivery ticket is signed and handed back to you, thank the customer.

6. When you find a hard place to make delivery, be pleasant about it. Remember satisfied customers pay your wages. In these days of keen competition, our service must be second to none.

7. Use every precaution in going over driveways and lawns. Always be courteous to customers.

8. Be very careful about hitting windows with coal. No one wants his house marked up with coal. Never throw coal at a window from your truck. Always unload from the tail of your truck.

9. Handle coal as carefully as possible. Remember, "Haste makes waste."

10. When you are unable to make a delivery, always call the office for instructions. No return drayage will be paid if this is not done.

Appearance of Trucks and Drivers

Wiedenman-Simpson furnishes paint for your truck and half the cost of your unionalls. Change your unionalls at least three times a week. Hose your truck off every day. Wash your truck at least once a week. Clean equipment on the streets is a continual advertisement for the company.

Courtesy in Traffic

Who knows who may be driving the car you meet at the intersection? It may be a customer or a prospective customer. A minute lost at a stop light or an intersection may pay dividends in new business, besides reducing the unwelcome expense of accidents. Courtesy to your fellow motorist attracts favorable attention.

Teamwork Among Ourselves

Always break a car at the corner. Pile the slack in one pile. When the coal is hand-picked, pile the nut and egg size in another pile. This leaves a clean place for the next man to load. If everyone does this, no one will have a lot of extra work.

In making steam deliveries, always throw your load back away from the window. This does not take much time and it eliminates any grudges or hard feelings from your fellow workman.

Truck Equipment

All trucks must have one shovel, one fork, one pick, one tarpaulin, one broom.



Clean trucks, courteous drivers and dirt-free deliveries bring business to the retailer; coal fleet and drivers of the Metropolitan Coal & Oil Co., Indianapolis, Ind.

wheelbarrow men and thus fixing responsibility for clean and courteous deliveries. "Competition from 'laborless' fuels will hasten this change," says one Cincinnati dealer.

Elsewhere retailers have determined to obtain and train better workmen for deliveries. In Kansas City, the Wiedemann-Simpson Coal Co. conducts a school for drivers, shares the cost of their uniforms and an hour after delivery sends a representative to check on the cleanliness of the unloading job. Metropolitan Coal & Oil Co., Indianapolis, plans to install truck-driver training courses in courtesy, cleanliness and efficiency, as well as a delivery check-sheet to be filled out and returned to the company by the customer after delivery. In Chicago, where the union has shown little effective interest in training drivers or improving the quality of delivery personnel, the coal merchants' association plans to open to drivers a long-established association-sponsored training course, heretofore available only to sales and office personnel. The course will include field trips to nearby furnace, stoker and accessory plants. The association will urge dealers to give thoughtful attention to recruiting and training.

In Dayton, a promising solution of driver personnel problems is shaping up. The Dayton Coal Exchange has enlisted the cooperation of the local union in filling its needs for manpower and training, and O. O. Bishop, business representative, Truckdrivers Local 94, A.F.L., has pledged "cooperation in every way possible with the dealers in selecting and training of drivers and in encouraging the use of mechanical loading and delivery equipment." This agreement should point the way for dealers and unions in other cities.

Thus, coal retailers generally are thinking and planning and acting to remove obstacles that can be handled locally. But there are broader problems whose solution requires resources of funds and experience not now available to individual dealers or to local dealer associations. Retailers are willing and eager to lend a hand in their solution, and with hope and not a little impatience they look toward the completion of an integrated nation-wide program of public education and modernized merchandising, supported in part by funds from the National Coal Association and guided by the collective wisdom of experienced producers and public-relations engineers.

Retailers believe that public opinion of the industry and of coal as a domestic fuel must be reconstructed. The latest strike added momentum to a deterioration of public opinion that already was well under way. "A wave of unfavorable publicity grew as the Chicago brownout deepened and financial losses mounted in the city," said Marc Bluth, executive secretary, Stoker Manufacturers' Association, shortly after the strike had forced Chicago's coal merchants and stoker dealers, together with Commonwealth-Edison, to call off a mammoth campaign to sell coal, stokers and power and to rehabilitate public acceptance of coal for home use. "Just now," Mr. Bluth continued, "you can't sell a stoker to any builder in Chicago, for builders are convinced that Lewis has the industry under his thumb." In greater or less degree in other cities coal's standing plummeted because of the strike.

Also, there is sentiment among retail coal men that the public has not been sold on coal as a home fuel. "A homeowner takes his guests into the

kitchen to show off his new refrigerator and into his basement to point out his new gas burner," says a Cincinnati dealer, "but I haven't known any homeowners who usher guests to the basement to see a new coal-burning installation." Successful advertising has persuaded the public that gas and oil are streamlined, glamorous and modern and, by inference, that coal is out-dated and troublesome. Dealers suggest that coal's story has not been adequately and colorfully told and that homeowners know too little about bin-fed ash-removal stokers and automatic heat controls that make coal-burning an armchair operation.

Public opinion of coal has been further weakened by smoke. Anti-smoke ordinances in St. Louis, for instance, already have sped conversion to oil or natural gas in many homes and in some industries. In other cities, notably Cincinnati, anti-smoke agitation is growing. Local associations cannot be expected to fight this battle alone. They need a forceful campaign, guided by experts and financed by joint contributions from producers and retailers, for public education in smokeless burning methods and equipment.

Good Will—Dealer Goal

Few coal merchants see any prospect that competition from oil and gas will ease off. An outstanding Chicago dealer declared recently that the only reason more coal customers have not switched already to oil is that production of oil burners is still far below manufacturers' goals. In Cincinnati, Chicago, St. Louis and Kansas City, natural gas is winning new customers daily. Convenience is the catchword of gas and oil salesmen alike. "We sell oil equipment on grounds of convenience," says Lester S. Scott, manager, Oil Heating Division, Merchants & Manufacturers Association, Washington, D. C. "An oil furnace to replace a coal furnace can be sold anywhere in Washington on that basis alone."

Retail coal merchants are doing what they can, individually and jointly, to rebuild their public relations and make coal a convenient fuel for home heat. Newspapers and radio stations in Dayton have been won over to the support of local coal men. Cincinnati dealers are studying a report drafted by Stokes, Palmer & Dinerman, Inc., public relations counsel, and are laying out their advertising campaign in terms of the needs shown in the survey. Experienced public-relations committees of coal merchants' associations are busy at work in Indianapolis and Chicago. The St. Louis Coal Exchange

has blueprinted its public relations program. Advertising by Coal Equipment Service Co., Inc., Kansas City, already has forced local furnace-cleaning fees down from \$7.50 to \$5.00, with consequent improvement in public opinion of coal. These are indications of the readiness of dealers and retailers' associations to join hands with the National Coal Association's marketing committee to rehabilitate the industry's public relations.

Better Service Offered

To answer the challenge of convenience laid down by competing fuels, coal dealers are acting independently and collectively in local areas. Some, like the Blue Diamond Coal Co. and the Metropolitan Coal & Oil Co., Indianapolis, and the Seidel Coal & Coke Co., St. Louis, have equipped themselves to sell, install and give 24-hour service on stokers, controls and other heating equipment. Their service staffs are trained either at the factory or by apprenticeship and experience and are drilled locally in telephone courtesy, customer relations and salesmanship. In other cities, notably Chicago and Cincinnati, coal dealers have effected written or oral agreements with stoker dealers or furnace repairmen to make 24-hour service available to their customers.

For some years the Chicago Coal Merchants' Association has maintained a full-time combustion engineer and an assistant to make surveys, analyses and recommendations without cost to the customer, to interview clients who plan conversion to oil or natural gas, to carry coal's case before building commissions, real-estate boards and construction companies and to appraise unsatisfactory coal-burning installations and make recommendations for re-engineering.

The George Lill organization has developed its own articles of faith for better merchandising: to sell only washed and oil-treated coal; to use rubber-tired wheelbarrows, canvas tarpaulins and mechanical conveyors; to uniform its drivers; to train delivery personnel in sales methods to win new customers; to maintain a full-time combustion engineer on 24-hour call; to clean, paint and scrub trucks by schedule; and to provide a financing plan through a local bank for spreading heating costs over a 12-month period.

Sales-boosting promotion—the Chicago co-operative program to sell coal, stokers and electric power to householders and apartment owners was sparked by ads like these.

Dealers in Cincinnati, Dayton and Kansas City, impatient to get on with the marketing job and spurred by the urgency of the competitive situation, have gone ahead on their own, intending to affiliate with the national coal-service organization when the contract has been finally prepared. In Dayton, plans are set, money is in the bank and a showroom is being equipped for the Miami Valley Heating Co., a stock company for complete coal service controlled by the Dayton Coal Exchange. Ninety-eight percent of Dayton's retailers are participating, says Mr. Foster, and full support of coal-burning equipment dealers has been enlisted. An assessment of 3c. per ton is being paid into the fund by retailers who move half a million tons annually. The service company will employ a 15-man staff for all types of coal-heating equipment—stoves, furnaces, stokers and controls.

Eighty to 85 percent of Cincinnati's dealers, anticipating the producer-retailer contract, have been paying a

1c. tonnage assessment into a local fund since April 1, ten stoker dealers have pledged 24-hour emergency service, plans are shaped for a display room to be financed by renting space to equipment dealers, and a school covering sales technique, delivery methods and utilization of coal is contemplated.

In Kansas City, the Coal Equipment Service Co., Inc., has been chartered with a capitalization of \$25,000, subscribed by local producers and retailers. A heating engineer has been employed as manager, a service staff is being recruited and trained and equipment is on order. Similar organizations, inspired by aggressive Kansas City retailers and producers, are expected shortly in Des Moines, Omaha, Lincoln and Sioux City. St. Louis dealers already have blueprinted their plans.

Retailers in Indianapolis and Chicago are assessing their practices in the light of the N.C.A. program and are finding that their delivery methods, by and large, are modern and that their

Keep the Home Fires Burning



...with a Stoker!

This fine fellow is off for the day... and maybe part of the night... but he's not worried about the furnace fire and frozen pipes. He's got an automatic stoker to tend the fire. No matter what the weather, the stoker will keep the temperature of the home just right. When the master returns (even if it's not until the next day) he'll step into a warm, cozy home.

Keeping the "home fires burning" the stoker way is economical...

Ask Your Neighborhood Dealer



TAKE IT EASY, MISTER...
GET A STOKER

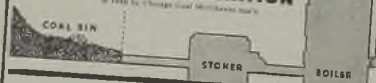
Sink back in cozy, carefree comfort—your stoker can be regulated without losing your place in your favorite sports column. This is the convenient advantage of having a Stoker with its thermostat control at your command.

And a Stoker gives abundant comfort in healthful, steady warmth from floor to ceiling because it burns coal which gives continuous, instead of intermittent heat.

Install a Stoker in your home. Your coal merchant will gladly help you select the equipment best suited for your heating requirement.

Coming: A STOKER SHOW
May 6 to 18—Commonwealth Edison Assembly Hall

CHICAGO COAL
MERCHANTS' ASSOCIATION



Enjoy THE ABUNDANT
COMFORT OF Coal Heat
A STOKER MAKES COAL HEAT EVEN BETTER

services already are available to customers through individual coal merchants or through agreement with separate maintenance and service companies. They look to the nation-wide marketing plan as an opportunity to enlarge, centralize and publicize their services. "The National Coal Association's marketing plan," says David Clint, executive secretary, Chicago Coal Merchants' Association, will unify and integrate policies and practices already in effect with some companies and will solidify scattered local efforts to improve the merchandising of coal." Chicago and Indianapolis dealers point out that the several ideas in the National's plan are not new but that their integration into a nation-wide plan is essential for rehabilitating public opinion of coal, securing coal's survival as a domestic fuel and improving coal's position competition-wise. This point of view is well expressed by Frank J. Donovan, president, Rutter Coal Co., Chicago, who says, "I want my competitors to share in the National's plan, for by sharing in it they will serve the industry at large by shaping favorable public opinion of coal and public acceptance of coal as a home fuel."

All this adds up to the fact that the National's marketing program is a welcome sign to the nation's retailers and that they are preparing themselves to carry their share of the load. For the first time in the history of the bituminous industry an organization of operators is interesting itself in the retail merchandising of coal. They will find the retailers ready for action.

Where the Producer Fits In

A large measure of the industry's rehabilitation must be assumed by the operators, dealers agree. A good starting point, they suggest, is a reconstruction of producer-retailer relations. In Washington, for instance, it is said that operators in years past have left the dealer to shift for himself and that their attitude is largely responsible for the coal-and-oil alliance in the capital city, where only one major coal dealer does not handle oil as well as coal. Operators are said to have taken little interest in retailer problems; they have not given advance notice of price changes, so that dealers could prepare their customers; they have offered little help in merchandising during depressed periods; they have paid scant attention to sizes requested. One Washington dealer drew an unhappy contrast between oil producers and coal operators. In the sale of oil for home heating, he pointed out, the hand of the producer is felt all along the line. Oil producers have standardized burning equipment, turned out a product uniformly high in quality, developed excellent public relations, backed local promotional campaigns and trained their salesmen painstakingly. Coal operators, in the opinion of this dealer, have fallen short in these respects.

A Cincinnati coal merchant pointed up this weakness by declaring that the sale of coal has been too long a buck-passing job between producer and re-

tailer. Consequently much of coal's advertising dollar has gone down the drain. A mutual understanding of problems by retailer and operator, fostered by the National's plan, will produce wiser and more effective advertising and a much-to-be-desired improvement in dealer-operator relations.

Key to building good relations between producer and dealer is the training of producer salesmen. In the opinion of many retailers, the day is long past when an operator representative could stroll into a dealer's office, tell a couple of stories, fill out his order sheet and call it a day's work. Retailers urge that producer salesmen represent the industry more intelligently. Salesmen must know what their coals will do. They must know the rudiments of combustion engineering. They must pass along merchandising ideas and suggest means of maintaining and improving local public relations. They must be informed about new coal-burning equipment and controls. They should be able to outline and assist in training programs for retailer salesmen, office employees and drivers. In short, the producer representative must be an expert in modern merchandising.

Rising Prices Aid Competitors

The rising cost of coal is disturbing many dealers, who point out that coal has lost much if not all of its price advantage over competing fuels. In Cincinnati, for instance, dealers estimate that coal and natural gas stand on the same price footing when coal sells for \$12.50 a ton. In June in that city a ton of stoker coal sold for \$12.38, including the State sales tax and a \$1.50 fee for transfer from curb to bin. Assuming that the customer burns an average of a ton a month through the year, he now saves 12c. a month by burning gas instead of coal. For the 12c. saving, the householder shovels coal into his furnace or stoker, removes ashes, lifts out clinkers and sweeps coal dust out of his basement periodically. Few coal customers view this saving as a real economy.

Coal retailers point in four directions for the answer to coal's present price structure: (1) retailer reduction of yard and delivery cost, already planned or undertaken by the advance guard of yard-owners; (2) further mechanization of mining operations by producers to bring down unit-production costs; (3) education of miners by producers in the basic

High Spots of the N.C.A.—Dealer Marketing Plan

THE TARGET

Joint effort by producers and retailers to retain present domestic sales and expand into the new-home market.

1. Improve and standardize retail sale, delivery and service.
2. Promote improved burning equipment and controls.
3. Boost public opinion of coal as a fuel and an industry.

THE TACTICS

Joint backing of local dealer organizations and creation of a central staff manned by merchandising experts.

1. Set up a national network of coal-service organizations.
2. Effect a code of standards for coal-heat service including clean deliveries, 24-hour emergency service, personnel training, engineering advice and community advertising.
3. Coordinate education, promotion and advertising.

economics of marketing, lest wages be forced so high as to squeeze coal out of the domestic market; and (4) stepped-up research, financed by producers, to develop coal-burning equipment that will give 100-percent heat for 30 to 50 percent less fuel, plus pressure on manufacturers for high-speed production of such equipment once it is designed and tested.

There is a strong feeling among retailers that the mounting pressure of competing fuels calls for top speed in research, design and production of this modern coal-burning equipment. Coal must be made constantly more convenient and efficient to offset its rising price. In this connection retailers hope for universal improvement of the coal stoker to include direct bin-feeding and ash-removal. As one dealer put it, "Ash removal remains the problem in competition with other fuels, and until the industry solves it coal will be the underdog in the home fuel market." Research, development and promotion along these lines are too expensive and too complex for the resources of retailers, and they look to producers and to Bituminous Coal Research for quick action on this front.

The coal-supply question, both immediate and long-term, is a critical factor in retail marketing. This year, dealers point out, a strike-born deficit of between 70 and 80 millions tons of bituminous must be made up, else there is little point in shoving a marketing program into high gear. Stoker coal is in greatest demand and it must be produced in quantities sufficient to fill the needs of customers who have installed stokers or who plan to install them before the beginning of the heating season. If there is any apathy among retailers toward a nation-wide plan for marketing—"Realists must admit that there is apathy in some quarters," says an Indianapolis merchant—it is due to the prospect of short supply, especially of stoker coal. Dealers want assurance from producers that their demands can be filled for this winter's heating season.

Dependable Supply Crucial

Coal retailers also are looking beyond the coming winter to future winters, and with the pattern of past stoppages stamped in their minds—stoppages that have brought dissatisfaction if not distress to their customers and have struck at the roots of the industry's public relations—they are asking, "What assurance can we give our customers of a dependable supply of coal in years to come? Must they remain forever at the mercy of Lewis and his like?" Operators, they urge,

How the Dealer Sees the Producer's Obligations

1. To produce coal to wipe out the deficit created by the six-week strike of 1946.
2. To enlarge mechanized mining operations to keep costs low, assuring (a) a competitive price position and (b) a profit to operator and dealer sufficient to stabilize the industry.
3. To produce coal of high quality, properly washed and oil treated and accurately sized.
4. To produce and prepare more stoker coal to supply new stoker installations in homes and industrial plants.
5. To train salesmen in intelligent merchandising.
6. To maintain good labor relations for a dependable supply.
7. To share in, subsidize and speed the development of new coal-burning equipment and controls, especially ash-removal stokers.
8. To assume a fair share of the responsibility for coal from mine to furnace.

must find some way to end annual stoppages. Intra-industry education in labor relations, enlistment of public opinion in behalf of the industry and a new and aggressive technique for negotiating contracts are suggested as avenues to peace within the industry. Retailers want producers to act vigorously along these lines.

Finally, but by no means to be passed over, coal retailers look for a constantly improved quality of coal for domestic uses. Now that wartime pressures and shortages of equipment have eased, dealers expect clean, dust-proof coal free of tramp iron, rock and dirt. And they want coal that is properly sized. One retailer tells of a producer who shipped lumps of coal weighing up to 400 lb. and who expressed indifference toward breaking them into suitable sizes. As this same dealer put it, "It makes no sense to spend a dollar for advertising unless the product is steadily improved." A Chicago coal merchant urged producers to exercise "the same conscientious care in turning out a high-quality product that the retailer must use in supplying his client." In short, dealers are agreed that the operator must assume his share of the responsibility for coal from mine to furnace.

Reviewing and summing up, the retailer's highway to new standards of merchandizing is barred with serious obstacles. He faces personnel and equipment problems in his yard. A declining public opinion of coal as an industry and as a home fuel, begotten by repeated labor upheavals, shortage

of supply and outmoded burning equipment, adds to his troubles. Oil and natural gas are offering tougher competition in price, convenience and streamlined salesmanship. He cannot hold old customers or win new friends with coal prepared and sized to wartime standards. He cannot promise his customers full supply. Producer-retailer relations are not geared to modern merchandizing. In coal's loss of price advantage over other fuels he sees a stumbling-block to broader markets. These forbidding barriers cast a shadow on coal's future use as a domestic fuel.

The Future—Bright

But there are broad patches of sunlight as well: the new-found spirit of producers and retailers alike, voicing itself in widespread and enthusiastic approval of the N.C.A. marketing program; the forehandedness of many retailers, who are re-staffing, rebuilding and re-equipping their yards and who already have formed or blueprinted coal-service organizations that await only the final signing of a contract with the national organization; and the N.C.A. program itself, which gives promise of restoring public opinion of coal, meeting competition from oil and natural gas and remodeling producer-retailer relations into a cooperative enterprise to please coal's customers with quality, economy, convenience and comfort.

For details of the retailer-producer Coal Heating Service contract, see p. 126.

HIGH EFFICIENCY

Marks Shaker-Conveyor Work at Imperial

With 13 Shaker-Conveyor Units in Service and a Mining Height of 5 to 8 Ft., Imperial Mine Has Developed Barrier-Extraction Methods Insuring High Efficiency With Safety—Special Face Pans Used

AN OUTPUT of close to 9 tons per man, all men on the mine payroll, was achieved in 1945 in extraction of barrier pillars with shaker conveyors at the Imperial mine of the Imperial Coal Co., Erie, Colo. This average corresponds with that achieved in previous years and puts Imperial mine high up in the list of efficient properties in the Denver basin. That this efficiency has been achieved with safety is indicated by the fact that there has been only one fatality in the life of the mine.

Imperial mine, a shaft operation, was started by James and George Brennan and associates in 1925 and active development began in 1926. James Brennan is now president and George Brennan, also of Denver, is secretary-

treasurer. Mine officials include Frank Kolar, Jr., underground superintendent; John Jackson, mine foreman; Wilbur Gunther, top superintendent; Avery Williams, master mechanic; and Pete Bellodi, chief electrician.

Coal Left for Top

Like other properties in the Denver basin, Imperial mine recovers a seam known as the Laramie formation. Cover averages 289 ft. Some 18 in. of coal over a natural parting is left to protect the top, which varies from slate to soapstone. The bottom is soapstone to sandstone, with the main bottom sandstone. Mining height, reflecting variations in seam thickness, varies

from 5 to 8 ft. General dip of the coal is 1 to 1½ percent southeast and the shaft was sunk near the south boundary of the coal area, making the main-line hauls at present 800 to 4,000 ft. Very few heavy local grades are encountered, except in one area working toward a fault, where the pitch increases up to approximately 12 percent.

Care in the early development of the property is reflected in unusually straight entries and very regular panel development. While some mining was done near the shaft in the early days, the general rule was to drive out and work back where possible. By about 1937, room-and-pillar work in panels was well along, although some virgin



View of a partly loaded working place, showing face pan and conveyor loaded with coal.

Swivel and line to the face in a barrier-pillar pocket.

coal still remained, and the management began casting about for an economical means of extracting the barriers, which still contain enough coal for several years of operation. After investigation and trial of other equipment, shaker conveyors were adopted and started in room work. In 1940, they were started in barriers. Now, practically all the tonnage comes from conveyors. A few hand loaders (12 to 14) are employed in the winter season to mine pillars in isolated sections where the tonnage is not sufficient to warrant putting in a shaker.

Shoot on Face Pans

At present, Imperial mine employs 13 conveyor units, about five of which are worked two shifts. Three are Vulcan of Denver, four are Goodman G-20's and the remainder are Goodman G-15's. Special face pans 6 ft. long and 30 in. wide, made at the mine, are used with each conveyor. After a place is cut and bugdusted, the pan is shoved under the coal to within about 6 in. of the back of the undercut and the center is shot down on it. The conveyor then is started and shakes out the coal with little shoveling. Then, the ribs (18-ft.-wide places) are shot over, the face pan taking a large part of the coal. The remainder is shoveled onto the con-



Conveyors discharge directly to the mine cars—in this case a new steel unit.

veyor, which loads into a mine car.

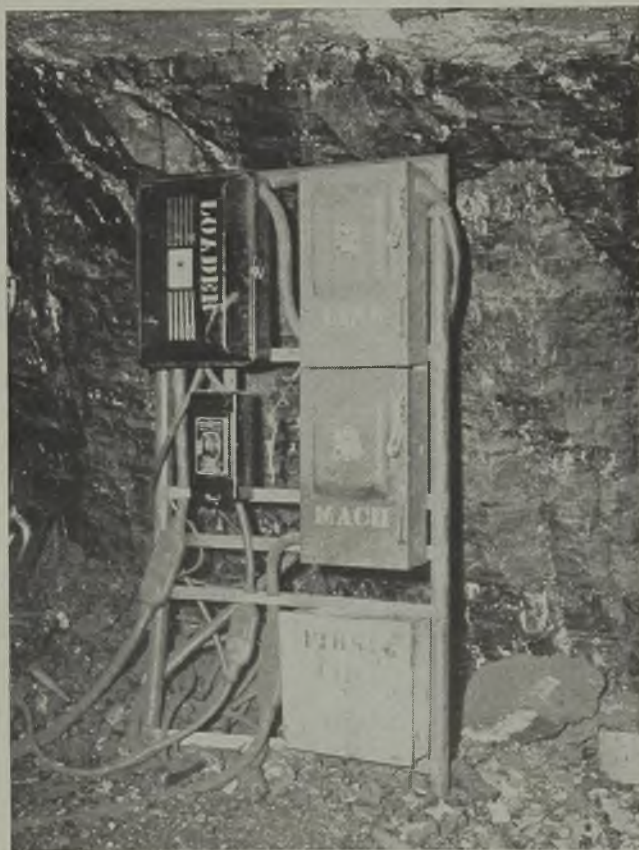
Each unit is worked by itself and consists of a conveyor with face pan and the necessary 45-deg. swivels, a Sullivan CE-7 shortwall making a cut 6 ft. deep (Bowdill bits), Black & Decker hand-held drill with Hardsocg conveyor augers and bits, a Buffalo

Forge tubing blower with duPont Ventube, a control panel made at the mine and containing starters, safety switch and first aid kit, and a 4-ton battery or light trolley locomotive. All equipment, except locomotives (battery or 250 volts d.c.) and drills (110 volts a.c.), is powered by 440-volt a.c. cur-



Flat face pan used at Imperial. It is shoved under the cut and the coal shot down on it.

Switches, controls and first-aid kits are mounted on portable pipe-frame panels.



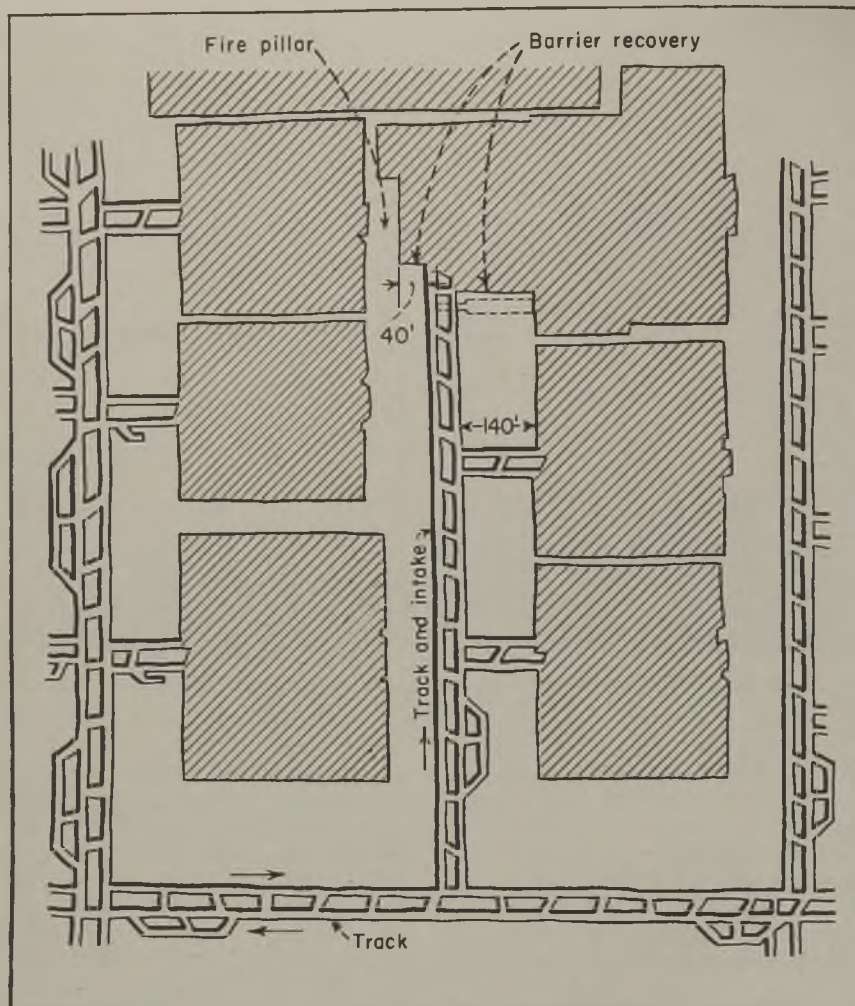


Fig. 1—Showing barrier recovery in one section of Imperial mine. That on the right is being completely removed. That on the left is being partly removed, leaving a fire pillar

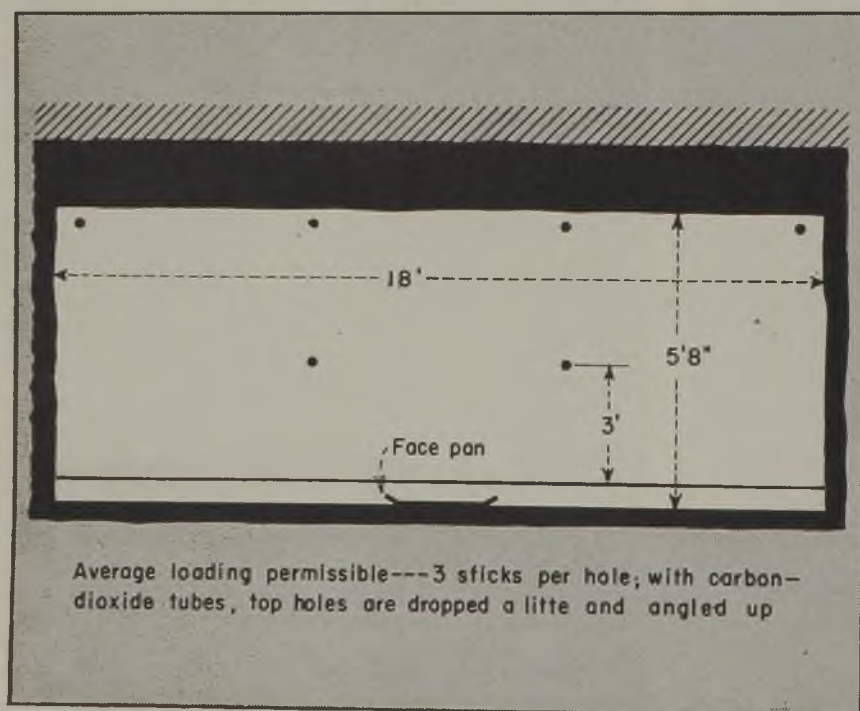


Fig. 2—Drilling diagram for room work at Imperial mine .

rent. Transformers for drill power are mounted on the cutters. Unit control panels are light enough to be carried by two men and are merely set up against the rib in a convenient place. Cables are plugged in and connected with Miller connectors. Cars are both wood and steel, the former being replaced by the latter—Card roller-bearing units holding around $1\frac{1}{2}$ tons mechanically loaded. Age and wear and tear due to heavy chunks breaking the side or bottom boards, with, among other things, increased spillage, were among the reasons for retiring the wood equipment.

Three Men Operate Conveyor

A crew for a conveyor unit normally consists of three men, although occasionally a fourth may be added. Two work at the face, doing everything necessary, including setting timbers and handling supplies with assistance as conditions permit from the third, or loaderhead, man. One of the face men, called the head man, is certified. The other is classed as his assistant. The loaderhead man does his own trip changing, during which period the facemen timber and do other work. Cars generally are blocked past the conveyor discharge, with a shove as necessary, the direction depending upon which way the grade runs.

Trough lines are suspended on chains from posts set on each side at each pan point ($13\frac{1}{2}$ ft. apart). Two other posts normally are set between those at the joints and additional ones are put in where necessary in room work and pillaring. Some posts are recovered by digging around the bottom in pillar work.

In room-and-pillar work in virgin territory, the rule is one conveyor per panel. Starting at the top, or the inby end, a room 18 ft. wide on 30-ft. centers is driven up, leaving a 12-ft. pillar, which is brought back by the pocket-and-stump method. The conveyor then is moved down one room and the process repeated. Drives and loading stations are put on the intake heading, which generally is on the other side from the room necks. Consequently, the practice is to cut through the chain pillars opposite the room necks. After about three rooms are worked, the conveyor is laid up the intake heading and the chain pillars are extracted. After panels are completed, they are sealed with double-brick stoppings.

Substantially the same system is followed where the barriers can be cut through to the old rooms. However, to prevent fires due to spontaneous combustion, a fire pillar is left between

each split of air, thus preventing circulation which tends to promote firing. One result of this rule is a complete absence of fires in Imperial mine. To recover a part of the barrier and still leave a fire pillar, however, requires a different method of attack.

Barrier-Extraction Plan

Fig. 1 shows complete extraction of the barrier on one side of an entry and partial extraction, leaving a fire pillar against the next split, on the other. While not shown, the old panels on the right are cut off from the split on that side by a barrier and fire pillar farther over. Fig. 3 shows how a barrier is completely extracted by driving up rooms and taking pillars in the same way rooms are driven and pillars mined in regular panel work. Fig. 3 also shows the method of taking part of a barrier where a fire pillar is left.

As in regular room work, a barrier-pillar room is driven up, usually 140 ft., with a tubing blower until it cuts into the old panel. Also as in regular room work, a pillar 12 ft. thick, or two cuts, is left against the gob. Pockets 18 ft. wide are driven through the pillars, leaving stumps 5 ft. thick. In pocketing through, the crews sometimes grip out on the stump side, giving a sawtoothed effect. To load the two cuts in the pocket, a swivel is put in the pan line, which permits turning it sufficiently to take both cuts and also the stump which may be cut if without weight or picked down if weight affects it. Then the conveyor is shortened to make the next pocket. One of the rules at Imperial is that the coal must be taken clean and caves made regularly to relieve weight on succeeding work and thereby prevent difficulties.

How Fire Pillars Are Left

To partially mine a barrier where a fire pillar must be left, places are driven in the required distance 18 ft. wide leaving 5-ft. thick stumps. The conveyor is set up along the center line of the heading. One 45-deg. swivel is put in 13 ft. back from the corner of the pillar place and another is installed, when the place is far enough in, at the corner. The two swivels permit turning the conveyor to drive the place. Where it is only 40 ft. or so deep, as is generally the case, the 5-ft. stump next to the gob is taken out by cutting half of it on the inby side and turning the pan to load it. Then the outby half is cut, if necessary, and loaded, in which case only the outby swivel is required. To complete the job, the conveyor nose is turned the

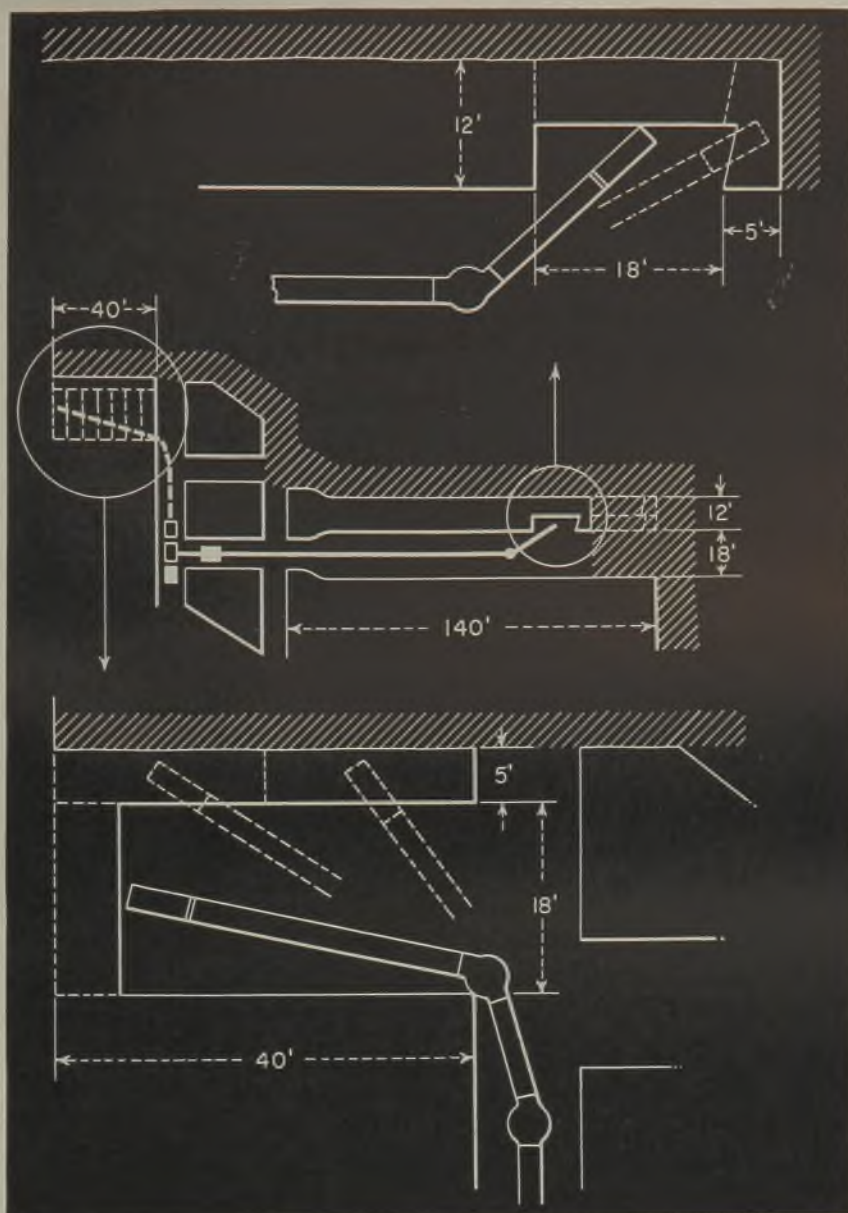


Fig. 3—Two methods of barrier recovery—one where the barrier can be completely mined by driving rooms and the other where a fire pillar must be left.

opposite direction and the chain pillar or pillars are mined back to the solid.

The coal is broken down with Cardox 231-130 tubes or $1\frac{1}{2}$ or $1\frac{3}{8}$ x8-in. permissible. Six holes normally are drilled in an 18-ft.-wide place, as shown in Fig. 2. With powder, the top holes are drilled as nearly straight in as possible. With Cardox, because of its different action, the top holes are started down a little and angled up. In using permissible, average loading is three sticks per hole. The four center holes, as previously noted, are fired after the face pan is placed under the cut. When the coal is loaded, the rib holes are fired to throw part of the remaining coal onto the pan. The remainder is shoveled by hand.

Another factor in results at Imperial is careful selection, training and supervision of men plus a cordial working relationship achieved by good management. This, plus equipment and methods, is responsible for the high efficiency attained at Imperial. In December, 1945, the mine worked 24 days with an average of 99 men to produce 21,693 tons, an average of 10.0 tons per man; January 1946, 25 days, 106 men, 23,883 tons, 9.0 tons per man; February, when the winter demand began to slack off, 19 days, 105 men, 17,288 tons, 8.7 tons per man; March, 20 days, 101 men, 16,780 tons, 8.3 tons per man; April, strike; May, nine days, 65 men, 4,967 tons, 8.5 tons per man.



One home of "Reading Briquets"—Locust Summit plant showing final cooling and loading conveyors.

READING BRIQUETS

Use Fine Anthracite in Two New Plants

With a Capacity of 1,000 Tons per Day Each, Two New Plants of The Reading Briquet Co. Augment the Supply of Domestic-Sized Anthracite—Buckwheats Used With Bituminous Coal and Binder

SCIENTIFIC controls in the hands of an operating management with 27 years of briquetting experience keep the Locust Summit plant of the Reading Briquet Co. producing at its rated capacity of 1,000 tons of "Reading Briquets" a day. This plant, one of two identical installations conceived during the war for the purposes of marketing anthracite fines and increasing the available supply of domestic fuel, is located next to the Locust Summit

central breaker of the Philadelphia & Reading Coal & Iron Co., Locust Summit, Pa., and started production last February. Anthracite and bituminous fines, low in ash, are blended together in the presence of a hot asphalt binder and pressed into pillow-shaped blocks midway in size between anthracite stove and chestnut. The American Briquet Co., operators of briquetting plants since 1919, directs operation of this plant and also a twin plant at the

St. Nicholas breaker for the Reading Briquet Co. Day & Zimmerman, Inc., were engineers and constructors for both plants. "Reading Briquets" are distributed by the sales organization of the Philadelphia & Reading Coal & Iron Co.

Fine sizes of white-ash anthracite (Buckwheats Nos. 4 and 5), bituminous fines with certain specifications insuring a better briquet, hot asphalt and other ingredients are the raw prod-

ucts which enter the plant and are converted into briquets that leave on two cooling lines converging at the railroad car.

Briefly, the process is as follows: the anthracite is dried and passed through a series of crushers and screens to obtain the optimum size range. The dry anthracite and bituminous fines, blended in the proper proportions, are mixed with a hot liquid-asphalt binder (plus other ingredients to improve combustion) and emerge in a hot, doughy state. This hot compound, after being thoroughly mixed, is fed to and pressed into briquets by two adjoining cylindrical rolls, the surfaces of which are indented to give the briquets their pillow shape. The briquets, still hot, are cooled to shipping temperature over a circuitous system of conveyors where both air and water are employed for cooling. The process is scientifically controlled with instruments since accurate measurement of volumes and temperatures is required throughout.

Asphalt Storage and Handling

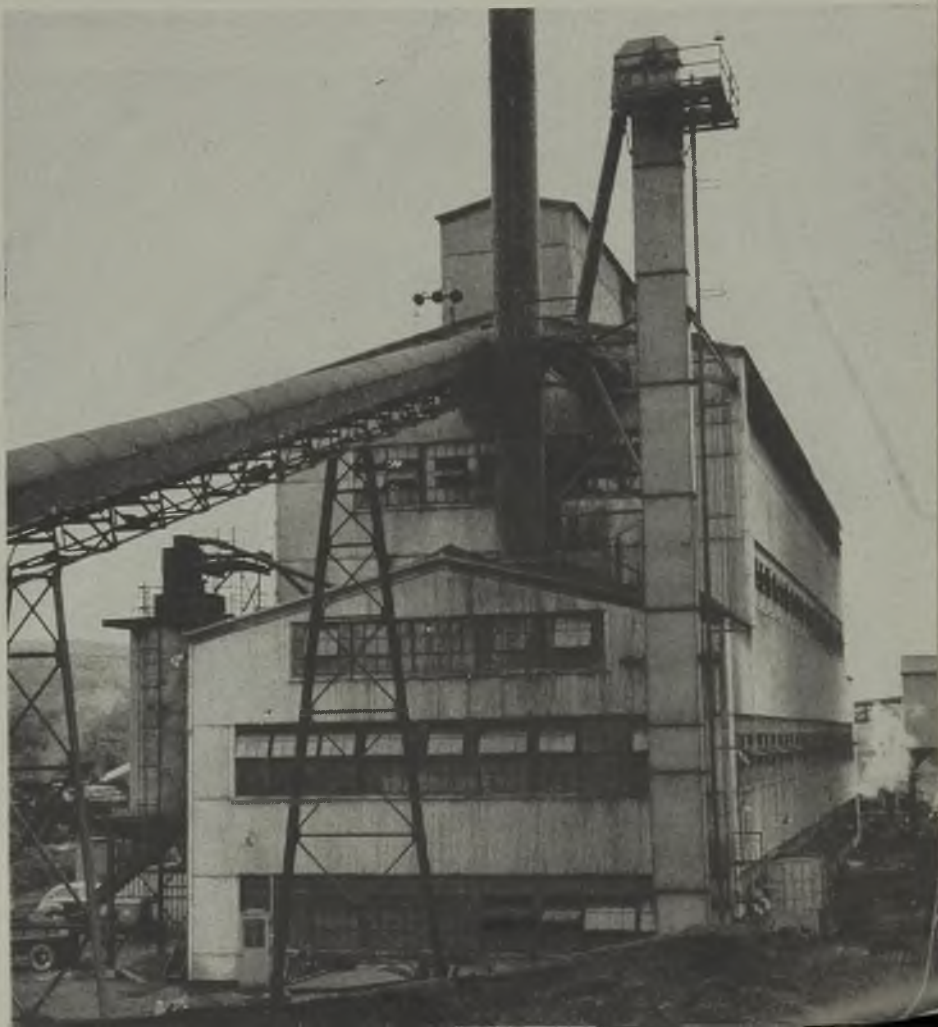
Asphalt arrives at the plant in railroad cars. Steam is used to warm the asphalt before it is transferred by a variable-speed pump from the tank cars to the storage tanks. Each 75,000-gal. storage tank is provided with steam coils and is inclosed by a circular tile wall covered with an insulated roof. As the asphalt is needed, transfer pumps pump it from the outdoor storage tanks to a 3,000-gal. stoker-fired binder-service tank inside the plant. In the service tank, the asphalt is maintained in a liquid state at the desired temperature. A steam-jacketed rotary-gear pump (one for each briquetting line) pumps the hot asphalt from the binder-service tank through an emulsifier and on to the pug mill.

The bituminous-coal circuit, up to the point where the hot asphalt is introduced, is simple. The coal—screenings with an ash content of not over 12 percent—is dumped into a hopper beneath the track and carried a few feet horizontally on an apron feeder to a sawtooth crusher. From the crusher, a centrifugal-discharge bucket elevator lifts the coal and discharges it onto a belt conveyor, where a magnetic head pulley on the discharge end removes all tramp iron before it falls into a 160-ton storage bin. A variable-speed apron conveyor takes the coal from the stor-

Anthracite fines enter the plant on the belt conveyor; bituminous screenings via the bucket elevator

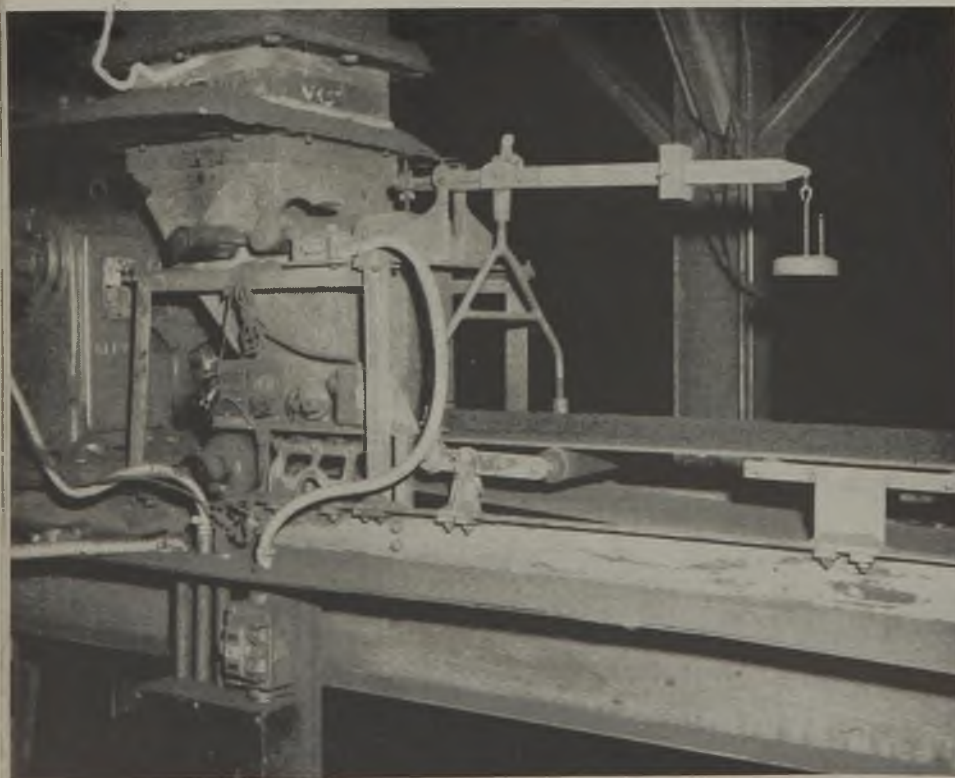


Loader-piler distributes the anthracite fines in the storage yard.





Conditioning equipment ahead of the briquetting press includes this horizontal fluxer.

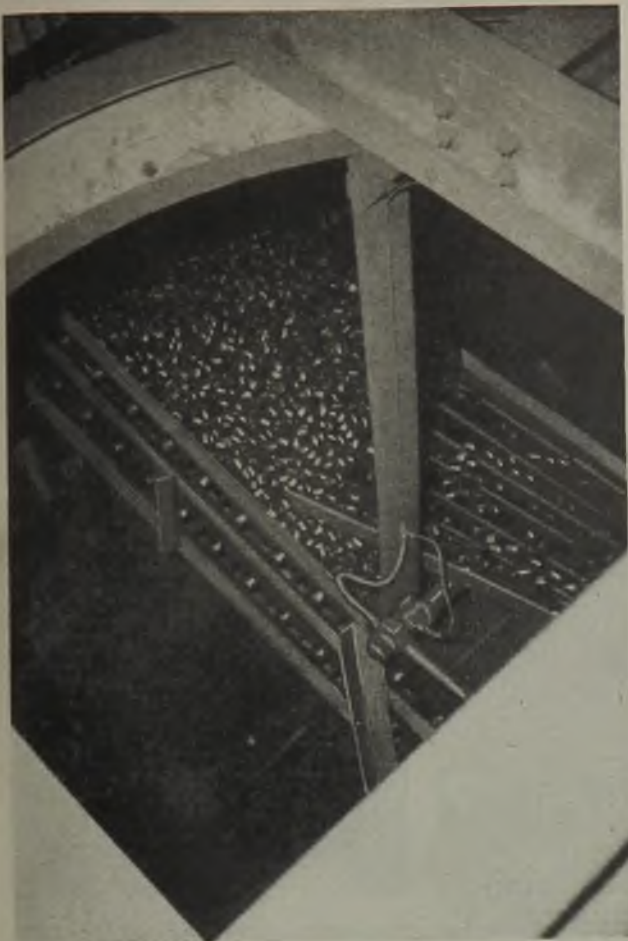


Where the bituminous coal is weighed as it enters the pug mill.

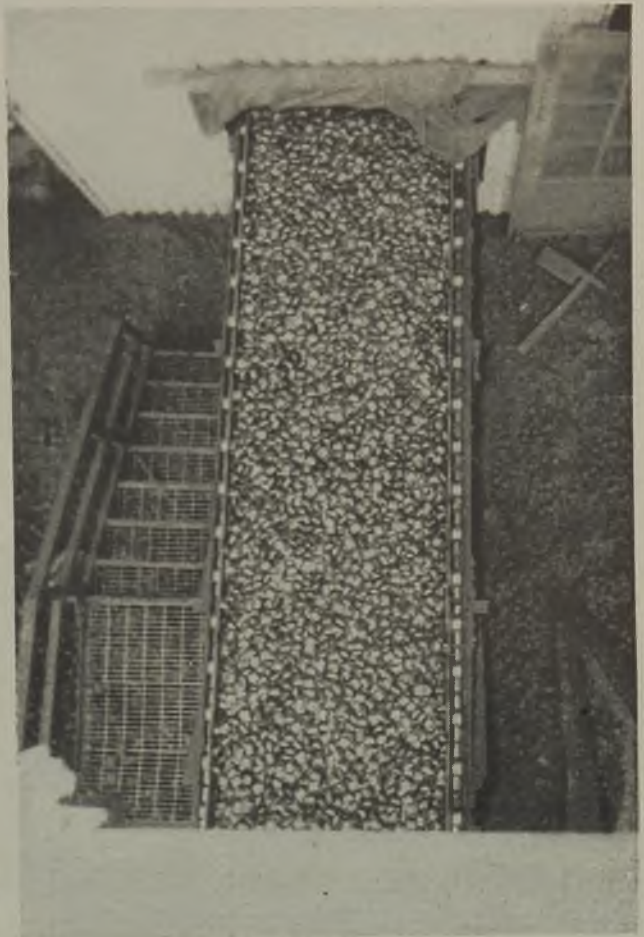
age bin and drops it into a hammer-mill crusher, the last pulverizing stage in the circuit. A screw conveyor moves the fines to another centrifugal-bucket elevator, which deposits them in a 25-ton bin. As the material is drawn from this bin for either briquetting line, it is weighed on a weigh-belt feeder as it goes to the pug mill where, as mentioned previously, the hot asphalt binder enters the briquetting process.

Fines Secured Locally and by Rail

Anthracite No. 4 and No. 5 buckwheat comes to the plant from two sources: (1) by rail from other collieries and (2) from the Locust Summit central breaker. The storage yard will accommodate rail shipments up to 3,000 tons of bituminous coal and 5,000 tons of anthracite, plus 15,000 tons of fines from the Locust Summit central breaker. The layer of bituminous coal is kept less than a depth of 20 ft. to guard against spontaneous combustion. Bulldozers push the anthracite into 33-ton hoppers, where the coal is deposited on a belt and taken to three storage bins in the top



Briquets entering the cooling conveyor from the press shaker in the first stage of cooling and loading.

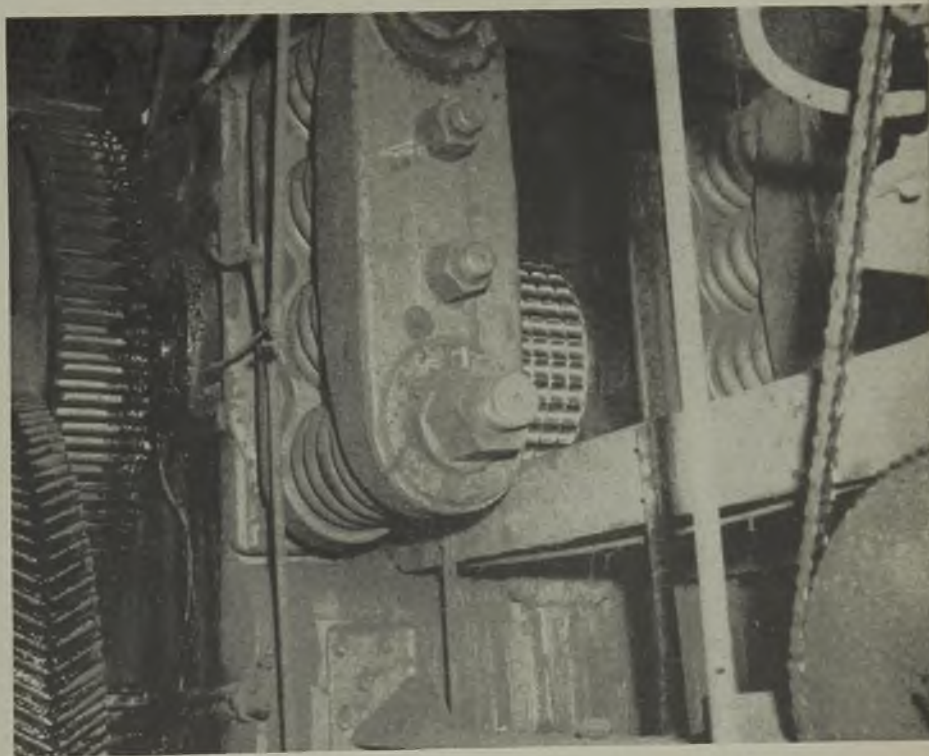


Briquet temperature is brought down to normal on a three-section wire-mesh conveyor—part of the cooling circuit.

of the plant. The two large bins, 200 tons each, are the starting points for the briquetting lines. A third bin holds 20 tons of anthracite for firing the boilers and dutch ovens.

Two boilers furnish saturated steam at 155 lb. per square inch for processing and plant-heating equipment. Much of the process steam is used for heating the briquet mixture in the pug mill and in the vertical and horizontal fluxers. Across the aisle from the boilers are two dutch ovens that supply hot gases for drying the wet anthracite which is later made into briquets. These ovens, as stated, are fired by small-size anthracite.

The hot gases used for drying the coal pass down the outside jacket of the dryer, return in contact with the coal and are expelled at the intake end. The particles picked up by the hot gases are reclaimed in a 12-ft.-diameter cyclone separator. The gases and fine dust continue through the induced-draft fan and are released outside the plant. The coal from the dryer, plus that reclaimed by the cyclone separator, is discharged into a continuous-type bucket elevator, from



Heavy springs supply pressure in forming the briquets.



T. H. Butcher, general manager, oversees operation of both the Locust Summit and St. Nicholas plants.



In the plant laboratory, a close check on briquet quality is maintained by Frank Oshinskie, laboratory technician.



H. F. Laudenslager is Locust Summit plant superintendent.



Harvey Unger is chief clerk for both the Reading Briquet Co.'s plants.



Joseph Katarski is clerk at the Locust Summit briquet plant.

which it passes through a vibrating screen to a 25-ton storage bin. The oversize goes through a pulverizer and is recirculated. Signals show when bins are full or empty and keep materials flowing through the plant.

At this point in the plant, anthracite and bituminous fines, in controlled quantities, are fed simultaneously to the pug mill and the hot asphalt binder is added. By the time the mixture has traveled along the horizontal pug mill, down the vertical fluxer and along a horizontal fluxer, it is well mixed. The first two units are steam-jacketed to bring the mixture to the proper temperature. The last unit, the horizontal fluxer, has both steam and water jackets so that heat may be added or withdrawn in adjusting the final temperature of the mixture before it enters the briquetting press. The operator stationed alongside the horizontal fluxer can tell from the control board what conditions are all along the briquetting line. As the success of the process depends largely on accurate measurements of volumes and temperatures, this board performs an indispensable function. Totally inclosed fan-cooled motors and Type IV, or water-tight, controls are used through-

out the plant. A Type IV inclosure was selected to make certain that it would be dust-tight and vapor-proof.

The briquets, weighing approximately 2½ oz. each, are formed under high pressure in double-roll presses. A shaker distributes the briquets on a three-section 42-in.-wide wire-mesh conveyor, on which they are cooled in turn by the atmosphere, water sprays and an air blast. As the briquets pass from one conveyor to the next, the deformed joints are smoothed and faulty briquets are broken. Only the whole briquets pass over the vibrating screen and onto the belt conveyor for loading into the railroad car. In this way, most of the defective briquets are eliminated and degradation in subsequent shipping and handling is greatly reduced.

Exhaustive Sampling the Rule

Exhaustive tests are run by a laboratory technician at the plant on samples from every car loaded. Crushing tests are made on five briquets from each car to insure that resistance to degradation and breakage is satisfactory. One asphalt extraction test is made on a sample from each car. An ash test also is made. These tests are repeated on

samples taken hourly from the briquetting lines. Each car of raw coal and asphalt received at the plant is analyzed so that adjustments may be made as the material is processed into briquets. The technician also tests and prescribes the treatment for the boiler feed water. At P. & R.'s laboratory in Pottsville, Pa., exhaustive tests were made to determine the type of bituminous coal giving the best burning performance when blended with the anthracite fines.

In addition to supervising the new Locust Summit and St. Nicholas plants, the American Briquet Co. also has operated the Lincoln and Lykens plants for a number of years, producing to date some 3,250,000 tons of briquets. P. & R. also handles the Lincoln output and the M. A. Hanna Co. that of the Lykens plant. Through briquetting, these plants make possible the utilization in a quality fuel of small-sized anthracite ordinarily produced in greater quantities than the market will absorb, in addition to putting it to good use in alleviating the current shortage of domestic-sized anthracite. The briquets find a ready sale in the eastern anthracite-burning territory and Canada.

CABLE PROTECTED

By Ground Shield and Circuit Breaker

For Greater Safety With Underground Trailing Cables, Kenilworth Mine Uses Ground Shield and Special Circuit Breaker to Protect Against Exterior Sparks — When Breaker Trips, Cable Is Removed

By **LEONARD WILSON**
Consulting Engineer
Independent Coal & Coke Co.
Salt Lake City, Utah

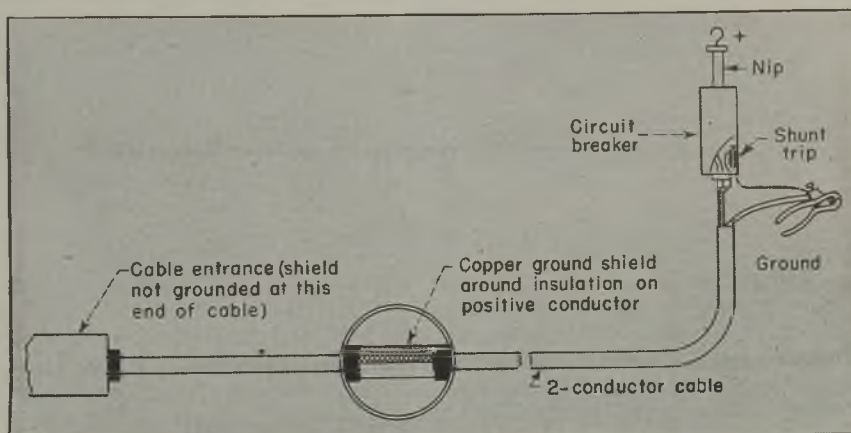
THE DIFFICULT problem of eliminating the hazards of sparks and flame incident to the use of d.c. trailing cables has been solved by a new method of protection developed at the Kenilworth mine of the Independent Coal & Coke Co., Kenilworth, Utah.

Trailing cables are subject to abuse resulting in mechanical injury, damage from overheating and the like and failures of cable insulation are bound to occur in normal use.

The problem is to detect an incipient insulation failure and instantly cut the power off at the trolley nip before any external spark or flame appears along the length of the cable. An overload circuit breaker at the nip is futile because it will not operate until a vicious arc has occurred. What is necessary is some form of ground-fault protection that will trip the power off when the current through the insulation fault is only 5 to 10 amp.

The new method devised for the Kenilworth mine involves a grounding shield in the cable and a special circuit breaker. The old type of trailing cable consisted of two insulated conductors with a jacket of mechanically durable rubber. The new cable is similar except that a fine copper-wire ground shield is laid around the insulation of the positive conductor before the rubber jacket is applied. A special SP circuit breaker with a shunt trip is used for connecting the positive conductor at the trolley nip. The only connection from the ground shield around the positive conductor is at the nip circuit breaker, where it connects to the shunt trip coil and thence to the grounded negative return circuit.

If there is an incipient failure of the insulation around the positive conductor, the first result is that leakage from the positive conductor through



Showing diagrammatically use of copper ground shield and special circuit breaker in protecting 275-volt d.c. trailing cables.

the faulted insulation charges the ground shield and instantly trips the breaker. This occurs before any leakage to the negative return conductor has started. This, in turn, means that power is cut off the cable before a short circuit starts. In other words, it prevents a short circuit.

The circuit breaker is designed so that it cannot be reclosed. Therefore, when it trips—which it does only when there is a cable fault—the cable with its attached circuit breaker can no longer be energized. It is removed and replaced with a standby cable with its attached breaker. The faulted cable is sent to the cable-repair shop in the mine and repaired for use again.

Special cable for test purposes was made by U. S. Rubber and a special De-Ion circuit breaker was supplied by Westinghouse. Many tests were made by purposely damaging lengths of cables in various ways. The results were surprisingly good. For example, a length of cable laid over a rail was run over by a 15-ton locomotive. The breaker tripped instantly and there was no visible spark. Examination showed that while the cable had been flattened there was not even the smallest hole through the outside rubber jacket.

In addition to the hazards from

electric sparks when the cable insulation is destroyed by mechanical means, there is the possibility of flame from a burning cable. If a short circuit develops in the loader or other machine and is not interrupted by the circuit breaker in the machine, then the trailing cable will be carrying the short-circuit current. The effect might be setting fire to the rubber of the cable—particularly the part coiled on the cable reel. Such accidents have occurred and in many cases the fires have not been easy to extinguish.

Special tests were made to demonstrate that the new method of protection will prevent the cable from being set on fire by excessive over-current. For these tests, the d.c. connections were the same as for the mechanical destruction tests but with the addition of a means of supplying an excessive over-current through the positive conductor from the low-voltage d.c. welder.

The tests demonstrated that the heating effect of the excessive over-current weakened the insulation of the rubber surrounding the positive conductor to the point of tripping the ground-fault breaker long before there was any indication of flame from a fire.

GAS-TURBINE LOCOMOTIVE:

New Motive Power for Big Coal Customer

Efficiency, Economy and Flexibility of the Coal-Fired Gas-Turbine Locomotive Answer to Diesel Competition—Major Laboratory Problems Have Been Solved—Rail Tests Are Scheduled for the Summer of 1948

By **W. A. STANBURY JR.**

Assistant Editor, *Coal Age*

THE COAL-FIRED gas-turbine locomotive—the answer to coal's major competitive problem in the railroad field—should be undergoing on-the-rail tests by June 1, 1948. That is the prediction of John I. Yellott, director of the research program set in motion in May, 1945, by coal companies and railroads comprising the Locomotive Development Committee of Bituminous Coal Research, Inc. Purchase of two gas turbines, each rated at 3,750 shaft horsepower, was authorized by the committee on July 10, 1946, and three builders (American, Baldwin and Lima) are cooperating in the design of the locomotives. Delivery of the turbines is expected shortly after Jan. 1, 1948.

Meanwhile, with coal-handling, pulverization and fly-ash-removal problems solved in the laboratory, Mr. Yellott and his researchers are concentrating on final solution of combustion problems, as well as on early integration of the research results so far completed into a large-scale combustion test unit as the next-to-final step in the complete locomotive equipment design.

With gas-turbine principles and equipment already developed to an advanced state, the job of the Locomotive Development Committee was primarily that of coal handling, pulverization and combustion. This work has included the following organizations and projects:

1. Battelle Memorial Institute—fundamental study of burning pulverized coal under pressure, design and operation of "Vortex" combustor and the burning of a low-ash-fusion coal.

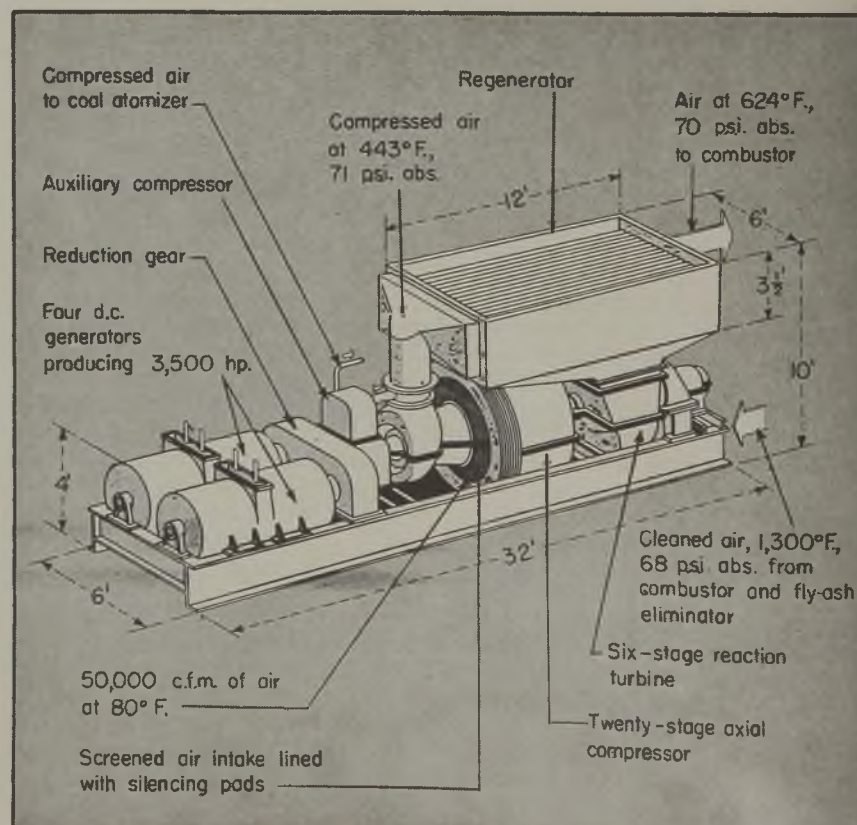
2. Institute of Gas Technology—feeding crushed coal against pressure, partial gasification and flash pulverization of coal, fly-ash removal and turbine-blade abrasion and the theoretical study of gas-turbine cycles.

3. Johns Hopkins University—development and testing of the "coal atomizer"; coal handling including study of the "draw-through" system and solution of the problems involved in feeding crushed coal; experience in igniting and controlling pulverized-coal flames in one type of combustor; determination of the efficiency of fly-ash removal equipment and study of pressurized combustion.

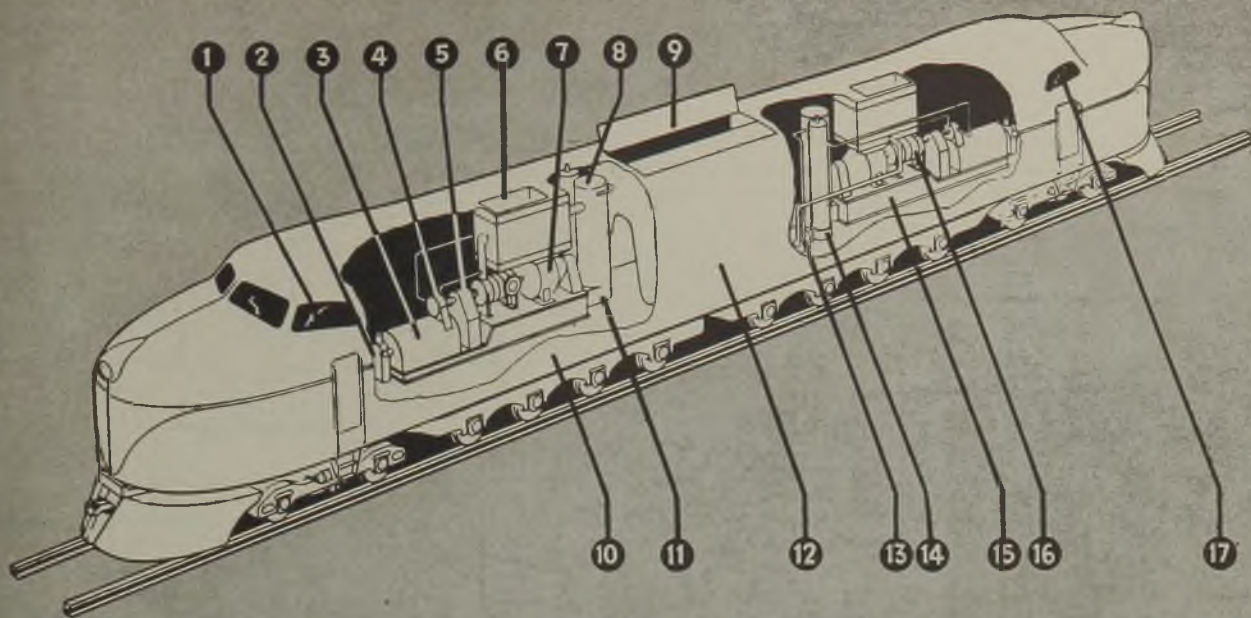
4. Purdue University—use of fly ash to sand rails; effects of sulphur on alloys in the combustor and turbine.

5. Southern Research Institute—development of a system for continuously determining the quantity of coal in a pressurized tank.

In contrast to the conventional locomotive and, even, the newer diesel, present plans envision the gas-turbine type in ratings up to 8,000 rail horsepower as a double-ended single unit complete with coal bunker and all auxiliaries, including an auxiliary power unit (probably a small diesel) for starting the turbine and facilities for supplying air, electricity and steam for train services. In the initial units, also, the gas turbine will drive a generator or generators through a reduction gear and these generators will supply power to motors on the trucks. Later, it is expected that it will be entirely pos-

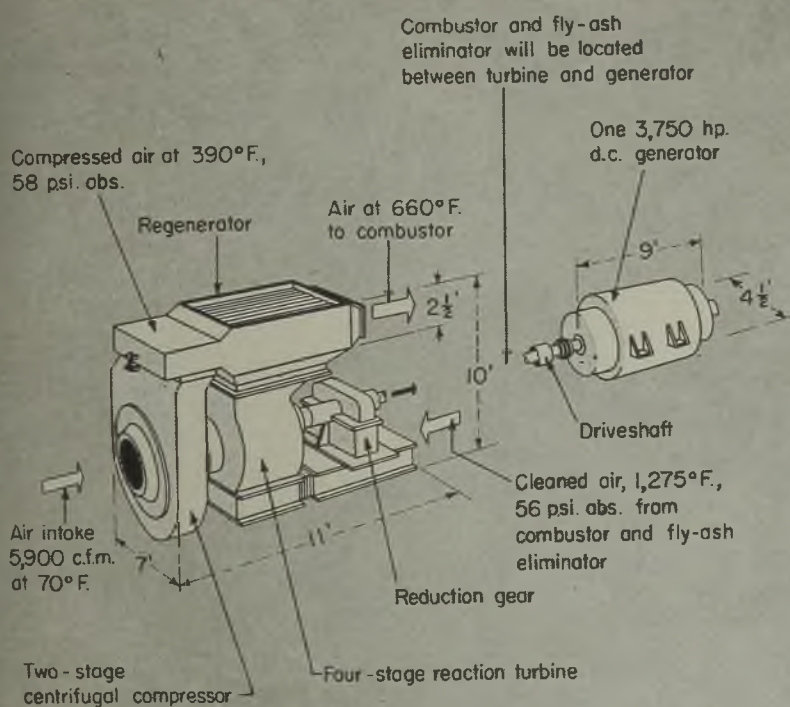


Two general types of gas turbines for locomotive service. The one at the left uses an axial compressor; the one at the right a centrifugal unit.



How a Gas-Turbine Locomotive Might Look—Twin Turbines, Two-Ended Cab

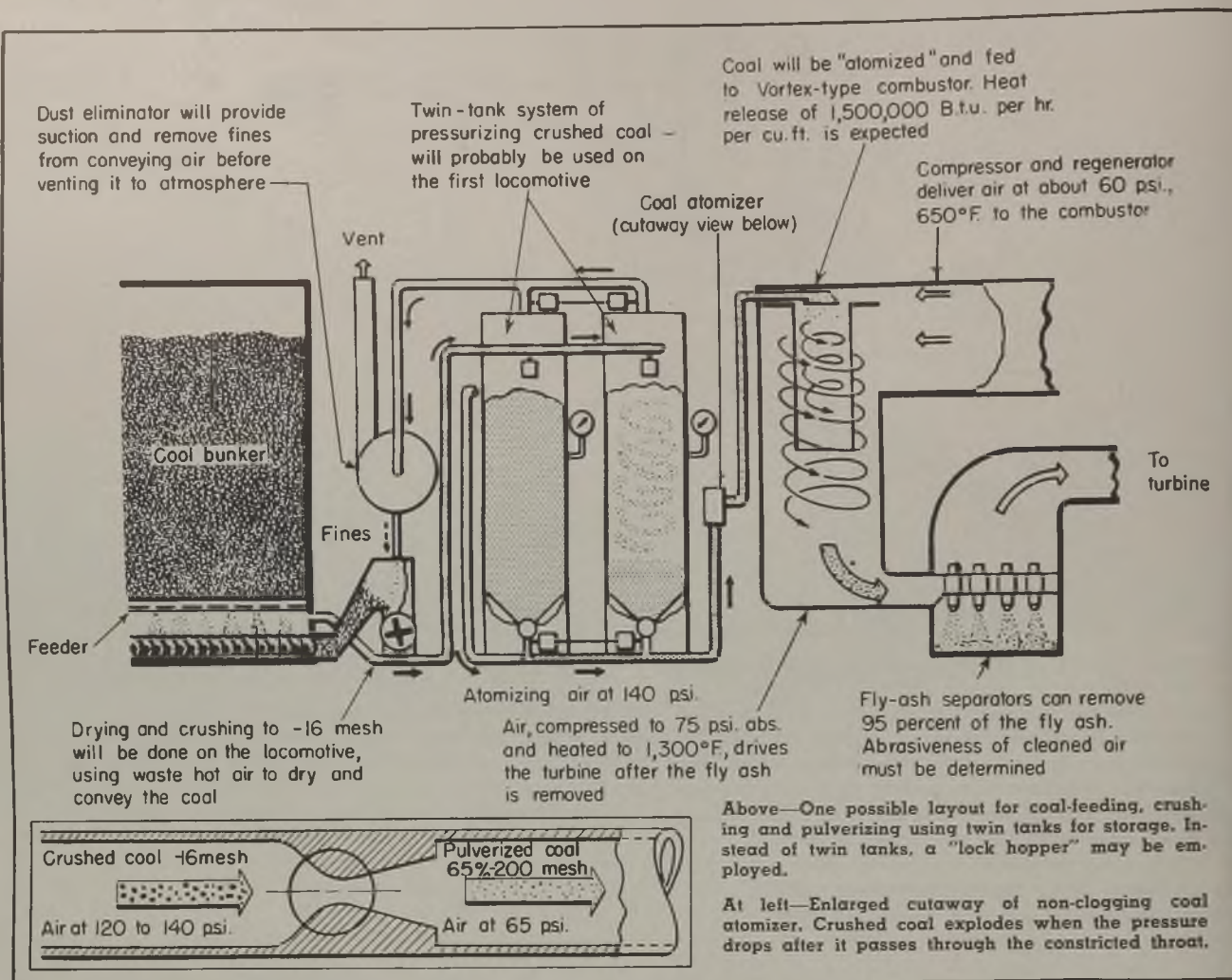
1. Coal feeding controlled from the cab.
2. Brake air compressor driven by the generator shaft.
3. D.c. drive to be used on the first gas-turbine locomotive.
4. Atomizing air supplied by a small auxiliary compressor.
5. Reduction gear driving the generator at about 1,000 r.p.m.
6. Regenerator; 50-percent effectiveness feasible.
7. Turbine and compressor running at 6,000 to 9,000 r.p.m.
8. Combustor design the major remaining problem.
9. Inclosed coal bunker with air-operated doors.
10. All axes motorized if necessary.
11. Fly-ash separator located in combustor outlet.
12. Divided coal bunker with dual feeders for reliability.
13. Hot air from regenerator for drying coal.
14. Lock hopper a possibility for pressurizing crushed coal before feeding to atomizing line.
15. Lubricating oil carried in the bed-plate.
16. Axial or centrifugal compressor.
17. Double-ended operation possible.



sible to drive the wheels directly through gears, as is now done on one steam-turbine locomotive in regular service.

Gas-turbine locomotives are expected to burn less than 1 lb. of coal per rail horsepower-hour without smoke, cinders, fly ash or slag; cost no more to purchase than a diesel and weigh considerably less; need no water except for the train-heating boiler; require less maintenance than the steam or diesel locomotive; need only a two-man crew, with no maintainer; involve only a negligible lubricating cost; produce up to 50 percent more power in winter than in summer; have an availability comparable to that of the diesel; and provide for braking either electrically or dynamically.

Other gas-turbine advantages include reduction in roundhouse time because of double-end design, coal capacity for 1,000 miles of operation without refueling and elimination of the tender by placing the bunker in the cab. Shaft thermal efficiency will be between 22.0 and 23.5 percent, compared to 4 to 8 percent for the average steam locomotive now in use.



Use of a regenerator will raise the efficiency of the turbine about 25 percent at full load and will maintain good efficiency down to about one-quarter load. In the blueprint stage, designs promise a locomotive weight of about 17 to 25 lb. per shaft horsepower, compared to about 50 lb. for the diesel.

Major advantage of the gas turbine will be its ability to burn low-cost coal. Although the thermal efficiency of the diesel is higher, the fuel bill of the gas-turbine locomotive with electric drive will be about one-third that of the diesel, one-third to one-fourth that of the modern steam locomotive and approximately one-eighth to one-tenth that of the older steam locomotive. The new gas-turbine unit will be able to burn the cheapest variety of coal on the market. The higher-volatile types will be particularly desirable, however, and keeping ash under 10 percent will help efficiency. The idea is to design the unit to use any type of coal now available to railroads. In fact, railroads running through lignite territory probably will

be able to use that fuel. Absence of a boiler and reciprocating parts will cut maintenance to a negligible figure.

The power plant of the gas-turbine locomotive consists of the turbine itself, a compressor, a regenerator, a combustor and a unit for removing fly ash. The turbine must be started by an auxiliary power unit but begins to operate by itself when it reaches 20 to 30 percent of its rated speed, varying from 5,700 to 9,000 r.p.m. depending upon type. The turbine is directly connected to the air compressor, which supplies compressed air at approximately 60 to 70 lb. per square inch at 400 to 450 deg. F. to the combustor, where the coal is burned. Before entering the combustor, the air passes through the regenerator, where some 50 to 60 percent of the available heat in the turbine exhaust is recovered. Leaving the regenerator, the air has a temperature of about 600 deg. F. Leaving the combustor the air enters the turbine at temperatures of 1,275 to 1,300 deg. F. and a pressure of 55 to 70 lb. absolute, first passing through equipment for removal of the fly ash.

Because of the energy added to the air fed into the turbine by the burning of pulverized coal, it is able to drive the compressor and have about one-quarter of its output left over as usable power. Two types of compressors will be employed in the first gas-turbine units being built by the Allis-Chalmers Mfg. Co. and the Elliott Co. One is the axial-flow type, which normally is the more efficient. The other is a two-stage centrifugal unit which, although somewhat less efficient than the axial type, is substantially lighter and shorter. Each unit (see accompanying illustrations) provides 3,500 hp. of d.c. output. Horsepower at the rail will be, in both cases, approximately 3,000.

Of all the equipment in the gas turbine, the compressor is the most important. If its efficiency is not high or its performance not stable, it can destroy the effectiveness of the entire unit. The compressor must supply about 25,000 c.f.m. at 60 to 70 lb. for a turbine rated at 2,000 shaft horsepower; 4,000 shaft horsepower, 50,000 c.f.m. Taking in such quantities of air

also poses a silencing problem, not to mention guiding it in.

To raise efficiency at full load, maintain good efficiency at partial load and promote rapid and complete combustion, a regenerator, or heat exchanger, is a "must" item in plans for the gas-turbine locomotive. Cleaning is a question still to be solved. However, the regenerator is expected to reduce fuel consumption some 25 percent.

Locomotive turbine designers will capitalize on wartime work on turbine-blade metallurgy. If the gas temperature is kept down to 1,300 deg. F. and abrasive materials are removed, the metals now available will last indefinitely. As indicated, the problem of eliminating fly ash has been virtually licked. As gas temperature rises, turbine-blade life is shortened but at the same time efficiency rises and cost comes down. Experience with the initial units will clarify the economics of temperature and life. However, it is expected that temperatures of 1,500 deg. F. may be attained in the next few years, creating cycle efficiencies equal to that of the diesel.

Because the gas turbine is considerably more compact than the diesel, as previously intimated, up to 8,000 hp. is possible in one unit. One manufacturer, for example, proposes four 2,000-hp. units in a single cab weighing 325 tons and employing a 4-8-8-4 wheel arrangement. Eight of the axles would be motorized, providing a starting tractive effort of 100,000 lb. with motors geared for 120 m.p.h. For heavy-duty freight service, two cabs would house 8,000 hp., with 16 driving axles to give a starting tractive effort of 225,000 lb. and running efforts of 160,000 lb. at 15 m.p.h. and 100,000 lb. at 24 m.p.h.

Coal Dried, Powdered for Burning

The coal-handling system developed thus far for the gas-turbine locomotive aims at using coal of regular locomotive size and quality and feeding it—dried, crushed and pulverized—at rates up to 8,000 lb. per hour. As previously noted, the coal bunker or bunkers will be placed on the locomotive itself. Drying is essential for satisfactory handling and present plans call for starting it in the bunker and continuing it through the primary crusher. Bunkers, incidentally, will be equipped with doors, or covers, opened and closed by air-actuated cylinders similar to those on the bomb-bay doors of the B-29 and other larger bombers. Equipment for feeding out of the bunker so far studied includes units already developed by the Iron Fireman Mfg. Co. and the Standard Stoker Co.

Gas-Turbine Locomotive Tops the Diesel

1. Lighter weight and smaller size for equal power.
2. Reduced maintenance, saving time and cost.
3. Negligible lubricating expense.
4. No refueling for 1,000-mile runs; no tender.
5. Curtailed roundhouse time with double-ended cab.
6. Winter power 50 percent higher than summer power.
7. Comparable purchase price.
8. Fuel bills slashed 30 percent by low-cost coal.
9. Quick availability for high efficiency.
10. Two-man operation.
11. No water needed except for train-heating services.
12. Flexibility for passenger and freight operations.

With the Iron Fireman feeder, drying would be continued in this stage by introducing heated air in the feeder itself, which involves reciprocating plates over a number of openings and a screw conveyor. In this stage, it is expected that moisture can be reduced from 10 to 15 percent to about 3 percent. Crushing will be done in a small hammer mill. One 3-hp. crusher tested (3,500-r.p.m. motor) turns out 1,000 to 1,200 lb. per hour with a size analysis as follows; minus 16-mesh, 100 percent; 28-mesh, 98.4; 48-mesh, 78.8; 100-mesh, 42.8; 150-mesh, 30.2; and minus 200-mesh, 15.6 percent. A larger unit will furnish up to 4,000 lb. per hour with the same specifications.

Further drying of the coal will be done by sweeping the crusher with hot air. This air, with a velocity of about 6,000 f.p.m., will pick up the fine coal from the crusher discharge, after it has passed through a 16-mesh screen, and will convey it to pressurized storage. Some type of cyclone or centrifugal dust eliminator, perhaps backed up by a filter, will be employed with this "draw-through" system to clean up the air before it is discharged, returning the fines to the crusher. It is expected that this system will be used on the first one or more locomotives, but some alternatives also are being studied, including feeding the coal by an inclined screw conveyor into the pressurized tank, the coal at the discharge end forming a plug against the pressure.

After preliminary crushing, it is necessary to get the coal under pressure for pulverization. Twin tanks used alternately are one possibility that appears simple and foolproof. Crushed coal would be fed into them by the conveying air—the "draw-through"

system. Another possibility receiving major attention is the so-called "lock hopper," such as used in the sand-blasting industry for many years. It comprises three chambers, the lower always under pressure with the intermediate and top chambers, equipped with valves, locking the coal through without releasing the high pressure in the bottom chamber. Coal would be brought into the upper chamber, equipped with a dust eliminator, by conveying it with air—again the "draw-through" system. A possible third alternative, with the inclined screw feeder, is a simple pressure tank. Since knowledge of the quantity of coal in the storage tank is essential, one research project is devoted to a method of continuously and automatically determining and indicating that quantity. One method already has been given a road test with satisfactory results.

Feeding the coal out into the pulverizing circuit is, in itself, something of a problem, since the flow should be fairly even. A small screw conveyor so far seems almost the only practicable means at the present time. Further to even out the flow, a rotary screen placed on the end of the screw has been found helpful. It removes oversize particles and sifts the coal into the pulverization system. Under pressurized operation, especially when delivering coal at low rates, the equipment is not too suitable a metering device. For that reason, investigation is being made into putting a cyclone separator and control valve into the circuit, the cyclone returning excess coal to the pressure tank.

The governing of the coal-fired gas turbine will be by a controller operated by a speed-sensitive device attached to the low-speed shaft of the reduction

gear. The actual locomotive control system will be similar to that of the diesel-electric, the engineman simply setting his lever for the desired speed. In turn, the electrical system will call for a particular generator speed and the turbine governor will call for the necessary coal. With the control valve and cyclone in the pulverizing circuit, there would be quick response and a minimum time lag between the adjustment of the control valve and the regulating of the coal feed.

Pulverization of the coal on the gas-turbine locomotive is primarily the job of the "coal atomizer." Air for atomizing the coal at 120 to 140 lb. per square inch picks up the coal from the screw-and-screen feeder. The atomizer consists of a simple tube with a constricted throat. In passing through the throat, the pressure is dropped to 60 to 65 lb. per square inch and the 16-mesh particles explode. Work so far indicates that with air at 140 lb. and 90 deg. F., 0.5 to 0.6 lb. per pound of coal, and a back pressure of 60 lb., the feed is reduced to about 60 percent minus 325-mesh. Other tests indicate that raising the temperature to 500 deg. F., with 60 lb. of back pressure, results in a product of 75 percent minus 325-mesh with only 5 percent over 100-mesh. Work is being

continued to reduce both the quantity of air and the percentage of plus 100. The throat of the atomizer is reversible so that stoppages are quickly cleared. For further pulverization, it is planned to follow the atomizer with a simple attrition device. Tests already have indicated its efficiency.

Although combustion problems are not yet completely solved, directions for further experiment and exploration are clear. The problem is this: the combustor must find a means of introducing the fuel with 20- to 30-percent excess air, igniting it, providing adequate time and turbulence for complete combustion at rates exceeding 1,000,000,000 B.t.u. per hour per cubic foot and mixing the cooling air and combustion products so thoroughly that a substantially uniform outlet temperature is maintained. The function of the combustor is to heat a large quantity of air to a temperature less than half as high as that reached in the combustion process. High temperature in the combustor means faster and more complete combustion but to admit all the air taken in by the turbines—some 280,000 lb. per hour—to the primary combustion chamber would reduce the flame temperature and thus the speed and completeness of burning. Actually, the amount of

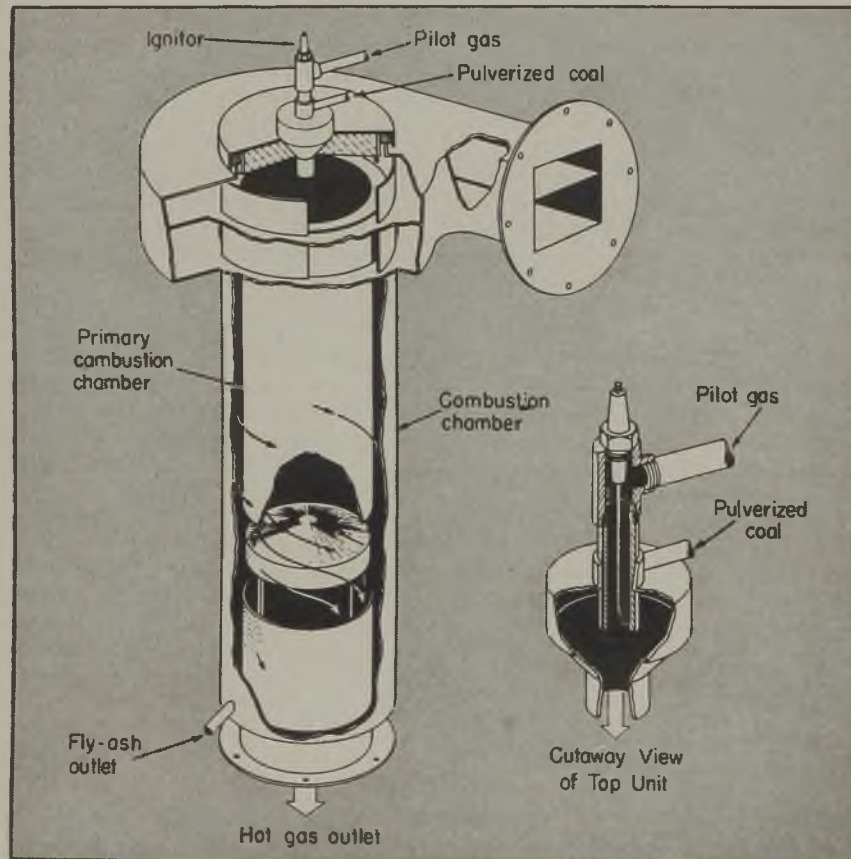
air needed for theoretical burning is about 750 lb. per million B.t.u. of heat released. Thus, to fuel a 4,000 shaft horsepower turbine, with an air temperature of 1,350 deg. F., the amount of coal required would be 2,750 lb., and the air needed to burn that coal would be only 27,800 lb. per hour. Obviously, the large amount of excess air must be separated from the combustion process until almost complete burning has taken place. Then, at the point of complete burning, good mixing must take place to minimize stratification and eliminate local high temperatures.

Complete Burning Desired

The time required to burn a particle of coal under pressure is still being studied. A basic project at Carnegie Tech is determining just what happens to individual particles of coal burning under pressure. Obviously, the particles would be expected to burn faster because the pressure of the oxygen in the atmosphere would be increased but exact data covering the process are needed. Reasonably complete data on the burning of pulverized coal at atmospheric pressure, made available some years ago, established the fact that one-fourth of a second of burning reduces unburned carbon to about 1 percent for coal ground to 80 percent minus 200-mesh and burned with 20-percent excess air. Increasing the fineness of pulverization and boosting excess air to 30 percent produced more complete combustion. With the results of these tests in mind it is reasonable to expect 97- to 98-percent combustion within the necessary space limitations. It also appears that some type of spiral path must be followed by the fuel to provide adequate time for burning within a practicable furnace length.

Ignition of the pulverized coal must be started by an oil or gas pilot flame in the combustor. If fuel oil is carried to start the unit, there is a possibility of installing a 100-hp. diesel that can energize one motor, providing enough power to move the locomotive out of the roundhouse. Experimental work done to date indicates that the pilot flame can be cut off as soon as the furnace has reached operating temperature, some five minutes after starting, and that continuous sweeping of the combustion chamber with cool air prevents the formation of slag.

The combustor must provide a total heat release of as much as 45,000,000 B.t.u. per hour. If a heat release of 3,000,000 B.t.u. per hour per cubic foot can be attained, 15 cu.ft. of actual combustion space will be needed. In



Experimental double-shell combustor. Another possibility is the "Vortex" combustor.

fact, under laboratory conditions coal has been burned at pressures up to 60 lb. per square inch without slag and with heat releases as high as 4,000,000 B.t.u. per hour per cubic foot of combustion space. The necessity of an outer housing for cooling air and for insulation would call for a total over-all length of about 6 ft. and a diameter of 4 to 5 ft. The fly-ash separator could be located directly beneath the combustor.

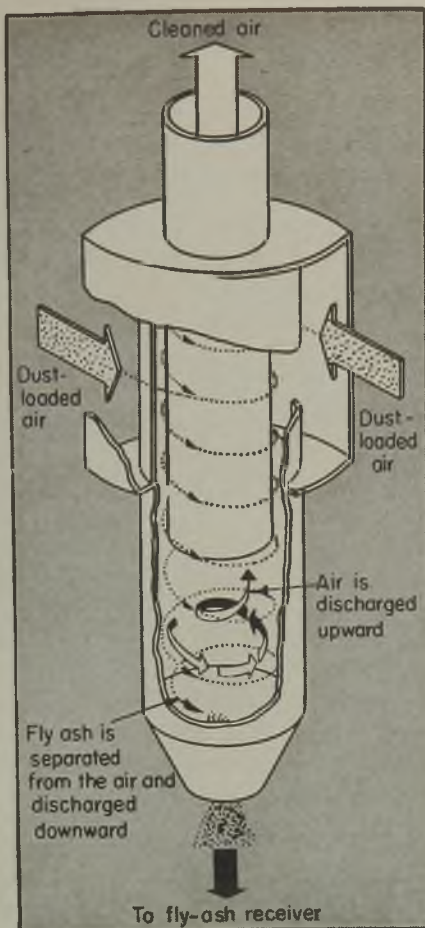
Further combustion investigations are now under way. Tests of the fundamentals of pressurized combustion are being made in a single tube furnace in which turbulence is purposely being avoided, primarily to determine the fundamental variables of the process, including flame speed and rate of combustion. Principal effects of increased pressure thus far observed are a marked shortening of the flame and a shift of the region of maximum heat release back toward the burner.

Also, a modified balanced "Vortex" combustor under test already has shown its ability to burn pulverized coal continuously. The necessary air for the experimental set-up is supplied by the compressor of a turbo-supercharger. The air enters the compressor tangentially, imparting a vigorous rotation to the coal, which is fed in through individual burners at the top of the combustion chamber. The larger coal particles form a rotating band that burns with an intense white flame. The finer particles are swept out of the combustor and burned in the ash separator. The outlet air temperature remains at 1,600 to 1,700 deg. F. for long periods of time. The hot air passes into the turbine element of the supercharger, supplying the energy to drive the compressor. The turbine rotates at about 12,800 r.p.m. A waste gate is provided as a quick means of dumping hot gas if the turbine overspeeds.

Slag and Fly Ash Eliminated

At Johns Hopkins, coal is being burned at atmospheric pressure in a combustor consisting essentially of two concentric tubes. Tangential entrance of the air imparts a whirling path down through the combustion zone. The cooling air follows a spiral path between the two shells. The coal enters through a small tangential section, so that it spins vigorously as it enters the combustion chamber. Gas is used for starting. Thus far, for coal with a fusion point of about 2,700 deg. F., no slag has been observed after three- to four-hour periods of operation.

So far, as previously indicated, all the combustors burn high-fusion coal



The fly-ash removal tube. Batteries of these small cyclone separators remove up to 95 percent of the plus 5-micron ash particles from the hot air driving the turbine

without slagging but tests on low-fusion coals are scheduled to determine if this still remains true. Fly ash, however, must be eliminated because turbine operation otherwise would be impossible.

Removal of up to 95 percent of plus 5-micron fly ash from the hot-air stream is anticipated through the use of a battery of "Aerotec" separators similar to those used in Army tanks and aircraft in desert warfare to clean intake air. Fly-ash particles less than 5 microns in size are not believed to be harmful to turbine blades. In tests, 2-in. Aerotec tubes have removed from 90 to 95 percent of fly ash in 1,000 deg. F. air. Similar performance is anticipated in the gas turbine at 60 lb. per square inch, 1,350 deg. F., with a pressure drop not exceeding 1 lb. Further tests show that the air thus cleaned is 100 times less abrasive to turbine-blade materials than uncleaned air, and that increased air temperatures boost air viscosity and thus reduce abrasion even more. A number of tests run on a 3-in. Aerotec tube, whose

capacity is more than twice that of the 2-in. tube, show that the larger tube is just about as effective as the smaller. Further investigations will explore the possibilities of 4- and 6-in. tubes to determine the size best suited for locomotive use.

A method for removing fly ash from the Aerotec separator housing is now under study. It is estimated that 300 lb. of fly ash per hour would be collected at full load from a 3,750 hp. unit, requiring about 10 cu.ft. of storage space. Tests to determine the practicability of fly ash for rail sanding are being conducted at Purdue University.

Other types of fly-ash separators will soon be under investigation. Meanwhile, researchers are exploring the following questions:

1. Is fly ash abrasive to turbine steel when it is present in quantities of about two grains per cubic foot?
2. Is the "clean air" abrasive as it leaves the Aerotec tube with a dust loading of about 0.05 grains per cubic foot, all smaller than 5 microns?
3. Is there a marked difference in abrasion-resistance qualities of various turbine-blade steels?
4. What is the effect of air temperature upon abrasion with very small particles?

Combustion and other equipment are now being put together in an area approximating that of a regular locomotive cab to prove laboratory findings in a full-scale test.

View Marine, Factory Use

With the coal-fired gas turbine now definitely a part of the railroad picture, is it natural to see if it has any other applications. At its present stage, it does not appear to have the efficiency to challenge the large, central-station steam plant in the generation of electricity. In isolated stations with capacities up to 10,000 hp., where condensing water is costly, the coal-burning gas turbine is expected to offer vigorous competition to the oil-burning diesel. The possibilities in factory applications also are a question to be fully explored. Use of the coal-fired gas turbine on tugs and lake and ocean-going ships is also a very definite possibility. In addition, this work may yield dividends to coal in still greater development of gasification, further justifying the investment of the members of the Locomotive Development Committee: Hanna Coal Co., Island Creek Coal Co., Sinclair Coal Co., Baltimore & Ohio R.R., Chesapeake & Ohio Ry., Louisville & Nashville R.R., New York Central System, Norfolk & Western Ry. and the Pennsylvania R.R.



This 35-cu. yd. shovel moved 9,462,126 cu. yd. of material at Georgetown No. 12 during 1945. A redesigned handle will enable it to swing a 40-cu. yd. dipper in the future.

GEORGETOWN STRIPPING

Coordinates Operations for Efficiency

Handling up to 87 Ft. of Overburden, Georgetown No. 12 Strip Mine Uses Shovels, Dragline and Stacker—Equipment Coordination and Close Supervision Raise Mine Tonnage and Efficiency

By **RALPH R. RICHART**
Associate Editor, *Coal Age*

COORDINATION OF EQUIPMENT and close supervision have helped increase output each year at the Georgetown No. 12 strip mine of the Hanna Coal Co., St. Clairsville, Ohio, where cover ranges up to 87 ft. Four tipples serve five pits. Roads across ravines and a tunnel under a highway reduce grades and keep the average haul between pit and tipple to two miles. Drains which put water through spoil banks without pumps and power prove good insurance against pit delays during rainy weather. Refueling and greasing crews patrol

the pits and service trucks and bulldozers on the job. Changes in the manufacturer's equipment have stemmed from operating experience at this property.

Since 1943, Georgetown No. 12, located in Harrison County, Ohio, has tripled its employees (now 520), its tonnage and also the quantity of overburden handled. Production comes from the Pittsburgh No. 8 seam, 54 in. thick, and No. 8A, 24 to 44 in. thick. About 3 percent of the raw output is rejected by hand picking at four tipples, each equipped with shaking or vibrating screen, crusher, picking table and loading boom. Each tipple has its own 5-ton refuse truck. About 40 percent of the coal is shipped via the Dun Glen No. 11 washing plant for

further treatment before being sold.

Poor roof overlying the coal in this area makes it virtually impossible for that portion of the seam lying under less than 50 ft. of overburden to be mined by underground methods. Approximately 73 percent of the coal stripped at Georgetown No. 12 could not be mined with any other method. Between the 50- and 80-ft. cover lines 90 percent, or 30 percent more than could be gotten by underground methods, is recovered by stripping.

Prior to 1945, only two stripping units were in service; a 300-E Marion 8-cu.yd. shovel and a 550-B Bucyrus-Erie 17-cu.yd. shovel. Now, in addition to the above units, there are four others: (1) a 5561 Marion 35-cu.yd. shovel; (2) a 10-W Bucyrus-

Monighan 12-cu.yd. walking-type diesel-powered dragline; (3) a 5-cu.yd. spoil stacker fed by a 120-B Bucyrus-Erie 5-cu.yd. shovel; and (4) a 1500 P & H 4-cu.yd. shovel. With the exception of the dragline, all the units use 4,160-volt power. Only the last three units strip the 8A seam.

The 8-cu.yd. shovel strips to 60 ft. of cover, the 17-cu.yd. unit to 75 ft. and the 35-cu.yd. machine to 85 ft. The 12-yd. walking dragline in virgin stripping works to an average of 40 ft. The average thickness of the overburden is 35 ft. and about 80 percent of it is material too hard to dig without shooting.

The 35-yd. shovel, put into service in March, 1944, is equipped with a 105-ft. boom and heated dual-control cabs. It weighs 1,800 tons and moved 9,462,126 cu.yd. of material in 1945. The electrical equipment includes Westinghouse Rototrol with automatic acceleration and deceleration control designed to reduce stress on pinions and strain on the front end.

Among the newer ideas in shovel design incorporated in this unit are two affecting the powering of the hoist and crowd mechanisms. Two motors still are used to drive the hoisting drum, but the old arrangement of a shaft between two motors with a single pinion driving a drum gear has been modified. The new method is to have the two d.c. motors, each with its coupled shaft and pinion, engage the drum gear at points 180 deg. apart. A friction clutch limits the torque that can be applied. Each pinion shaft is carried in two roller



Spoil stacker at Georgetown enables a 5-cu. yd. shovel to act as an effective stripping unit.



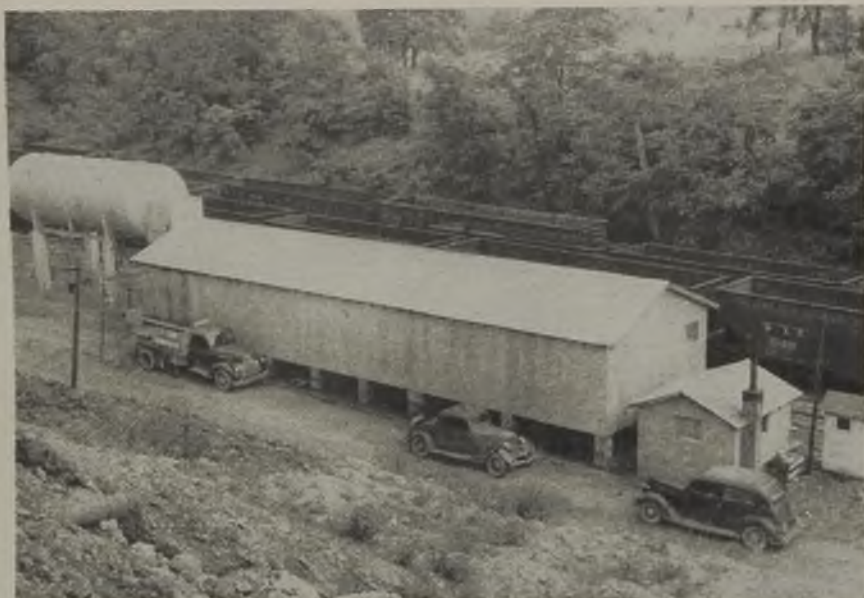
The 5-cu. yd. car of the spoil stacker makes two trips per minute.

This 12-cu. yd. walking dragline handles up to 40 ft. of cover.





Two of the three churn drills working ahead of the 35-cu. yd. shovel where a new pit is being opened.



At the explosive plant, bags of finely divided carbonaceous material are soaked in liquid oxygen, received in tank cars, for use in breaking the overburden.

One of the two high-level drills assembled by Hanna to drill the sandstone strata lying high in the bank.



bearings, one on each side of the pinion. Gears and pinions are herringbone. Two advantages are cited for this arrangement: the stress on the gear section is cut in half and the pressure on the drum-shaft bearings is equalized. The first is expected to eliminate gear breakage; the second, to improve lubrication. Two 75-hp. motors, one for each crowd rack, instead of a single 150-hp. unit and gear train, have reduced checking and cracking of "wishbone" and stick.

Will Install 40-yd. Dipper

Very soon a new stick and a lighter but higher capacity dipper (40 cu.yd.) is to be installed on the 35-yd. shovel. Sometime ago the old dipper was redesigned and now it has five teeth instead of the usual six or seven. Bases on the new dipper are 2 in. longer for better entrance into the bank. The use of high-tensile steel in both the stick and dipper and transferring the swivel in the knee-action handle from the dipper end up to the knuckle will permit the handling of a 40-cu.yd. load with a decrease in bail pull.

To facilitate the lubrication of this shovel a central greasing system has been installed on the revolving deck. Below the deck, the greasing is done by the groundman, who is provided with a high-pressure gun.

A spoil stacker with a 152-ft.-long inclined track and a 5-cu.yd. car fed by a 120-B Bucyrus-Erie 5-cu.yd. shovel (with a short boom) is used as a stripping unit in the 8A seam, primarily on the outcrop. This com-

Bertis Willis, manager of the explosive plant, exhibits the finished product.



bination disposes of 10 cu.yd. (two cars) of material a minute. Three men are required to operate the two units.

Much of the credit for keeping up the yardage on the stripping units is due the bulldozers. They keep the loose material pushed forward which saves the shovels from backing up. Twelve bulldozers, consisting of Caterpillar D7 or D8 tractors with LaPlant-Choate blades, are in service.

In preparing overburden at Georgetown No. 12, churn drills as well as high- and low-level horizontal-type auger drills play important roles. For drilling horizontal holes in the sandstone, where it lies high in the bank, the mine constructed two high-wall drills. As originally built, each consisted of a tower built on a 42T Bucyrus-Erie churn-drill chassis with a gasoline-powered Hardsocg horizontal drill mounted on the platform. The gasoline engine has been replaced with a motor and now the complete rig is electrically operated. The working platform may be extended out 8 ft. to reach a sloping bank and is retracted for moving.

Auger sections are 6 ft. long and a Kennametal bit (see illustration) cuts a 6½-in. hole to a distance of at least 60 ft. The cutting edges of the bit are not designed to follow a common groove but are ground and positioned to make individual grooves of equal cutting value. The cutting edge is a special-alloy insert silver soldered to the cast-steel body. Use of the Kennametal drill bits has resulted in a 25-percent increase in drilling footage per shift in addition to better ability



A scraper and sweeper work in tandem ahead of the loading shovel to rid the seam of all loose rock and dirt.

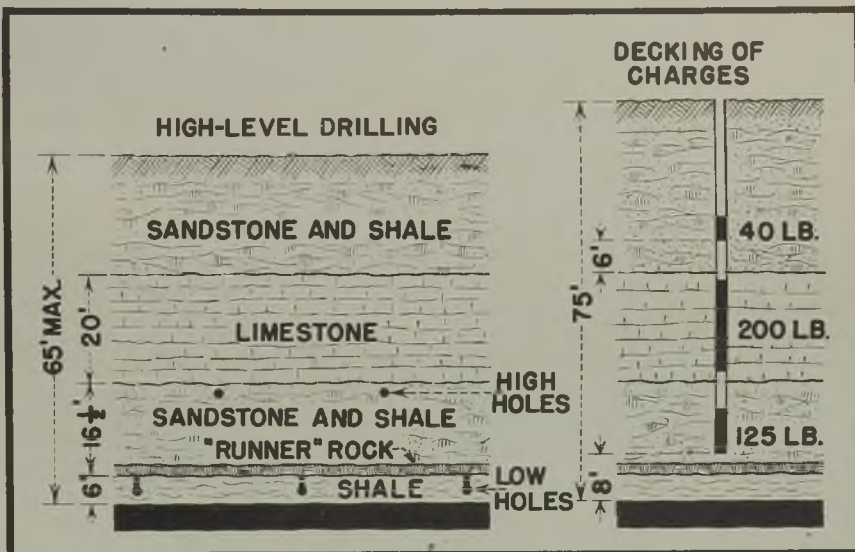


Fig. 1—High-level drilling and decking of charges to break hard material up in the bank at Georgetown No. 12.

Howard Singer, blasting foreman, holds a 6-ft. auger with the special bit used.



This 7½-cu. yd. shovel loads coal behind the 35-yd. stripper. A 35-ft. coal berm is left after each pass as a haulageway.





Four tipples serve five pits. The longest truck haul is 3½ miles and the average is two miles.

to operate in hard material. Special grinding equipment is provided for sharpening. Long cutting life is a feature of these cutting edges, along with many regrinds from a bit. A 54-ft. hole has been reported drilled in the sandstone in twelve minutes.

In the high-level drilling plan, Fig. 1, the low holes, drilled with Sullivan and Hardsocg horizontal drills equipped with hydraulic feed, are angled up to get the charge as high above the coal as possible. With the Sullivan

drill, the bottom holes are drilled above the "runner rock" to give better protection to the coal. Both the low and high holes are drilled on 30-ft. centers, but the top holes are staggered with respect to the bottom ones. Approximately 125 lb. of Airmite (liquid oxygen) is placed in the bottom holes and 200 lb. in the top in banks up to 65 ft. maximum depth. In thicker cover, vertical drilling and decking of charges is followed as also shown in Fig. 1. Hole spacing is 25 ft. on inside

and 30 ft. on outside curves.

Diameter of the horizontal holes was increased from 5 to 6 in. to accommodate a larger explosive cartridge and thereby concentrate a bigger charge in the back of the hole. This is especially advantageous in a narrow pit where a short hole would reduce the amount of stemming. Average depth of holes in deep banks is 35 to 40 ft. The use of Airmite, after more than a year's trial, has resulted in the breaking of an additional 2 cu.yd. of

A 300-ft.-long gunited tunnel, 100 ft. below Route 250, saved routing the 15-ton trucks across the highway and the maintenance of a highway watchman, in addition to eliminating a heavy grade and shortening some hauls.

Gasoline-powered pumps like this relay the water from one sump to another until it is discharged outside the cut.



overburden per pound of explosive, besides better fragmentation.

Once the overburden is out of the way, Caterpillar scrapers (road maintainers) and Hough power brooms clean off the seam and the coal is loaded without shooting. The list of loading equipment is as follows: (1) 44-B Bucyrus-Erie 3-cu.yd. shovel; (2) 54-B Bucyrus-Erie 4-cu.yd. shovel; (3) 4160 Marion $7\frac{1}{2}$ -cu.yd. shovel (loading behind the 35-yd. shovel); (4) 43-B Bucyrus-Erie 3-cu.yd. shovel (a diesel unit in the same pit with the diesel dragline); (5) 120-B Bucyrus-Erie 5-cu.yd. shovel (loads the stacker when stripping); and (6) a 75 Lorain $1\frac{1}{2}$ -cu.yd. shovel.

A fleet of 25 15-ton end-dump trucks hauls the coal from the pits to one or the other of four tipples so located that no haul is more than $3\frac{1}{2}$ miles while the average is only 2 miles. The seven Dart trucks have Hercules gasoline engines while the four Macks and 14 Euclids have Cummins diesels. On a test, the haulage units required 48 gal. of gasoline per shift at 15 to 16c. per gal. or 22 gal. of diesel fuel at about 7 $\frac{1}{2}$ c. per gal.

Providing and maintaining suitable haulage roads for strip-mine service is quite a task in eastern Ohio where the terrain is decidedly rolling. Some of the mine roads have grades up to 8 percent. However, building roads on fills across ravines and tunneling under the main highway have improved the haulage situation. A 300-ft-long gunited tunnel under Route 250, 100 ft. below it, illustrated elsewhere in this article, shortened the haul from

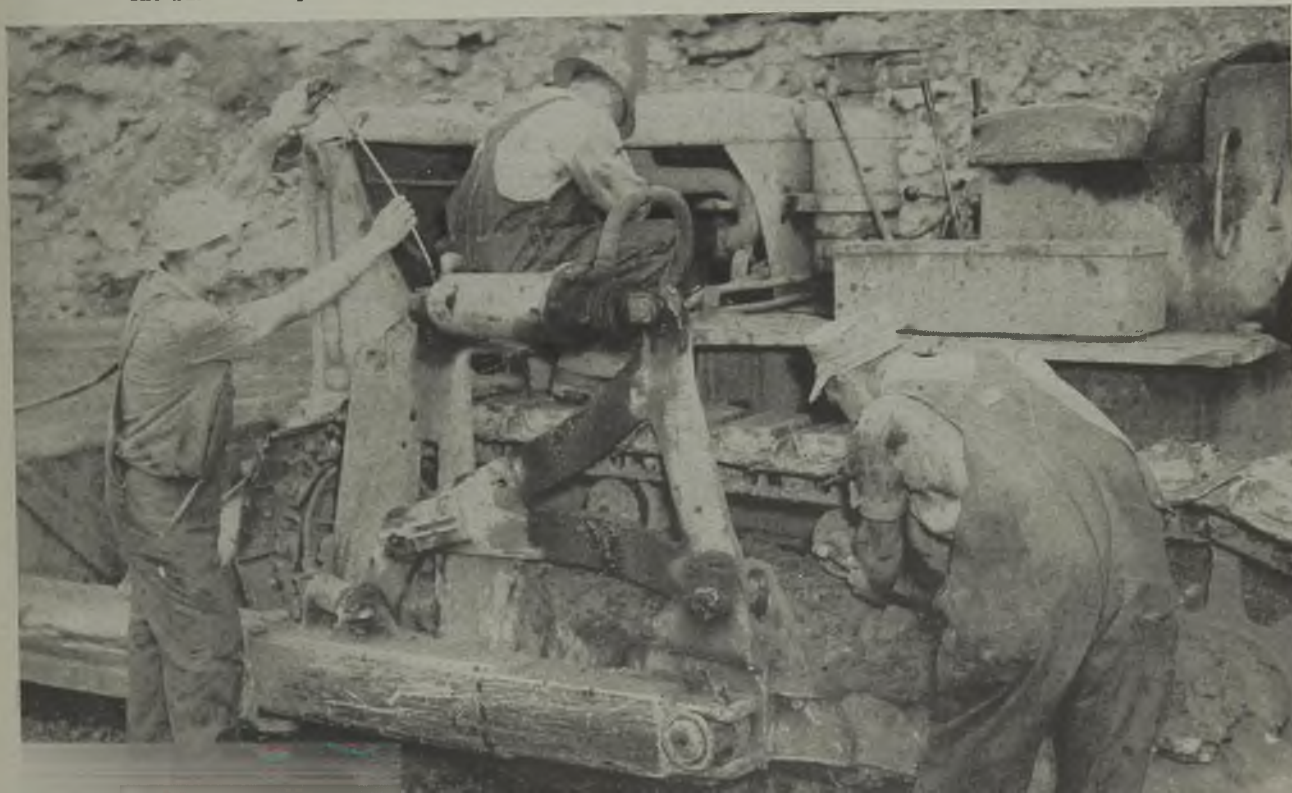


This fuel truck with tandem-rear unit and all-wheel drive travels anywhere to refuel trucks, bulldozers and other field equipment.



Equipment in the field lubricating truck includes a gas-powered air compressor and five outlets for various lubricants, each with a hose on a reel.

The bulldozer is greased and checked in a few minutes on the job by the crew of the lubricating truck.



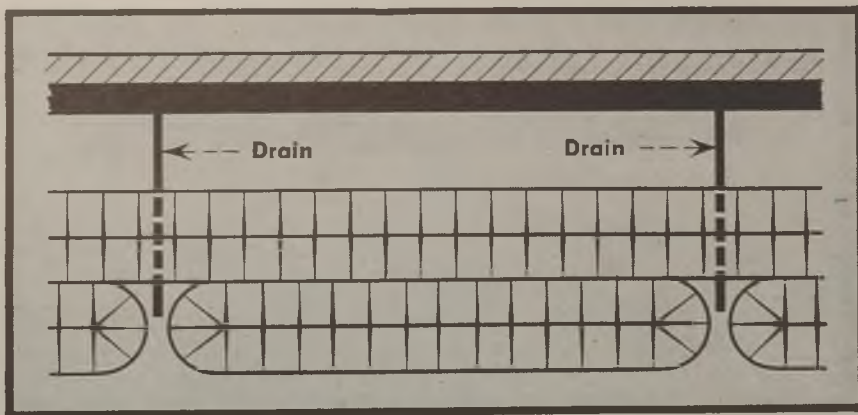
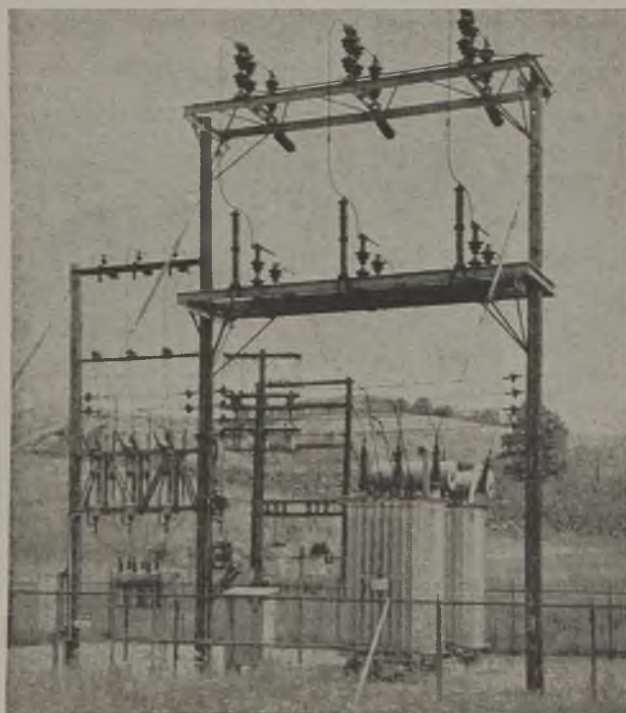


Fig. 2—How gravity-fed drains through the spoil help eliminate the need for pumps.



Part of the plant where limestone will be crushed for roads and agricultural lime.



The substation is readily accessible from the main highway.



Truck moves the last junction box closer to the 35-yd. shovel.

several pits, eliminated some severe grades and removed the necessity of having a highway watchman. A Northwest shovel and 12-yd. Carryalls are used to build the fills across the ravines.

At present, a limestone plant is being installed for making crushed stone from the limestone rock in the spoil banks for building better haulage roads. The mine reports that road improvements during the past year raised tire mileage on the 15-ton haulage trucks (using 100-percent synthetic tires) from around 10,000 to 14,000 to 16,000 miles. One of the by-products of the limestone plant will be the production of a substantial quantity of agricultural lime for sale to farmers. Adding lime to the soil decreases the acidity of the soil and supplies needed calcium. In nearly all agricultural areas of the United States where rainfall exceeds 30 in. annually there is a calcium deficiency.

As for strip-pit drainage, Georgetown follows the scheme of leaving open drainways in the spoil for the first cut and thereafter providing pipe drains under the spoil at low spots, or at least at intervals of 600 ft. Thus gravity rids the pit of water that might otherwise call for several pumps and the consumption of a considerable amount of power. To begin with, 8-in. junk pipe was laid under the spoil banks but considerable plugging was experienced. Now, the mine buys 12-in. culled concrete pipe in 30-in.

PERSONNEL

Cleveland (Ohio) Office

R. L. Ireland Jr., President
A. A. Jenkins, Vice President, Charge of Sales

Operating Office—St. Clairsville, Ohio

James Hyslop, Vice President, Charge of Operations
Charles Nailler, General Manager (Deep Mines)
J. S. Harmon, General Superintendent (Strip Mines)
Ray E. Zimmerman, Preparation Engineer
W. J. Schuster, Safety Engineer
Andrew Hyslop, Chief Engineer
Charles Hagenbuch, Engineering Assistant to Vice President

Georgetown No. 12 Mine

Otis Bledsoe, Superintendent
Donald Saxton, Assistant Superintendent
C. L. Secrest, Assistant Superintendent (Night)
Bruce Meyers, In Charge of Mechanical Department
Harry Milligan, Foreman of Road Construction

Raleigh Bedell, Pit Foreman
Boyd Young, Pit Foreman
R. C. Henderson, Pit Foreman
E. S. Booth, Pit Foreman (Stacker and Limestone Plant)
L. S. Moscrip Jr., Pit Foreman
Arthur Piatt, Pit Foreman
Charles Piatt, Pit Foreman
Henry H. Hawkins, Tipple Foreman
Alvin Smith, Tipple Foreman
Ellis Smith, Tipple Foreman
Merle Blackburn, Tipple Foreman
Homer King, Blasting Foreman
Howard Singer, Blasting Foreman
Bertis Willis, Charge of Liquid-Oxygen Plant
A. N. Porter, Mechanical Engineer
Lloyd Olds, Master Mechanic
Ray Fowler, Assistant Master Mechanic
Richard Burggraf, Chief Electrician
Wayne Fuhr, General Shop Foreman
Peter Savage, Garage Foreman

lengths for about the same price. A ditch is blown out and the pipe is laid about 2½ ft. below the bottom of the coal. A wagon drill drills the holes on 30-in. centers prior to the blasting of the ditch. After the pipe is laid a bulldozer piles 4 or 5 ft. of dirt over it before the stripper passes. A plank is embedded in a 3-in. groove in the surface of the coal bench to mark the exact location of the drain.

The mine has a few 2- and 3-in. portable pumps (mostly gas), illustrated elsewhere in this article, for relaying water out of the pits at some points. But for the most part, the drains carry away the water.

Many of the mobile units in the field are greased right on the job by a two-man crew with a special lubricating truck. Besides carrying drums of grease and oil the truck has a gas-powered air compressor and five outlets for various lubricants, each with a hose on a reel. This crew services bulldozers, sweepers, road maintainers, etc., at one visit to the pit. Occasionally the operator of the machine being serviced operates a third hose to help speed up the job. The lubricating truck also services trucks when they are worked more than one shift. The lubricating and fuel trucks working together can completely service a 15-ton coal truck, tires checked and all, in seven minutes, compared to one hour and 15 minutes if the truck were to go to the shop for the same kind of service. The fuel truck, an army tandem-rear unit with all-wheel drive, can go anywhere to dispense gasoline and fuel oil. It is equipped to meter



The four-section shop (left) and the office (right) are headquarters for Georgetown No. 12. Hanna's central repair shop, serving both deep and strip mines, is in the background.

the fuel from all compartments of the tank.

Good voltage on the 4,160-volt lines to the various pits is obtained by adjusting taps on transformers or through the 0.8-power-factor synchronous-motor-driven m.g. sets (synchronous condensers also carrying a mechanical load) on the shovels, by capacitors (static condensers) or by a combination of all three. Some of the aerial lines have been paralleled to give greater carrying capacity. Georgetown keeps a spare trailing cable (1,000 ft. on a spool) to facilitate changing between stations. A four-wheel-drive army truck equipped with a winch and cable pullers on the back is used to move cables. The winch is used where

trucks cannot go. A single-loop cable carrier is employed for pulling cable up the high wall.

To speed up cable splicing in the field, two M.S.A. velocity-power splices are carried on a cable-repair truck. All the supplies necessary for making a complete splice are sealed in a cartridge-type container. The mine has two cable vulcanizers with molds to accommodate the range of cable sizes. Cables are brought from the field when they have 4 or 5 splices, and never are more than 10 to 12 permitted. Some cables are 6 to 7 years old and still are giving good service.

Using Class B insulation (mica, asbestos, glass or other inorganic materials in built-up form combined with



Harry Milligan, a foreman of road construction, is sure of getting there in his jeep.



J. S. "Casey" Harmon, general manager of strip mines, keeps a firm grip on a new car.



Otis Bledsoe, superintendent at Georgetown No. 12, stands alongside a 15-ton truck of the 25-unit fleet.



Donald Saxton, assistant superintendent at Georgetown No. 12, pauses for a moment at mine headquarters.

a suitable binder) capable of withstanding higher temperatures has reduced motor failures to a fraction of the number experienced in past years.

Since 1943, general repair and maintenance shops and warehouse have been built to serve equipment at Georgetown. Hanna's central repair shop, across the road, can handle any repair job. Small shovels can be moved into the central shop, torn down and repaired. Larger units are repaired in the field. There is one field shop for running repairs on trucks, bulldozers, etc. The farthest pit also has a new two-truck garage. In addition to the

many other trucks, many of which are army jobs, there is a heavy supplies truck. It, too, is an all-wheel-drive army unit with tandem in the rear for carrying items up to 12 tons to any equipment in the field needing repairs. Four portable gasoline-powered and two electric welders are mounted on individual trucks for welding duty in the field.

But with all of the equipment, special servicing units and shop facilities, close supervision and effective planning are necessary to get good production and to keep it at that level. One glance at the personnel list is proof enough

that operations at Georgetown are well supervised. Seven pit, four tippie and two blasting foremen is an imposing list, not to mention those in other departments. Strip mines, like deep mines, have discovered that close supervision pays—and yet, only an operation that keeps production high can stand the overhead. It takes supervision to save time on unavoidable delays and to eliminate the unnecessary ones. It may not be so bad for a truck or two to be waiting on a loading shovel, but for a shovel to be waiting on a truck—the excuse must be a good one.

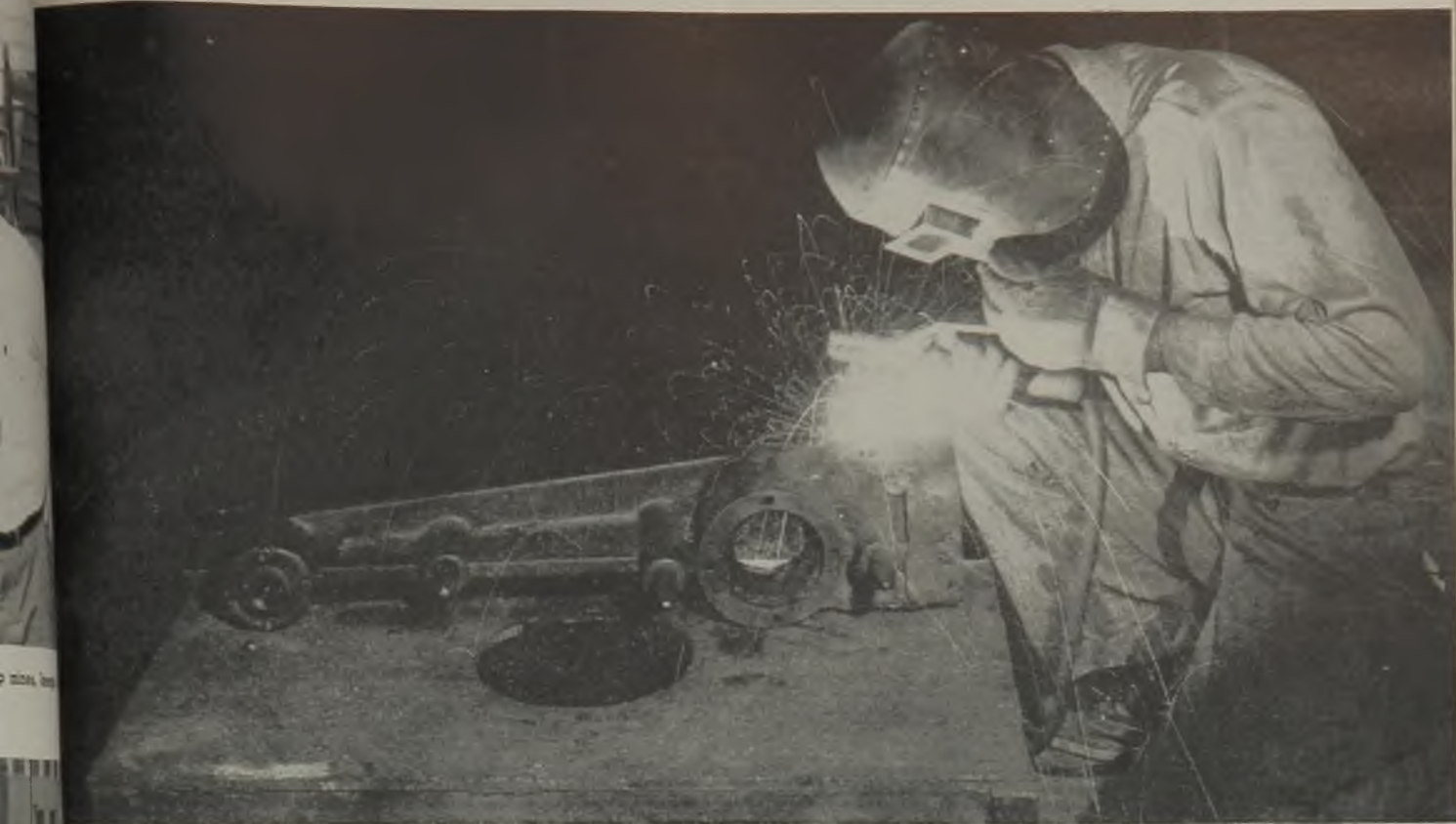


Fig. 1—Rebuilding worn loading-arm brackets requires two operations—reinforcing the end band and rebuilding the bore. About five hours of labor is required to complete the job.

WELDING, FLAME CUTTING

For Efficient Maintenance and Low Cost

Modern Welding and Flame-Cutting Equipment Lends Itself to Repair, Rebuilding and Fabrication of Mining Equipment—How It Can be Employed in the Maintenance of Coal-Mining Machinery

By **A. D. STOUT JR.**
Technical Sales Division
Air Reduction Sales Co.
New York, N. Y.

THE INTRODUCTION of modern mechanical-mining equipment into coal mines, as pointed out in the previous article in this series, has been the greatest single factor in strengthening the industry's competitive position. It also brought with it a realization of

the importance of good maintenance, including welding and flame cutting. The previous article (September Coal Age) detailed the use of welding and flame cutting in maintaining preparation-plant equipment. The following material discusses their application in the maintenance of mining equipment, including cutters, loaders and shuttle cars, cutter bits, shovel teeth and buckets.

The introduction of modern cutting machines, loading machines and shuttle cars in recent years has been

directly responsible for greatly increasing the tonnage of coal mined per shift with the same or, in many cases, reduced labor. High wages and increasing competition today make profitable operation dependent on the continued high output of this equipment. These machines, actually engaged in cutting and removing raw coal, are subject to more wear and tear and general abuse by the very nature of their work than most other mining machinery. Replacement parts run high. Mechanical failure and decreased efficiency caused



Fig. 2—The badly worn loading-machine arm at the left was rebuilt in six hours with oxyacetylene-welding equipment using about 6 lb. of chrome-vanadium-steel welding rod.



Fig. 3—Reclaimed cast-steel forks for loading-machine conveyor pans wear 20-percent longer than the original when rebuilt with arc-welding equipment. Welding time was 1½ hours on this job. Note the wear in the bore on the fork at the left.



Fig. 4—New stiffeners are welded around the axle housing on loading-machine crawler frame which was originally cast in one piece. Old cracked stiffeners were burned out with a cutting torch

by wear are quickly reflected in decreased profits.

The gathering arms on loading machines normally subject to a short life may be rebuilt at a fraction of the cost of a new arm. Fig. 2 shows a loading arm for a coal-loading machine before and after reclamation. This arm was

restored by building up the worn fingers with oxyacetylene welding using a $\frac{3}{8}$ -in. chrome-vanadium-steel rod. The finger-building operation on a pair of these arms requires six hours time, and about 6 lb. of welding rod. Subsequent grinding is not necessary. Building up loading-arm brackets for loading

machines (Fig. 1) involves two electric-welding operations using AWS E6012 electrodes: namely, reinforcing the end pin band and rebuilding the bracket pin holes and bore. The job, including necessary grinding, re boring and tapping for screw holes, requires about five hours of labor.

The rebuilt cast-steel fork illustrated in Fig. 3 had been badly worn from coal grit in the bore and bolt holes. The reclamation process was somewhat similar to the swing-arm rebuilding operation described previously except that two different electrodes were used. The bore was rebuilt with AWS E6012 and the bolt holes filled with AWS E4511 electrodes with a total welding time of 1½ hours. After the bore is machined and bolt holes re-drilled the rebuilt fork gives 20-percent better service than the original, according to the shop authorities who have been rebuilding these pieces in this manner for some time.

The operation shown in Fig. 4 saved the price of a new crawler frame on a loading machine. This frame was cast in one piece but the stiffeners around the axle housing cracked. The frame was saved by removing the stiffeners with a cutting torch and welding new flame-cut stiffeners in place with AWS E6010 electrodes. Similarly, the practice of rebuilding worn take-up rollers used on loading-machine booms is highly profitable. The roller, illustrated in Fig. 5 is 3 in. in diameter, 18 in. long and is made of 45-carbon steel. The shop where this operation was performed uses a $\frac{3}{8}$ -in. chrome-

vanadium-type welding rod with a welding time of two hours and an average rod consumption of 5 lb. per roller. Steel rail wheels for loading and cutting machines are built up with an AWS E6012 electrode as shown in Fig. 6 and turned down. In this illustration, the face of this wheel has been built up and the flange partly rebuilt. The face and flange will be ground smooth after welding.

The application of hard-facing materials to sprocket teeth, clutch jaws, chains, worn quills, worm gears and cutter-bar ends provides another good example of where employment of the welding process to build up metal will greatly prolong the life and efficiency of mining machinery. Sprocket teeth may be reclaimed by gas welding with a high-carbon rod. The teeth are built up nearly to finished size, after which a final layer of self-hardening material is applied to assure maximum wear. In Fig. 7 the operator is applying a coating of self-hardening material to a crawler-drive sprocket wheel. Clutch jaws also are built up by the oxyacetylene process, using a nickel-vanadium rod. This provides a tough surface that may be ground to shape. Reclamation of quills by building up worn sections with an electrode designed to resist severe wear and abrasion has proven its value through great savings in mines where this practice is carried out. Annealing softens the deposit for machining and the desired hardness is restored by reheating and quenching.

Saving Gears With Gas

Worm gears usually are made of cast iron or cast steel around which is cast a bronze rim in which the teeth are cut. Excessive wear on these teeth causes a back-lash through the gear train. With oxyacetylene welding, using a manganese-bronze rod, the gear blank can be built up and the teeth machined to their original size. This technique has proved less expensive than reclaiming by re-casting a new bronze rim around the gear center and provides a more serviceable gear.

The cutter bars on some types of machines are subject to considerable wear on the ends, providing another typical example where hard-facing greatly prolongs the life of the part. The rails over which the cutter bar chain is dragged also wear with considerable rapidity and may be arc welded to size with an electrode conforming to the AWS E4511 classification. Although oxyacetylene welding would practically eliminate the need for grinding in this operation, the



Fig. 5—Worn carbon-steel take-up roller (left) from loading-machine boom was rebuilt in two hours with oxyacetylene-welding equipment using a chrome-vanadium welding rod.



Fig. 6—Rebuilding worn steel wheel for cutting machine. The face of the wheel has been built up and both the face and flange will be ground smooth after rebuilding of the flange is completed.



Fig. 7—Hard-facing worn crawler-drive sprocket wheel for loading machine.



Fig. 8—Hard-facing cutter bits. The jig (left) permits adjacent bits to be preheated while one bit is being hard-faced. Up to 200 bits can be hard-faced in an hour with this set-up, a very economical operation. In the illustration at the right, the bit at the left has been machine forged. Center bits have been hard-faced. Hard-faced bit at right will be reground again after service.



Fig. 9—All parts of the bucket subject to greatest wear are hard-faced before installation.



Fig. 10—New hard-faced shovel teeth last two to six times longer than untreated teeth. Periodic building up keeps teeth sharp, increasing tonnage stripped with less power.



Fig. 11—This broken manganese shovel bucket repaired with stainless-steel welding rod and hard-faced was restored to better-than-original condition and has given considerable service without failure.

warping produced from the flame requires considerable straightening.

In coal mines employing undercutting machines, a considerable annual loss of production may be traced directly to wear on cutter bits caused by the highly abrasive and corrosive nature of coal which results not only in decreased operating efficiency but increased power consumption and frequent shut-downs for bit replacement. Under severe operating conditions it is not uncommon to replace a complete set of bits as many as three or four times per shift. These worn bits must be reformed or sharpened in special

machines and heat treated and ground before they can be returned to service.

Cutting bits hard-faced with a cast tungsten carbide that imparts a diamond-like hardness to the cutting edge have been found to last up to eight times longer with a kerf increase of up to three times over unprotected bits. Bits normally can be ground once before retipping is necessary and can then be reformed and retipped many times.

Bits to be hard-faced are first sharpened and the fins removed by grinding. A jig designed to hold the bits side by side, as illustrated in Fig. 8, generally

is employed to speed up the operation, reduce handling time and permit adjacent bits to be preheated during the hard-facing operation. The torch is adjusted for a soft flame with an excess of acetylene to insure rapid application and a clean, smooth deposit. No unusual welding skill is necessary.

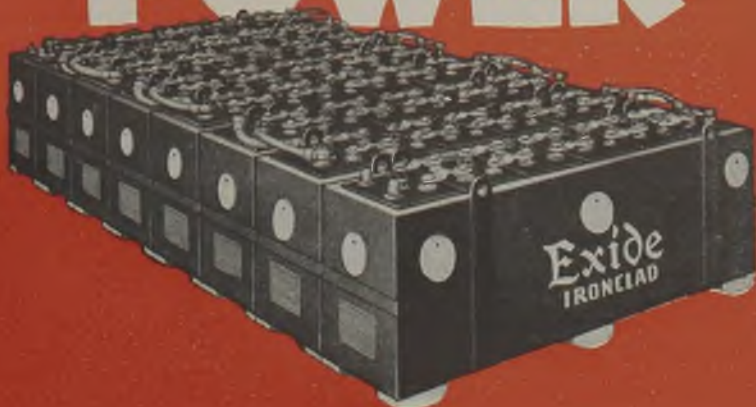
If ordinary precautions are taken during the tipping operation, bits need not be ground after hard-facing. Heat treatment also is unnecessary but the bits must be allowed to cool slowly in still air. Welding time will depend on the welder's experience with this kind of work and the quantity of material applied. Some shops report welders have hard-faced as many as 200 bits per hour—making this an exceedingly economical hard-facing application.

Welding in Strip Mining

In strip mining, the teeth on shovel buckets, draglines, clamshells and pull shovels, as well as the buckets themselves (though the parts subject to impact and abrasion are made of manganese steel) soon lose their "bite" in service. The precaution at some mines, of welding on manganese strips and hard-facing both the teeth and bucket lips before placing them in service and periodically thereafter, as illustrated in Fig. 9, has paid for itself many times over through greatly increased life and greater tonnage stripped with less power. This particular mine does not apply the rod in solid deposits but uses stringer beads. The theory behind this type of application is that the ridges of hard-facing material absorb the brunt of the wear and reduce abrasion on the parent metal. Shovel teeth hard-faced (Fig. 10) last two to six times longer than untreated teeth. As there are several types of hard-facing material available the choice of which to use will be determined by service conditions. Hard-facing rod designed to resist abrasion will give poor service if subjected to extreme impact from heavy boulders or vice versa.

The manganese shovel bucket illustrated in Fig. 11 had been in service in a strip mine only a short time when a large section, including two teeth, broke out. Twenty-two hours of labor, 25 lb. of stainless-steel welding rod and 20 lb. of hard-facing material restored the bucket to better than its original condition as it has since been used for a considerable period of time without evidence of failure. As shovel, pull-shovel, dragline and clamshell buckets are made of special materials, such as manganese or alloy steel, it is important that the correct metal analysis of the defective part be known before welding.

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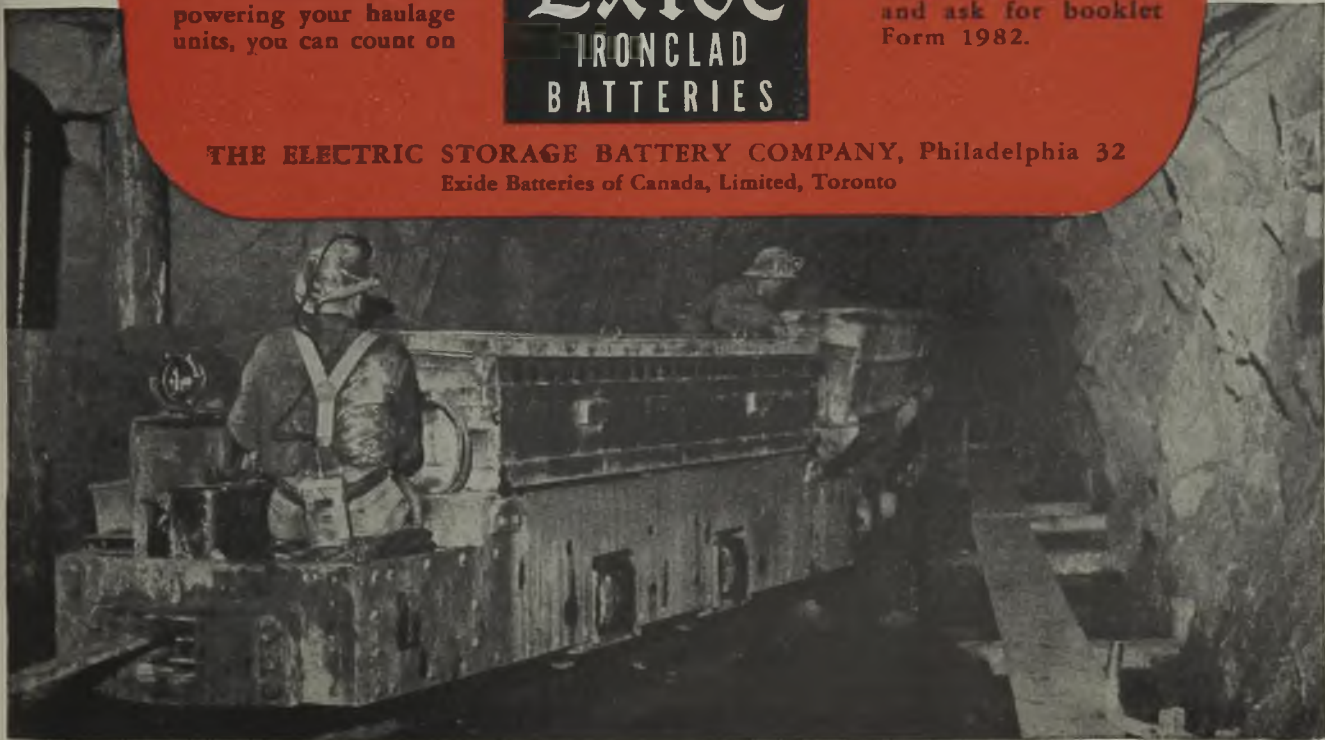
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An atom consists of protons, neutrons and electrons, the number and arrangement of which normally is fixed and determined by the kind of atom or kinds of atoms under consideration. Electricity, we are beginning to learn, is a concentration of electrons that have escaped from these atoms or been drawn from them by certain physical changes to which the atoms have been subjected.

What Is an Electrical Charge?—An "electrical charge", which is described as a "difference of potential" or of electrical energy is now regarded, not so much "generated" (which means "created" or "born") as it is "extracted", as red balls can be separated from blue and white balls by some physical means of separation, or selection. The electrons are ready at any time to return to their source or to a similar source which has been robbed of its electrons by a physical condition somewhat similar to, and often associated with, that which separated them from their former association with protons and neutrons. This will occur when protons and neutrons are found which have been subjected to precisely opposite physical conditions to those which caused the electrons to dissociate themselves from their original association. The idea that compensation for the loss of electrons always comes from the electrons returning to the point where they were dissociated is not tenable. Probably they usually do, but it is not as inevitable as is indicated in all electrical charts. In short, electrons are not like "homing pigeons", always looking for an opportunity to return home. They are more like city pigeons that don't always go home but seek a meal wherever it may be found.

Generation Is Merely The Assembling of Electrons—"Generation of electricity" then is the drawing of electrons out of atoms and their assembly thereafter by some physical means. Electricity is drawn out and assembled:

(1) **By Friction and by Separation of Surfaces Thus Electrified**—Electricity is extracted from materials by friction and also by the contact or near contact, followed by separation, of electrified bodies.

This is well illustrated in hot dry weather by the rubbing of the upper of two sheets of paper. As a result of this rubbing, the upper and lower sheets adhere, because the electrons in the upper sheet are withdrawn to the surface of that sheet, while the lower sheet, which is not so electrified, and so has a positive charge adheres to the upper sheet which has a negative electrification.

When the upper sheet is lifted or withdrawn, the sheets try to remain in contact either because of their opposite charges or, at least, because of a difference of intensity of charge of their contact surfaces. This separation causes a further difference of charge intensity which often results in a discharge of electrons as the intensity of charge increases. A similar discharge occurs between a belt and pulley, when the belt leaves the pulley.

(2) **By the passage of a conductor or conductors through a magnetic field as in**

the case of an "electric generator."

The first electrical charge, which is at rest, is known as "static electricity". For many years, it frequently was designated "frictional electricity" and perhaps that is still a suitable term, though, as has been seen, it does not cover all the conditions under which an electric charge is developed and perhaps not the most important condition, namely separation between charges. Of late, some authorities have declared that the only function of pressure and friction in the development of the phenomenon has been to create a closer and more complete contact between the charged substances, making the succeeding separation only the more effective.

Frictional Electricity—"Really" declares R. Beach in *Electrical Engineering*; "there is no such physical phenomenon as frictional electricity". But P. W. Edwards and J. O. Reed, Bureau of Chemistry and Soils, U. S. Department of Agriculture in the *Quarterly of the National Fire Protection Association*, April, 1929, declare that "the friction of the belt on the pulley, the friction of the atmosphere with the belt and the friction of the conveyed material on the belt all have their part in the development of a static electrical charge, "though under normal operating conditions a large part of the charge on the belt is generated by the separation of the belt from the pulley". A difference of the charges on belt and pulley is created by the several forms of friction especially by

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Type of Explosive Material Tested	Highest Energy in Joules That Just Failed to Ignite the Explosive Designated in Column (1).		Type of Ignition Obtained At Energies Above Those Stated in Columns (2) and (3) Respectively.	
(1)	(2) Explosive Unconfined	(3) Explosive Unconfined	(4) Explosive Unconfined	(5) Explosive Unconfined
Lead Azide	0.0070	0.0070	Detonation	Detonation
Nitrostarch	0.007	1.0	Deflagration	Detonation
Smokeless Powder Ungraphited (Through 100-Mesh)	0.012	4.7	Deflagration	High-Order Deflagration
Mercury Fulminate	0.025	0.025	High-Order Deflagration	High-Order Deflagration
80% Mercury Fulminate } 20% Potassium Chlorate }	0.054	0.054	High-Order Deflagration	High-Order Deflagration
Nitrocellulose (13.4% N)	0.062	3.1	Deflagration	Deflagration
Fusee Mixture	0.62	4.2	Deflagration, probably dust explosion	High-Order Deflagration
Nitroglycerin	Over 12.5	.....	None	.....
Smokeless Powder Graphited (Through 100-Mesh)	Over 12.5	Over 12.5	None	None
Black Powder NaNO ₃ Type (Through 100-Mesh)	Over 12.5	0.8	None	Deflagration
Black Powder KNO ₃ Type (Through 100-Mesh)	Over 12.5	1.6	None	Deflagration

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friction of the belt and pulley, and this is increased by the separation of the two as the belt leaves the pulley, often causing static discharges between them, leaving both of them wholly or partly discharged.

Ignited Dust Clouds

Effect of Insulation—The belt and dry air both being insulators, the charge if not removed by such electrical discharge, accumulates and accordingly, as stated by Edwards and Reed in the same article, may reach 65,000 volts. Sparks are formed which in the Pacific Northwest frequently have ignited clouds of a certain cereal disease germ, known as *tilletia tritici*, or "stinking smut", which infested some of the wheat which was being threshed.

Explosions at grain elevators have been attributed by the U. S. Department of Agriculture to the carriage of materials on belt conveyors. Price and Brown, National Fire Protection Association say in "Dust Explosions", p. 151, "Interesting results were obtained from tests made upon numerous conveyor belts, large slow-moving belts carrying grain. These ran at the comparatively slow speed of 750 feet per minute. In spite of this fact, 45,000 volts were recorded on one rubber belt conveyor carrying grain from the elevator head to storage bins." In a private communication P. W. Edwards, chemical engineer, Chemical Engineering & Development Division, U. S. Department of Agriculture, says, July 11, 1946, "It is my opinion that if the speed of that belt had been reduced to 500 ft. per minute it would have produced high voltages." He added "A second hazard is sometimes produced by the charge on the belt inducing another charge on other objects, such as a guard rail."

In Mines, Charge Usually Is Neutralized—In our coal mines, the air, the mine floor on which the supports of the belt and machinery rest and the belt itself usually are damp and the static charges are discharged, in general, as fast as they are developed. When the air in mines is dry, however, static charges tend to accumulate and, if an opportunity is provided or if the charge gets powerful enough to jump an air gap or gaps, that charge may pass off suddenly as a spark or as a flash to a conductor. That spark will ignite methane or coal dust, which it will explode, if the atmosphere is explosive, and if the energy which causes the breakdown of the air gap is sufficient to ignite the mixture, which ignition, however, rarely occurs.

Why Charges Are Static

Insulation Holds Electricity at Rest—Static electricity is static, only because it is held in place by an insulating environment. It becomes current just as truly as dynamic electricity, as soon as conditions favor a flow of the charge. It is not a different kind of electricity from dynamic electricity, it is merely imprisoned electricity, held within strict bonds by dielectrics, such as insulating air or other non-conductors.

The current will pass if a properly grounded conductor touches the charged body or the charge on its surface or if the conductor comes so close to the body or

to that charge that the electricity (the electrons resting on its surface) can leap across the air gaps between the conductor and the charged body. But as the charge, barring leakage, dispersion over the charged body, or both, augments as the distance increases from the charged body, the spark theoretically can leap across the air gap with equal ease, no matter how great the distance to be traversed becomes.

However leakage and dispersion over the surface is always present to limit the length of the sparks from the discharged body. To escape from the statically electrified body, the voltage of the charge must be sufficient to rupture the air gap, and the "storage capacity" or "capacitance" of the body must be enough to pile up enough energy.

In Dryness Is Danger

Deep Mines and Mines in Arid Regions—In deep mines and in mines in the Rocky Mountain region the air, the belt, the coal being transported, and the floor are all dry, whereas in a State like Illinois all these are likely to be wet, especially as the coal may be dripping with moisture. In the former case, flashes are to be expected; in the latter, there will be less likelihood that these will occur. The capacitance of a belt may be considerable. Its length, its width and perhaps the number of plies may enable it to gather up an immense quantity of energy, for the quantity of energy is roughly equal to the product of all three. The coal on the belt probably is more irregular and therefore more resistance-creating than the material on a belt carrying flour, for the coal itself consists of irregular lumps with the fine coal below them, and in the main air current the intake air passing over the belt is traveling at a high speed, and usually in the opposite direction to the belt, thus increasing the relative speed. But, as will be seen later, in the intake, the charge on a belt is not likely to cause an explosion of methane but might cause one of coal dust.

Winter Is Crucial Period

Two Sources of Dryness—So the voltage, provided conditions favor dryness, will be high, and in winter the air in the mine has great drying capacity, or in non-technical language, "is inordinately thirsty". This is (1) because in winter the air or the earth's surface is cooled and so is compelled to drop much of its moisture on the vegetation and even on the ground, so that air entering the mine, through it may be saturated or nearly saturated, carries very little moisture and (2) because the warming of the air, on entering the mine reduces its percentage of saturation and gives it the power of taking up more moisture, if any be present.

In dry mines, the air will not gain moisture below ground. Dryness will not matter if the belt is in the intake and near the mouth of the mine, for the intake mine atmosphere does not contain methane provided the return does not re-enter the mine and so recirculate, but if the belt is on the return the absence of moisture and the high content of methane, may together create a distinct menace. Near

the face also, the content of methane and coal dust may be high, but the air speed will be low. The danger therefore will be greatest during the winter, at the face and in the return. What makes explosions occur in the winter also makes static electricity and its dangers most evident in that same period.

So we may look perhaps for trouble from static electricity in deep and Rocky Mountain mines especially in the dry seasons. The word "may" is used because little has been ascertained as to the degree of hazard, which does not seem, at first sight at least, likely to be considerable in shallow and Eastern mines.

Nearly a Joule

Tests made by the U. S. Bureau of Mines show that, when an individual wears rubber-soled shoes, the capacity of his body ranges from 0.0001 to 0.0004 microfarads. Suppose he got a charge of 75,000 volts from a charged belt near the face and carried that charge on his body with touching anything on his way he would have a charge energy of, say

$$0.5 \times 0.0003 \times (75,000)^2 = 8,437,500 \text{ ergs}$$
$$\frac{1,000,000}{8,437,500} = 0.84375 \text{ joules}$$

This because the charge energy-half the farad capacity x the square of the voltage. But a microfarad is a millionth part of a farad, so the capacity in microfarads has to be divided by a million to get the capacity in farads. A joule is 10,000,000 ergs.

An accompanying table deduced from R. I. 3852, U. S. Bureau of Mines, showing "Sensitivity of Explosives by Electrostatic Discharges" gives a list of common explosives and shows how many joules will just fail to ignite the explosives if the pressure is 5,000 volts. It shows how sensitive some of them are to electrical ignition even when the voltage drop is considerable, but the amperage is insignificant, as is often the case with static charges when liberated.

Body Endures High Voltage

Body Is Little Affected by Low-Energy High-Voltage Charge—Strange to say, the human body seems to be resistant to high voltages, provided (1) the energy of the charge is low, (2) the charge builds up slowly and does not enter suddenly into the body. Its passage away from the body does not seem painful or harmful, but the human body is quite painfully affected by the receipt of a charge even when of little energy, for all the energy spread over a body of large capacitance may leave by a small area of that body. Automobiles accumulate a charge of relatively high voltage on traveling over a highway on a dry day.

Illustration from New York Tunnel—When the Holland Tunnel in New York City was first operated, the automobilist or bus driver, when he paid the tunnel-toll collector for his intended trip through the tunnel, often passed a heavy electrostatic charge over to that official, who received in his hand thereby the entire charge of the occupants of the vehicle and of the vehicle itself which is insulated by the dry tires.



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State-Board Questions

Mine Foremen, W. Va. (continued)

Safety With Auxiliary Fans

Q.—Why are auxiliary fans objectionable?

A.—In further reply to the foregoing question to that already made in earlier issues (Coal Age, August, 1946, p. 102 and September, 1946, p. 104), two other dangers arising from the use of auxiliary fans will be described: (2) danger in running fans without any one present to meet emergencies, should their motors, blades, spindles, covers, or wiring fail to operate safely; and (3), danger when the methane collects in large volume as a result of the fans being idle for some time, thus leaving this big body of standing methane to be expelled from the mine.

Outby Rooms Greatly Need Ventilation

—In the previous issue, it was explained that the air from an auxiliary fan created a "retroverse" or rearward current, that carries some of the air back to the "outby rooms (rooms outby those having fan ducts) and even into the goaf behind them, and some of the effects of this retrograde movement were studied. With line brattice, the "approaches" of an outby room short of the innermost crosscut receive only the almost fortuitous ventilation of the subsidiary current, unless checks have been provided to scale off the air from the direct, or heading, current at the mouths of these rooms.

Yet, it is important that a steady current should sweep such rooms, for it is in them that much methane is released. Here, pillars are cut, drilled and shot with rapid emission of methane and the formation of dense clouds of coal dust; here the roof is dislodged as pillars are withdrawn, often releasing, in methanous mines, much methane from roof coal, rashings, wild coal and rock; here also the floor heaves—sometime releasing more methane.

Where Most Methane Appears

Advancing Rooms Emit Methane at Face—Less methane is released in the pillars lining the "approaches" to the innermost crosscut of advancing rooms, because the ribs, roof and floor of these approaches remain undisturbed by mining and relatively undisturbed by pressure and will not emit methane in any great volume until they are finished and the room pillars begin to be drawn, and then they themselves in their turn become the victims of mining and of inordinate roof pressures consequent on the withdrawing process. The advancing rooms, it is true are great methane producers but, in the main, they emit methane only at the face, and there

(1) the auxiliary fan duct discharges in such great volume or (2) the detouring subsidiary air current supplies, or should supply, such necessary ventilation as will rid these danger points of any dangerous quantity of methane.

With auxiliary fans, the retroverse current in the retreating outby rooms will take care of the methane in these outby rooms almost as effectively as the auxiliary fan current takes care of the methane emissions at the face of the same rooms when advancing. It will be far more effective than the ventilation afforded by the subsidiary current from the main fan in those same advancing inby rooms with line-brattice ventilation. Thus, the force and volume of this retroverse current are both unquestionably adequate to meet the needs of the outby rooms which, with line-brattice ventilation, often give trouble.

Where Air Is Still Fresh

Is This Retroverse Split a Menace?

But, some will say this rearward air movement is to be reprobated, as it takes, methane from the goaf and the outby rooms and spills it into the haulageway. True, it cleans the goaf and outby rooms in so doing and will discharge the goaf atmosphere continuously into the heading current, but if the intake current has not gathered up much methane from older goafs before reaching this point, the addition of this methane will be well within the bounds of safety and not as dangerous as it would be if the methane came out more or less

as a body, as it may do from a badly ventilated goaf, when the barometer is low or falls rapidly.

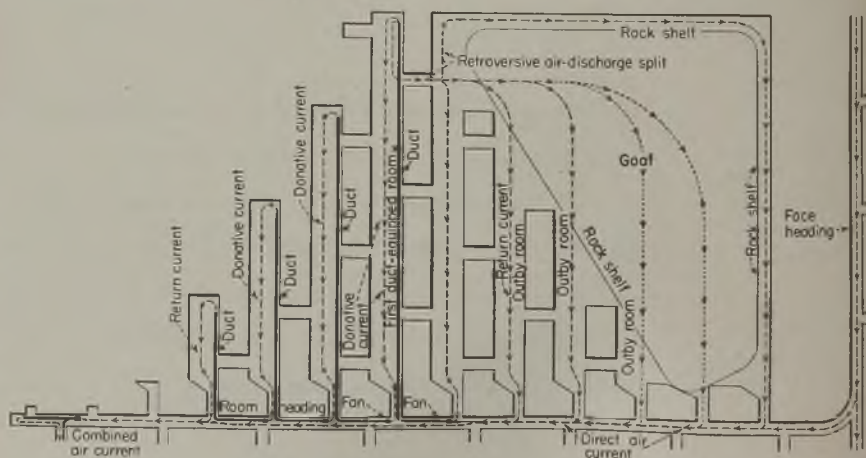
Uniform Methane Desirable

By the introduction of the necessary quantity of air, one can provide, and probably will provide, against this varying percentage of methane in the room heading ever exceeding a safe percentage, but a low and uniform methane content is much more desirable. Of the methane added at, and up to, this point, much of it goes back through the fan to a point where it will be thrown into the subsidiary current which travels, not the heading, but near the face. Reasons for preferring the subsidiary current to the room heading as a vehicle for methane will be canvassed later.

Is Recirculation Fatal?

Methane Should Be Speedily Evacuated—If the recirculated methane steadily passes on to the final outlet and does not recirculate back into the same room from which it is driven, but is swept out in a matter of minutes from the region where the methane is emitted, and does not recirculate a long distance, it may be no such menace as is thought. It would be better if it did not occur. That is certain.

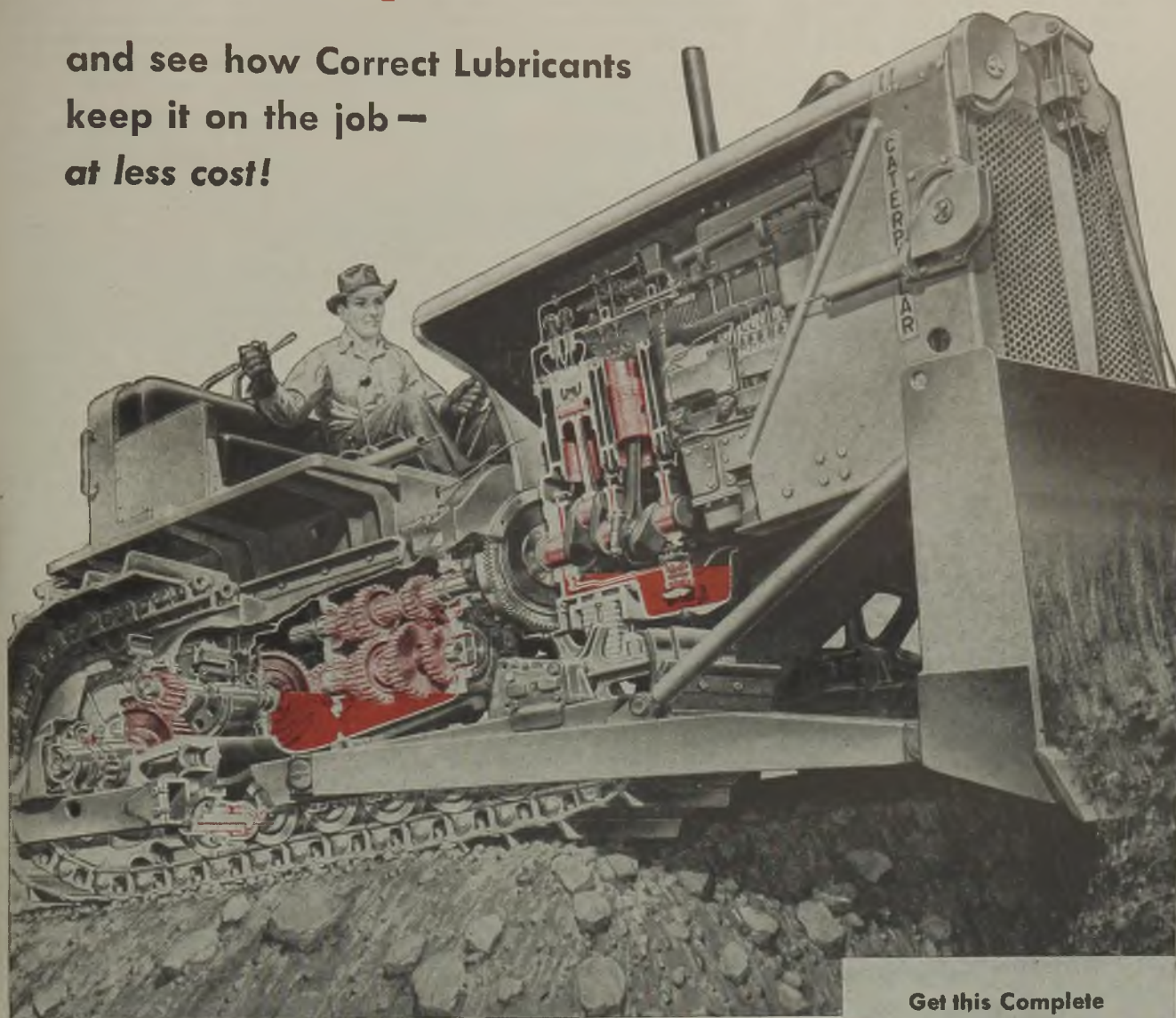
One may regret it, because thereby power is wasted, but if the recirculated methane is steadily depleted by direct-current air, it clears itself and does little harm. If it is not removed but is recirculated again and again, recirculation is, of course, a definite menace. It should



Circulation with several auxiliary fans. Air goes from one fan to the next returning by the same room to the main heading and leaving for the next face promptly and finally returning to the direct current in the main heading.

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be borne in mind that speedy but befouled air is not unsafe air unless the air recirculated is in itself thereby so befouled as to be menacing. In the drawing it is assumed that the goaf has not so tightly caved or the cover not so completely subsided as to prevent air from passing over and through the fallen rock.

What Might Be Done

Retroversive Split Might Be Eliminated—However, if the bleeding of the methane from the goaf into the heading current is believed not to be tolerable, it could be prevented by putting brattices or curtains in the crosscuts on the outby side of the duct-equipped room, but then the outby rooms in which pillars are being drawn would be ventilated imperfectly by the natural goaf current, which would be established only by feebly acting non-mechanical splits from the direct current. However, this condition could and would, doubtless be remedied though imperfectly by air checks or doors provided in the heading between the extracted rooms or rooms in process of extraction, thus compelling more air to enter the outby rooms and goaf.

Goaf Gas in Subsidiary Split

Protection to Men in Subsidiary Split—Something perhaps should be said in favor of keeping all pollution with methane out of the haulway. With the line-brattice method of ventilation, the goaf air current travels along the subsidiary split and is carried into every face where miners are at work. It might be thought that it is well to have at least some of the goaf air with its methane in the direct split (the heading) where there are fewer men to ignite the explosive gas and fewer men to be injured by an explosion. However, an explosion in either the heading or the room faces would probably involve all the men. So the avoidance of an explosion is the main consideration; just where it will initiate is less important. What is important is the likelihood of an explosion anywhere, whether in rooms or headings.

Putting Methane in Haulway

Counter Balancing Evils—To recapitulate, the fourth, or retroversive split from the fan discharge will add a little more methane to the air in the heading. All of the methane will not go back through the fan to the subsidiary current of the heading. On the other hand, with exclusive line-brattice ventilation, there probably will be still more in the heading during the periods of heavily falling barometer and perhaps low barometer also. (Sec Coal Age, October, 1945, p. 116).

To take some of the goaf methane and that of the pillars into the haulway, as also the methane in the third (recirculative) and fourth (retroversive) split of the fan discharge may seem dangerous, though in this case the auxiliary fan will put much of it back into the first split and make it part of the subsidiary split which goes, on the other hand, to the rooms ahead.

The accompanying illustration shows how the atmosphere from the face can creep up behind the first fan in the room heading. The frontal approach, via the

duct-equipped room and thence to the rear of the fan, by a short sharp looping movement of the air rearward and then forward within the room heading itself has been generally recognized and discussed, but this approach by a broad and extensive movement to the rear through the outby rooms and goaf and then forward by the room heading to the fan is worthy of at least equal consideration.

Regulation Will Help

Four Ways to Regulate—A partial cure is effected, if the main mine fan is made to provide so much air that the auxiliary fan will pick up only a small part of the air in the intake. To provide more direct air current is therefore helpful. Decreased force in the auxiliary fan draft will also give the fan less power to push the air so energetically toward the goaf and to force so much of the third split into the fan inlet, thus disputing the entry of air from the direct current but, when this is done, the air in the outby rooms, where pillars are being drawn and the roof is being broken, may be less than is adequate for their ventilation.

Fans Running Unsupervised

Continuity of Service Without Attendance—Now, should be discussed the two dangers of auxiliary fans mentioned at the beginning of this section. Where mines are operated every day and by triple shift, the dangers of discontinuance of service are removed. At least, attendance between shifts can then be arranged with lessened cost, but where the mines work fewer shifts or work irregularly, the management is confronted with the problem, whether to provide continuous or nearly continuous attendance for the fan or little or no attendance during idle hours or to close the fan down.

Unattended Electrical Service Hazardous—The operation of any electrical machinery with little or no attendance is always risky, especially in a mine where falls of roof and coal are to be anticipated. A fall of rock or roof coal may bring down the trolley wire or dislodge the conductors which have been left charged to supply power to the fans, causing a short circuit. Moreover, such a fall may crush an air duct and thus increase resistance and overload the fan motor causing it to burn. Or less probably, the fan spindle may bend or break and cause the blades to strike the casing and emit sparks, which in turn may ignite methane.

Suspended Operation

Discontinuity of Service—If the auxiliary fan is operated only during working hours and is idle between such periods, methane will gather in the working places. When the fans are started, the air around the fan motor and the starting switch or nip may become so surcharged with methane from rooms and goaf that an explosion may occur. During the idleness, the ventilation from the main fan will keep the air in the room heading free from methane, but not the air in the faces of the rooms, and the sudden removal of stagnant methane after

the fans are started will create a dangerous condition. With line brattice, on the other hand, the rooms are ventilated continuously by the air from the main mine fan, and so are kept relatively free from methane. Moreover, with such ventilation, there are no running or starting fan motors to ignite methane if, by any chance, it becomes present, in quantity.

Uncertainties in Starting

Electrical Starting Hazards—If, with an auxiliary fan, the fan motor has a starting switch and both motor and switch are explosion-proof and in proper condition, there will be no explosion, but it is always hazardous to assume that the condition of the equipment renders that equipment safe. There is always a possibility also that a fan spindle may have been broken or a duct damaged, causing, in the one case, mechanically produced sparks and, in the other, motor burning. Nor is there any assurance that the fan always will be started by a fireboss or otherwise authorized person or that those persons will have undamaged lamps or use them safely. Consequently, starting the auxiliary fan or fans endangers the mine.

Bringing Out Stored Methane—An immense volume of methane is moved in a short time, and its movement through the return also is hazardous. This starting should be done before a working shift enters, and the standing methane must be expelled before any work is done, but there is always the danger that it may not always be expelled before the underground mine workers arrive and that men may drift in at off-shift periods to work or to remove tools.

After Travel With Many Fans

No Subsidiary Current—Recirculation within a single fan and its duct is greatly reduced, in fact almost eliminated where, as is customary, several fans run in adjacent rooms (see illustration). What has been termed in this discussion the subsidiary split exists only for the furthest inby auxiliary fan, which in any room is running. However, where ducts are of unequal length and all fans are of equal capacity, the ducts in the shorter rooms have less resistance and the pressure at the face and at every crosscut will be slightly greater than in the longer room. As the pressures will not be accurately balanced, there will be some small quantity of retroversive air as has been shown that will pass in the crosscut retroversively and go back to the outby room and be sent back by the inby room through its auxiliary fan and duct.

In and Out but Steadily Advancing From Fan to Fan—With a fan to each advancing room except the last, the air goes into the first face thus ventilated and, finding all the crosscuts inby blocked by equal or even greater pressure, consequently returns to the room heading. Caught up by the next inby fan, the air then travels to the face of the next inby room and again after ventilating the face is thrown back to the room heading to enter another fan. This process is repeated until the air has entered the last fan in the room heading, returning by the last inby crosscut or, if the room has none, by the mouth of the room.

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Operating Ideas

Jug and Valve Make Float-Control Device

AN ORDINARY GALLON JUG with a cork stopper and a valve makes a very effective float-control device for controlling the water level in numerous sumps along the haulage roads in the Piney Fork No. 1 mine of the Jefferson Coal Co. (Hanna Coal Co. affiliate) near St. Clairsville, Ohio.

The mine-engineered float valve, shown in the accompanying illustration, is cheap and very effective. At Piney Fork, as many as 20 sumps are served by one gathering pump. Almost every crosscut has a sump. Therefore, some cheap and reliable means was needed for shutting the valve when the sump became dry. A gallon jug was tried and now is part of the standard installation at each sump.



A gallon jug with cork stopper helps regulate the valve in accordance with the level of the water in the sump.

Any Ideas?

A mine is like a power plant. Its preparation plant, like the generator room of the power plant, is comparatively efficient. But in its face-to-tipple operations, as in the boiler room of the power plant, there is room for much improvement. Because ideas can bring about improvements we invite you to send in any that you have put to work. It can be a mechanical, electrical, operating or safety idea. If accepted, Coal Age, upon publication, will pay you \$5 or more for each.

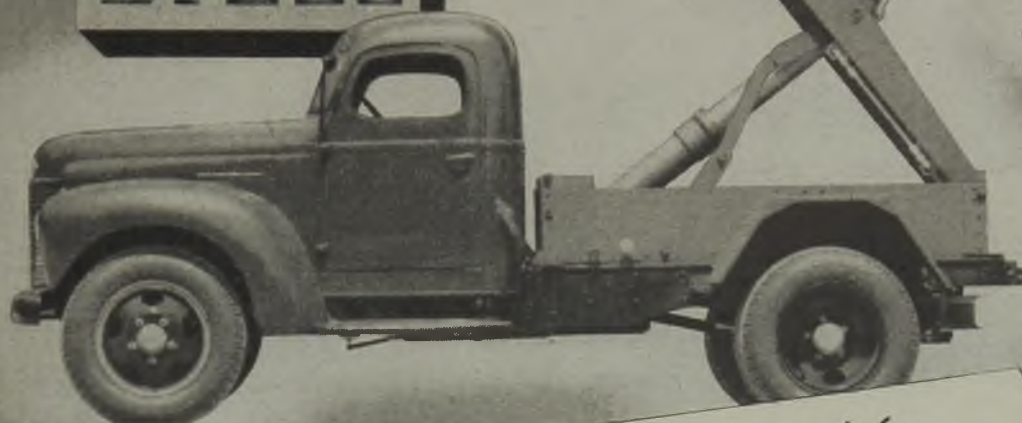
Grease Gun Supplies Power for Press



FOR USE IN LIGHT WORK, such as pressing coal-drill armatures off shafts, Horace Middleton and William G. Harris, electricians at the main shop of the Kemmerer Coal Co., Frontier, Wyo., developed the press with which they are shown in the accompanying illustration. The pump and reservoir were made from an Alemite grease gun with an extension for the necessary fluid capacity. A light oil is employed and Alemite hoses connect pump and reservoir with the ram, made from extra heavy pipe with springs to return the plunger to retracted position. Capacity of the press is approximately five tons. It is easily moved by one man. The platform on the bottom may be positioned at various heights to accommodate varying shaft lengths and is held in place by pins through holes in the side members.

The grease gun powering this small shop-made press is mounted on top of the frame. Messrs. Harris (left) and Middleton pose with their creation.

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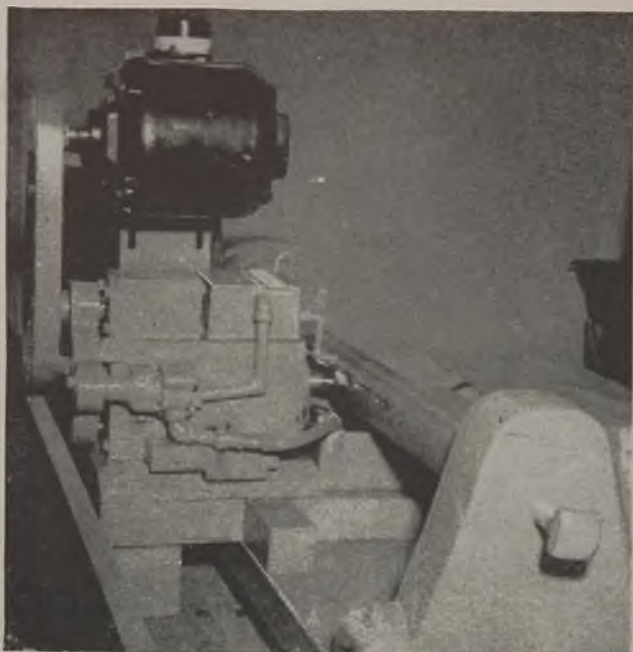
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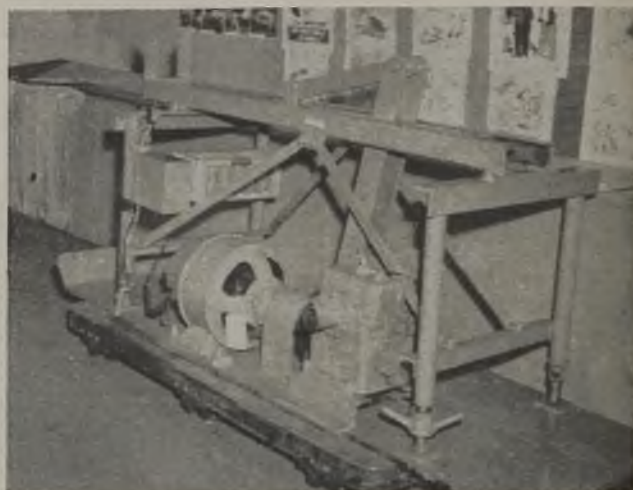
Keyways are cut before removing the shaft from the lathe.



The hollow handle of this foreman's stick holds first-aid material.



Showing use of wedge-bolt pan fastener.



Arm and spreader at left reciprocate crosswise over the top of the mine car at proper height to level the incoming coal.

SIX OPERATING IDEAS submitted by mining men received prizes in the "Gadget Show" which accompanied the Southern Appalachian Industrial Exhibit at Bluefield, W. Va., Aug. 22-24.

First prize of \$25 was awarded a milling attachment for a lathe, to be used principally for key-seating, designed and built in the mine shop at Arista, W. Va., by J. R. Stover and W. R. Evans, electricians with the Weyanoke Coal & Coke Co. Principal parts consist of a small motor, V-belt and pulleys purchased from Sears-Roebuck, gears from an old speed reducer, two Timken and two ball bearings from discarded machinery and an automobile oil pump from the scrap pile.

Key-seating before the work is removed from the lathe centers saves time and promotes accuracy. The attachment (see accompanying illustration) is mounted on the carriage cross-feed. When a keyway is to be cut the end of the milling cutter is fed into the shaft to the required depth and then the longitudinal feed put into motion. The shop tool-room has been equipped with each size of milling tool to

cover the ordinary range of keys used on the mining equipment.

The bolt, wedge and set-screw fastener for shaker-conveyor pans shown in the accompanying illustration won the second prize of \$15 for Edgar Bailey, section foreman, Premier Pocahontas Coal Co., Premier, W. Va. Speed of assembly, tightness and need for only a small wrench and hammer as tools are the advantages cited for the Bailey fastener. Driving in the wedge quickly draws up the bolt, which is made of cold-rolled steel, to desired tension. The relatively small set-screw in the end of the bolt keeps the wedge from moving. Disassembly is done with the same tools and is accomplished as quickly as the assembly.

A foreman's stick with a hollow handle containing first-aid material brought an award to R. L. Roberts, New River Co., Kaymoor, W. Va. This device appears, along with certain other gadgets exhibited, in another of the accompanying illustrations. Prizes also were won by Harry Barlow, International Correspondence Schools, for a foot-operated safety switch thrower,

two-way switch for room work and a car stop, and by E. F. Brown, chief electrician, Gay Coal & Coke Co., Mt. Gay, W. Va., for a cable insulation stripper (third prize) and a machine for leveling coal as it is loaded into mine cars.

Excellent results were reported for the new coal-leveling machine, which is used in shuttle-car mining. In operation, the machine is installed across the track from the elevating conveyor into which the shuttle cars discharge. The motor-driven spreader (at the left in the illustration) moves back and forth to distribute the coal to the sides and corners of the cars and level the top of the load to the limit of haulway roof clearance. Filling the car corners by this machine results in carrying 300 to 400 lb. more per car.

Four screw jacks built into the supports between the base and the operating mechanism provide for adjusting the height of the spreader above the top of the mine car. Stroke of the horizontal arm to which the spreader is attached is adjusted by moving the crankpin to different holes in the crank disk.

A FREE ECONOMY IS WORTH FIGHTING FOR

BUSINESS must take the initiative if the price decontrol machinery, set up by Congress, is to be effective. The present price control law is far more than a set of instructions to the administrators of OPA; it is a challenge to business to be aggressive in speeding decontrol decisions and in persuading the Price Decontrol Board to adopt a strong stand for return to a free economy.

Thus far business has not met this challenge. *Two months after the passage of the new price law not a single application for decontrol of a major product had been filed by an industry advisory committee.* This is due in part to the red tape controlling such applications. Nonetheless, a continuation of such inactivity on the part of business can well result in perpetuating price control far beyond the time either the present law or sensible economic policy require.

It was the clear intent of Congress to hasten our return to a free economy. In the legislation continuing the general control of prices, Congress formally declared its purpose to have it "terminated as rapidly as possible."

To accomplish this, the House originally approved a formula which would have made decontrol mandatory when production had attained a prescribed level. The automatic decontrol provision was dropped before the bill was finally passed, partly because of the uncertain effects of strikes on production. But Congress did not mean to return the timing and extent of decontrol to the administrative discretion of OPA.

On the contrary, to assure having price control "terminated as rapidly as possible," Congress created a Price Decontrol Board and gave it power to overrule OPA when the board finds price control should be removed. Moreover, it gave to industry the right and the responsibility to seek decontrol. Also, in a further effort to speed up the decontrol process, it placed narrow limits on the time allowed for board decisions.

Congress had compelling economic reasons for doing its legislative best to speed up decontrol.

1. It is by all odds the best way to eliminate the

bottlenecks in production and the black markets which have plagued the country since V-J Day.

Rigid price ceilings promote shortages of badly needed commodities by discouraging their production. Such shortages both upset the flow of production and promote black markets. At present a considerable part of American industry is stymied by shortage of critical parts and materials. Price control is much to blame.

2. There must be flexibility of prices if a round of new wage adjustments, which may be forced on industry early in 1947, is to be negotiated without grave risks of seriously curtailing production.

When, under the leadership of the national administration, the first post V-J Day round of wage adjustments was made, price ceilings were held rigid while wages were boosted. The result was a series of price-wage squeezes which upset production. They would have been disastrous if we had not been in a sellers' market, created by a tremendous accumulation of war-time shortages. In 1947, however, many industries will be in a buyers' market. It must be possible, therefore, to have wage increases reflected promptly in price adjustments if we are to avoid a repetition of the costly post V-J Day round of strikes, which often had price control as the key issue.

3. Rapid decontrol is necessary to maintain a high level of employment and production.

Almost five years of price control inevitably twisted the factors of production and distribution far out of the equilibrium which would prevail in a free economy to which it is the clear purpose of the nation to return. Unless the return to a free economy is facilitated by a speedy and orderly decontrol, the jolt of an abrupt return to competition can be expected to upset employment and production seriously.

It's Up To Business

To encourage speed and boldness in decontrol, Congress provided for the reimposition of control over any prices which, after being released, might

get out of hand. The dangers of this sort are chronically exaggerated. During the 25-day period in July when there was no price control the Civilian Production Administration found that "manufacturers of finished industrial and consumer products have generally exhibited commendable restraint in increasing prices no more than increased costs."

All of this endeavor to speed up decontrol and expand its scope is likely to be futile, however, unless business furnishes the driving power for the machinery Congress provided. OPA certainly will not do it. Neither can the Decontrol Board be expected to go out and drum up cases.

The necessity for vigorous action by business in pressing for decontrol is increased by the fact that the general legislative standards to guide decisions by the Decontrol Board are vague. They must be clarified and sharpened by decisions in specific cases.

The main principle to guide the decontrol of non-agricultural products is that price ceilings shall be removed when supply is in approximate balance with demand. But what precisely does that mean? The meaning will become clear only through Decontrol Board decisions.

The same is true of the principle which makes automatic decontrol of a non-agricultural commodity contingent on whether or not it "is important to business costs or living costs." Business must press cases which will give specific meaning to those vague terms if decontrol is to get on apace.

Cards Are Stacked

At present the government has the cards pretty well stacked against rapid decontrol.

First, the key members of the staff of the Price Decontrol Board are holdovers from the Bowles regime which emphasized the importance of carrying on price control rather than speed in getting rid of it.

Second, in exercising his authority to prescribe regulations to govern petitions for decontrol, the OPA administrator has required excessively complicated statistical and economic data. Manufacturers who are sure they can convince any fair-minded board of the desirability of decontrolling certain of their products assert that they are blocked by statistical entanglements.

Third, OPA has discouraged business from moving immediately under one section of the law to speed decontrol. This section provides that products "not important in relation to business or living costs" may be freed from price ceilings immediately and must be freed by December 31, 1946, unless OPA specifically finds they are important to these costs.

Instead of making it possible for business to move under this section now, OPA has issued rules which have the effect of blocking such a course until the end of the year.

In the light of obstacles such as these, it is not surprising that the record of decontrol to date is not impressive.

Decontrol Record

Since June 30 there has been a drop from about 70% to about 60% in the total value of products under price control. But most of the drop has been accounted for by food products, which Congress took the lead in decontrolling, and by industrial machinery which was being decontrolled when Congress acted. By far the larger part of manufactured consumer goods remains under control.

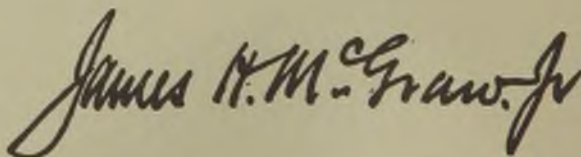
This, however, is no time for business to be discouraged. Rather, business should accept the obstacles put in its way as a challenge and work harder than ever for speedy decontrol.

The case for decontrol should not be stated in narrow technical terms. It should be based on grounds of broad public policy, and should demonstrate how a speedy return to a free economy can hasten the full release of the nation's productive power.

For example, there should be very clear demonstrations of how, in far too many cases, rigid price ceilings—(1) discourage production of key parts and materials by making such production relatively unprofitable, (2) create shortages of key parts and materials which tie up broad ranges of production or result in piling up lopsided inventories of partially completed goods, and (3) thus cut away the foundations of a stable economy and the prospects of steadily sustained employment.

There should be equally full demonstrations of the well known sequence from shortages to unrealistic price ceilings to black markets. Meat prices are rolled back, but the meat is rolled under the counter.

A free economy is worth fighting for. Liberty is preserved only by the constant struggle of those who believe in it. Neither the interests of the nation in a strong and well-balanced economy nor the interests of business itself will be served by drifting at this time. Now is the time for business to lead a strong offensive for speedy elimination of price control.



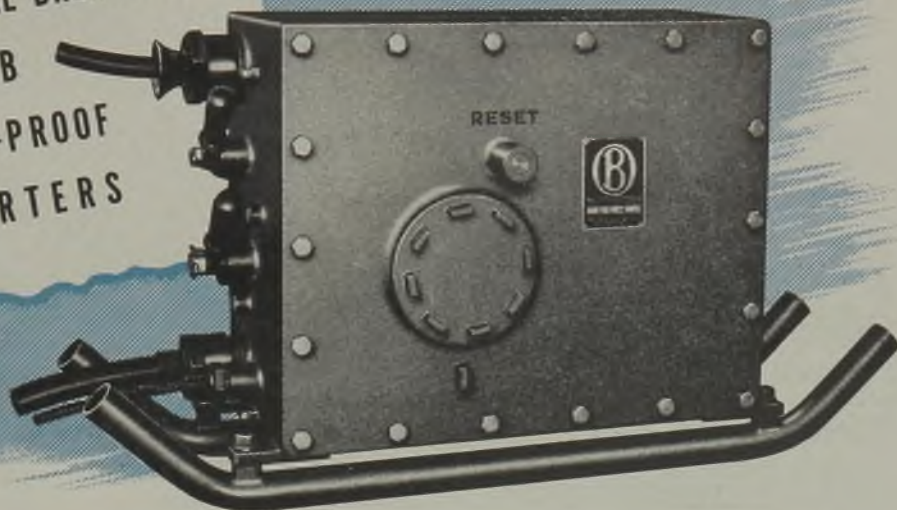
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Clips Make Planing Operation Easier



Two clips at each end of the plate make it possible to keep the clamps, which secure the plate to the bed of the planer, well in the clear.

CLIPS WELDED ON prior to the machining of the plate assembly forming part of the valve-chest assembly for the 18-ft.-diameter Chance cone makes the planing operation easier at the Drifton shop of The Lehigh Valley Coal Co., Drifton, Pa.

To be able to plane the entire surface of the plate, shown in the accompanying illustrations, with one set-up on the planer insures a job that will conform more closely to the tolerance allowed. Before, when clamps gripped the top surface of the plate, more than one set-up was required to do the entire job of machining—and there was always a chance for misalignment. Any misalignment robs the valve-chest assembly of that much operating freedom. Now, clips, welded temporarily on the plate, make it possible for all holding clamps to be kept below the finished surface of the plate. When the job is completed the clips are removed with a burning torch.



Once the plate is shimmed and clamped in place the operator takes it easy.



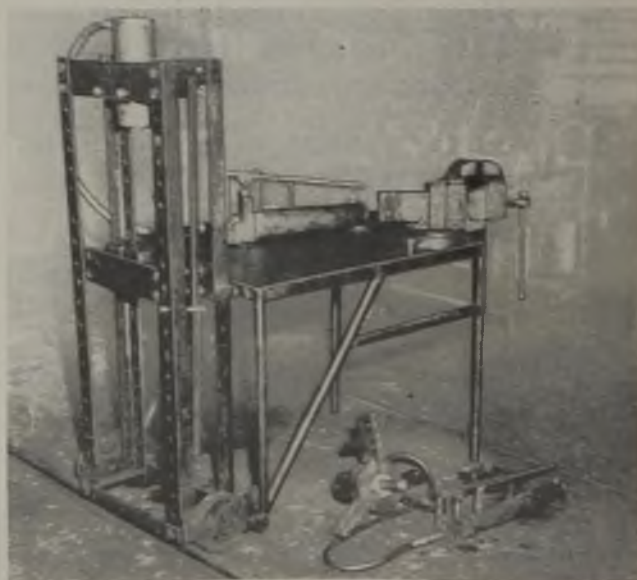
More plates with clips already welded in place waiting to be machined.

Shop-Made Presses Facilitate Maintenance

HYDRAULIC POWER has been applied to facilitating shop work at the Monarch mine of the Sheridan-Wyoming Coal Co., Inc., Monarch, Wyo., by a combination press and work-stand and a portable unit for operating pulling and pushing equipment. The table unit is shown in the accompanying illustration and on the floor beneath it is the portable unit. Both were developed by Frank Canfield, of the Monarch shop.

The table-mounted press is provided with two wheels so it can be moved easily to any desired part of the shop. A vise on one corner facilitates holding material and parts while working on them. The press is mounted, as indicated, on one end of the table with the ram, made from a Joy hydraulic cylinder, at the top. The table on which the lower end of the work is set is fixed so it can be raised and lowered in the angle-iron guides on each side, being held at the desired elevation by pins passed through the holes drilled in the angles. The pump for the ram was made of 2-in. stock drilled for the necessary valves. With the oil reservoir it sits on top of the table and can be moved around as desired. The connection to the ram is a Joy hydraulic hose. The ram develops 37 tons with a 50-lb. pressure on the handle. Maximum length of work that can be accommodated is 38 in.

The portable unit is shown with a spider to which gear pullers can be hooked. By screwing the spider off and putting on a ferrule, the unit also can be used for pushing, as in straightening frames and other work. The ram in this case was made of Shelby tubing. Capacity of this portable unit is 50 tons.



The pump for the press is shown on the table, with the ram at the top of the guides. On the floor is the portable unit.

How to keep a mine car on the track...

Let O-B Form-8 Automatic Couplers
Increase the Track Stability of your Cars



Because of its broad bearing surface, a trip of cars equipped with Form-8 Couplers holds its alignment on the rails, does not zigzag.

Sectioned view of a new Form-8 Coupler. Up to 3000 lbs. push, the coupler is free to pivot around the clevis pin, the thickened ends of the rubber buffing pad (A) absorbing the compression. Above 3000 lbs. push, the coupler drawbar ends (B) bear against the steel plate (C) embedded in and vulcanized to the draft gear. The stabilizing pressure thus produced pushes the couplers, and hence the cars, into alignment.

Mine car derailments, long considered a necessary shortcoming of train operation, need not be tolerated. Because of their advanced draft gear design, O-B Form-8 Automatic Couplers can help prevent buckling under push or buff...will actually increase the Track Stability of the cars under all operating conditions.

Mine cars equipped with old-fashioned links and pins push against each other from a single pivot point. This action, coupled with the "play" between the car wheels and track, allows the cars to zigzag, developing a side thrust against the car wheels.

The new O-B Form-8 Coupler eliminates this tendency by providing between the cars a broad pushing surface 20 square inches in area. The stabilizing pressure thus created forces the cars towards the center of the rail and counteracts any side-thrust to derail.

Make it a point to investigate the Track Stability feature of O-B Form-8 Couplers before purchasing your next mine cars. Full information on request.

2719-AM

Ohio Brass

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Under push or buff, a trip of mine cars equipped with links and pins and spring bumpers will assume this zigzag position on the track.

Portable Stands Serve Shop Better

PORTABLE PLATFORM STANDS for handling and storing machined parts are among the late improvements at the Providence shop of The Hudson Coal Co., Scranton, Pa.

The Yale platform stands and truck for moving them, shown in the accompanying illustrations, will accommodate loads up to 3,500 lb. Each platform is 30x48 in. long and stands 9 in. high. The wooden platform is 1 in. thick and bound around the edges with a metal strip.

A Type NS Lewis-Shepard lift truck with a lifting range from $2\frac{1}{2}$ to 10 in. is used to move the platform stands about the machine shop or to the storage and truck-transfer platform.



Heavy loads are easily moved by one man.



The portable platform stands can be set down wherever the shop floor is clear.



The truck usually is available for moving any stand.

Switch Thrown Automatically

TO FACILITATE SWITCHING the locomotive to the empty track automatic equipment is employed to throw the switch at the Monarch mine of the Sheridan-Wyoming Coal Co., Inc., Monarch, Wyo. The equipment, shown in an accompanying illustration, was purchased from the American Mine Door Co. When the trip comes out, the locomotive uncouples and runs ahead

through the tripping device, which throws the switch for the empty track. After going through the switch another trip returns the switch to the straight position, permitting the loads to run on down to the dump. The equipment is designed so as to function regardless of which way the switch may be set when the trip approaches it.



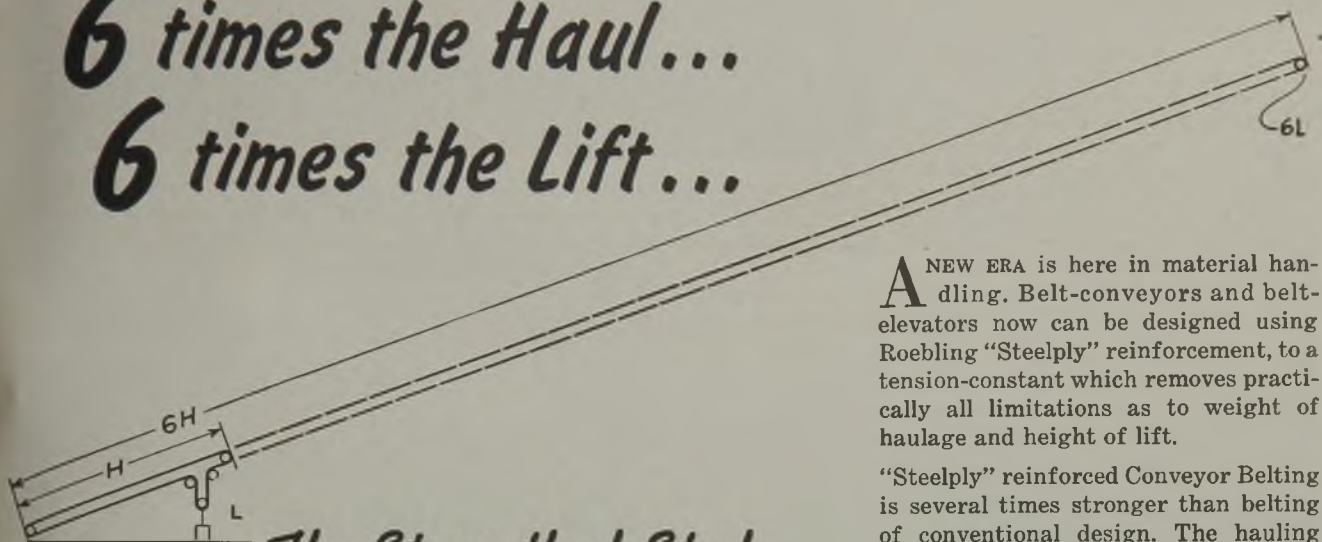
Ready for a trip to come in. The trip will throw the switch to permit the locomotive to take the right-hand track and then throw it back to allow the loads to go down the straight.



Here the locomotive has cut off from the trip and is coming through the switch. The trip in the foreground will throw the switch back to put the loads down the straight to the dump.

Steelply REINFORCED CONVEYOR BELTING

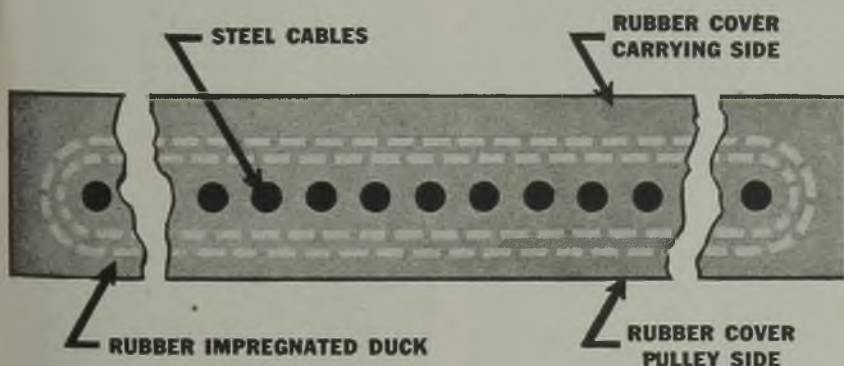
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"Steelply" reinforced Conveyor Belting is several times stronger than belting of conventional design. The hauling distance and the lift can be increased about six times that of ordinary belts, depending, of course, upon the arc of contact and coefficient of friction attainable at the driver pulley . . . But "Steelply" cables can "take it".

An extremely flexible belt, its longitudinal stiffness is exactly enough to prevent undue sagging between idlers; its lateral flexibility insures perfect troughing.

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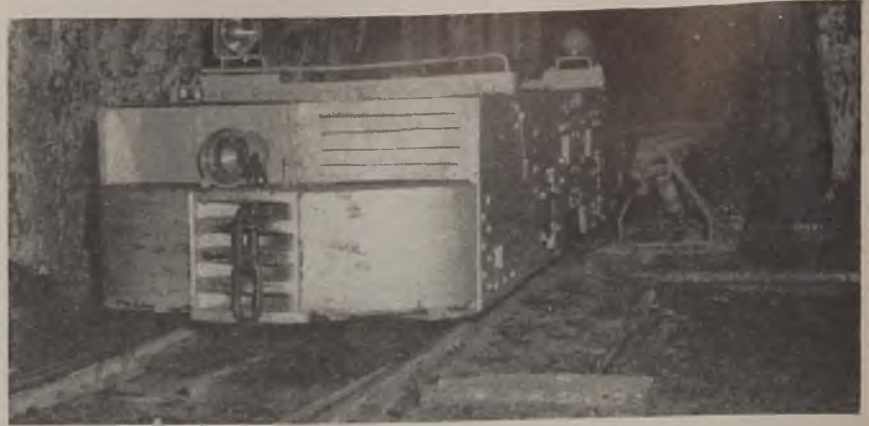
PACEMAKER IN WIRE PRODUCTS

Switchthrower Actuated by Locomotive

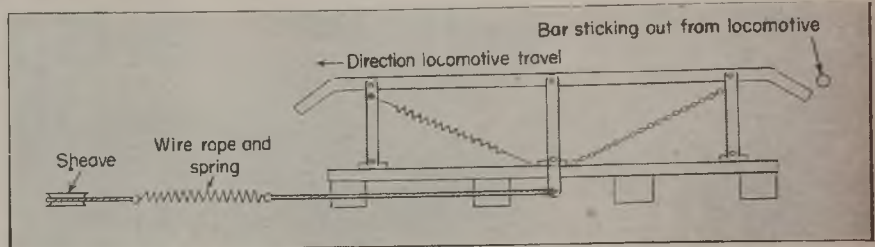
TO FACILITATE LANDING TRIPS on the bottom, Edwin Kolar, motorman at the Imperial mine of the Imperial Coal Co., Erie, Colo., developed the locomotive-actuated switchthrower shown in the accompanying illustrations. It consists of an elevated treadle alongside the track which throws the switch by means of a wire rope running around a sheave to the end of the bridle. A spring in the rope insures positive snap action in throwing the switch. A bar sticking out from the side of the locomotive depresses the treadle and aligns the switch for the runaround track.

When the locomotive passes the treadle a spring returns it to normal position, a stop chain preventing it from going too far back. Springs on the opposite end of the switch bridle pull it back to straight position to permit the loads to drift in on the loaded track to the bottom. The bar is placed on the rear end of the locomotive and the distance from the treadle to the switch is adjusted so that the treadle remains down, holding the switch in position, until the rear wheels of the locomotive engage it. As soon as the locomotive passes over the switch, the springs on the bridle, as stated, return it to straight position.

Showing diagrammatically how the treadle is built and used.



The round bar sticking out from the rear end of the locomotive has depressed the treadle and thrown the switch for the runaround track. Note rope and spring to bridle at right. Springs on the other end of the bridle return the switch to straight position when the locomotive has passed over it.



Signal Shows Cars Off the Track

TO SIGNAL THE MOTORMAN when cars are off the track a weight-operated switch released by the breaking of glass tubes lights red lamps down the track. Thus the motorman can stop his trip to rerail the car or cars before they are dragged too far.

As shown in the accompanying illustration, the signal system involves a switch on a post that can be closed by the dropping of a weight. In the original set-up shown in the illustrations, a fine wire ran down from the weight over pulleys and through holes drilled in both rails to the anchorage point on a tie at the opposite side of the track. The idea was that when a car derailed the wheels would strike and break the wire, releasing the weight to close the switch and light the red lamps down the entry. In practice, however, it was found that the wire occasionally would not break and it was planned to insert glass tubes in it to make sure that breakage and activation of the switch would take place.

Showing the wire used in the original installations, which was broken by the car wheels to activate the switch lighting the signal lamps. To make more certain that the installation functions every time, glass tubes are to be used at strategic points.



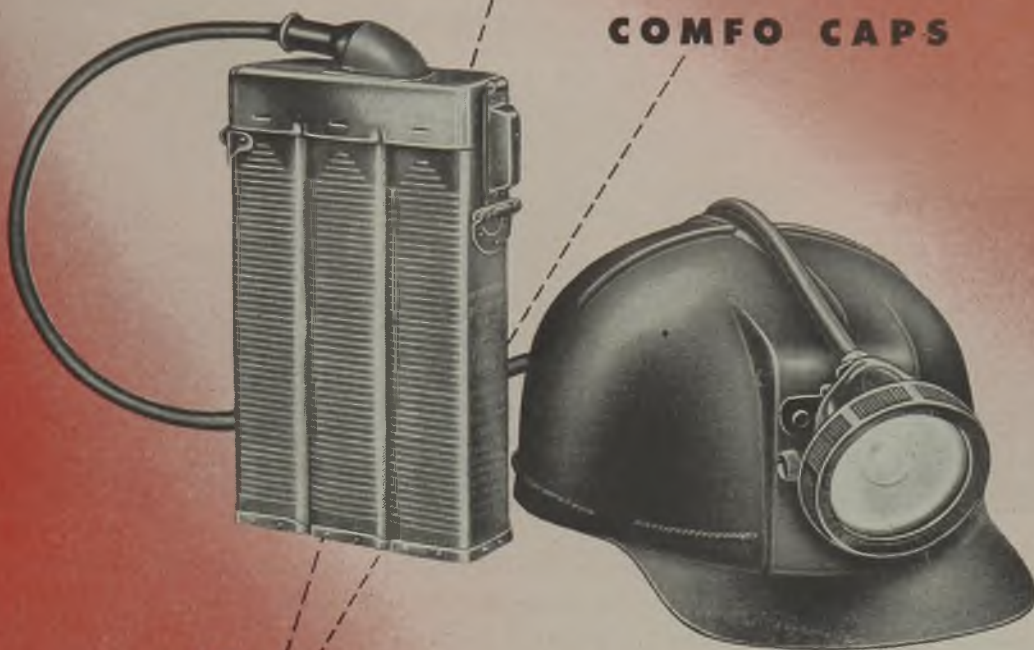
Broken wire or glass drops the weight, closing the switch to light the red lamps.

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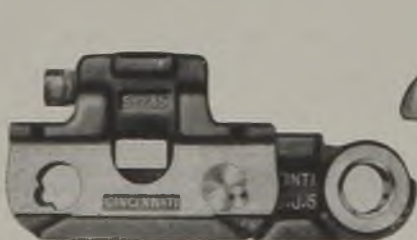
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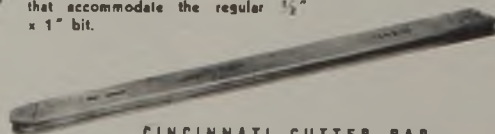


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News Round-Up



Wage Negotiations Broken Off; U.M.W. Bans Regional Contracts

Calling for a "basic national wage agreement for the bituminous industry," members of the United Mine Workers of America in convention at Atlantic City on Oct. 4 refused to bargain with separate groups of operators and thus dashed hopes of an early settlement and return of the mines to private operation. The convention voted for "basic improvements" and directed its policy committee to prepare proposals for "improvement in the health and welfare fund; increase of wages and adjustment of hours . . . ; the proper adjustment of the matter affecting supervisory, technical and clerical employees; adjustment of vacations, holiday and severance compensation," as well as other matters of more general import. John O'Leary, vice president, U. M. W., presided over the convention in the absence of John L. Lewis, who was convalescing in a Washington hospital after an emergency operation for appendicitis.

Divergent views on three major issues between Southern and Northern operators on Sept. 13 resulted in adjournment of the Joint Wage Conference in Washington, D. C., until after the U.M.W. convention scheduled for Oct. 1 at Atlantic City. At that time John L. Lewis stated he would obtain from his miners an expression of policy on the question of dealing with separate operator groups.

The Joint Wage Conference, originally called by Adm. Ben Moreell, Federal coal mines administrator, for Sept. 10, met on Sept. 11 after a one-day postponement. At the opening session Admiral Moreell offered his suggestions for consideration by both parties, expressing the hope that collective bargaining on these points would provide a contract that would free the coal mines of government control and return them to their owners. His suggestions were as follows:

1. The new agreement to run to April, 1948, with the proviso that only the question of wages and hours could be taken up by either party on 30 days' notice.

2. Revisions of the Federal Mine Safety Code, now promulgated under the miners' agreement with the Government, to be recommended from time to time by the Director of the Bureau of Mines, such revisions to be submitted to the Operators' Negotiating Committee and to the U.M.W. for concurrence. If concurrence was obtained, the provisions would be promulgated. If concurrence was not obtained, the matter would be referred to the Secretary of the Interior, who would act

as umpire. Enforcement of the code would be a matter of contract obligation, disputes as to its application being decided by the Secretary of the Interior. The Secretary of the Interior also would act as umpire to determine in any specific case whether the mine safety committee was misusing its authority.

3. Operators would provide all employees with the protection and coverage of workmen's compensation and occupational-disease legislation in their respective States.

4. Trustees of the welfare and retirement fund would be appointed as follows: one by the president of the U.M.W., one by the operators and the third chosen by the other two.

5. Provision could well be made for a gradual changeover of the \$1.85 daily increase for tonnage workers to a tonnage rate to compensate for individual efficiency and merit.

6. Adequate provision should be made for the 1947 vacation payment. The question of pro rata vacation payments to miners who shifted from one company to another during the coal year should be resolved.

7. Some procedure should be set up for referring inequitable grievance procedures to an umpire. Provision should be made for adequate grievance procedures in those

district agreements that do not now include such provision.

8. Relative to "wildcat" stoppages, the obligation for maintaining discipline is that of the U.M.W. Therefore, it would appear that the authority of the president of the U.M.W. should be substituted for that of the coal mines administrator with respect to the imposition of fines that is, the imposition of the fine would be the function of the mine operator but his action would be subject to the authorization of the president of the U.M.W.

9. The status of supervisors was stated to be probably the most controversial issue before the meeting. The following solution was proposed for consideration:

- A. Define "managerial function."

- B. Include in bargaining units: (1) all clerical and technical employees except confidential secretaries and top-level engineering specialists and (2) all operating supervisory employees other than those exercising "managerial function," as defined.

- C. The foregoing would be eligible to vote, or in other acceptable manner to indicate, whether they desire to be represented by District 50.

- D. If District 50 is thus selected by a majority, a contract would be negotiated.

- E. The contract would provide that District 50 would operate entirely independently of and have no relationship to the district or local organizations of the rank-and-file union, the tie-in between District 50 and the rank-and-file



Joint Wage Conference Leaders—Charles O'Neill (left), representing bituminous operators, and John L. Lewis (right), U. M. W., with Admiral Ben Moreell, Federal coal mines administrator, at the Washington meeting Sept. 11.

union being solely through the person of the president of the U.M.W., who would be president of both organizations.

F. To prevent the growth of top-heavy supervisory organizations, exemptions of operating supervisory employees from the union would be limited either by a percentage of the rank-and-file production workers or, in the case of strip mines, by stipulated limitations of the number of men, depending upon the daily production. It is suggested that for hand-loading mines the total number of exempt supervisory personnel should not exceed 3 percent of the rank-and-file production workers. For strip mines, the limitations would be as follows: (1) in mines producing 5,000 tons, 16 men; (2) in mines producing 2,500 to 5,000 tons, 12 men; (3) in mines producing 1,000 to 2,500 tons, 10 men; and (4) in mines producing less than 1,000 tons, 8 men. For mechanized deep mines, exemptions would be limited to 5 percent of the rank-and-file production workers.

In mines with unusual working conditions, provision should be made for an appeal for increase of the limitation of exempt supervisors to an arbitrator, who also would determine whether an employee is performing "managerial function," as defined.

10. The definition of "managerial function" proposed was as follows: "Managerial function" is exercised when the individual concerned is clothed with and exercises the authority to make responsible decisions affecting the hiring, discharge, discipline, promotion and demotion of employees, changes in the status of employees, representation of management in the settlement of disputes or expenditures of company funds in significant amounts.

Lewis States Position

At the conclusion of the meeting on Sept. 11, Lewis made the following statement to the press:

"The position of the U.M.W., as enunciated at the conference over which Admiral Moreell presided, was that they had a contract with the government which was producing coal in ample quantities for the national need; that the U.M.W. preferred to have a collective bargaining agreement with the operators; that they were not in favor of government operation of the mines; that they were not consulted when the mines were seized by the government; that it would be agreeable to the U.M.W. if the mines were returned to private ownership at any time or at any moment—tomorrow if the government wished; that since March 12, 1946, the mine workers have been waiting for a firm offer from the operators for a national agreement; that during all the period since that date no such offer has been made; that since the government seizure the operators had made no tender of a contract to supersede the existing government agreement; that the U.M.W. had no demands to make or proposals to present or suggestions to be considered; that whenever the operators crystalized their opinion and their judgment where they might make a tender of a national bargaining agreement, the mine workers would give it every consideration, depending on its nature; that until

Coal Activity

Bituminous Coal Stocks

	Thousands Net Tons	P.c. change From July 1 1946	P.c. change From Aug. 1 1945
Electric power utilities..	12,594	+10.2	-11.8
Byproduct coke ovens..	3,871	+6.6	-18.9
Steel and rolling mills..	642	+2.9	-2.1
Railroads (Class I)....	7,641	+4.7	-25.2
Other industrials*.....	15,702	+28.3	+3.9
Retail dealers.....	3,161	+23.3	-35.2
Total.....	43,611	+15.4	-12.6

Bituminous Coal Consumption

	Thousands Net Tons	P.c. change From June 1946	P.c. change From July 1945
Electric power utilities..	5,710	+13.7	-5.8
Byproduct coke ovens..	7,552	+19.7	-1.8
Steel and rolling mills..	671	+15.3	-10.1
Railroads (Class I)....	8,719	+5.6	-13.3
Other industrials*.....	10,079	+7.5	+0.9
Retail dealer deliveries..	6,491	+45.4	-9.6
Total.....	39,222	+15.3	-6.0

* Includes beehive coke ovens, manufactured-gas plants and cement mills.

Bituminous Production

August, 1946, net tons.....	54,830,000
P.c. change from July, 1946.....	+7.9
January-August, 1946, net tons.....	340,820,000
P.c. change from Jan.-Aug., 1945.....	-13.0

Anthracite Production

August, 1946, net tons.....	5,444,000
P.c. change from July, 1946.....	+3.4
January-August, 1946, net tons.....	40,158,000
P.c. change from Jan.-Aug., 1945.....	+10.2

Sales, Domestic Stokers Vs. Oil Burners

	Stokers	Oil Burners
July, 1946.....	15,726	33,896
P.c. change from month earlier.....	+95.5	+313.8
January-July, 1946, net tons.....	100,344	192,048
P.c. change from Jan.-July, 1945.....	+131.4	+309.0

Index of Business Activity *

Week ended Sept. 28.....	182.5
Month earlier.....	183.3
Year earlier.....	166.7

* Business Week, Oct. 5.

Electric Power Output †

Week ended Sept. 28, kw-hr.....	4,517,874,000
P.c. change from month earlier.....	+2.6
P.c. change from year earlier.....	+1.9

† Edison Electric Institute.

the operators found themselves in a position where they could make such an affirmative position, there was nothing the miner representatives could do and no contribution they could make toward the negotiation of an agreement."

Answering a question regarding additional demands later, Lewis stated, "This only represents our position at this time, that we are not making any demands as a quid pro quo of negotiations or any suggestions. . . . If the government doesn't want to return the mines until a new agreement is signed, then the responsibility devolves upon the operators to see under what conditions they would employ the mine workers if they are to abandon the government contract and go to work for the coal operators. It is very simple; nothing involved; nothing obtuse; plain open-and-shut. What have you to offer, gentlemen, in lieu of what we have?"

The split between Southern and Northern operators developed when the Southern group announced: (1) their position to the inclusion of a safety code

in a wage agreement; (2) their belief that the imposition of a royalty tax or levy on production for the support of a welfare and retirement fund is unsound in principle and would be dangerous in practice because of its encroachment upon the proper functions of State and Federal governments to levy taxes for general programs of social security; and (3), their rejection of a percentage limitation upon the exemption of supervisory employees from unionization. Northern operators appeared willing to accept Admiral Moreell's proposals as a basis for negotiation, though they pointed out the need for clarification and definition of several of his suggestions.

Admiral Moreell reported on Sept. 7 that more than \$2,500,000 has been paid into the welfare and retirement fund, created under the existing Krug-Lewis agreement. The first payment was due Aug. 15 covering the period from June 1 to July 15. The second payment was scheduled for Sept. 15 for the period from July 15 to Aug. 31. Subsequent payments will be made on the 15th of each month covering production for the preceding month. No expenditures are to be made from the fund until trustees have been appointed. Rear-Admiral W. J. Carter, Navy paymaster-general, is temporary custodian.

The resignation of Admiral Moreell as Federal coal mines administrator, effective Sept. 30, and appointment of Capt. H. N. Collison, formerly Deputy CMA, to succeed him was announced Sept. 20. Admiral Moreell was due to be retired from active duty with the Navy on Sept. 30. In his letter of resignation to Secretary Krug the admiral said, "The Coal Mines Administration is effectively organized to continue the functions which it has been performing since the seizure on May 22, 1946. It is my hope that our current efforts to return the coal mines to private operation will be successful in the near future."

Frick Coke Co. Opens World's Largest Mine

Opening of the new Robena mine, near Carmichaels, Pa., 80 river miles south of Pittsburgh, world's largest, was announced Sept. 13 by the H. C. Frick Coke Co., a subsidiary of the United States Steel Co. Eventual production is scheduled at 20,000 tons daily.

Operating with its own water-front tippie on the Monongahela River, the mine is completely mechanized. Many of the main haulageways are built of steel-beam overhead construction. Track-mounted drilling, cutting and loading machines are employed, and the coal is to be hauled from the face in steel mine cars to two ten-car rotary dumps at the base of a 300-ft. slope leading to the outside. A 5-ft. conveyor belt takes the coal from the rotary dumps to the surface and into the tippie housing shaking screens, picking tables and crushers. After the coal is sized to minus 3-in., it is conveyed by another belt system to blending bins with capacity of 18,000 tons. With all seven loading chutes of the tippie working, a 900-ton-capacity barge can be loaded in about six minutes. The mine has a water-treating plant with a capacity of 1,000,000 gal. a

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day for mining, coal-washing and other water needs.

A new coal-cleaning plant is still under construction close to the Robena dock. Coal produced in Robena travels by barge to the Clairton byproduct coke ovens of the Carnegie-Illinois Steel Corp., where coke is produced for various U. S. Steel subsidiaries.

Formation of a new anthracite mining company, the Mammoth Coal Co., to operate the newly acquired Raven Run breaker at Raven Run, Pa., was announced last month by A. J. Schrader, Minersville, Pa. The new company has leased or purchased coal lands near the breaker and production of 3,000 to 4,000 tons daily is expected in a short time. Shipments will originate on both the Lehigh Valley and Reading railroads.

A new mine in Pike County, Kentucky, operated by the D.J.B. Collieries, Inc., Grundy, Va., has been reported to have begun production. Completely mechanized, the operation is said to have under lease sufficient reserves to maintain a daily production of 1,500 tons for the next 50 years. Zach Justice is president of the company; Dr. A. S. Richardson, vice president; and Eugene Bane, secretary-treasurer and general manager. The mine is located on the Norfolk & Western Ry.

The Pittsburg & Midway Coal Mining Co. is reported to be opening a new stripping operation including a washery near Madisonville, Ky., on the Illinois Central R.R. Production is slated to start about Feb. 1, with a capacity of 1,500 tons daily. James A. Minor is resident manager.

The Marigold Coal Mining Co., an affiliate of the Sinclair Coal Co., Kansas City, Mo., is understood to be closing its strip operations in Alabama, and planning to move into Kentucky next summer to carry on extensive stripping of the Beaver Dam properties for the Black Star Coal Corp.

The Commercial Fuel Co., Pittsburg, Kan., has closed its operation in Kansas and has moved its equipment to Ohio, preparatory to starting a new mine there.

Deep mining at the Hecla mine of the West Kentucky Coal Co., Earlington, Ky., has been discontinued, and a strip operation, 5,000 tons per day, is being opened on the property. A McNally-Pittsburg washer with a capacity of 400 tons per hour is to be installed, and the stripping is to be done under contract by the Badgett Mine Stripping Co.

The Forsyth-Williamson Coal Co. is reported to have opened Oct. 1 a new strip mine near Seely, Ill., on the Illinois Central R.R. Capacity of 1,500 tons per day is planned and the No. 5 seam is to be mined. James G. Forsyth is president of the firm, and Walter R. Forsyth, vice president.

The Line Fork Cannel Coal Co., Whitesburg, Ky., has been formed by Dr. B. F. Wright of Seco, C. C. Caudill and L. Wilson Field of Whitesburg. The new firm is reported to have a new truck operation well under way and is expected to start shipments soon. A seam of cannel coal 6 to 11 ft. thick on the Dry Fork of the Line Fork, near Roxana, Ky., on the Louisville & Nashville R.R., is being mined, and production of 1,000 tons daily is expected within several months.

MEETINGS

- **Canadian Institute of Mining and Metallurgy: annual western meeting Nov. 13-15, Vancouver, B. C., Can.**
- **West Virginia Coal Mining Institute: annual meeting Nov. 15, Bluefield, W. Va.**
- **Illinois Mining Institute: 54th annual meeting, Nov. 15, Abraham Lincoln Hotel, Springfield, Ill.**
- **Harlan County Coal Operators' Association: annual meeting Nov. 20, Harlan, Ky.**

Approval of the sale of Pittsburgh Consolidation Coal Co.'s railroad properties, including the Youngstown & Southern R.R. and the Montour R.R., for a reported \$10,575,000 was asked of the ICC last month. Under the agreement, 50 percent of the lines will be held by the Pennsylvania R.R., and 25 percent each by the New York Central and Pittsburgh & Lake Erie R.R.s. According to the coal company, the sale is another step enabling the company to concentrate on the mining and selling of coal.

Construction of a B. & O. spur line to open up the Ohio Power's newly acquired coal lands near Cumberland has been started, according to reports. The stripping operation is already under way and until the line is completed, the coal is being trucked to the tipple of the old Congress Coal Co. at Cumberland, acquired by the Ohio Power Co. The property totals 10,000 acres and a 25-year operation is anticipated.

Doubts Spreading Of Ohio Mine Fire

Fears that the southeastern coal fields of Ohio were threatened by a fire in the abandoned Sand Run mine near Logan, Ohio, were dispelled last month by Stephen Williams, chief of the Ohio Division of Mines, following a personal inspection and conferences with State mine inspectors. Mr. Williams said that accounts of the fire had been grossly exaggerated and that it was "not a foreseeable threat" to properties in adjoining Athens and Perry Counties. "The fire is consuming only pillars which were left as supports in mine corridors, and it can burn for many years in the abandoned workings without doing any great damage," he said.

Kentucky Strikes End After Six Weeks

Six weeks of labor trouble in the Letcher County, Ky., coal mines was reported ended last month with the return to work of some 5,500 miners on Sept. 11. The strike was caused by the continued employment by the Elk Horn Coal Corp. of Jim Short as an armed guard after he was accused of mistreating a miner. Workers in other mines in the county joined the strike in sympathy. It was announced Sept. 10

that Short had resigned his post with the mining company.

It was later reported that eight men active in the strike had been arrested on charges of sedition, in connection with their threats to overthrow the Letcher County government. They were held in bail pending appearance before the grand jury meeting early in October.

A further disruption of production in this area was threatened in the announcement Sept. 26 by Tom Rainey, U.M.W.A. District 30, that unless 89 truck mines in Letcher, Pike and Floyd counties employing 3,200 miners turned over union dues and other monies collected and due the Union, strike notices would be filed, and that the miners would strike and remain on strike until the funds were paid.

Hanna Aids Sea Scouts With Training Ship

The SSS *Hanna*, a land ship built to train Sea Scouts and equipped with surplus Navy materials, was christened at Piedmont Lake, Ohio, on Sept. 22, as part of the Hanna Coal Co.'s program to train young boys for better citizenship. The ship, one of the largest of its kind in the world, is 156 ft. long and 35 ft. wide. Five daughters of Hanna coal miners performed the christening and Rear Admiral Telfair Knight, director, U. S. Maritime Commission, was the principal speaker at the ceremonies. The Sea Scouts are affiliated with the Boy Scouts of America.

Resources Group Name Four Coal Executives

The U.S. Chamber of Commerce recently made public the membership of its 1946-47 National Resources Department committee. Included in the list are four coal executives: James D. Francis, president, Island Creek Coal Co., Huntington, W. Va.; Col. Robert P. Koenig, president, Ayrshire Collieries Corp., Indianapolis, Ind.; Hooper Love, president, West Kentucky Coal Co., Earlington, Ky.; and James Prendergast, vice president, M. A. Hanna Co., Cleveland, Ohio. Ralph L. Carr, former governor of Colorado, was renamed chairman of the 26-man committee.

BCR Adds New Western Tonnage to Its Roster

Enrollment of 2,000,000 additional tons from west of the Mississippi River into the Bituminous Coal Research program was announced Sept. 17 by B. R. Kaiser, assistant to the president, BCR, at the conclusion of the first month of a seven-week tour covering Colorado, Utah, New Mexico, Oklahoma, Missouri and most of the coal-producing area west of the Mississippi with the exception of Washington. The western membership now includes the following companies: the Colorado & Utah Coal Co., Hayden Coal Co., Independent Coal & Coke Co., Lion Coal Corp., Nugget Coal Co., St. Louis, Rocky Mountain

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& Pacific Co., Sheridan-Wyoming Coal Co., Inc., Southwest Coal Co., representing Kansas, Missouri and Oklahoma producers; United States Fuel Co. and the Utah Fuel Co.

Endorsement of BCR's development work was reported all along the line by Mr. Kaiser. Western producers, he said, look on smokeless stoves, fully automatic stokers and improved industrial coal-burning equipment as "the salvation of the industry" and "our only hope of regaining and holding markets. Their production and marketing problems are surprisingly similar to those in the Middle West and the East."

Anthracite Mines Aid In Stream Clean-Up

Reports from the Pennsylvania State Sanitary Water Board indicate that coal operators are cooperating with the State in its program to clean up streams. Of the 329 anthracite companies to which notices were sent, 169 applied for permits to construct silt-diversion systems, the board said.

Health Secretary Harry W. Weest has reported that silt diversion systems have been constructed at about 50 percent of the anthracite mines. Some of these systems are so designed to reclaim small sizes of coal for sale in the open market.

Pipeline Additions Requested of FPC

Four applications to increase natural-gas pipeline facilities were received in September by the Federal Power Commission and one certification permitting expansion of capacity was issued. The Ohio Fuel Gas Co., Columbus, Ohio, requested authority to install enlarged facilities and make changes in its existing system to receive additional natural gas from the United Fuel Gas Co. The United Fuel Gas Co. has agreed to supply the Ohio company with an additional 20 to 25 million cubic feet daily during 1946 and 1947. The Ohio Fuel Gas Co. also plans to connect with its system about 6 to 8 million cubic feet from the Wellington field in Ohio.

Applications also were filed by the Chicago District Pipeline Co., the Natural Gas Pipeline Co. of America and Texoma Natural Gas Co., and the Northern Natural Gas Co. for authority to increase extensively their present pipeline facilities. If these applications are granted, they will permit the additional daily delivery of 95,000,000 cu. ft. by the Chicago District Pipeline Co., 135,000,000 cu. ft. by the Natural Gas Pipeline Co. and the Texoma Natural Gas Co. and 82,000,000 cu. ft. by the Northern Natural Gas Co. The aggregate is equivalent to 4,672,730 tons of bituminous coal annually.

The FPC announced Sept. 13 certification of the Northern Natural Gas Co. to construct and operate six new natural-gas pipeline compressors that will enable the company to increase its total pipeline capacity from 300 to 325 million cubic feet daily and the capacity into the Minneapolis St. Paul area from 82 to 89.5 million cubic feet per day.

National Coal Association Flashes Go-Ahead For Coal-Heat Service

Terms of the agreement to be entered into between the National Coal Association and local Coal-Heating Service groups to provide 24-hour service and minimum standards of delivery performance were announced by John D. Battle, executive secretary, N.C.A., in Washington, Sept. 14. The announcement signaled the start of a nation-wide program to increase public acceptance of bituminous coal as the best home fuel and marked a significant milestone in the 10-month activity of N.C.A.'s Marketing Committee.

Two facts were given special emphasis in Mr. Battle's announcement: "First, any increase in the use of oil and gas has not been due to any lack of virtue in coal as a product; on the contrary, it has been due to more progressive methods and services early adopted by oil and gas and too often neglected by coal. Second, the bituminous coal industry is now awake to its situation and through Coal Heating Service is undertaking the job of capitalizing fully upon modern methods and services in combination with the inherent advantages of coal."

Procedure for organizing local Coal-Heating-Service groups was outlined in Mr. Battle's announcement as follows:

1. By appropriate means, using the counsel and assistance of N.C.A. representatives where desired, form a non-profit group of coal merchants willing to adopt the Coal Heating Service plan and support it financially.
2. Agree to undertake the adoption as soon as possible of suggested standards of service, particularly the complete, clean delivery of coal, and to publicize all improvements widely.
3. Agree to handle 24-hour trouble-shooting service.
4. Decide the per-ton assessment and arrange for its collection.
5. Compile figures on the total retail tonnage of the group and the total retail tonnage of the community.
6. When the group has developed to a point where it includes a substantial number of retail coal merchants handling a substantial volume of the retail tonnage in the municipality, it is then qualified to file an application for formation of a Coal Heating-Service group, as provided for by the application form.
7. Mail the application to Coal-Heating-

Service Division, National Coal Association.

When it is found that the local group has complied with the preliminary requirements, a formal agreement will be signed between the N.C.A. and the community organization. Terms of the agreement are briefed as follows:

1. The Financial Arrangement—The local group will levy a tonnage assessment upon subscribing members in the trading area for the discharge of obligations under the agreement.

2. Financial Help from the N.C.A.—The N.C.A. will match, up to 2c. a ton, funds raised by local assessments. Payment will be made quarterly to the local organization, after approval of the statement of receipts and expenditures for the preceding quarter.

3. Expenditure of Funds—Funds raised locally will be combined with quarterly payments from the N.C.A. to carry out the terms of the agreement, including the advertising of Coal-Heating Service. Inordinate accumulation of funds is forbidden.

4. Accountability for Funds—Retailer organizations shall submit quarterly reports to the N.C.A. on all receipts and expenditures to the extent that such funds are matched by payments from the N.C.A. Free access shall be given the N.C.A. to local books, records, documents, memoranda and papers pertaining to the contract.

5. Advertising Programs—Advertising materials of national scope will be furnished at cost by the N.C.A. Payments for such materials will be made from the Coal-Heating Service fund. The local group will plan and initiate advertising to boost retail sales in the trading area, but no advertising materials involving Coal-Heating-Service must be released or paid for without the approval of the N.C.A.

6. The Coal-Heating-Service Emblem—Local groups shall require their members to use the emblem of Coal-Heating Service as long as they are members in good standing as regards performance and payment of obligations.

7. Trouble-Shooting Service—Community Coal-Heating-Service groups shall provide and maintain a 24-hour emergency service, Sundays and holidays included. Competent personnel shall be available at one or more telephone numbers to suggest solution of common or usual problems in the burning of bituminous coal. Such telephone calls shall be handled free of charge. Competent personnel shall be available at all times to make repairs or adjustments for consumers who report unusual or emergency problems. The local Coal-Heating-Service group shall establish a schedule of fees for such calls. The availability of such services shall be advertised in local publications and upon cards posted on or near customers' bins.

8. Clean Deliveries—Member retailers of Coal-Heating-Service organizations shall take all reasonable steps to insure clean and efficient delivery of coal to customers' bins. Standards prescribed for clean deliveries include the use of boards or retaining facili-

EQUIPMENT APPROVALS

Two approvals of permissible equipment were issued by the U. S. Bureau of Mines in August as follows:

Jov Mfg. Co.—Type 11BU-11APE/F loading machine; two motors, 50- and 4-hp.; 250 or 500 volts, d.c.; Approvals 560 and 560A respectively; Aug. 1.

Jov Mfg. Co.—Type PL12-1PE elevating feeder conveyor; 4-hp. motor; 250 volts, d.c.; Approval 561; Aug. 1.

TOURNAPULLS strip top half of 40' overburden **ON ALABAMA COAL MINE**



Controlled cutting and spreading
leave level pit and dump areas.



MARIGOLD COAL MINING CO. keeps its present stripping shovel in profitable operation by taking off the first 20' overburden with 2 Tournapulls

40' of overburden, too deep to be overcast with its stripping shovel, presented a problem for the Marigold Coal Mining Company at Jasper, Alabama. 2 Tournapulls proved to be the answer by benching off the top 20' of clay, leaving the remainder within economical range of the shovel.

Rigs Make Fast Cycles on Short Hauls

On 400' one-way haul, stripping and wasting clay a short distance from the pit, each Tournapull makes 15 trips per hour. Stripping is a continuous operation . . . after the Tournapulls take off the top half, the shovel completes the stripping . . . leaving the Tournapulls free to start opening the next section.

On short 400' haul, big-tired Tournapulls take direct route to dump, have no regular roads.



Build Roads at no Extra Cost

As mine access roads are needed, Marigold's Tournapulls use overburden to build roads, without interrupting stripping production. Use of Tournapulls on this work has proved more economical than former truck methods, because the rigs spread their loads in controlled layers . . . eliminate need for follow-up dozer work. When enough roads are built to meet current mine requirements, the Tournapulls switch back to dump on waste area.

Wherever you have earthmoving that involves rehandling or hauling, these one-man-operated Tournapulls can help cut your costs . . . let your LeTourneau Distributor show you *how*.

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ties in the bin doorway, window protectors in delivery windows, canvas in areas adjacent to the unloading, sprays to allay accumulated dust and, when necessary, planking or belting to protect lawns, shrubbery and other improvements. All evidences of delivery must be removed before truck and driver leave the premises. Delivery equipment must be maintained in excellent condition of repair and appearance. Bright-painted trucks displaying the Coal-Heating-Service emblem are suggested, together with rubber-tired wheelbarrows, portable truck conveyors, brooms and clean metallic pads for the customer's use in signing delivery tickets. Drivers should present a neat appearance and should be courteous on the streets and highways and in the customers' residences. Adequate lavatory and clothes-storage facilities on the retailer's premises and frequent conferences between drivers and management are suggested as effective means to attain these objectives.

9. Personnel Training—In conjunction with the N.C.A., local organizations shall conduct courses for education and training of office and delivery personnel. The N.C.A. will render advice, counsel and assistance in the conduct of these courses. Subjects for training will be delivery methods and customer contacts for drivers, yard foremen and dispatchers, telephone salesmanship and complaint handling, combustion, heating systems using coal and other fuels, controls, stokers and furnaces. The training program includes also cooperation with firms who sell, install and repair heating equipment.

National Coal Heating Service is equipped to work also with retailers in communities where the tonnage does not justify a local group. The educational material will be available, as well as the advertising, within the limits the tonnage dictates, to tell the story of coal-heat advantages and the advantages of new equipment to the customers of those retailers who are sincerely interested in improving their service.

Anthracite, Bituminous, Coke Industries Meet

Representatives of the anthracite, bituminous and coke industries met with Anthracite Institute engineers Sept. 14 at the Institute's new headquarters in Wilkes-Barre, Pa. to discuss mutual problems, with special emphasis on fuel and ash handling. The invitation to the meeting was extended by Anthracite Institute, and the gathering was the first in fuel history to involve the three industries in a cooperative research plan. A second meeting is scheduled for an early date this fall. Attending the joint sessions were the following: Dr. Harold J. Rose, vice president & director of research, Bituminous Coal Research, Inc., Pittsburgh; B. A. Landry, supervisor, fuels division, Battelle Memorial Institute, Columbus, Ohio; Carroll F. Hardy, chief engineer, Appalachian Coals, Inc., Cincinnati; Samuel Weiss, executive secretary, American By-Product Coke Institute, Washington, D. C.; John Mitchell, director of research, Eastern Gas & Fuel

Association, Boston; C. E. Shaffer, research division, Koppers Co., Inc., Kearney, N. J.; W. B. Ross, vice president, Philadelphia Coke Co., Philadelphia; K. R. Hare, sales manager, Seaboard division, Koppers Co., Inc., Kearney, N. J. The Anthracite Institute was represented by F. W. Earnest, Jr., M. R. Grover, Dr. R. C. Johnson, P. A. Mulcey and E. H. Walker.

Taking the Anthracite Institute's removal from Primos, near Philadelphia, to Wilkes-Barre as an occasion for reviewing the institute's work since it was established 16 years ago, Dr. R. C. Johnson, vice president in charge of research, reported that it has made more than 900 different investigations on all phases of basic and applied research in anthracite and burning equipment. These include 163 stoker investigations, 129 studies of controls, 61 projects on furnaces, 38 on space heaters and many others ranging from kitchen ranges to fireplaces. Dr. Johnson directed attention especially to the Institute Seal of Approval, placed on equipment offered

to the consumer, as an effective merchandising aid, assuring sound construction and efficient operation.

Koppers to Sell Mining Community

The entire community of Baxter, W. Va., was offered for sale last month by the Koppers Coal Division. In asking for offers, the company stipulated that present occupants of the houses be given first opportunity to buy them in case of resale by the new owners. Most of the residents are employees at Federal No. 1 mine, Grant Town, W. Va.

The property consists of 71 acres, with 77 houses, 86 building lots and a water-supply system. The proposed sale was said to be in line with the company's policy of disposing of houses and other property not directly connected with mining.

Atomic Energy as Coal Competition Outlined in Committee Report

The possibilities in the application of atomic energy to industrial power needs, and the opinion that it will probably "find favorable industrial application if obstacles are not placed in the path of its development," were outlined in a report on a study of the costs of nuclear power made by a group of scientists under the direction of Dr. Charles A. Thomas, vice president and technical director of the Monsanto Chemical Co., which operates the Clinton laboratories at Oak Ridge, Tenn. The report, released Sept. 7, was submitted to the United Nations Atomic Energy Commission by Bernard M. Baruch, United States representative.

Highlight of the report was a comparison of the cost of building and operating a 75,000 kw. stationary nuclear-energy power plant with that of a plant using coal. Based on present tentative and incomplete information, the report said, an atomic energy plant could produce electricity at 0.8c. per kilowatt hour; while a coal plant, with coal at its present price of \$7 a ton, would provide power at 0.65c per kilowatt hour. It was pointed out that 35 percent of the cost of operating a plant powered by coal is the coal itself, and the report estimated that equality of operating costs between coal power plants and nuclear power plants would be reached when coal costs \$10 a ton. Should the cost of coal continue to rise, as it has in recent years, the report said, "development of nuclear power may be attractive to those industries which are capable of undertaking its development." Atomic-energy plants also may have a place in developing isolated parts of the world where cost of oil, gas or coal is prohibitive.

The text of the salient part of the report is as follows:

"A number of types of nuclear power plants have been considered. For the present cost comparisons it was decided to consider a modified Hanford-type pile,

since more design and operating information is available for this type than for any other kind.

"The commercial pile which is being considered here would differ from the Hanford pile in two important aspects:

(a) The operating temperature would be high enough to supply power.

(b) All the plutonium formed would be recovered for later consumption in the pile. No attempt would be made to produce plutonium for use elsewhere.

"A number of changes in design and operating technique would be necessary. An extensive research and development program would be required to solve the problems which will arise. These problems appear difficult, but not insurmountable. The complete nuclear power plant would include not only the pile itself but all of the auxiliary equipment and installations needed to operate a continuous thermal power plant.

"While no such plant has ever been built or even designed, it is felt probable that a large stationary nuclear power plant could be built. Based on prices now current, a plant designed along the lines indicated and producing 75,000 kilowatts could be built in a normal locality in the eastern United States for approximately \$25,000,000. On the assumption that the plant would operate at 100 percent of capacity and that interest charges on the investment would be 3 percent, the operating cost of the plant would be approximately 0.8 cents per kilowatt hour.

"This is to be compared with a coal power plant which would cost \$10,000,000 under the same conditions. The operating cost depends on the price of coal. The price of bituminous coal at 13,500 BTU is about \$3.50 per ton at the mine and about \$7 per ton delivered to the furnace of a power plant in the eastern United States. The operating cost of such a power

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3—The "Automat" will give you maximum production in either of the above services.

4—The "Automat" has a Parallel Lift rear conveyor for maximum loading height in limited head room.

5—The "Automat" gives you safe service, because of its vertical shoveling action—no danger of injuring men or knocking out timbers.

6—The "Automat" gives you maximum production at minimum power consumption—with its one 25 H.P. Motor using only 1/5 KWH per ton of material loaded.

Consider the SERVICE-ABILITY of this practical machine before you choose a loader. Myers-Whaley Co., Knoxville 6, Tenn.



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plant would be approximately 0.65 cents per kilowatt hour, again on the assumption that the plant would operate at 100 percent of capacity and that the interest charges on the investment would be 3 percent. Equality of operating costs between coal power plants and nuclear power plants would be reached if the coal cost \$10 per ton. It must be realized that lower costs of nuclear power plants can best be achieved by continued research and development.

Comments

"(1) It should be emphasized that these costs imply the successful solution of a number of difficult technological problems.

"(2) In the case of nuclear power, the operating cost is greatly affected by the large investment, which is reflected in the interest, depreciation and maintenance charges. The labor and supervision charges for the nuclear plant are expected to be greater than for the coal plant, until such time as the production of electrical power from nuclear energy has been further developed. It seems reasonable to expect that the future development of nuclear power will result in the standardization of design and construction and a material reduction in the investment and operating cost.

"(3) The cost of power from coal is primarily determined by the price of coal, which constitutes about 35 percent of the total operating cost. The prices of coal and fuel oil have increased greatly since before the war and show signs of increasing further in the future. The coal plant figures are based on high quality coal as delivered to plants in the eastern part of the United States during the second half of 1946. It would appear that the cost of nuclear power may decrease and the cost of coal power may increase as time goes by and that the development of nuclear power may be attractive to those industries which are capable of undertaking the development.

"(4) Nuclear power plants would make feasible a greater decentralization of industry, a desirable factor in the world economy. Only a trivial amount of fuel need be brought in, and the need for a large cooling water supply might be obviated by the development of gas turbines.

"(5) Nuclear power plants in contradistinction to hydroelectric power plants have the advantage of being able to supply process and heating steam directly in addition to power. Because nuclear plants lend themselves to decentralization, more economical industrial combinations should develop.

"(6) Research has already shown possibilities for use of radioactive isotopes in analytical work and medical treatment. These isotopes would be valuable by-products from the production of power, although they would probably have little effect on the economics of power generation.

"(7) The nuclear power plant might aid in the industrial development of isolated parts of the world where the cost of oil, gas or coal is prohibitive and where a suitable supply of water is unavailable, because the nuclear power plant, if combined with the modern gas turbine, would make unnecessary a supply of any such fuels or cooling water.

"(8) The nuclear power plant, in connection with the modern gas turbine, might be desirable as operating or stand by plants to existing large utilities.

"(9) It is the belief of many of the scientists and engineers connected with this work that a comparatively small standardized nuclear power plant will be developed. If this reasonable prediction comes to pass, such power plants can be placed at strategic points on all established utility company systems. They would greatly reduce power transmission costs and insure partial operation of the system even if the standard super-power station of the system were inoperative. Such a development would of course complicate any inspection system.

"(10) These considerations will affect

the ultimate place of nuclear power in industry. The immediate progress will probably be in the direction where benefits can be achieved with present knowledge. More detailed estimates made by individual industries would be necessary to push this point further.

"(11) On the basis of this study and other similar studies which have been made recently, it seems probable that nuclear power will find favorable industrial application if obstacles are not placed in the path of its development.

"(12) It is not altogether a case of nuclear power versus coal, gas, oil or water power, because the nuclear power plant has advantages and fields of application not open to other types of power-producing plants."

Over 200 Organizations Represented At Southern Appalachian Exhibit

PRODUCTS and services offered by more than 200 organizations featured the eighth "annual" Southern Appalachian Industrial Exhibit, held at the N. & W. freight station, Bluefield, W. Va., Aug. 22-24. The list included the U. S. Bureau of Mines (safety equipment and practices), West Virginia University (State mineral resources), Mercer County Vocational Schools, Bituminous Coal Research, Inc., and Bituminous Coal Institute. It also includes modern Norfolk & Western streamlined passenger locomotive and car equipment, as well as a stoker display including the following:

Barlow & Wisler, Bluefield, W. Va.—Winkler stokers.

Bailey Lumber Co., Bluefield, W. Va.—Consolidated stokers.

Bluefield Supply Co., Bluefield, W. Va.—Combustioneer stokers.

Burgess Electric Co., Bluefield, W. Va.

—Iron Fireman stokers.

Jones-Cornett Electric Co., Welch, W. Va.—Master stokers.

C. L. Lowder & Son—Smithway stokers. Montgomery, Ward & Co.—Ward stokers.

O. P. Coal Burner, Cleveland, Ohio—O. P. stoker.

Superior-Sterling Co., Bluefield, W. Va.—Fairbanks-Morse stokers.

The proceedings also included a gadget show (see p. 112 of this issue) and the Pioneer Miners' Reunion, with Fred J. Bailey, Cardox Corp., as chairman. The reunion featured presentation of Joseph A. Holmes Safety Association awards to coal-mining companies and coal-mining men in the region by D. Harrington, chief, Health and Safety Branch, U. S. Bureau of Mines, Washington, D. C., and awards to old-time miners. Of the more than 225 men enrolled in the club, 179 were in at-



Accident-free old timers named at the Pioneer Miners' Reunion—left, Sam Carter, 65 years 4 months; L. H. Carter, 60 years 3 months; William Norris, 63 years; A. C. Nelson, 65 years.

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Rotary Mine Car Dumpers
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NO TWO LIONS are ever equally matched. Strong as each may be... in a fight only *one* wins—the one with the margin of *extra* toughness.

NOT ALL WIRE ROPES are "equally matched", either. While most wire ropes are strong, some are *extra tough*.

THE EXTRA TOUGHNESS of Rochester wire rope is the result of our careful attention to quality standards in the 4 M's of wire rope fabrication—men, materials, machinery and methods. **MEN** who make this rope are skilled craftsmen... **MATERIALS** they work with are the finest available... **MACHINERY** and **METHODS** are the most modern and efficient in the industry. Rochester wire ropes in all sizes, types, grades and constructions—preformed or standard—are available for prompt shipment. Inquiries invited.



LOCKED-IN LUBRICATION is forced by air pressure between individual wires. This process requires twice as much lubricant as is absorbed by other methods... protects against internal friction caused by rope passing over sheaves... assures longer life and better service from wire ropes made by Rochester.

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terrace and each received a service award. All miners with more than 40 years' service are eligible. Special awards were made as follows: E. H. James, Elkhorn, oldest white man present, and Samuel Carter, Buckeye Coal & Coke Co., Stephenson, W. Va., oldest colored man present.

Mr. Carter also received an award for having worked the greatest number of years (65 plus) in and around mines. Runners-up were: Andrew J. Nelson, Pocahontas Fuel Co., Boissevain, Va.; William Norris, Arlington Coal & Coke Co.; and Lee H. Carter. Mr. Nelson also led the list with the same company for the greatest number of years (65). Three other Pocahontas Fuel Co. employees were runners-up: John Music, Charles P. Davis and William D. Anthony. Samuel Carter also received another first award, making three in all—for working 65 years and 4 months without a lost-time injury. He was followed by Messrs. Nelson, Norris and Lee H. Carter.

Holmes safety certificates and diplomas were presented to the following: Luther Cook, B. H. Mills, J. B. Thompson, E. B. Jennings, and Edward Gallagher, United States Coal & Coke Co., Lynch, Ky.; Arthur Romley and Sam J. Henry, Howard colliery, Norfolk & Western Ry. Fuel Department; John Stapleton, Electro-Metallurgical Co., Alloy, W. Va.; Harry W. Payne, general superintendent, American Coal Co. of Allegany County, McComas, W. Va.; and Kopperston mine, Koppers Coal Division.

With Lewis C. Tierney, Eastern Coal Corp., as general chairman, and B. B. Housman as director, the exhibit included the following:

Allis-Chalmers Mfg. Co., Milwaukee, Wis.—Screens, solids-handling pump and other coal-mining products.

McLanahan & Stone Corp., Hollidaysburg, Pa.—"Bantam Buster" and other coal-crushing equipment.

Pennsylvania Crusher Co., Philadelphia, Pa.—Bradford breaker, single-roll and other crushers.

Ensign Electric & Mfg. Co., Huntington, W. Va.—Ensign rail bonds, cable splicers, Ensign-Clark d.c. motor starters, Clark controllers, Fairbanks-Morse pumps, Louis Allis motors, "Westco" high-pressure spray pumps and the new Ensign spring-loaded centrifugal control switch for installation anywhere along belt conveyors as well as elsewhere.

Clark Controller Co., Cleveland, Ohio—Controllers, pushbuttons and other control products for mining.

Long Super Mine Car Co., Inc., Fayetteville, W. Va.—Irwin mine cars, Union wire rope, Vulcan Iron Works products, Long Super Mine Car car stop—bolted to the rail for permanent and semi-permanent service, the new Long Super Mine Car JBL chain-conveyor tail piece—low height, dirt-proof and designed to permit safe delivery of supplies, and the new JBL quick-make pan joint.

H. D. Smith Sales Co., Bluefield, W. Va.—"Iceberg" frozen-food lockers and drawers for mining communities.

Kennametal, Inc., Latrobe, Pa.—Kennametal cutter and drill bits, Kennametal tools.

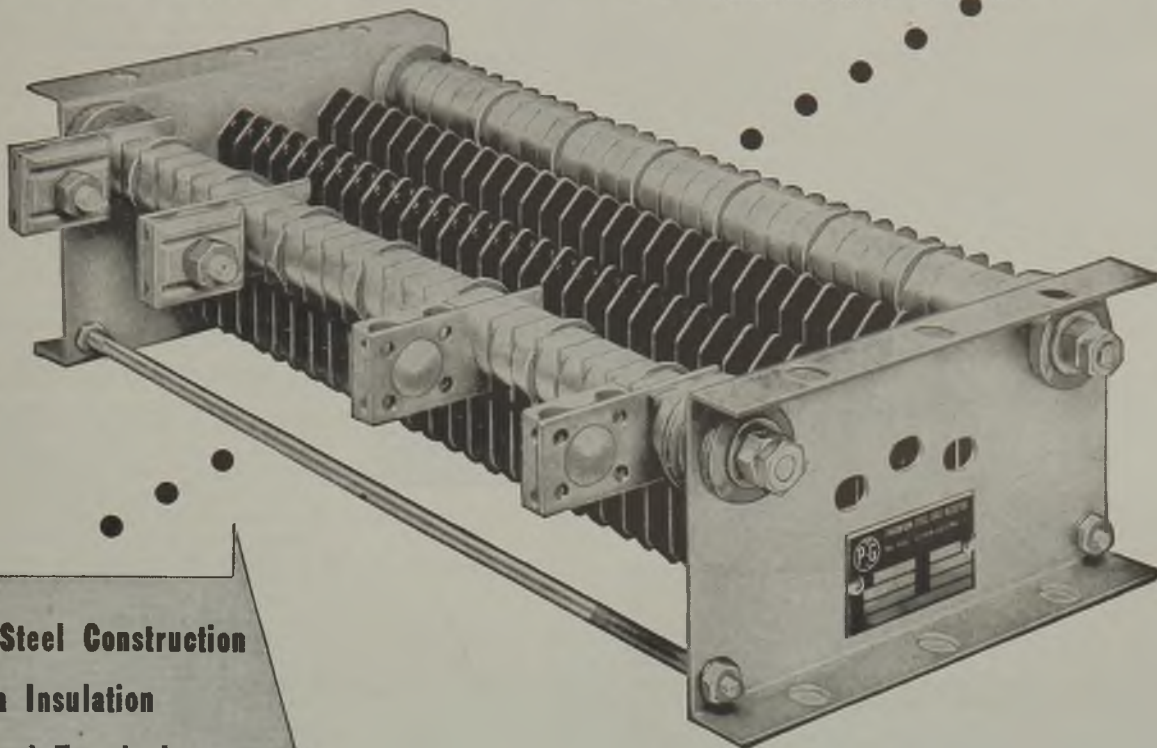
Armco Drainage & Metal Products, Inc., Middletown, Ohio—Tunnel, shaft and slope liner plates, culverts and other drainage products, sheets and "Steelox" portable buildings.

Standard Oil Co. of N. J., Charleston, W. Va.—Standard lubricants.

West Virginia Bearings, Inc., Charleston, W. Va.—Fafnir and New Departure bearings, Keystone anti-friction-bearing motor end bells.

Pure Oil Co., Bluefield, W. Va.—Lubricants

Built...FOR SEVERE SERVICE



- ☆ All Steel Construction
- ☆ Mica Insulation
- ☆ Rugged Terminals
- ☆ Provision for Expansion
- ☆ Adequate Ventilation
- ☆ Unaffected by Vibration
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Since 1915**

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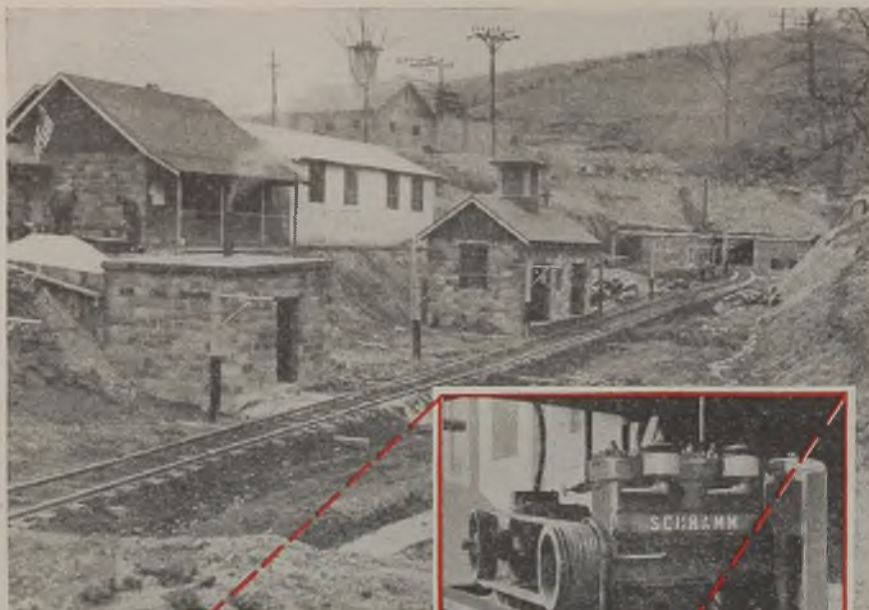


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The units are lightweight, compact and sturdy. Specific features include: (1) 100% watercooled (2) forced feed lubrication (3) mechanical intake valve.

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and petroleum products.

Patrick Equipment Co., Charleston, W. Va.—Lowell wrenches, Simplicity vibrating screens, Thor shop tools, Thor Model UFZ hand-held electric coal auger and the Thor Model 28 (30-lb.) and Model 33 (30-lb.) pneumatic coal augers.

Rapids-Standard Co., Grand Rapids, Mich.—Steel forged casters, trucks, gravity conveyors and power belt conveyors.

Harris Pump & Supply Co., Charleston, W. Va.—Marlow Type FM mine gathering pump with diffuser priming.

American Air Filter Co., Huntington, W. Va.—Roto-Clone dust-collecting and settling products.

Hall Petroleum Co., Princeton, W. Va.—Sun oils and petroleum products.

Friden Calculating Machine Agency, Roanoke, Va.—Friden automatic calculators.

Elliott Service Co., New York City—Safety poster and management services for mining.

Victualic Coupling Co. of America, New York City—Speed-type flexible couplings and full-flow fittings for pipe lines.

International Correspondence Schools, Scranton, Pa.—Correspondence courses in mining.

Universal Supply Co., Beckley, W. Va.—Universal electric controller equipment; Pittsburgh Gear & Machine Co. cut gears.

Electro-Nite Carbon Co., Philadelphia, Pa.—Carbon brushes and carbon products.

Concordia Electric Co., Pittsburgh, Pa.—CEAG electric hand and trip lamps.

Owens-Corning Fiberglas Corp., Toledo, Ohio—Fiberglas electrical insulation.

Ashland Oil & Refining Co., Ashland, Ky.—Lubricants: "Permatreat" coal-spraying oils.

W. O. & M. W. Talcott, Inc., Providence, R. I.—Talcott belt fasteners.

Bear Mfg. Co., Rock Island, Ill.—Industrial static and "Dy-Namic" balancing equipment.

Link-Belt Co., Chicago—Chain and chain products, speed reducers and preparation equipment, including the Link-Belt "Multi-Louvre" dryer.

Smith Welding Equipment Corp., Minneapolis, Minn.—Welding and cutting equipment.

Hardie Mfg. Co., Hudson, Mich.—Hardie coal sprayers—cold-oil and calcium-chloride.

Bluefield Supply Co., Bluefield, W. Va.—Ohio Injector Co. valves, York air-conditioning equipment, Goodyear industrial rubber goods, Bonnev tools, Sioux and Skilsaw power tools, Ashcroft gages, Consolidated safety valves, Gould batteries, Alemite lubricating equipment, Cook pumps, Diston saws, Simplex jacks, "Ridgid" pipe tools, Toledo tools, Yale & Towne products, R. Hoe & Co. products, Carborundum abrasives, Gates V-belts, Bethlehem wire rope, Ingersoll-Rand tools, West Virginia Steel & Mfg. Co. products, Republic Steel products, "Kwik-Mix" concrete mixers, Manning, Maxwell & Moore hoists, Flexco belt fasteners, Trumbull switches, etc.

Rish Equipment Co., Bluefield, W. Va.—Clark-International diesel generator sets, Quaker Rubber products, Wire Rope Corp. of America, Euclid road machines, Southern Welding & Machine scrapers and bulldozers, "Graco" lubricating equipment, Cummins diesel engines, Syntron gas paving breakers, Blaw-Knox clamshell buckets, "Mercury" chain saws, Gorman-Rupp pumps, Ingersoll-Rand compressors, Kochring shovels, Trojan graders, International tractors, Bucyrus-Erie bulldozers, Hough "Pavloaders," etc.

Cunningham-Lewis Co., Roanoke, Va.—"Golden Bell" sand dryers.

Johns-Manville Sales Corp., Cincinnati, Ohio—Industrial and building materials.

Gates Rubber Co., Denver, Colo.—"Vulco" rope drives.

Mosebach Electric & Supply Co., Pittsburgh, Pa.—Welders, "Mescowald" rail bonds, line material, trolleys harps and fittings, feeder and trolley switches, trolley taps, other electrical products for mines.

West Virginia Steel & Mfg. Co., Hunting-

Thermoid — For Progress in Industry

The makers of the Beltloder have standardized on Thermoid belting for many years because it has proven itself capable of standing up under hard punishment. Exposure to weather, high angle of operation, intermittent loads, various kinds of materials all put the Beltloder and its Thermoid belting to an extreme test. The toughness and super-flexibility of Thermoid belting permits the use of a very small idler pulley on the Beltloder, making it possible to bring the belt closer to the ground and with less difficulty to push the conveyor into the pile of material to be moved.

This is just one of hundreds of instances of the way Thermoid—working with designers, engineers and production men—has aided industrial progress. Whatever your problem in the field of materials handling or power transmission, you owe it to yourself to consult your Thermoid Representative. Like so many others, you may find—It's Good Business to Do Business with Thermoid.

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Fast, economical coal-loading with the Thermoid-equipped Beltloder. On this rigorous job, users estimate that a single Thermoid conveyor belt handles as much as 100 thousand tons of coal.

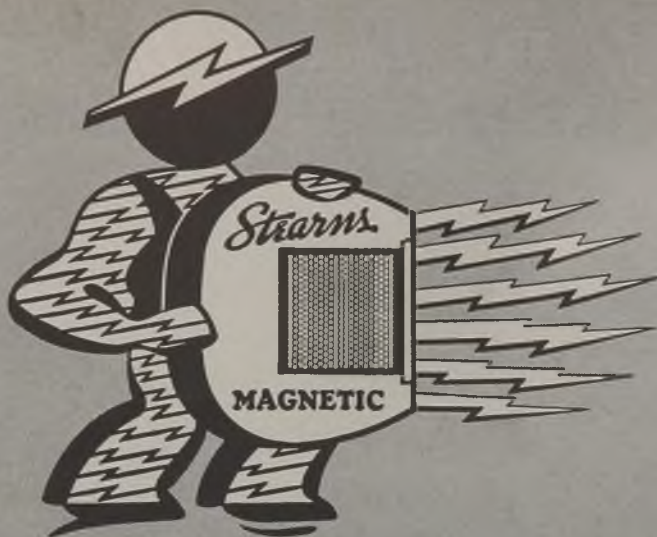


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ton, W. Va.—Steel ties, frogs, rail adapters, benders, switch throws and other track materials.

Ingersoll-Rand Co., Pittsburgh, Pa.—Compressors, pneumatic tools, drills, riveters, etc.

E. I. du Pont de Nemours & Co., Inc., Wilmington, Dela.—“Ventube.”

American Blower Corp., Cincinnati, Ohio—Fans, dust collectors, fluid drives.

American Crucible Products Co., Lorain, Ohio—“Promet” chain products, bearings, journal liners, bushings and wearing parts.

General Electric Co., Schenectady, N. Y.—Controllers and starters, welders, mining cables, Geoprene cables, brushes, contactor parts, Amplidyne control and Deltabeston wire and cable.

Industrial Products Co., Pittsburgh, Pa.—Ware “Hi-Lag” fuses.

Marathon Coal Bit Co., Montgomery, W. Va.—Marathon cutter bits, Timken rock bits, “Airco” cutting and welding equipment, coal augers, controllers and parts.

Enterprise Wheel & Car Corp., Bristol, Tenn.—Low-type steel mine car borrowed from the Feds Creek Coal Co., Feds Creek, Ky.; Enterprise wheels.

Hendrick Mfg. Co., Carbondale, Pa.—Perforated metal screens, including “Wedge-Slot” dewatering screens, grilles, grating and horizontal screens.

Barber-Greene Co., Aurora, Ill.—Mine belt conveyors.

Southern Oxygen Co., Inc., Arlington, Va.—Victor cutting and welding equipment, Westinghouse welders, Sight-Feed Generator Co. welders, CO₂ fire and fog equipment, National carbide, Emerson “Iron Lung” and resuscitators, Acme all-purpose gas mask, Scott “Air-Pak” oxygen apparatus, goggles, masks, welder’s supplies.

Dixie Appliance Co., Bluefield, W. Va.—“Femco” frequency-modulation mine communication system for locomotives and elsewhere.

Mines Equipment Co., St. Louis, Mo.—Safety circuit centers for distribution of power to face equipment; permissible connectors designed to drop load before they can be opened.

Chicago Pneumatic Tool Co., New York City—CP hand-hand and post-mounted coal drills, new design of tamper-proof drill clutch, new electric-drill arm for mounting drills on crawlers, trucks or cutters—operated by electric motor with all controls for all motions at the front end convenient for the operator.

Princeton Foundry & Supply Co., Div. of Graham-White Mfg. Co., Princeton, W. Va.—“Perfection” cone-stove sand dryers.

Joy Mfg. Co., Pittsburgh, Pa.—Mechanical-mining equipment—loaders, conveyors, shuttle cars, etc.

Cleveland Worm & Gear Co., Cleveland, Ohio—Worm-gear speed reducers.

Farval Corp., Cleveland, Ohio—Centralized lubricating systems.

Edwin L. Wiegand Co.—“Chromolox” electric-heating equipment and controls; fire-detector equipment for detecting fires and operating fire-fighting equipment.

Linde Air Products Co., New York City—Mining applications of welding and cutting equipment, Linde oxygen and acetylene, Union-Carbide carbide.

Texas Co., Norfolk, Va.—Alcaid oil, Crater compound, Starfak and Olympian greases, other mining lubricants.

Tamping Bag Co., Mt. Vernon, Ill.—New “Super Seal-Tite” tamping bag made from wet-strength paper for minimum loss in transit and use, “Dummy-Maker” tamping-bag filling machines.

John A. Roebling’s Sons Co., Trenton, N. J.—Wire rope and fittings, screen cloth, electrical wire and cable.

Ohio Carbon Co., Cleveland, Ohio—Brushes, commutator burnishers, and other carbon parts, including repair kits.

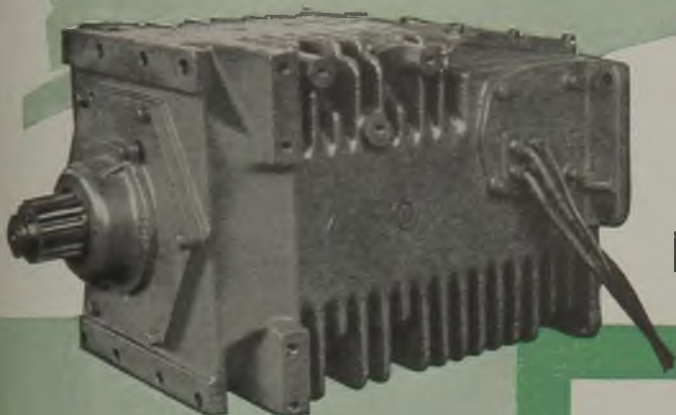
Yale & Towne Mfg. Co., Philadelphia, Pa.

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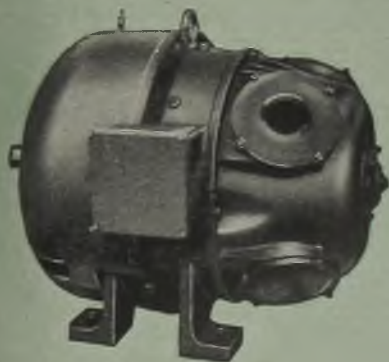
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In the modern swing to mechanization, *outstanding* performance is making Reliance Motors the preferred source of power in more and more mines. On 7 out of 10 loaders, on conveyors, shuttle cars and preparation equipment in the tippie, these rugged, designed-for-the-job drives help keep production up — costs down.

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"Motor-Drive is More Than Power"

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Prevent Corrosion OF BOLT THREADS



—with the Red Elastic Collar that protects the threads against Liquid Seepage

Moisture cannot penetrate the Red Elastic Collar. Study the heavily corroded bolt and nut assembly in the unretouched test photograph. It has been subjected to the equivalent of three years' exposure to moisture . . . to industrial smoke and grime . . . to climatic change. Study the same bolt with the nut removed. Look at the bolt threads that were inside the Elastic Stop Nut. They're as good as new! Why? Because the Red Elastic Collar protects them permanently against Liquid Seepage—and Corrosion.

Elastic Stop Nuts are easily removed because they cannot 'rust solid'. They prevent fasteners from failing because of corrosion weakened threads.

Here's a challenge: Send us complete details of your toughest bolted trouble spot. We'll supply test nuts—FREE, in experimental quantities. For further information or literature address: Elastic Stop Nut Corporation of America, Union, New Jersey. Agents and Representatives located in principal cities.



The RED ELASTIC COLLAR

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. . . is threadless and permanently elastic. Every bolt—regardless of commercial tolerances—impresses (does not cut) its full thread contact in the Red Elastic Collar. This threading action produces a compressive, radial-reactive pressure against both the top and bottom sides of the bolt threads . . . insures a permanently tight, full contact between the bolt and nut threads . . . and makes all Elastic Stop Nuts self-sealing against Liquid Seepage.

As a result, all Elastic Stop Nuts protect permanently against thread corrosion.



ELASTIC STOP NUTS



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—Yale materials-handling equipment, including "Cable King" and "Midget King" wire-rope and chain hoists.

American Car & Foundry Co., Huntington, W. Va.—A.C.F. wheels and other car products, 120-cu.ft. 26-in.-high steel car for the new Deerfield mine of the American Coal Co. of Allegany County.

Duff-Norton Mfg. Co., Pittsburgh, Pa.—Mine roof and timber jacks, including new roof-jack fittings to be made into jacks by the purchaser; shop jacks, pullers, straighteners, etc., including new line of "Hy-Power" hydraulic jacks in 3- to 12- and 20- to 50-ton capacities.

Jeffrey Mfg. Co., Huntington, W. Va.—Jeffrey mining and preparation equipment.

Appalachian Electric Power Co., Bluefield, W. Va.—Appalachian Electric service.

Wheat Lamp Sales Co., Charleston, W. Va.—Wheat electric cap lamps and charging equipment, Koehler flame safety lamps, new permissible shotfiring headpiece, new safety-lamp testing cabinet with a capacity of five lamps, new quick-on quick-off safety car stop.

Southern Office Supply Co., Bluefield, W. Va.—Remington-Rand business machines.

Gulf Oil Corp., Pittsburgh, Pa.—Gulf mining lubricants.

Kanawha Mfg. Co., Charleston, W. Va.—Kanawha preparation equipment and facilities.

Cardox Corp., Chicago—Cardox coal-breaker equipment.

Charleston Electric Supply Co., Charleston, W. Va.—Ohio Brass starters and other equipment, Deming pumps, Goodyear "World's First" two-way conveyor, Allen-Bradley starters, Anaconda wire and cable, "Cesco" coils, etc.

West Virginia Armature Co., Bluefield, W. Va.—Coils and brasses, Pittsburgh Gear & Machine Co. cut gears, new air alarm, including recorder, trolley-line material, headlights, mine-car wheels, etc.

Bearing Service Co., Pittsburgh, Pa.—Timken and McGill bearings, M.R.C. bearings, Torrington needle bearings, Bearing Service ball and roller bearings.

Goodman Mfg. Co., Chicago—Loaders, conveyors and other mining products.

Templeton, Kenly & Co., Chicago—Simplex mine and shop jacks and tools, including new multiple-purpose "Util-A-Tool" for lifting, straightening and other applications and the new Simplex-Jenny center-hole hydraulic pullers.

Persinger Supply Co., Williamson, W. Va.—"Torchweld" and "Tweco" welding equipment, Reliance motors, Gates V-belts and sheaves, Cutler-Hammer products, "CMC" self-priming and Aurora pumps, Yale & Towne products, Hartzell propeller fans, American Steel & Wire products, Crosby clips, the new "Matco" tool and man car (1 hp., 1 to 12 m.p.h., 1,500 lb., 3 in. off the rail, 18 in. overall, three-point suspension) and the new underground gobbing conveyor (245 lb. without 1-hp. motor, 12-in. belt, 13- and 18-ft. lengths, 50 tons per hour, can be moved around by one man).

Huntington Supply & Equipment Co., Huntington, W. Va.—Cincinnati cutter chains and bits, "Feralun" brake shoes, Tool Steel gears and pinions, Nolan feeders and dumps.

American Brattice Cloth Corp., Warsaw, Ind.—"Mine-Vent" tubing, "ABC" brattice cloth.

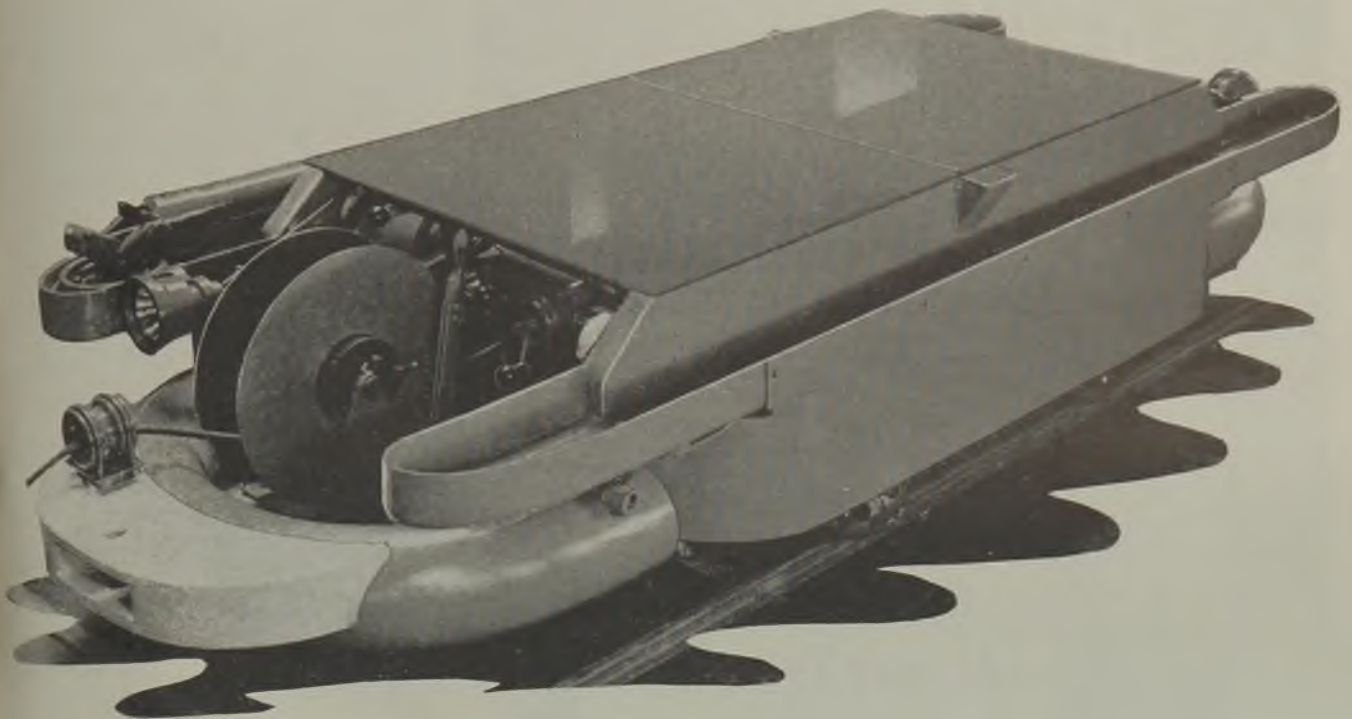
United States Steel Corp., Pittsburgh, Pa.—"USS" mining products.

Banks-Miller Supply Co., Huntington, W. Va.—Condor belt, "Segmetec" V-belts, Browning group-belt drives, Continental Gin belt conveyors, Johns-Manville packing, Pittsburgh Gear & Machine Co. cut gears, Farquhar portable conveyors, Littleford powder-storage magazines, Simplex wire and cable.

Westinghouse Electric Corp., Pittsburgh, Pa.—Power-factor-improvement equipment, brushes, coils, renewal parts, De-Ion "No-Fuze" circuit breakers, safety switches, line materials, "Minestarters" and motor parts.

Westinghouse Lamp Division, Philadelphia,

**HERE'S AN AIR COMPRESSOR THAT TAKES YOU
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BACK . . . ALL UNDER ITS OWN POWER!**



The Cantrell, Type S-P, Air Compressor is, first and foremost, a dependable, heavy duty machine that meets every requirement for coal mine compressor service. But its more than that. It's a completely independant two-ton locomotive and compressor combination that is on its own at all times — no time wasting or waiting to get to point of service . . . no holding up of other work of heavy locomotive and crew for transporting compressor.

Truly, no modern mine is fully equipped without a Cantrell Type "SP" compressor. Its cost is a small item compared with the savings made through its use.

In addition to regular drilling work, you use the Cantrell "SP" for ditch lining, leveling haulways, hauling repairs, shifting pumps and mining machines, chipping, riveting, blowing substations . . . a new, broader service in a complete air compressor-locomotive combination.

Imperial-Cantrell builds 5 types of compressors to meet every requirement of track, trackless or stationary coal mine use. One of them will fit your needs and at most reasonable cost, too. Write or wire us now for complete information.

Cantrell
COMPRESSORS



Shown above, top, is the Cantrell, Type S-P Compressor with safety-top in position. Photo below shows the control end and operators' seat. A simple shift of a lever changes unit from locomotive to compressor service.

IMPERIAL-CANTRELL MFG., CO. JELICO, TENNESSEE

FOR SAFER, MORE ECONOMICAL MAINTENANCE IN MINES

...SPECIFY

"CZC"-TREATED TIMBERS AND TIES



NO NEED to worry about accidents and replacements resulting from decay-weakened wood in *your* mine if all the timbers and ties have been treated with "CZC." Du Pont Chromated Zinc Chloride gives wood additional long life—safeguards it against decay, gives it measurable resistance to fire.

Maintenance costs are lowered,

accidents are reduced, and costly delays caused by replacements of ties and timbers are lessened—wherever "CZC"-treated wood is used.

Write today for complete information on wood preservation for mines. E. I. du Pont de Nemours & Co. (Inc.), Grasselli Chemicals Department, Wilmington 98, Del.

DU PONT CZC

Chromated Zinc Chloride

WOOD PRESERVATIVE



BETTER THINGS FOR BETTER

... THROUGH CHEMISTRY

Pa.—Mercury-vapor picking and other lamps.
Rockbestos Products Corp., New Haven, Conn.—Rockbestos "AVC" wire, cable and cord.

Ideal Industries, Inc., Pittsburgh, Pa.—Insulation-resistance testers, blowers, motor-repair tools, soldering outfits, other maintenance and testing equipment.

Joseph Dixon Crucible Co., Jersey City, N. J.—Silica-graphite and aluminum-graphite lubricants, belt dressing, maintenance floor enamel, flake silica-graphite paint, new trolley-wire lubricant and a new ball- and roller-bearing grease stated to withstand a wider range of temperature up to 340 deg. F.

Dayton Rubber Mfg. Co., Dayton, Ohio—Dayton V-belt drives.

Diamond Chain & Mfg. Co., Indianapolis, Ind.—Diamond roller chains.

Timken Roller Bearing Co., Canton, Ohio—Timken tapered-roller bearings.

B. F. Goodrich Co., Akron, Ohio—Belt conveyors and rubber goods.

Continental Paint & Varnish Co., Chicago, Ill.—Continental paints.

Blackhawk Mfg. Co., Milwaukee, Wis.—Shop and maintenance tools, wrenches, etc.

Van Dorn Electrical Tool Co., Towson, Md.—Portable electric tools.

Anaconda Wire & Cable Co., Cincinnati, Ohio—"Security-Flex" mining cable.

Independent Pneumatic Tool Co., Chicago—Air drills and tools.

Lowell Wrench Co., Worcester, Mass.—Wrenches and tools.

Superior-Sterling Co., Bluefield, W. Va.—Products of the United States Steel Corp., Westinghouse Electric Corp., Westinghouse Lamp Division, Diamond Chain & Mfg. Co., Timken Roller Bearing Co., B. F. Goodrich Co., Continental Paint & Varnish Co., Blackhawk Mfg. Co., Van Dorn Electrical Tool Co., Anaconda Wire & Cable Co., Dayton Rubber Mfg. Co., Rockbestos Products Corp., Duff-Norton Co., Fairbanks, Morse & Co., Ideal Industries, Inc., Independent Pneumatic Tool Co., Industrial Products Co., Linde Air Products Co., Lowell Wrench Co., Templeton, Kenly & Co., Yale & Towne Mfg. Co., Joseph Dixon Crucible Co., LaBour, Weinman and Aurora Pumps, Fostoria infra-red drying and heating equipment and products of the American Pulley Co., including American "Speed-Jack" drives, the old original steel split pulley with American V-belt drives, sheaves and wedge belt, and the tension-control-base speed-reduction unit, which notches tension to motor load using motor torque.

Socony-Vacuum Oil Co., Baltimore, Md.—Mining lubricants.

Duquesne Mine Supply Co., Pittsburgh, Pa.—Trolley and line materials, pole heads and fittings, skids and car stops, feet and heads for jack pipes, rerailers, trip drags, fused trolley taps, cable connectors, etc.

Safety First Supply Co., Pittsburgh, Pa.—Dust respirators, Willson gas masks, Scott "Air-Pak" oxygen apparatus, Willson goggles, welding masks, E. & J. inhalators, other safety products.

National Electric Coil Co., Columbus, Ohio—Coils and insulation, including silicone types, Dow-Corning silicones, silicone lubricants, etc.

Mine Safety Appliances Co., Pittsburgh, Pa.—"Bantam" high-pressure rubber-tired rock-dust distributor designed to be carried on belt or pan conveyor, shuttle car or rubber-tired truck, M-S-A semi-portable rock-dust distributor, "Chemox" oxygen breathing apparatus, flame-safety-lamp testing equipment, hats, shoes, goggles, other protective clothing, methane and CO₂ detectors and recorders, gas masks and oxygen apparatus, rescue apparatus, self rescuers, permissible shotfiring units, first-aid materials and kits, Edison cap, hand and trip lamps, other safety products and "Velocity-Power" tools.

Bluefield Hardward Co., Bluefield, W. Va.—Bethlehem Steel ties, Sherwin-Williams



Newest type Dragline, equipped with Fawick Airflex Clutch.

How to CUT CLUTCH COSTS

Control torque, transmit power, absorb shocks and vibration through a cushion of air—that's what the Fawick Airflex Clutch does.

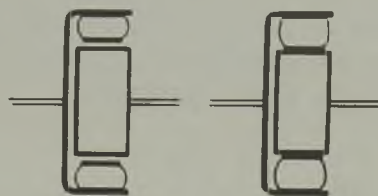
Here are its cost-saving advantages, all realizable under extreme operation conditions:

1. Maintenance expense reduced—no adjustments to make—no lubrication required.
2. Replacement costs reduced—no springs, arms or levers to break or wear out.
3. Down time much less—better assurance of continued operation.
4. Both prime mover and driven unit have positive protection against the shock of tough starting, and against vibration, even in the heaviest service.

A long war record and hundreds of industrial applications prove every one of these benefits.

Let our experienced engineers help you select and install the clutch that best suits your special requirements. Book on request.

FAWICK AIRFLEX COMPANY, INC.
9919 Clinton Road • Cleveland 11, Ohio



How the FAWICK AIRFLEX CLUTCH Works

Compressed air expands the rubber-and-fabric gland to engage clutch with any degree of "grip" you want. Release the air and clutch disengages.

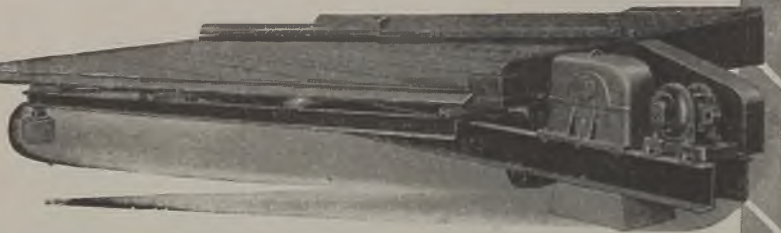
FAWICK



CLUTCH

In Canada, Reynold-Coventry Ltd., Montreal, Toronto, Vancouver
In Britain, Crofts Engineering, Ltd., Bradford, England

5 REASONS for GREATER PROFITS with *SuperDuty* TABLES



1. **INSTALLATION SAVINGS**—Since the SuperDuty coal washing table underconstruction is built in at the Concenco factory and pre-aligned for you, installation costs are low—you avoid expensive millwork, eliminate blocking and bracing.
2. **LABOR SAVINGS**—SuperDuty Tables are so simple to control and adjust that one easily trained operator can supervise a large battery of tables.
3. **HIGHER RECOVERIES**—This is largely due to the efficient treatment given by SuperDuty's diagonal deck which places approximately 75% more effective working riffles in the natural path of separative action.
4. **LOW POWER REQUIREMENT**—SuperDuty requires only 1 H. P. under continuous operation.
5. **ECONOMICAL UPKEEP**—Sturdy construction and mechanical simplicity keep maintenance costs down for added years of hard use.

These are but a few of the reasons why SuperDuty Coal Washing Tables earn more money for you. Write for further details.



Concenco Feed Distributors

The Concenco Revolving Feed Distributor is a heavily fabricated, all steel machine, built in various types, with motor drive requiring less than $\frac{3}{4}$ H. P. in operation. This distributor effects perfectly a splitting of feed sluiced to its revolving tank, into any desired number of revolving portions. It is especially suitable for efficiently feeding a battery of coal washing tables, giving an equal distribution of feed to each table.

**THE DEISTER ★
CONCENTRATOR
COMPANY**

909 Glasgow Ave. • Fort Wayne, Ind., U.S.A.

**CONCENCO
PRODUCTS**

★ The ORIGINAL Deister Company ★ Inc. 1906

paints, Fafnir bearings, Gardner-Denver pumps and pneumatic tools, National Carbon Co. products, Economy renewable fuses, Boston Woven Hose & Rubber Co. belt conveyors and rubber products, Square D switches, breakers, controllers, distribution cabinets and other electrical products, General Cable Corp. wire and cable, Black & Decker tools, Fairbanks-Morse products, including pumps and motors, a new multiple shotfiring unit that remains dead all the time a key is in, has a neon-lamp indicator and is arranged so that if the shot is not fired in 15 sec., all the power goes off; also the new Garfield Engineering Corp. "Powrarm"—a floating-ball hydraulic work holder and positioner.

A. Leschen & Sons Rope Co., St. Louis, Mo.—Hercules "Red Strand" ropes.

Guyan Machinery Co., Logan, W. Va.—"Nu-Air" propeller fans, resistors, headlights, welders, foot valves, strainers and other mining products.

Manhattan Rubber Mfg. Co., Passaic, N. J.—Conveyor belt and hose.

Post-Glover Electric Co., Cincinnati, Ohio—P-C resistors, transfer switches and other electrical products.

I-T-E Circuit Breaker Co., Philadelphia, Pa.—Automatic reclosing circuit breakers, pilot-wire protection of trolleys and feeders against roof falls.

Browning Mfg. Co., Maysville, Ky.—"Grip-belt" V-belt drives and sheaves.

Electric Ry. Improvement Co., Cleveland, Ohio—"Erico" rail bonds and welders.

Beckley Machine & Electric Co., Beckley, W. Va.—Locomotive controllers, Whitney roller chains, Rome cable, Bemeco headlights, gears and parts, brasses and bushings, trolley-line material, pole heads and fittings and cable guides.

American Mine Door Co., Canton, Ohio—Canton track-mounted rock duster, cable splicers, bonders and trimmers, improved fingerboards, electric switchthrowers and signal systems, semi-portable dust distributor, rubber-tired duster, materials and parts carriers, other Canton track devices, Ace portable electric blowers and the Canton track cleaner.

New French Sand Dryer Co., Bluefield, W. Va.—Type C French sand dryer.

Anti-Smoke Talk Grows In Three Ohio Cities

Smoke abatement made headline news last month in three of Ohio's great industrial cities—Cleveland, Cincinnati and Toledo—as citizens' committees, engineering experts, city councils and coal-industry representatives met to survey air pollution, debate courses of action and reduce the smoke nuisance.

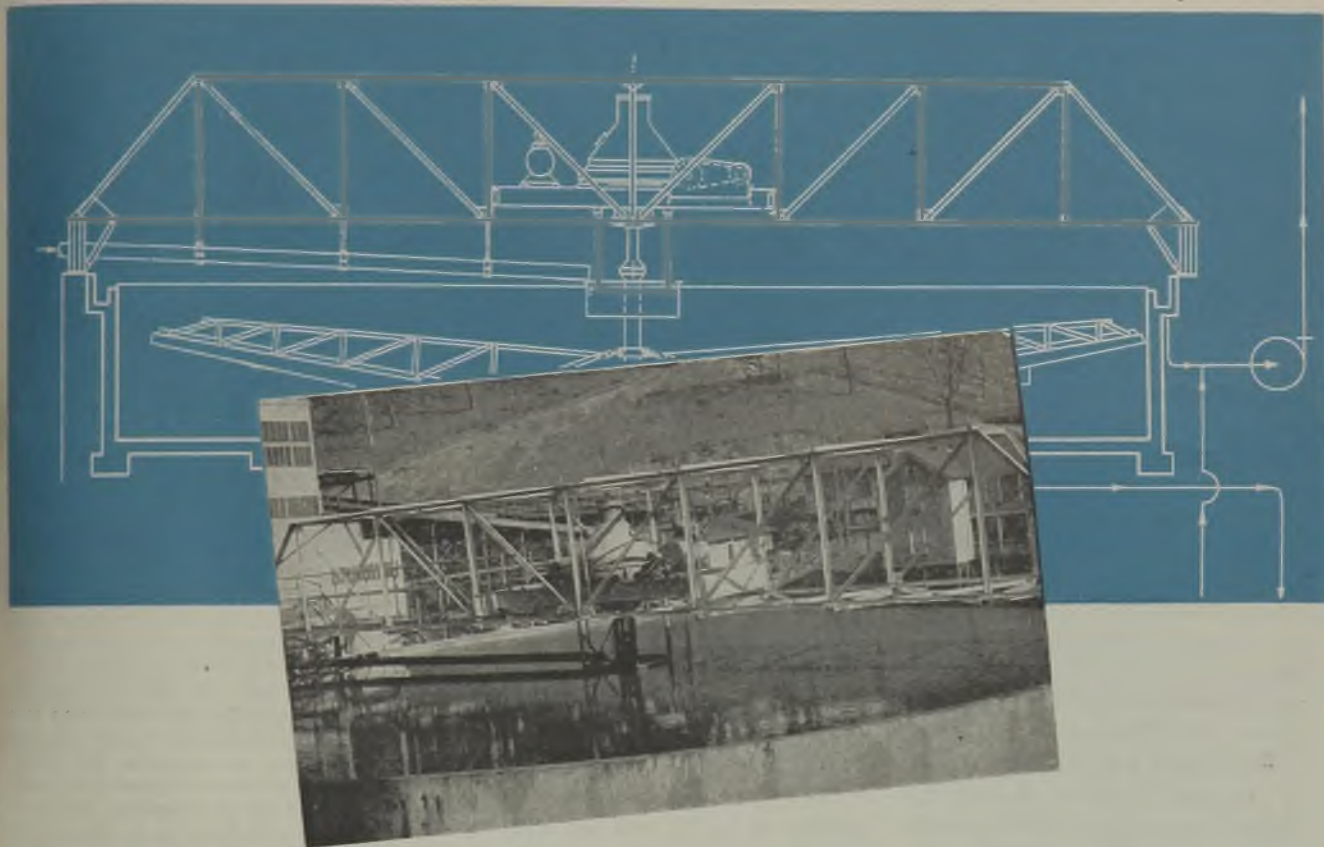
In Cleveland, A. P. McGrath, chairman, Cleveland Railroad Operating Committee, announced Sept. 10 the appointment of 20 smoke-abatement experts by railroads operating in the city to speed the air purification campaign. Mr. McGrath also disclosed that work suspensions and record demerits are being imposed by rail lines against crews of locomotives involved in smoke-law violations. Regular educational meetings with locomotive crews, installation of steam jets in coal-fired locomotives and conversion from steam to diesel power are further steps now being effected by Cleveland railroads, he said.

A smoke inspection tour of Cleveland's industrial areas Sept. 17 by a party of newspapermen and members of the executive committee of the citizens' air purification committee revealed that officials

ANOTHER LARGE COAL MINING COMPANY *has just ordered*

2

GENERAL AMERICAN THICKENERS



This decision was made — after a careful study of the performance of the thickener installation shown above — because the General American Thickener is the most completely automatic and foolproof thickener now available.

The hydraulic lift makes a virtually "choke proof" machine, permitting shut-downs without recirculation, and starting under

a full load. The thickener will never stall in the event of a power failure. Where operation is such that surges of fine coal occur, the thickener will handle them automatically.

A General American engineer will be glad to assist you in designing new units or modernizing your existing coal dewatering plant.

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process equipment • steel and alloy plate fabrication

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Less Weight with Ample Strength — in All-Manganese Steel Welded Type Dipper

To meet demands for a dipper with optimum durability and minimum overall weight the Amsco All-Manganese Steel Welded Type Dipper has been developed and thoroughly service-tested. These dippers have stood up staunchly in such rugged applications as steel slag recovery, iron ore mining and handling coral rock.

Design, in a dipper, affects durability, but the use of austenitic manganese steel, "the toughest steel known," as the sole material of construction in these dippers, except for small complementary parts, assures maximum resistance to impact and wear.

The important factors of design in a power shovel dipper are those which contribute to faster, more efficient digging, full loading, with maximum proportion of power consumption applied to payload, quick dumping and longer life. All these characteristics are embodied in the Amsco All-Manganese Steel Welded Type Dipper.

When fitted with a door and bail of adequately strong design, this dipper is somewhat lighter in weight than the Amsco Renewable Lip Dipper, thousands of which have been put into use since 1928. If made

with a lightly constructed door and hinges, as generally used in light weight dippers, it will not exceed the weight of any composite-type fabricated dipper that is sufficiently strong to do a good job. The dippers illustrated have the advantage of a manganese steel body welded into an operating unit. The body is as strong



C-801C. Amsco All-Manganese Steel Welded Type Dipper (Patented)

and homogeneous as if made in one piece. At the same time it is possible to remove a worn front and weld on a new one without destroying the back.

The Amsco All-Manganese Steel Welded Type Dipper is made in capacities of $\frac{3}{4}$ yd. and up. Sizes $\frac{3}{4}$ to 2 yd. are made in two body pieces; front and back. Sizes over 2 yd. are made in four pieces; front, back and two side plates. Write for full information.

Joliette Steel Limited, Joliette, Quebec, owned by American Brake Shoe Company, produces and sells Amsco Manganese Steel Castings in Canada.



A-468. 2 yd. Amsco All-Manganese Steel Welded Type Dipper on Lorain "82" shovel; used for handling coral rock in New Guinea.

of the industrial plants in Cleveland's Cuyahoga Valley are as interested as the general public in the reduction of air pollution. Spokesmen explained the industrial processes involved, the reasons why some air pollution is unavoidable and the improvement made possible by air jets and vacuum devices. Three conclusions were cited by news reporters at the end of the tour: (1) a large part of the smoke can be eliminated only at the expense of many millions of dollars, plus extended periods of industrial shutdown while replacements are being made, (2) in some industrial processes no means of smoke abatement is known, though scientists are working continually to develop methods less offensive to the atmospheres, and (3) an appreciable amount of smoke and smudge can be eliminated by repairs, reasonable replacements and careful attention to smoke-abatement principles.

Smokeless production of metallurgical coke within the near future was forecast in Cleveland Sept. 18 by H. R. Klepinger, chairman, subcommittee on Cuyahoga Valley industries, in a report to the Cleveland citizens' air purification committee. Mr. Klepinger said that a plant designed to produce metallurgical coke without smoke is being erected at Lorain and probably will be completed within eighteen months. Further action by the citizens' committee to reduce smoke involved a request to the Board of Education to outline its plans for re-engineering its heating plants, about which nearby residents have registered complaints.

In Toledo, conferences at the end of August debated the city's proposed new anti-smoke ordinance, and formal hearings were scheduled for mid-September. Representatives of coal and railroad interests in the city assured the city councilmen that coal dealers and railroads would cooperate in every way to eliminate the smoke nuisance. A city council proposal to specify the type and size of commercial fuel to be burned was withdrawn in the face of objections by railroad representatives. It was agreed that the new city smoke inspector, soon to be appointed by the mayor, should confer with the Coal Producers' Committee to measure the proposed ordinance against the model ordinance presented by the Toledo Retail Coal Merchants' Association.

In Cincinnati, the Academy of Medicine, the Women's City Club and the League of Women Voters called for quick passage of an anti-smoke ordinance modeled after the St. Louis plan, and the last-named group scheduled an address Oct. 7 by C. H. Carter, St. Louis commissioner of smoke abatement, in the interest of the proposed ordinance. Insistence upon low-volatile coals in the proposed city legislation has been the target of attacks by local coal dealers, who claim that insufficient low-volatile coal could be brought in to meet the city's needs. Appearing before the city council S. C. Higgins, secretary, New River Coal Operators' Association, Mt. Hope, W. Va., contended that volatile content is not the measure of smoke density. "A bad smoke situation cannot be cleared up without proper firing regardless of volatile content," he said. "Therefore, we recommend that the smoke ordinance be confined to prevention of dense smoke from

(AMSCO)

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Chicago Heights, Ill.; New Castle, Del.

Denver, Colo.; Oakland, Calif.;

Los Angeles, Calif.; St. Louis, Mo.

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AMERICAN MANGANESE STEEL DIVISION

CHICAGO HEIGHTS • ILLINOIS

AMERICAN
Brake Shoe
COMPANY

UNLOAD a Ton of Coal per Second!

An illustration of a heavy-duty metal mine car, labeled 'A.C.F.', positioned on a set of railroad tracks. The car is tilted, and a large, dark pile of coal is shown falling from its open bottom. In the background, a large, stylized clock face is visible, with its hands pointing to approximately 10:10. The clock face is white with black markings and numbers, set against a solid orange background. The coal falling from the car is depicted as a dense stream of dark, irregular shapes.

Yes, actual timing has shown that with a proper storage bin it is possible to dump a 16-car trip of 5-ton **A.C.F.** Drop-Bottom Mine Cars in 80 seconds! A "ton-per-second" unloading time!

Such speed in dumping permits cars to be returned to the mine immediately—saving precious minutes for greater loading efficiency!

Why not ask our Sales Representatives about using **A.C.F.** Drop-Bottom Mine Cars in your mine—to increase your daily production—to lower your transportation costs.

AMERICAN CAR AND FOUNDRY COMPANY

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MINE CARS

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THE BIGGEST IMPROVEMENT IN UPSON-WALTON BRATTICE CLOTH

in 75 years!

Announcing the newest, finest brattice ever developed. Completely dry! Lighter in weight, yet just as strong and tightly-woven as the finest ever made! Resists flame better under all conditions (proved by independent laboratory tests in accordance with National Bureau of Standards)! Can be used longer because it can be rebung and therefore cuts your costs. Distributors in all fields.

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Manufacturers of Wire Rope, Wire Rope Fittings, Tackle Blocks

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BUILT FOR SERVICE

Built to Last



(This Adams Motor Grader is equipped with General Deep Cleat Tires.)

Best Tire "on earth"

Yes, General Off-the-road Tires were ALWAYS built for SERVICE. Wartime shortages of natural rubber led to constant research and continuous tests to build a tire comparable to pre-war standards. General's engineers succeeded. They developed "shock-absorber construction" which added life to the tire, made it more rugged, eliminated the common chance of bruises, tears, snags and blowouts.

Now natural rubber is back in greater quantities. More natural rubber plus advances in construction methods worked out in General laboratories mean that General's Off-the-road Tires are as always not only the "best on earth"... they are *better than ever*.

These massive Generals... like all General Tires... are built to top quality. They are the product of skilled craftsmen and *they are built to last*. That is why General Off-the-road Tires... and General Highway Tires as well... are giving the lowest cost performance in tire history.



THE GENERAL TIRE & RUBBER CO.
AKRON, OHIO

THE GENERAL
DEEP CLEAT

THE GENERAL
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GENERAL OFF-THE-ROAD TIRES

BIG



TWO-FISTED PERFORMANCE



COAL SHOVELS



SMART BUYERS
SPECIFY BIG FIST SHOVELS
TO GET THESE EXTRA VALUE
FEATURES.

- Moly D Handle with Steel Banded Grip. Grip never loosens, checks or splits.
- Thoroughly seasoned XX Grade handles. Thoroughly sanded and waxed.
- Steel I-Beam Handle Reinforcement. Strengthens where most breaks occur.



MINERS PREFER
BIG FIST SHOVELS
BECAUSE

- Flat edge and wide curved flare of blade gets into and under coal.
- Fine Tool Balance lessens fatigue because shovel is easier to work with.
- Over-sized Moly D Handle is comfortable to any hand regardless of size.

THE **WOOD** SHOVEL AND TOOL CO., *Piqua, Ohio*

A National Organization Specializing Exclusively in
SHOVELS SPADES SCOOPS

either liquid or solid fuels, without regard to volatile limitation; that the facilities of existing scientific, technical and educational groups be used by the smoke commissioner where improper combustion is creating smoke nuisances; that the source of supply of available coals for Greater Cincinnati be as flexible as possible and not restricted to any particular limited area; that those in the low-income bracket be given special consideration before requiring them to make conversions that only the more provident citizens can afford; and that industrial plants and railroads cooperate with scientific developments to take care of their problem adequately."

In Pittsburgh, anticipating the start of the enforcement of Pittsburgh's new smoke ordinance, the Pittsburgh Consolidation Coal Co. ran a full-page advertisement entitled, "We Agree. . . Smoke Must Go!" In this message to the public, the company offered the assistance of its staff of experts to help any commercial or industrial firm who may experience difficulty in complying with the new law. Illegal smoke is not the result of burning Pittsburgh-district coal, the company stated, but rather results from improper equipment or improper firing practices, and it pledges itself to help in every way possible to solve these two problems. The advertisement calls for the cooperation of all and ends with the statement, "This company dedicates itself to the job of taking the smoke out of Pittsburgh's smog".

Court Upholds Pa. Stripping Law

The constitutionality of the 1945 Pennsylvania State law placing strip mining in Pennsylvania's bituminous coal fields under state regulation was upheld last month in the Dauphin County court. Judge Karl E. Richards held that in the court's opinion the act, passed by the 1945 session of the General Assembly as a conservation measure, was "a proper exercise of the police power of the commonwealth."

Meanwhile the Pennsylvania Coal Strippers' Association prepared to press its fight against the Judge Richards' decision. A bulletin outlining a plan for further litigation is being prepared by the executive committee of the association. Coincident with this development a "land-use" committee named by the National Coal Association, with members from Ohio, Indiana, Illinois, Kansas and other states, met in Pottsville Sept. 15 to begin a survey of reclaimed lands in Pennsylvania.

Ohio Governor Hits Stripping State Land

The campaign of Governor Frank J. Lausche to regulate strip-mining of coal in Ohio branched out in a new direction late in August with the governor's declaration that he would "not condone, to the extent that lies within my power, the use of state land for strip-mining purposes." The governor's statement was provoked by a proposal to sub-lease for stripping operations 640 acres of school-district land originally leased in Hocking County, Ohio.

A promising future in valve economy



A
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TYPE VALVE FOR
THE SERVICE



B
E SURE TO
PLACE VALVES
CORRECTLY
IN THE LINE



C
HOOSE
JENKINS VALVES
FOR LIFETIME
ECONOMY

If you follow this Jenkins 3-Point Formula, you can look forward to years of low cost valve operation.

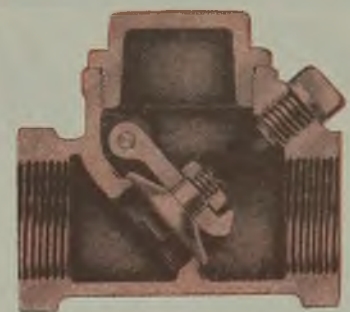
Valves chosen wisely to withstand specific service conditions will require a minimum amount of maintenance.

Valves installed correctly are sure to last longer, remain trouble-free.

Valves made by Jenkins will give you *extra endurance* that means *extra years* of service life.

So, with a clairvoyant eye on future costs, base your valve buying on the 3-Point Formula. Jenkins engineers, top-flight valve specialists, will gladly help you on any question of selection or placement. For the *lowest cost in the long run*, specify Jenkins.

Jenkins Bros., 80 White Street, New York 13; Bridgeport, Conn.; Atlanta; Boston; Philadelphia; Chicago; San Francisco; Jenkins Bros., Ltd., Montreal, Canada; London, England.



125 lbs. Steam 250 lbs. O.W.G.

JENKINS Fig. 92 Regrinding BRONZE SWING CHECK VALVE

Designed for service on non-return control systems; especially in connection with the use of gate valves where a comparable, full free flow of steam, oil, water or gas is required. Also widely used for condensate and return lines. Even at extremely low pressure, seat remains tight. The bronze disc, carefully machined to a smooth, snug-fitting finish, can be re-ground easily without removing valve from the line.

**ONE OF OVER 600 EXTRA VALUE VALVES
MADE BY JENKINS VALVE SPECIALISTS**



LOOK FOR THIS



JENKINS VALVES

For every Industrial, Engineering, Marine, Plumbing-Heating Service . . . In Bronze, Iron, Cast Steel and Corrosion-resisting Alloys . . . 125 to 600 lbs. pressure

Sold Through Reliable Industrial Distributors Everywhere



Strip Mine Pumps

NEED *Tirex* CABLES

A portable electric pump — and its cable — while not spectacular are very necessary in a strip mine. Their value can be measured by the delays to more important equipment that can be caused by surface water if it is not drained off. The cables lie in the sun, are subject to falling coal from passing cars, and as often as not may get a “dunking”.

Simplex-TIREX Cables — designed for just such work — do their job without having to be protected from ordinary hazards. Their Selenium Rubber Armor sees to it that ordinary difficulties are taken in stride with no lowering in the quality of the TIREX performance.

If you have the problem of carrying current to a mine pump or other portable machinery, a TIREX Cable with its Selenium Rubber Armor will solve your problem. For every portable cord or cable need there is a TIREX Cord or Cable to fit the job.

SIMPLEX WIRE AND CABLE CO.

79 Sidney St., Cambridge 39, Mass.

last April. Terms of the sub-lease would provide a 10c. royalty on all coal removed from a 488-acre tract on which the State has retained surface rights and an 8c. royalty on 160 acres on which 99-year leases have been granted.

Admitting that 480 acres of the section were “sterile, barren land” for which no previous leaser had been found, Governor Lausche nevertheless claimed that “stripping by a lessee or sub-lessee would constitute waste and would be grounds for cancellation of a lease.” State Auditor Joseph T. Ferguson was requested to study the statute concerning the right to lease the land for strip-mining purposes. Under an old law the State auditor administers the school-district land in the area.

High School Plans Mining Courses

The Blakely (Pa.) School Board has announced approval of tentative plans for the establishment of a course in the elements of coal mining for high school students.

It is thought that teaching of coal-mining methods and practices to high school students may draw them into the coal industry, which is now pressed for men. Then, too, these high school courses may be expected to influence young men of the coal region to pursue further education in mining engineering, to the benefit of the industry and the community.

Mines Bureau Develops Low-Cost Water Heater

Development of an automatic water heater that operates with sub-bituminous coal at a cost of less than a dollar a month has been announced by the U. S. Bureau of Mines. A coal hopper and constant-volume fan, a feed screw, a retort and a double water-storage tank operated by thermal controls make up the system. The small flame is regulated by an air-adjusting vane. Designed to utilize sub-bituminous coals, the heating system is the product of several years of bureau research in the use of low-ranking coals in domestic appliances.

Canadian Miners Gain Wage Boosts

Sources close to the Western Canada coal industry last month predicted an increase of about 50c. a ton for domestic coal mined in that area, as the dispute between some 9,000 miners and the coal operators neared settlement with miners conceding a wage increase of \$1.40 a day. In a joint statement issued by the United Mine Workers of America, the domestic operators, and bituminous operators, agreement on the wage increase was announced, but it was yet to be ratified by the War Labor Board and the miners' locals. A number of minor points in the dispute still remained to be settled.

Mining authorities said the average man-day production in the domestic fields

YOU BET

IT'S A LUXURY



IT MAY NOT SEEM TO BE. Of course you wouldn't use a wheelbarrow in mass production. But any inefficient conveying method costs you money! It costs you time and production! Yes . . . it is a luxury!

BUT WHEN ROBINS CONVEYORS ARE PUT TO WORK —

They do your job cheaper. They're "Job-Engineered" to carry your specific bulk materials . . . to fit your production schedule.

They do your job faster. They keep materials flowing at the exact, steady rate needed to keep your plant running efficiently.

They do your job better. Fifty years of practical experience in materials handling is applied to your particular operation.

Yes . . . you'll find it pays to check with Robins first for the answer to your problem.

**ROBINS
CONVEYORS**



**"Job-Engineered" to Solve Your Problem
CHEAPER . . . FASTER . . . BETTER**

Robins Conveyors Incorporated, Passaic, New Jersey — Division of Hewitt-Robins Incorporated

Keep DUST HOG from making a PIG of Itself



Unrestrained, DUST HOG will eat up your chances of making your plant an efficient working place. Dust—out of control—monopolizes light, spoils workmanship, speeds wear on moving parts, and increases maintenance costs. What is often regarded as merely a nuisance, is usually a profit thief.

How to put DUST HOG in its place is the subject of Pangborn's free booklet, "Control of Industrial Dust". As a first step toward ridding your plant of expensive "dust pockets", request this booklet. Write Pangborn Corporation, 288 Pangborn Boulevard, Hagerstown, Maryland—*world's largest manufacturer of dust control and blast cleaning equipment.*

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PANGBORN CORPORATION, HAGERSTOWN, MARYLAND

stretching from Estevan, Sask., to Vancouver Island was about 3.5 tons. The wage increase of \$1.40 a day alone would mean an additional cost of 40c. a ton. The domestic mines employ about 4,500 men.

Other concessions granted the miners that are expected to increase the price of domestic coal include a welfare-fund royalty of 3c. a ton, reduction from a 48-hour to a 40-hour work week, with mine maintenance costs remaining the same, and new holiday provisions. The increase granted the 4,500 bituminous miners is not expected to affect the public so directly.

Overseas Coal Notes

LONDON (McGraw-Hill World News) —A nation-wide campaign, organized by the National Coal Board, the National Union of Mineworkers and the National Association of Colliery Managers, was reported ready to begin last month in an attempt to revitalize Britain's coal industry, attract young men to the mines and raise output. Speakers representing the various groups were to urge cooperation and ask for a pledge of increased effort for greater safety, efficiency and production at conferences to be held in every mining area in the country between Sept. 14 and Oct. 26. Each colliery will be represented at its area conference by two representatives from the union, one from the management, and one from the Colliery Deputies' Association, who are expected to report back to their fellow-workers on the program of the conference.

The need for the improvement of the miners' conditions, on which the government is now working, and the necessity for adding many new workers to the industry, is evident in the fact that in the first half of 1946, although 38,500 new workers joined the industry, the net gain was only 5,300.

On the conservation side a saving for Britain of 1,000,000 tons of coal a year is expected when the program approved by the Minister of Transport for conversion of the main-line railways from coal to oil goes into effect.

Plans envisage the adaptation to oil-burning of some 1,200 locomotives. Only heavy-duty locomotives that consume the largest quantity of fuel will be selected for conversion. Each of the railways will carry out its own work of conversion with equipment supplied by the Ministry of Supply. A considerable tonnage of steel will be required, and complete standardization of some of the parts is impossible because different types of engine are involved.

Conversion of industry from coal to oil, also suggested by the Government, had reportedly led to an influx of orders for equipment that was swamping manufacturers with backlogs of three to six or more months. If a complete new oil-burning plant is desired, the lag is more than 14 months, it was said.

Industrial expansion in Australia has resulted in the demand for coal exceeding production by one-sixth, it was recently announced by the Australian Department of Information. It is estimated that the 1945-46 demand will exceed the supply by 2,000,000 tons.

The Proved B-Z Round Rod Screen

Gives You
30% LONGER SCREEN LIFE
20% COAL SAVING



Here are facts that will help you lick the old problem . . . how to get better screening efficiency and longer life.

Records prove BEE-ZEE

Coal Screens solve those problems. These rugged, quality built screens are long wearing . . . Round-Rod design adds wearing surface and maintains size of original opening for better screening efficiency and quality coal output. Lines keep moving because BEE-ZEE Screens require fewer changes — less time out for maintenance. Facts like these add up to performance that gives you up to 30% longer screen life and savings in material up to 20%! Get the complete story today!

Below . . . a full section of BEE-ZEE Round Rod Screen, ready for installation. Sizes, types and mounting finishes are ENGINEERED to fit your present plant equipment.



HERE'S WHAT HAPPENS IN YOUR PLANT

These two views illustrate why BEE-ZEE Round Rod Screens give longer life screening efficiency. This design, combined with quality construction of corrosion-resisting stainless steel, is your answer to lower screening costs.



NEW — Coal rides on top of round rods which form an accurate opening that will not clog or blind because materials fall free at bottom of opening.



21 Months Later — Notice how top area of rods wear without affecting size of opening. Round-Rod maintains efficiency for longer period of time.

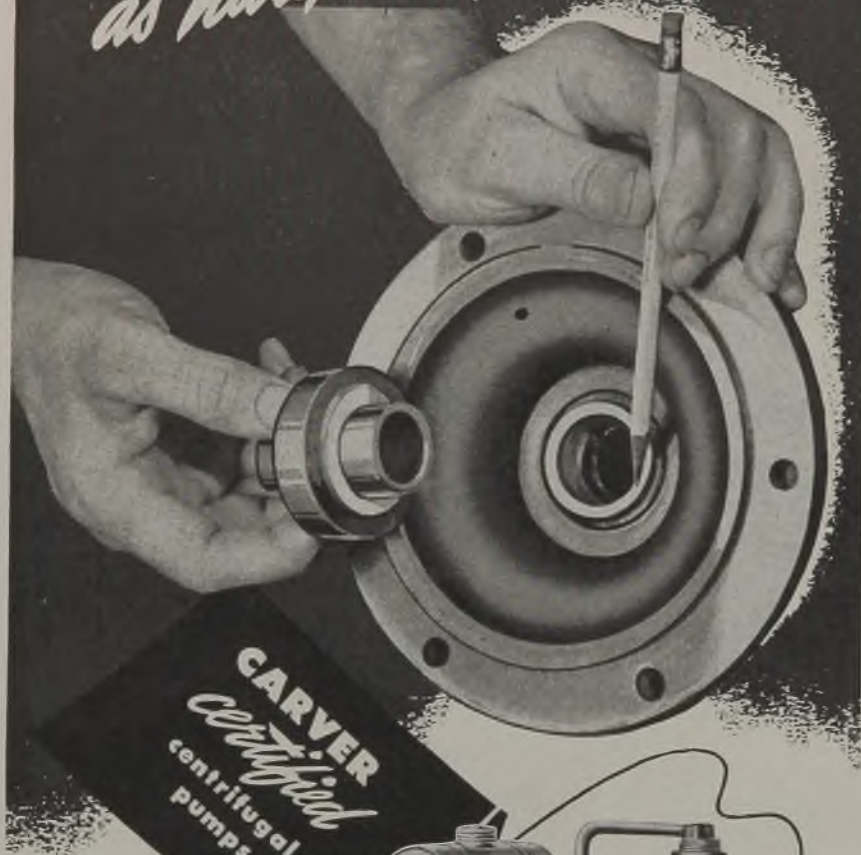
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HERE'S ANOTHER REASON WHY CARVER PUMPS ARE BETTER

A SEAL

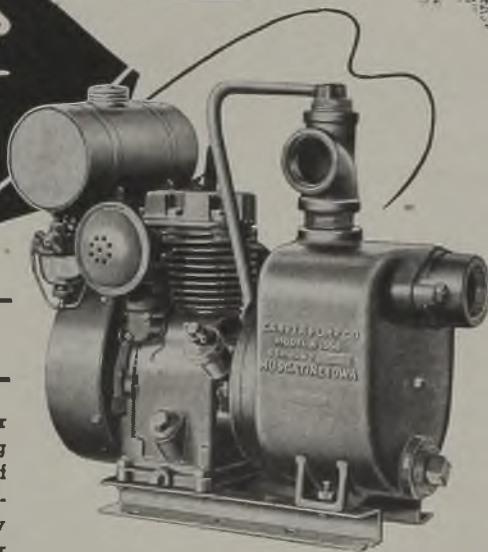
as hard as Diamonds



won't wear...

can't leak...

The seal that keeps a Carver Pump always fast-priming and non-leaking is made of diamond-hard tungsten-carbide so it is practically immune to wear. . . . Carver Pumps are offered with a choice of power and mounting in sizes from 1½" to 10".



Write for Catalog

CUTS PUMPING COSTS

CARVER PUMP CO.
Muscatine, Iowa

MEXICO D.F. (McGraw-Hill World News)—The Nueva Rosita coal mines, already among the best-equipped of Mexico, will soon be the most up-to-date in the country. The Cia. Carbonifera de Salinas, S.A., a subsidiary of the American Smelting and Refining Co., which acquired the exploitation rights of the six Rosita coal mines in 1923, is expecting from the United States in the very near future modern mechanical equipment for coal cutting and underground transportation similar to that used in the most modern U.S. mines.

From a previous average efficiency of less than 50 percent (under the previous management) the Cia. Carbonifera gradually brought this proportion up to over 70 percent. The mines are already well equipped, have underground electric transportation, extraction by vertical shafts, and radial ventilation. Washing facilities can handle 50 tons daily, and there is a 6,000-kw. electric plant on the premises, using coal as fuel. Present production runs to around 40,000 tons monthly, of which 50 percent is turned into coke in two Wilputte coking-oven batteries, with recuperation of byproducts—the first of this kind in Mexico. Present production is expected to be substantially increased when the new equipment is installed.

Correction

An item in the Overseas Coal Notes in the September Coal Age (p. 130), based on incomplete information from abroad, incorrectly stated that British coal production for July, 1946, was exceeded by that of both France and Germany. The British figure should have been reported as 3,492,000 tons and as the average weekly tonnage for the four weeks ending July 27 rather than the total month's production, while the totals of 4,750,000 and 4,050,000 tons for Germany and France respectively were correctly listed as the total tonnages for the month of July, 1946.

Mine Explosions Topic At W. Va. Meeting

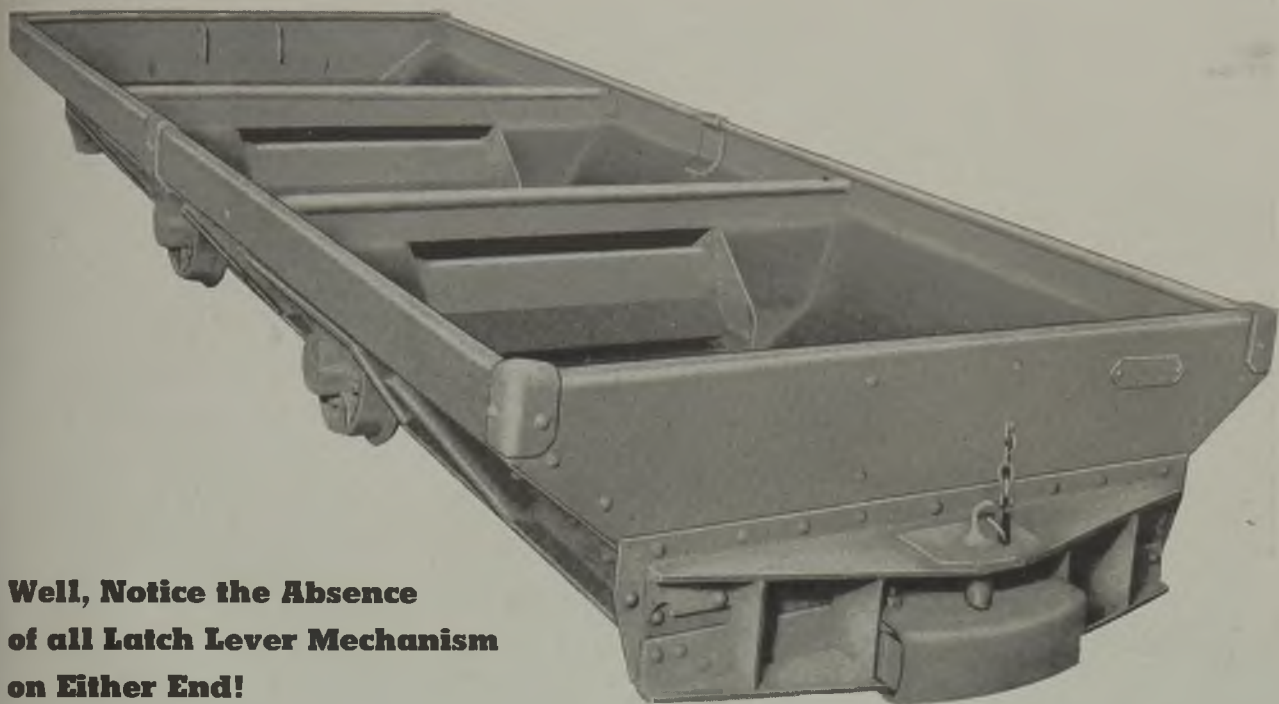
Gas and coal-dust explosions were the major subject at the monthly meeting of the Central West Virginia Coal Mining Institute, Fairmont, W. Va., Sept. 11. P. J. McGraw, inspector-at-large for the State mine department, presided in the absence of President E. Frank Miller.

E. E. Quenon, Pittsburgh mining engineer and a member of the U. S. Bureau of Mines, demonstrated types of portable safety equipment, including a deep-well sampler and a dust gallery, and discussed the explosibility of methane gas and coal dust. Saw dust, corn-starch dust, aluminum dust and coal dust were ignited several times to compare the violence of explosions and to show that some coal dusts, like other dusts, will explode over and over. The different effects of permissible and non-permissible equipment on methane gas were demonstrated.

Three lines of defense against mine gas explosions were stressed by Mr. Quenon, as follows: adequate ventilation to sweep and dilute the dangerous gases, detection of gases if ventilation fails and avoiding ignition.

Provisions of the Federal mine safety code were discussed at length by W. D. Walker, engineer, U. S. Bureau of Mines.

DOES THIS CAR LOOK DIFFERENT TO YOU FROM ORDINARY AUTOMATIC DUMPING CARS?



**Well, Notice the Absence
of all Latch Lever Mechanism
on Either End!**

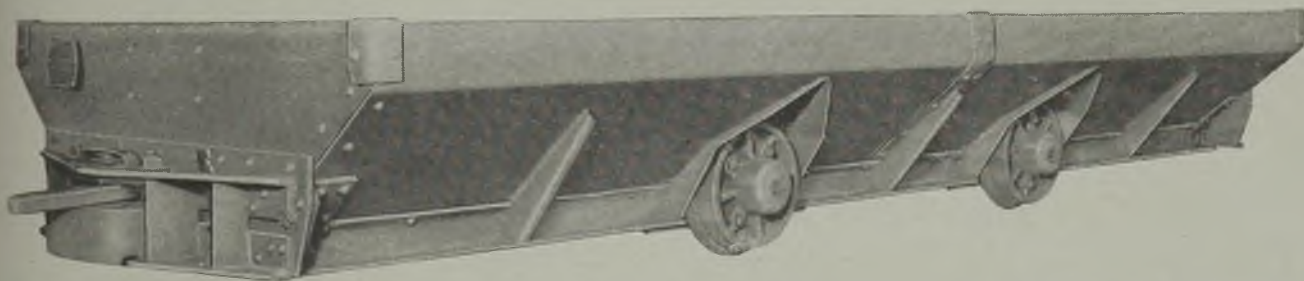
The two photos in this ad show both ends of a late model S-D 1-2-3 Automatic bottom dumping mine car equipped with our trouble free "Jerk-out" unlatching device. Operators tell us it's the greatest, most practical improvement in mine cars since we brought out the automatic dumping car.

This device, that works underneath the bottom of car, automatically unlatches two separate hooks. These two hooks also give you a double safety feature. No more do you need worry about bent latch lever bars or accidental tripping. Here is another improvement, among many, that have made Sanford-Day leaders in the building of mine cars that cut the cost of producing coal. We will send you, upon re-

quest, some case histories of change-overs to our "Automatics" that show the great savings with these remarkable cars.

How would you like to lease these cars, at an annual rental cost which, over a 15 year period, would average 2¢ a ton? You have no initial outlay for these cars. Also, we keep the cars in good working order as long as the cars last. Finally, the big part of the rental applies to reduce the purchase cost and you can stop renting and buy them any time you feel like it.

This is a proposition where you have everything to gain and nothing to lose. Let us hear from you.



Sanford-Day Iron Works, Knoxville 9, Tennessee

Depend on "VENTUBE"



**NOT HARMED BY
FUNGUS GROWTHS**



**STANDS UP TO
"YELLOW BOY"**

Among the many advantages of a Du Pont "Ventube"* auxiliary ventilation system are long life and trouble-free operation, which keep costs down and production up.

"Ventube" is triple-treated against fungus growths. First, the thread is treated. Then the fabric. And finally the coating is treated.

"Ventube" also gives maximum protection against the corrosive effects of "yellow boy" (and alkali waters, too).

In case of accidental damage, "Ventube" is easy to repair. The damaged spot in the tubing can be

cut out and a new section coupled into place.

You can depend on "Ventube" (attached to a permissible blower fan) to do a good job for you . . . bringing fresh, cool air to men at the face . . . reducing down-time after blasting . . . speeding your production. Light weight and long lasting. Easy to install, to move, to store. Low in both original and upkeep cost.

For further details, consult Du Pont technical service, Fabrics Division, E. I. du Pont de Nemours & Co. (Inc.), Fairfield, Conn.

*"VENTUBE" is Du Pont's registered trade mark for its flexible, synthetic-rubberized ventilating duct.

who stressed the fact that the new regulations are supplementary to existing State laws and do not supplant them.

Obituary

Ray Moore, 63, president of the Fairpoint Construction Co., stripping operators in Ohio and West Virginia, died Aug. 18 at his home.

Cecil L. Benham, 40, mine electrician for the Red Wing mine of the Colowyo Coal Co., Axial, Colo., was killed Aug. 22 when an electric locomotive he was repairing apparently started up unexpectedly and threw him under it.

Douglas Millard, 65, vice president in charge of sales, Colorado Fuel & Iron Co., died in Denver Sept. 10. He had been a director of the National Coal Association for 15 years and at one time was a vice president of that organization.

Charles C. Carter, 55, who recently retired as superintendent of the Southern Harlan Coal Co., Williamsburg, Ky., because of ill health, died Sept. 23 at his home in Gray's Knob, Ky.

Richard Younts, 52, foreman of construction for the Consolidation Coal Co. of Ky., Jenkins, Ky., died Sept. 15 in a Coeburn, Va., hospital from injuries incurred in a fall over a 20-ft. cliff while on a hunting trip with his son.

Association Activities

Southwest Washington Coal Operators' Association was organized early in September, with Phil E. Owens of Centralia, Wash., heading the new organization. The group plans to act as a clearing house for information on developments in the coal fields of that section of the State.

Harlan County Coal Operators' Association has announced the resignation of J. F. Bryson as safety director, because of ill health. Mr. Bryson joined the Association in 1928.

Ohio Reclamation Association has appointed Charles MacIntire, formerly assistant director, acting director to succeed Jay Littlepage, resigned.

Coal Exporters Association of the United States, Inc., at its first annual meeting Sept. 26, in addition to re-electing Charles A. Owen, president of the Imperial Coal Co., as president, named other officers as follows: C. W. Brown, president of C. W. Hendley & Co., vice president; A. L. Lynn, Island Creek Coal Sales Co., treasurer; James A. Haley, assistant treasurer and general counsel; and F. F. Estes, executive secretary. Elected to the board of directors were: Charles A. Owen; W. H. Carpenter, president, Dexter-Carpenter Coal Co.; A. L. Lynn; C. W. Brown; John S. Routh, president, J. P. Routh Coal Corp.; E. Kelley Downey, Red Jacket Coal Sales Corp.; S. Pemberton Hutchinson Jr., general sales manager, General Coal Co.; Everett Horgan, Horgan Fuel Corp.; and A. F. Kempe, president, Seneca Coal & Iron Corp.



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BETTER THINGS FOR BETTER LIVING

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WHERE THE GOING IS **Toughest**



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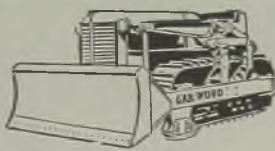
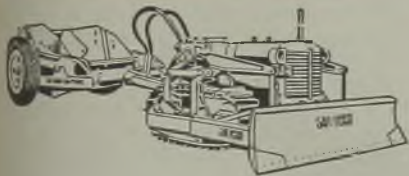
In use everywhere for clearing, leveling, grading, and excavating ... All Gar Wood Road Machinery is specifically designed, engineered, and built to make the toughest jobs easy... and more profitable.

That's a fact... for Gar Wood Bulldozers and Dozercasters are the

result of practical, down-to-earth engineering. They're constantly being proven and reproven in the field... in mining, quarrying, lum-

bering, railroading, and general contracting.

Moving the four corners of the earth, rebuilding a war-torn world, Gar Wood Road Machinery has got to be good. For your next job... particularly if it's a tough one... specify Gar Wood.





... AVOID BREAKAGE

The advantage of Holmes' spiral over previous chutes of this nature lies in the design of the carrying surface, which is formed much as the bowl of a race-track, having no retaining wall on the inside edge. Elimination of this inside edge allows the material to slide gently onto the peak of the pile without droppage. By the same token, the peak of the pile may be carried around the interior of the bin in such a manner that the material is deposited in overlapping layers, where the problem of segregation is present.

ROBERT HOLMES AND BROS.
BINS - GATES - LOWERING SPIRALS - DUST-O-LATORS - SHAKING GATES
DANVILLE, ILLINOIS

With the advent of scientific consumption of coal and the increased demand for a clean, sized product, much study was given to methods by which so fragile a commodity might be handled into bins and silos without excessive degradation. This problem was solved by using lowering spirals designed to take the material from the conveyor and carry it gently to the bottom of the bin.

Design is such that the lowering speed of the material is automatically retarded when it begins to exceed a safe limit. Regardless of the distance the material travels, its velocity remains uniform; and it reaches the bottom in a continuous, even stream.

Spirals are available with the carrying surface covered to form a spiral tube for lowering above bin enclosure and thus give weather protection.



Coal Bunker Storage

Anthracite Group To Hold Fall Meeting

The annual fall meeting of the anthracite section of the American Institute of Mining and Metallurgical Engineers has been announced for Nov. 8, at the Necho Allen Hotel, Pottsville, Pa. The program will feature a paper on 'Applications of Vertical Deep-Well-Type Pumps in the Anthracite Industry,' presented by L. Lamont of the Philadelphia & Reading Coal & Iron Co.

Personal Notes

A. R. Mathews, executive vice president, has been elected president of the Clinchfield Coal Corp. and the Davis Coal & Coke Co., Dante, Va., succeeding Dr. Huston St. Clair, who has resigned on the completion of his contract to devote his time to other companies with which he is connected.

Robert L. Llewellyn, formerly preparation manager for the Valley Camp Coal Co., has been named preparation manager for the Koppers Coal Division, Eastern Gas & Fuel Associates, with offices in Pittsburgh.

Jay Littlepage, formerly director of the Ohio Reclamation Association, has resigned to join the Greenwood Coal Co., Lawton, W. Va., as manager of the forest resources department.

Glen Tharp has been appointed superintendent of a mine operated by the Preston County Coke Co., Cascade, W. Va.

Dr. William R. Chedsey, widely known in mining and mining education, has been appointed professor of mining engineering in the department of mining and metallurgical engineering at the University of Illinois.

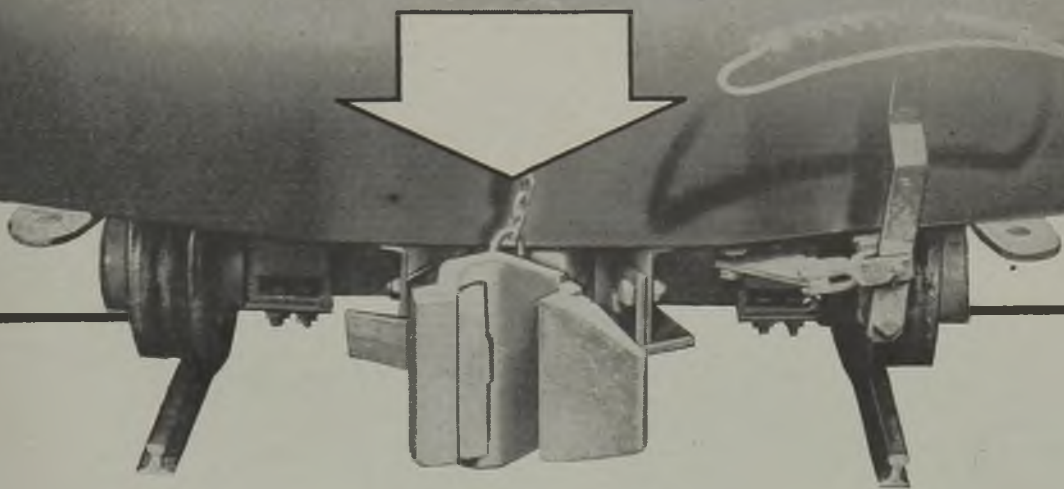
Raymond Pyle, formerly pit boss of the Flamingo mine of the Fairview Collieries Corp., Fairview, Ill., has been named superintendent of the Chinook mine of the Ayrshire Collieries Corp., Staunton, Ind., succeeding C. E. Walker, who has been appointed superintendent of the newly acquired Delta mine, operated by the Delta Collieries Corp., another Ayrshire subsidiary. Hollis Hopper, previously timekeeper at the Flamingo mine has been promoted to pit boss, replacing Mr. Pyle.

Owen Robertson has been appointed superintendent, Mines Nos. 73 & 74, Industrial Collieries Corp., Johnstown, Pa., succeeding George Lindsay, who recently retired after 55 years in the mining industry. Alfred Wallace, foreman of Mine No. 74, has been named foreman of Mine No. 73.

George B. Clark has been appointed assistant professor of mining engineering in the department of mining and metallurgical engineering at the University of Illinois. Since his release from the Army as a 1st lieutenant, he has been doing graduate research at the University of Utah.

John P. Brophy, Shenandoah Heights, Pa., has been appointed a Pennsylvania State anthracite mine inspector and will be assigned to a section of the southern coal field.

MOVE MORE CARS PER DAY with Willison Automatic Couplers



These advantages combine to give you speed with safety:

- Couple or uncouple without going between cars.
- No uncoupling on rotary dumps—faster operation on non-rotary dumps.
- Faster shunting, gathering and handling of large-capacity cars, with less coal spillage.
- Operate around sharp curves as low as 14' radius.

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Your investment in Willison Automatic Couplers will pay its own way. Ask us for details.



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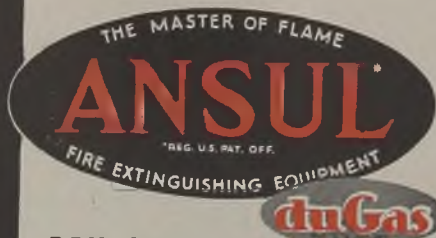


Open nozzle and direct chemical stream at base of flames.

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FASTER FIRE STOPPING POWER

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FIRE EXTINGUISHERS

Greatly increased fire-killing capacity.

Simplified operation.

Expert performance by inexperienced operators.

Quick, easier on-the-spot re-charge after use.

More fire stopping power pound for pound, dollar for dollar.

Greater heat-shielding protection for operator.

Increased fire-fighting capacity without increased weight.

Engineered to resist corrosion.

Install the NEW Ansul-Dugas Extinguishers at all hazard spots for greater protection against all fires involving flammable liquids, gases and electrical equipment.

53% More...

FIRE STOPPING POWER

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FIRE EXTINGUISHER DIVISION • MARINETTE, WIS.

Tim Davis has resigned from the Christopher Mining Corp. to join the Simpson Creek Collieries Co. as superintendent of Mine No. 3, Galloway, W. Va. Irwin Spotte has been named assistant general superintendent for the company.

Ben A. Adams has been promoted to superintendent of the Elk Horn No. 6 mine of the Elk Horn Coal Corp., Fleming, Ky., succeeding Alvis Mercer.

Coal Publications

Gasification of Lignite and Sub-bituminous, Progress Report for 1944, by V. P. Parry, D. C. Gemes, J. B. Goodman, E. O. Wagner, A. W. Koth, W. L. Patty and E. C. Yeager, U. S. Bureau of Mines, R.I. 3901; 76 pp., 8x10½-in.; paper, mimeograph; free.* Publication describes tests on (1) carbonization and gasification of lignite in laboratory retorts, (2) gasification of lignite in Glover-West retorts, (3) gasification of lignite char briquets in a water-gas machine and (4) gasification of sub-bituminous coal and lignite in the Golden, Colo., pilot plant. Cooperative work of bureau with University of North Dakota and Colorado School of Mines.

Active List of Permissible Explosives and Blasting Devices Approved Previous to December 31, 1945, by J. E. Tiffany and Z. C. Gaugler, U. S. Bureau of Mines, R.I. 3910; 20 pp., 8x10½-in.; paper, mimeograph; free.*

Wartime Progress in Coke Production, by William Seymour, U. S. Bureau of Mines, R.I. 3907; 14 pp., 8x10½-in.; paper, mimeograph; free.*

A Plan for Training Mine Officials in Rescue Organization and Disaster Prevention, by E. R. Maize, U. S. Bureau of Mines and J. V. Berry, supervisor of safety, compensation and relief, Industrial Collieries, U. S. Bureau of Mines, I.C. 7353; 20 pp., 8x10½-in.; paper, mimeograph; free.* Practical advice as to preparation for possible disasters including lists of equipment needed and persons to be notified after disasters and how the exigencies thus occasioned should be met.

Automatic Water Heating, Utilizing Sub-Bituminous Coal, by V. F. Parry, W. S. Landers and J. B. Goodman, U. S. Bureau of Mines, R.I. 3890; 15 pp., 8x10½-in.; paper, mimeograph; free.* With a double-tank system using about 50 gal. per day 8.1 pounds of coal were burned per day, but with a single-tank system 13.5 lb. were used per day because stoker and blower units had to be operated continuously. Heating value of coal was about 9,500 B.t.u. per pound. Test run was of about 2½ years duration for single-tank system and 18 months for double-tank system. Double tank increased available heating surface and stoker-operating mechanism operated intermittently, thus obtaining advantage of reactivity of sub-bituminous coal.

Coal-Mine Explosions and Coal and Metal-Mine Fires in the United States During the Fiscal Year Ended June 30, 1945, by D. Harrington, W. T. Fene and H. B. Humphrey, U. S. Bureau of Mines, I.C. 7359; 23 pp., 8x10½-in.; paper,



NOW—for the First Time— Real Performance in a 31-lb. drill

Here—at last—is a lightweight drill with a heavy-weight performance! The Gardner-Denver S33 Sinking Drill has built-in drilling capacity that lifts it far out of its weight class. And, like all Gardner-Denver Sinking Drills, it is easy riding—blows the hole clean—and stays on the job!

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FOUR-PAWL ROTATION—instead of the two pawls so generally used in drills of this weight. Gives you extra power.

LIVE AIR AT FULL LINE PRESSURES directed to the bottom of the hole for thorough cleaning.

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SIMPLE VALVE DESIGN admits air directly from throttle valve to rear of hammer. No tortuous passages. Extremely short stroke of valve and its large bearing on the valve plug reduces wear to the absolute minimum.



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CATALOG "H" comprises 154 pages of helpful data, replete with photos, drawings and specifications, covers every track work need. A request on your letterhead will bring your copy promptly.

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mimeograph; free.* Numbers of fatalities from gas and coal-dust explosions continue to vary widely from year to year; 911 in 1907, 27 in 1933, 26 in 1935, 33 in 1944 and 53 in 1945. Even the 5-year periods have their ups and downs; 65 in 1931-1935, 116 in 1936-1940 and 99 in 1941-1945. Yet 1944 and 1945 totals are subject to revision, probably upward, if and when injured men die.

Exploration, Composition and Washing, Burning and Gas-Producer Tests of a Coal Occurring Near Coaldale, Esmeralda County, Nev., by many authors, U. S. Bureau of Mines,† T.P. 687; 79 pp., 5½x9½-in.; paper; price, 30c. Reserves not yet determined because of faulting, pitching and folding. Price of cleaned coal, having 37 percent ash, estimated at \$7.50 per ton, plus fixed charges. Ash content of run-of-mine from minable beds ranges from 35 to 85 percent with probable over-all average of 50 percent. Unwashed coal feasible as gas-producer fuel.

Procedure and Apparatus for Determining Carbonizing Properties of American Coals by the Bureau of Mines—American Gas Association Method, by D. A. Reynolds and C. R. Holmes, U. S. Bureau of Mines,† T.P. 685; 35 pp., 5½x9½-in.; paper; price, 10c.

Accidents from Hoisting and Haulage in Bituminous-Coal Mines, Coal Mine Accident-Prevention Course, Section 3, U. S. Bureau of Mines,† Miners' Circular 49; 59 pp., 5½x9½-in.; paper; price, 20c.

Safe Practices in Mine Hoisting, by D. Harrington and J. H. East, Jr., U. S. Bureau of Mines,† Miners' Circular 61; 5½x9½-in.; paper; price, 15c. An excellent publication on hoisting and care of hoisting ropes for all persons, managers, foremen, rope splicers, cagers and hoisting engineers.

Resins in Coal, by W. A. Selvig, U. S. Bureau of Mines,† T.P. 680; 24 pp., 5½x9½-in.; paper; price, 10c., (now available) see Coal Age, May 1946.

Analyses of Alaska Coals, by many authors, U. S. Bureau of Mines,† T.P. 682; 114 pp. with map of Alaska showing coal-mining districts; 5½x9½-in.; paper; price 25c. Usual treatment. Reserves, as at present discovered; lignite and sub-bituminous 6,945,000,000 short tons, bituminous 24,720,000,000 and anthracite, 2,103,000,000; total 33,768,000,000 short tons, a large increase since 1909 when they were estimated at 15,104,500,000 short tons and in 1913 at 21,597,000,000 short tons. This technical paper states "It is believed that even these revised estimates are conservative and that future surveys will disclose even larger reserves in the territory."

Hydrogenation and Liquefaction of Coal, Part V—Characterization of Light Oils, by E. H. Kaplan, H. H. Storch and M. Orchin, U. S. Bureau of Mines,† T.P. 690; 18 pp., 5½x9½-in.; paper; price, 10c.

Carbonizing Properties of Eagle-Bed Coal From Prospect Shaft, Carbon, Kanawha County, W. Va., by D. A. Rev.

"We Live with Coal"

Located in the heart of Appalachian coal fields for the past forty-four years, the Fairmont Machinery Company actually does live with coal. Such close association with the actual mining and preparation of coal has afforded us a wealth of knowledge with which to do a better job. Since we have no other interests, our every effort is directed toward making coal a better, a more marketable product.

Greater demands for a cleaner, more uniform product make better and better preparation and cleaning mandatory, if coal is to maintain and strengthen its present position as the number one fuel and the basic industry.

We are proud that our services of engineering, designing, and building have contributed toward maintaining coal's leadership. The fact that "we live with coal" gives assurance that our service to the coal mining industry will continue to be outstanding.



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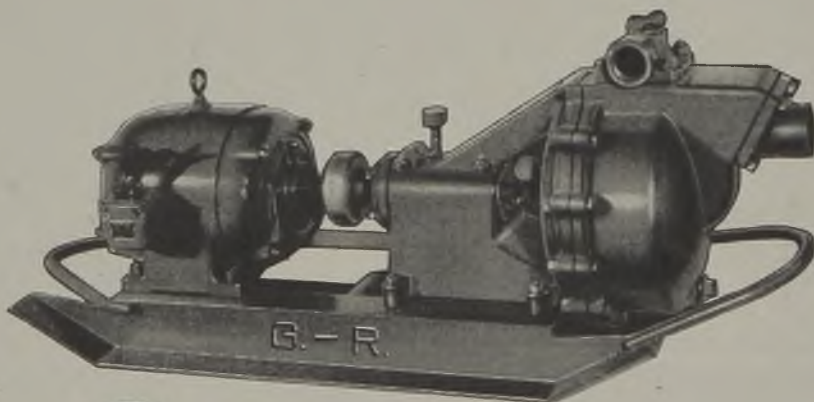
Gorman-Rupp self-priming, centrifugal, pumps will handle the large quantities of water involved, yet take unbelievably small space. Their self-priming is positive and powerful. In an official test where both pump and 300 feet of suction line were dry, the pump was primed and was under full operation in three minutes. Any sand, muck or solids that will pass the intake strainer will clear the pump—they will not clog or harm the pump.

Only one moving part, the impeller, and no reduction gears. All wearing parts can be quickly and easily replaced by an inexperienced man with common tools.

Reliable and trouble-free — these pumps are ideal for remote locations or automatic operations.

Available in four sizes to meet any requirement. Write for special mine bulletin No. 301-46 or contact your distributor.

Model	Overall Lgth. Pump only	Overall Width	Overall Height	GPM at 20' total head
2162 (B-21½)	21½"	10"	13½"	48
9261 (40-40)	27"	12½"	14¾"	108
9262 (60-60)	27"	12½"	14¾"	165
9263 (60-100)	34"	17½"	21¼"	208
9361 (125-100)	34"	17½"	21¼"	250



THE GORMAN-RUPP COMPANY
306 BOWMAN STREET, MANSFIELD, OHIO

Distributed by: Guyan Machinery Co., Logan, W. Va. — Weinman Pump & Supply Co., Pittsburgh, Pa. — McComb Supply Co., Harlan, Ky. — Bittenbender Co., Scranton, Pa. — Industrial Supply Co., Terre Haute, Ind. — Hoe Supply Co., Christopher, Ill. — Central Supply Co., Greenville, Ky. — Ebbert & Kirkman Co., Inc., Birmingham, Ala. — Henszey Co., Watertown, Wisc. — Union Supply Co., Denver, Colo.

nolds, J. D. Davis, W. H. Ode, R. E. Brewer and G. W. Birge, U. S. Bureau of Mines, † TP 691; 43 pp., 5½x9½-in.; paper; price, 15c.

Planning Financial Policies, Financial Management Series No. 82, American Management Association, ° 44 pp., 6x8½-in.; paper; price, 50c. Foreign trade, government controls, working capital and business financial methods.

Over-Hauling Pension and Profit-Sharing Policies, Financial Management Series, No. 83, American Management Association, ° 32 pp., 6x8½-in.; paper; price, 50c.

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Departmental Cooperation in Cost Reduction, Financial Management Series, No. 85, American Management Association, ° 26 pp., 6x8½-in.; paper; price, 50c. Insurance, sales, customer service, production, office.

° 330 W. 42nd St., New York 18, N. Y.

* Apply to U. S. Bureau of Mines.

† Apply to Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C.

Preparation Facilities

Scotia Coal & Coke Co., Brooklyn, W. Va.—Contract closed with Kanawha Mfg. Co. for Kanawha-Belknap calcium-chloride washer; capacity, 40 t.p.h., 8x3-in. egg.

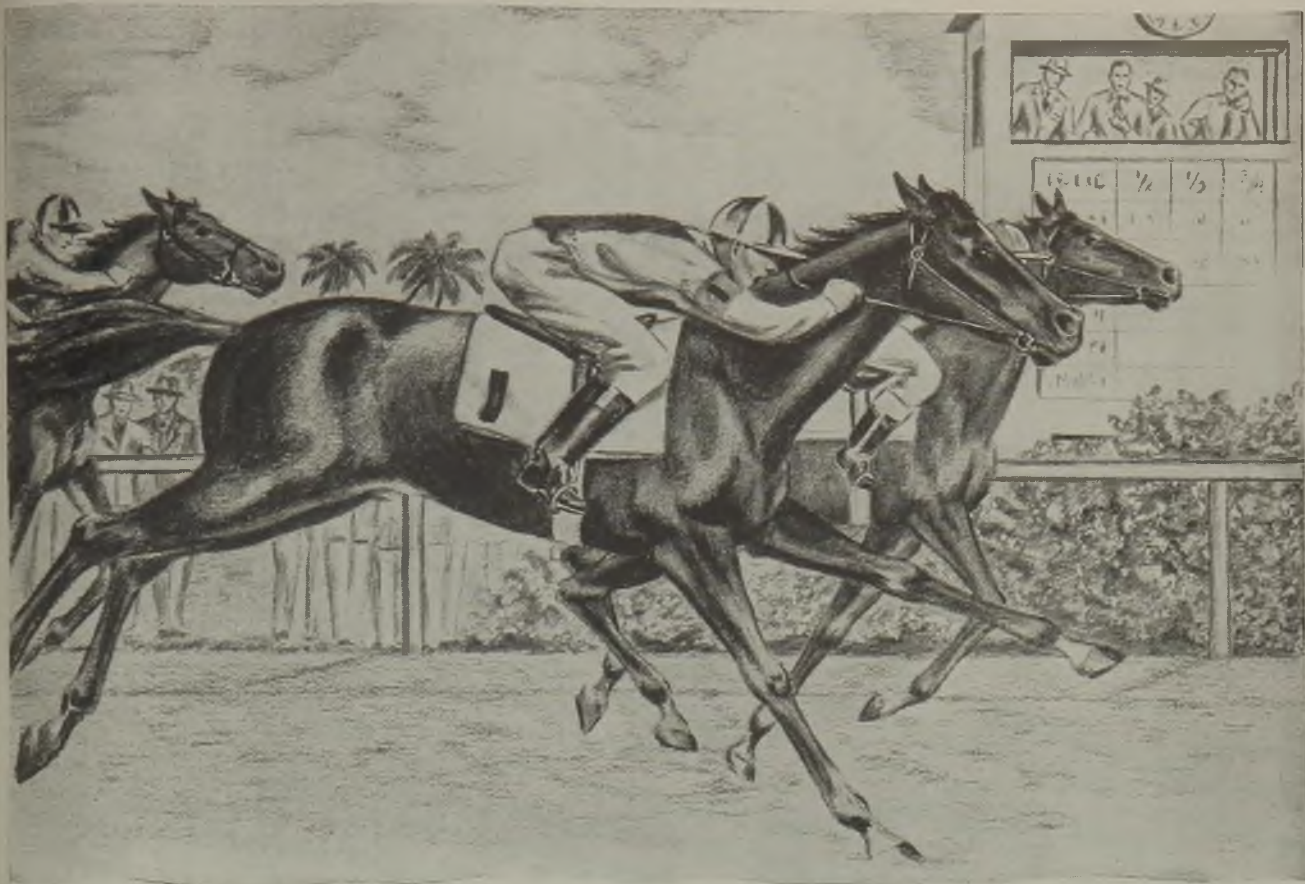
Mary Frances Coal Co., Robson, W. Va.—Contract closed with Roberts & Schaefer Co. for hydro-separator coal-washing equipment; capacity, 50 t.p.h., 3x½-in. coal.

Leccony Smokeless Fuel Co., Besoco, W. Va.—Contract closed with Roberts & Schaefer Co. for Stump Air-Flow coal-cleaning equipment with accessories for cleaning ¾x0-in. coal; capacity, 50 t.p.h.

Franklin County Coal Corp., Royalton No. 7 mine, Royalton, Ill.—Contract closed with Roberts & Schaefer Co. for complete combination wet-and-dry coal-cleaning plant; capacity, 409 t.p.h. of 6x½-in. coal, wet washed; to be washed in R&S tandem hydro-separator units with R&S Hydrotator units as auxiliaries; dry cleaning in R&S Stump Air-Flow coal-cleaning units, 242 t.p.h. of ¾-in.x10-mesh; total capacity of plant, 750 t.p.h.; all Illinois prepared sizes will be produced.

Consolidation Coal Co., Van Lear, Ky.—Contract closed with Roberts & Schaefer Co. for Hydrotator-process equipment for cleaning 1x½-in. stoker coal; capacity, 125 t.p.h.

Rail & River Coal Co., No. 3 mine, Bellaire, Ohio—Contract closed with Roberts & Schaefer Co. for complete coal-preparation plant embodying tandem hy-



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dro-separator coal-cleaning equipment; plant capacity, 450 t.p.h.; washing capacity, 180 t.p.h. of 6x14-in. coal.

Youghiogeny & Ohio Coal Co., Rayland, Ohio.—Contract closed with Roberts & Schaefer Co. for complete tippie and coal-preparation plant; capacity, 300 t.p.h., with facilities for washing 200 t.p.h. of 6x3-in. coal in R&S tandem hydro-separators; standard Ohio prepared sizes will be produced.

Ethel Chilton Mines, Inc., Ethel, W. Va.—Contract closed with Roberts & Schaefer Co. for hydro-separator coal-washing equipment with accessories; capacity, 100 t.p.h. of 3x4-in. coal.

Little John Coal Co., Victoria, Ill.—Contract closed with Jeffrey Mfg. Co. for tippie equipment; capacity, 175 t.p.h. of 6x4-in. raw coal.

Hill Top Coal Co., Janesville, Pa.—Contract closed with Deister Concentrator Co. for eight No. 7 SuperDuty Diagonal-Deck coal-washing tables for No. 4 buck; also two Concenco revolving feed distributors and two Leahy heavy-duty NO-Blind vibrating screens equipped with Concenco water-spray nozzles.

Donaldson Coal Co., Tremont, Pa.—Contract closed with Deister Concentrator Co. for one No. 7 SuperDuty Diagonal-Deck coal-washing table, No. 1 buck.

Jonathan Coal Mining Co., Fred Reed plant, Dornsife, Pa.—Contract closed with Deister Concentrator Co. for one No. 7 SuperDuty coal table, No. 4 buck.

Haddock Mining Co., Beaver Meadows colliery, Beaver Meadows, Pa.—Contract closed with Deister Concentrator Co. for two SuperDuty Diagonal-Deck coal-washing tables, No. 4 buck.

Consolidation Coal Co., Jenkins, Ky.—Contract closed with Deister Concentrator Co. for ten SuperDuty Diagonal-Deck coal-washing tables and one Concenco revolving feed distributor; capacity, 100 t.p.h., 4x0-in. coal.

Woodward Iron Co., Woodward, Ala.—Contract closed with Centrifugal & Mechanical Industries, Inc., for one 48-in. C-M-I centrifugal dryer; addition to present preparation plant.

American Smelting & Refining Co. (For Carbonifera de Sabinas, S.A. Rosita, Coah., Mexico)—Contract closed with Centrifugal & Mechanical Industries, Inc., for three 48-in. C-M-I centrifugal dryers for dewatering minus 4-in. coal.

Muskingum Coal Co., Misco Mine, Zanesville, Ohio.—Contract closed with Centrifugal & Mechanical Industries, Inc., for one 48-in. C-M-I centrifugal dryer for 3x0-in. coal.

Central Indiana Coal Co., Odon, Ind.—Contract closed with Centrifugal & Mechanical Industries, Inc., for one 48-in. Type S C-M-I centrifugal dryer for minus 10-mesh coal.

Rochester & Pittsburgh Coal Co., Kent Nos. 1 and 2 mines, McIntyre, Pa.—Contract closed with Centrifugal & Mechanical

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SAFETY SEAM
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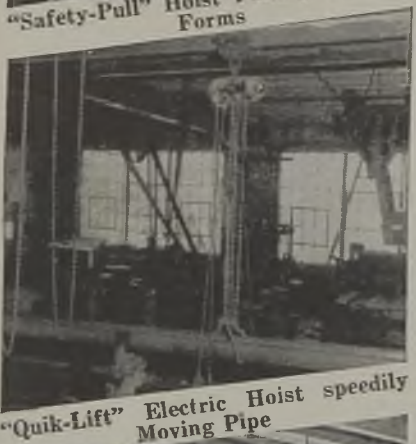
MOUNT VERNON,
ILLINOIS



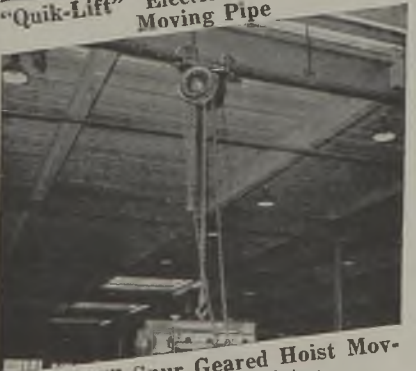
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Industries, Inc., for two 48-in. C-M-I centrifugal dryers.

Knox Consolidated Coal Co., Bicknell, Ind.—Contract closed with Centrifugal & Mechanical Industries, Inc., for two 48-in. C-M-I centrifugal dryers for $\frac{3}{8}$ x0-in. coal.

Mine Fatality Rate Slightly Lower in July

Accidents at coal mines in the United States caused the death of 66 bituminous miners and 7 anthracite miners in July, 1946, according to reports furnished the U. S. Bureau of Mines by State mine inspectors.

For the two industries combined, the July, 1946, fatality rate was 1.30 per million tons, a fraction under that of 1.33 for June, 1946, and less than that for July, 1945, of 1.47, which was later revised to 1.78.

With a production of 50,800,000 net tons, the July bituminous fatality rate was 1.30 per million tons, compared with 1.36 in June and a similar preliminary rate of 1.43 in July, 1945, later revised to 1.69.

The anthracite rate in July, 1946, in mining 5,274,000 net tons, was 1.33 per million tons, over 1½ times the June rate of 0.83 but less than that of July, 1945 of 1.83 per million tons, which was later revised to 2.63.

July, 1946 fatalities, by causes and states, and comparable rates for the first seven months of 1946 and 1945, were as follows:

U. S. COAL-MINE FATALITIES IN JULY, 1946, BY CAUSES AND STATES

State	Underground										Grand total
	Falls of roof	Falls of face	Haulage	Explosives	Electricity	Machinery	Other causes	Total underground	Shaft	Open-cut	
Alabama.....	2	2	2	1	..	..	1	4	..	..	4
Illinois.....	..	..	..	..	..	..	..	..	..	..	..
Indiana.....	1	..	..	..	..	..	..	1	..	..	1
Kentucky.....	4	..	..	..	..	..	..	9	1	..	10
Montana.....	..	..	..	..	..	..	..	..	..	..	..
Ohio.....	2	..	..	..	..	..	..	1	..	..	1
Penna. (bit.).....	10	..	..	..	..	..	..	16	..	..	16
Utah.....	..	..	..	..	..	..	..	..	..	..	..
Virginia.....	2	..	..	..	..	..	..	2	..	..	2
Washington.....	1	..	..	..	..	..	..	1	..	..	1
West Virginia.....	9	..	..	..	..	..	..	19	..	..	19
Total bituminous.....	29	18	18	1	6	5	2	68	1	1	70
Penna. (anth.).....	4	1	..	1	1	..	..	7	..	..	7
Grand total.....	33	19	18	2	7	5	2	68	1	1	70

DEATHS AND FATALITY RATES AT U. S. COAL MINES, BY CAUSES OF ACCIDENTS* JANUARY-JULY 1946 AND 1945

Cause	Bituminous				Anthracite				Total			
	Number Killed	1945	Killed per Million Tons	1946	Number Killed	1945	Killed per Million Tons	1946	Number Killed	1945	Killed per Million Tons	1946
Underground:												
Falls of roof and face.....	219	254	0.766	0.730	61	36	1.757	1.137	280	290	0.873	0.763
Haulage.....	86	128	.301	.368	13	18	.374	.569	99	146	.309	.384
Gas or dust explosions:												
Local.....	..	9	..	.026	..	1	..	.032	..	10	..	.026
Major.....	27	39	.094	.112	..	..	..	..	27	39	.084	.103
Explosives.....	6	14	.021	.040	5	6	.144	.189	11	20	.034	.053
Electricity.....	11	16	.039	.046	3	1	.086	.032	14	17	.044	.045
Machinery.....	14	30	.049	.085	1	2	.029	.063	15	32	.047	.084
Shaft.....	6	7	.021	.020	1	1	.029	.032	7	8	.021	.021
Miscellaneous.....	13	9	.045	.026	9	8	.259	.252	22	17	.069	.045
Total underground.....	382	506	1.336	1.453	93	73	2.678	2.306	475	579	1.481	1.524
Stripping or open-cut.....	10	16	.035	.046	5	2	.144	.063	15	18	.047	.047
Surface.....	26	36	.091	.104	5	6	.144	.190	31	42	.097	.111
Grand total.....	418	558	1.462	1.603	103	81	2.966	2.559	521	639	1.625	1.682

*All figures are subject to revision.

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Drop Forged Links

Drop forged for strength, Superior Swivel and Single Link Couplings are built to stand the gaff. No welds to let go with resulting wrecks. Superior Couplings on your mine cars will prevent accidents and reduce haulage costs. Order Superior Couplings for your replacements and specify them on new equipment.

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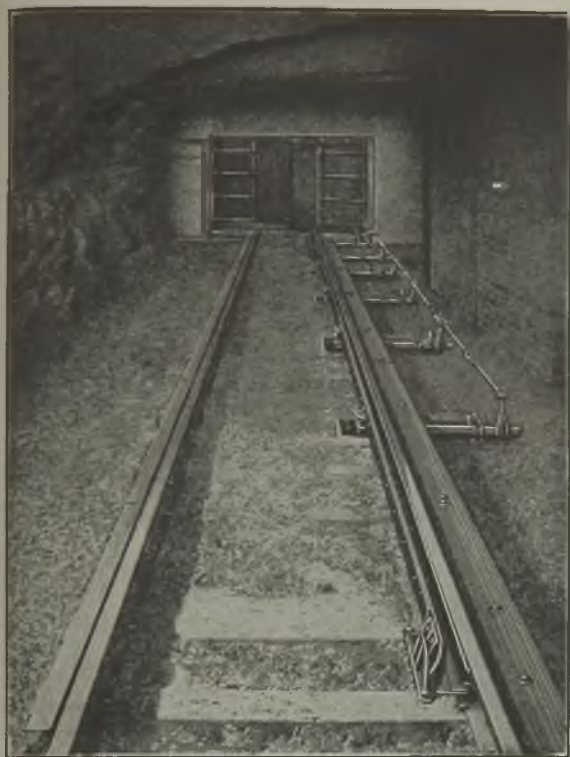


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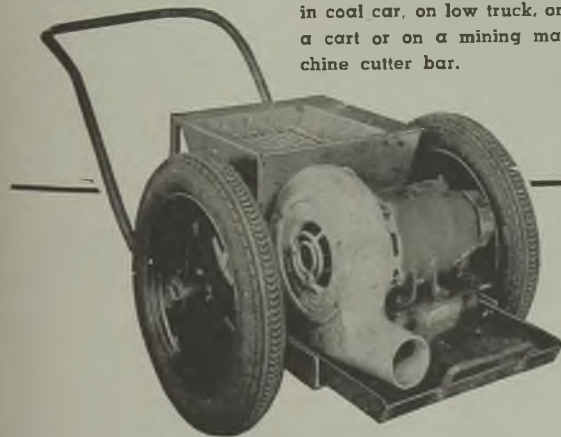
These automatic doors operate under heavy pressures—require no attendant—open and close quickly. They are arranged so that one door opens each way, equalizing air pressure and flow. Construction is rigid but weight is kept at a minimum. We can supply CANTON AUTOMATIC DOORS in types to meet every mine condition.

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... does an expert switchman's job and does it faster with complete safety. Automatically throws switch points ahead or behind trip—or both. Trip can maintain full speed. Switch can be operated by remote control, by the motorman or by hand and is adapted for use as an automatic derailer.

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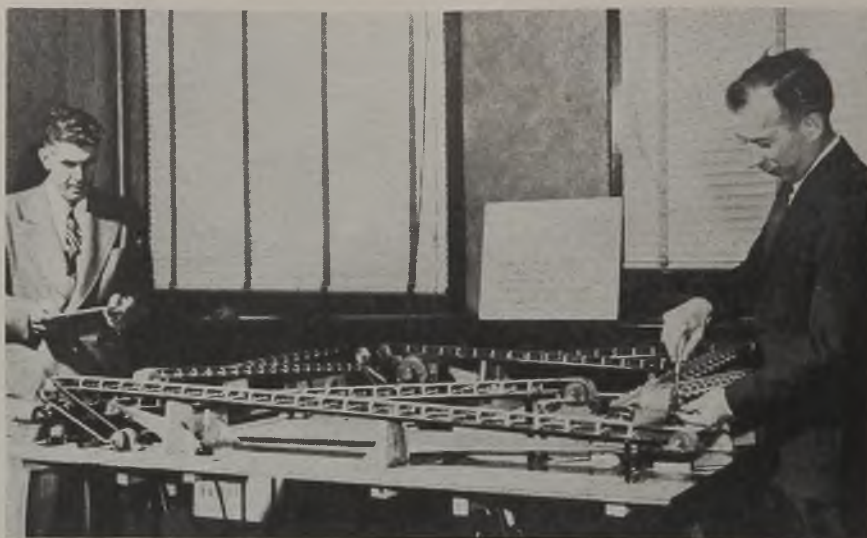
Equipment News

A.C. Motor

A completely new line of a.c. squirrel-cage electric motors featuring reduced size, greater strength and lower maintenance costs has been announced by the Westinghouse Electric Corp., Pittsburgh.

Use of steel throughout in the new "Life-Line" motors has made possible a smaller, more shock-resistant and better appearing motor, without decrease in size or efficiency of the electrical parts, it is said. The "Life-Line" is more than 35 percent smaller in size than its predecessor, yet starting torques have been increased as much as 134 percent and maximum torques as much as 116 percent per pound of motor, with efficiencies and power-factors maintained. According to the announcement, the use of steel equal in thickness to the cast iron it replaces makes an unusually strong motor, with the steel construction also permitting closer clearances and improved engineering.

Design features reflecting decreased and more infrequent maintenance also are stressed. Pre-lubricated ball bearings require no lubrication for five years after the motor is put into operation. Redesign of slot and coil shapes and sizes, connections and other parts, to simplify and facilitate the winding process, is expected to reduce motor failures, since most failures are traced to damage of insulation during winding. In addition, interchangeability of parts on several types of motors is said to simplify and speed manufacture and conversion of the various models in the line. Deliveries thus are speeded up and any conversions necessary can easily be accomplished, according to the manufacturer.



Shaft Seal

A new "Sealol CB" seal for rotating shafts has been announced by the Sealol Corp., 45 Willard Ave., Providence 5, R. I. Designed for original equipment or replacement, the seal is said to make stuffing boxes obsolete and to seal leaking shafts simply, permanently and economically, excluding all foreign material. The Sealol CB is packaged as a complete seal, without any loose parts, and no skill or special tools are required to install the unit, according to the manufacturer. It is available in non-corrosive construction for shaft sizes $\frac{1}{2}$ to 1 in., with other sizes to order.

Two-Way Conveyor

Introduction of the world's first two-way conveyor belt highlighted the recent conference held by the Mechanical Goods Division of the Goodyear Tire & Rubber Co. The four miniature two-way conveyors in the accompanying photograph illustrate this new principle in handling bulk materials. The belts are installed in a manner that permits each belt to carry material on the "return run," thus continually utilizing the top cover of the conveyor.

Wire Stripper

A new universal and automatic wire stripper, Model No. A-02, has been announced by the Holub Industries, Inc., Sycamore, Ill. The new model is said by the manufacturer to strip a wide variety of either solid or stranded copper wires, ranging from No. 22 wire up to and including No. 10. It clamps the wire, cuts the insulation and strips it in one operation. Both automatic and standard models are available.

Rock Drill

Schramm, Inc., West Chester, Pa., offers its newly improved Model D-45 rock drill. Made of drop forgings throughout, all parts are of special-analysis steel, heat-treated for their particular function, the company states.

The new quick-acting strong retainer has met with definite approval, according to the manufacturer. The exhaust ports are arranged to divert the exhaust away from





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 PERMASET PRE-FORMED

ON WORLD'S LARGEST CAPACITY DRAGLINE

For dependable service and long rope life J&L Precisionbilt Perma-set Wire Rope was specified for use on this and other identical draglines for uncovering and digging coal. The twin 260 ft. lengths of 2½ in. 6 x 19, Independent Wire Rope Center, Right Lang Lay Drag Cables are used to pull a huge 26½ yard bucket weighing 73 tons loaded. The repeat orders from this and other draglines prove that J&L Wire Rope gives outstanding service. J&L also makes Precisionbilt Wire Rope for all coal mining operations. Write for further information.

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J&L *Precisionbilt* **PERMASET PRE-FORMED WIRE ROPE**

MAKE UNLOADING COAL EASY

Freezeproof it with

**WYANDOTTE
CALCIUM CHLORIDE**

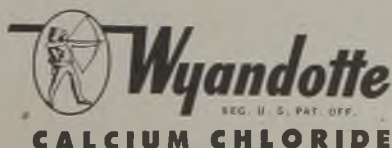
- Coal frozen in the car means lost delivery time and extra labor . . . dissatisfaction on the part of your dealers . . . deterioration of your product. And it's so simple and cheap to avoid all this! Just freezeproof your coal shipments with Wyandotte Calcium Chloride.

- Coal treated with Wyandotte Calcium Chloride is readily handled at the yard—even in freezing weather. It comes out of the car the same grade as when it went in—not battered, smashed or cracked. And you need no special equipment to handle Wyandotte Calcium Chloride for freezeproofing.

- Full information about this safe, dependable and economical agent for freezeproofing coal is yours for the asking. Just mail the coupon.

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Michigan Alkali Division, Dept. 1773
Wyandotte, Michigan
Send me literature and further information about the uses and advantages of Wyandotte Calcium Chloride.

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Title _____



WYANDOTTE CHEMICALS CORPORATION
Michigan Alkali Division, Wyandotte, Michigan



operator and are of ample size to prevent freezing in the most severe weather. Operated by a patented new-type valve, which is lighter and faster, the drill can be furnished in dry-blower and wet type for $\frac{1}{2}$ - or 1-in. steel. Bulletin D-45 is available from the manufacturer.

Insulating Varnish

A new internal-curing insulating varnish to cut curing time up to 50 percent yet involving no change in curing equipment has been announced by Irvington Varnish & Insulator Co., Irvington, N. J. Known as Harvel 912C, it is a new member of the Harvel series of phenol-aldehyde varnishes produced by Irvington. Typical operational curing schedule in standard convection ovens, based on actual coil curing, is: two to four hours at 285 deg. F.; three to five hours at 260 deg. F.; four to six hours at 250 deg. F. These schedules vary slightly with coil size and iron mass and the periods can be reduced with infra-red equipment, it is said.

In addition to faster curing schedules, 912C also provides greater dip-tank and storage stability while maintaining all the favorable electrical and chemical properties of Harvel varnishes, according to the manufacturer. Information and samples can be secured from the manufacturer.

Outdoor Welder

A new twin-unit, outdoor a.c. arc welder in a single inclosure has been announced by the electric welding division, General Electric Co., Schenectady, N. Y. Each of the two circuits in the welder can be used simultaneously and independently with electrodes up to $\frac{1}{8}$ in. in diameter or

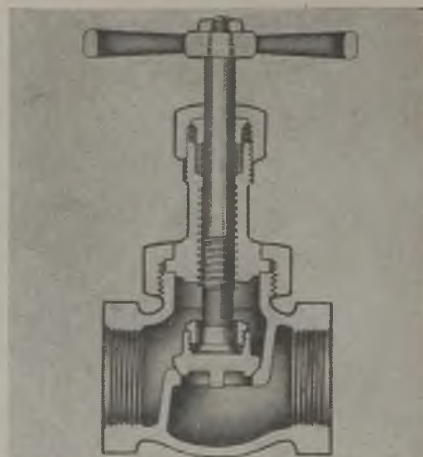


combined into one circuit for heavy welding with $\frac{3}{8}$ -in. electrodes, according to the manufacturer. The units have a current range of from 90 to 270 amp. when used singly, and from 180 to 540 amp. when operated in parallel.

Both welders are equipped with a control reducing the open-circuit voltage to approximately 30 v. when the machine is not welding, but which makes full power available the instant the arc is struck. Both halves are supplied through a single set of primary terminals, so that only one power-line circuit to the unit is required.

Valves

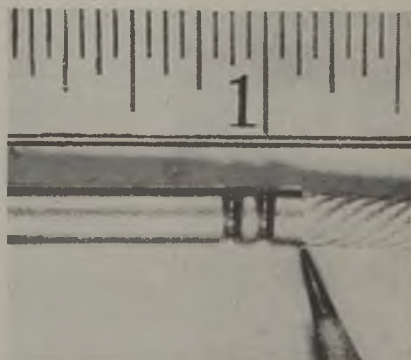
Reinstatement of its line of 18-8 Mo alloy-steel corrosion-resistant valves and fittings, manufacture of which was discontinued during the war, has been announced



by the Crane Co., Chicago 5. The Crane 18-8 line, as reinstated, includes globe, gate, check and relief valves in both screwed and flanged patterns, liquid-level gages and screwed and flanged fittings. Sizes in screwed-end patterns are $\frac{1}{4}$ to 2 in., and in flanged-end patterns, 1 to 4 in. The valves and fittings are recommended for service in handling corrosive mine waters, various acids and chemicals.

Blasting-Fuse Cap

RDX, the war's most powerful chemical explosive, is the basic charge of the new Western "Big Inch" blasting-fuse cap, declares the explosives division of Olin Industries, Inc., East Alton, Ill. Because of its tremendous power, it has made possible the smallest blasting cap ever developed, and



In the Mine . . . in the Preparation Plant . . . in the Power Plant

Warren Pumps

**increase capacity
lower maintenance costs
save power**

A Pennsylvania mine replaced two other pumps with one Warren pump. In four years, power savings alone amounted to \$10,105 . . . savings in maintenance costs had totalled more than the original cost of the pump.

Another mine faced the problem of pumping 50% more gallons per minute. The question was whether to replace the existing pump with a larger one or to add a second pump. The answer: The original was replaced with a Warren which now uses the same motor and delivers 2400 g.p.m. in contrast with the 1600 g.p.m. of the other pump . . . with no increase in power requirements.

These instances are not unusual. Warren produces results because of an intimate knowledge of mine requirements and highly specialized experience in building pumps.

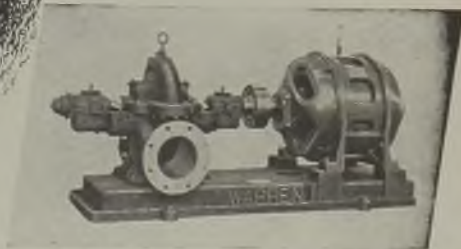
There is a Warren representative near you. Why not get his suggestions on your problem? Write . . .

Warren Steam Pump Company, Inc.

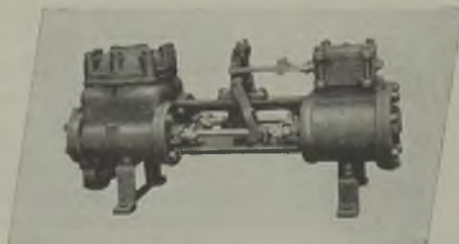
WARREN, MASSACHUSETTS

Atlanta Boston Chicago Cleveland Denver Detroit Houston
Hartford Los Angeles Minneapolis New Orleans New York
Philadelphia Pittsburgh Richmond San Francisco Seattle St. Louis

CA-1



Warren DM and DL, single stage, double-suction centrifugal pumps are widely used in mines and preparation plants. Special metals, capacities, heads, etc., are available to meet any operating conditions. Complete description in Bulletin 227.

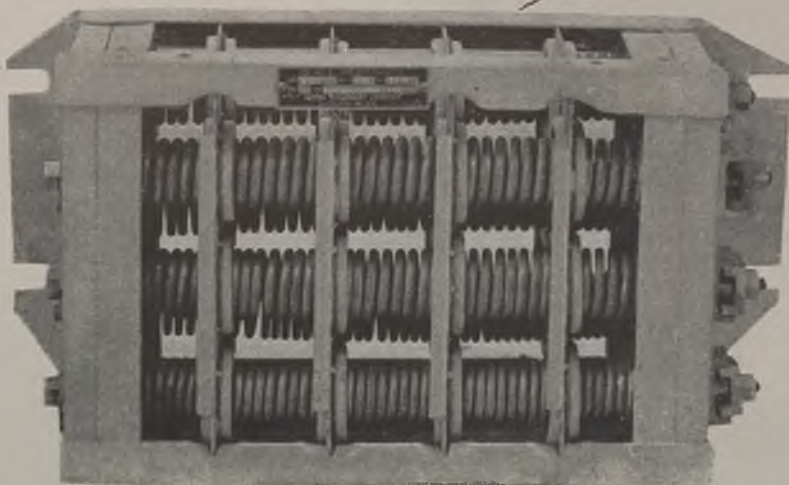


The "Realwear" is one of the Warren pumps used in power plants. New standard features are: Molded Piston Cup Packing, Stainless Steel Durable Valves, Stainless Steel Piston Rods and All-Steel Valve Gear. The TM type (below) is used in plants having higher boiler pressure than could be handled by the "Realwear" steam pump. Write for information.



Warren Pumps

MINING MACHINE *resistances*



GUYAN MACHINERY COMPANY

Logan
W. Va.

Let us know the model and make of your mining machines and we'll furnish Guyan Resistance units with the same number of taps, numbered the same as the original wiring diagram and with bolt holes that line up!

Write for the Guyan Catalog now.

FLEXIPIPE

The improved flexible tubing for
mine and tunnel ventilation

This flexible air tubing is ready for immediate, easy installation. On account of its flexibility, it can be put up or taken down in a fractional part of the time required by a more rigid means of face ventilation.

Write for free sample and full information

BEMIS BRO. BAG CO.

412 Poplar Street, St. Louis 2, Mo.

MORE HAULAGE FOR 20% LESS BATTERY CAPACITY

Oil-tight, non-leak transmission. Use regular auto oil; change every 6 months.

Strong, Simple, Low maintenance cost.



Extra-long journalsprings assure better trackability.

Large motor, to assure more horsepower per ton weight of locomotive. Can be equipped with hydraulic brake.

GREENSBURG "RANGER"

This locomotive being used for main line haulage at the Blacksmith Coal Company, Novinger, Missouri. This is a 4½ ton locomotive, operating on 30" gauge track. This locomotive built from 3½ to 10 tons — either single or double motor-drive — 16" to 56½" track gauge.

All Greensburg Locomotives are CUSTOM-BUILT to your requirements

THE GREENSBURG MACHINE CO. 101 STANTON ST. GREENSBURG, PA.

with 50 percent more power than TNT, according to the manufacturer. RDX has a rate of detonation surpassing that of any other commercial explosive. The new cap is hardly more than 1½ in. in length and less than ¼ in. in diameter.

Made of shining aluminum, the new caps are more easily found when accidentally dropped on dark mine floors. Because the new cap is so short, it also is easier to bury it completely in the smallest stick of dynamite, reducing the risk of its being struck with a tamping bar, it is said. The new "Big Inch" caps can be used in all types of blasting and are said to be safer to handle, as they can withstand shock of a heavy impact without detonating.

Welding Goggle

A new head-rest welding goggle which can be instantly thrown into an "off guard" position for rapid inspection of set-ups is announced by American Optical Co., Southbridge, Mass. Developed to eliminate waste motion and speed up weld-



ing operations, according to the manufacturer, the goggle is attached by a friction joint to a comfortable head-gear assembly. Using only one hand, the welder can flip the goggle above his eyes, where it is held securely by the friction joint, so that he has complete unimpeded vision. Adjustable for individual features, the goggle is equipped with opaque eyecups especially designed for wearing directly over eyes or over personal prescription glasses. It also has indirect, ventilated side shields to reduce fogging, and is available with either Noviweld or Noviweld-Didymium lenses in certain shades.

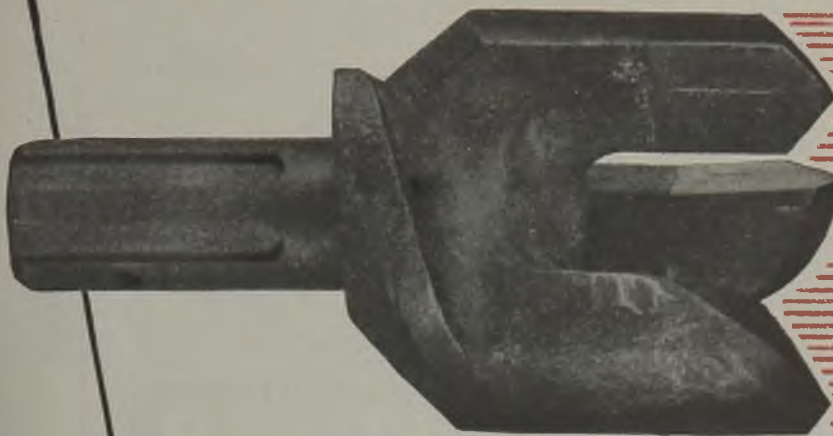
Air-Hose Coupling

The new Wiggins Quick Connect air-hose coupling, guaranteed leakproof under working pressures up to 1000 lb., eliminates the wasteful leakage of air generated at a substantial power cost, according to the manufacturer, E. B. Wiggins Oil Tool Co., Inc., 3424 East Olympic Blvd., Los Angeles 23, Calif.

In addition to a positive seal against leaks, an important exclusive feature is its greater ease of service, it is said. Changing gaskets takes only a minute, reducing maintenance time and keeping production delays down to a minimum. A simple tool such as a small screwdriver is all that

1500 FEET DRILLED

*and its Cutting Edges
are still Keen!*



**That's The Record of The
First Kennametal 3-Way Bit.
Today these Modern Drill Heads
Give Even Better Service,
Because They Are . . .**

Now improved

by a properly shaped extension of the shank projecting between the prongs to form an effective core breaker; and by modification of the cutting edge angles, that has resulted in distinctively extended service life.



The Kennametal-tipped 3-Way Drill Bit shown above was the first of its type ever used by a surface mine. After drilling thirty 50-foot holes in typical overburden, its edges were still keen. Thus, the tool material that had previously revolutionized metal-cutting, demonstrated that it was ready to do an outstanding job for America's mining industry.

Today, Kennametal 3-Way Drill Bits are at work at scores of leading surface mines. Typical field experiences are as follows:

- Ohio mine reports: "Have used a Kennametal Bit continuously for one month and it is still cutting faster than any other type bit we ever used."
- Indiana mine says: "First Kennametal Bit used drilled holes needed in removing one-half million cubic yards of overburden, before being resharpened."
- Pennsylvania mine reports: "Kennametal Bit put down 15 holes, 60 feet deep, in 390 minutes, in overburden consisting of hard shale imbedded with limestone nodules. Did not need resharpening."

The Kennametal Drill Bit is a sturdy, one-piece heat-treated alloy steel casting, having cutting tips of Kennametal—the tool material that is much harder than the hardest tool steel (75 Rockwell C compared to 66). It is scientifically contoured to maintain gage throughout its long life. The shank is welded-in bar steel, adaptable to fit all common types of augers. *It is the first and only bit that drills holes without taper—and drills more of them faster, cheaper. Ask us to show you the evidence.*



KENNAMETAL

SUPERIOR CEMENTED CARBIDES

KENNAMETAL Inc., LATROBE, PA.

Protection Against TRAMP IRON for YOU and YOUR CUSTOMERS



with **DINGS**
Magnetic Pulleys

Protect both your own coal handling equipment and your customer's stokers by installing a powerful Dings Magnetic Pulley to eliminate tramp iron before it can cause expensive damage. Separation is automatic and positive . . . Operating and maintenance cost about a penny a day, depending on pulley size . . . Some operators report "no cost" tramp iron protection because the sale of scrap removed more than pays for depreciation charges and operating expense! Size for size there are no more powerful magnetic pulleys built than Dings. Get full details from Dings today.

NEW! DINGS

*Magnetic
Drill
Extractor*



A powerful Alnico Magnetic Drill Extractor to save redrilling blast holes when drill rod or bits break off in the hole. Dings Extractors lift up to 25 times their own weight . . . Easy to use . . . Can be carried in a pocket . . . Write for data sheet containing complete information.

DINGS MAGNETIC SEPARATOR CO.
506 E. Smith Street, Milwaukee 7, Wisc.

Dings

"HIGH INTENSITY"

NEW LIFE FOR OLD CABLES

7 Point Superiority



- 1 Double grip . . . both sides adhesive.
- 2 Great tensile strength . . . tough.
- 3 Won't tear, ravel or pucker.
- 4 Resists abrasion.
- 5 Acid- and alkali-proof.
- 6 Extra thick . . . one layer insulates.
- 7 Exceeds A.S.T.M. specifications by 300% in adhesive-ness, 26% in tensile strength, 290% in dielectric strength.

RUBEROID INSULATING TAPE

The RUBEROID Co., Executive Offices, 500 Fifth Avenue, New York 18, N. Y.

is needed, and the coupling body does not have to be disassembled but remains intact while the gasket is quickly removed and replaced. The speed with which the coupling may be connected and disconnected also cuts operating costs and promotes efficiency, the manufacturer states. A quick down-pull and push-up on knurled ring and the coupling is connected with a safe, leakproof seal. Another quick pull on knurled ring disconnects the coupling instantly.

Fire Hose

American-LaFrance-Foamite Corp., Elmira, N. Y. announces a new "All Weather" line of water-repellent, mildew-resistant fire hose. The new All-Weather hose is double-jacket tailored and is a durable hose, built to withstand the abusive, abrasive action of gravel cinders or rough surfaces over which it may be dragged and able to withstand extreme temperatures, from freezing cold to blistering heat, according to the company.

The hose is said to be flexible for easy handling at time of fire, and for racking snugly and completely into a hose body before and after service. Both hose jackets of this white All-Weather line are water-repellent and receive a double treatment of the All-Weather process to make doubly sure that all fabric is thoroughly impregnated. The Alaseptic treatment (mildew-inhibiting) is applied at the same time.

Industrial Notes

Joy Mfg. Co., Pittsburgh, has appointed Hugo C. Nyquist district manager of the anthracite area with offices at 125 Adams Ave., Scranton, Pa. Mr. Nyquist has been connected with the Tennessee Coal & Iron Co. since 1937, serving as chief engineer of the coal division for the past several years. For ten years prior to that he was with the Hudson Coal Co.

The Okonite Co., Passaic, N. J., has named R. S. Keefer sales manager, succeeding Edward J. Garrigan, vice president in charge of sales, who died in July. Mr. Keefer, formerly assistant sales manager of the company's Hazard Insulated Wire Works Division, joined Hazard in 1922 and has been a member of the sales department for the past 20 years.

American Car & Foundry Co., New York, has elected J. L. Onderdonk, associated with the company since 1912, assistant vice president. He will continue to make his headquarters in Chicago.

Cummins Engine Co., Inc., has named Don Cummins, associated with the company since 1919, quality manager.

Carnegie-Illinois Steel Corp. has named Robert C. Myers assistant manager of the market development division of its sales department.

Koppers Co., Inc., Pittsburgh, has appointed E. J. McGhee sales manager. In his new capacity Mr. McGhee, who is a

LOOK into UNIT!



**CONTACT
FACTORY
DIRECT**
FOR PRICE
AND DELIVERY



**FULL
VISION
CAB**

Operator can see in ALL directions. No "blind spots". Promotes safety. Increases job efficiency.

1/2 AND 3/4 YD. EXCAVATORS

UNIT CRANE & SHOVEL CORP.



Lift the cab from any UNIT crane or shovel. You'll find the following exclusive features not found in any other comparable machine:

- Compact, modern design . . . all parts readily accessible.
- Gasoline engine mounted in straight line with main machinery.
- Drop-forged alloy steel gears and splined shafts, heat-treated.
- Automatic traction brakes . . . no manual control required.
- Disc type clutches, interchangeable with easy and foolproof adjustment.
- One-piece cast gear case...simple in design and built as carefully as the finest automotive transmission . . . dust-proof and oil tight.

And that isn't all! A UNIT costs less . . . is more economical to operate . . . is built to endure. Investigate today.

Convertible TO ALL ATTACHMENTS

Shovel . . . Clamshell . . .
Dragline . . . Trenchhoe . . .
Magnet . . . Pile Driver
. . . Back Filler.

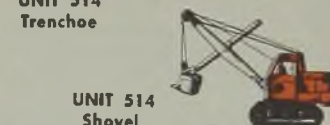
UNIT 1020
Clamshell



UNIT 357
Mobile Crane



UNIT 514
Trenchhoe

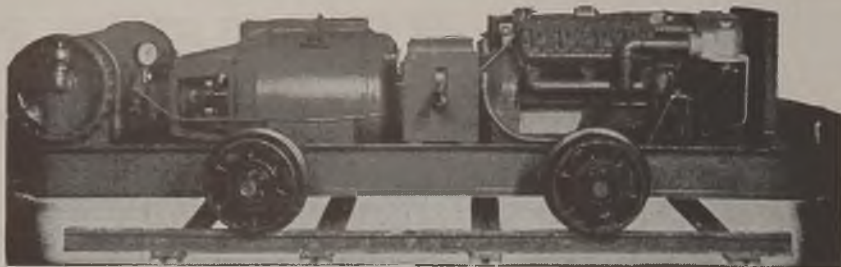


UNIT 514
Shovel



5 TO 10 TON CRANES

6307 W. BURNHAM ST.
MILWAUKEE 14,
WISCONSIN, U.S.A.



ACME "LOWBOY" Model 110, MINE CAR AIR COMPRESSOR

Just ask for
BULLETIN 3920

For full particulars on construction,
operation, and general specification.

The Model 110 Acme "Lowboy" Mine Car Air Compressor is designed to meet the mining conditions existing today, especially in mechanized mining.

Low—compact—light weight—it is adaptable to both high and low seam operations and offers the additional advantage of efficient, economical service.

Designed particularly for mine service the unit is an adaptation of the Schramm Fordair which has proved highly efficient and dependable in many fields of service.

Its mechanical simplicity—portability—and rugged construction make it ideal for mine use.

ACME COMPRESSOR CO.

Williamson, West Virginia

CORE DRILLING FOR COAL



Keep down cost per foot by using Acker light-weight, sturdy core drills—simple to operate and easy to move in rough country.

.....

Ideal for determining nature and depth of over-burden before strip mining. Accurate cores of coal seams by using single or double tube core barrels. Will operate diamond—alloy—steel shot bits.

.....

Choice of mountings—trailer—truck—drag skid.

.....

Drill tools and equipment for coal and mineral prospecting and all subsurface exploration.

.....

Send for literature

ACKER DRILL CO. SCRANTON 3, PA.

vice president of the company, will coordinate Koppers sales activities on a company-wide basis.

Kennametal Inc., Latrobe, Pa., has announced the establishment of a national organization for selling and servicing Kennametal-tipped mining tools, and has appointed district supervisors for each of its four mining districts as follows: Pennsylvania and Ohio, under Robert J. McGinnis, whose headquarters are at the Latrobe office; West Virginia, Virginia, Tennessee, Alabama, and Eastern Kentucky, under Orval Robson, 95 South Washington St., Waynesburg, Pa.; Illinois, Indiana, Kansas, Missouri, Iowa, and Western Kentucky, under Robert A. Thompson, Franklin Hotel, Benton, Ill.; Montana, Idaho, Nevada, Arizona, Utah, Wyoming, Colorado, and New Mexico, under Orville Phipps, P. O. Box 1716, Denver, Colo.

Gar Wood Industries, Inc., has named W. Gerard Tuttle, formerly director of industrial relations of the San Diego division of Consolidated-Vultee Aircraft Corp., director of industrial relations. Robert L. Bartley, for the past twelve years sales engineer of Gar Woods tank division, has been named sales manager of the division.

Jessop Steel Co., Washington, Pa., has named I. B. Anderson, associated with the steel industries for 24 years, manager of its stainless steel division.

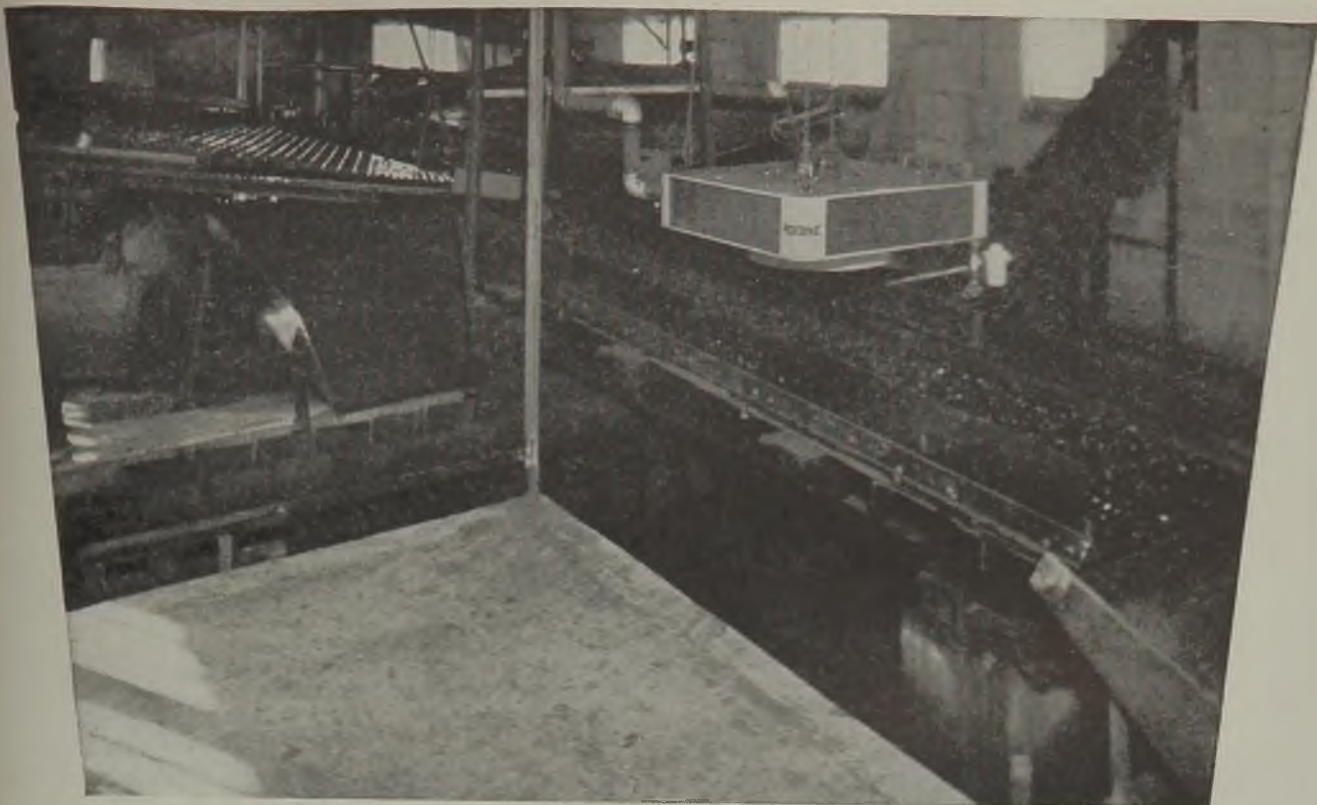
Coal Operators Casualty Co., Greensburg, Pa., has announced the addition of Alabama to the list of states in which it is writing business. According to the announcement, the move is a part of the company's expansion program to increase the volume of workmen's compensation and public liability insurance for both coal and commercial risks.

Alloy Steel Products Co., Linden N. J., has appointed Emil G. Holmberg consulting metallurgist. Mr. Holmberg for a number of years was research metallurgist specializing in corrosion problems at the Belle, W. Va., plant of E. I. duPont de Nemours & Co., Inc.

Wickwire Spencer Steel, Division of the Colorado Fuel & Iron Corp., has moved its general sales manager's office from New York City to 361 Delaware Ave., Buffalo, 2, N. Y., in a step to bring the top sales and production officials into one location for better coordination and service to the trade.

Southern Research Institute, Birmingham, Ala., has announced that with the completion of an additional group of laboratories, it plans to extend its research services into the fields of applied biochemistry, pharmacology, toxicology, and industrial hygiene. The new facilities of the biochemistry division are designed to assist producers and manufacturers and to aid industry generally in the study of industrial and mining hazards arising from physiologically active fumes and aerosols. Dr. W. A. Lazier is director of the Institute and Dr. Howard E. Skipper is director of the division.

Acme-Hamilton Mfg. Corp. Trenton, N. J. has been formed through the merger of the Acme Rubber Mfg. Co. and the



● Built by THE DEISTER CONCENTRATOR CO.

GIVING COAL A BATH ON SKF BEARINGS

In the washing plant of the Pekin Mining Company, No. 7 SuperDuty Diagonal-Deck Coal Washing Tables produce a premium fuel for domestic stokers. SKF Bearings are used in the Concenco Head Motions to give a full measure of dependable bearing performance. Here, SKF Bearings combine correct alignment with freedom

from adjustments and the ability to take varying loads without binding. In exchange for proper lubrication, they last as long as the machine to which they are assigned. Because SKF makes many types of ball and roller bearings, seek the advice of an SKF engineer. He will help you select the right bearing for the right place.

6140



The "C-M-I" CONTINUOUS CENTRIFUGAL

is being used in the most modern cleaning plants for dewatering the minus 1/4" or 3/8" sizes or reclaiming the minus 10 mesh.



Whatever the feed size is, the product from the "C-M-I" contains less surface moisture than that obtained from any other type of mechanical dewatering and at a cost of only a few cents per ton.

**CENTRIFUGAL AND
MECHANICAL
INDUSTRIES
INC.**

3600 SOUTH SECOND STREET
ST. LOUIS 18, MO.

Hamilton Rubber Mfg. Corp. Officers of the new firm are Albert M. Kahn, president, A. J. Kaminsky, executive vice president and treasurer, Peter Jenkins, vice president, and Charles J. Gale, secretary.

National Tube Co., Pittsburgh, has appointed Henry J. Wallace, recently sales manager of the eastern area, as general manager of sales to succeed W. F. McConnor, who recently was elected National Tube vice president in charge of sales.

Ward LaFrance Truck Division, Great American Industries, Inc., Elmira, N. Y., has promoted Clinton W. Wiley, formerly domestic sales manager, to the post of distribution manager. Nils J. Björck, previously acting chief engineer, has been named consulting engineer for Ward La France's fire apparatus sales. Guy V. Brown, formerly executive assistant to the president of the McCord Corp., has been appointed factory manager of the division.

Anaconda Wire & Cable Co., New York, has named C. H. Porter, formerly eastern sales manager, manager of industrial, wholesaler and contractor sales.

Fafnir Bearing Co., New Britain, Conn., has elected Fayette Leister, associated with the company since 1921, vice president in charge of engineering.

National Malleable & Steel Castings Co. has elected Cleve H. Pomeroy, vice president and secretary-treasurer, president of the company, succeeding Charles H. McCrea, deceased.

Stearns Magnetic Mfg. Co., Milwaukee, has appointed Curtis H. Stout, Little Rock, Ark., sales representative for the State of Arkansas.

B. F. Goodrich Co., Akron, Ohio, has named Clyde O. DeLong, with the company for 28 years, manager of its industrial-products sales division, succeeding Fred A. Lang, recently appointed general manager of a newly created shoe-products sales division.

R. G. LeTourneau, Inc., Peoria, Ill., has announced several personnel changes in its general sales division. Wendell Richards, district sales representative, has been promoted to the post of market-research manager. Cloyd Richards, assistant service manager, has been named general service manager to succeed C. F. Zimmerman, who recently transferred to the sales field. O. A. "Jack" Williams, district sales representative in Ohio, Indiana and Michigan, has been appointed eastern sales manager to succeed Harry Conn, resigned. Replacing Williams is C. F. Zimmerman, former general service manager, who has been with the firm since 1937. Also announced was the appointment of Harold R. McQuarrie, eastern credit manager, to the newly created post of assistant to the domestic sales manager.

Lovejoy Flexible Coupling Co., Chicago, has appointed Walter B. Briggs, formerly manager of the power transmission division of Ideal Industries, Inc., general manager of its power-transmission division.

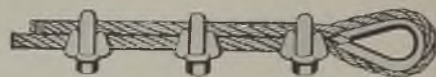
durable!

Galvanized, drop-forged steel!



Mfd. by American Hoist & Derrick Co., St. Paul.

CROSBY CLIPS



SIGN OF QUALITY



PACKING

for

MINE PUMPS

Resists acid mine waters. Keeps grit out of stuffing box. Three types.

• MARLO ALL PURPOSE METALLIC PACKING

Best ever devised. Will not freeze at 70° below, soft, pliant, like fibrous types, yet easier to handle. Won't cut, score or corrode moving parts.

• "TWIN-TWIST" SEMI-METALLIC PACKING

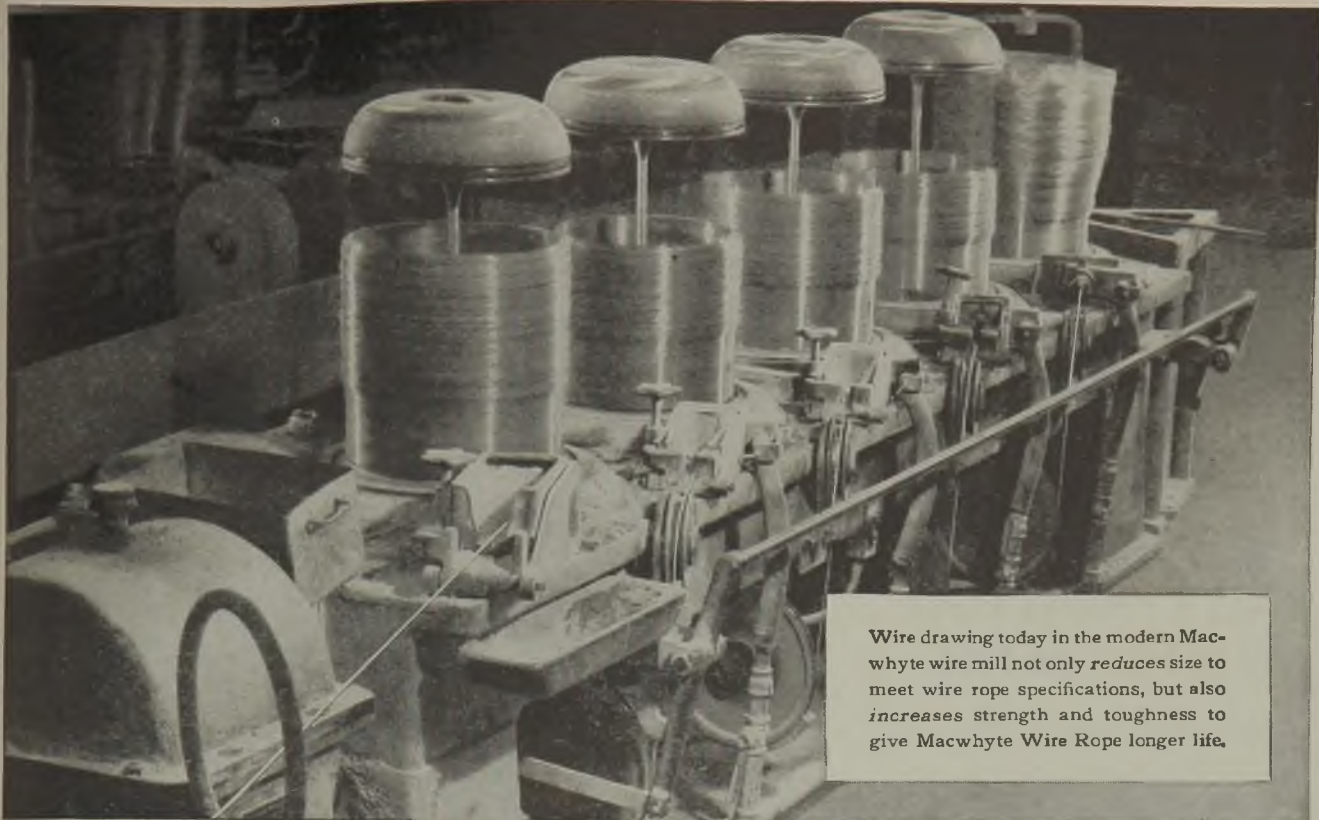
Metal strands twisted with asbestos. Anti-frictional. Durable. Economical. Remarkable future up to 550° F.

• "RED WATER" SEMI-METALLIC PACKING

Most modern development for all hydraulic applications. A solid-packing vegetable fibre combined with metal strands. Retains form under any conditions.

THE MARLO COMPANY

38 HOWARD ST.
NEW YORK, N. Y., U. S. A.



Wire drawing today in the modern Macwhyte wire mill not only *reduces* size to meet wire rope specifications, but also *increases* strength and toughness to give Macwhyte Wire Rope longer life.

Metal flows cold TO INCREASE YOUR DOLLAR VALUE *in Macwhyte Wire Rope*

You get a better, longer lasting Macwhyte Wire Rope, because we cold-draw rope wire from heat-treated wire rods.

Tungsten-carbide dies, polished to a satin-finish with diamond dust and oil, are used. The wire is p-u-l-l-e-d through the dies cold. This results in an extremely smooth round wire of practically double strength with great flexibility to resist bending fatigue.

Precision Wire drawing by Macwhyte (ex-

clusively for Macwhyte Wire Rope) is another reason why Macwhyte PREformed internally lubricated wire rope is your best buy.



Here's a helpful wire rope buyer's guide: The 170-page, completely indexed Macwhyte G-15 catalog will be sent free if you are a wire rope user. Just write or call any Macwhyte distributor.



MACWHYTE WIRE ROPE

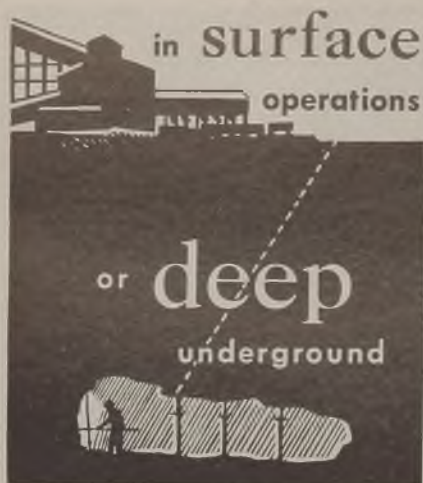
Manufactured by Macwhyte Company

2931 Fourteenth Avenue, Kenosha, Wisconsin

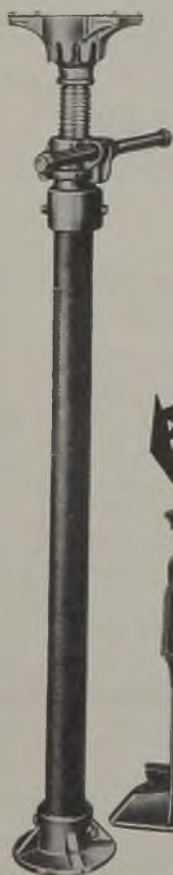
Mill Depots: New York • Pittsburgh • Chicago • Minneapolis • Fort Worth • Portland • Seattle
San Francisco • Los Angeles • Distributors throughout the U. S. A. and other countries

MACWHYTE PREformed and Non-PREformed Internally Lubricated Wire Ropes . . . MONARCH
WHYTE STRAND Wire Rope . . . Special Traction Elevator Rope . . . ATLAS Braided
Wire Rope SLINGS . . . Hi-Fatigue Aircraft Cables, Assemblies, Tie-Rods . . . Stainless Steel
Wire Rope . . . Monel Metal Wire Rope, Galvanized Wire Rope.

Make MACWHYTE your headquarters for WIRE ROPE and SLINGS



count on dependable
DUFF-NORTON
MINING JACKS
 for strong, safe,
 easy operation!



For every job in and around the modern mine, there is a Duff-Norton Mining Jack to speed up your operations; give you safer mining; cut costs and make work easier.

Your industrial distributor will be glad to give you the details on the Standard Duff-Norton Mine Roof and Timbering Jacks and the new Tailor-Made Type Jack Fittings. Ask him also to show you where other Duff-Norton Jacks can meet your specific requirements!

MINE ROOF JACK



GENERAL PURPOSE JACK

WRITE
 for descriptive bulletins on the complete line of Duff-Norton Mining Jacks.

THE DUFF-NORTON MFG. CO.
 PITTSBURGH, PA.

There is a Representative Near You!

Mathieson Alkali Works, New York, has named Harry Ensminger to head the company's newly formed fire-protection department, which will specialize in both high- and low-pressure, built-in carbon-dioxide systems.

Caterpillar Tractor Co., Peoria, Ill., has appointed Robert D. Evans, formerly chief field engineer of R. G. LeTourneau, Inc., civil-engineer consultant on earth-moving equipment and its applications.

Joyce-Cridland Co., Dayton, Ohio has appointed H. H. Landis as eastern division manager, with offices in Dayton.

J. V. Hammond Co., Spangler Pa., has announced expansion of its manufacturing facilities with the formation of the Clearfield Wood Products Co., Clearfield, Pa., to manufacture shovel handles, trolley and tamping poles and other wood products. Partners in the new enterprise with J. V. Hammond are Urban Weaver and Robert E. Dovan, who are connected with the Hammond company in a supervisory capacity.

General Detroit Corp., has appointed Gail Rutledge midwestern regional sales manager with offices in Chicago. Succeeding Rutledge as assistant to the vice president and coordinator of national accounts is Harold J. O'Neill, formerly central states zone sales manager.

Beckwith Machinery Co., Pittsburgh, has named Hugh A. Cameron, formerly Wilkes-Barre branch manager, general sales manager. He has been associated with the company for 25 years.

Trade Literature

Mine Cars—American Car & Foundry Co., 30 Church St., New York 8, N. Y. Catalog illustrates A.C.F.'s complete line of mine cars and parts. Detailed descriptions cover a wide selection of design in rotary-dump, end-dump and automatic-drop-bottom-type mine cars and includes construction and design features.

Diesel Lubrication—Sun Oil Co., Philadelphia 3, Pa. Technical Bulletin No. B-1 (Revised) thoroughly describes the design and operation of diesel engines, explaining and illustrating in detail the operation and conditions affecting the various parts with regard to proper lubrication. Cut-away views and recommended lubrication practices for a number of makes are included.

Drills—Paris Mfg. Co., Paris, Ill. Individual folders describe the Parmanco two-speed mechanical-feed horizontal drill and the Parmanco vertical drill, for strip-mine work. Operating, construction and maintenance details are explained.

Shovel, Crane and Dragline—Lima Locomotive Works, Inc., Shovel and Crane Division, Lima, Ohio. Booklet No. 82A describes the Lima Type 802 shovel, crane and dragline. The application of "Precision" air control is featured, along with specifications, capacities, working



THE MERRICK FEEDOWEIGHT

Reg. U. S. Pat. Off.

tells rate per hour
 —weight per day

A self-contained automatic conveyor scale, combined with automatic gate to give feed rate control. Powered feed regulator operates gate, without restraint on scale beam. Feed rate may be varied. Large feed opening insures even flow. Uniformly feeds bulk material BY WEIGHT; and automatically totalizes weight of materials fed. Durable. Simple to operate. Rugged, heavy duty design. Slow moving parts mean long life. Easy to install and maintain.

we also manufacture

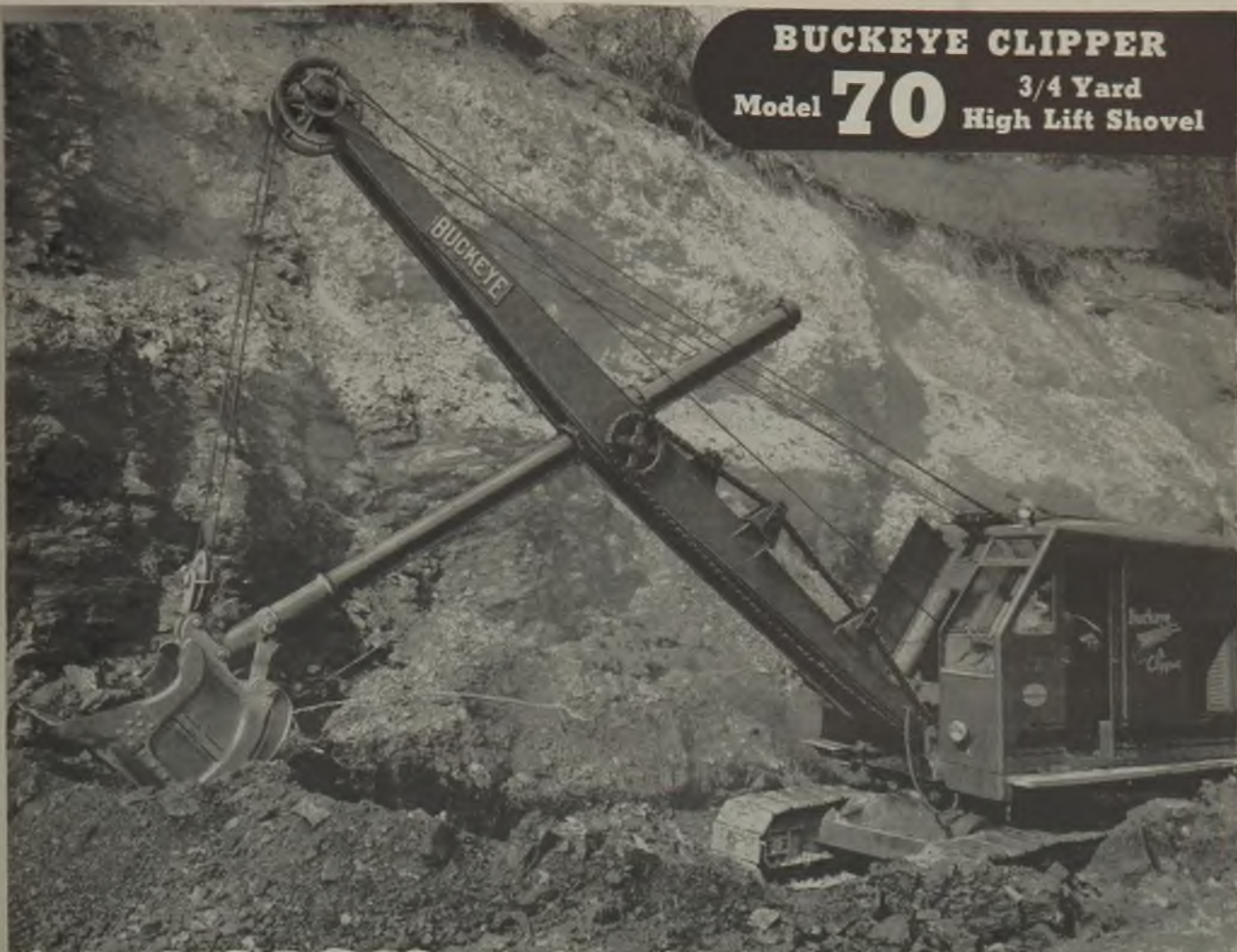
The Merrick WEIGHTOMETER, which weighs any material carried on a belt conveyor without interrupting conveying operation. Complete descriptive matter on request.

MERRICK SCALE MFG. CO.
 Engineers & Mfgs. of Automatic Weighing Equipment

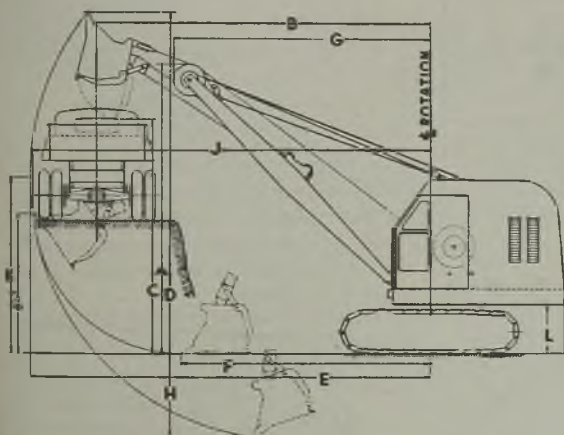
PASSAIC, N. J., U. S. A.



BUCKEYE CLIPPER
Model **70** 3/4 Yard High Lift Shovel



It's the E-X-T-R-A R-E-A-C-H



Check these "High Lift" Specifications:

Boom length 22', Dipper stick 17'4", A 19'11", B 25'8", C 17'1", D 23'6", E 31'0", F 20'1", G 19'10", H 8'0", J 30'8" (at 8' elevation), K 11'10" (at 40° boom angle).

That Gives You GREATER Tonnage

Joe F. Sherman of Hawthorne, Pennsylvania, operator of a Buckeye "70" 3/4-yard Shovel knows from experience why his Buckeye can give him more tonnage per day than other equipment of similar size. Because the 3/4-yard Buckeye has EXTRA REACH in all directions, operation is easier and faster; it strips low, cuts high, revolves completely . . . and reaches out farther for loading. Less spotting of the shovel is required—the minutes saved go into more digging and loading, resulting in greater tonnage per day.

Prove this to yourself. Check the Buckeye Clipper 3/4-yard Shovel against the field; you'll see why it can easily average 400 to 500 tons, and strip as high as 800 tons per day in tough Allegheny soil. Write for the new Buckeye Shovel Bulletin and get the facts.

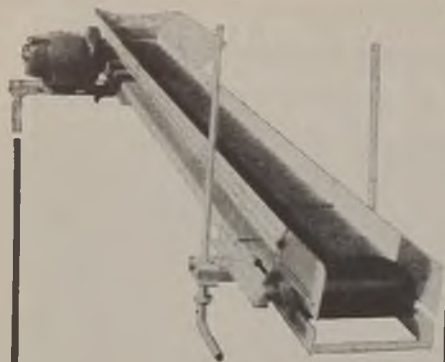
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A low vein portable belt conveyor, all steel construction, fitted with heavy mine type conveyor belts. Now being used successfully.

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Write us for details of how you can use the "Handy Andy".

*Without motor.

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ranges and illustrations showing details of construction. As a shovel the Type 802 has a capacity of 2 cu.yd., as a crane, 40 tons, and as a dragline, variable. Special high-lift equipment consisting of a 34½-ft. boom, 27-ft. dipper handle, and 1½-cu.yd. dipper can be furnished.

Electric Motors—Crocker-Wheeler Electric Mfg. Co., Ampere, N. J. Bulletin SL-300-3 describes protected-type motors designed for close coupling to centrifugal pumps, agitators, atomizers and many types of machine tools. Drawings and dimensions of the NEMA B flange and NEMA C face mountings are shown in frame sizes up to and including 326.

Electric-Motor Control—Yardeny Laboratories, Inc., 105 Chambers St., New York 7, N. Y. Folder details the Yardeny Pulsing Drive, which provides single-knob control of reversible motors to regulate both the direction and speed of the motor. Various applications also are described.

Diesel Generators—Caterpillar Tractor Co., Peoria 8, Ill. Booklet No. 9321 covers the specifications and distinctive features of the Caterpillar diesel electric sets designed as complete electric-power plants for small communities, mines, logging camps, and the like.

Tractors—Allis-Chalmers Mfg. Co., Tractor Division, Milwaukee 1, Wisc. Catalog MS-402A introduces the newly improved HD-10 diesel tractor and details its features such as grease-packing and positive seals, transmission construction, two-cycle diesel power and the new longer track design. Standard equipment and auxiliary attachments of the HD-10 are listed along with specifications on the tractor's 86 drawbar horsepower, its six speeds forward and two reverse, engine dimensions and fuel capacities.

Electrodes—Hollup Corp., 4700 West 19th St., Chicago 50, Ill. Complete catalog of all Hollup electrodes and National oxyacetylene-gas-welding rods includes complete descriptions, color identifications, specifications, physical properties, welding procedures, recommended ranges and sizes available in the Hollup line—mild-steel, alloy-steel, stainless, hard-facing, cast-iron, etc. Tables on the weldability of metals, appearance, inspection of welds, an electrode-consumption estimating chart and definitions of welding terms, are included.

Wire Rope—Preformed Wire Rope Information Bureau, 520 North Michigan Ave., Chicago, Ill. Booklet describes and illustrates the development, construction, features and applications of preformed wire rope.

Hose—B. F. Goodrich Co., Akron, Ohio. Catalog sections on suction hose for excavating and general utility services and various brands of industrial water hose feature a description of the Spirallock construction, said to provide a smooth-bore, light-weight and easy-to-bend hose. Other types of suction hose also are pictured and described.

Fire Protection—Randolph Laboratories, Inc., 7 East Kinzie St., Chicago, Ill. Booklet, "How to Fight Fires and Pro-



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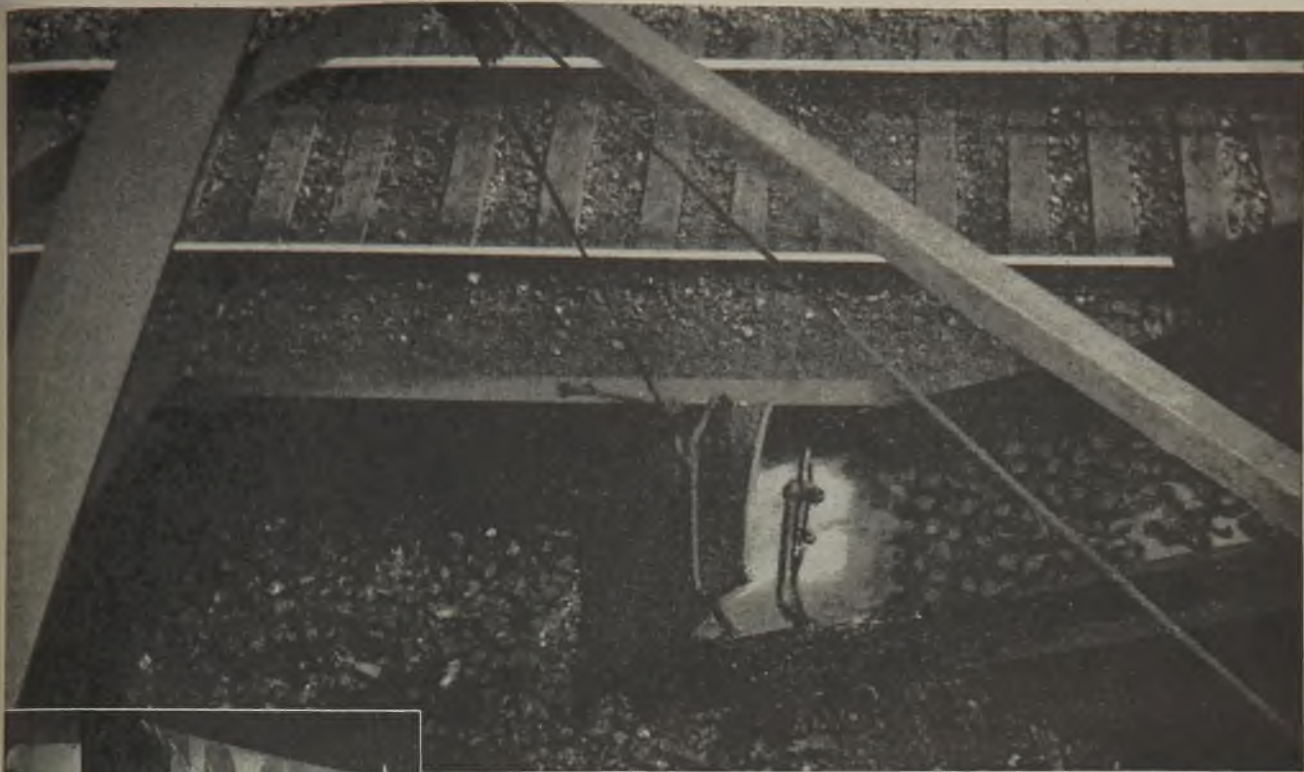
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fect Property," graphically explains and illustrates latest techniques in fighting fires with carbon-dioxide and other type fire extinguishers. Various preventive and hazard-elimination measures are described.

Electric Switches—Delta-Star Electric Co., 2400 Block, Fulton St., Chicago 12, Ill. Folder outlines proper application of both vertical and side-break high-voltage three-pole disconnecting switches and includes comparative costs for the various applications of six different types of switches.

Tractors—Caterpillar Tractor Company, Peoria 8, Ill. Booklet No. 9458 describes past methods for heavy plowing, logging and earthmoving tasks; the progress made through diesel power, and the possibilities for future applications.

Cable Terminators—Delta-Star Electric Co., 2400 Block, Fulton St., Chicago 12, Ill. Bulletin No. 4607 describes and lists single-conductor cable terminators or pot-heads, of the sealed type for both indoor and outdoor service, in ratings up to 46 kv. and all standard ampere capacities.

Welding Precautions—Air Reduction Sales Co., New York 17. Manual explains the "do's and don't's" for handling oxy-acetylene and arc equipment and shows the care to be exercised when using gas cylinders, torches and regulators, hose lines and generators, the prevention of backfires and flashbacks, welding of tanks, containers and pipelines, with notes on personal safety. Safe practices in the use of arc-welding equipment are included.

Welding—Air Reduction Sales Co., 60 East 42nd St., New York 17. Book entitled "Oxyacetylene Flame Processes and Arc Welding in Railroad Mechanical Operations," illustrated with more than 100 photographs, describes approved methods of doing many shop maintenance and fabrication jobs.

Electric Motors—Electric Specialty Co., Stamford, Conn. Catalog No. 46-1 illustrates a.c., d.c. and universal motors for applications not met by standard motors; dynamotors and converters; motor-generator sets; a.c. and d.c. generators; gas and diesel-electric generating plants. General specifications cover the main construction points, uses, and the range of electrical and mechanical characteristics to which units are manufactured on order.

Water Purifier—American Cyanamid Co., Ion Exchange Products Department, 30 Rockefeller Plaza, New York 20. Booklet describing Filt-R-Stil potable-water units and their use in the demineralization of highly brackish waters includes operating data on a typical successful application in supplying an entire community. Specifications on the standard models available, including the portable units designed for permanent installations, and an explanation of the mechanical and chemical theories involved, with the aid of schematic drawings and flow diagrams, are included.

Steam-Turbine Generators—Worthington Pump & Machinery Corp., Harrison N. J. Bulletin No. WP-1099-B50 illustrates and describes the construction and operation of Worthington "Package-Type" steam-turbine-generator power plants, made in capacities of 500, 1,000, and 2,000 kw.

Compressors—Worthington Pump & Machinery Corp., Harrison, N. J. Bulletin L-640-B1A lists the company's line of HB single horizontal compressors. Construction details, specifications and performances are included.

Mine Equipment—Brown-Fayro Co., Johnstown, Pa. Booklet contains description and illustration of the hoists, mine cars and wheels, pumps, post pullers, car retarders and other Brown-Fayro mining equipment.

Switchgear—Westinghouse Electric Corp., East Pittsburgh, Pa. Three separate booklets contain complete construction, operating and application details of the Westinghouse Unitized switchgear as follows: heavy-duty metal-clad, with Type DH De-Ion air circuit breakers; low-voltage, metal-enclosed with drawout air circuit breakers; and light-duty metal-clad with Type F oil circuit breakers.

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• Barber-Greene Conveyors are built on a *unit* basis—*pre-engineered* and *pre-fabricated*—with a wide range of equipment in the sizes and types that best meet your haulage requirements.

Standardized units include factory-assembled drives and take-ups; truss, channel, and low-seam frames; roll or ball-bearing carriers, "A" frames, walkways, loading hoppers, and discharge spouts. Field assembly of miscellaneous pulleys, bearings, and dozens of other parts, is completely eliminated.

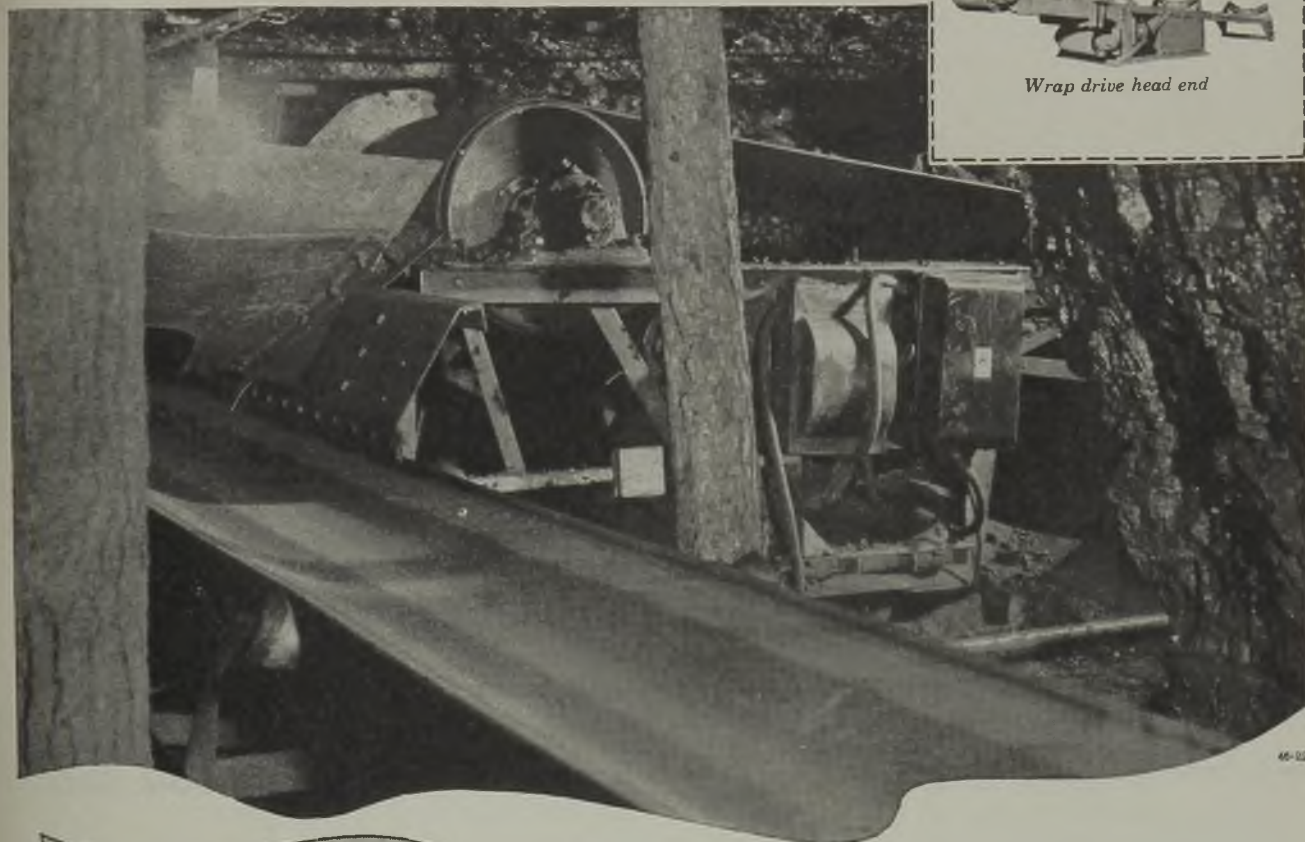
Standardization also permits interchangeability . . . makes installation, alteration, and moving quick and easy. Investigate the many other advantages of B-G Conveyors, and call in our mining engineers to help you plan an efficient, economical haulage system. Barber-Greene Company, Aurora, Illinois.



Assembled section with removable decking plates



Wrap drive head end

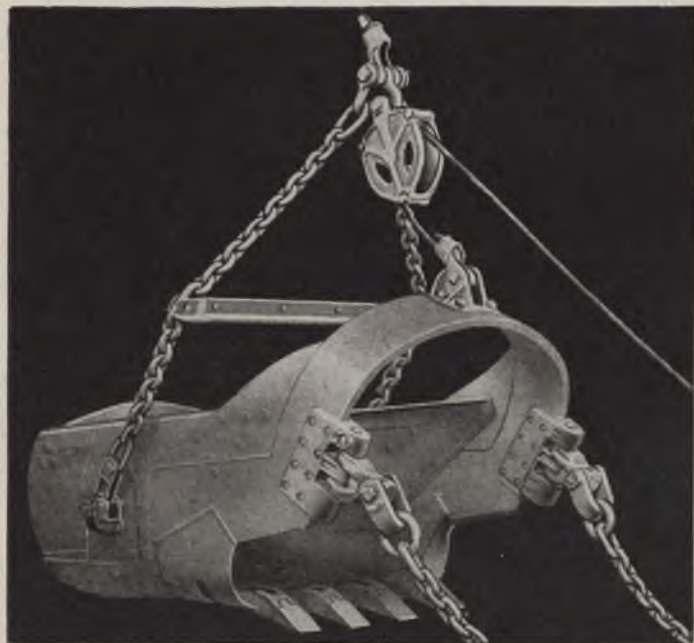


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**PAGE REVERSIBLE
CENTER SHANK
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(secured by a hook bolt)



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Installed throughout a mine, I-T-E Sectionalizing Circuit Breakers guard against overload conditions in trolley and feeder circuits. They automatically open when currents become excessive and automatically close when line conditions return to normal.

Thus, production schedules are held, power utilization is more economical, and maintenance and repair of equipment is decreased. Such advantages effect savings—defray installation cost in a short time.

Bulletin 2503 contains complete technical information—send for your copy today. If more convenient, call your nearest I-T-E representative. We have application engineers in all principal mining areas. The I-T-E Circuit Breaker Company, 19th & Hamilton Streets, Philadelphia 30, Pa.



SECTIONALIZING CIRCUIT BREAKERS

THE PERMANENT ASBESTOS INSULATION IN THE ORIGINAL ROCKBESTOS A.V.C. Mining Cable

- ★ STEPS-UP EQUIPMENT PRODUCTION
- ★ REDUCES MAINTENANCE COSTS
- ★ INCREASES SAFETY

CHECK THESE Permanently Insulated Rockbestos Advantages

- It is made to fit bushings properly.
- The impregnated asbestos yarn braid is heatproof, flameproof and resistant to moisture, oil, grease and alkalis.
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This construction is one of 125 developed by Rockbestos for severe operating conditions.

It's the tough, impregnated asbestos insulation that gives Rockbestos A.V.C. the ability to stand up in equipment that is working overtime under the most severe operating conditions.

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TWO SPEED TRANSMISSION—gives dislodging rope pull of 20,000 lbs. at 10 ft. per minute; drag-out speed of 100 ft. per minute. $\frac{3}{4}$ " wire rope is used.

HYDRAULIC CONTROL—for easy operation—keeps maximum pull within safe loading of the rope.

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HYDRAULIC JACKS—Anchor the machine quickly and effectively without straining machine parts. Removable jack extensions can be made for various roof heights.

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SELF-PROPELLED—equipped with auxiliary trolley pole for use where ventilation permits.

CABLE REEL—power driven, capacity 500' No. 8 three conductor cable, can be furnished if desired.

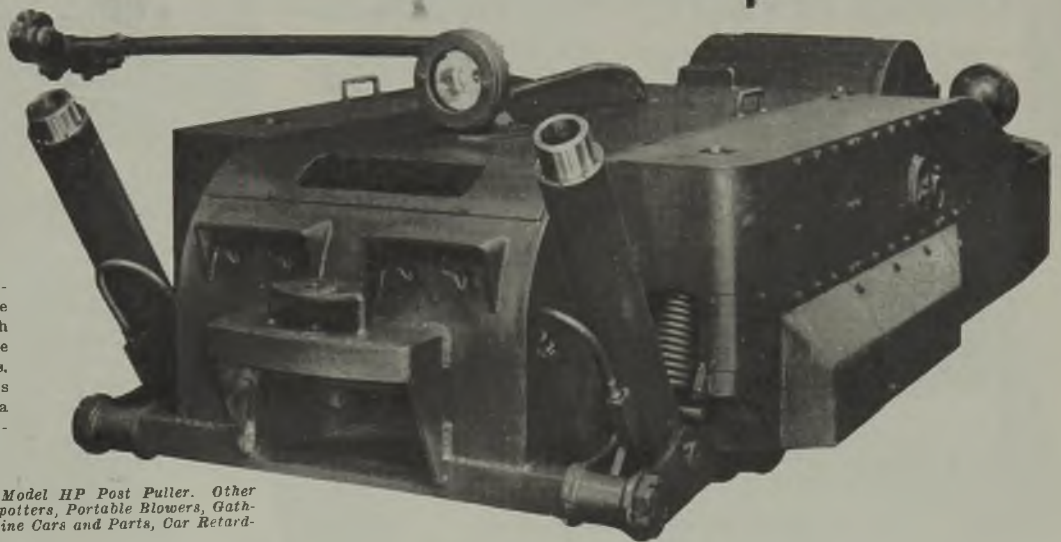
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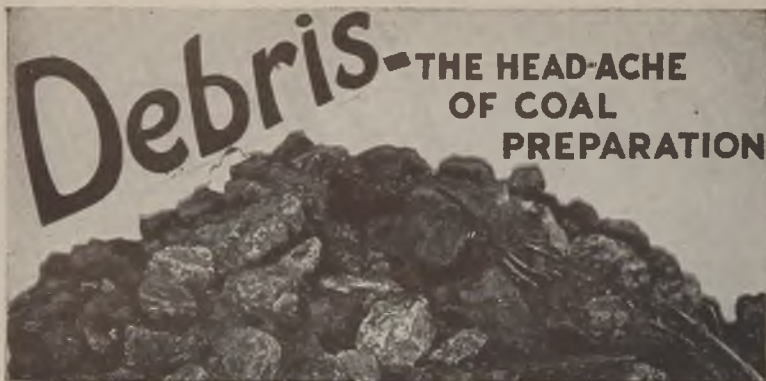
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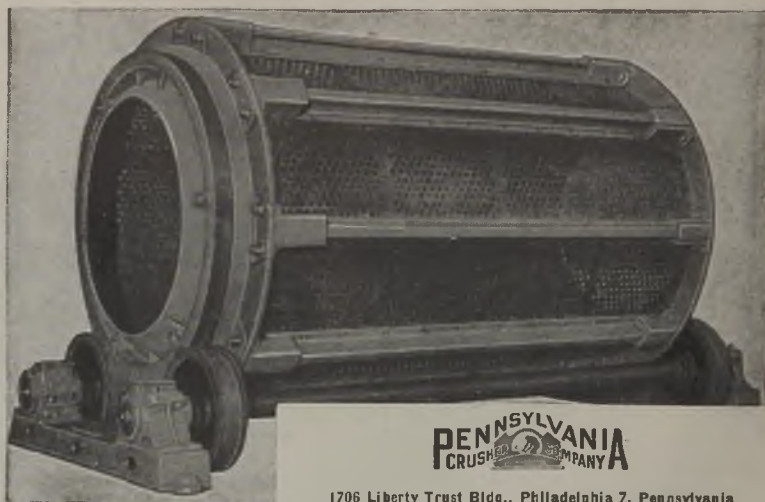
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Four Important Jobs It Does

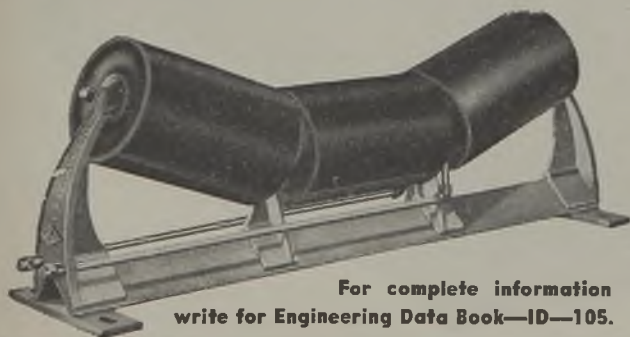
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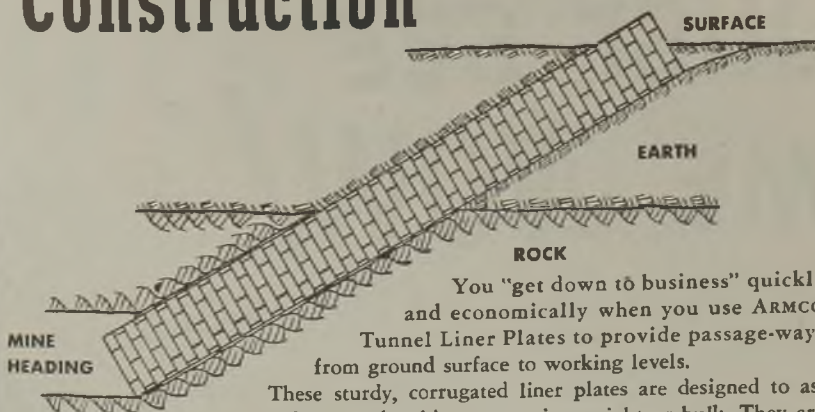
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MECHANICAL FEED
HORIZONTAL DRILL.

2800 LBS.
OF
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Heat-treated gears are used in this transmission and spur gear reductions, with an ample factor of safety for the operation of machine under all conditions. Link-Belt bearings of extra size are used throughout. Augers are connected to main drive shaft through a self-aligning chuck of ample size, in which is secured the drive shaft by two shear pins which provide sufficient safety to rest of machine. The machine is raised or lowered to a height of 36 inches by jacks on front of machine, and rear of machine is mounted on two pneumatic-tired wheels which also have a 36-inch range of adjustments. The machine permits the drilling of a controlled-angle hole, which makes possible a great saving in the use of explosives through the cantilever effect of this controlled-angle drilled hole.

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You can cash in on what you learned in the army about welding. Thousands of 200, 300 and 400 Ampere AC and DC Arc Welding units are surplus and available to you on veteran priority. There are large quantities of Hobarts and Lincolns, quite a few Westinghouse and fair amounts of other makes for sale now. Most of the equipment is used and in good operating condition. Best of all, it is being sold at prices you can afford in setting up your own repair shops or for contract work. Write, wire or phone the nearest War Assets Administration Regional Office below or come in and ask for the special veterans' service section.

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| Arc Welding Equipment: | AC..... DC..... |
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Hobart — Standard models of this make available in large quantities and most ratings.



Lincoln — In all models and most ratings. Hundreds in the popular 300-400 Ampere size.

EXPORTERS: Most surplus property is available to the export market. Merchandise in short supply is withheld from export, and if such items appear in this advertisement they will be so identified by an asterisk.

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These cranes have seen some use but are in excellent condition to give tough service for years to come. All were built by well known manufacturers with outstanding reputations in modern industry. The low sale price marks this equipment as the best dollar-value on the industrial market.

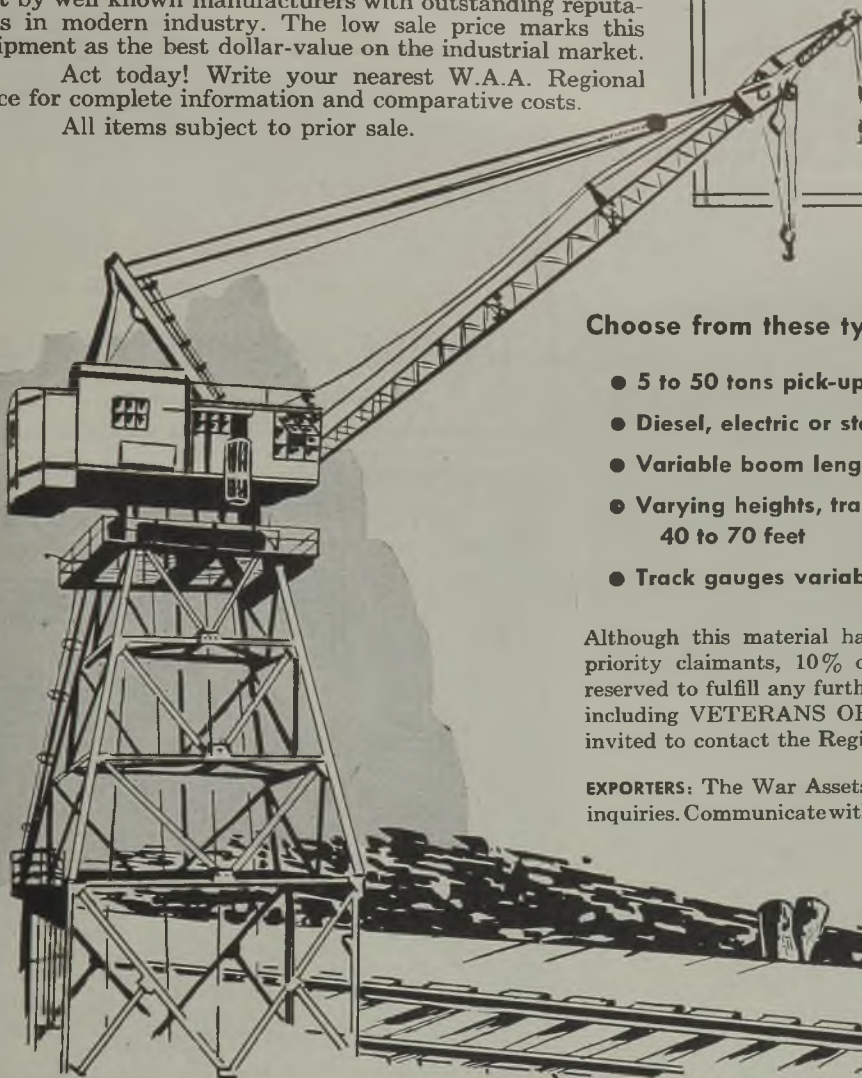
Act today! Write your nearest W.A.A. Regional Office for complete information and comparative costs.

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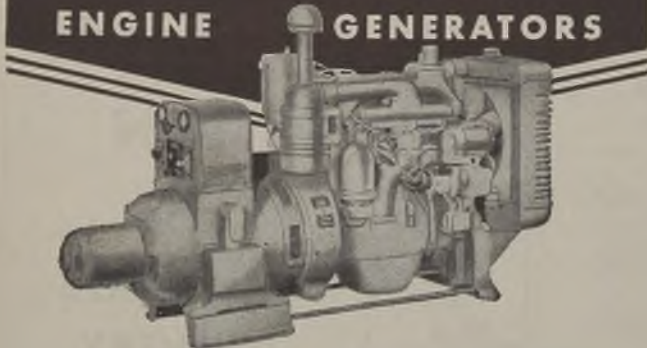
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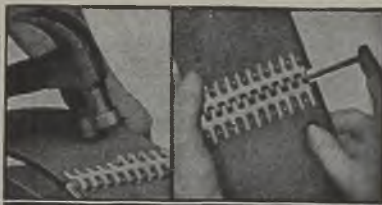
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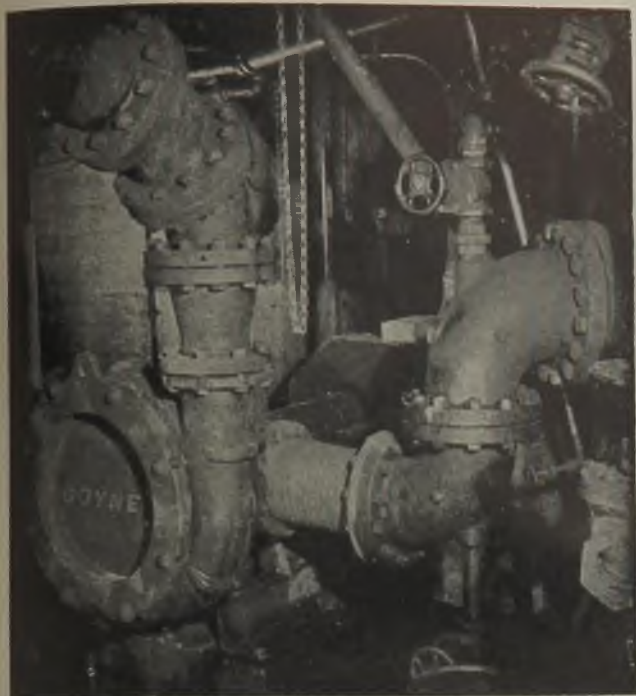


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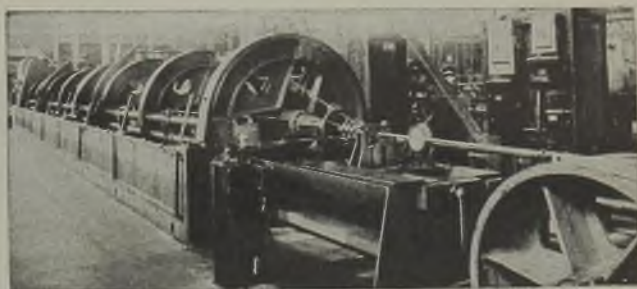
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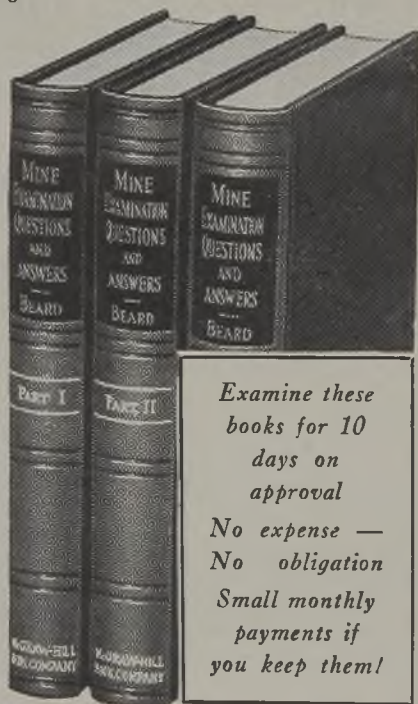
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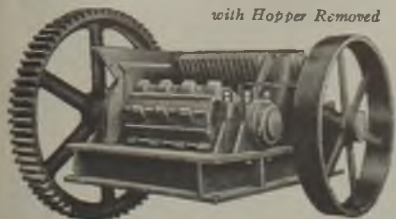
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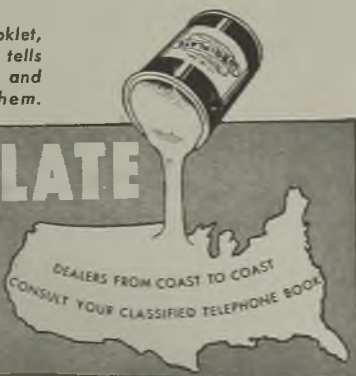
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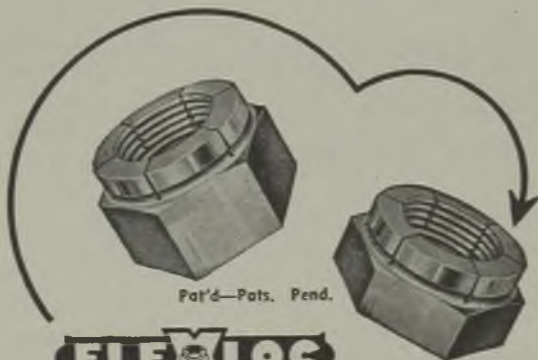
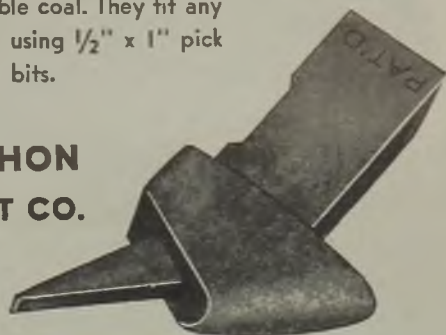
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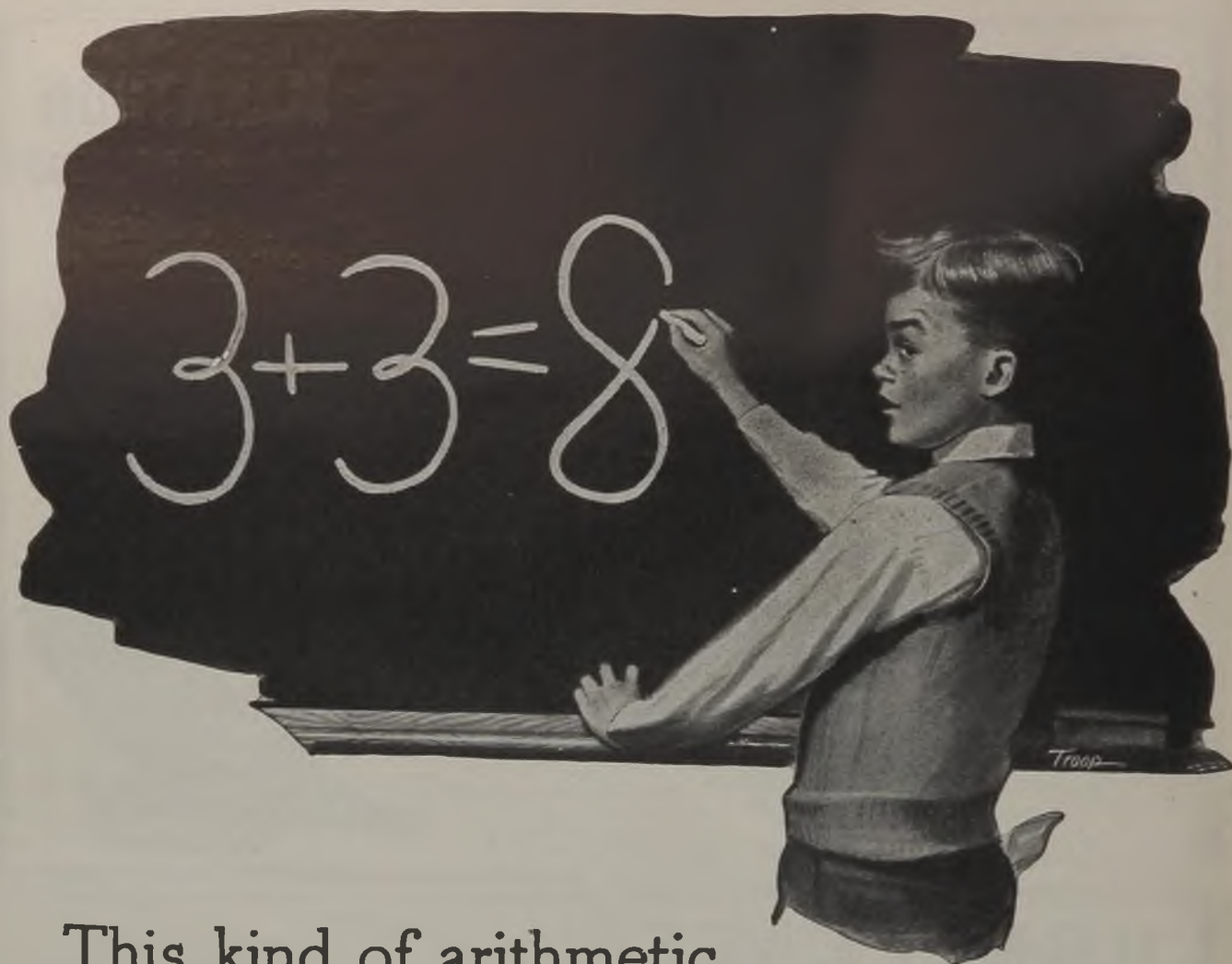


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1—6 ton G.E. locomotive 36" gauge with crab.
1—35B Jeffrey cutting machine 36" gauge Bowditch
cutter bar and chain.

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7/8" 6 x 37 improved plow steel cable.

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Gauge, 40" Wheel Base, Approximately 12' over-
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- 1—3 yd. Model 3T Monighan Diesel Dragline. New type walking device. 90' boom. 3 yd. Bucyrus-Erie Bucket and a 3 yd. Page Bucket. Fairbanks Diesel Engine. Caterpillar Diesel Engine for the swing motors.
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10-35 B Jeffrey 500 v. Permissible, 8 1/2" bar.
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12DA Goodman 50 HP 250 v. 6" Bar, rebuilt.
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2-6 Ton G.E., permissible 36/44" Ga. HM 825 HB Motors, with Edison Batteries.
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4 Ton 36" Ga. Atlas 2 BB Motors.
4 Ton 31 to 36" Ga. G.E. 2BH Motors.

Haulage & Gathering Locomotives

13 Ton Westgh. 250 v. 36" or 40" Ga.
13 Ton Westgh. Bar Steel 500 v. 40/32"
2-13 Ton G.E., 5" armorplate 500 v. 44" Ga.
10 Ton Jeffrey MH 110, 250 v. 36/42" Ga.
8 Ton West. 250 v. 42" Ga. 966 C Motors, completely rebuilt.

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9"x8" Sullivan Portable—motor driven.

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Rotary Con. & MG Sets (3 ph. 60 cy.)

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200 KW West. 250 v. 720 RPM—300 HP 2200 v.
150 KW Ridgway 275 v. 900 RPM dir. con. 225 HP.
50 KW G.E. 125 v.—75 HP West. 220/440.
15 KW 250 v. G.E.—25 HP GE 220/440/3/60.

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500 KW G.E. 250 v. DC—Terry mixed pressure. Turbine.
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150 KVA G.E. 240/3/60—Erie Ball Steam Eng.
50 KW West. 125 v. DC—Skinner Engine.

SLIP RING & SQ. CG. MOTORS

HP	Make	Speed	WDG	Type
500	G.E.	450	S.R.	MT 412
450	G.E.	257	S.R.	MT
350	G.E.	900	S.R.	I-M
300	West.	1750	S.R.	CW
200 (2)	G.E.	240	S.R.	MT 412
150	West.	600	S.R.	Syn.
100	West.	1750	S.R.	C-I
100	G.E.	500	S.R.	M 1-25-cy.
100	F.M.	1200	S.R.	
50	G.E.	900	S.R.	I-M
40 (3)	G.E.	600	S.R.	MT
40	G.E.	900	S.R.	MTC

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DC MOTORS

HP	Make	Speed	WDG	Type
175	G.E.	47 1/2	ser.	MD 109
130	G.E.	550	ser.	CO 1812
100	G.E.	480	ser.	MD 108
75KW	West.	1000	cp.	S
70KW	G.E.	1250	cp.	DLC 204
70	G.E.	950	cp.	
50KW	G.E.	1350	cp.	RC
50	G.E.	1050	sh.	RC 14
40 (3)	West.	775	cp.	SK
40KW	West.	1030	cp.	SK
40	Roth	1500		
25	West.	825	cp.	SK 113
20	West.	750		XK
15	West.	850	cp.t	SK 93
15	Wh.	800	sh.	CM
13	*West. (Enc.)	825	cp.	SK 113

GENERATORS, 230/250 v.

HP	Make	Speed	WDG	Type
47 1/2	G.E.	47 1/2	ser.	MD 109
550	G.E.	550	ser.	CO 1812
480	G.E.	480	ser.	MD 108
1000	West.	1000	cp.	S
1250	G.E.	1250	cp.	DLC 204
950	G.E.	950	cp.	
1350	G.E.	1350	cp.	RC
1050	G.E.	1050	sh.	RC 14
775	West.	775	cp.	SK
1030	West.	1030	cp.	SK
1500	Roth	1500		
825	West.	825	cp.	SK 113
750	West.	750		XK
850	West.	850	cp.t	SK 93
800	Wh.	800	sh.	CM
825	*West. (Enc.)	825	cp.	SK 113

REDUCTION UNITS

500 HP Morse ratio 4.28 to 1.
250 HP Ottumwa ratio 12.7 to 1.
2-40 HP Ohio Forge ratio 45 to 1.

HOISTS & CRANES

75 HP Vulcan 2 drum shaft, S.R. Motor.
40 HP Lidgerwood sgl. fr. drum geared to 40 HP G.E. slip ring 220/440 v. 3 ph. 60 cy. MTC. Rev.
30 HP Carlin double dr. fr. 13"x18"—5 1/2" figs.
10 HP Lidgerwood Hoist—AC or DC Motor.
2 1 Ton Same as above.
5 Ton Shep.-AC Traveling Crane 35'9 1/2" span—220/3/60.

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300 KW G.E. SYN. 275 V., 6 Ph., 60 Cy., 1200 RPM, Pedestal Type, 2300/4000 V. Transformers.
150 KW WEST. SYN. 275 V., 6 Ph., 60 Cy., 1200 RPM, Bracket Type, 2300/4000 V. Transformers.

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200 KW WEST. SYN., 275 V., 2300/4000 V., 3 Ph., 60 Cy., 900 RPM, Manual Switchgear.
150 KW G.E. SYN., 275 V., 2300/4000 V., 3 Ph., 60 Cy., 900 RPM, Manual Switchgear.
150 KW G.E. SYN. 600 V., 2300/4000 V., 3 Ph., 60 Cy., 1200 RPM, Manual Switchgear.

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13-T Westghse., 500 V., 908-C Mts., 36"-42" Ga.
13-T Westghse., 250 V., 908-C Mts., 36"-44" Ga.
13-T Gen. Elec., 500 V., 827 Mts., 36"-42" Ga.
13-T Gen. Elec., 250 V., 827 Mts., 36"-42" Ga.
10-T JEFFREY, 250 V., 110 Mts., 36"-48" Ga.
10-T JEFFREY, 250 V., MH-110 Mts., 44"-48" Ga.
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10-T WESTGHSE., 250 V., 907-C Mts., 36"-44" Ga.
8-T WESTGHSE., 250 V., 906 Mts., 36" Ga.
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1—6 ton, 30B, 43" 1—5 ton.
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1—4 ton 902, 48" with crabs.
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Bar steel frames 10 ton, 6 ton, and 4 ton.

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4 ton 1022, 44", asis
6 ton 803, 44" as is
6 ton 823, 44" 8 ton 839 motors
6 ton 801.
8 ton 839

Battery Locomotive, Ironton, Whitcomb and 1 1/2 ton Mercury.

Jeffrey: 6 ton and 4 ton, all gauges, 250 volt.
8 ton, 250 and 500 volts, 10 ton, MH78, 500 volts.

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Revolving head for 29C.

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2—Permissible Type 12CA. 6—112AA.
Motors for 112AA, both 250 and 500 V.
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Jeffrey MH 110, MH 78, MH 73, and MH 64-350 Volts and 500 V. 29B, 35B and 28A. **Goodman** 34B, 30B, 30C, 12A, 2600 K and R; 12AB, 12AA, 33-1-4-T, 31-1-4-T, 32-1-4-T. **General Electric** 801, 803, 807, 819, 821, 825, 839. **Westinghouse** 904, 905, 906, 102, 907, YR2, 115. Also 200 KW Westinghouse Rotary Converter Armature, 250 V Bracket Type, 150 KW G.E., HCC Bracket Type. **Sullivan** CE6, CE7, CE9 and CE10.

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1—Goodman Universal, 250 Volts DC
1—Goodman Standard, 250 Volts DC

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GENERATORS

1—100 KVA West. Syn. Motor, 2300 Volts AC
1—96 KW, 2300 Volts AC, direct connected to a 14x17 Chuse Engine
1—25 KW Crocker-Wheeler, 250 Volts DC
1—15 KW Ft. Wayne, 480 Volts AC

MISCELLANEOUS

1—6 Ton Jeffrey Trolley Locomotive, 36" Ga.
1—8 Ton Jeffrey Trolley Locomotive, 36" Ga.
3—Double Deck Mine Cages
4—3 x 4 1/2 Goulds Pyramid Pumps, Motorized
1—5x5 Deming Oil-Rite Pump, Motorized
1—3x3 Deming Oil-Rite Pump, Motorized
10—Tons 85# Rail
1—50 H.P. G.E. Slip-Ring Motor, 3 ph, 60 cy. 220/440 volts, 1725 RPM with Cont. & Grids
Enclosed Safety Switches, 30 to 600 Amps.

LOADING MACHINES

5—L-400 Jeffrey, 250 volt DC.
3—7-BU Joy, 250 volt DC.
15—5-BU Joy, 250 volt DC.
8—Goodman type G-20 Duck Bill Conveyors, type 158, complete.

ELECTRIC LOCOMOTIVES

2—13-ton Jeffrey, 250 volt DC.
3—10-ton Goodman, 250 volt DC.
3—15-ton Goodman, 250 volt DC.
4—6-ton General Electric, HM-803, 250 volt DC.

MINE CARS

500—5-ton all steel, end dump, 44" gauge, Timken bearing 16" wheels.
400—4-ton rotary dump, 42" gauge, Timken bearing 14" wheels.

MISCELLANEOUS

1—Late type 3-track Link-Belt Steel Tipple and Coal Washer, capacity 200-ton per hour. Other 3, 4 and 5-track steel tipples, suitable for drift, slope, shaft and strip mines, complete. Electric hoists from 150 to 1000 H.P. motors. AC and DC Shortwall Mining Machines. Motor Generator Sets. Rotary Converters.

COAL MINE EQUIPMENT SALES COMPANY

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L. D. Phone-34

AIR COMPRESSORS:

12—Belted 360, 676, 870, 1000, 1300 ft.
12—Diesel 105, 315, 520, 676 & 1000 ft.
6—Electric 1300, 1500, 2200, 5000 ft.

CARS & LOCOMOTIVES:

100—50 ton cap. Gondolas
35—50 ton cap. Flat Cars
4—35 & 65 ton Diesel Locomotives
6—10, 16, 20 & 30 ton Gas Locomotives
150—8000 & 10000 gal. cap. Tank Cars
20—12 yd. Std. ga. Steel Dump Cars

RUBBER CONVEYOR BELTS:

1000', 60", 600', 30", 300', 20', 100', 42", 900', 48", 1450', 36", 1200', 24", 900', 18", 600', 16", 350', 14"

ELECTRIC LOCOMOTIVES

15—3, 5, 8 ton Battery & Trolley.

DIESEL GENERATORS:

12—100, 150, 180 & 480 KW.

MINE LOADERS:

17—GD9, Elmco 21, Conway 20, 50, 60 & 75 and Sullivan HL3.

STEEL TANKS:

30—8000, 10,000 & 20,000 gallon capacity.

SHOVELS—DRAGLINES:

7—1 yd., 1 1/2 and 2 yd. Gas & Diesels.
16 yd. Elec. 160 ft. Boom Dragline.

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1—Thomas 24" dia. Drum with 50 H.P. Motor & Control
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1—Wellman, Keyed Drum, 60" Dia. will coil 4500 ft. 1" rope, 200 or 300 H. P. Motor with Magnetic Control.
1—Vulcan, Shaft Hoist, 72" Dia. Suitable 300 ft. Shaft. Motor with control to suit requirements.
1—Nordberg, Shaft Hoist, 72" Dia. Suitable 200 ft. Shaft. 150 H.P. Motor with Control.
1—Vulcan, Cylindro-Conical, Shaft Hoist. Drum 7'-9" Dia. Suitable 350 ft. Shaft. 400 H.P. Motor with Control.

Other Hoists Available to suit all mining conditions.

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500 BBL. CAPACITY NEW API BOLTED STEEL TANKS

9—High Type, Galvanized; 6 High Type Black 15 1/2" inside diameter x 16 1/2" high, Shell & Bottom Cone Roof 12 ga. throughout. Gross Weight—Approx. 9,000 lbs. Net Weight—Approx. 7,000 lbs.
69—Low Type, Black, 21'6-3/4" inside diameter x 8'0-1/2" high, Shell & Bottom 10 ga. steel, Cone Roof 12 ga. Gross Weight—Approx. 12,000 lbs. Net Weight—Approx. 9,000 lbs.
All above tanks unassembled, complete with Bolts, Gaskets, Fittings, Erection Tools and in original crates for shipment.

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Immediate Shipment

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3'x6'—2 deck Vibrat. Screen.....	595.00
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3'x8'—2 deck Vibrat. Screen.....	685.00
3'x8'—3 deck Vibrat. Screen.....	885.00
Stoker Coal Crusher.....	345.00
Large Coal Crusher.....	795.00
15 Ton Truck Scale.....	450.00
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INCLUDING:

LATE MODEL GE MOTORS, 200 HP, 1800 RPM., 2300/4000 VOLT, SLIP RING; COMPLETE WITH INTERLOCKING CONTROLLERS.

WESTERN GEAR REDUCERS, 200 HP., 40 TO 1 RATIO, HERRINGBONE GEARS.

8' x 12' MARCY ROD MILL, COMPLETE WITH DRIVE AND SPARE SET OF NEW MANGANESE LINERS.

DORR HYDROSEPARATOR, 20' x 4', COMPLETE WITH DRIVE UNIT.

8" 16" AND 20" DEEPWELL TURBINE PUMPS AND ONE 3" x 4" TWO STAGE HIGH HEAD CENTRIFUGAL PUMP, ALL COMPLETE WITH MOTORS.

30' BODINSON TRIPPER AND TRESTLE. MISC. ELECTRICAL EQUIPMENT AND SUPPLIES.

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DOUBLE DRUM HOIST

1—50 HP Lidgerwood Double Drum Hoist, drums 24" x 24", good for 5000 ft. RP and 4000 ft. of 1/2" rope, motor driven

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NEW and REBUILT STORAGE BATTERY

LOCOMOTIVES

1 1/2 to 10 Ton 13" to 56" Track Gauge

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Greensburg, Penna.

B-Erie 1 1/4-yd. gas-air shovel, GA-3, rebuilt.
Marion 4-yd. electric shovel, Model 125.
Bucyrus-Erie 52B Diesel dragline-shovel.
Bucyrus-Erie 50B 2-yd. steam shovel.
Marion 350 electric 7-yd. shovel.
25-yd. Diesel truck-trailers, bottom dump (7).
Euclid 6-yd. bottom dump crawler wagons (8).
Porter, Vulcan 18-ton atm. locos., 36", rebilt.
Whitcomb 8-ton gas locomotives, 24" ga., (4).
Steam locos., 27 to 50 tons, std. & 42" ga.
H. V. SMITH CO., 828 N. B'way, Milwaukee 2, Wis.

325—3-ton wooden rotary-dump mine cars, 42" gauge, 11' 4" total length, 5' 0" wide, 43" high with loading end cut down to 32"; equipped with 3 link couplers and timken bearings.

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701 Merchants National Bank Bldg.
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New 6" and 4" Electric Weld Steel Tubing and Couplings

6,000,000 ft. 6" O. D., .109 Wall Thickness

1,000,000 ft. 4" O. D., .083 Wall Thickness

All 20 ft. lengths exact

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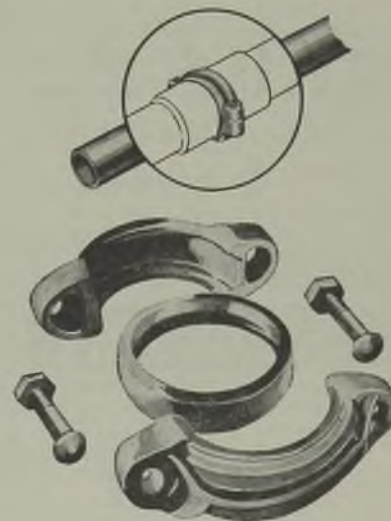
This tubing is new, excellent and has been hydrostatically tested to 900 pound pressure p.s.i. Every 20 foot length of tubing has welded on each end a 6" (6 5/8" O.D.) or 4" (4 1/2" O.D.) pipe nipple which is grooved for use with Victaulic type coupling.

This tubing is recommended for normal use and application on steam, oil, gas and water lines, for columns and other structural purposes.

Prompt shipments can be made from various locations throughout Ohio, Pennsylvania, New Jersey.

Prices will be submitted upon application, and special arrangements are available to jobbers.

Representative samples of both sizes of couplings and tubing may be inspected at our various warehouses.



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MOTOR GENERATOR SETS

- 1—150 KW. 250/275 v. Ridgeway Motor Generator Sets driven by 225 HP. 2200 v. 3 ph. 60 cy. Ridgeway Synchronous Motors.
- 1—30 KW 250 v. DC cp. wd. Gen. dir. con. 220/440 v. 3 ph. 60 cy. AC Motor.
- 1—25 KW. 860 rpm. 230 v. G.E. Generator mounted on fabricated steel base and direct driven by 40 HP. 860 rpm. 220 v. Westg. Motor.
- 1—20 KW 1150 rpm. 250 v. Westg. Gen. dir. driven by 30 HP 1150 rpm. motor.

MINE LOCOMOTIVES

- 1—5½ ton Ironton Storage Battery Locomotive.

PUMPS

- 1—48 GPM 161' hd. Roper 3" suc. 3" dis.
- 1—65 GPM. 50 ft. head Allis Chalmers Pump.
- 1—90 GPM 225 ft. head, 600 rpm. 2x2" Blackmer.
- 1—100 GPM. 50 ft. head Dayton Dowd Pump.
- 1—135 GPM. 53 ft. head Allis Chalmers Pump.
- 1—140 GPM. 60 ft. head Dayton Dowd Pump.
- 1—160 GPM. 50 ft. head Dayton Dowd Pump.
- 1—160 GPM 50 ft. head Allis Chalmers.

- 2—200 GPM. 200 ft. head Dayton Dowd Pumps.
- 1—220 GPM 225 ft. head, 600 rpm. 3½"x3" Blackmer.
- 2—243 GPM 100 ft. head Dayton Dowd.
- 1—239 GPM 65 ft. head Dayton Dowd.
- 1—300 GPM. 90 ft. head Allis Chalmers Pump.
- 2—350 GPM. 50 ft. head Dayton Dowd Pumps.
- 4—378 GPM 44 ft. head Dayton Dowd.
- 1—400 GPM. 85 ft. head Allis Chalmers Pump.
- 1—500 GPM Morris Machine Wks. 4" succ. 4" dis. 123" hd. 1760 rpm.
- 1—500 GPM 70 ft. head Allis Chalmers.
- 1—600 GPM. 105 ft. head Dayton Dowd Pump.
- 4—750 GPM. 70 ft. head Dayton Dowd Pumps.
- 1—2000 GPM DeLaval 170' head.
- 1—3000 GPM DeLaval 144' hd. 150 HP.
- 1—3500 GPM DeLaval 130' hd. 1450 rpm.

SLIPRING MOTORS—3 ph. 60 cy.

HP	Make	Type	Volts	RPM
400	Westg.	CW	2200	435
2—2.25	Northwestern	HEW-1	440	1080
1—250	Westg.	C. W.	440	450

230 V. DC MOTORS

HP	Make	RPM	Type
25	Westg.	600	SK
25	G.E.	650	MD
20	Westg.	600	M
20	Westg.	1100	SK
20	Westg.	975	S
15	Al. Ch.	800	
15	Westg.	1700	SK
13½	Al. Ch.	700	
13	Cr. Wh.	1100	CM
10	Cr. Wh.	675	33M
10	Cr. Wh.	825	CM
10	Westg.	650	S
8	G.E.	950	RC-11
7	Westg.	750	M
5	Westg.	400	SK
15	Westg.	1160	Vertical
60	G.E.	450	Vertical
60	G.E.	450	I
75	Westg.	685	CCL

ALTERNATING CURRENT MOTORS

3 Ph., 60 Cy.

HP	Make	Volts	RPM	Type
100	Westg.	220/440	860	CCL

COMPRESSORS

2—315 CFM Ingersoll Rand portable 100# pres. driven by 105 HP Waukesha Oil Engines. 860 rpm.

DUQUESNE ELECTRIC & MFG. CO., PITTSBURGH (6), PA.

FOR SALE

NEW RAILROAD TRACK BOLTS

also

GOOD USED TIE PLATES

for 75-90 lb. Rails

Available for immediate delivery

Write or wire

SONKEN-GALAMBA CORP.

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For Sale

Four Plymouth Locomotives, 8 ton, Model DLB. Good running condition. Buda engine, Model FRH. Standard Gauge. Offered subject to prior sale. Act quickly for immediate inspection.



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Allis-Chalmers, 30,000 lb. load, 870 F.P.M. Single drum, with two motors: 400 H.P., 2200 volt, 900 RPM, 60 cycle. Parallel post, air operated brake and Lilly controller, etc.

Also large stock of mine cars, locomotives, pumps, etc. Catalogue on request.

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- PROMPT SHIPMENTS
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SPECIAL RAIL PURCHASE

3000 tons 90# ARA "B" FIRST QUALITY RELAYERS complete with four hole angle bars and new bolts.

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200 tons used "LUNDIE" tie plates . . . can be repunched to fit any rail section.

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All sections of rails and good serviceable second hand cars, all gauges, also spikes, bolts, frogs, switches and ties.

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DIESEL DRAGLINE

100 foot boom with 3½ cubic yard bucket, crawler type, rebuilt.

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AMERICAN PULVERIZER

Type A. C. Serial No. 2258

Complete with V-Belt Sheave

Excellent condition - Immediate delivery

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Sullivan Mining Machine

Type 10-B; Shop No. 111353; 230 Volt DC; Bowditch cutter chain.

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MINING MACHINES

AC OR DC

**REBUILT & GUARANTEED
FOR IMMEDIATE SHIPMENT**

COAL CRUSHERS

Single & Double Roll
Electric Coal Drills, Mine Fans, etc.
Iron-ton 5-ton Storage Battery
Locomotive 36" or 42" Gauge, with
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CONVEYORS—Belt and Drag
Equipment of all kinds

Buy, Sell or Exchange

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EQUIPMENT CORP.**

(Established 1902)

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Pittsburgh 22, Pa.

Warehouse: Carnegie, Pa.

- 1—Heyl & Patterson 200 H.P. Tandem Speed Reducer 39 to 1 Ratio with Magnetic Brake and 200 H.P. Westinghouse Motor, 440 volts, 3 Phase, 60 Cycles and Controls.
- 1—Heyl & Patterson 60" Belt Conveyor 26 ft. Centers complete with Jones Speed Reducer and 10 H.P. Westinghouse Motor, 440 Volts, 3 Phase, 60 Cycles, 1200/600 R.P.M. and Controls.

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- 1—18" Feeder Conveyor—8' long
- 1—30" picking table 60' long with electric drive and controls
- 1—24" conveyor belt 84' long with electric drive and controls
- 1—Crescent Coal Washer, capacity 50 tons per hour
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- 2—Electrically driven air compressors capacity 50 cu. ft. per minute.

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DRAG LINES and HIGH LIFTS
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Complete Rebuilding Shop
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- 1—Slightly used Shovel boom, dipper and stick and chain for Lima Model 802
- 2—New unused Shovel booms, dipper and stick and attachments complete for Northwest Model 6

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Large stocks, all sizes
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Belting...Elevator Belting...Fire,
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RUBBER HEADQUARTERS

**CARLYLE RUBBER PRODUCTS ARE
NEW, GUARANTEED & LOW PRICED**

CONVEYOR BELTING

ABRASIVE RESISTANT COVERS

Width	Ply	Top-Bottom	Covers	Width	Ply	Top-Bottom	Covers
48"	— 8	— 1/8"	— 1/16"	20"	— 5	— 1/8"	— 1/32"
42"	— 5	— 1/8"	— 1/16"	20"	— 4	— 1/8"	— 1/32"
36"	— 6	— 1/8"	— 1/16"	18"	— 4	— 1/8"	— 1/32"
30"	— 6	— 1/8"	— 1/16"	16"	— 4	— 1/8"	— 1/32"
30"	— 5	— 1/8"	— 1/16"	14"	— 4	— 1/16"	— 1/32"
24"	— 5	— 1/8"	— 1/32"	12"	— 4	— 1/16"	— 1/32"
24"	— 4	— 1/8"	— 1/32"				

Inquire For Prices - Mention Size and Lengths

TRANSMISSION BELTING

HEAVY-DUTY FRICTION SURFACE

Width Ply	Width Ply	Width Ply
18" — 6	10" — 6	6" — 5
16" — 6	10" — 5	5" — 5
14" — 6	8" — 6	4" — 5
12" — 6	8" — 5	4" — 4
12" — 5	6" — 6	3" — 4

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ENDLESS "V" BELTS

"A" WIDTH All Sizes "D" WIDTH All Sizes
"B" WIDTH All Sizes "E" WIDTH All Sizes
"C" WIDTH All Sizes Sold in Matched Sets
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PROTECT THAT PLANT FIRE HOSE

APPROVED SPECIFICATION HOSE EACH LENGTH WITH COUPLINGS ATTACHED

Size	Length	Per Length
2 1/2"	— 50 feet	— \$28.00
	— 25 "	— 16.00
2"	— 50 "	— 23.00
	— 25 "	— 13.00
1 1/2"	— 50 "	— 20.00
	— 25 "	— 11.00

Specify Thread On Couplings

CARLYLE RUBBER CO., INC.

62-66 PARK PLACE

NEW YORK, N. Y.

SPECIAL OFFER... HEAVY DUTY RUBBER HOSE

WATER HOSE

I.D. Size	Length	Couplings Attached per Length
3/4"	— 25 feet	— \$4.25
1"	— 50 "	— 8.00
	— 25 "	— 6.25
1 1/4"	— 50 "	— 12.00
	— 25 "	— 7.50
	— 40 "	— 10.50
1 1/2"	— 50 "	— 12.00
	— 25 "	— 15.00
	— 35 "	— 10.00
	— 50 "	— 14.00
	— 50 "	— 20.00

AIR HOSE

I.D. Size	Length	per Length	Couplings
1/2"	— 25 feet	— \$5.00	— \$1.50 Pair
3/4"	— 50 "	— 10.00	— 1.50 "
	— 25 "	— 6.25	— 2.50 "
1"	— 50 "	— 12.50	— 2.50 "
	— 25 "	— 10.00	— 3.50 "
	— 50 "	— 20.00	— 3.50 "

LARGER SIZES ALSO AVAILABLE
All Prices—Net—F.O.B. New York

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Converters, Motor Generator Sets, A. C. & D. C. Motors,
Control Equipment and Transformers.
We build equipment to fit your requirements. Over 25 years
engineering background.

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TEL. 38-136

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REBUILT**

**PIPE — MACHINERY — GAS ENGINES
AIR COMPRESSORS — DIESELS — PUMPS**

Some Steam Engines and Boilers available only slightly above the metal price

BRADFORD SUPPLY COMPANY

WAYNE, WOOD COUNTY, OHIO

Near Toledo



FOR SALE

MINING MACHINES

- 3—Goodman Longwall mining machines, DC, 36" or 42" gauge.
- 6—Jeffrey 35A Shortwall mining machines, 50 HP motors, 250 volts, DC, 6' cutter bars, 36" or 42" gauge.
- 1—Sullivan CH-11 Shearing Machines, 250 volts, DC, 7 ft. cutter bars, 36" or 42" gauge.
- 1—Sullivan CH-11 Shearing machine, AC, 220 volts, 3 ph. 60 cy. 7 ft. cutter bars, 36" or 42" gauge.
- 1—Sullivan CE-7 Shortwall mining machine, AC, 220 volts, 3 ph. 60 cy. tip-turn truck, 7 ft. cutter bar, 36" or 42" gauge.
- 2—Sullivan Longwall mining machines, AC, #2991, #7061.
- 1—Sullivan CR3 Shortwall Cutting Machine 250 volts DC. Late style rope type machine complete with electric cable and reel.
- 2—Sullivan CLES Longwall mining machines, AC, 220 volts, 4 ft. cutter bars.

LOCOMOTIVES

- 2—Goodman 5 ton locomotives, type WI-2A5, 36" or 42" gauge. One is complete with electric reel.
- 1—6 ton Goodman locomotive, type 13314T, 250 volts, 41½" gauge, ball bearing motors.
- 1—Goodman 4 ton locomotive, type 76A04T, 26" gauge.
- 1—Goodman 4 ton locomotive, type 75A04T, 28" gauge.

STEEL TIPPLES

- 1—Tippie and shaker constructed by Allen and Garcia Company. Capacity 3000 tons daily.

Have new and second hand rails and track accessories.

DUCKBILL

- 1—Goodman New Type, DC, type G20 Duckbill complete with pans.

PUMPS

- 1—Gould Centrifugal pump #112851, 4", 3 stage, 250 gals per min. 231 ft. head, direct connected to 30 HP Allis Chalmers DC motor 1750 rpm, 230 volts. Pump and motor mounted on cast iron base. Complete with automatic float switch.
- 1—Fairbanks Morse size 2 centrifugal pump #5870 N, capacity at 250' head 60 gals per min., at 150' head 180 gals per min., direct connected to 10 HP West. motor 3/60/220/440 volts, 3600 rpm.

VIBRATOR

- 2—Robins Vibrex Screens #VSL 700, and VSL 701, speed of shaft 1000 RPM.
- 4—Tyler "600" Vibrating Screens
- 1—Tyler-Niagara Vibrating screen, single deck, type 100 No. 8050, 57" long by 24" wide.

SCALES

- 1—100 ton Fairbanks Morse Railroad scale, 54' platform, recently overhauled, standard gauge. #E 121880.

CRUSHERS

- 1—Stephens Adamson 30 x 30 double roll crusher.
- 1—American Pulverizer Crusher #1627, type AC3B.
- 1—McNally-Pittsburgh single roll crusher 36 x 54 complete with new set of segments.
- 1—Link Belt 36 x 60 double roll crusher.

We are distributors for John A. Roebling Sons Company wire rope and fittings.

GAVENDA BROTHERS

CANTON, ILLINOIS

Copper, Feeder Wire. All Sizes Bare & Insulated.

Copper Trolley Wire 4/0 Grooved & 2/0. Also Various other sizes.

Diesel Angle Dozer, 17 Ton, Gar Wood Hydraulic Blade.

New Fabricated Landing Mats for Reinforcing, etc.

12,000 Gallon Steel Tank for Gas, Oil, or Water.

New Sheet Iron 3/32" Thick Safety Spectacles, Full Vue

Asbestos Mittens

Ford and International Winch Trucks with Freuhauf Semi-Trailers

Immediate Delivery

MANSBACH METAL COMPANY

LOGAN, W. VA.

PHONE 1071

GASOLINE DRIVEN GENERATOR

65KW 220 Volt DC

General Electric Generator driven by 200 H.P. Hall Scott engine on welded steel frame with controls and accessories.

FS-379, Coal Age

620 North Michigan Ave., Chicago 11, Ill.

FOR SALE

3 SHEAVE WHEELS

Steel Lined

NEW

10 Feet Diameter for 1½" Rope 8" Diameter Axle

Substantial Discount
IMMEDIATE DELIVERY

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MINE CARS

Look Them Over and Make Us an Offer

85 all steel mine cars, end dump (may be easily changed to tight end for rotary dumping), 14" Timken bearing wheels, 42" track gauge, 40" wheel base, 6'6" overall width, 34" high above rail, 11'6" overall length. Capacity 124 cu. ft. level full. Equipped with semi-automatic spring couplers. New and/or slightly used.

Phillips Cross-over dump 42" gauge heavy duty, style #7, new.

The mine cars specified above are in excellent condition and are far above the average in used equipment of this type.

They will be priced to move.

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Templeton-Matthews Corporation
Sycamore Bldg., Terre Haute, Ind.
Phone: Crawford 2867

1 Low Pedestal

8 BU JOY LOADER

220-440 Volts A/C current.

STANDARD CLAY MFG. CO.
NEW BRIGHTON, PENNA.

- 1—24x24 Jeffrey Single Roll Crusher, V Belt Drive
 - 2—512-DA Goodman Machines, factory reconditioned and not used since
 - 1—12-AA Goodman Machine, Tool Steel Gears, HC Cable, 6½" Cutter Bar, Reconditioned, Goodman Chain
 - 1—12-AA Goodman Machine on Low Vein Trucks, 30" Trimming Height, 6½" Cutter Bar, Bowdill Chain
 - 1—6 Ton General Electric Locomotive, YR-4 Westinghouse Reel, HM-803 BB Motors, 29" Height, 36-42 Track Gauge, Outside Frame Reconditioned
 - 2—6 Ton Westinghouse Locomotives, 904-C BB Motors, 29" height, MD Reels, 36" Track Ga., Outside Bar Steel Frames
 - 1—Three-Track Tippie, complete with motors, transformers, Screens, etc., ready for operation
 - 40—42" Ga Mine Cars, Drop Bottom, 28½" Height, 3 Door, 14" Timken Roller Bearings Wheels, 30" Wheel Base
 - 1—212-G-3 Motor for Goodman Low Vein AC Machine
- ARMATURES—Jeffrey MH-78, 96, 110, 121, 29-B, 29-C, 35-B, 35-BB, 35-L, MM-2108, 29-B Prop. Goodman 36-B, 2600, 12-A - General Elec. HM-801, 807, 819, 821, 830, 839 - Westinghouse 905-C and 906-C - 500 VOLT MH-82 Jeffrey, MH-88 - 124-EJ and 212-AA Goodman, and GE-52 Gen. Elec. 904-C Westinghouse.
- HUNDREDS OF ITEMS listed for sale, - Locomotives, Mining Machines, Substations, Hoists, Mine Cars, AC and DC Motors, et cetera - Your inquiries solicited

R. T. McNEES

HOTEL NORTON

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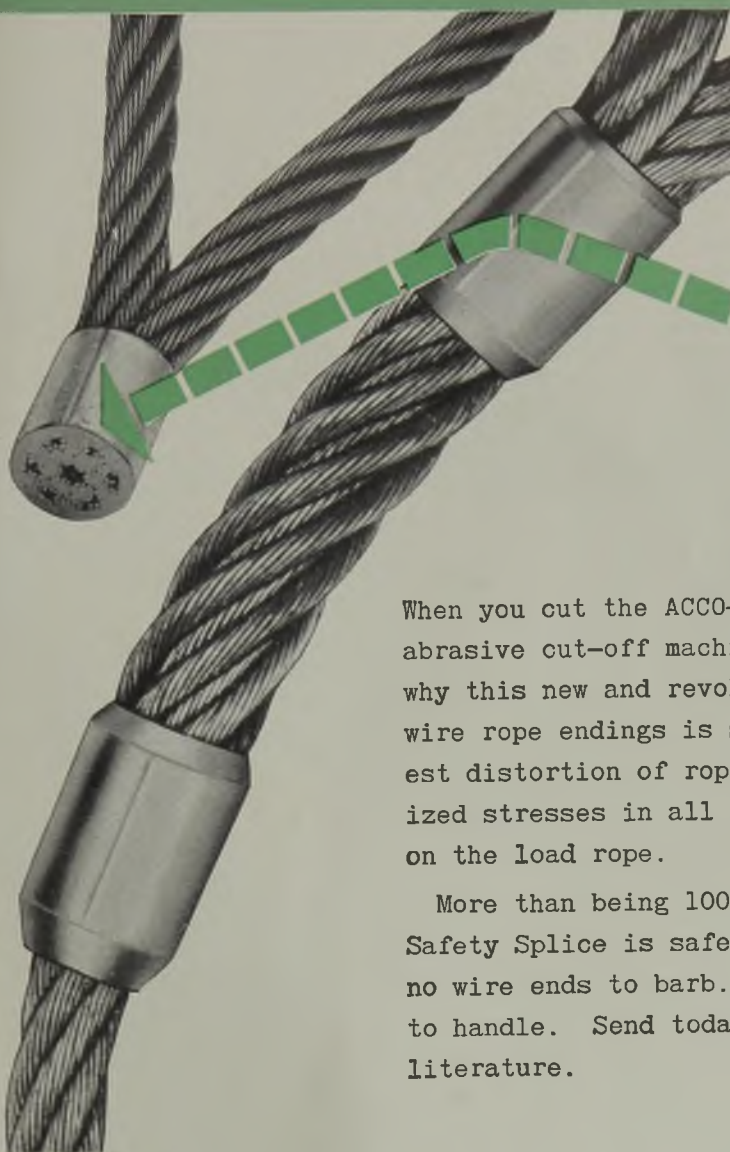
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