COAL AGE

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DEVOTED TO THE OPERATING, TECHNICAL AND BUSINESS PROBLEMS OF THE COAL-MINING INDUSTRY

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New York, January, 1934

Small Units

SHOULD SMALL UNITS in industry be exempt from codes? Unless such exemption is granted or the application of codes to small plants spread over a period of several months, many enterprises without reserves to carry them through the transition period, it is argued, will be wiped out. This ready sympathy for the smaller units, however, overlooks the effect such exemptions may have upon an industry as a whole. One of the cardinal advantages of NIRA is that a code once adopted is presumed to apply to every unit in the industry affected. There is no sanctity in size: a small unit can wreck a structure of fair wages and fair trade practices as effectively as its bigger competitor.

Hydrogen Dangers

WITH ACID WATERS, steel and iron pipes are always likely to cause an explosion if a light is brought in contact with the atmosphere of the pipe. The Association of British Chemical Manufacturers relates a case where a man removed the cover on the top of a steel railway tank car containing sulphuric acid. Dipping in the liquid a sampling vessel containing a hydrometer and withdrawing it, he thought he had lost the hydrometer, so he struck a match to look inside the tank and a violent explosion occurred, ascribed to the formation of hydrogen by the reaction of the sulphuric acid on the steel. Extremely high concentrations of acid are known to be less corrosive than those which have a lower concentration, but this concentration, though 78 per cent, was low enough to cause the generation of hydrogen. Naked lights at the discharge of pumps are always dangerous where the discharge is gas rather than water and the water has been in the pipe some time.

Orphaned?

UNCERTAINTY has clouded the future of the Bureau of Mines since the change in national administrations at Washington. Slated for return last spring to the Department of the Interior, the Bureau still remains an orphan under the jurisdiction of the Department of Commerce. In the meantime, the meager appropriation given it by Congress has been arbitrarily reduced by the Commerce Department to 31.9 per cent of the 1928-29 allotment. As a result, personnel has been slashed one-third, many activities—including those relating to safety and mine-rescue work—have been drastically curtailed and many other projects have been abandoned.

The dangers inherent in such a threatened disintegration of the services of the Bureau of Mines needs no elaboration. Protest against this situation, voiced in resolutions adopted at the recent annual convention of the American Mining Congress and supported by the Coal Mining Institute of America and the Illinois Mining Institute, comes none too soon. Nor should the campaign to remove all uncertainty as to the Bureau's future status and to see that the present session of Congress appropriates sufficient funds to permit the Bureau to function adequately in the service of the mineral industries be left solely to the three organizations named. It is a fight in which every association and individual should be glad to enroll.

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Fly Ash—an Aspirated Product

FROM the stacks of furnaces comes a light product which must have different properties from the whole ash of coal, and for purposes of health should be collected. It has been calcined, and aspirated, and, if it comes from a pulverized-coal furnace, also has been crushed and ground. It should, therefore, have certain qualities, conceivably of some individuality, if not necessarily of some value.

It would seem worthy of study, therefore, to see if it contains material that could be used in manufacture. Conceivably, one could grind, calcine, aspirate and collect other materials or thus treat coal to get its products, but here is a product to hand and, even if of low value, not to be despised. Why not try to find a use for it or its constituent parts?

Suffocating Gob Pyrite

EXCELLENT WORK has been done by H. M. Vanzandt, chief engineer, coal-mine drainage department, Pennsylvania State Sanitary Board, in formulating a satisfactory method to be used by the coal operator in reducing the acidity of mine water. Some of his theories, however, may justly be questioned. He declares that the mine water, which arrives at the sump charged with acid, becomes further acidified when the oxygen absorbed by the water acts on the pyrite which, with other mine refuse, has been carried into the sump. In actual fact, pyritic oxidation is more largely due to the action of free air on pyrite that ceases to be submerged whenever the sump waters are low than to the action of absorbed air on submerged pyrite. By this former action are created ferrous-sulphate crystals, which are dissolved whenever the water in the sump rises.

When, however, a sump has been provided with traps, as Mr. Vanzandt suggests, air is excluded, and little oxygen is present with which unsubmerged pyrite can react, so sulphates are formed in such small quantity that when the sump water again rises its acidity is not much increased. Meantime, the water in the sump is in process of neutralization by carbonates and possibly alkaline waters and of partial neutralization by feldspars and their derivatives. Thus, it becomes less acid and perhaps even alkaline. The ferrous sulphate also, heavy in itself, is borne down by settling solids. Moreover, as coal and pyrite are deoxidizers, the acid ferric sulphate tends to be converted into the extremely mild acid, ferrous sulphate.

What is to be feared is that, with time, the acid thus stratified will eventually collect till it reaches the effluent waters and that the alkaline earths in the floor will have their neutralizing powers exhausted. Moreover, ferrous sulphate, though it is hardly able to reveal itself as an acid to methyl red, once released to the oxygen in air or in surface waters, will take up the necessary oxygen and become ferric sulphate, especially seeing that it is now free from the coal, pyrite and ferrous oxide with their deoxidizing influences.

On Guard!

ALTHOUGH the National Industrial Recovery Act was passed as an emergency measure to expire not later than June 16, 1935, President Roosevelt's declaration, in his message of January 3, that "we have created a permanent feature of our modernized industrial structure" should come as no shock to those who have observed earlier invasions of government into the domain of business. Indeed, if NRA should come within striking distance of its goal, it is doubtful if industry itself would be willing to return to the ruinous competitive conditions which existed a year ago.

Whether later proposals for permanency shall involve restrictive and initiative-deadening regulation or, as suggested by the President, operation "under the supervision but not the arbitrary dictation of government," therefore, becomes a question of major importance to every business executive. It is not impossible that decision will be influenced largely by the degree of ability each industry displays in exercising the functions of self-regulation accorded it under the present setup. If every problem of internal relationships and adjustments under the code is referred to Washington for solution, it is easily conceivable that these appeals will be seized upon by proponents of straitjacket control as proof that industry is incapable of self-government.

Once establish this conviction in the minds of Congress and the public, many of whom already have leanings in that direction, and the door is wide open for irresponsible bureaucratic administration of the affairs of business on a scale never before known in this country.

MODERNIZATION

+ Of Power Plant Raises Capacity

And Cuts Fuel Cost $1,000 Per Month

IN 1906, when the power plant of the McKell Coal & Coke Co. was built at Kilsyth, W. Va., a "boiler" was truly descriptive of the steaming equipment being installed at the general run of mine power plants. Just a steel drum fitted with fire tubes and heated by a hand-stoked coal fire. Recently the old equipment in this plant supplying the McKell mines was replaced by a "steam-generating unit" to which the old designation "boiler" is rather inappropriate. It is truly a "machine" when considered from the standpoint of the many refinements designed to provide trouble-free operation, raise efficiency and provide tremendous overload capacity. Figured on a full-time operating basis, this new boiler-room equipment is saving at least $1,000 per month in the plant fuel bill. Other recent improvements to the power plant include a large electrical generating unit, feed-water heater, and switchboard.

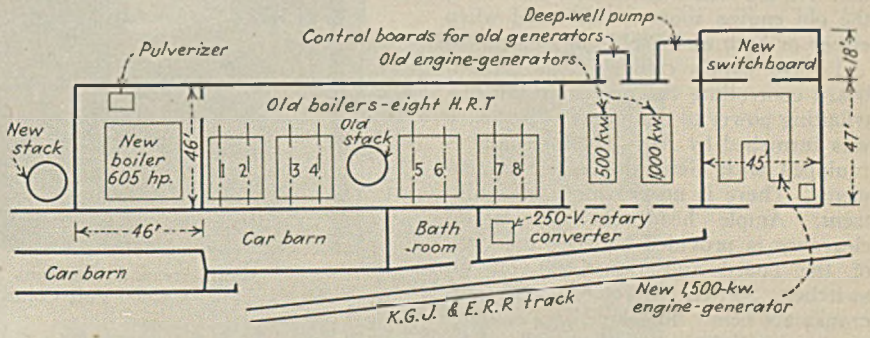
The McKell Coal & Coke Co., managed by W. R. Ballard, of Glen Jean, W. Va., operates four mines in the Sewell seam, all within a few miles of the central power plant located at Kilsyth mine, which in turn is within one mile of the business center of Mt. Hope. This is in Fayette County, West Virginia, and near the center of the New River smokeless field.

The original plant consisted of horizontal return tubular boilers and an Allis-Chalmers 500-kw. generating unit. The latter is a single-cylinder corliss-valve engine, direct-connected to a 6,600-volt 25-cycle generator. In 1912, there was added another Allis-Chalmers unit of the same general specifications except that it is double the capacity and is equipped with twin high-pressure cylinders. The boiler-room equipment was at that time increased to include six 250-hp. and two 150-hp. horizontal return tubular hand-fired units. With this steaming equipment it was necessary to use mine-run coal.

The aggregate mine load gradually increased to a point where it could not be handled over the peaks with the two engines; therefore, installing a third generating unit was the first of the recent improvements. The old engines had proved quite satisfactory during the many years, and even to date neither one has required reboring. However, a new cylinder was applied to the older unit, because of an accident with a packing ring. Lack of an abundance of water, together with fuel cost considerations, decreed that the new unit be operated non-condensing, as is the case with the old units.

There was selected an Allis-Chalmers corliss-valve engine-driven generator. It is 1,500-kw., 80 per cent power factor, horizontal cross-compound, 34x56x42-in., 25-cycle, 115.5-r.p.m., and is operated at 125 lb. steam pressure, 75 deg. F. superheat. It is operated at this pressure and superheat because they are the highest deemed advisable to apply to the old units. The guaranteed water rate at 125 lb. and 75 deg. is 31 lb. per kilowatt-hour at full load, 30.7 at three-fourths load, and 34.3 at half load.

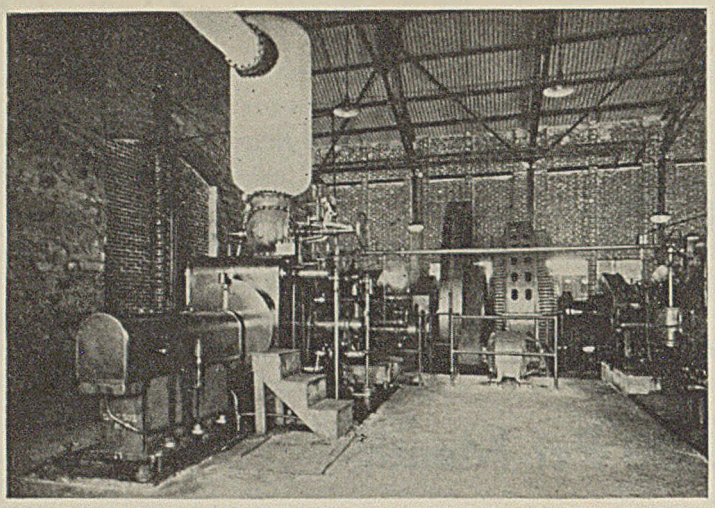
As a safety feature the engine is equipped with a Schutte & Koerting automatic stop valve, which serves also as a hand throttle valve and is located between the steam separator and the steam chest of the high-pressure cylinder. The magnetic trip closing this valve in case of overspeed is operated by an auxiliary flyball governor connected to the generator shaft by multiple-belt Texrope drive. On the generator control panel and also at convenient locations on the engine-room walls are installed emergency stop buttons to operate the stop valve. Some years ago the old engines were equipped with the same make of safety stops. Speed of the new unit can be adjusted within narrow limits, for synchronizing, by a motor-driven governor adjustment controlled from the generator panel. The two old engines are not equipped with remote speed adjustment.



Kilsyth Power Plant, Showing Additions to Accommodate New Boiler Equipment and Engine-Driven Generator.

The 1,500-kw. unit was purchased with belt-driven exciter, although the plant was already equipped with both turbine-driven and motor-driven exciters. Normally, however, the excitation current is taken from a 250-volt rotary converter located in the power plant and serving also to supply direct current to the closest mine loads. Six other substations are located in the field, the farthest being approximately four miles from the plant.

The new engine project included a



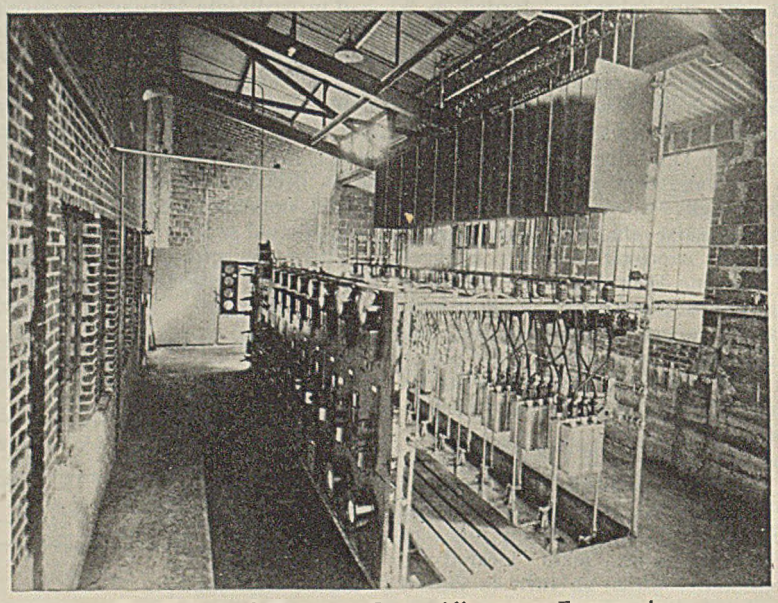
High-Pressure Side of the New 1,500-Kva. Unit.

feed-water heater and electrical switchboard. Engine and heater are located in one room built as an extension to the end of the original engine room, and the switchboard is installed in a separate room built as a lean-to on the side of the new engine room. Construction consists of brick walls, steel roof trusses, steel purlins, corrugated Transite, a fill of aerated gypsum to eliminate condensation, and a final covering of built-up roofing material supplied by the Johns-Manville and Fairbanks-Morse companies.

The new open-type heater, a 1,500-hp. Cochrane of the combination storage-tank type, cast-iron construction, is used only when the new generating unit is in operation. It is located on an elevated platform close to the low-pressure cylinder. An old feed-water heater located in the old engine room is still used when either or both of the old engines run.

Twelve panels comprise the switchboard controlling the new unit and distributing power to the mines. The board was furnished by Allis-Chalmers and is equipped with General Electric instruments. There is no crowding of equipment. Ample headroom and lateral clearance is provided between the back of the board and the 6,600-volt oil switches. Switch control rods and bell-cranks are below floor level in a shallow pit traversed by a wooden walk. The ends of the latter are flush with the concrete floor of the room, therefore presenting a smooth surface where stumbling is especially to be avoided. Nevertheless, the terminals and cables of the 6,600-volt oil switches are thoroughly insulated and the framework is adequately grounded as protection against shock. A clearance of 30 in. or more is provided between the equipment and the closest wall of the building.

After installing the new generator, there remained the problem of increasing the boiler capacity 10 per cent or more. It was determined that from the refuse going to the aerial tram disposal at Siltix mine there could be made available by screening this refuse, fines running as low as 25 per cent in ash. This product could be substituted for the run-of-mine being used as boiler fuel, provided it was burned in pulverized form.



Simplicity and Generous Space Allowances Feature the 6,600-Volt Control and Feeder Board.

Accordingly it was decided to install one large pulverized-fuel boiler which could carry the whole of the present load, thereby obtaining the increased steam capacity, effecting a tremendous saving in fuel cost, and decreasing the operating labor.

The new "steam generator" is located in an addition built to the end of the old boiler house, and the old boilers have been left in place as spare equipment. This new unit consists of a Riley No. 5 Atrita pulverizer and a Union Iron Works 605-hp. Type NA bent-tube water-tube boiler built for 200-lb. working pressure. The latter has 6,050 sq.ft. of effective heating surface and is guaranteed to operate at 300 per cent capacity—in other words, to deliver 1,815 boiler horsepower. Plant loads, since its installation, often have demanded 200 per cent steaming, and this has been carried without difficulty, using only the refuse as fuel. Performance is indicated and recorded by a Brown electric steam flow meter having integrator and automatic planimeter.

The boiler is mounted high above the floor so as to provide a large combustion chamber. The latter is approximately 12 ft. wide, 17 ft. long and 28 ft. high. The flange connection of the boiler steam nozzle is 38 ft. above the floor. There are 584 water tubes, 3½-in., No. 10 gage, providing 6,920 linear feet considered as heating surface. The front and rear cross drums are each 42 in. in diameter, the bottom drum 44 in. and the lower front 22 in. The Superheater Co. furnished the 75-deg. superheater with which the boiler is equipped.

Furnace side walls are water-cooled beginning at a point about 5 ft. above the furnace floor and extending up a distance of about 12 ft. Remaining wall space is Dietrick air-cooled, as is also the floor. The air thus circulated is utilized as preheated air for combustion. The suction of the secondary blower, a Buffalo size No. 5½ driven by a 20-hp. motor, is connected to the wall and floor ducts. Disposal of ash from the floor of the combustion chamber is accomplished by raking it out by hand and into the intakes of a steam jet ash conveyor.

The unit pulverizer, driven by a 75-hp. motor with Texrope drive, has a magnetic separator built into the feeder and a primary blower built into the main casing. The first stage of the pulverizer

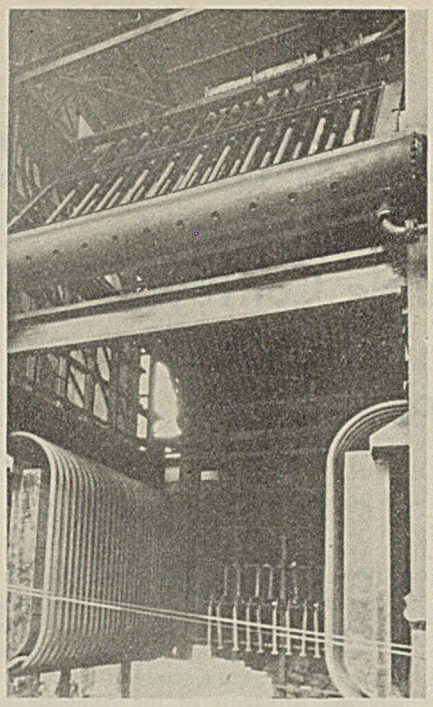
consists of hammers and the two other stages of pins and blocks. A recent test indicates that the fuel delivered to the No. 4 flare-type burner is averaging about 50 per cent through 200-mesh. Flue-gas temperatures run between 500 and 550 deg. F. An analysis of the refuse coal shows fixed carbon 54.4 per cent; volatile, 19.6; ash, 23.4; moisture, 2.6; sulphur, 1.4; B.t.u., 11,300; and ash fusion temperature, 2,690 deg. F.

Electric motors are provided as drives of the pulverizer and secondary blower. Here it is necessary to explain how these are driven when starting up the boiler from cold. For this emergency two of the old horizontal return tubular hand-fired boilers are kept hot with banked fires. In a few minutes these can be steamed sufficiently to operate one of the generators, thus supplying the electricity for driving the pulverizer and secondary blower of the large boiler.

VanStone joints are used on steam lines except that welding was used in building up certain sections of convenient size for erection. New pump equipment consists of two horizontal duplex feed pumps 10x7x10 in. and an oil pump, all of Worthington manufacture.

A stack to take care of the new boiler and of sufficient oversize to handle the flue gas from an additional unit of the same size was built close to the end of the new boiler room. It is of hollow-tile construction, 185 ft. high, has a bore of 17 ft. at the bottom and 10 ft. at the top. This stack was built by the Alphons Custodis Chimney Construction Co., of New York.

The railroad haul of the fuel from the Siltix mine to the power house is about two miles. This fuel, approximately



Construction, Front View, of 605-Hp. Boiler Showing Lower-Front Drum and Water Walls.

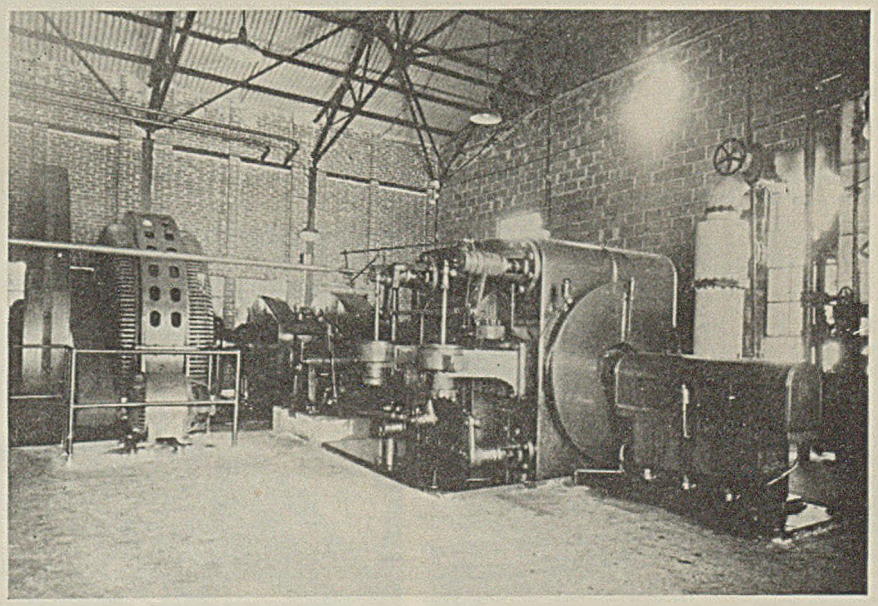
1¼ in. and under, is the product passing through stationary screens that have been installed in the bottom of the chute leading to the tram-bucket loading station. Heretofore these fines went to the refuse dump. The fuel cost for the power plant is now little more than the railroad switching cost.

To handle this fuel at the power house there were installed an apron feeder, bucket elevator and 30-ton steel hopper or bunker. The latter is located in the boiler room and directly above the pulverizer. This equipment, with driving motors, was furnished by the Kanawha Manufacturing Co., Charleston, W. Va.

Boiler-feed water is treated with soda ash, sometimes with lime added. The water is piped from a dam on Mill Creek, about two miles from the power plant. Up to the time that the new boiler was installed, part of the water collected in the pond back of the dam was mine water. This has since been piped under the pond and through the dam so that now the pond contains only surface water. With this water, boiler scale is not a problem, but care is necessary to limit acidity, which would cause corrosion. Soda ash is regularly added to the water. It is only when the water gets low in the pond that lime is added to the soda-ash treatment, this usually in September.

Tests are made regularly at the power plant to determine the relative acidity or alkalinity of the water. This is figured in the pH scale, in which 7 pH indicates neutral. Below is acidity, and above, alkalinity. Results of a typical test show the following: raw water, 6.4 pH; treated, 7.2; and water taken from the boiler, 11.2.

Four crews, each consisting of an engineer and two firemen and each working 40 hours per week, operate the plant. For 8 hours on Sunday the plant is shut down. On the day shifts a janitor works in the plant. C. P. Gilmore, chief electrician and master mechanic for the mining company, with headquarters at the central machine shop, which is just across the K. G. J. & E. railroad tracks from the power house, therefore is able to give close supervision to the general operation of the plant.



Low-Pressure Side of 1,500-Kva. Engine-Generator Set at Kilsyth Plant.

CUT REFUSE-DISPOSAL COST

+ By Belts and Shuttle Conveyors

At Hudson Coal Co. Collieries

REFUSE DISPOSAL at anthracite collieries, due to the large quantities of waste material produced in both mining and preparation, generally evolves into the dual problem of obtaining sufficient storage space and selecting efficient, low-cost handling equipment. Where topography or surface improvements or both prevent side-hill dumping or restrict storage space, the disposal system must provide for the storage of a maximum quantity of material on the ground space available within a reasonable distance from the plant. This, in turn, generally means increasing the height of the dump within the limits imposed by the angle of repose of the material or the allowable cost of transporting it to the storage site and elevating it to the top of the pile.

Like many other operations throughout the anthracite region, a number of the collieries of The Hudson Coal Co. were faced in recent times with the several problems growing out of an increase in the quantity of waste to be handled, a reduction in available storage space and a fairly substantial increase in disposal cost, due to the larger quantity of material and the increased distance it had to be transported and elevated. This led to a study of the refuse-handling problems of the company by its operating staff, which was directed primarily toward the development of a system that would reduce power, maintenance and attendance costs, and also facilitate the storage of a maximum quantity of refuse on a given ground space.

As storage on the original site at Marvine colliery, Scranton, Pa., had reached its practicable limit with the 10x24-in. chain-and-flight conveyor originally used to carry the waste material to the top of the pile, this operation was selected for one of the first installations (*Coal Age*, March, 1932, p. 104) of a system designed to handle breaker refuse in accordance with the above principles. Revision of the Marvine system was completed in August, 1931, and involved the selection of a new dumping ground on the opposite side of the breaker from the original site. Two 30-in. belt conveyors with Dodge Timken-equipped troughing and return idlers (No. 1 operating at 200 ft. per minute and No. 2 at 230 ft. per minute) were completed on March 16, 1931, to transport the refuse (largest size, 4 in.) from the breaker to the new dump.

The discharge end of the No. 2 conveyor was carried up to a point 90 ft. above ground level on steel towers. Dumping was started immediately, and on Aug. 3 the installation of a shuttle, or distributing, conveyor, carried on a track laid on the lower deck of the No. 2 conveyor structure, was completed. Length of the shuttle, which is mounted on wheels, is 200 ft. With a belt speed of 250 ft. per minute, designed capacity is 200 tons per hour, or somewhat under the maximum which the belt is capable of handling at that speed, due to the intermittent loading of the material on the belt. A single-drum hoist is employed for moving the shuttle forward as the refuse bank is extended and additional track can be laid on the newly made refuse bank. Due to its location under the No. 2 con-

Fig. 1—Pine Ridge Disposal System; One of the Old Dumps Shows in the Background.

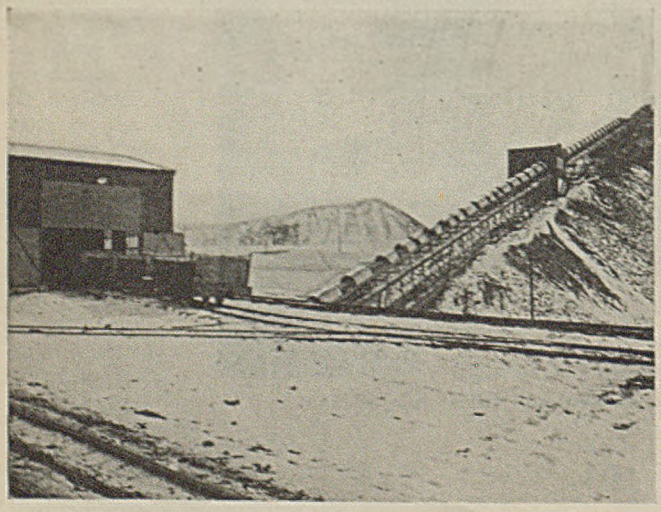
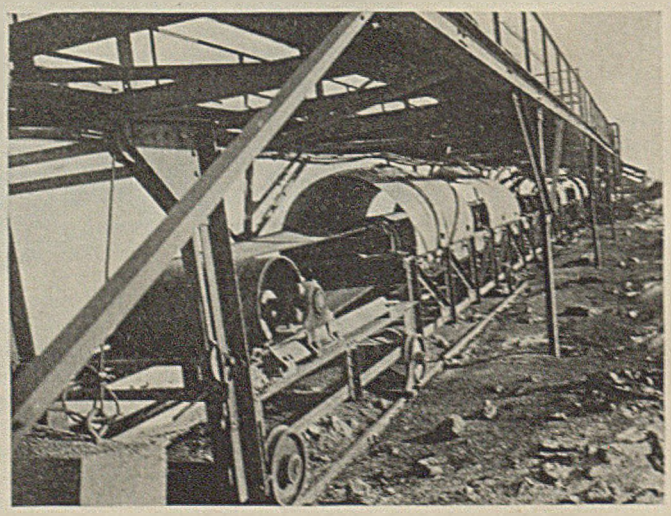


Fig. 2—Showing Position of Pine Ridge Shuttle Conveyor on Track Under Main Conveyor.



veyor, the shuttle can receive material from the No. 2 unit at practically any point along its length as it is moved forward. The end of the shuttle unit is cantilevered to allow extension of the bank for some distance before additional track must be laid.

In 746 starts since disposal actually began, the Marvine installation had handled up to Nov. 30, 1933, approximately 480,000 tons of refuse, a "pants weigher" being used to determine quantity. Operation of the system requires one man under normal conditions.

With preliminary experience at Marvine as a guide, a similar installation was completed at Pine Ridge colliery, Wilkes-Barre, Pa., in December, 1931, to handle mine rock (shale and sandstone) from the Pine Ridge, Laurel Run and Delaware operations, as well as ashes from the Pine Ridge power plant and refuse from the Pine Ridge breaker. Saxon dumps formerly were employed to handle the mine rock and ashes. While the use of belts as a transportation medium necessitated the installation of a crusher to break down the rock before feeding it onto the conveyor, it was felt that this expense was justified in view of the reduction in attendance and maintenance costs to be expected.

As at Marvine, the Pine Ridge project included the selection of a new dumping site on a comparatively level piece of ground near the old Pine Ridge rock banks (Fig. 1). Mine rock and

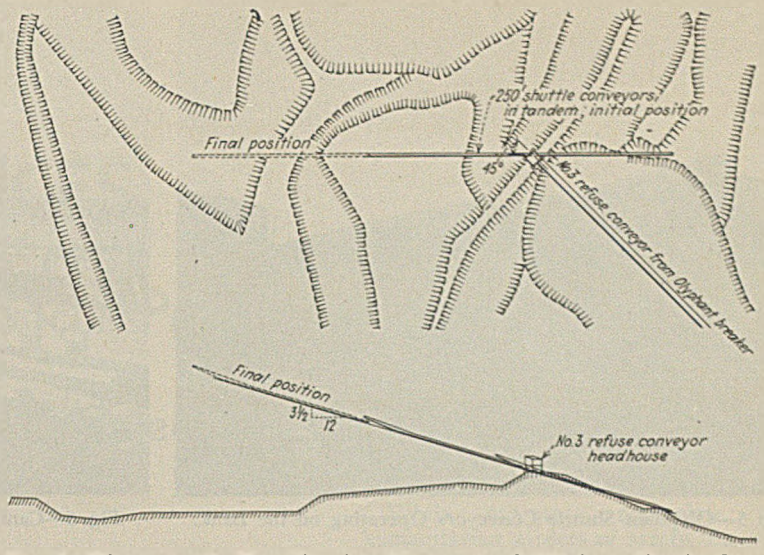


Fig. 4—Diagrammatic Plan Showing Movement of Olyphant Shuttle Conveyors. Both Are Shifted Together to the Final Position, One Discharging Into the Other.

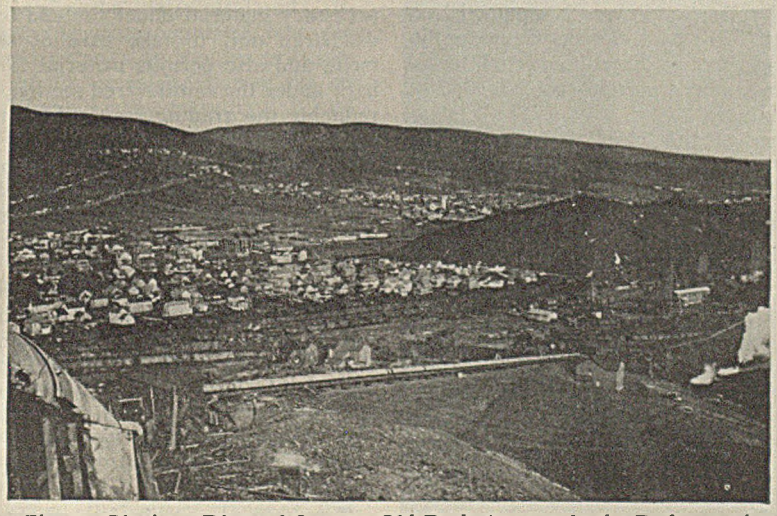


Fig. 3—Olyphant Disposal System; Old Bank Appears in the Background.

ashes (as well as breaker refuse at a later date) are brought to the site in mine cars, which are dumped by a one-car "RandS" rotary dump. From the rotary dump, the rock (maximum size, 48x48x16 in.) and ashes pass over a set of stationary bars, which separate out the minus 6-in. material. The smaller material is bypassed, while the plus 6-in. material drops into a 36x60-in. single-roll McLanahan & Stone crusher, where, with the exception of some thin slabs, it is reduced to a maximum of 8 in.

After leaving the crusher, the minus 8-in. material joins with the minus 6-in. material separated out on the bars. The combined waste product is then fed onto a 36-in. belt conveyor by a Ross feeder, which was installed to protect the belt from injury due to the impact of the comparatively large and heavy pieces of rock. Length of the conveyor, which is laid on a 3½ in 12 pitch, is 468 ft. The conveyor is driven by a 75-hp. motor, which is sufficiently large to permit an extension of 200 ft. in the future. With a belt speed of 250 ft. per minute, the designed capacity is 250 tons per hour. Due to the intermittent loading and the large size of the material handled, this is only approximately half of the maximum capacity. The main belt discharges onto a 212-ft. shuttle conveyor similar in construction and installation to that at Marvine, except that the Pine Ridge unit is elevated at the outer end to facilitate discharge. The shuttle is equipped with a 36-in. belt, driven by a 30-hp. motor. A second Ross feeder retards the flow of material from the discharge end of the main conveyor to the shuttle belt.

With a record of 306 starts, the Pine Ridge installation had handled approximately 330,000 tons of rock and 6,000 tons of ashes up to Nov. 30, 1933. One man is employed to operate the dump, and a second takes care of the disposal equipment.

Another Hudson Coal operation selected for modernization of refuse disposal was the Olyphant colliery, Olyphant, Pa. The Olyphant program also involved the selection of a new dumping site (primarily for breaker refuse) and the use of shuttle conveyors substantially similar to those at Marvine and Pine Ridge but with improvements designed to increase flexibility. Original disposal equipment consisted of an 8x18-in. chain-and-flight conveyor to convey the material to a point near the top of the pile just north of the breaker and additional similar conveyors for distributing it.

One of the major steps in the Olyphant program was the installation of a main conveyor line made up of three sections equipped with 24-in. belts and Link-Belt roller-bearing troughing and return idlers and drives. Installation of the first two sections, extending south 1,069 ft. horizontally to a point near the Eddy Creek colliery on the opposite bank of the Lackawanna River, was completed on Jan. 13, 1931. No. 1 conveyor, varying in pitch from ¾ in 12 to level, is driven by a 7½-hp. motor through a speed reducer. A 15-hp. motor operates the No. 2 conveyor, which varies in pitch from level to 2⅞ in 12. Upon completion of the first two sections, portable conveyors were used to

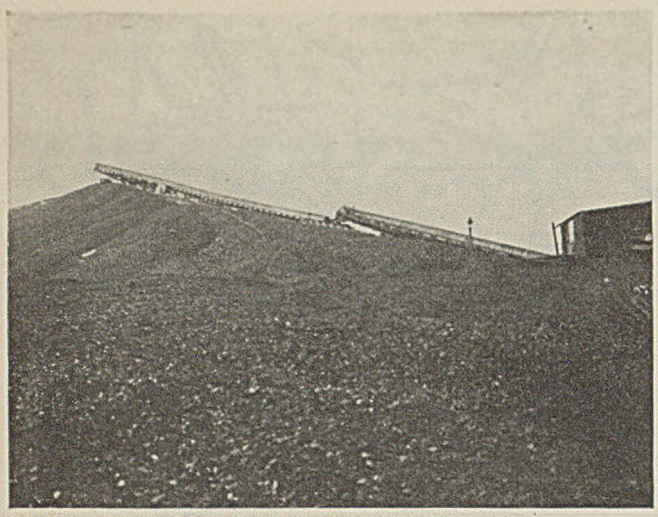


Fig. 5—Olyphant Shuttle Conveyors Operating on the Bank.

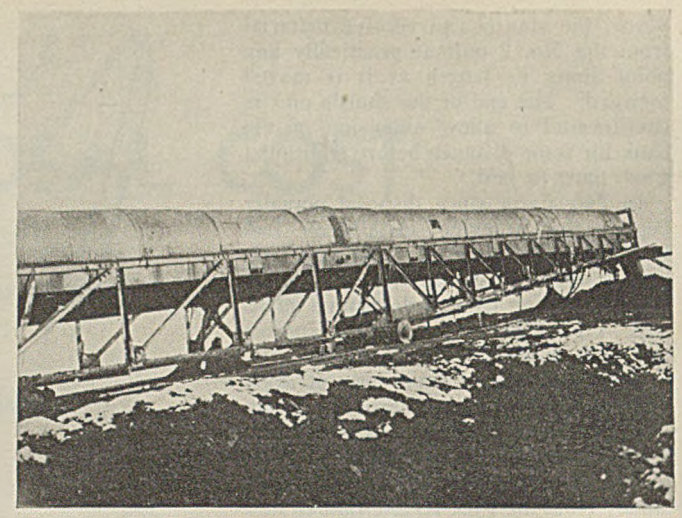


Fig. 6—Cantilever Construction at Discharge End of Shuttles.

extend the bank in preparation for the installation of the No. 3 conveyor, which is laid on a 2⅛ in 12 pitch, and is driven through a speed reducer by a 25-hp. motor. Horizontal distance spanned by the No. 3 unit is 541½ ft.

Belt speed on each of the three main conveyors is 300 ft. per minute, and at this rate the equipment can handle a maximum of 225 tons per hour. Designed capacity, however, is 600 tons per shift, or an average of 75 tons per hour, again due to the intermittent loading of the belts. This is based on handling minus 4-in. breaker refuse weighing 75 lb. per cubic foot, as well as ashes from the Olyphant power plant as soon as construction of the proper facilities, now under way, is completed.

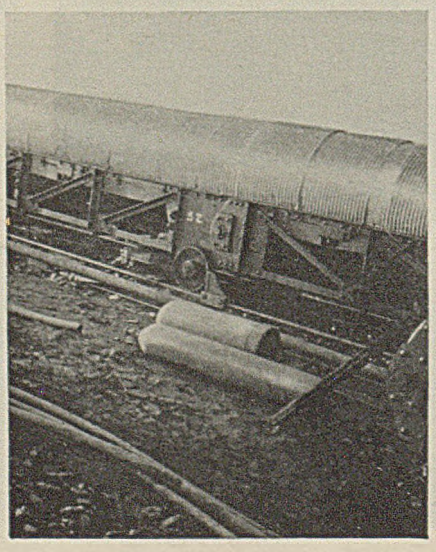
From the discharge end of the main conveyor line the waste material is transported to the dumping point by two 250-ft. shuttle conveyors. The first of these went into service on June 9, 1932, and the second in December of last year. Both operate on a track laid on the bank on a 3½ in 12 pitch, and are moved forward by a hoist located in the No. 3 conveyor headhouse. The relation between the shuttles and the No. 3 unit is shown in Fig. 4. When both shuttles are fully extended, the top of the storage pile will be approximately 150 ft. above the No. 3 head pulley.

Each shuttle consists of a complete troughed belt conveyor with an internal drive mounted in a trussed structural steel frame carried on suitably spaced wheels, and is equipped with a 24-in. stepped-ply "Durabelt" with 28-oz. duck, 6-ply edges, 4-ply centers and a ⅛-in. rubber cover on the carrying side. The belt is carried on Robins 3-pulley troughing idlers, Timken equipped, and Robins return rolls with Shafer roller bearings and dead-shaft mountings.

The conveyor pulleys are made of cast iron with turned and polished steel shafts mounted in roller bearings. Diameters of the head and tail pulleys are, respectively, 24 and 20 in., and the latter is equipped with a horizontal counterweighted take-up. The driving unit is located within the conveyor frame approximately 103 ft. back of the head pulley and consists of a 24-in. rubber-covered pulley mounted on a 3⅞-in. shaft, a 20-in. snub pulley and a chain transmission to a Foote herringbone speed reducer. Power is supplied by a 20-hp., 720-r.p.m., double-wound, squirrel-cage motor direct-connected to the reducer, and the belt speed is 345 ft. per minute.

One of the chief features of the shuttle conveyors is the use of articulated sections to enable the units to operate over an uneven track. The sections are pinned together as shown in Fig. 7, and at Olyphant the complete units consist of one 24 ft. 8 in. section at the tail end, five 31-ft. intermediate sections and a head-end trussed section 76 ft. long, 40 ft. of which is cantilevered to permit the newly deposited refuse to settle before the track is extended on it.

Fig. 7—Pinned Joints Between Shuttle Sections, Also Wheel Position and Stop.



Beginning at a point approximately 148 ft. from the tail end, the shuttle is inclined upward so that the head end is elevated about 8 ft. to allow the unit to discharge into another conveyor, if necessary. In addition, the upturned end facilitates the deposition of the necessary material under the end of the discharge unit to take care of settlement, and also permits material to flow back under the cantilevered section, thus reducing the grading required for track extensions. Intermediate sections are carried on wheel outfits consisting of 16-in. cast-iron wheels with 2⅞-in. shafts mounted in solid boxes. The shuttles are held in place on the inclined track by stops, as in Fig. 7.

Semicircular corrugated steel hoods are used on both the main and shuttle conveyors at all collieries to protect them from the weather. The Olyphant shuttles also are inclosed on the bottom by inclined steel plates, and a steam line is mounted below the return rolls to prevent formation of frost or ice on the return idlers.

Two men are required to operate the Olyphant disposal system under ordinary conditions, one looking after the main conveyor line and the other attending to the shuttles. Up to Nov. 30, 1933, the Olyphant installation had handled approximately 300,000 tons of refuse.

CODE INFLUENCES

+ On Engineering and Social Problems

Discussed at West Virginia Meeting

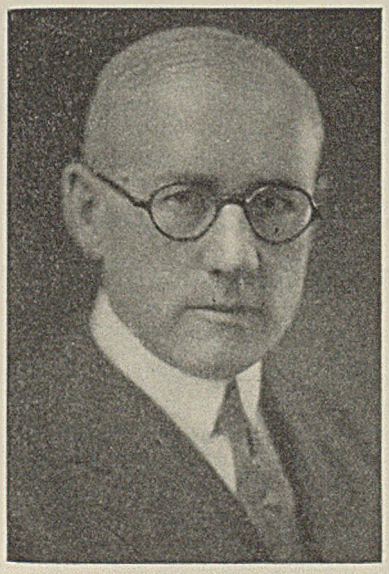
THE BLUE EAGLE cast a lively shadow over the deliberations of the 26th annual meeting of the West Virginia Coal Mining Institute, held at Bluefield, W. Va., Dec. 5, 1933. Not only was there direct exhortation to support the NRA program as expressed in the bituminous coal code but the problems arising out of the changed relationships and practices created by that code and by the recognition of organized labor in the Southern mining fields cropped up in papers and discussions on safety, coal sampling and the social aspects of mining.

"This coding business," declared C. B. Huntress, executive secretary, National Coal Association, who was the principal speaker at the annual banquet of the institute, "is no longer a theory. It's as plain as the nose on your face that we should exert every ounce of energy to give the plan a thorough test on the premise that, if management is fair, if labor is fair, if government is fair, the code will work out to the best interests of all concerned.

"Certainly this industry, along with some others, was on the verge of a breakdown last spring. Certainly, as things were going in those chaotic days, not many companies could have long survived." Since then, however, there has been an improvement, with still better days in sight. This does not mean, he continued, that every company will continue in business, "but we trust it means that every well-managed operation will have a fair break," although the industry is still suffering "from the two-edged punishment of depression and competition of other fuels." The present plan may not be perfect, "but that is no reason for non-cooperation."

Operators should observe the code rules and regulations meticulously, said E. L. Greever, general counsel, Pocahontas Coal Operators' Association, in order to protect the local code authorities. "Your code authorities," he warned, "are your stronghold. Through them you will control or lose control of your industry. Get behind your code authorities and protect their power; see that they are not shorn of that authority by some Washington bureau."

Management, asserted C. J. Flippen, safety director, Norfolk & Western Railway fuel department, holds the key position in accident prevention work.



Mark L. Garvey
Retiring President

"Management is directly responsible for the class of employees on the payroll; it is responsible for labor turnover in many cases, although economic conditions may have a part; labor turnover can be reduced by management, even during good times." Management also is responsible for conditions in and around the mines, for safety education and for the enforcement of discipline. Management "is directly responsible for many of our accidents and indirectly responsible for others."

While operators appreciate the humanitarian aspects of safety, the cost of injuries is one of the mainsprings in safety work. With the importance of a good safety record recognized, there also is a wide variation of opinion as to how it shall be achieved. An organization is a necessity, however, and the mentality and customs of both employer and employee must be considered, along with changes in the economic situation of the industry and the physical conditions encountered at the particular operation, though the latter has been overemphasized as a source of injuries.

An efficient organization requires cooperation from the top to the bottom, and one-man types deserve little faith, as responsibility should be divided and blame and credit distributed where due. Organization should be adjusted to reduce labor turnover to a minimum, and should be predicated on a fair deal for the miner, thus fostering a feeling of security and banishing worry, one of the more important causes of injuries.

Better understanding between the supervisory staff on the job and the management in a distant city is essential, as well as the development of a feeling of confidence on the part of the men. A follow-up system must be considered in any safety organization, and staff meetings, confined to safety and operating efficiency, should be held regularly. Safety rules must be reasonable, clear and concise, and officials should not be exempt from obedience. A bonus of some sort for outstanding safety achievements is essential, but the practice should not be overdone or adopted merely to augment salaries or wages.

"All companies do not have safety directors and safety inspectors, but all can have a man who is responsible for safety work." The qualifications of safety inspectors and safety directors differ widely. The former needs the faculty of observation, a knowledge of the work sufficient to enable him to make accurate reports and the necessary tact to enable him to get along with foremen and men. A safety director, on the other hand, must be able to plan

and work harmoniously with the operating organization, and it is essential that he have the confidence of both his superiors and the men he leads. An important factor is a record system—not too elaborate—which will show the accident record of each man injured, as well as how and why, where the responsibility lies and how similar accidents may be prevented in the future.

Of all the factors in a safety program, education is the most important. Common sense will point the middle road between useless exaggeration and indifference or hostility. Some kind of education always is going forward in every coal camp, so the company should take pains to see that it is the right kind. Tact is necessary, as an otherwise good program may be ruined by trying to force some measure on the miners without the proper preparation. Immediate results may not come up to expectations, but if a company sincerely desires education, persistent application of tried methods over a period of years will achieve it.

Mr. Flippen could see no reason why "discipline should go to the dogs" with the advent of unionism. "Leaving prejudice out of our feelings, we can administer discipline where deserved in most cases—and certainly it should not be given where and when not deserved." Although orders for discipline may come from the higher officials, it should be meted out only by the foreman directly in charge of the offender. In that way the prestige of the foreman is enhanced and his work is made easier.

E. H. Shriver, superintendent, Raleigh Coal & Coke Co., agreed with the speaker that a good safety record was impossible with a large labor turnover. Workers, he continued, must be convinced of the sincerity of management. Worry and lack of job training, said Mr. Shriver, are the two principal causes of accidents. He favored keeping the number of rules as low as possible.

How to check up on and reduce power losses in mine haulage was outlined in a paper by R. L. Cole, power sales engineer, Monongahela West Penn Public Service Co. The objects of the paper, he stated, were to show, "first, a simple method of determining the performance of direct-current haulage circuits; second, a picture of the performance of an electric haulage circuit, and; third, the effect of the variable factors of the electric haulage circuit on the power requirements." An abstract of Mr. Cole's paper appears on pp. 26-28 of this issue of *Coal Age*.

Discussing the paper, H. D. Smith, assistant to the president, Ashland Coal & Coke Co., emphasized the savings effected by reducing the speed of gathering locomotives and suggested an investigation of the possibilites of slowing main-line locomotives without loss in production. W. A. Buchanan, district manager, Appalachian Power Co., felt that 275 was a very low voltage for the transmission of power and that the d.c. distribution system was likely to prove a veritable sponge in soaking up power.

P. P. Pipes, engineer, Ohio Brass Co., in commenting on adequate bonding and the proper size of copper feeder, said that there should be a proper balance between the resistance of the track circuit and the trolley. The common-sense reason for adequate bonding, remarked J. H. Edwards, associate editor, *Coal Age*, is to utilize the very large copper equivalent capacity of the rails. Installing additional feeder before knowing that the track is utilized fully as a conductor is not recommended; assuming that bonding is kept in condition to fully utilize the rails, however, there should be no hesitancy in installing additional feeder if the voltage still is below some predetermined standard minimum, such as 200. Copper feeder requires little or no maintenance and the depreciation is small.

Pointing to the declining percentage of the national energy requirements furnished by coal, Harry G. Kennedy, Kanawha Coal Operators' Association, declared that the industry must look to the research laboratory to improve combustion methods and build back the market. In Charleston, he said, substitution of an industrial stoker burning coal at $2.15 per ton for natural gas at 24.3c. per 1,000 cu.ft. had meant a saving of 48 per cent in 1933 to the consumer. A stoker campaign in that city had brought eighteen industrial and two domestic orders.

New Institute Officers

Raymond E. Salvati, general manager of the Pond Creek Pocahontas Co., was elected president of the West Virginia Coal Mining Institute at the 26th annual meeting of the organization, in Bluefield, last month.

R. J. Burmeister, general manager, Raleigh Coal & Coke Co.; E. B. Agee, general superintendent, Youngstown Mines Corporation; George Caldwell, general superintendent, West Virginia-Pittsburgh Coal Co.; J. D. Sisler, chief, West Virginia Geological Survey; and N. P. Rinehart, chief, West Virginia Department of Mines, were elected vice-presidents.

M. L. Garvey, Pocahontas Fuel Co.; E. H. Shriver, superintendent, Raleigh Coal & Coke Co.; S. Austin Caperton, general manager, Slab Fork Coal Co.; N. A. Emslie, division superintendent, Bethlehem Mines Corporation; and Harry A. Moses, general manager, United States Coal & Coke Co., were chosen as members of the executive committee.

Prof. C. E. Lawall, head, School of Mines, West Virginia University, who was given a rising vote of thanks for his labors in behalf of the institute, was reelected secretary and treasurer.

W. E. E. Koepler, secretary, Pocahontas Coal Operators' Association, explained that his organization had been conducting stoker tests in cooperation with the Norfolk & Western Ry. since the beginning of 1929. Mr. Huntress stated that Bituminous Coal Research, Inc., hopes to correlate the investigations and findings of these and other tests and to classify coals on an adaptability basis for specific uses. Mr. Edwards told how a stoker sale in a small Iowa town had been lost to oil because the retail coal dealers of the community were not prepared to supply the customer with stoker-size coal.

The history of company-owned communities was traced by William Beury, vice-president, Algoma Coal & Coke Co., in a paper on "The Social Aspects of Coal Mines," read in his absence by Mr. Koepler. The industry, he maintained, had done a real job in providing adequate living facilities for the men employed in the mines, and most of the criticism of these communities came from people who had never lived in a company-owned coal town.

Because development of company towns was compelled by the location and nature of the industry, said Mr. Beury, it was possible to plan these communities "with sanitary provisions better than existed in all other towns and cities for many years before they attained a sanitary consciousness. The health of a mine community is as important a part of the plant as the coal tipple. Many features of the company town, such as the finer stores, churches, schools and recreation centers, are plainly matters of competition for labor, forced on the operators among themselves. Added to other considerations, too, is the fact that the coal operators have generally lived right on the job and would hardly want to live in a community which was unsightly, unsanitary or otherwise unattractive."

There is no other industry, Mr. Beury asserted, in which rental and other incidental charges are as uniformly low—rentals, $2 per room per month; kitchen and bath, $1; lights about 35c. per drop per month, with porch light free; garages, $2 per month; house coal, $1 to $2 per month; free store delivery system. More remarkable still, these charges have not gone up in boom times. How satisfactory these conditions are to the worker is demonstrated by the fact that most of the labor turnover is largely internal. Miners "who wander off to cities to work in other industries return convinced that, after all, the coal-mining towns are the best."

There have been some attacks on company stores, said Mr. Beury, "by independent stores on the ground that independent stores cannot meet the prices and service of the company stores. An attack is now being made on the use of scrip by the brain trust, but it is hoped that the employees will be able to as-

sert their preference for this method of extending credit before this provision of the Retail Code can be made the law on this point.

"Every other known method of handling credits at these stores has been and is being used now in the coal fields, and scrip is the only one which protects the women and children of the miner's family in their daily needs. Lump-sum payment of wages only would make the golden opportunity for the racketeers who are being forced out of the liquor racket and are reported to be muscling into the labor racket. The coal industry—operators and miners alike—will have to be alert to prevent a great wrong being done the living conditions of the miners by abolition of the use of scrip."

Recreation perhaps is the only phase of mining community activities that has not been developed as rapidly as it has developed in city life. The need for faster development in this direction, continued Mr. Beury, will be greater with the establishment of the shorter work-week. Emphasizing what governmental agencies have done in increasing city recreational facilities, Mr. Beury asked whether it was not logical that the State appropriate money for summer camps for miners' children, especially when such camps have been established for farmers' children.

"The need of the coal fields," he concluded, "seems to be for a careful study of the living situation on a well-rounded basis as a complete program. The need for larger recreational facilities is one of the outstanding problems. There is some danger that the present basis of handling labor relations through representatives and committees may make more difficult the task of working out these recreational provisions on the same cooperative basis that was possible under restrained collective bargaining, with the operators dealing with the whole mass of citizens of the coal communities—but it must be done.

"This brings out the necessity of the operators continuing and increasing natural leadership in these communities. Their responsibility is the same as it was at the beginning and is increased now by new conditions, among which is the five-day week, which is likely permanent and which presents new problems. Unless the miners and their families are provided with recreational facilities adequate to their need, in addition to the present abundant essential living conditions, there will be complications in the labor problem that may add to the coal man's burdens."

Mr. Kennedy declared that there was need for a strong offensive, instead of a belated defensive, in combating misrepresentations of mining living conditions. M. L. Garvey, retiring president

Charles E. Lawall
Reelected Secretary and Treasurer

of the institute, contrasted the situation in company-owned communities with city conditions, where men out of work are denied credit at grocery stores and are evicted from their homes. H. W. Straley, who had spent several years in Illinois, said that the company-controlled police system was the most difficult to defend from critical attack.

Results of ash and float-and-sink tests made at ten plants for the purpose of measuring sampling errors were illustrated with slides by T. W. Guy, consulting engineer, of Charleston. Sampling error was defined as the margin by which the sample fails to represent the actual quality of the coal sampled. Results of similar samples from a single lot of coal differed as much as samples from different lots of the same coal, indicating, said Mr. Guy, that sampling errors are responsible for a large part of the variations in quality shown by the usual samples from commercial lots of a given coal.

For a given coal, he explained, it was possible to measure statistically both the sampling errors and the true lot-to-lot variations. With such data available, either or both readily may be compared with other coals or with other samples or preparation results for the same coal. Ninety-three sets of data on float-and-sink tests recently made at 18 plants on groups of 20 to 155 samples of a wide range of coals and sizes show a good agreement between actual and expected results calculated from relationships based on the principle that, for a given accuracy, the weight of the sample varies directly with the percentage of sink and directly with the effective weight of the pieces of sink material. In other words, if either percentage or effective weight be doubled, the required sample must be doubled; if both percentage and effective weight are doubled, the sample must be quadrupled.

Experiments and studies of the effect of sampling errors on the results of ash and chemical analyses, Mr. Guy stated, indicate that, with the necessary data on the characteristics of the coal sampled, the sampling accuracy and reliability may be materially increased. In many cases, he added, this can be done without taking large samples.

Accuracy of sampling, said Mr. Smith, has suddenly assumed increased importance because of the bituminous coal code. Describing some of the work he has been doing in classifying Pocahontas coals for the code authority, he reported that one company had sent in an analysis based on a single sample and another company one based on 6,000 samples. Analyses from 200 mines in the field show a much wider variation than they should if sampling had been more accurate. Errors in sampling which may lead to a wrong classification under the code have a serious aspect.

Many samples sent to laboratories are worthless from the standpoint of giving a true picture of the average quality of the output of the mine, asserted George E. Keller, manager of the Charleston office of the Commercial Testing & Engineering Co. He urged that more care be exercised in taking samples. A paper on "Oxyacetylene Welding and Cutting," by E. S. Wade, superintendent, Windsor Power House Coal Co., who was unable to be present at the meeting, was read by title only.

On the day following the technical sessions, members of the institute toured mining operations in the Pocahontas field.

Stock-Taking Time

We must turn back to the pages of the World War period to find a year in the history of the coal-mining industry as colorful as the year just closed. . . . The district sales agency plan approved by the Supreme Court of the United States . . . the movement launched by Appalachian operators to lift wages from the deep trough of the depression . . . NRA and the codes . . . new labor relationships . . . new competitive pictures . . . and new problems and new opportunities for progressive management.

It is time to take stock of these changes. . . . Their appraisal, therefore, will be the theme of the February issue of *Coal Age* . . . our Twenty-third Annual Review and Progress Number.

ELIMINATING MACHINE DELAYS

+ At New Monarch Mine

SEVERAL METHODS of operating mechanical loaders have been adopted at the New Monarch, No. 7, mine of the Consolidated Coal Co. of St. Louis, at Herrin, Ill., each, in turn, affording a further increase in the output per machine. The seam at this mine dips steadily toward the north at a gradient of about 1.75 per cent, but the coal rolls heavily, making the gradients somewhat uncertain and, at times, quite difficult. The coal seam usually does not make much water, but, unfortunately, there are mines on all sides which have caved, and in these the water lies at a depth of 40 to 45 ft. A continuous flow of water is derived from this source.

Formerly, rooms were driven either directly up and directly down the pitch from one level entry toward an adjacent entry, the rooms from adjacent headings meeting one another, as shown in Fig. 1. But, more recently, the "fir-tree" system has been adopted, with the main entry forming the stem of the tree, and rooms, driven at an angle of 60 deg. to the entry, being the branches. This plan gives a lighter gradient than would be afforded by driving the rooms straight down toward the dip and also affords —and this is the main reason—an angle at the entry so easy that cars and machines are less likely to be derailed at the switch (Fig. 4).

Usually, each of these room entries consists of three parallel headings with crosscuts (Figs. 2 and 3). Every few hundred feet, these crosscuts, in pairs, are driven on a slant so that they can be used by the haulage locomotives to get around standing cars, thus making other partings unnecessary. In the first of these fir-tree workings, slant crosscuts are driven between rooms at intervals, so that three cars can be placed in them by the "swing" locomotives, thus affording a supply for the service locomotives as near as possible to the points where the cars are to be serviced. Rooms, when completed, are about 400 ft. long, and cars are hauled along them until the rooms are finished, one car being serviced at a time. When the cars are brought into the room, one of them is placed behind the loading machine and the other three are pushed into the slant crosscut and blocked there wherever the gradient makes blocking necessary.

Later, in the workings shown in Fig. 3, slants have been driven from room to room so as to make a continuous heading parallel to the entry and approximately 150 ft. away from it. This heading is made into a haulage or "subentry," permitting the rails and ties between the near heading of the entry and the new haulageway to be lifted and used in the extension of the room from that point on. The switches also are lifted for use in the new haulway. This saves the time of the swing locomotives and decreases the quantity of material in service.

Rooms are driven to a length as great as 500 ft. The new arrangement increases the daily tonnage per machine about 7 per cent. By driving rooms at 60 deg. from the first room started, not only is coal obtained from the pillar left by the slanting course of the first room but additional tonnage is obtained with no extra development.

The rooms in these workings are driven 24 ft. wide and at 51-ft. centers. The coal is about 10 ft. thick, but only 8 ft. of it is removed, 2 ft. of good coal being left to protect the roof. In the newer development, it was decided that the entire thickness of the seam should be removed, at least in most of the rooms, and that at the same time, if possible, further increase in the working time of the loading machines should be effected. The main development is driven N. 30 deg. E. and the room headings are driven N. 30 deg. W., or at an angle of 60 deg. to the main development. The rooms in their turn are driven parallel to the main development on one side of the room entry and due west on the other side (Fig. 4). This leaves a gore between the first room and the main development, which is removed by driving, off the first room, other rooms parallel to the main development.

All these rooms are driven by a modification of the checkerboard system, a system which makes the driving of crosscuts an integral part of the coal-producing plan. Coal is cut by shortwall machines which have either 7½- or 9-ft. cutter bars. These make cuts 7 ft. and 8½ ft. deep, respectively. The method of operation is shown in Figs. 5 and 6.

As will be seen in Fig. 5, which represents the operation with the 7½-ft. cutter bar, the practice is to drive forward two cuts and then to swivel the third forward cut around on the right or left and cut down the right or left rib respectively for a distance equal to the depth of two cuts. Then two more straight cuts are made in advance, and then a "rounder" is made in the opposite direction to the previous swiveling cut, removing a portion of the rib and ending the cut opposite what was the rear end of the first "rounding" cut. Thus, first one rib and then the other is recessed for the full depth of one cut (7½ ft.) and for a length equal to the depth of two cuts, or 15 ft. In taking the second and third cuts the shortwall machine is not reloaded but skidded over by jack pipe and chain.

Concurrently with the cutting of the first advance cut after each swivel cut has been made, the side cut is extended one more cut for a width of two cuts, thus completing a crosscut 15 ft. wide with the aid of two similar cuts, a "rounder" and a straight cut, which have been made from an adjacent room. In this way, a crosscut is driven half way through the pillar, which is completed by cutting through the pillar in a similar manner. However, the crosscut as driven from that room is one cut behind, so that, instead of striking the crosscut fairly, it noses into it at its outer corner. This suffices quite well for ventilation and has the advantage that not only are the crosscuts staggered with regard to one another but they themselves follow a staggered line. Thus, the roof is much less weakened by the driving of crosscuts than it would be if they were lined truly and driven straight—a condition to be

avoided because it brings maximum strain on the roof.

Fig. 6 represents the method when a 9-ft. cutter bar is used. The pillar has been increased to 37 ft. and 8½-ft. cuts are being made. Those in the pillar are somewhat less deep. It may take six cuts—two "rounder" cuts and four straight cuts—to break through, but, as five times 8½ ft. is 42½ ft., it usually is possible to cut through with five cuts. This practice of providing a 37-ft. pillar is not regarded as standard. It might be more desirable to make the pillar only 27 ft. What is regarded as desirable is that the cut shall be made with a 9-ft. cutter bar. The machines in this section of the mine produce 16 per cent more tonnage per working shift than those working in the area portrayed in Fig. 3.

In all cases, 5-BU Joys are used for loading. When operating under the earlier system, three or four empty cars are pushed by the locomotive into the room at one time, and all but one are placed in the sidetrack. That one car is placed by the locomotive behind the loading machine and, when loaded, is pulled out beyond the switch. An empty car is then dropped onto the room track and coupled to the load and with it pushed back to be loaded. When the car has been filled, the same procedure is followed until the last car has been dropped out of the sidetrack. This last car is then pushed back in loading position at the machine, blocked and left while the loaded cars are being pulled out and placed on the heading and while several empty cars also are being brought in and placed in the sidetrack, whereupon the locomotive picks up the car left behind the loading machine, which by this time has been loaded. Then the already detailed procedure is repeated until all the loose coal has been loaded.

The foregoing, however, describes only the method of operation when the gradient from the switch toward the face is uphill. When the inclination is in the opposite direction, the four cars are brought into the room and backed up to the loading machine and, when the rear one has been loaded, all the four cars are pulled beyond the sidetrack. Then the rear, or loaded, car is dropped into the sidetrack, and the three empties are backed up to the loading machine and the rear one is loaded. This procedure is repeated until only one car remains. This car is then "spotted" behind the machine, and the locomotive picks up the three loads dropped into the side switch and takes them out on the heading and, leaving them there, brings in three more empties, which are coupled to the "spotted" car, which has by that time been loaded. Thereafter, the same procedure is followed.

With the plan shown in Figs. 5 and 6, however, storage is not necessary. Only three cars are provided and they are placed at the face all at one time, and the machine loads them one after the other from the side of the track—which track is laid in the center of the room—the machine being moved from side to side for that purpose. The reach of the Joy is 24 ft. 10¾ in. With a 27-ft. pillar, deducting 2½ ft. for the width of the car, the most remote distance in the crosscut measured at right angles to the line of the track is 23 ft., so the coal is readily transferred. With a 37-ft. pillar and a similar deduction, the distance is 5 ft. more, and some coal is 3 ft. beyond the range of the loading machine. This can be met by shoveling some of the coal by hand toward the machine. However, it is more economical to allow the machine either to "double load" the coal or to "taxi" it from the face to the car on the conveyor.

Do what one may, time must be lost between loading opportunities. In the area shown in Fig. 3, the time lost in an 8-hour shift is approximately 3½ hours, and in the area being described this is reduced to about 2 hours. As this time is divided into a number of intervals of about 1 minute, some coal can be moved during the delay so as to place it where it can be loaded with greater facility.

Contrary to customary belief, the "rounding" cut gives large coal. It is true the corner, when shot, shatters

Fig. 1—Early Method With Rooms Driven to Rise and Dip. Fig. 2—Fir-Tree Method as First Developed. Fig. 3—Same Method With Sub-Entry Cross-Headings. Fig. 4—Fir-Tree Development With Checkerboard Room Operation. In Figs. 2 to 4, Swing Locomotive Roads Are Stippled and Gathering-Locomotive Roads Are Hatched. In Fig. 3, the Main-Haulage Road Is Marked With a Heavy Central Line. Fig. 5—Details of Checkerboard Work—51-ft. Pillar. Fig. 6—Checkerboard Work—61-ft. Pillar. Fig. 7—(a) Switch in Which Swing Locomotive Sets Three Cars and (b) Switch From Room to Room for Car Placement.

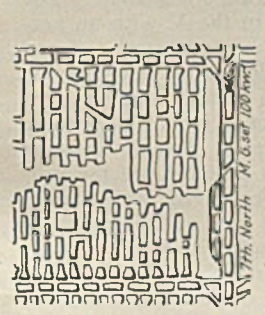


FIG. 1

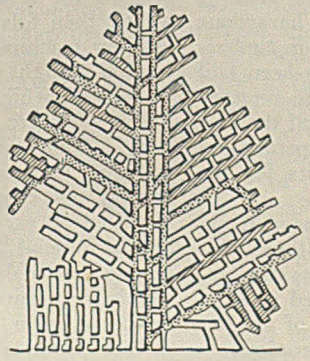


FIG. 2

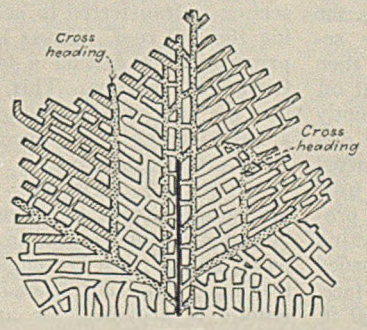


FIG. 3

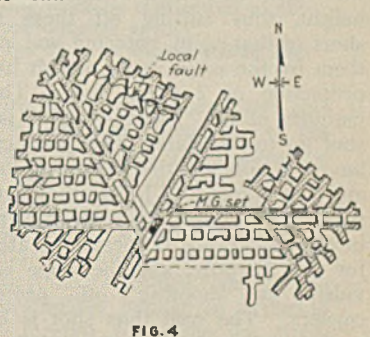


FIG. 4

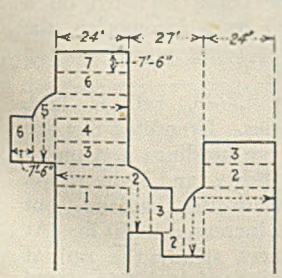


FIG. 5

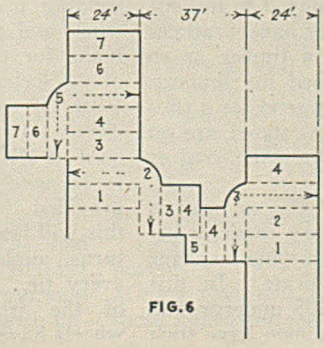


FIG. 6

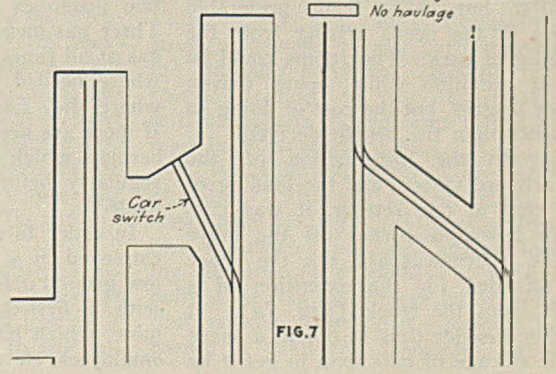


FIG. 7

badly, but, when the coal at the corner is broken, opportunity is afforded to all the other six shots in the same stratum of coal to be shot toward a loose end. The face of the "rounding" cut is 39 to 41 ft. long and, though it turns at a right angle, the shots outside the angle are quite effective. However, the improvement in size of the product should be accredited largely to the removal of all the coal up to the slaty top. There is a good parting at that point and, when shot to that level, the coal falls with relative ease. Holes are placed at two levels in the coal, about midway in the seam and near the top.

In a "rounding" cut, there will be fourteen holes in all—in the advance cut, six holes and, in the crosscut, another six holes, with two in the corner. All these are drilled by Chicago Pneumatic equipment. The three holes at each level of an advance cut are shot at one time and in accord with Illinois law, which requires that they be fired after the mine shift is concluded, which at this mine is 4 p.m. The cycle of operations follows the prescribed order: (1) inspection and timbering by a timberman; (2) loading; (3) tracklaying and further timbering when necessary; (4) cutting; (5) drilling; (6) shothole loading and tamping by the same man who also cleans up any bug dust in the cut; and finally, after 4 p.m., (7) shooting.

It should be noted that, in the area where the coal is removed to its full height, it is customary to drive every third room only 8 ft. high, afterward connecting it, to a point about 200 ft. in, by sloping crosscuts to the rooms to the right and left, which are full height, thus cutting off these rooms short of that point, entering and leaving them by the main room, which has the protection of 2 ft. of coal. The remainder of the "haulage room" is then shot up to the slate. The parts cut off have the rails and ties removed promptly and are allowed to fall if they are disposed so to do. Crosscuts constructed in the checkerboard operations are used for this purpose, and the slope is provided by shooting off projecting corners. The coal thus shot is loaded as the loading machine goes to the face.

Rooms are now driven about 350 ft. long. All lengths have been tried up to 650 ft., but 350 ft. seems preferable because of the needs arising from the changing of cars. The rooms could be held in condition while being driven greater lengths, but the cost of doing so is greater than the benefit derived.

Prior to the introduction of the checkerboard system and the loading of three cars at one setting, it was customary to cut a corner off the inbye edge of a crosscut and use the space thus afforded for the extension of a switch from the track (Fig. *7a*). It was much easier thus to obtain a space for the storage of cars than to get it by a connection through the crosscut to the track in a near-by room, which necessitated the laying of two switches, as in Fig. *7b*.

When a small fall of rock occurs such as the Joy loader can satisfactorily handle, it is customary to remove it with that loader, placing it to one side of the road where it will be out of the way. A larger fall such as could not thus be easily handled or stowed and one which could not readily be handled without feeding it by hand to the machine or by hand-loading it into cars is allowed to lie. Instead, a crosscut is made by cutting, shooting and machine-loading a piece of the pillar, thus affording a roadway leading through the pillar ahead of the fall and heading off the room which has caved. The coal shot down at the face is recovered by "back driving" the room, thus maintaining the desired percentage of extraction, recovering the coal already shot down and furnishing another loading place without cost of track and with minimum moving of equipment. As many of the steel ties and rails as possible are pulled from under the rock.

Loading crews consist of 13½ men and comprise one operator, one helper, one "skin-up" man who makes the place safe after loading, two cutting-machine men, one electric driller, one shot charger and tamper, one timberman, one tracklayer, 1½ motormen (there being, for each two loading machines, one swing locomotive and two service locomotives), 1½ trip riders, one "utility man" at base-rate pay and the half time of one boss, but all of these men aid one another whenever, owing to difficulty, some part of the work falls behind. Sometimes, where the roof is bad, a timberman from a less hazardous section is transferred to help in timbering the bad roof. Stress has been laid principally on getting a large tonnage from each machine. This, and the fact that the mine was formerly operated on a hand-loading basis, accounts for the large crews employed.

About 150 men are engaged in mechanical work, including those employed in haulage and in making repairs, and 55 men are engaged in hand loading. Yet, 120,000 cu.ft. of air per minute is provided, or approximately 600 ft. per man per minute. Each of two machines is in charge of a boss. Three gas men are employed to test for gas at all times, and they hang brattices where needed and put a timber or so where they find any need for timbers. If more are needed, they send for a timberman, which timbers, as stated, are set regularly before and after the coal is loaded.

In order to assure safety, no man is employed in a supervisory capacity below ground unless he is a mine manager with a first-class certificate. In this mine, which has only 205 underground employees, eleven of the men have such certificates, and the chief electrician and surveyor also are certificated. In addition to these company men, five of the employees possess first-class certificates as mine managers.

Maintenance is performed at the company shop, which is operated much as if it were an entirely separate repair company. Charges are made for the labor and material used in the repair of each loading, cutting and drilling machine, also for the repairs to any other equipment. The cost of labor for loading-machine repairs will run about 4 mills per ton of coal loaded, and the cost of material about 6 mills, or in all about 1c. per ton. In fact, the cost of these two items is somewhat under that figure. The oil used for lubricating machines costs less than 3 mills per ton loaded and the labor of lubrication about 2.8 mills, or a total of less than 6 mills.

Surveys are made every two months and points given to the various bosses. Every room is driven on sights placed by a surveyor. Each Joy machine, of which there are ten, is serviced by a high-clearance, low-speed, single-motor 7-ton Whitcomb or Mancha battery locomotive. To two service locomotives are apportioned a swing locomotive which is a heavy-duty, two-motor Westinghouse battery unit weighing from 9 to 9½ tons. For main-haulage locomotives, Jeffrey and Goodman locomotives weighing 15 to 18 tons each are used.

An improvement of 15 volts at loading machines has been obtained by welding main-line rails instead of bonding them together. A man with a cutting torch bevels the ends of adjacent rails so as to form a V at the joint, and he then grinds the side of the V so as to prepare for a clean, even weld. The welder then fills in the V with an arc-welding machine using a steel rod and leaving a slight depression near the top of the rail, which he fills later by using the welding arc on a rod of manganese alloy. This gives a durable wearing surface. Only at switches are the rails bonded with copper. Here, double bonds are used on each side of the track. It has been found that, with track welding, not only is a durable connection made but the resistance of the bond is reduced to unity. To stiffen the track and further promote an efficient bond, the welder runs a weld around the fishplate. General Electric welders are used, the welding machine being mounted on a truck and pulled by a locomotive, the tanks for cutting being placed on top of the locomotive.

In the rooms, 30-lb. rail is laid, mostly on steel ties. Creosoted ties are used in all haulage headings and under room switches. Forty- and 50-lb. rail is provided for main-line haulage, but this will later be increased to 60 lb. At turns, angle braces steady the rail at every tie. Because of the high speed of the trips, Timken roller-bearing wheels have been introduced.

MINING CONGRESS ASKS

+ Square Deal for Bureau of Mines;

Opposes Additional Tax Burdens

STRONG PROTEST against curtailment of the work of the U. S. Bureau of Mines by administrative or legislative action was registered by members of the American Mining Congress at their 36th annual convention, at the Mayflower Hotel, Washington, D. C., Dec. 13-16, 1933. Told how appropriations had been slashed, personnel reduced, field work contracted or abandoned and the Washington staff of the Bureau scattered in offices in five different buildings in the city, members of the congress authorized the appointment of a special committee to present the demand of the mineral industries that the threatened disintegration of the Bureau be halted to the Secretary of the Interior.

Taxation discussions centered around proposals embodied in a report of a subcommittee of the House Committee on Ways and Means for the prevention of tax evasions, but which, if enacted into law, would materially increase the tax burdens on the mining industry. Interest in these proposals was further intensified by a statement of the Acting Secretary of the Treasury to the committee on Dec. 15 recommending that the discovery depletion provisions of the existing law be eliminated. Depreciation allowances, it was pointed out, also were jeopardized by the subcommittee proposals, which would arbitrarily reduce these allowances 25 per cent.

NRA activities came to the fore in the opening address of J. B. Warriner, retiring president of the congress, who urged that no snap judgment be taken on the recovery program, and by Henry I. Harriman, president, Chamber of Commerce of the United States, who indorsed the concept of NIRA but criticized its application to small units in industry and also voiced the opinion that sectional wage differentials had been narrowed too much. Blanket statutory establishment of a maximum work-week for all industry met with unopposed condemnation in the deliberations of the convention.

Characterizing the Bureau of Mines as the child of the mining industry and subject to criticism and chastisement by that industry, J. F. Callbreath, secretary of the congress, in presenting his annual report at the first session of the convention, declared that, "like all family quarrels, when the outsider comes in to settle the trouble, we find the industry pretty solidly behind the Bureau. It has been shunted from department to department, from office building to office building; appropriations have been cut to the bone, while bureaus of less importance have waxed fat and healthy."

The Bureau of Mines, said Scott Turner, director, who had been asked to outline its present status, has more demands upon it for service and less to do with than in twenty years. Congressional appropriations have dropped from $3,400,000 for the year ended June 30, 1929, to $1,514,000 for the year ending June 30, 1934. To make matters worse, however, the 1933-34 appropriation was pared to $1,100,000 by the Department of Commerce, bringing the money actually available down to 31.9 per cent of the 1928-29 allotment.

As a result, continued Mr. Turner, personnel has been reduced one-third, nine of the eleven mine-rescue cars have been taken out of service, several field stations have been closed and the work at others sharply curtailed. The work of the health division, carried on in cooperation with the Public Health Service of the Treasury Department, has been discontinued. Studies of roof falls and of underground mechanization have been abandoned. First-aid training also has suffered: the number of men trained annually by Bureau instructors has dropped from 100,000 to 70,000 and this year will decline to 40,000.

Canvass of the mineral industries, reported A. W. Dickinson, American Mining Congress, shows that leaders in these industries are opposed to any curtailment in the safety activities of the Bureau and want to see appropriations for Bureau work increased. They also recommend that the statistical services be expanded and that the staff for this work be augmented so that data collected may be more promptly disseminated. Research, too, should be adequately supported. There was some criticism of bureaucratic tendencies and a suggestion that the director of the Bureau should work out more projects in cooperation with committees of operators from each producing district.

Summarized, the specific recommendations developed by this canvass, said Mr. Dickinson, were:

1. More field work.
2. Experiment station work should be concentrated at four major stations —one each for coal, metals, oil and clay.
3. Safety work should be extended.
4. Statistical activities should be continued and under no circumstances should this work be transferred to any other governmental agency.
5. Research work should not be curtailed.

Following this presentation there was a parade of witnesses testifying to the high esteem in which the Bureau of Mines is held by the mineral industry. All coal statistics, declared Eugene McAuliffe, president, Union Pacific Coal Co., should be centered in the Bureau. This agency, he continued, has done a job of inestimable benefit in bringing improved foreign technique in safety work to the attention of American operators. Speaking for the Illinois Mining Institute, T. J. Thomas, president, Valier Coal Co., said Illinois was strongly opposed to any curtailment of the Bureau's activities. He also paid special tribute to the constructive criticisms made by engineers of the Bureau in mine examinations.

E. A. Holbrook, dean of the school of mines, University of Pittsburgh, as spokesman for the Coal Mining Institute of America, protested against making the Bureau a football of partisan politics. From the time of its organization, when a Republican President had named a Southern Democrat as the

first director of the Bureau, the Bureau has been kept out of the arena of politics and should be continued in that position. No agency in the South, said Milton H. Fies, vice-president, DeBardeleben Coal Corporation, has contributed as much to the education of the mass of workers and to technical advancement as the Bureau of Mines. The improvement in the safety record of Alabama is a direct reflection of the Bureau's activities.

Because it has the respect of the entire industry, Mr. Fies suggested that the Bureau be put in a position to set up quality standards for various coals as a basis for price differentials under the NRA code. He also proposed that the Bureau be given the funds and the personnel to enlarge its research into the chemistry of coal. Such research, he argued, is most important for long-range planning.

Cleveland E. Dodge, vice-president, Phelps Dodge Corporation, felt that the friends of the Bureau should make their position known in influential political circles. He emphasized the great contribution the Bureau had made to controlling gas and dust difficulties in the Raton district. Curtail the work of the Bureau, he warned, and accident rates will again increase. Special support, maintained J. T. Ryan, vice-president, Mine Safety Appliances Co., should be given the work of the Bureau in three fields: (1) health and safety; (2) fundamental research, particularly along health and safety lines; and (3) the economic division, with special emphasis on statistical activities.

Mr. Callbreath set the stage for the taxation discussions by pointing out in his annual report that, under the new program of taxation being considered by the national Congress, the industry is threatened with:

1. Increased levies on dividends.
2. Reductions in depreciation and depletion allowances.
3. Changes in the basis for reporting capital gains and losses.
4. Abolition of the exchange and reorganization provisions of Sec. 112 of the present law.
5. Elimination of tax-free distributions of March 1, 1913, surpluses.
6. Elimination of foreign tax credits.
7. Elimination of consolidated returns.
8. Denial of loss on sale or exchange of property between a shareholder and a corporation in which such shareholder owns a majority of the voting stock.
9. Modification of the rule as to March 1, 1913, value in case of a loss.
10. Modification of provisions on distribution in liquidation.

H. B. Fernald, Loomis, Suffern & Fernald, emphasized the importance of the proposed changes in depreciation and depletion allowances, consolidated returns and the exchange and reorganization provisions of the present law. If, as has been suggested, Congress should arbitrarily reduce depreciation and depletion allowances 25 per cent, what, he asked, is there to prevent the government later wiping out these allowances entirely? Depletion and depreciation allowances, declared Prof. Donald H. McLaughlin, are rights, not subsidies, and should be defended. Ellsworth C. Alvord, tax attorney, deplored the costly litigation created by disputes over interpretation of the revenue laws.

Experimentation, said Mr. Warriner at the opening session, always has been the keynote of the mining industry, which has set a model for the world to follow. The industry, therefore, cannot object if the experiments of the recovery program are carried on sanely and dropped promptly when they fail. The vast majority in the mining industry is willing and anxious to cooperate with the government. That doubt and uncertainty exist were attributed by Mr. Warriner to the introduction of extraneous issues since the NRA program was conceived. One of these disturbing elements is the assumption by labor that NIRA is a charter to advance its interests exclusively.

While not fully in accord with certain features of NIRA, Mr. Warriner stated that he was trying to take a rational view of the statute and its application. The success of NRA in bringing together the discordant elements in the bituminous coal industry for agreement on a code which raised low wages and eliminated unfair trade practices was an achievement of real magnitude.

Senator M. M. Logan, chairman of the Senate Committee on Mines and Mining, informed the convention that all legislation referred to his committee would have fair, intelligent and honest consideration, free from bias, predilection and prejudice. "It is your duty," he said, "to submit briefs, arguments and facts that will be helpful in arriving at a conclusion, but I have no use for the man who merely makes assertions." With the intelligence there is in the industry, it should be possible to arrive at some plan to achieve stability. But the industry will have to take the lead; Congress and the administration, he said, can only help.

The good outweighs the bad in the administration's recovery program, in the opinion of Mr. Harriman, who pointed out that 4,000,000 men have been put to work and monthly payrolls are up $600,000,000 since last February. Other accomplishments include the elimination of sweatshop labor and the discipline which has been established in the steel, coal and oil industries. These achievements necessarily demanded more drastic action than is desirable under normal conditions.

The great danger, as Mr. Harriman saw it, lies in an excess of government control. The old *laissez-faire* philosophy has been repudiated, but the new order must not suppress individual initiative and the opportunities for profit. It was inevitable, he conceded, that mistakes should be made in the formulation of such a large number of codes as now are in operation, but he was confident that many, if not most, of these initial errors would be corrected before a year rolls by.

Mr. Harriman expressed the belief that the wage differential between the North and the South, established in the textile and other codes, is not broad enough and that the differential between wages in the large city and the small town is too narrow. The codes, he said, are unduly oppressive on many small plants employing five to twenty men. Many of these plants, which he described as the backbone of industrial life, had been unable to accumulate reserves to carry them through the transition period. He suggested, therefore, that these small units either be exempted from codes or the application of codes to such plants be spread over a period of several months.

Strong agitation for Congressional action on a shorter work-week was predicted by Mr. Callbreath. Uniform application of a 30-hour week to all industry, he feared, might leave the country without adequate production in prosperous times. A shortage so created would lead to rising prices, the burden of which would fall most heavily upon the mass of the wage earners. The worker, he said, must choose between more things and more leisure.

According to figures compiled by the National Industrial Conference Board,

(Turn to page 20)

Mining Congress Officers

Howard I. Young, president, American Zinc, Lead & Smelting Co., has been elected president of the American Mining Congress. Mr. Young succeeds J. B. Warriner, president, Lehigh Navigation Coal Co. Other officers elected at the annual meeting of the congress held in Washington, D. C., last month were:

First Vice-President: A. E. Bendelari, president, Eagle-Picher Lead Co.

Second Vice-President: D. D. Moffat, vice-president, Utah Copper Co.

Third Vice-President: J. B. Putnam, Pickands Mather Co.

Secretary: James F. Callbreath.

Executive Committee: Messrs. Young, Putnam and W. J. Jenkins, president, Consolidated Coal Co. of St. Louis.

A. B. Jessup, vice-president, Jeddo-Highland Coal Co., was elected a director for a term of three years to succeed Mr. Warriner. Charles H. Segerstrom, president, Carson Hill Gold Mining Co., was chosen to succeed L. S. Cates, president, Phelps Dodge Corporation, on the congress board.

FLOTATION MAY BE USED

+ To Separate Coals

Having Specific Industrial Uses

By DR. ERWIN M. MAYER

Berlin, Germany

AS WITH ORES, so also with coal, differential flotation in some cases can be effected which will separate coals of different petrographic characteristics; that is, the respective material from anthraxylous, attrital, and mineral-charcoal bands, under favorable conditions, can be segregated by flotation.

Anthraxylon is the constituent best suited for coke. Attrital coal will not swell on being heated, and if it is low in ash, it forms a gray, dense, cross-fractured coke. If the ash content is high, it produces a powder coke. The presence of attrital coal beyond a certain limit may be detrimental to coking.

Mineral charcoal, or fibrous coal, may have either a soft fiber, the cell spaces of which are filled with gas, or a hard fiber which is high in ash. If the first exceeds 20 to 30 per cent of the coal, and if the second constitutes 12 per cent or more, their presence will be detrimental to the coking process, according to F. L. Kuehlwein.

According to E. Stach, anthraxylous coal is suited to coking, attrital coal to liquefaction and carbonization, and mineral charcoal to fuel-dust firing.

Moreover, in addition to differences due to the vegetal orgin of coal, there are differences resulting from the age of the coal and its environment. In the Ruhr district, the petrographic constituents vary largely with depth, low-volatile, medium-volatile, gas and long-flame coals being derived respectively from the various depths.

Where coal is used for the manufacture of coke, the proportion in which these constituents are mixed is important. Consequently, the flotation plant should not only reduce the ash content but also should enhance the suitability of the product for coking purposes.

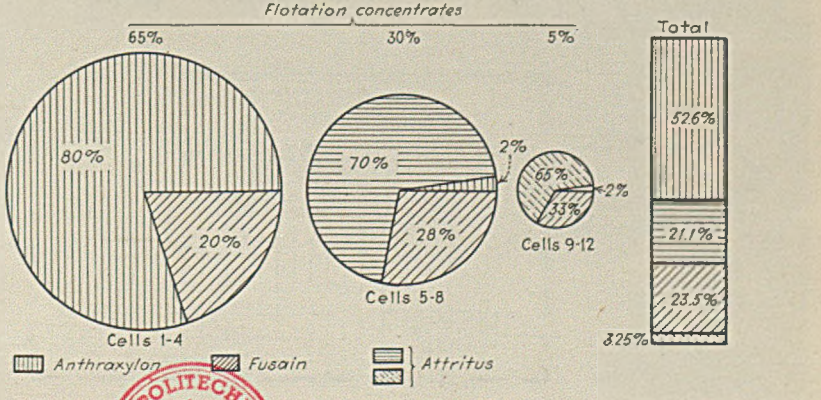
Studies by A. Czermak, O. Schaefer, F. L. Kuehlwein, Y. Lange and E. Hoffmann have been directed to a determination of the composition of coal that is suited to coking. H. Hoffmann has made investigations of flotation concentrates from Saar coal and established the fact that fibrous coal, or mineral charcoal, is found principally in grains smaller than 0.1 mm. (0.0039 in.). This grain also has the highest ash content, which, however, as tests of the flotation slimes of low-ash content proved, does not decrease the coking strength of the coal. Most of the fusain and most of the non-coking flotation concentrate examined was found, as in the raw slime, to consist of grains between 0.1 and 0.15 mm. (0.0039 and 0.0059 in.).

The first four cells of the flotation machine on which his tests were made, which supplied 65 per cent of the total product, furnished suitable material for the coke oven, most of it being anthraxylous. From the following four cells, which contributed 30 per cent of the entire product, came a product that, in grains larger than 0.1 mm. (0.0039 in.), was clearly enriched with anthraxylous coal and, in grains smaller than 0.1 mm. (0.0039 in.), was mixed with mineral charcoal. The last four cells, which contributed only 5 per cent of the product, gave a concentrate with a large percentage of attrital coal.

It will be noted in Fig. 1, which gives details of the petrographic constituents of one of the flotation concentrates examined, that the coal contains about 23 per cent of fibrous coal incapable of coking and a large percentage of attrital coal containing a high percentage of ash. H. Hoffmann's investigation showed that the flotation slime had more anthraxylous coal than the raw coal but that the quantity of attrital coal had not been greatly reduced. Thus, no differential separation of anthraxylous and attrital coal had occurred.

The problem of selective flotation consists in the separation of attrital and anthraxylous coal and, in certain circumstances, also in the separation of mineral charcoal. Though the las sometimes can be removed by flotation it would complicate the process greatly, and, for this reason, it is frequently best to remove the greater portion of the finest mineral charcoal by aspiration, after which it is comparatively

Fig. 1—Products of Flotation Slimes as Drawn From Different Groups of Cells



This final installment of Dr. Mayer's discussion of coal flotation combines the material originally scheduled for publication as the third and fourth parts of the series. The first article in the series appeared in the October, 1933, issue of *Coal Age*, pp. 333-4; the second, in the November, 1933, issue, pp. 375-9.—EDITOR.

simple to separate the fractions of attrital and anthraxylous matter in the dust, just as, with ores, sulphides having different metal bases can be isolated by successive flotation operations.

Where, because of marked differences of surface characteristics, conditions are peculiarly favorable to differential flotation, such a separation can be made by a suitable oil even without the use of depressants. For instance, at Niederschlesische Bergbau AG., Neu Weisstein, Silesia, products rich in anthraxylous material, on the one hand, and rich in attrital matter, on the other, are separated by flotation. This separation has been effected after suitable adjustments in the slime density and in the selection of flotation oils have been made.

The industry is still far from being able to fit the differential flotation of coal to all the many types of coal. W. R. Chapman, however, in *Fuel*, declares that kerosene produced, with certain coal, froths containing 76 per cent anthraxylon and 24 per cent attrital coal; whereas, when phenol was used, the froths contained 80 per cent attrital coal and 20 per cent anthraxylous coal.

According to F. G. Price, American Patent 1,499,872 (1924), individual structures can be depressed by the addition of certain materials. Thus, for example, it is possible in certain cases to depress attrital coal by adding organic protective colloids such as starch, glue or tannin to the slime without affecting the flotability of the anthraxylous material.

At the Ilseder Hütte, which cleans the coal from a mine at Meissen, near Minden, Westphalia, Germany, 16½ net tons of coal dust and slime is floated per hour, the coal being reduced to 15 mm. (0.59 in.) by a crusher (see Fig. 2). It is then carried by a bucket conveyor, *1*, to a two-crank screen, *2*, which makes two sizes: 0x6 mm. (0x0.23 in.) and 6x15 mm. (0.23x0.59 in.).

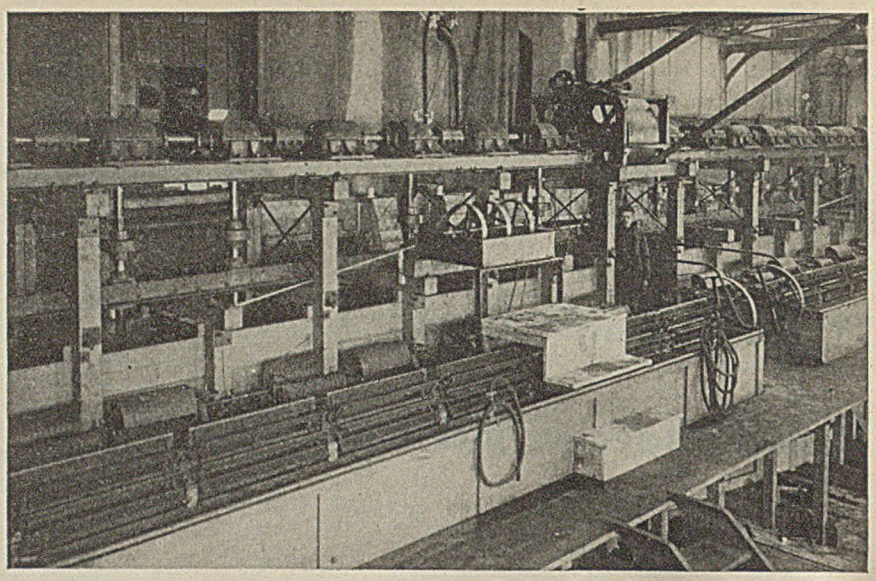
A screw conveyor, *3*, carries the smaller size to four vibrating screens, *4*, which remove dust below 1.5 mm. (0.059 in.). It will be noted that this dust is still dry. The 1.5x6 mm. (0.059 x0.23 in.) is carried by water to a bucket conveyor, *5*, which raises it and the 6x15 mm. (0.23x0.59) from the two-crank screen, *2*, to a jig, *6*. This separates the refuse from the coal. This coal product is sized on two screens, *7* and *8*, having apertures of 6 mm. (0.23 in.) and 1 mm. (0.039 in.) into nut coal, coal for coking and slime. The plus 1-mm. and the plus 6-mm. coal leave the plant as finished products, and the slime is concentrated in two hopper tanks, *9*, and fed to a mixer, *11*, with the dust delivered by the rotary plate feeder *10* from the bin.

By pump *12* this material is fed to two Minerals Separation flotation machines, *13* (Fig. 2), each having eight cells with 24-in. stirrers. The froth from the first cells of the flotation machine is carried as a preliminary product by a bucket conveyor, *14*, to the recleaning cells. Froth from these cells floats through an equalizing tank, *15*, to a suction filter, *16*. A drag belt, *17*, carries the filter cake to a bucket conveyor, which raises it to the coking-coal drying tower.

At the washer of the Gewerkschaft Karl Alexander, at Baesweiler, in the Aachen district, the fine coal from the preliminary vibratory screens, which have slots 1.5 mm. (0.059 in.) wide, is not treated in the main washing plant. Though no fine coal enters the main washer, enough coal is broken to make slimes which, after storage in a Baum settling tank and screening on vibratory screens, are mixed with the fine coal from the raw-coal screens mentioned and treated with it in the flotation plant. The coal is a semi-bituminous with a volatile content almost entitling it to be described as low-volatile.

The total raw slime treated varies considerably, but usually is between 33 and 42 net tons per hour, with an average ash content between 12 and 14 per cent. The screen analysis of the raw slime may be found in Table I.

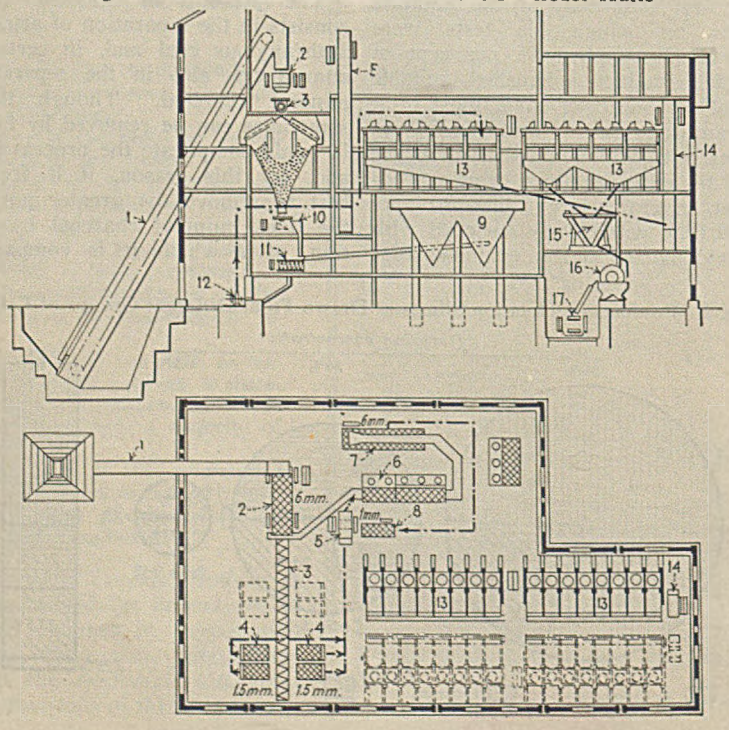
The raw slime is floated in two Minerals Separation Standard machines working side by side, from 13 to 15½



(*Courtesy, Krupp Grusonwerke, Magdeburg-Buckau*)

Fig. 3—Flotation Equipment at the Ilseder Hütte

Fig. 2—Coal Washer and Flotation Plant of Ilseder Hütte



net tons being floated in one 24-in. machine with ten cells, and from 20 to 26½ net tons in a 30-in. machine with seven cells (see Fig. 4). The second machine has the largest cells of any M. S. Standard machine as yet constructed. The average density of the raw-slime pulp is one part solid matter to three parts water.

In both machines the entire cycle produces concentrates with 5.5 per cent of ash and tailings with 62 to 64 per cent of ash. The concentrates flow to a suction filter with 26 sq.yd. of filter surface. The dewatered concentrates are added to small coal from the washer, and the flotation tailings flow to the slime pond. Beechwood tar oil is used as the flotation agent. About 1 lb. of oil is used per ton of raw slime (dry weight). The cost of oil per dry ton of material treated is about 1.9c. The screen analysis of the concentrates is as in Table II. About 35 kw. is needed for the operation of the 10-cell 24-in. Standard machine, and about 30 kw. for the 7-cell 30-in. machine.

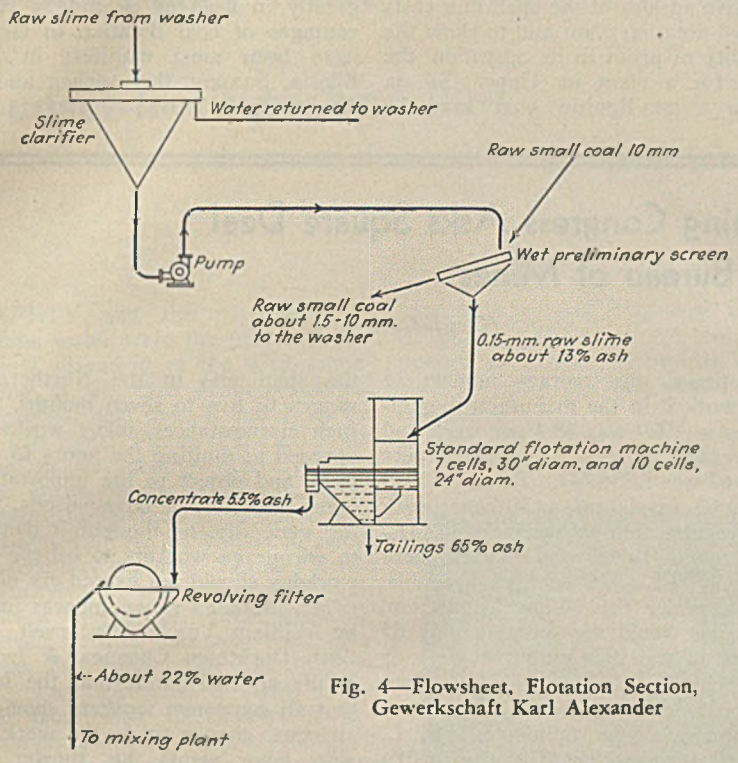


Fig. 4—Flowsheet, Flotation Section, Gewerkschaft Karl Alexander

At the plant Juliusschacht of the Fuchsgrube of the Niederschlesische Bergbau-Aktiengesellschaft, at Neu-Weisstein, one concentrate with a high attrital percentage and low anthraxylous percentage, and another concentrate with a high anthraxylous content and low attrital content, are separated by a selective flotation. The feed consists of raw-coal dust and coal slime, with some pyritiferous rejects.

Means whereby a high-grade coking coal is made from these dusts and slimes is shown in Fig. 6. The slime waters from the washery, particularly those from the dewatering and spray screens, are thickened in a spitzkasten plant and led thence through an equalizing tank of large dimensions to a mixer. This large tank prevents size segregation and provides for adequate thickening of the discharge from the clarifiers. To the slime feed is added dust obtained from the aspiration of the small coal before the latter enters the washery. This is delivered from a storage bin by the operation of a plate feeder.

The pulp has a density of 250 to 300 g. per liter (2.09 to 2.50 lb. per gallon) and contains particles that will pass through a 100-mesh screen. The flotation is effected in two parallel 18-cell 24-in. M. S. Standard machines. Cell *10* receives the feed. In cells *10* to *4*, a product enriched in anthraxylous material is produced. This is led to cell *18*, whence it passes and is reworked in cells *18* to *11*. The cells deliver a product rich in anthraxylous elements and low in attrital coal. This product is used for coking.

Froth from cell *13* is an intermediate product which is fed to cell *18*. That from recleaning cells *12* and *11*, and that from cells *3* and *1* of the preliminary cleaning unit abound in attrital coal and have only a small anthraxylous content. These concentrates are combined and used for steam raising. The coking-coal froth is mixed with the small coal from the washery previously dewatered on screens and sent to coal dewatering towers, in which it is satisfactorily dewatered. So long as the flotation coal does not exceed, say, 20 per cent of the small washery coal, the water content is low enough in the mixture to afford a product that can be charged to coke ovens, but the boiler coal has to be led to a storage tank for dewatering in revolving filters. The tailings derived from the flotation process are removed from cells *1* and *11*.

When 33 to 35 net tons per hour of coal containing 22 per cent or more of ash is treated, about 16½ net tons of coal is produced hourly, with an ash content of about 5 per cent. From 10 to 10½ tons of boiler coal is drawn from the flotation machine per hour, and this product has an ash content between 10 and 15 per cent. Tailings from cells *1* and *11* are 75 to 80 per cent ash. The

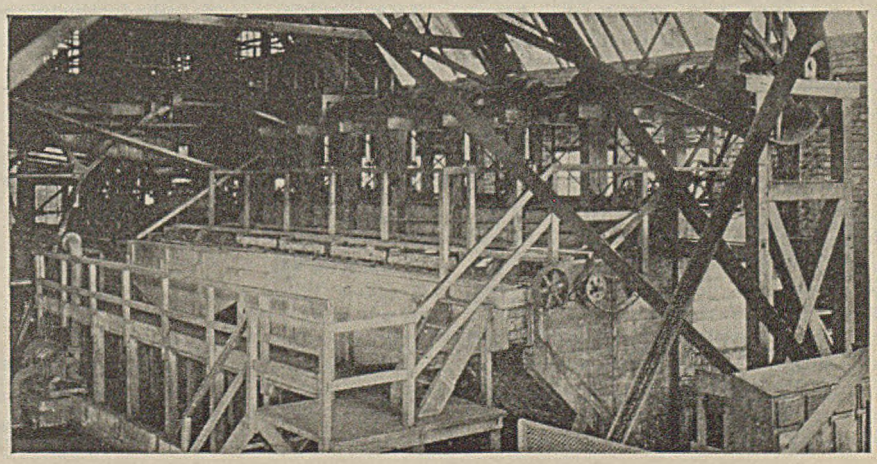
Table I—Raw Flotation Slime at Gewerkschaft Karl Alexander

Mesh	Per Cent Weight	Ash Percentage
18	9.4	12.12
18-35	31.1	12.28
35-70	7.8	9.95
70-140	29.0	10.48
-140	22.7	17.34

Table II—Flotation Concentrate at Gewerkschaft Karl Alexander

Mesh	Per Cent Weight	Ash Percentage
+18	9.2	2.5
18-35	31.3	3.8
35-70	9.2	4.6
70-140	29.8	6.0
-140	20.5	10.0

Fig. 5—Seven-Cell Flotation Unit at Karl Alexander Mine



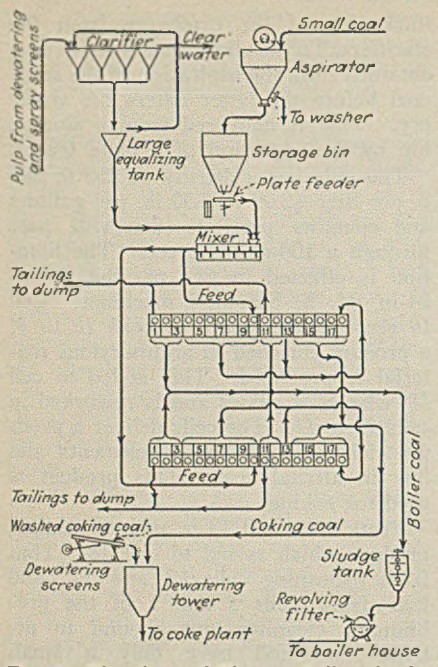


Fig. 6—Flowsheet of Plant at Juliusschacht of Fuchsgrube

thirty-six 24-in. cells require 95 kw. for their operation, the auxiliary equipment taking 46 kw. In spite of the comparatively complicated path of the products, operating costs are as low as about 8.8c. per net ton of dry weight charged.

In most cases the concentrates in commercial-coal flotation are used in the manufacture of coke; to a small extent the anthracite (anthrazit) and low-volatile coals are used for making low-ash briquets and for boiler firing. Occasionally, the purest of the cencentrates are used in the manufacture of carbon electrodes. The degree to which ash is removed depends, for economic reasons, on the purpose for which the product is to be used.

Flotation coal is always mixed with small coal before being fed to the coke oven, the proportions of each being governed chiefly by the size and water contents of the respective coals. In general, 10 to 20 per cent of flotation slimes is added to the small coal. Mixing should be uniform and thorough, so as to avoid slime nests. This intimate mixing is provided by delivering the flotation concentrates to several small-coal conveyor belts rather than to one, which carry it well mixed to the bins. In process of removal from the bins it becomes further mixed. In some plants the flotation coal is mixed with the small coal before it is sent to the dewatering centrifuges or the coals are mixed by plates or worms. Coke produced from mixtures of flotation and small coal, in general, has unusually excellent physical and chemical properties, because the cleaned slime binds the coal particles and thus increases the tensile strength of the coke.

To give an idea of the operating costs of a coal-flotation plant and to show the possibility of profit in its operation, the figures for a plant in Upper Silesia treating a non-lignitic coal may be given. The plant has a 20-cell 24-in. M. S. machine. Washer slimes, dump slimes and dust are floated, the product treated comprising 13½ tons per hour. The plant operates 20 hours per day, and the quantity handled daily is about 269½ tons; it contains about 13.7 per cent of ash. From it is obtained 11.80 tons per hour, or 86 per cent of the material treated, the ash percentage in the concentrate being 5.94. The tailings carry 62 per cent ash.

Flotation has made most headway in Europe, where the slimes have been most greatly in need of cleaning. The advantages of coal flotation in Germany have been most manifest in Lower Silesia, Saxony, the Aachen and Saar districts for this reason.

Table III—Operating Costs and Profits of a Flotation Plant at an Upper Silesian Coal Mine

	Cost per Ton of Cleaned Coal	Cost per Ton of Feed	Operating Cost per Day (269½ Ton Output)
Power	$0.063	$0.054	$14.70
Flotation Agents	0.180	0.153	4.66
Wages	0.021	0.017	41.65
Depreciation	0.072	0.064	17.40
Repairs	0.009	0.008	2.22
	$0.345	$0.296	$80.63
Value of concentrates produced by flotation per year:			
Concentrate, 269½ tons per day x 0.86 x 300 x $2.53		$175,913.43	
Operating costs per year, $80.63 x 300			$24,189.00
Filter costs, $24.10 x 300			7,230.00
Value of raw material before cleaning, 269½ x 300 x $0.75			60,637.50
Total cost of treatment			$92,056.50
Profit derived from flotation			$83,856.93

Mining Congress Asks Square Deal For Bureau of Mines

(Concluded from page 16)

he continued, the average number of hours worked in the manufacturing industries in 1929 was 48.4 per week and the average number of wage earners employed was 8,838,743. To reach 1929 production levels on a 30-hour week would require the employment of 14,141,908 workers. But, it was asserted, there were only 9,302,504 workers available, so that, under the 30-hour limitation, production would approximate only 65 per cent of the 1929 output.

To bring up the question of Congressional action on hours of work at this time, in the opinion of S. L. Mather, vice-president, Cleveland-Cliffs Iron Co., is very unwise. Hasty blanket legislation might create situations difficult to correct. The special conditions surrounding each industry should be considered separately and the establishment of maximum hours in each industry should be left to the code makers for that industry.

In iron-ore mining, for example, said Mr. Mather, the workers are not now averaging 24 hours per week. Lake transportation and other conditions limit the season of active operation of the strip pits in the Northern iron ranges to five to seven months. Under such circumstances, many workers are opposed to limiting the hours to 40 per week and object to the importation of other labor for the busy periods. Speaking generally, he thought it dangerous to encourage workers to believe that a workday should not exceed six hours.

Mr. Mather's viewpoint was indorsed by William Young Westervelt, president, Ducktown Chemical & Iron Co. While all will admit that the ideal is that all competent workers should have an equal chance to do the work available, labor wants the shorter hours without reduction in base rates of pay. If labor, remarked Mr. Westervelt, insists on the shorter work-week, it should be willing to contribute to the cause by accepting a lower base rate of pay per day. Industry, as was pointed out by General Johnson, National Recovery Administrator, in his speech to the National Association of Manufacturers at New York last month, is in no position to meet the demands for a 30-hour week at this time.

The fallacy of attempting to fix hours by blanket regulation, declared Donald A. Callahan, president, Callahan Zinc-Lead Co., was demonstrated in the President's Reemployment Agreement, which put the corner drug store on the same basis as the big industry. To persist in such an attempt would be to invite evasions as scandalous as the non-observance of the late 18th Amendment. Although limitation of hours might be desirable in the tri-state district as a means of cutting down production, it would not increase employment there and might have injurious effects upon other industries. Mr. Callahan, too, favored control through codes.

DECREASE ACCIDENTS

+And Purify Mine Waters

Counsel Institute Speakers

SAFETY and the purification of mine water were the principal subjects discussed at the 47th annual meeting of the Coal Mining Institute of America, held Dec. 6 and 7, in the Fort Pitt Hotel, Pittsburgh, Pa. A decrease in the acidity discharged by active mines on the Allegheny River, equivalent to 250 tons of sulphuric acid, was claimed by H. M. Vanzandt, senior mine-drainage engineer, Sanitary Board of Pennsylvania, who admitted that this statement might be quite generally traversed, because this year the Kiskiminetas had been more acid than in 1932. Last year the drought, which lasted from May to October in the Kiskiminetas Valley district, shut off much of the effluent from abandoned mines. Forty per cent of them ceased to discharge water. In May of this year, the precipitation established a record; as a result, all the abandoned mines discharged water. The acid water from these mines was the cause of the increased acidity.

Impounding of mine water in an oxygen-free atmosphere by a dam or dams had been found to be a means of freeing the water from acid. The height of the dam over which it is necessary to discharge the water depends on the volume to be impounded and on the acidity of the water received from the mine. Mr. Vanzandt showed three types of dams. One is placed precisely at the mouth of the mine, and above it a channel is constructed in the rock (see Fig. 1) so that the water will flow out at a level above the dam. A structure such as this may be destroyed by high-water pressure, and the consequent escape of the impounded water may do much damage. Another dam, outside the mine and higher than the drift mouth (see Fig. 2), is suggested. It raises the water in the mine for a long distance back, entirely blocking the opening. A third suggestion is shown in Fig. 3. The dams are low, but the outside air is shut out by trap walls, so that it cannot get back to the interior of the mine.

Our observation and investigation, declared Mr. Vanzandt, give us these

C. L. Lutton
President, Coal Mining Institute, 1934

facts: (*a*) That if the flow of water is retarded by an obstacle such as a mine fall, dam or barrier, suspended solids in the mine water are rapidly precipitated, because they largely consist of iron salts, which are heavy. (*b*) Such precipitation carries with it a large percentage of the free acid, which the sludge thus retains on the bottom. (*c*) The degree to which good results are obtained depends on the area of the surface of the pool created and on the depth of the water; the result is most favorable when the mined-out working and the surrounding strata are completely submerged. The water discharged, or, in the case of shafts and slopes, the water pumped, comes from the top of the pool and contains little acid.

In the opinion of Mr. Vanzandt, oxygen dissolved by sump waters attacks the pyrite particles which the mine water has carried into the sump, and he believes that, in a place divested of air, the water will become relatively harmless. He described a test in which two glass jars containing pyrite were filled with water. One jar was sealed so as to shut out air, and the other was left open. The pyrite in the first jar was little affected and that in the other disappeared.

A 5-gal. glass carboy was filled with mine drainage which analyzed 3,400 p.p.m. acid to methyl red (cold test). This was sealed to exclude air and covered with a cardboard carton to shut out light, and in a few days the iron discoloration, which was marked, was greatly reduced. After 45 days, an analysis showed 2,500 p.p.m. above the sludge deposit, a reduction in acidity of 900 p.p.m.

In September, 1932, near the end of a three-month drought, when the tributaries of the Kiskiminetas River became a chain of pools from a few hundred feet to more than a mile in length, with no perceptible movement of water between pools, tests were made of the acidity of the water immediately under the surface and at the bottom of the pool. When the depth was 18 in. or less, the acidity at the surface was 100 p.p.m. less than at the bottom of the pool. In pools 6 to 12 ft. deep, the difference was 500 p.p.m. and over.

Questioned as to the probability that eventually the streams would be made as pure as before the advent of civilization and that aquatic life would be restored, Mr. Vanzandt declared that 40 per cent of the acidity found in one case was derived from industrial wastes and that, with the elimination of acid, it would be necessary to exclude the sewage draining into the streams; otherwise

they would then be polluted with bacteria from that source.

A motion was passed for the formation of a committee to go to Washington and interview Secretary Ickes, expressing the opinion that the Coal Mining Institute of America desired that the U. S. Bureau of Mines activities continue as in the past. The committee appointed comprised E. A. Holbrook, dean, school of engineering, University of Pittsburgh; R. D. Hall, engineering editor, *Coal Age*; and W. R. Chedsey, professor of mining, Pennsylvania State College, with the following alternates: M. D. Cooper, division general superintendent, Hillman Coal & Coke Co., Pittsburgh, Pa.; C. I. Lutton, safety director, H. C. Frick Coke Co., Scottdale, Pa.; and F. B. Dunbar, superintendent, Mather Collieries, Mather, Pa.

In two years, 1930 and 1931, said S. P. Howell, explosives engineer, U. S. Bureau of Mines, two men were fatally suffocated in bituminous mines and one in anthracite mines by the smoke from explosives. Moreover, 35 men were injured by suffocation in the former mining region and 156 in the latter. Of the accidents from premature blast, 260 were caused by agencies other than short fuse, electric wire or stray current; 168 were caused by short fuse, and 161 by electric wires or stray current. It is thought, said Mr. Howell, that most premature blasts of this type are caused by the use of squibs with some form of blasting powder, or the ignition of black blasting powder by an open light or by the means used to light the fuse or squib.

Table I is constructed to illustrate the relative dangers of firing black blasting powder, dynamite and permissible in the presence of dust and firedamp, as stated by Mr. Howell.

Table I—Relative Safety of Explosives

Type of Explosive	Limiting Charge Grams		Relative Safety
Black Blasting Powder	15		1
Dynamite	40		2.7
Permissible	680	(1½ lb.)	45

Though in 1932, said Mr. Howell, 26 per cent of the explosives used in bituminous coal were permissible explosives and 68 per cent black blasting powder, with 6 per cent high explosive, probably much more than 26 per cent of the coal was shot by permissible explosives, because it has been conservatively estimated that 1 lb. of permissible explosive will, on an average, dislodge as much coal as 1¾ lb. of black blasting powder.

No permissible explosive used in a permissible manner, declared Mr. Howell, has ignited either gas or dust, and no permissible explosive has ignited gas unless two or more non-permissible requirements have been violated. For safety, the charge should be in properly placed holes and should be properly confined in the hole. No portion of the charge, therefore, should be too close to a free face; for instance, in holing through in a crosscut between rooms and headings, the charge must not be so close to the edge of the rib ahead that the shot will be inadequately protected. The charge of a slabbing shot must be proportioned to the burden along the side of the hole, and be properly stemmed, or the charge will be insufficiently confined.

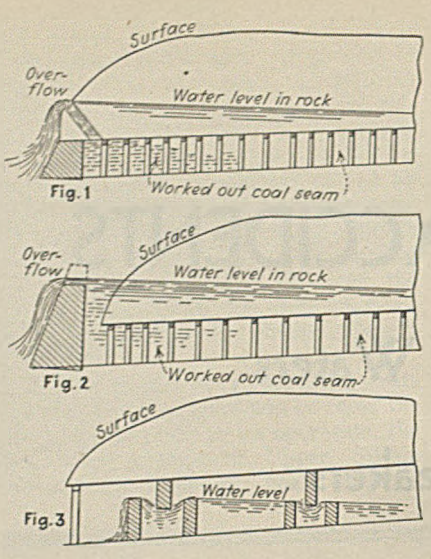


Fig. 1—Seal Just Inside Mine Portal. Fig. 2—Exterior Seal. Fig. 3—Air Trap, Method, Adaptable Also for Trapping Water Inside of Workings in Shaft and Slope Mines.

Moreover, a "break spark" in the shotfiring line will ignite methane, if present, provided the current by which the shot is fired is strong enough to ignite the gas. Such a spark may result from a "floating short" on the shotfiring line or by the line being violently disturbed by the blast while still electrified. Where single shots are being fired, the blasting unit should not be more than will serve for a single shot, in that manner providing that the "break spark" will not be of any unnecessary strength.

Even copper tamping bars are not safe, said Mr. Howell, because they may cause a spark and because they facilitate a too-vigorous tamping of the charge. Certain grades of pellet powder—perhaps all of them—produce carbon monoxide, and possibly hydrogen sulphide and other poisonous gases, to the extent that these gases are hazardous if the workings are entered too soon after a shot.

Safety work, said T. W. Lightfoot, accident prevention engineer in charge of compensation, Koppers Coal Co., may be completely centralized, completely localized or contain features of both. With safety work centralized, the local authorities lose interest, lean back and "pass the buck." When it is localized entirely, conditions are not any too good. The superintendent means well, but he always thinks he is too busy for safety work. Safety is shunted to let efficiency and production pass.

With a combination of local and central authority, the best results are obtained. Responsibility rests with the local authority, but the central authority is always present to check results, to give advice and to stimulate action. When an accident of gravity occurs or an inspection is made by the central authority, a report is made of the mine at which the accident happened or at which the inspection was made. The foreman is always given a copy of the report, so that he knows just where he stands. The central authority reports to the president, and the plant safety inspector to his superintendent.

About all that John Brey, mine foreman, Ford Collieries Co., could see in combustible stoppings was their low cost and their value in parts of mines where car transportation is not available and construction material has to be carried by hand. He said that the variant moisture content of the mine air caused temporary stoppings to swell and contract, and the pressure of the roof broke them down. In case of fires, combustible stoppings can be broken down, said William Filer, safety engineer of the Hicks coal interests, whereas a 9-in. wall may be an unbreachable barrier through which trapped men cannot escape. His companies were building incombustible brattices of 3-cell, 5x8x12-in. tile, making a 5-in. wall that was giving satisfaction. Mr. Dunbar said that a 4-in. brick wall could be used with one or two 9-in. headers to give stability; it made an inexpensive wall and one that was amply strong. Properly pointed and faced with cement mortar, it prevented leakage. With a current cost of $40 per horsepower per year, declared J. J. Forbes, supervising engineer, safety division, U. S. Bureau of Mines, the costs for leakage from stoppings were as given in Table II, figures for leakage in cubic feet per minute being also appended.

Table II—Leakage and Its Cost for Different Kinds of Stoppings

Kind of Stopping	Air Leakage in Cubic Feet	Annual Cost of Air Leakage Per Stopping
Board, rough lumber	340	$74.49
Board, tongued and grooved	180	19.06
Board, planed on both sides and painted	171	18.04
Slate or gob dry wall	240	34.33
Slate or gob dry wall, faced with cement	171	18.04
Brick, 4 in. thick	26	1.48
Brick, 8 in. thick	10	0.95
Concrete monolith, 8 in. thick	6	0.83
Concrete blocks (8x10x 20 in.)	6	0.83

Several methods for reducing haulage accidents were presented by F. W.

Howarth, Pennsylvania district state mine inspector. Standards for timbering of haulage roads, said J. F. Bell, Pennsylvania district state mine inspector, should be adopted. Haulage-road standards logically should follow those made for room timbering. Many haulage roads are even wider than rooms, especially where they are driven inadvertently off sights, as many are in places. All roadways are excessively wide where headings debouch to the right or left. He believed that, disregarding the appearance of roof, which may be deceptive, all roadways exceeding a certain width should be timbered.

Erroneous ideas may be formed regarding the degree of the dangers of haulage, declared R. N. Hosler, superintendent, Pennsylvania Mine Rating and Inspection Bureau, if only fatalities are considered. Only one-sixth of the fatalities in the mine are the result of haulage accidents, whereas a majority of all the injuries have haulage as causative agent.

Up to June 30, 1933, no less than 1,037 plants in the mineral industry have introduced 100 per cent first-aid training. Between 1910 and 1933, 701,085 persons have been trained in that industry, 63 per cent, or 370,978 persons, by the cooperative plan in which the U. S. Bureau of Mines trains only the instructors who are chosen from the company staff. With the cooperative method, the instruction is more complete because the classes are smaller, the time is shorter, more cooperation and fellowship are generated and a nucleus is left at the plant for further instruction. It is the preferable and self-perpetuating method of promoting first aid, and indeed accident prevention. Two hundred lives annually are saved by first aid in the mineral industry. As trained men are injured only one-fourth as frequently as untrained men—M. H. Fies, vice-president in charge of operations, De Bardeleben Coal Corporation, says his experience is one-eighth—first-aid training is a preventive of accident as well as a means of reducing case severity.

Discipline can be enforced, said M. W. Thomas, Pennsylvania district state mine inspector, only when there are standards. If we would have men toe the line of safety, a line of correct performance must first be drawn. Safety directors should have advisory rather than functional duties. They should not be required to enforce compliance or to make detailed inspection, but to make the rules and prescribe the methods. Education, asserted G. C. Trevorrow, safety engineer, Harwick Coal & Coke Co., is an essential part of discipline, and the safety man should be even more ready to compliment a man for his good work than to blame him for his shortcomings. It was the rule at his mines that when the section foreman entered the room, the miner tested the roof and then the posts, but now, instead of testing the soundness of the prop, he is required to test the cap-piece, for its correct placement is considered a more important matter.

Shotfirers, added J. V. McKenna, Pennsylvania district state mine inspector, should be required to share in the work and responsibility of the assistant foremen. Discipline should be enforced before the accident. One should not wait till an accident occurs. Safety should be sold to the miner. He should be made to feel it is something he wants to buy at the expense of the necessary self-service. Safety is not something to force down his throat.

Many of the oddities of the Pennsylvania mining laws and the need for changes were recited by Richard Maize, deputy secretary, bituminous division, Pennsylvania Department of Mines. Some arose from the age of the law, which has not been revised for years. Thus it was permissible under the law to shoot none but undercut coal. No provision was made which designated the manner in which overcut, center-cut or sheared coal should be treated. Determination of a gassy mine roused the usual discussion. Mr. Dunbar did not believe that any such crude contraption as an "approved safety lamp" should be used with its personal equation and its dubious findings.

You can often find gas at the mouth of a borehole after a pillar has been standing for four years, and if you cannot shoot such a hole, said William Lauder, safety director, Pittsburgh Coal Co., you may find you cannot work your mine. Perhaps the law should read only that if gas is found near the roof, or diffused in the air, the place must not be shot, said Mr. Maize. He did not believe that a mine which showed no gas for merely one year should qualify as a non-gassy mine; the period should be three years, not one. The law should have more definitions to clarify its legislative intent. Francis Feehan, U. S. Bureau of Mines, saying he was on the commission that framed the present law, proposed: That a commission be appointed to make a revision of the mining law. This motion was passed.

Rules regarding cap-pieces should be adapted to the particular section of the mine under operation, declared D. L. Boyle, general superintendent, Penelec Coal Corporation; conditions vary so greatly. Cap-pieces are used either to cushion the post or to transmit the support to places beyond the post, said T. J. Davis. In some cases the rock will break around the props if a cap-piece is not used. He thought a cap-piece should always be placed. The rule of the committee of the American Mining Congress was good: Length, three times prop diameter; thickness, half the diameter; and width, equal to diameter, but it should be made to fit conditions. Suitable cap-pieces should be purchased, supplied and their erection demanded. The H. C. Frick Coke Co., said Mr. Lutton, uses a cap-piece measuring 18x5x3 in. W. J. Rainey and Jones & Laughlin use a wedge cap 18x4 in. with the ends 2 and 1½ in. thick respectively. Mr. Lauder declared that the Pittsburgh Coal Co. uses an 18x4x3-in. cap, but has tried others. The company prefers to hold to a standard. He could not say definitely that the use of saw-cut caps had reduced accidents. As a rule, the props are sunk 2 or 3 in. in the floor to prevent them from being knocked out. Many props are broken, said Mr. Forbes, for lack of cap-pieces.

Saying that collective bargaining has resulted in the displacement of safety hats, shoes and goggles, and that accidents were increasing because of the operation of the code, Mr. Dunbar declared that his mines had been able to retain all these safety features. So had *his* mines, said Mr. Gibbs, but instances were given where all safety clothing had been discarded. Mr. Feehan stated that the trouble arose from profiteering. At some mines, orders that all men wear safety shoes had been given, and every man had to buy them at a price affording 50 or 75c. profit. Likewise gauze goggles were required, and the men had to buy them. These proving unsatisfactory, the men were required to buy glass goggles and again pay for them at a profit.

Mr. Dunbar presided at all meetings except when the question-box discussions were in progress. The chairmen for these were C. W. Pollock, assistant general manager, Ford Collieries Co.; Mr. McKenna and Mr. Boyle. At the banquet, Mr. Dunbar presided and Mr. Holbrook described the framing of the NRA code.

Officers of Coal Mining Institute of America, 1934

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Vice Presidents: G. W. Riggs, mine safety engineer, Uniontown, Pa.; G. S. McCaa, state mine inspector, Pittsburgh, Pa.; and W. R. Chedsey, professor of mining, Pennsylvania State College, State College, Pa.

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NOTES

. . . from Across the Sea

HITHERTO, the dust of free silica (SiO_2) has been regarded as the cause of silicosis. However, asbestos dust, $Ca_2(MgFe)_5(Si_4O_{11})_2$, causes asbestosis, which is much the same disease. Pneumoconiosis covers both forms of these diseases of the lungs. Quite recently, at several meetings, notably the 1933 meeting of the British Association for the Advancement of Science, and in many publications, Dr. W. R. Jones has declared that silica dioxide in the uncombined state is not the chief cause of silicosis, but rather sericite, $H_2KAl_3(SiO_4)_3$; sillimanite, Al_2SiO_5; and tremolite, $Ca_2Mg_5(OH)_2(Si_4O_{11})_2$, or a fibrous form of free silica, as in chert, or a fibrous rock, as in pumice.

Dr. Jones took exception to the declaration of the International Congress on Silicosis, 1930, that "to produce the pathological condition, silica must reach the lungs in a chemically uncombined condition," and he objects to the English law (Silicosis Scheme for Compensation) which limits the rocks which produce silicosis, as contemplated under the scheme, to quartz, quartzite, sandstone, gritstone or chert, excluding natural sand or rotten rock.

He was led to make his inquiries by certain cases of silicosis occurring in the anthracite district of South Wales, where no rock of the type named in the scheme occurred. Examination was made of the mineral residues of 29 lungs, each taken from a person whose death had been certified as being due to silicosis or silico-tuberculosis. The cases included potters, colliery workers, a stonemason and a silica-brick worker. Residues from other lungs—51 lungs in all—were examined, including pulmonary cases other than silicosis; a normal lung was used as control.

Most of the mineral residues from each of the silicotic lungs consisted of minute fibers of sericite, which were abundantly present in all rocks that gave rise to the dust which the silicotics inhaled and was present in the size and form in which it was found in the residues and in sections of silicotic lung tissue. Silica in an uncombined state (quartz) also was found in these residues as relatively coarse and fine grains, but in smaller percentages than sericite.

According to Dr. Jones, his assertion that silica in the uncombined state is not the main cause of silicosis appears proved (*a*) by the examination of the mineral residues and sections of silicotic lung tissue under the microscope; (*b*) by the chemical analyses of these residues; (*c*) by the many cases of silicosis, such as those in the South Wales coal field and the Rand, South Africa, where rocks containing sericite are mined, and the complete absence of silicosis, as in the Scottish coal fields, where silica rocks contain as much free silica, and in the Kolar gold fields of India, where rocks containing an even higher percentage of free silica have been worked by thousands of underground men for many years; (*d*) by the many cases of silicosis in mines where the ore and adjacent rocks contain only a low percentage of free silica; and (*e*) by the fact that no silica rock hitherto investigated has caused silicosis unless it contained sericite or fibrous materials.

These views of Dr. Jones have met with quite general acceptance, but Prof. W. G. Fearnsides, in discussion, declared that though the author of the paper had proved that sericite remained in the lung, he had not proved that silica had not been in the lungs and been subjected to physiological action and subsequently disappeared. Those who had examined residues of lungs from deceased silicotics had never been able to find more than 60 or 70 per cent of silicon dioxide, which left open the contention that other minerals than quartz, flints or other siliceous materials might be present. But the other residues might be from coal or other substances which some believed harmless. Despite the acclaim Dr. Jones' theory has received, Dr. J. S. Haldane has not changed his often-expressed opinion that free silica is the cause of silicosis. He instances cases where silicosis developed, though the rocks being mined were devoid of sericite.

A report by Prof. A. H. Cox, department of geology, University College, Cardiff, Wales, states that he has found that silicosis is in many cases due to the dust of rocks, such as shales, which do not come within any of the categories of silica rocks (quartz, quartzite, ganister, etc.) specified in the Silicosis Order, 1931. Professor Cox raises the question why silicosis is more prevalent in South Wales than in other British coal fields and why it is especially prevalent in the anthracite area as compared with other areas of the South Wales coal field, and he adds that there appear to be three areas at which the carbon content in the anthracites reaches a peak and each of these seems to have been productive of silicotics. The author of the report declares that both the anthracitization of coal and the condition of the rock have been due to a common cause, great geological stress. In this report apparently nothing is said as to sericite, but F. W. Clarke, in his "Data of Geochemistry," speaks of its presence in building slate and suggests that sericite has been formed, with other materials, by great pressure and high temperature.

Without attempting to answer the question, one is prone to ask: Is fibrosis a condition of the lung material or a condition of the foreign matter in the lung? The advocates of silicosis as a disease derived from the fibrous material are many, but the matter is not yet proved. Free silica may be a cause, perhaps the principal cause, and safety in dealing with some dusts of free silica may be found in their coarseness and not in the absence of sericite. Some South Wales coal-mine rocks contain a high percentage of free silica (20-40 per cent) as well as combined silica, as Professor Cox declares. Perhaps the pneumoconiosis is due to the action of both.

SUPERLATIVES are dangerous; perhaps only too often they have been used to describe our coal mines. It comes as a distinct shock to learn that a mine in the Niederlausitz district of Germany is producing 45,000 tons daily. This mine, the Ilse operation of the Ilse-Bergbau Aktiengesellschaft, is a strip pit working lignite coal of irregular thickness in the Miocene formation. The deposit is made up largely of coniferous trees, comprising the *Taxodium distichum,* one of the yews, and the *Sequoia Langsdorfii,* akin to the large redwoods still to be found in the West. Well-preserved trunks of the yew trees are to be found in the beds. The overburden is removed by bucket excavators. This, as well as the coal, is divested of some of its free water by drainage holes. The raw lignite is mined also by bucket excavators and loaded into cars of 39¼ cu.yd. capacity, some of it being sent to the briquet plant. There it is screened and crushed to 0.39 in. and under. In drum dryers, the quantity of water in the lignite is reduced from 58 to 16 per cent.

The temperature of the lignite is lowered in cooling rooms, where it loses 1 or 2 per cent of water and the product is then pressed into briquets without an agglutinant. From 2.8 tons of raw lignite one ton of briquets is obtained, but 0.8 ton of this lignite is used to produce electric power for the operation of the briquet presses. The steam is first used in high-pressure turbines, the exhaust being used to dry the briquets; 1.5 ton of steam is needed for one ton of briquets. The condensed water from the dryers is collected and used for boiler feed, which is supplemented by fresh water from other sources. Six briquet plants are operated—the Ilse, with a capacity of 294,234 tons per annum; Renate, of 491,492 tons; Eva, of 548,796 tons; Anna Mathilde, of 407,740 tons; Marga, of 1,179,140 tons; and Erika, of 980,780 tons; a total of 3,902,182 tons annually, or 13,000 tons daily. To produce this tonnage, 103 steam boilers with 344,558 sq.ft. of heating surface, 140 dryers of 1,081,782 sq.ft. of heating surface and

126 briquet presses are used. Four boilers operate at a pressure of 147 lb., 38 at 294 lb., 22 at 500 lb. and 2 at 1,764 lb., all measured in excess of atmospheric pressure.

In 1929, 10,455,776 tons of raw lignite was thus mined and converted into briquets, or 34,713 tons daily. In addition, raw lignite is sent also to nearby electric plants, so that the total output was 13,538,070 tons, or about 45,182 tons daily. To strip the coal, 32 bucket excavators, 3 elevators, 3 tips and a transportation bridge of a capacity of 1,046 cu.ft. per hour were employed removing 32,917,128 cu.yd. in 1929, or 130,800 cu.yd. daily. Eighteen bucket excavators removed the coal. To haul the stripped material and lignite, 35 steam and 92 electric locomotives (400 hp. each) were used.

From this, it may be concluded that each bucket excavator handles 1,028,660 cu.yd. annually. The big shovel of the United Electric Coal Companies, at Duquoin, Ill., moves about 500,000 cu.yd. per month, or 6,000,000 cu.yd. per year when working steadily. Evidently our big shovels have the larger capacity. The depth ratio of coal to overburden equaled about 1:2.46, which is quite a favorable figure for stripping operations, but one giving adequate cover when the lignite is of abnormal thickness.

Six power stations are operated with an installed capacity of 69,200 kw., 35,000 kw. being generated from the exhaust of the high-pressure turbines connected with the briquet plant. The company also manufactures brick. The area operated is 18,402 acres.

R. Dawson Hall

On the ENGINEER'S BOOK SHELF

Requests for U. S. Bureau of Mines publications should be sent to Superintendent of Documents, Government Printing Office, Washington, D. C., accompanied by cash or money order; stamps and personal checks not accepted. Orders for other books and pamphlets reviewed in this department should be addressed to the individual publishers, as shown, whose name and address in each case is in the review notice.

Ten years of Fatal Accidents and Two Years of Accident Costs in Indiana Coal Mining, by C. A. Herbert. U. S. Bureau of Mines, Information Circular 6672, 12 pp.

In Indiana, when numbers employed are considered, the shotfirer runs a greater risk of fatality than anyone else in the mines, as judged by the fatality returns from 1922 to 1931. Rating the shotfirer's relative hazard at 100, mine bosses come next, with 34; drivers, 31; cagers, 24; motor or parting bosses come next, with 23; room bosses, trip riders and trappers, 21; mining machinemen and firebosses, 17; laborers, 16; top bosses, 14; electricians and timbermen, 13; and superintendents, surveyors, shot runners, pumpers and tracklayers, 11.

Where, then, is the miner? He follows with a rating of 10. Motormen are next, with 9; drillers, 8; hoisting engineers and loading machinemen, 6; and top labor, 3. These are revealing figures. They tend to show that the number of fatalities of miners in mines is large mainly because there are so many of them. Because 50.1 per cent of the employees were miners, their fatality percentage of 45.4 per cent of all fatalities becomes relatively low per miner. Perhaps too much emphasis has been placed on his hazard and too little on the hazard of his coworkers, but Indiana may not be representative.

Costs of compensable accidents, by occupations for two years are given in the circular, and the miner's personal risk, as judged by severity in those years, is 14 per cent of the shotfirer's in one case and only 3 per cent of that of the loading machineman and helper in the other, those two classes leading in risk in their respective years. Compensable accidents are analyzed by causes in two other tables; falls of rock dropping in one to 15.9 per cent, which tends to show that Indiana has on the whole a fairly good roof.

* * *

Uniform Cost Activities in Trade and Industry. Policyholders' Service Bureau, Metropolitan Life Insurance Co., New York City. 46 pp. text (mimeographed) +4 pp. charts.

As a means of combating the unsatisfactory conditions that have arisen out of uncontrolled price competition and excessive price cutting, many business men are giving serious consideration to the need for some plan of uniform cost accounting and reporting specifically adapted to the problems of their trade and industry. The Policyholders' Service Bureau of the Metropolitan Life Insurance Co. has prepared a report on the subject, entitled "Uniform Cost Activities in Trade and Industry." It is the result of a review of the uniform cost experiences of more than 76 trade associations and sets forth, as well, the opinions and ideas of a number of responsible executives in a wide variety of industries. Procedures entailed in administering uniform cost activities and methods of preparing uniform cost accounting manuals are discussed.

Measurement of the Kinetic Loads on Colliery Winding Ropes, by S. M. Dixon and M. A. Hogan, (British) Safety in Mines Research Board, Paper No. 78; 28 pp. British Library of Information, New York City. Price, 30c.

Stresses in hoisting ropes when raising or lowering cages may be divided into their static and kinetic components. The first, those due to the dead weight of the load, are easily calculable, but the latter, which result from the acceleration or deceleration of the engine, the elasticity of the rope and other hoisting conditions, are largely unknown. The measurements described in this bulletin were made either (1) with a dynamometer inserted between rope and cage or (2) indirectly by deduction from observations of the acceleration of the cage.

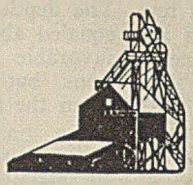
In the first, or direct, method, the cage was held below the detaching hook by a special gage bar or link. Changes in length of this link were measured by an arrangement of condensers, the separation of the condenser plates corresponding to the strain in the link, and the resulting changes in capacity were used to modify an ultramicrometer circuit comprising suitable coils and a micrometer valve. Changes in the anode current of this valve were amplified and recorded on an oscillograph. The two methods gave results which agreed closely.

The studies showed that, with a steam-driven hoist in a shaft of moderate depth, the kinetic shock at the capel may be 1½ times the dead load, so that the total tension on the rope may be as much as 2½ times that load. Observations made at a number of shafts confirm this conclusion and show that shock stresses of this same relative magnitude are not unusual.

Factors of safety for winding ropes are often calculated by dividing the breaking strength of the rope—as determined by a static tensile test—by the weight of the load to be raised. It usually is considered satisfactory if a value of about 8 or 10 is obtained, but such a figure is misleading, for it neglects kinetic shock stresses and the fatigue arising from repeatedly applied stress on the wires, which latter reduces the resistance of hand-drawn steel wire to about one-half that which it will afford in a static tensile test. For this reason, to get a true factor of safety, the gross value must be divided by 2½ to allow for kinetic-shock stresses and again by 2 to allow for fatigue. Thus, the true factor of safety becomes 1.6 or 2 instead of 8 or 10. As rope strength may be reduced considerably by surface damage and corrosion, the margin of safety in some hoisting ropes is not large.

The authors recommend that shocks on the rope be reduced by fitting a spring between the winding rope and the cage and by improvements in hoisting conditions.

OPERATING IDEAS



From Production, Electrical and Mechanical Men

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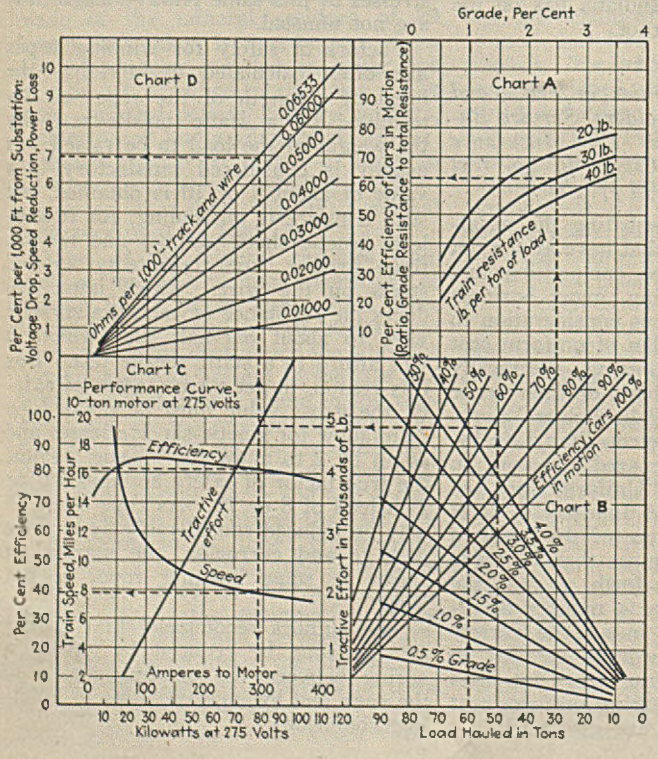
How to Check Up on D.C. Power Losses In Underground Transportation

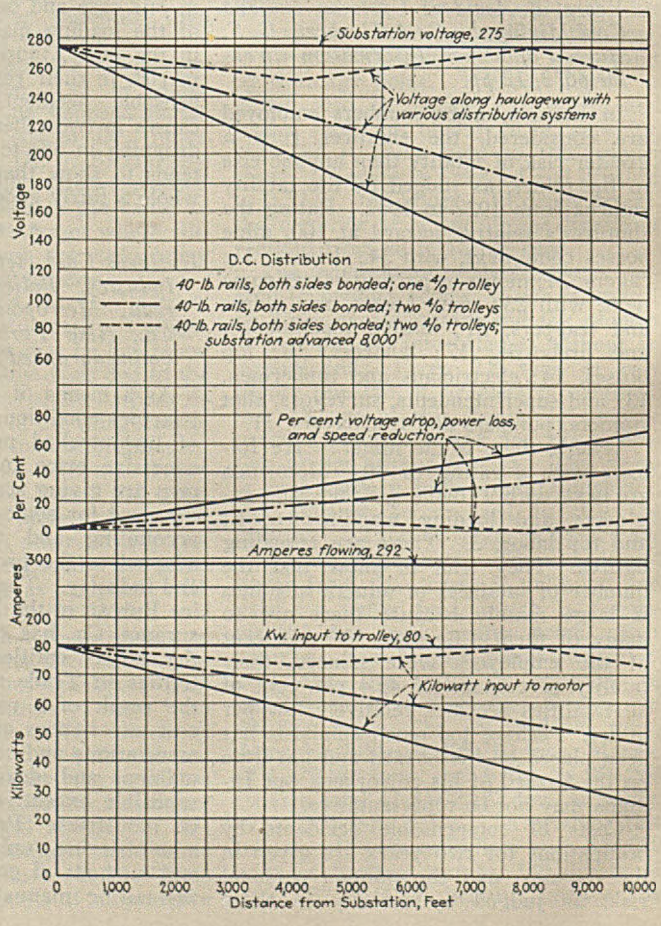
INTELLIGENT STUDY of the electrical distribution problem often discloses many opportunities for savings in power that will pay good dividends on the investment required to effect such savings. How to make such a study of direct-current haulage circuits and the effect of the variable factors of the circuit on power requirements were explained by R. L. Cole, power sales engineer, Monongahela West Penn Public Service Co., Fairmont, W. Va., at the 26th annual meeting of the West Virginia Coal Mining Institute, held at Bluefield, W. Va., last month. Mr. Cole embodied his working data in a series of charts and illustrated the practical application of these data by describing a series of tests of power losses in mine haulage at a hypothetical operation.

Fig. 1 of the series of charts presented, said Mr. Cole, supplies the key to any mine-haulage problem and shows clearly the relations of the factors affecting the

Fig. 1 (Left)—Graphic Determination of the Mechanical Efficiency of a Train in Motion, Voltage Drop, Speed Reduction and Power Losses.

Fig. 2 (Right)—How Additional Copper and Change in Substation Location Improve Voltage at the Locomotive and Reduce Power Losses.





performance of the locomotive and the electric power losses encountered in supplying power to the locomotive. Chart *A* shows curves which take into consideration the type of equipment used, the condition of the track and other factors affecting the general mechanical efficiency of the haulage facilities. With roller-bearing equipment and good track, train resistance per ton of load will vary between 10 and 20 lb.; with plain bearings, between 20 and 40 lb. per ton.

With the unit train resistance and grade percentage known, Chart *A* may be used to determine the mechanical efficiency of the train in motion—i.e., the ratio of the grade resistance to the total

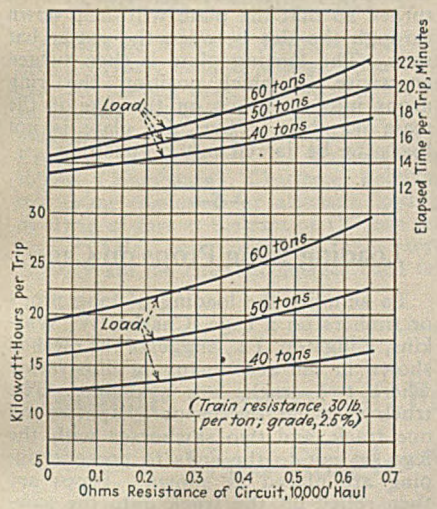


Fig. 3—Relative Energy and Time Requirements With Different Circuit Resistances and Loads.

resistance, including all friction losses. Chart *B* shows the relation between grade resistance in pounds and the total load of the train in tons. By projecting vertically from the load scale to the grade lines, thence horizontally to the 100-per cent efficiency line, thence vertically to the predetermined efficiency line for the particular grade and train resistance, the tractive effort required to haul a given load may be read on the scale at the left of the chart.

Chart *C* (Fig. 1) shows efficiency, speed and tractive effort plotted against amperes for a typical 10-ton locomotive. From this chart, by following the dotted lines from the tractive effort scale, which is common to both Charts *B* and *C*, the amperes, efficiency and speed of the locomotive or train at 275 volts (the rated voltage for the performance curve) may be read on their respective scales.

In Chart *D* (Fig. 1), lines for different fixed resistances per thousand feet of track and overhead circuit are plotted against amperes to the locomotive and voltage drop, power loss and speed reduction in percentage of normal per 1,000 ft. from the source of the 275-volt power. The voltage drop, power loss and speed reduction at any point along the haulageway may be determined by multiplying the values read from the performance curve below by the percentage shown in Chart *D*, and the distance in thousands of feet from the substation.

No Substitute

When an unexpected problem crops up at a coal mine, it is generally the practical operating, electrical, mechanical or safety man who is called on to supply a quick solution. Furthermore, the duty of adapting equipment and methods to actual conditions encountered rests largely on his shoulders. This means that a wide knowledge of the workable short cuts developed throughout the industry is a distinct asset. There is no substitute as good. These pages serve as a clearing house for worthwhile ideas developed by forward-looking men, and here is where your idea should find its place. Send it in, together with a photograph or sketch if either will make it clearer. *Coal Age* will pay $5 or more for each acceptable item.

This grouping of charts may be used to solve any haulage problem by substituting the performance curve of the locomotive in use. For locomotives of a different tonnage, the scales should be multiplied by the ratio between the weight of locomotive being used and the 10-ton machine. It is only necessary that the scale of the performance curve for the tractive effort and the amperage correspond with that of Charts *B* and *D*.

To illustrate what happens when a locomotive hauls a trip from the far end of a d.c. distribution system, it may be assumed that tests are being carried out at a hypothetical operation to determine why power cost is high and why locomotive and machine motors frequently burn out. Several mining machines are being operated in remote sections of the mine, and a 10-ton locomotive is used on the main line, which is approximately 10,000 ft. long on an even grade of 2½ per cent against the loads. One 4/0 trolley line serves the entire haulageway, and the return consists of double-bonded 40-lb. rails. A 100-kw. rotary converter located at the center of operations supplies direct current at 275 volts. The mine has natural drainage and cutting is done at night. Other power requirements are supplied with alternating current, so that only the locomotive requires direct current during the day.

Special meters are placed at the substation for recording graphically the voltage, load supplied and amperes delivered to the trolley wire. A graphic voltmeter to show the voltage drop and a graphic wattmeter to show the kilowatt loss between the substation and the point of consumption are installed on the locomotive, which is ready to pull a load of 50 tons from the siding near the working places. At the moment of starting, the voltage at the locomotive is 275, and the total weight of the train, including the locomotive, is 60 tons, making the power requirements when pulling away from the substation 80 kw. and 292 amp. (see Fig. 2).

After traveling 4,000 ft., voltage at the locomotive has dropped to 198. Amperes flowing into the trolley, and consequently the kilowatts delivered to the trolley, remain constant at 292 and 80, respectively, as the grade is the same throughout. However, the power delivered to the locomotive to perform useful work has dropped from 80 to 58 kw., or a loss of 28 per cent, while the speed

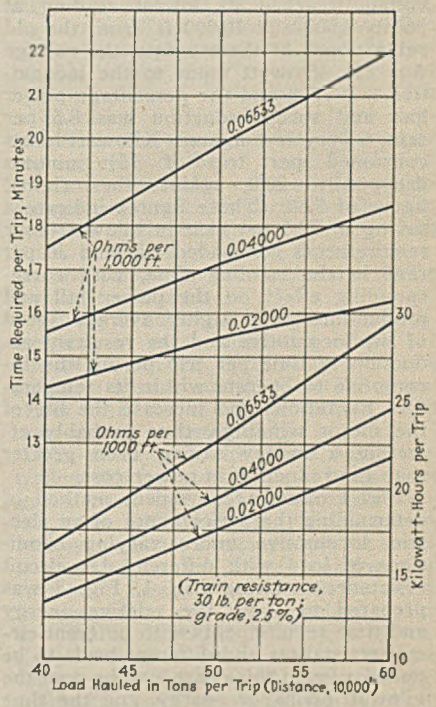


Fig. 4—Relation Between Energy and Time Requirements and Circuit Resistance.

of the locomotive has dropped in the same proportion, or 28 per cent.

Continuing along the haulageway, the voltage drops still further, and the input to the motor and the speed diminish, until, at the end of the haul, the voltage is reduced to 85 and power input to the locomotive to 25 kw., while the percentage power loss and speed reduction have increased to 69 per cent of the original figures.

The meter readings at the end of the trip reveal quite plainly the reason for the excessive maintenance and power costs. The long haul and slow operating speed of the locomotive, together with the heavy amperage flowing, obviously are the cause for the short life of the motor windings. Integration of the kilowatt charts obtained at the substation and on the locomotive show that

29.6 kw.-hr. was delivered to the trolley and that only 19.3 kw.-hr. reached the locomotive. The difference represents heat lost in the trolley and rails. Time required to make the trip was 22.2 minutes.

To remedy the situation, an additional 10,000 ft. of 4/0 trolley wire was installed on the haulageway and the test repeated. At the end of the trip, the voltage reading on the locomotive was 158 instead of 85, kilowatt input was 46 instead of 25 and the percentage power loss and speed reduction was 42 instead of 69. Kilowatt-hour consumption during the trip, which required 18.5 minutes, was reduced from 29.6 to 24.6.

As conditions were still considered unsatisfactory, it was decided to install a substation 8,000 ft. away from the old location. Upon its completion, another test was made, which showed that the voltage reached its lowest reading at points 4,000 and 10,000 ft. from the old substation. At these points, the voltage was 251, kilowatt input to the locomotive was 73.4, and the percentage power loss and speed reduction was 8.5 per cent, a very low figure. Kilowatt-hours consumed per trip of 15½ minutes dropped to 20.0, against the original figure of 29.6. These figures indicate a saving of 32.5 per cent in kilowatt-hour requirements per loaded trip and 30 per cent in the running time, with corresponding effect on the power bill and production. The higher average speed of the locomotive and the resultant reduction in time per trip permit the locomotive to operate within its temperature limitations and increase the life of the motor windings, thus probably effecting a money saving even greater than the reduction in power cost.

Fig. 1 offers a convenient method of determining the performance of an electric locomotive under varying conditions of load with different d.c. circuit resistances. Using Fig. 1, Fig. 3 was prepared to show the relative energy and time requirements with different circuit resistances and different loads to be pulled. From this chart may be read the kilowatt-hours, or energy, and the time required to pull different loads 10,000 ft. along a 2½-per cent grade with different uniformly distributed circuit resistances. This chart shows that energy and time requirements vary with the circuit resistance to a power greater than one.

Analysis of Fig. 4 shows that the energy and time requirements for hauling a load with a low circuit resistance vary approximately as the weight of the train. From this analysis of these particular conditions, it may be stated also that the integrated kilowatt demand of the haulage circuit will vary with the weight of the coal and cars hauled so long as the time required to haul the maximum load used in a comparison does not exceed the period over which the demands are integrated. The deductions made from Fig. 4 will not hold true for all cases, but should not vary materially with different operating conditions, except where voltage conditions are poor and the distribution loss becomes an important consideration, or where very small loads form the basis of comparison.

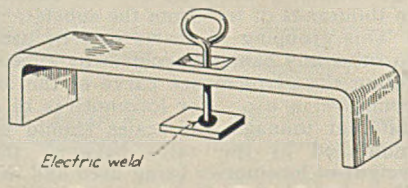
These charts should provide a fair conception of the magnitude of the factors involved in an efficient power supply for a haulage sytem. Each problem must be analyzed and solved in accordance with existing conditions. Chart *D* of Fig. 1 may be enlarged to afford consideration of the base load of a mine and the haulage problem simultaneously.

Addition of copper and advancement of d.c. substations are the methods most generally used to improve voltage at load centers and reduce power losses. Fig. 2 shows, to a certain extent, the relative effectiveness of each method. The importance of good track bonding should not be overlooked.

Although the analysis presented was limited to haulage, the methods used, Mr. Cole explained, may be applied, with appropriate modifications, to embrace other factors, to cutting, pumping and other mine power applications.

Safe Chain Lock

The Logan County Coal Corporation recently adopted a safety regulation calling for the use of a positive lock to prevent the accidental operation of cutter chains while mining machines are trammed from place to place. In accordance with this ruling, Reuben Lee, chief electrician, designed the locking device shown in the accompanying illustration for use on the Goodman Type 12AA cutters at the Slagle (W. Va.) operations of the company. The main member is made of ¾x3-in. bar stock, with the ends turned down 4 in. Span inside the ends is 17½ in. The rectangular locking plate welded to the center pin is made of ¼x1¾-in. stock.



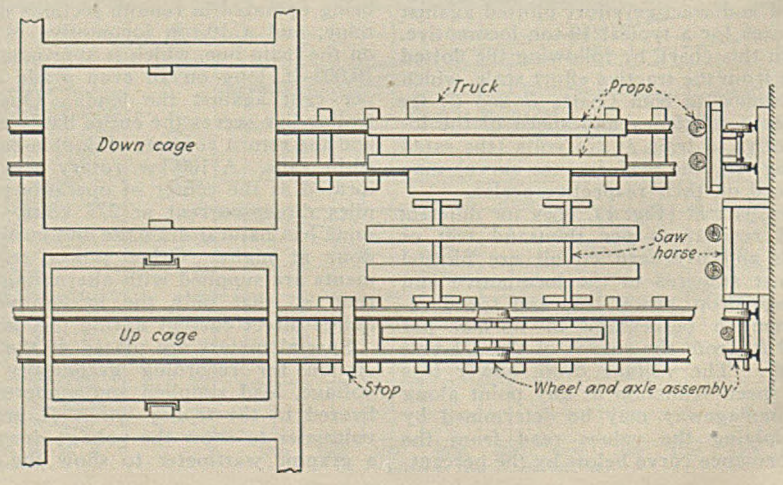
Construction of Chain Lock

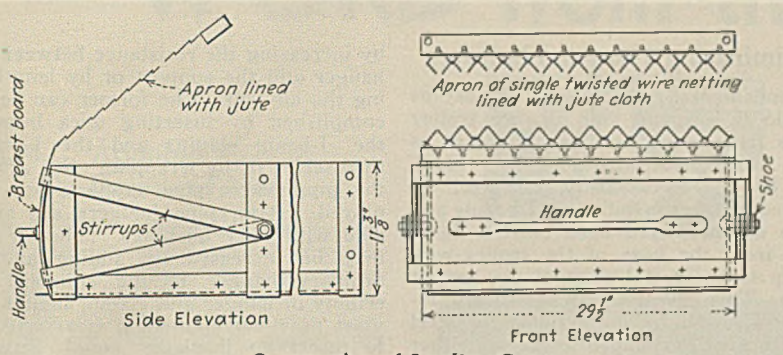
The locking bar is so designed that the safest way of applying or removing it also is the easiest way—that is, in applying it, by grasping the ring at the top of the pin with one hand and lowering the device so that the main member spans the cutter bar, the ends dropping down between the bit blocks. Usually, the member will not rest squarely across the cutter bar, due to the fact that the intervals between bit blocks may not occur opposite each other. After the main member is in place, the center pin is turned so that the plate will drop down through the slot between the cutter bar rails. The locking plate is then turned crosswise, in which position the ring drops into a groove on the top of the main member. Thus, the plate is not likely to be jarred out of position.

Loading Long Props on Cage

To simplify the loading of long props or timbers on a cage, Charles W. Watkins, Kingston, Pa., suggests the method shown in the accompanying illustration where two tracks are available. The truck carrying the props is spotted on one track, and two sawhorses with the legs set out to the ends to prevent tipping are placed as shown. Props are then rolled off the truck onto the sawhorses, and from these onto the wheel and axle assembly one at a time, so that they rest on the axle in a nearly balanced position. As the wheels are loose on the axle, the prop can be moved forward by pushing on it until the wheels strike the stop, whereupon the prop or timber is up-ended and allowed to slide down onto the cage platform, which has been spotted the proper distance below the landing. For props of different lengths, the position of the stop may be changed to the point where loading the cage is easiest.

Suggested Method of Loading Long Props on Mine Cage





Construction of Loading Gate

Gate for Loading Cars

Annales de Mines de Belgique, Vol. 33, Sec. 2 (1932), includes a description of a gate for loading mine cars at the foot of an inclined working place. This gate is used in the Mère des Veines bed, Sacré-Français operation, S. A. Charbonnages Réunis (Mambourg), Charleroi, Belgium, two being employed for alternate loading of a trip of cars at the rate of 110 tons per hour. Safe, easy operation and large capacity are the chief advantages cited for the equipment, which is shown in the accompanying illustration.

The gates are made of steel plates reinforced with flat bars for stiffness. The lift gate proper is attached to two stirrups pivoted on the sides, as shown. Wire netting lined with jute cloth is attached to the top of the lift gate at one end and to the roof at the other, the length of the curtain being dependent upon the inclination of the gate structure. The netting effectively protects the operative from flying pieces of coal.

Remote Control of Fan and Borehole Feeder Uses Single "Control" Wire

At a mine in the Appalachian field, a single "control" wire system has been successfully applied to the remote control of a 9-ft. fan. This fan is installed over an airshaft three miles distant from the hoisting shaft as an auxiliary to the main fan. At this distant point is a switching station which supplies energy to the auxiliary fan and also to a 300-kw. motor-generator set through a borehole feeder. The system provides automatic features for cutting off the power supply to the mine from this substation, in case either or both fans should stop, through a motor-operated oil circuit breaker which is controlled by the same wire that controls the fan. This control is effected from the power house at the main shaft.

It is intended that the future power requirements accompanying further extensions of the mine will be met by the switching station. Three 400-kva. transformers are installed, but only two are in use, stepping down the voltage from 25,000 to 2,300. These two are arranged in open delta, with their secondary connected as shown in Fig. 1.

The control scheme proper is illustrated schematically in Fig. 2. Note on this diagram that the ground can be made on phase *A* of the transformers. In this particular installation, however, the lead covering of a 3-conductor metering and control cable is utilized as a continuous grounded conductor. Control power for the system is taken from the lighting transformers available at the substation and at the power house. It is necessary that both control transformers be connected to the same phase of the a.c. system.

In the diagram, *C* refers to interlocks on the fan control; *D* refers to interlocks on the oil circuit breaker; (1) is an auxiliary fan control relay; (2) is an oil circuit breaker auxiliary control relay; (3) is a relay which functions to indicate fan operation; (4) is a relay which functions to indicate the position of the oil circuit breaker.

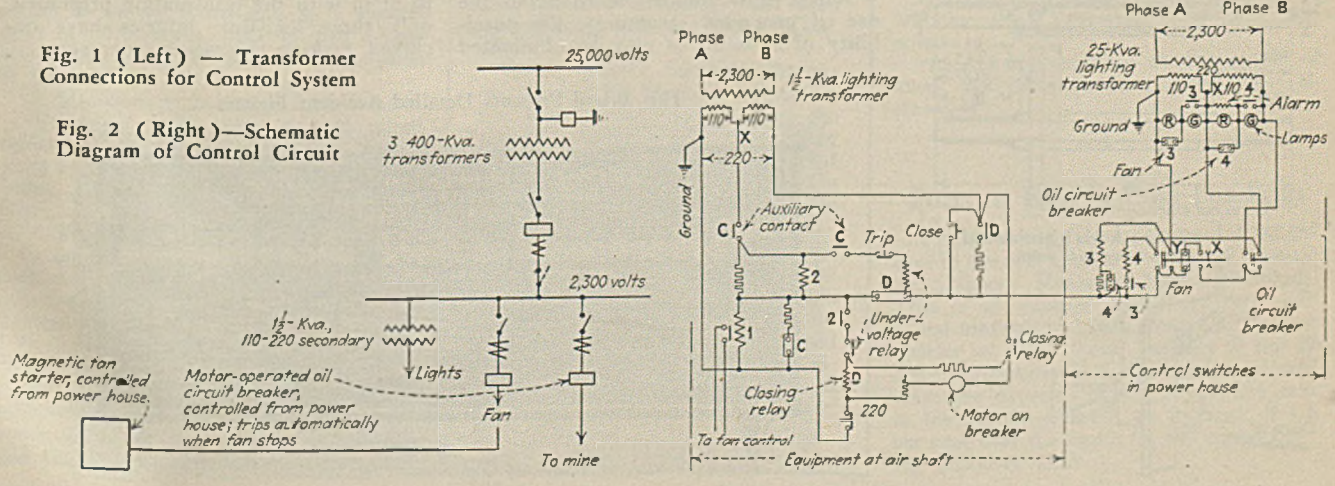
Control relay (1) is connected as a master relay in the fan starter circuit. When it closes, the fan starts; and when the last contactor of the starter has closed, the two auxiliary contacts, *C*, close. One of these contacts causes the indicating relay (3) at the power house to close and light a red lamp, indicating that the fan is operating. The other auxiliary contact closes the circuit of the undervoltage trip coil relay of the oil circuit breaker on the borehole feeder. Then, the undervoltage relay and the circuit breaker can be closed by the energizing coil (2), which is the control relay causing the closing relay and motor-operated mechanism on the breaker to function.

Wiring is such that failure of the control line, or of the indicating relays (3) and (4), or of the alarm relay will cause an alarm horn to sound. This alarm continues until the trouble is cleared. The horn circuit is tested daily.

The switches at the power house controlling the fan and oil circuit breaker are spring reset and make momentary contact only while held in "trip" position. However, contact *Y* closes when the switch is operated to the "close" position; but contact *X* does not open until the switch is operated to the "trip" position. This provides an interlock, in addition to auxiliary contact *A* on the fan starter, and thus insures that the oil circuit breaker cannot be closed unless the fan is operating and the fan control switch has been

Fig. 1 (Left) — Transformer Connections for Control System

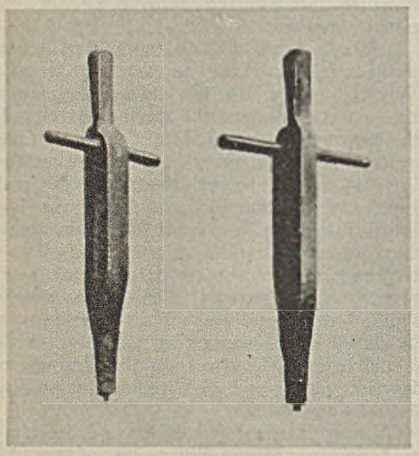
Fig. 2 (Right)—Schematic Diagram of Control Circuit



moved to "close" position. The alarm relay, the coil only of which is shown, opens the alarm horn circuit when the coil is energized.

Durable Sprag

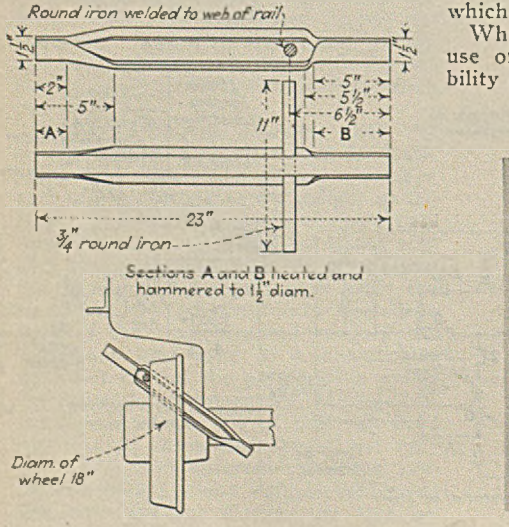
The accompanying illustrations show a mine-car sprag developed at the Columbia (Utah) mine of the Columbia Steel Co. for use with cars weighing from 4 to 5 tons when loaded and operating on grades as high as 6 per cent in rooms. Prior to the development of the type shown, which is made of 20-lb. rail,



Two Views of the Rail Sprag Used at the Columbia Mine.

both 3-in. oak sprags and 1½-in. tool-steel sprags were tried, according to Thomas C. Harvey, superintendent. Neither were satisfactory, however, as the oak sprags broke and the tool-steel types bent. While the rail sprag now in use costs slightly more than other types, this is outweighed, it is felt, by the fact that there is no renewal and little upkeep.

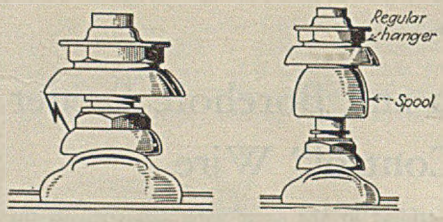
Construction of the Rail Sprag; Also Position of the Sprag in the Wheel (Dimensions Shown Are Those Adopted at the Columbia Mine).



Eliminating Hanger Flashover

Fundamentally, it should be just as simple to suspend and insulate trolley wires from steel I-beams and pipes as from wood structures, says *O-B Haulage Ways.* Occasionally, however, insulated hangers installed on I-beams and pipes are destroyed by a current flashover from the boss of the trolley-wire clamp to the metal skirt of the hanger body. This, investigation has shown, invariably is due to the fact that the steel structure was grounded to the rail either accidentally or intentionally.

When supporting structures are grounded to the rail by bonding for increased safety or accidentally through armored cables, pipes or other auxiliaries in contact with the steel, the hangers also are grounded. Consequently, the full potential of the trolley circuit is impressed across the short air space between the trolley-clamp boss and the hanger skirt. If the face of the insulator is reasonably clean so that there is no leakage across it, any standard hanger will supply sufficient trolley-wire insulation. However, the combination of grounded hanger body and



Left, Diagrammatic Representation of the Path of the Arc When a Hanger Installed on a Grounded Structure Flashes Over; Right, Use of a Spool Between Clamp and Hanger to Lengthen Air Gap.

extremely short air gap may permit the spark of a passing current collector to ionize the surrounding air, thus breaking down its resistance to flashover and allowing an arc to jump from clamp to hanger. When this happens, the hanger is almost certain to burn up unless the circuit breaker cuts out the dead short which results from the flashover.

Where it is impossible to avoid the use of grounded structures, the possibility of a flashover may be eliminated by increasing the resistance between the hanger and the support or by lengthening the air gap. The former can be accomplished by inserting mica between the I-beam clamps and the I-beams themselves or by wrapping mica around the pipe where pipe supports are employed. Also, pipe hangers are available with fiber bushings. The air gap may be increased by adding another ordinary hanger to the standard assembly of hanger and clamp, though the most practical method, it is asserted, is to insert an insulator spool between hanger and clamp.

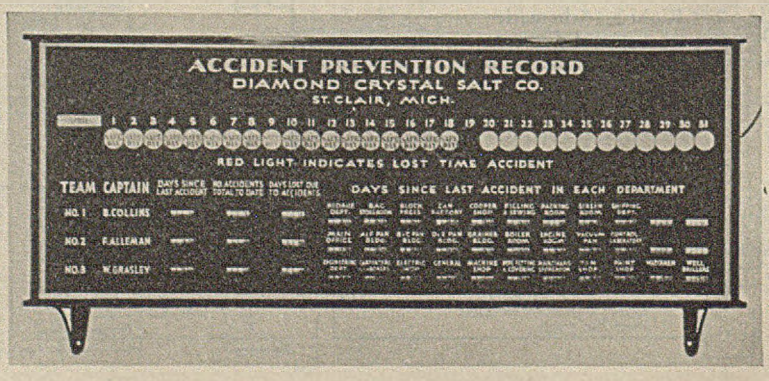
Safety Board Built to Give Complete Information

The accompanying illustration shows the safety record board used at the St. Clair (Mich.) plant of the Diamond Crystal Salt Co. to give all employees a daily statistical record of progress in accident prevention. In addition to the basic idea of presenting full knowledge of the records being made in each department in such a form that they can easily be grasped, a secondary objective was an appearance sufficiently striking to compel daily attention.

The board is approximately 8 ft. long and 3 ft. high. The round tags marked "Safe Day" are blank on the opposite side and are simply lifted off the hook and turned over until the proper day of the month is reached. Electric light sockets are installed behind each of the tags, and on days when an accident occurs a red blinker light is inserted. The problem of giving figures for each of the several departments was solved by mounting odometer wheels on shafts behind slots in the board. Thus, numbers from 0000 to 9999 are available simply by rotating the wheels with the fingers.

Cost of the board was approximately $400, but it is felt that the sustained interest has more than repaid the outlay. Prior to its installation, according to S. H. Zimmerman, general superintendent, lost-time injuries had averaged 24 per year for four years. Since the board was installed and the organization changed to fit in with the information presented, only three lost-time injuries have occurred, making the rate six per year.

This Board Presents Detailed Accident Figures.



WORD from the FIELD

A.M.C. Appoints Committee On Bureau of Mines

The American Mining Congress has appointed a national committee to confer with Secretary of the Interior Ickes on the future status of the Bureau of Mines. Eugene McAuliffe, president, Union Pacific Coal Co., heads the group. Other members are as follows: E. A. Holbrook, dean, School of Engineering and Mines, University of Pittsburgh; Milton H. Fies, vice-president, DeBardeleben Coal Corporation; Charles M. Moderwell, assistant to the president, Chicago, Wilmington & Franklin Coal Co.; Cleveland E. Dodge, vice-president, Phelps Dodge Corporation; Howard I. Young, president, American Zinc, Lead & Smelting Co.; and John L. Lewis, president, United Mine Workers.

New Policy for NRA Proposed By John L. Lewis

Unless NRA takes early action in putting aside temporizing measures and fearlessly applies "a constructive plan," declared John L. Lewis, president, United Mine Workers, in an address read before the American Academy of Political and Social Science at Philadelphia, Pa., Jan. 6, by Ellis W. Searles, editor, *United Mine Workers' Journal,* organized labor, which is in full accord with the objectives of NIRA but feels that the practical application of the law has been too restricted, will seek support for its position in Congressional expansion of the provisions of Sec. 7.

"Economic recovery," said Mr. Lewis, "means the adoption of economic planning and the placing of industry and commerce more or less in the hands of the government." If this is so "the ultimate objectives as to policy and procedure of NRA should be announced immediately and stated to be the standards which must be included by industries in their codes. To my mind, these standards should be:

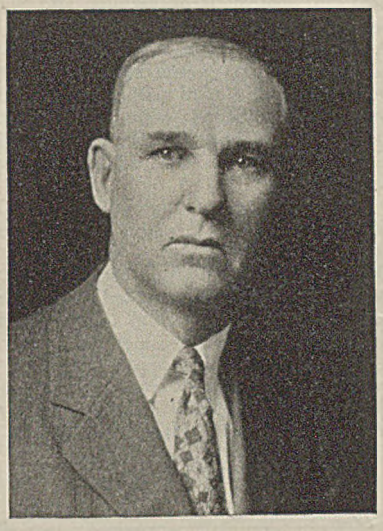
"1. Hours of work per week to be reduced, as far as practicable, to a general level of 30 hours a week of five 6-hour work days" to provide for reabsorption of workers.

"2. Minimum wage rate of 50c. per hour.

"3. General wage rates of 1926 raised sufficiently to produce the same weekly wage for shorter hours as earned per week before reduction in weekly schedule of hours.

"4. Production schedule as of 1926."

In the absence of the adoption of some such constructive policy by the NRA on its own initiative, "it will be necessary for organized labor to seek an extension of Sec. 7 through legislation by Congress" to include: (*a*) complete cooperation between capital and labor by providing that code authorities or administrative agencies be composed of an equal number of employer and employee representatives with an impartial chairman appointed by the NRA given the right to vote in case of a tie; (*b*) 6-hour day and 30-hour week in all codes; (*c*) minimum rates of pay in all codes sufficient to enable an unskilled worker to support his family in health and modest comfort and lay up reasonable savings; (*d*) equal pay for women performing the same work as men; and (*e*) assessment of industries under codes for unemployment insurance payments and old age and disability pensions.



Eugene McAuliffe

COAL AGE was founded in 1911 by the Hill Publishing Co. In 1915 *Colliery Engineer,* with which *Mines and Minerals* previously had been consolidated, was absorbed by COAL AGE.

When, in 1917, the Hill Publishing Co. and the McGraw Publishing Co. were consolidated to form the present McGraw-Hill Publishing Co., COAL AGE became a member of this larger publishing enterprise. On July 1, 1927, the journal was changed from a weekly to a monthly.

During twenty-two years the editorship has been held successively by Floyd W. Parsons, R. Dawson Hall, C. E. Lesher, John M. Carmody and Sydney A. Hale. The editorial staff of COAL AGE consists of: Sydney A. Hale, R. Dawson Hall, Louis C. McCarthy, Ivan A. Given and J. H. Edwards.

A.I.M.E. Annual Meeting To Be Held Next Month

The 143d annual meeting of the American Institute of Mining and Metallurgical Engineers will be held at the Engineering Societies Building, New York City, on Feb. 19-22. Four sessions will be held under the sponsorship of the Coal Division, three devoted to a coal classification symposium, with the following subjects scheduled:

"Significance of the Terms Caking, Coking, Swelling, Agglutinating and Agglomerating as Applied to the Use and Scientific Classification of Coals"—R. E. Gilmore and others.

"Effect of Oven Humidity on Accelerated Weathering Tests of Coal"—Edgar Stansfield.

"Reactivity of Anthracite With Carbon Dioxide"—W. L. Keene and others.

"Mineral Matter in Coal—Preliminary Report"—A. W. Gauger.

"Preliminary Report on Unit Coal—Specific Gravity Curves of Illinois Coals"—G. H. Cady, D. R. Mitchel and L. C. McCabe.

"Unit Coal as a Basis of Coal Standardization as Applied to Illinois Coals"—O. W. Rees and G. H. Cady.

"Mineral Matter Correction in Coal Analyses—A Study Based Upon Coal Ash Analyses"—Gilbert Thiessen.

"Classification of Coals in the United States, According to Fixed Carbon and B.T.U."—W. A. Selvig, W. H. Ode and A. C. Fieldner.

"Application of Coal Classification to the Problems of Commercial Sales Agencies and Operation of Codes"—Howard N. Eavenson.

"Anthracite Classification" — H. G. Turner.

"Estimation of the Grindability of Coal" —H. F. Yancey, O. L. Furse and R. L. Blackburn.

"Use of Caving Chambers in Pennsylvania Bituminous Mines"—J. W. Paul.

"A New Use for Anthracite"—H. G. Turner.

"Report of Committee on Methods of Valuing Coal Properties"—John B. Dilworth.

"Report of Committee on Evaluation of Coal for Blast-Furnace Coke"—R. H. Sweetser.

Forecast Rise in Coal Loadings

Total coal and coke loadings of 1,732,087 cars in the first quarter of 1934 are forecast by Shippers' Regional Advisory Boards. This is an increase of 6.2 per cent over actual loadings of 1,630,363 cars in the first quarter of 1933. Total loadings of the 29 principal commodities, including coal and coke, are expected to reach 3,878,284 cars in the current quarter, an increase of 6.5 per cent over the figure for the corresponding period of 1933.

Conference on Bituminous Code Postponed; Illinois-Indiana Dispute Continues

BITUMINOUS code operation in December was featured by continuation of the Indiana-Illinois price-differential controversy, indictment of officials of one coal company charged with code violation, the naming of additional appointees to the various regulatory boards under the code and postponement of the general conference to consider what, if any, changes in code provisions are necessary from Jan. 5, the date specified in the code, to Feb. 12. Postponement was suggested by Division Administrator K. M. Simpson because of the inability of NRA officials and the industry to have their data assembled for presentation on the earlier date.

Complaints of code violations by the Moore Coal Co., Missouri, and the Seals Bros. Mining Co., Iowa (December *Coal Age*, p. 428), referred to the Department of Justice last month, was turned over to local federal district attorneys. On Dec. 29, William E. Vandeventer, U. S. District Attorney for Missouri, issued warrants for the arrest of J. S. Moore and his son, S. Moore, operating the Moore company, which was charged with having sold coal to Iowa truckers below the minimum prices fixed by the Iowa subdivisional code authority.

In injunction proceedings growing out of the refusal of two Salt Lake City dealers to observe minimum prices fixed by the state retail coal industry board of control, the Utah Recovery Act, patterned after the NIRA and providing for price regulation, was upheld as constitutional by District Court Judge Herbert M. Schiller on Dec. 29. Both dealers were enjoined from cutting prices, and later disobedience brought a 30-day jail sentence to one offender.

No solution to the Indiana-Illinois controversy was reached, despite a ten-day conference which began shortly after the issuance of a proposed basis for settlement on Dec. 7 by Presidential Code Authority Members Ellis, Gambrill and Harrington (December *Coal Age*, pp. 428-429). Indiana, holding out for freight rate absorptions, rejected suggestions for price changes proposed by southern Illinois producers. The latter announced that when all districts in the two states were correlated there would be no objection to a reasonable general advance, provided prices on western Kentucky and dock coals also were brought into line.

As a result of the stalemate, Indiana announced the adoption of the Nov. 1 price list, carrying reductions on certain sizes to territory west of the State and continuing freight-rate absorptions up to 30c. per ton. A temporary Illinois schedule, effective to Dec. 31 and including certain freight-rate absorptions, was approved on Dec. 19. Western Kentucky entered the picture Dec. 26 by reducing prices 10 to 20c. on certain coals to meet the Indiana-Illinois absorptions. The month ended with the promulgation of January schedules subject to change without notice by Indiana.

While Division I as a whole marked time awaiting a final settlement of this dispute, certain Eastern groups went ahead with their own correlation questions, notably northern West Virginia, Pennsylvania and Ohio, which were reported to have agreed on eastbound schedules. The request of the northern West Virginia Panhandle, originally grouped with Ohio, for a separate subdivision was denied by the divisional code authority on Dec. 6, which authorized the field to join up with either Ohio or western Pennsylvania.

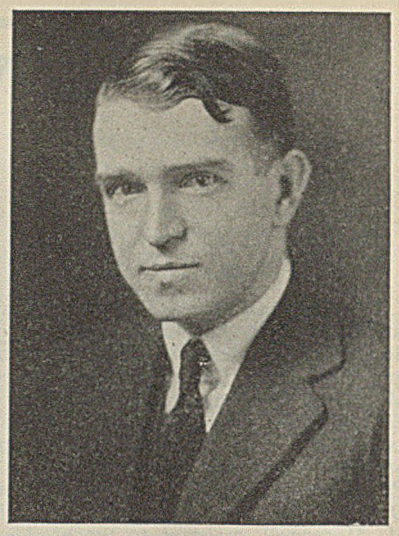
One phase of operator-wholesaler relations brought out a difference of opinion between central Pennsylvania and representatives of the American Wholesale Coal Association and New York and New England wholesalers over a reduction in commissions from 8 to 7 per cent. A formal protest was lodged with the marketing committee of the Eastern Subdivisional Code Authority on Dec. 12 by the wholesalers.

The personnel of the Bituminous Coal Labor Board for Division I—South was completed in December when Charles B. Barnes, Boston, Mass., reconsidered an earlier refusal and accepted appointment as impartial Presidential representative. Mr. Barnes' career includes experience as a West Virginia newspaper publisher; director, New York State Employment Bureau; and impartial chairman and arbitrator, New York Leather Pocketbook Industry and Men's Shirt Industry.

December ended without the appointment of a presidential representative on the western Kentucky subdivisional code authority, but Frank D. Cain, Madisonville, mining engineer and a former member of the West Kentucky Coal Co. staff, was named as a special deputy to Wayne P. Ellis, deputy administrator, NRA Coal Division, and Division I appointee, and will act in an advisory capacity. Other appointments included the names of Newell W. Roberts, formerly with the Davis Coal & Coke Co. and Blair & Co., as assistant deputy administrator under Mr. Ellis. In the Southwest, W. C. Shank, president, Crowe Coal Co., Kansas City, Mo., was elected chairman of the Kansas-Missouri-Oklahoma subdivision of Division IV.

Pressure on truck and wagon mines to force observance of code regulations bore fruit in the organization of associations in some fields to establish uniform prices or prepare supplemental codes. In Ohio, the Perry County Truck Mine Operators' Association was formed to regulate the operations of approximately 40 truck mines in that county, and the Coshocton County Coal Operators' Association was organized by 150 truck operators to prepare a code for submission to the Ohio Subdivisional Code Authority. On the other hand, 50 wagon-mine operators in ten southern Indiana counties met to protest against the bituminous code, which they asserted was forcing them out of business, and also to formulate a supplemental code for submission to NRA. Brazil (Ind.) truck-mines, however, decided that the best course would be the adoption of a uniform price schedule considerably higher than the previous quotations.

Department of the Interior purchasing policies were assailed by the Division V Code Authority, which formally protested against the department's accepting a bid of the Gallup Southwestern Coal Co. for 1,500 tons of slack at 80c., and 6,000 tons of lump at $4.30, on the ground that the prices are below code minima. The authority also attacked the ruling of the Secretary of the Interior that Code price restrictions do not apply to sales made to the government.



Wayne P. Ellis

NRA adviser on coal problems since last August and Presidential member of the Division I bituminous code authority, has been appointed a deputy administrator in Division I of the NRA, in charge of the administration and enforcement of the bituminous code.

NIRA Idea Permanent, Says Roosevelt

Building his message to the 73d Congress around restoration of national well-being and the erection "on the ruins of the past" of a "new structure designed better to meet the present problems of modern civilization," President Roosevelt on Jan. 3 declared his belief that the principles of NIRA would become a permanent feature of the industrial structure.

"We seek," he said, "the definite end of preventing combinations in furtherance of monopoly and in restraint of trade, while at the same time we seek to prevent ruinous rivalries within industrial groups which in many cases resemble the gang wars of the underworld, and in which the real victim in every case is the public itself.

"Under the authority of this Congress, we have brought the component parts of each industry together around a common table, just as we have brought problems affecting labor to a common meeting ground. Though the machinery, hurriedly devised, may need readjustment from time to time, nevertheless I think you will agree with me that we have created a permanent feature of our modernized industrial structure and that it will continue under the supervision but not the arbitrary dictation of the government itself."

Board to Study Fuel Problems Planned by NRA

A study of the competition between the various fuels and sources of energy brought out during the hearings on codes for the coal, natural-gas, petroleum and other fuel and power industries is scheduled as the first job of a proposed Fuel and Energy Planning Board to function under the NRA. Possibility of the formation of such a board was disclosed on Jan. 8 by Deputy Administrator W. H. Davis in connection with conferences on the proposed anthracite code. Mr. Davis declared that a committee, under his temporary chairmanship, was studying the possibility of organizing such a board, and that representatives of the Federal Power Commission, U. S. Geological Survey, U. S. Bureau of Mines and the Petroleum Code Authority were cooperating in the movement.

While the first job of the proposed board would be to delve into the problem of inter-industry competition under the codes, plans call for an extension of its activities far beyond this subject. The codes have been and are being drawn up without much respect to competition from other energy sources, which the NRA recognizes as a dangerous situation.

NRA is calling together all the authorities for the 200-odd codes now in effect, the meeting to be held in Washington early in February, not only for the purpose of instruction in code enforcement but also to take on the job of solving inter- as well as intra-industry problems. Meanwhile, the inter-industry competition in the fuel and energy field has been brought into the spotlight again by the opening of the light and power utilities code, which further complicates the problems brought out in the coal and petroleum codes. General Johnson says that the meeting of the code authorities in February certainly will result in an airing of these problems, among others, but does not guarantee that they will be solved.

Anthracite Code Revised

Following a series of conferences in December between representatives of the operators, the United Mine Workers and the NRA, a revised code of fair competition for the anthracite industry was submitted early in January, according to an announcement by W. H. Davis, Deputy NRA Administrator, on Jan. 6. While some minor changes in provisions were reported, the revised code failed to embody the major labor provisions urged by labor representatives at the initial hearing (December *Coal Age*, pp. 426-427) and in subsequent conferences. Included in the union demands were: equalization of working time; 6-hour day and 30-hour week; a minimum rate of $4.62 for outside labor; abolition of contract mining; and restriction of stripping, washery and culm-bank operation.

Another conference on the disputed labor provisions began immediately after the submission of the revised code, and was featured by a number of suggestions from Mr. Davis designed to expedite a settlement of differences. These included: insertion of some other provision in the code, other than a reference to the existing agreement, to govern minimum wages and maximum hours; creation of an industry board, composed equally of operator and miner representatives, to register all qualified miners and thereafter study the question of equalization of working time, this committee or another special committee also to take up the question of making available to the industry the maximum benefits of such CWA aid as may be obtainable; and appointment of a board to work out a plan suitable to all interests for reducing the cost of anthracite to the consumer. On the question of the check-off, Mr. Davis felt a code could be prepared either with or without it, depending upon agreement in the industry, but that if it were inserted it would be applicable only to those miners who express a desire to have union dues deducted from their wages.

Associations

All officers of the Smokeless Coal Operator's Association of West Virginia were reelected at the annual meeting held in New York, Dec. 14, as follows: president, William G. Caperton, vice-president, Slab Fork Coal Co., Charleston, W. Va.; vice-presidents, R. H. Knode, president, Stonega Coke & Coal Co., and E. C. Page, president, Crozer Coal & Coke Co., both of Philadelphia, Pa.; treasurer, H. R. Hawthorne, vice-president, Pocahontas Fuel Co., New York; secretary, Holly Stover, Washington, D. C.

James White, superintendent, Cass No. 48 mine, Peabody Coal Co., Sullivan, Ind., was chosen president of the Indiana Coal Mining Institute at the annual meeting held in Terre Haute, Dec. 8. B. H. Schull, general manager, Binkley Mining Co., Clinton; P. L. Donie, general manager, Little Betty Mining Co., Linton; and H. P. Smith, Shelburn Mining Co., Terre Haute, were chosen vice-presidents. Harvey Cartwright, Terre Haute, secretary, Indiana Coal Operators' Association, was reelected secretary.

R. J. Burmeister, general manager, Raleigh Coal & Coke Co., Raleigh, W. Va., was elected president of the New River Coal Operators' Association at the annual meeting held at Mt. Hope, W. Va., in December. Edward Graff, general manager, New River Co., Macdonald, W. Va., was elected vice-president; P. M. Snyder, president, C.C.B. Smokeless Coal Co., Mt. Hope, treasurer; and S. C. Higgins, Mt. Hope, secretary-traffic manager (reelected).

A. W. Laing, vice-president, Morrison Coal Co., Charleston, W. Va., was again chosen president of the Winding Gulf Operators' Association at the annual meeting at Beckley, W. Va., last month. Other officers were elected as follows: vice-president, L. T. Putman, general superintendent, Raleigh-Wyoming Mining Co., Beckley; secretary-treasurer, P. C. Graney, general manager, C.C.B. Smokeless Coal Co., Mt. Hope (reelected); assistant secretary and commissioner, Hal M. Scott, Beckley.

James F. Crockett, manager of mines, National Fuel Co., National, W. Va., was elected president of the Monongahela Valley Coal Mining Institute at the annual meeting held in Morgantown, W. Va., Dec. 12, and the following were chosen as vice-presidents: George Benson, foreman, Arkwright Coal Co.; Joseph Bierer, general superintendent, Shriver Coal Co.; H. H. Davis; Alex Bryce, superintendent, Kellys Creek Colliery Co.; and John Atkinson, general superintendent, Sunrise Coal Co. E. D. Gall, superintendent, Arkwright Coal Co., Morgantown, was elected secretary-treasurer.

Steve Arnott, superintendent, Kentucky King Coal Co., Wallins Creek, Ky., was elected president of the Harlan Mining Institute last month. J. T. Angel, superintendent, Mahan-Ellison Coal Corporation, Liggett, Ky., and Roy H. Gonia, district mine inspector, Harlan, were elected vice-presidents, and James F. Bryson, safety director, Harlan County Coal Operators' Association, was chosen secretary.

Kentucky Purchasing Agents Hear Case for Coal Mining

Coal's position in the economic life of Kentucky was the theme of a special meeting of purchasing agents in Louisville, Ky., Dec. 19, under the sponsorship of the Louisville Association of Purchasing Agents and the Stearns Coal & Lumber Co., Stearns, Ky. With Stanley S. Held, president of the association, presiding, J. E. Butler, general manager of the coal company, introduced George C. Ritchie, fuel engineer for the Chesapeake & Ohio Ry. Mr. Ritchie reviewed the development of equipment and methods in Kentucky since the early days and declared that during a normal year coal sales bring approximately $100,000,000 in new money into the state, two-thirds of which immediately is turned over to the miners to find its way into the state's retail trade. Purchases of supplies and equipment by the coal industry also represent a large factor in the income of Kentucky jobbers and manufacturers, and, in addition, coal-mining creates traffic for the railroads, which spend a part of the resulting revenue for taxes, wages and supplies within the state.

Coming Meetings

Mining Institute, University of Washington; annual meeting, Jan. 22-27, Mines Laboratory and Guggenheim Hall, Seattle, Wash.

United Mine Workers of America; 33d constitutional convention, beginning Jan. 23, Tomlinson Hall, Indianapolis, Ind.

American Wood Preservers' Association; 30th annual convention, Jan. 23-25, Rice Hotel, Houston, Texas.

Coal Club of Philadelphia; annual dinner, Jan. 25, Bellevue-Stratford, Philadelphia, Pa.

Third International Heating and Ventilating Exposition, Feb. 5-9, Grand Central Palace, New York City.

Eastern Ohio Coal Operators' Association; annual meeting, Feb. 12, Cleveland, Ohio.

American Institute of Mining and Metallurgical Engineers; annual meeting, Feb. 19-22, 29 West 39th St., New York City.

N.C.A. Moves for Federal Tax on Natural Gas; Illinois Coal Men Attack Chicago Rates

BITUMINOUS resentment against unfair competition from rival fuels was translated into action on a wide front in December. The National Coal Association campaign for a federal tax on natural gas bore fruit in the appointment of a committee to draw up legislation for introduction during the present session of Congress, and representatives of the organization also presented soft coal's case against substitutes at NRA hearings on the gas code and on fuel-oil prices. Illinois operators opened an attack on natural gas in the Chicago district. In addition to the efforts of the industry, the NRA began an investigation into the feasibility of organizing a board to study the question of competition between the various fuel and energy sources (p. 33 of this issue).

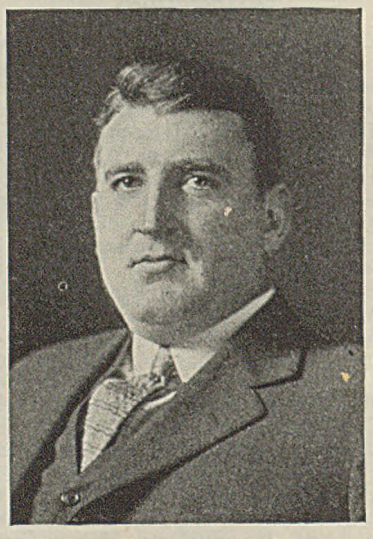
Eight attorneys were named to the committee to prepare federal tax legislation by C. E. Bockus, president, National Coal Association, as follows: Ohio, Wm. P. Belden; Illinois, Thurlow G. Essington; southern West Virginia-Virginia low-volatile fields, E. L. Greever; central Pennsylvania, A. M. Liveright; Kentucky, J. Van Norman; Southwest, T. L. Phillips; western Pennsylvania, Don Rose; Indiana, E. B. Wilkinson.

With Earl Houck, director of the legal department, and Henry Warrum, general counsel, United Mine Workers, in attendance, the committee held its first meeting in Washington, D. C., Dec. 14 and approved the appointment of a subcommittee consisting of Messrs. Liveright (chairman), Greever and Essington "to assemble various taxing statutes that have been enacted, whether or not disapproved by the U. S. Supreme Court, for study," and to draft a tentative bill and supporting memorandum for consideration at a later meeting. At this meeting, held Jan. 6, it was voted to request an excise tax of 5c. per M on all natural gas sales, whether or not blended with artificial gas, such tax to be collected from the ultimate consumer.

The committee, at the Dec. 14 meeting, also approved a motion requesting the Economic Division of NRA "to make a study to develop the facts as to the replacement of coal by natural gas, the effect upon employment of labor resulting therefrom, the effect of freight rates on production and distribution of coal; also to submit figures or an estimate as to the ratio of labor cost in the production and transportation costs of natural gas." This request brought a reply to the effect that while such information could not be obtained from original sources before Jan. 5, available material would be supplied.

Omission of any reference to fair-trade practices or price control drew the fire of representatives of diverse interests at the hearings on the natural-gas code before Deputy Administrator Leighton H. Peebles, Jan. 3. The Petroleum Industry Code Authority pointed out that, as a well may bring forth either oil or gas, labor employed in drilling should be under the same set of rules. The NRA Labor Advisory Board also found the labor provisions unsatisfactory. Spokesmen for the Oil Burner Code Authority dwelt at length on alleged unfair trade practices of natural gas.

Stating that 40,000,000 to 50,000,000 tons of soft coal is being lost to natural gas annually, thus displacing 40,000 to 50,000 miners, in addition to labor in the transportation and service industries, John D. Battle, traffic manager, National Coal Association, declared the proposed measure, due to the omission of fair-trade practices, could not be considered a code. Together with Roderick Stephens, chairman of the code committee, National Retail Coal Merchants' Association; J. B. Scott, Anthracite Institute; and W. Y. Wildman, Illinois Coal Operators' Association, Mr. Battle supported a group of fifteen unfair practices suggested by H. H. Westerman, representing Northwestern coal dealers. Mr. Westerman's proposals would prohibit the sale of natural gas below cost (including all factors) to any purchaser, and



Charles O'Neill

brand guarantees or offers to guarantee a price lower than that at which competing fuel shall or may be sold an unfair practice.

W. J. Jenkins, president, Consolidated Coal Co. of St. Louis, and A. B. Steffens, president, Indiana & Illinois Coal Corporation, in behalf of themselves and other officers, agents and employees of the Illinois Coal Operators' Association using or consuming gas, filed a formal request with the Illinois Commerce Commission early in December for an investigation into alleged illegal and discriminatory practices of the People Gas Light & Coke Co., distributing Texas natural gas in the Chicago district. The petition is supported by the United Mine Workers in the state, and hearings were set for Jan. 10.

The major attack is directed against a recent contract between Swift & Co. and the gas company which provides for the sale of gas at 12½c. per million B.t.u., and also binds the company, in case service is interrupted, to supply fuel oil at a price which will yield a steam cost not greater than that with gas. To carry out the latter provision, the gas company erected a fuel-oil plant at a cost of $159,000, it was pointed out.

Petitioners charged that the Swift contract is discriminatory and illegal in that it provides for what amounts to "non-interruptible," or "demand," service at the price of "interruptible" service; that the stand-by plant represents unusual facilities not supplied other customers; that the sale of oil and other liquid fuel is not provided for in the company's charter; that gas is sold below cost, thereby discriminating against other users; that sale at such a price constitutes "dumping," and is unfair competition to producers of other fuels, particularly coal, in that the gas displaces coal, thereby increasing unemployment; and that the contract violates the published rate schedule. In addition to the specific attack on the Swift contract, petitioners also allege that all contracts for "interruptible" service at the price named, whether or not stand-by facilities are included, are discriminatory against other gas users.

Soft coal's case for an equitable adjustment of fuel-oil prices was presented to the Petroleum Administrative Board on Dec. 11 by Charles O'Neill, vice-president, Peale, Peacock & Kerr, Inc., and chairman of the government relations committee, National Coal Association. Considering the general unprofitable operation in recent years and the additional costs imposed by the NRA Code—estimated at approximately 50c. per ton in increased labor, supply and administrative expenditures—Mr. O'Neill declared that if the industry is to furnish employment, pay established wages and make a reasonable profit, the average 1932 realization of $1.32 must be increased at least 50 per cent. Such an increase, however, lays coal open to further tonnage losses unless prices of competitive fuels and energy are advanced proportionately.

Comparable advances in fuel oil prices, by limiting movement into the heating and steam-raising markets, would force an increase in processing, and thus promote the recovery of valuable constituents which otherwise would be used wastefully in heating and steam raising. Establishment of normal "cost-plus" fuel-oil prices, said Mr. O'Neill, would reduce the burden on gasoline, lubricating oils and other distillation products to the advantage of the consumer.

An equitable adjustment of fuel-oil prices would increase employment and earnings—major objectives of NIRA. Counting employment in mining, as well as in transportation and in industries dependent on the purchasing power of miners and transportation workers, displacement of 1,000,000 tons of soft coal, at a conservative estimate, would result in the loss of one year's employment for 1,000 miners and an equal number of employees in related industries, Mr. O'Neill asserted. On the other hand, the labor involved in producing, transporting and processing oil up to the time delivery from the refinery started is variously estimated at one-sixth to one-tenth of that required in the production and transportation of the equivalent in coal.

Utah Coal Rates Cut

To protect both coal merchants and railroads from the inroads of trucking, the Utah Public Utilities Commission, over the protest of the carriers, has ordered a reduction of 50c. per ton in rates on prepared sizes moving intrastate, and a proportionate reduction in rates on slack.

Anthracite Insurgents Threaten General Strike; Labor Board Gets Captive Mine Dispute

ANTHRACITE and captive mines again held the spotlight in December labor developments. In the northern hard-coal field, where an investigation was conducted by a committee of the National Labor Board in November, a convention of insurgent United Anthracite Miners of Pennsylvania, held at Wilkes-Barre, Pa., on Jan. 2, voted to call a general strike Jan. 13 unless the labor board took action on its complaints before that time.

The Jan. 13 deadline was voted in the face of a recommendation by the labor board's investigating committee that a differently constituted commission should be set up to go into the charges of abuses. This commission, according to the committee, should consist of an equal number of representatives of operators and miners, together with an outside member or members selected by the operator-miner representatives or the NRA Administrator, and as a necessary prerequisite to instituting an investigation should receive pledges from both sides that its recommendations would be put into effect.

The investigating committee's work was complicated by a controversy over the scope of the labor board's reinstatement declaration, on the strength of which the general strike in District 1 was called off on Nov. 12. Insurgent representatives contended that all men who lost their places, not only as a result of the general strike but also in various company strikes, beginning with the Penn Anthracite stoppage on Aug. 31, were covered by the declaration. The committee, while expressing its inability to intercede with the companies, felt that the question contained the seeds of future serious stoppages unless immediate action was taken, and therefore made no attempt to dig deeply into charges of abuses, submitting its findings on Dec. 2. (These were made public on Dec. 21.)

In a court case growing out of the organization of the insurgent union, officers of Local Union 400, Wanamie colliery, Glen Alden Coal Co., on Dec. 15 lost an action to prevent the United Mine Workers from revoking the local's charter on the ground that it paid the expenses of eight delegates to the convention at which the rival union was formed.

Lehigh Navigation Coal Co. collieries in the Panther Creek valley were the object of another strike in December in protest against the stagger system inaugurated to spread work. The Tamaqua and Greenwood collieries were closed on Dec. 4 by pickets from other operations, and on Dec. 14 miners from these two collieries, as well as the Nesqueshoning colliery, rejected orders from John L. Lewis, president, United Mine Workers, to return to their jobs. Operations were resumed at seven of the ten collieries and strippings of the company on Dec. 20. Plans were being whipped into shape, however, for a convention this month to demand equalization of working time in all the anthracite fields.

Insurgent miners closed the Racket Brook Coal Co. mine at Carbondale on Dec. 15 in a drive for higher wages, and a few days later shut down the John Conlon Coal Co., Hudson, over the discharge of four employees for loading excessive quantities of rock. A two-weeks' strike at the Chauncey colliery of the George F. Lee Coal Co., ended Dec. 19 when employees agreed to submit to a special commission their contentions that grievances were not receiving proper attention. Seven hundred employees of the West End Coal Co., Mocanaqua, staged a "holiday" strike on Jan. 4, to extend until alleged grievances are adjusted, and 1,700 men employed at the Harry E. and Forty Fort collieries of the Wyoming Valley Collieries Co. walked out over the alleged discharge of certain employees and their replacement by others.

The long-standing captive-mine controversy in western Pennsylvania came before the National Labor Board on Jan. 4 after failure of contract negotiations between operators and officers of the United Mine Workers elected in November as representatives of the employees (December *Coal Age*, p. 430). The case was taken to the labor board by Philip Murray, vice-president, United Mine Workers, under the "President's agreement" of Oct. 30 (*Coal Age*, November, 1933, pp. 387-388), which provided that in case a formal agreement with "terms and conditions at least as favorable as the Appalachian agreement" could not be negotiated within ten days, both parties would submit the controversy to the board and abide by its decision.

The principal points at issue presented were: whether agreements shall be with the union officials elected as representatives as individuals or as agents of the union; the method of selecting mine committees proposed by the operators, which would require these committees to be selected from among the elected reprseentatives, thus forcing union officers to serve as the mine committee in adjusting any dispute that might come up; and the check-off, union officers insisting on the clause inserted in the District 4 and other agreements covering commercial operations and operators holding out for payment of voluntary orders, the money going to the person or organization named in the orders offered.

Presentation of their cases by representatives of the United Mine Workers and the H. C. Frick Coke Co. featured the initial hearing. Cases involving the Inland Collieries, Consumers, National Mining, Republic Steel, Vesta, Shannopin, Allegheny Coal & Coke, Sharon Coal & Limestone, Pickands, Mather & Co., Crucible Fuel and Weirton companies were deferred to Jan. 8. Declaring that the Frick representatives had no knowledge of any controversy coming within the jurisdiction of the board and appeared only out of courtesy, Nathan L. Miller, counsel, United States Steel Corporation, reiterated the company's stand against union recognition and asserted that at no time had it agreed to submit to the National Labor Board the question of with whom it would sign a contract. Substantially the same stand was taken by representatives of the companies appearing at the Jan. 8 hearing.

Rosedale No. 72, and Franklin Nos. 73 and 74 mines of the Bethlehem Mines Corporation, Johnstown, Pa., were partially closed by a strike early in January, called, according to reports, to force an election under the supervision of the National Labor Board. The Revloc (Pa.) mine of the Monroe Coal Mining Co. was closed down in a controversy over the discharge of two employees.

Pending completion of the investigation into wages, hours and working conditions of the bituminous industry, as provided in the soft-coal code, Vandenburgh and Warrick County (Ind.) operators, strippers excepted, were granted a wage reduction on Dec. 22 by General Johnson to enable them to meet western Kentucky competition. General Johnson's order permits operators in the two counties to reduce minimum wages to $4.20 for inside labor and $3.60 for outside labor. Previous code rates called for $4.57½ and $4 per day, against $4 and $3 in western Kentucky. A wage agreement including the new rates was reported to be ready for signature on Dec. 26.

The Illinois dual union controversy was placed in the hands of the Division II Labor Board in December, following a conference between Governor Horner and Senator Wagner, chairman of the National Labor Board. Settlement of a dispute over representation at the Mark mine of the Prairie States Coal Co. was the first task of the local board. One vote to determine which union should represent the employees having proved inconclusive, the board announced a second referendum on Jan. 17.

December was marked by a renewal of violence in Sangamon and Christian counties. Three men were reported to have been killed at Galatia and Taylorville, in Christian County. Both communities are the site of Peabody Coal Co. operations. On Dec. 7, the fan house at Peerless No. 59 mine of the Peabody company, Springfield, was dynamited, forcing a shutdown, and a number of miners' homes in Springfield, Riverton and other towns were bombed at various times. Early in January, the Sangamon County sheriff ordered 100 special deputies into the field to forestall violence expected from the announced intention of 12,000 striking Progressives to picket regular union operations.

The Progressives lost one move for control in December, when Federal Judge FitzHenry, Peoria, denied an application for an injunction to restrain seven companies from refusing to employ insurgent

Soft Coal Up 5.9% in 1933; Anthracite Down 0.9%

Production of bituminous coal rose to 327,940,000 net tons in 1933, according to preliminary estimates by the U. S. Bureau of Mines. This is an increase of 18,230,000 tons, or 5.9 per cent, over the 1932 total of 309,710,000 tons. Anthracite production dropped to 49,399,000 net tons, a decrease of 456,000 tons, or 0.9 per cent, from the 1932 output of 49,855,000 tons.

Bituminous production in December was 29,600,000 tons, against 30,582,000 tons in November and 31,522,000 tons in December, 1932. Anthracite output declined to 4,424,000 net tons, as compared to 4,811,000 tons in November and 5,141,000 tons in December, 1932.

members. Judge FitzHenry held that under the NRA injunction proceedings growing out of violations could be instituted only by the Attorney General, and that the insurgents should first apply to the regional and national labor boards for redress of grievances.

Organization of Virginia miners during past months has resulted in the establishment of Provisional District 28 in the State by the United Mine Workers. Dale Stapleton was designated as provisional president and William Minton as secretary-treasurer.

Personal Notes

L. Roncaglione, for 4½ years a mine inspector for the Pocahontas Corporation, has been appointed superintendent of Nos. 30, 31 and 32 mines of the company, Amonate, Va.

F. J. Dohrer has been appointed general manager of the Wilkeson Coal & Coke Co., Tacoma, Wash., vice J. T. Lee, deceased.

F. W. Braggins, formerly president of Lorain Coal & Dock Co. and sales manager for Red Jacket Coal Co., has been appointed sales manager for the Hanna Coal Co., Cleveland, Ohio.

J. T. Morris, formerly general manager, heads the new official staff of the Borderland Coal Corporation, Borderland, W. Va., as president. W. S. Leckie, Columbus, Ohio, president, Leckie Smokeless Coal Co., is vice-president, and W. S. Beale, also of Columbus, is secretary-treasurer.

Obituary

J. T. Lee, a pioneer operator in the Pacific Northwest and general manager, Wilkeson Coal & Coke Co., Tacoma, Wash., died early in December. Mr. Lee's connection with the Wilkeson organization extended over a period of 37 years.

H. G. Randall, 68, vice-president, Creech Coal Co., Twila, Ky., died Dec. 3 at Atlanta, Ga., while undergoing hospital treatment.

Clyde Francis Barnes, 65, prominent Coshocton County (Ohio) operator and one of the organizers of the Columbus Coal & Mining Co. and the Barnes Coal & Mining Co., died at his home in Columbus last month.

John D. Cribbs, 66, operating the Rockvale No. 2 mine, Rockvale, Colo., died Dec. 2 at the Denver General Hospital after a long illness following a stroke of apoplexy. Mr. Cribbs' early coal-mining experience was gained in Eastern bituminous fields. He went to Colorado in 1912 as chief coal inspector for the Colorado Fuel & Iron Co. and later was made superintendent of the Rockvale, Nushaft, Emerald and Fremont mines. He took over the Rockvale operation on lease in 1931.

Charles H. Hix, 71, president of the Virginian Ry. and the Loup Creek Colliery Co., Page, W. Va., died at his home in Norfolk, Va., Dec. 23, after a short illness.

Michael J. Bracken, president, Argyle and Mineral Point coal companies, died at Altoona, Pa., Dec. 3, while attending a code conference. Born at Gallitzin, Pa., in 1879, Mr. Bracken's first position was in the engineering department of the Webster Coal & Coke Co., Cresson, Pa. In later years he was associated with the Argyle, Inland and Mountain coal companies and the Keystone Coal & Coke Co. in executive capacities. He became president of the Argyle company in 1922.

S. T. Farley, for a number of years mining engineer for the Winding Gulf Collieries, Winding Gulf, W. Va., was killed in an accident near Beckley, W. Va., Dec. 10.

R. B. Mellon, since 1921 a director of the Pittsburgh Coal Co. and from 1923 to 1925 chairman of the board, died at Pittsburgh, Pa., Dec. 1, at the age of 75. In addition to his interest in the Pittsburgh Coal Co., Mr. Mellon also was a director of the Koppers Co., a number of byproduct coke companies and the Indian Creek Coal & Coke Co., as well as president of the Mellon bank.

Everett Morss, president, Simplex Wire & Cable Co., Cambridge, Mass., for the past 30 years, died at Boston, Dec. 27. Mr. Morss was graduated from Massachusetts Institute of Technology as a mining engineer.

Robert Vincent Devlin, 57, engineer, industrial locomotive division, General Electric Co., died at his home in Erie, Pa., Dec. 27. During his more than 25 years of design work, Mr. Devlin gained a wide acquaintance in mining and was responsible for the development of a wide variety of equipment for industrial and mining locomotives.

Edward H. Darlow, chairman of the board, Buffalo & Susquehanna R.R. and the Buffalo & Susquehanna Coal & Coke Co., died at the Buffalo (N. Y.) General Hospital, Dec. 18, at the age of 82.

Edmund O'Brien, 39, foreman at the Ewen colliery of the Pittston Co., Pittston, Pa., died at the Wilkes-Barre (Pa.) General Hospital, Dec. 17, after a brief illness of pneumonia.

Wellston Improving Tipple

Wellston No. 2 Coal Co., operating a strip mine at Wellston, Ohio, has contracted with the Morrow Mfg. Co. for tipple equipment consisting of reciprocating plate feeder, apron conveyor, three-track shaking-screen installation, rescreen conveyor and two loading booms; capacity, 125 tons per hour.

Industrial Notes

Joseph T. Ryerson & Son, Inc., Chicago, has purchased the stock and good will of Bacon & Co., iron and steel company, of Boston, Mass.

Henry W. McQuaid, authority on carburizing steels and case-hardening methods and a collaborator in the development of McQuaid-Ehn test for grain-size control, has joined the staff of the Republic Steel Corporation, Youngstown, Ohio, and will devote his time to research and development work.

Charles F. Norton, formerly vice-president, Howell Electric Motors Co., has been appointed general sales manager of the Louis Allis Co., Milwaukee, Wis.

Mine Fatality Rate Down

Coal-mine accidents caused the deaths of 50 bituminous and 29 anthracite miners in November, 1933, according to information furnished the U. S. Bureau of Mines by State mine inspectors. This compares with 70 bituminous and 29 anthracite fatalities in October. Based on a production of 30,582,000 tons, the bituminous death rate was 1.63 per million tons in November, against 2.36 in October, when the output was 29,656,000 tons. The anthracite death rate dropped from 6.16 in October, when 4,711,000 tons was produced, to 6.03 in November, based on an output of 4,806,000 tons. For the two industries combined, the November death rate was 2.23, against 2.88 in October.

Comparative fatality rates for the first eleven months of 1933 and 1932, by causes, are given in the following table:

FATALITIES AND DEATH RATES AT UNITED STATES COAL MINES, BY CAUSES*

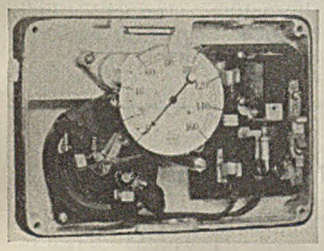
Cause	Bituminous: Number Killed	Bituminous: Killed Per Million Tons	Anthracite: Number Killed	Anthracite: Killed Per Million Tons	Total: Number Killed	Total: Killed Per Million Tons
January-November, 1932						
Falls of roof and coal	418	1.522	126	2.847	544	1.706
Haulage	132	.481	28	.633	160	.502
Gas or dust explosions:						
Local explosions	11	.040	7	.158	18	.056
Major explosions	54	.197	..	....	54	.169
Explosives	18	.066	11	.248	29	.091
Electricity	39	.142	5	.113	44	.138
Machinery	18	.066	1	.023	19	.060
Surface and miscellaneous	71	.258	29	.655	100	.314
Total	761	2.772	207	4.677	968	3.036
January-November, 1933						
Falls of roof and coal	410	1.374	113	2.513	523	1.523
Haulage	138	.463	28	.623	166	.484
Gas or dust explosions:						
Local explosions	19	.064	12	.267	31	.090
Major explosions	7	.023	..	....	7	.020
Explosives	16	.054	10	.222	26	.076
Electricity	46	.154	7	.156	53	.154
Machinery	13	.044	2	.044	15	.044
Surface and miscellaneous	61	.204	37	.823	98	.286
Total	710	2.380	209	4.648	919	2.677

*All figures are preliminary and subject to revision.

WHAT'S NEW
IN COAL-MINING EQUIPMENT

Pressure Governors

An improved line of pressure governors, designated as Type CR2922, is announced by the General Electric Co., Schenectady, N. Y. Although these governors are especially adapted to pumping-station service, according to the company, they also may be used in industrial processes where it is desired to maintain a predetermined pressure. The scale can be furnished to read water head in feet instead of pressure in the usual pounds per square inch, and adjustments can be made on the governors within 20 and 80

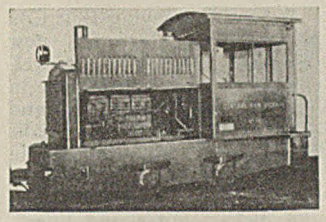


per cent of full-scale rating. Maximum differential is 60 and minimum 2 per cent of full-scale rating. Accuracy at a setting is 1 per cent of full scale, the company declares.

Gasoline Locomotive

Vulcan Iron Works, Wilkes-Barre, Pa., offers a new 35-ton gasoline-powered locomotive for operation on standard-gage tracks built with not less than 60-lb. rail and curves not under 40 ft. in radius. The locomotives are equipped with four 37-in. drivers with rolled-steel A.R.A.-contour tires. Wheelbase is 6 ft.; height to top of cab, 10 ft.; height to top of radiator cap, 8 ft. 9 in.; width over bumpers, 9 ft.; length over bumpers, 18½ ft. Power is supplied by an 8-cylinder V-type gasoline motor rated at 224 hp. at 1,000 r.p.m.

The transmission provides four speeds forward and reverse. Tractive power is as follows: low gear (2.8 m.p.h.), 23,000 lb. with sand; second gear (4.7 m.p.h), 14,500 lb.; third gear (8.3 m.p.h.), 8,100 lb.; high gear (15 m.p.h.), 4,500 lb. Approximate fuel consumption per 8-hour shift under normal working conditions and train loads is 35 gal., according to the com-



pany, which points out as one of the features of the locomotives an air-operated clutch interlocked with the speed-change lever to protect gears and clutch from damage due to faulty or careless operation. Two units have been purchased by the Pittsburg & Midway Coal Mining Co. for service between strip pit and preparation plant.

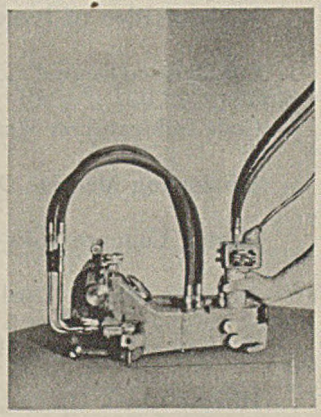
Loading Machine

Utility Conveyor & Equipment Co., St. Louis, Mo., now offers the new Utility loader with a weight of 12 tons, an over-all length of 27 ft., and a 9-ft. clearance for handling cars 10 ft. long. Height of the chassis and loading head is 34 in. above the rail for all seam thicknesses, and various height cars are accommodated by adjusting the height of the rear trough conveyor.

Drives for the various working parts are as follows: loading head, including the clutched swing mechanism and hydraulic lift mechanism, 15-hp. Louis Allis motor and D. O. James gear-in-head herringbone transmission; tramming mechanism, 10-hp. Louis Allis motor and same type of transmission; rear conveyor, 5-hp. Louis Allis motor and D. O. James transmission; rear conveyor swing mechanism, ¾-hp. motor and transmission, which also operates the rear carriage in either direction through a load chain. Separate Cutler-Hammer drum controllers are provided for each motor, and both controllers and motors are protected by a Cutler-Hammer magnetic circuit breaker which cuts off all the motors until the controls are brought to neutral in case one motor stops. Hydraulic brakes are provided, and Ni-Chrome steel shafting and hardened and tempered gears and sprockets are used throughout, the company says. Baldwin 1½-in. pitch high-speed roller chain is used on the drag chains.

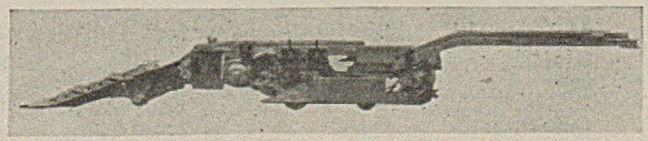
Welding and Cutting Aids

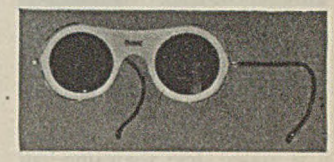
Linde Air Products Co., New York City, now offers the "Oxweld" straight-line cutting machine for trimming and beveling plate. The machine consists essentially of a steel channel supporting base, a means of moving the blowpipe and adjustments for cutting bevels.



Oxweld "Secator"

Motion in two directions is possible—45 in. longitudinally and 7¾ in. laterally. The machine can be furnished with two handwheels for manual operation or with one handwheel and a 110-115-volt universal motor, either of which can be used by throwing a lever.





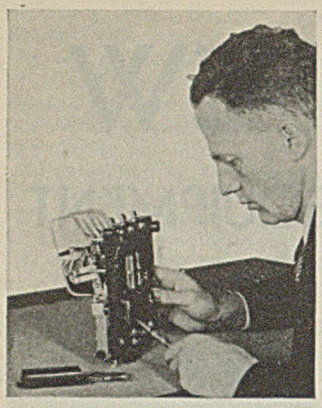
No. 15 Welding Spectacles

The "Secator," a portable cutting machine weighing 43 lb., is another addition to the "Oxweld" line. It consists essentially of a specially designed Type C-14-H blowpipe mounted on an electrically driven, air-cooled, dustproof chassis. It is equipped with direct drive and runs on a 1½-in. angle-iron track or on any relatively smooth plate. On the track, straight-line cutting is done automatically. A hand grip is provided for cutting shapes. For automatic circle cutting, a center and radius rod are furnished. The blowpipe can be adjusted horizontally or vertically and also to cut 45-deg. bevels.

Other additions to the "Oxweld" line are the new No. 15 welding spectacles and the Type AA, 50-mm. lens. Features of the new spectacles pointed out by the company are: natural canvas-Bakelite frame, which is non-inflammable and a non-conductor of heat; insulated bows; and provisions for quick changing of lenses. The Type AA lens, flat ground and polished, comes in light, medium and dark green shades, and is said to have high protective qualities.

Arc Arrestor

Without introducing mechanical suppressing devices, it is possible to speed a.c. arc extinctions with a simple, sturdy single-break type of contactor by including an "arc arrestor," says the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., in announcing such a device for mounting on the base of a contactor or linestarter. It consists of a small capacitor and resistor connected across the poles on the load side of the contacting equipment. As an example of its effectiveness, the company cites tests with a 7½-hp. motor, with locked rotor, at 550 volts, 60



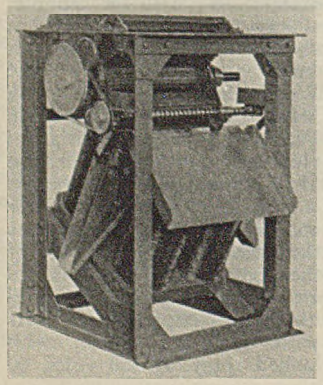
cycles. Oscillograms showed, it is stated, less than one-half cycle arcing, against 5 to 8 half cycles without the "arc arrestor."

In practical installations, but one unit is required for a three-phase contactor, the company says, and relief is afforded not only to the contactor or linestarter on which it is mounted but also to any disconnect, operating switch, fuse or other rupturing equipment ahead of the contactor. On three-phase reversing service, one "arc arrestor" will act with equal effectiveness to relieve either the forward or reversing contactor.

Magnetic Separator

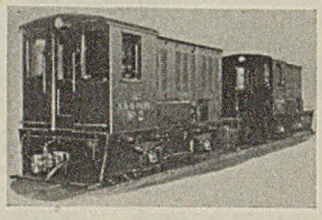
Magnetic Mfg. Co., Milwaukee, Wis., has added a magnetic separator for removing cinders and other feebly magnetic particles from coal to its "Stearns" high-duty line. This new separator is mounted in a structural steel frame 67 in. high, 43½ in. wide on the side and 33 in. wide in front. Weight is approximately 3,800 lb., and total current consumption is 3,000 watts. In operation, material is delivered to the feeder hopper by chutes, spouts or other means. Rate of feed is regulated by opening the feed gate sufficiently to allow the material to be fed out one layer deep. The mixed material then passes over an intense, deep magnetic gap. The coal passes over the gap, while the magnetic material is pulled down between the poles and flows out of chutes at the sides of the machine.

"Stearns" Magnetic Separator for Coal



Diesel-Electric-Drive Locomotives

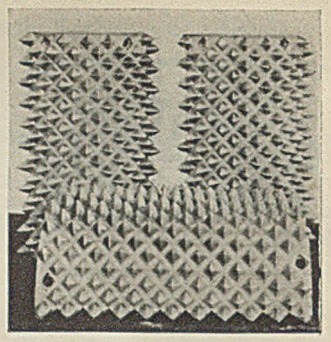
Atlas Car & Mfg. Co., Cleveland, Ohio, now offers diesel-electric locomotives similar to the two 35-ton units recently shipped to the Naval Ammunition Dept., Oahu, Hawaii. These locomotives have 38-in. steel-tired wheels, and power is supplied by two 140-hp. electric motors, one to each driving axle. Current is supplied by a generator driven by a Westinghouse 4-cylinder solid-injection diesel engine with a brake horsepower rating of 265. In the case of the two units already built, the company stresses the compact design adopted to meet the width, length and height requirements of the Navy while operating over a 36-in. gage track. Adaptations of these locomotives, according to the maker, can be supplied to meet individual conditions.



New Cast Iron

Robins Conveying Belt Co., New York, offers the new "Super Manga" nickel-chromium cast iron for use in handling coke, stone, ore and other abrasive materials. From 2 to 12 times longer life is claimed on applications such as gates, grizzly bars and disks, chutes and liners, pump castings, baffle plates, cams, segments, skirt boards, feeder vanes, etc.

The new product consists of a properly adjusted base mixture to which nickel (usually about 4.5 per cent) and chromium (usually about 1.5 per cent) are added in such proportions as will give best results for the intended application. Chilled surfaces will show a Brinell hardness of 600-750, the company declares. Chill depth can be controlled within close limits and a tough gray back can be provided if desired. The material also may be sand-cast with a solid white structure of 475-625 Brinell. Heat-treatment is recommended for applications involving impact or alternating stresses. Fully hardened "Super Manga" iron is not machinable.



Crusher Segments of Sand-Cast "Super Manga" Iron.

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