COAL AGE

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

SYDNEY A. HALE, *Editor*

September 1938

Awakening?

LOCAL UNIONS that have indorsed the National Coal Association campaign against unfair competition are to be congratulated. This, of course, is not the first time men and management have joined hands to repel attacks from without. There is no reason to believe it will be the last. Too often, however, labor is seemingly less sensitive to the dangers from within. If it is desirable to increase duties on foreign oil to stop a flood of low-cost competition, is it not equally desirable that labor forego policies which unduly increase coal-production costs here at home? All of our troubles are not foreign-born.

Tightness of Air Seals

A STUDY should be made of the effectiveness of seals under a difference of atmospheric pressure. Why do ribs and stoppings let so much air enter into what is euphemistically termed a "sealed fire"? How much air will concrete pass, and what kind of concrete is most impervious to air? In construction work, concrete has been compounded almost always so as to give maximum strength for a minimum proportion of cement, but, for stoppings against fires which are not extremely fierce after an explosion need no longer be feared, the desideratum usually is not strength but impermeability to air. Perhaps, then, rock dust would not be an undesirable constituent of the aggregate.

If, in an emergency, concrete that will permit the passage of air may have to be placed, should a new stopping with an impervious aggregate be added when the emergency has elapsed, or would a coat of paint make the seal sufficiently effective? How much would a coat of paint over roof, sides and around the edges of the seal make the latter more effective in preventing the passage of air? How much air would be prevented from entering the fire area if whitewash were spread over the ribs of the heading?

Would rock-dusting directed against the ribs, followed by a sweeping to remove material that has not entered and filled crevices, and further by a whitewashing to make an integral coat over the rib, give a greater resistance to leaking than a single whitewash or rock-dust coat? Should the whitewash be made with cold or hot water, and would it be desirable to add other materials to the lime hydrate? Should the crosscut also be whitewashed? What place has bentonite in the solution of such problems? Could the measures covering shallow coal be drilled and grouted with rock dust so as to render the roof airtight? We need to know.

Not Yet

AN ACCIDENT is not an accident until it happens, but the potentiality is there, and if accidents are to be avoided their possibility should be visualized with due regard to human frailty and fallibility. Many accidents seem unlikely, but nevertheless they happen, especially in dark places like mines and the poorly lighted parts of tipples.

Observation and premonitory thought

will prevent many accidents, especially that large number of them depending on slipping, mental aberration, recklessness, nervousness, distraction or horseplay. The entire force should be trained to recognize remote causes of accidents and to guard against them. With so many home injuries daily occurring, it is evident that the work of creating the right kind of consciousness is one involving a large measure of inspirational teaching.

Dealing With Realities

As MORE detailed cost data are made public, the inequities of a narrow construction of the basic price-fixing provisions of the Guffey law grow clearer. Comparison of average costs of mechanized and non-mechanized operations in Districts 10, 11 and 15 is illuminating on this point. The 1937 "final" figures in Illinois, for example, show $2.1793 per ton as the average cost for hand-loading operations, $1.7457 for mechanized deep mines, $1.4139 for strip pits and $1.7611 as the average for all classes of mines included in the compilations introduced during the July hearings before the National Bituminous Coal Commission.

This final "average" of averages is 32.92 cents higher than the average for strip mines, 1.54 cents above the mechanized deep-mine average, but 41.82 cents per ton under the average for hand-loading mines. In Indiana, the final average is 17.35 cents higher than that for strip pits, but 12.70 and 32.06 cents per ton less, respectively, than the averages for mechanized deep mines and hand-loading operations. District 15, where no mechanized deep-mine figures are reported (*Coal Age*, August, 1938, page 60), has an over-all average 22.38 cents per ton higher than that shown for the strippers, but 57.43 cents less than the average for deep mines in that area.

Averages based on dissimilarities are bound to yield absurd results. In the figures cited, the over-all average in every case presupposes a minimum price which means a substantial net loss to hand-loading mines on every ton sold at that minimum. If the minimums are to be fixed high enough to cover hand-loading costs, then the consumer will be forced to pay excessive profits to many mechanized operations. Moreover, the relationships between strip and mechanized deep-mine costs in Illinois and Indiana also are suggestive of the dangers in flat prices. Is it too much to hope that the new price schedule to be promulgated by the Commission will forget mathematical abracadabra and deal with the realities of the situation?

Scranton Backfilling

PROGRESS in the plan to backfill the coal seams under Scranton, Pa. (*Coal Age*, September, 1937, p. 90), continues to lag. Engineers somewhat cold to the proposed Works Progress Administration project question the success of "blind backfilling" where the spaces are approached only by a borehole. Experience, they declare, shows that while, with water, fine material can be spread over a fairly large area, it will not afford any real support unless men can get into the rooms and gangways to pipe or flume it to the points to which it should be directed. Owners of mines which are not to be backfilled would face the prospect of handling a large volume of water which would deluge their workings and put them to much expense—with no prospect of return.

Advocates of backfilling explain that coal pillars can be recovered without damage to the city after the voids have been filled. If the job is well done, there is some merit in that contention. But at present prices for coal it will be difficult to find anyone willing to cope with the quantity of backfilling which would have to be controlled and traversed if and when remining is resumed, since, with blind backfilling, the gangways as well as the chambers will be filled. Any immediate benefit from the work, therefore, will be confined to the uncertain support of property flushed and to the employment in carrying out the project.

NEW ROTARY DUMP

+ Handling Three Types of Cars

Spreads Cost of Replacements

By J. H. EDWARDS
Associate Editor, Coal Age

"WE HAD 720 old wooden mine cars equipped with anti-friction bearing trucks, but saw the necessity of replacing them with larger and better equipment. The investment to install a new dump and all new steel mine-car equipment complete at one stroke was prohibitive—in the neighborhood of $250,000. To install new cars by steps of 50 or 100 at a time would require only replacing the old compressed-air rotary dump with a new one but it would have to handle *en train* and at high speed three types of cars arriving in irregular sequence. We were told it had never been done before and some manufacturers said it was not practicable to consider. It did prove difficult, but was finally accomplished. Now we have in use, along with the old cars, 100 new large-capacity rubber-mounted steel cars."

Thus A. S. Wilson, general manager, Boone County Coal Corporation, summarizes his company's answer to the question that has been faced by so many other coal companies. Larger and better cars are needed, but how can dumping facilities be arranged to accommodate a step-by-step change from old to new cars? At Boone No. 2 mine. Sharples, W. Va., in the Little Coal River field, we are privileged to view a practical solution.

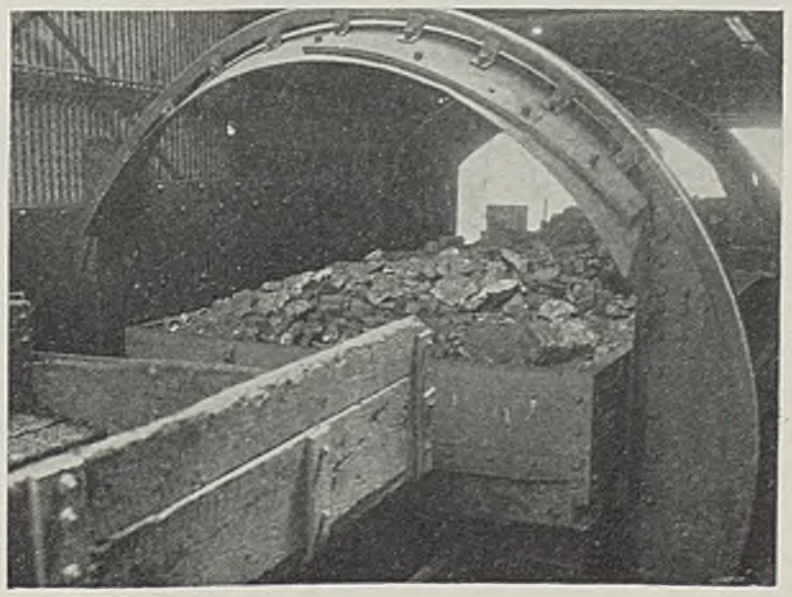
The present complement of new cars, together with the dump, car feeder and necessary changes to the rock gate and weigh basket, represents a total investment of approximately $50,000. Mine production per seven-hour day hovers consistently between 2,900 and 3,000 tons. The tipple and washing plant operates one shift of 440 minutes actual running time. Production comes from a drift operation in the Chilton seam, which there lies generally level and is from 40 to 66 in. thick. Excepting 500 to 600 tons per day mined from low-coal sections by hand loading onto conveyors, the production is by hand loading into mine cars.

Before installing the 100 new steel cars, transportation equipment consisted of 660 wood cars and 60 old-type steel-bodied cars. Some of these old cars had been transferred to No. 2 mine from the eleven small mines which the company permanently shut down between 1922 and 1931 in favor of the larger single operation at No. 2 with modern mining and preparation facilities (*Coal Age*, December 1929, p. 744). The abundance of cars has proved a great advantage. For years there have been no serious plant delays from waiting for loads. Literally every minute of the entire shift is utilized for car dumping. Time lost must be entered on the daily dump report.

As indicated by Table I, the new dump must handle cars differing widely in height, width, length, wheelbase and weight. The difference in car lengths complicated the design of the car feeder, difference in wheelbases required special arrangements for automatic slowing down of the trip and spotting, and the wide variation in total weight (both empty car and load) made it necessary to give the closest attention to balancing the dump to allow quick starting and accurate stopping. In collaboration with H. L. Copher, general superintendent; C. B. Scholl, mining engineer, and C. B. Locke, electrical engineer, Link-Belt Co. designed and built the dump and furnished the auxiliary equipment. Installation was made the last part of January.

Track grades are as follows: With

Eleven hundred and four cars of coal and 32 cars of slate have been handled by this installation in 440 minutes

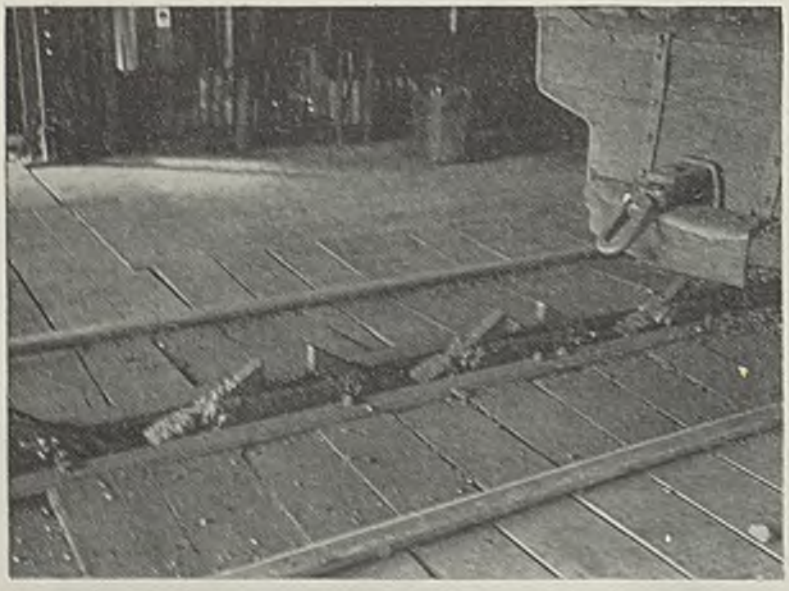


the leading car of a 40-car trip engaging the feeder the last 8 cars are on a 1.19 per cent adverse grade and the leading 32 cars on a ½ per cent favorable grade; from beginning of feeder and on through the dump the grade is 1 per cent favorable and from dump to empty hole 2½ per cent favorable. Distance from dump to loaded-track knuckle is 425 ft.

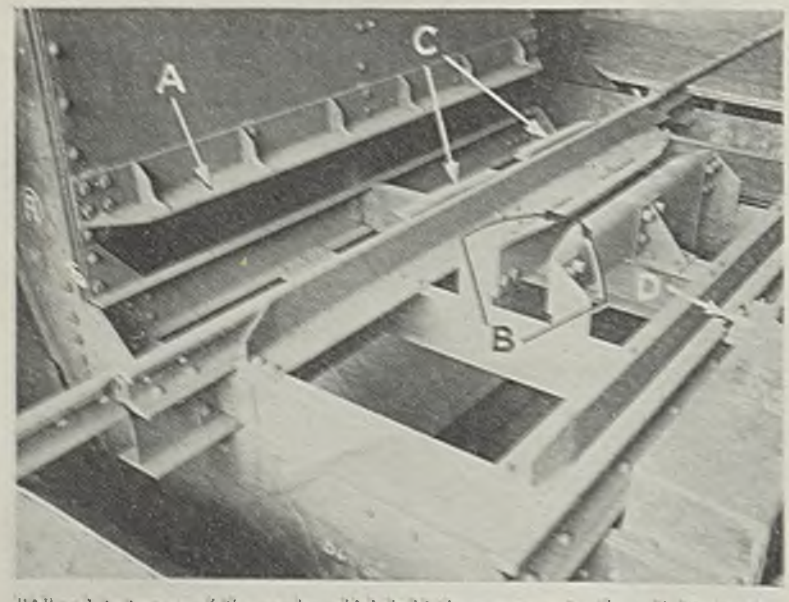
The feeder consists of a reversible car-haul chain with gravity-tilting spurs spaced every pitch and with one pair of outside carrying rollers spaced every pitch. Feeder length, center to center, is 20 ft. 3⅝ in. and the chain pitch is 12⅛ in. Pairs of pushing and/or retarding spurs face each other and between them are engaged the car lugs or brackets by which the trip is handled and controlled. Because of the special pitch chain the spurs come up at correct positions to engage the brackets of either short or long cars as they may happen to arrive.

Table I—Dump Must Handle These Cars En Train and in Irregular Sequence

	Over-all Width, In.	Over-all Length, Ft.-In.	Height Above Rail, In.	Capacity Level, Cu. Ft.	Wheel-base, In.	Track gage, In.	Wheel Diam., In.	Type of Body
Old wooden cars....	63	10–6	42	83.0	36	44	16	Wood
Old steel cars.....	66	10–6	39¾	100.0	36	44	16	Composite Steel and Wood
New steel cars.....	86	12–9	27	131.2	40	44	16	Steel



A special pitch chain with spurs every pitch engages the bracket of every car regardless of car length and regardless of the order in which the types of car occur in the trip



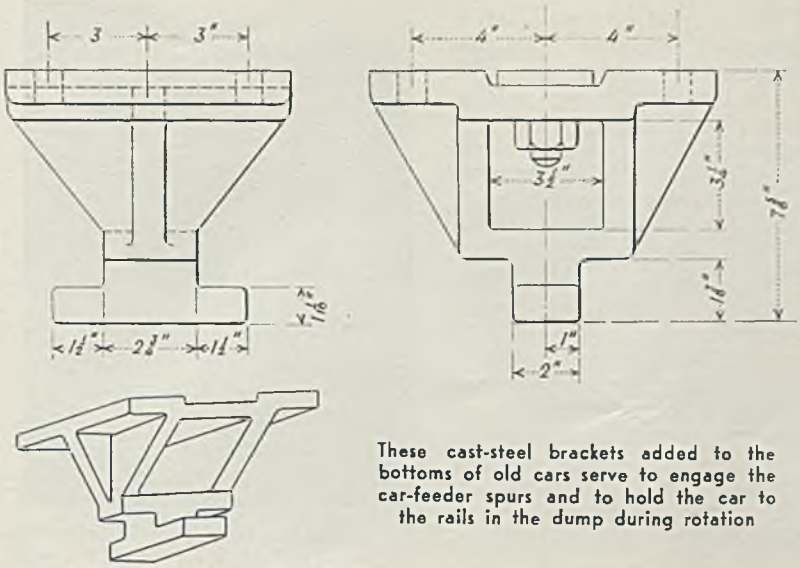
"A" points to one of the angles which hold the new cars to the rail, "B" to the inverted L-irons which hold the old wood and old steel cars, "C" to the two treadles which effect slow-down of the car feeder, and "D" to the front-wheel treadle of the car-feeder stop

Feeder drive consists of a 30/10-hp. two-speed induction motor (820/255 r.p.m.) connected through a speed reducer and equipped with a Thrustor brake. Another brake of the same type but built for heavy duty works on the shaft of the main drive sprocket of the car haul. To this larger Thrustor a limit switch was added which by electrical interlock with the controls prevents throwing power onto the car-haul motor before the large Thrustor brake is released, thus preventing mechanical damage to gears or motor. All controls are completely interlocked to prevent improper operation which might harm the equipment.

The new dump is a single-car type, thus utilizing the original rock gate, weigh basket and car-inspection system. Weigh basket and rock gate were changed, however, from air operation to electric-motor drive. The 7½-hp. motor of the weigh basket operates in one direction only, driving a crankshaft which moves through half a revolution to open the basket and continues through the other half revolution to effect the closing. The 2-hp. motor of the rock gate is reversible.

Two rings 10½ ft. in diameter support the dump frame and each ring rides on two double-flanged wheels 24 in. in diameter. The two wheels of one side—that is, one wheel of each ring—are keyed to a common drive shaft connected through a speed reducer to a 15/6-hp. two-speed motor (1,150/390 r.p.m.) equipped with Thrustor brake. Dump rings are spaced 9½ ft. center to center. Dump length—that is, the clearance between stationary rails—is 13⅜ ft., as compared to an over-all length of 12¾ ft. for the new steel cars and 10½ ft. for the old wooden cars. Estimated weight of the dump is 10 tons.

During rotation, the new steel cars are held to the rails by angles along each side of the dump frame, which slide into channels forming the outside bottom edges of the cars. Old-style cars are held by a pair of inverted L-shaped irons 3 ft. long and set in the center of the dump frame



These cast-steel brackets added to the bottoms of old cars serve to engage the car-feeder spurs and to hold the car to the rails in the dump during rotation

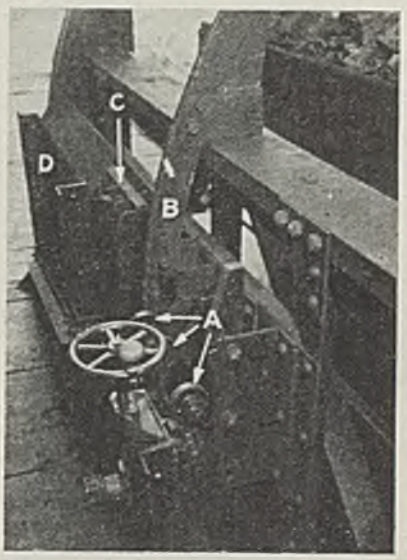
between rails. These L-irons engage on the bottom of the old cars the same cast-steel brackets that afford a hold for the car feeder. The brackets were added to the 720 old cars as a part of the new project. Variations in car design and dimensions required using, during installation, a track clearance templet to assure proper shimming of the brackets to a level and uniform position in relation to the top of the rail.

Track rails of the dump have neither horns nor dogs for holding the car in spotted position. The car is kept at the right place by hitching tension due to the trip being held on the grade by the car haul. The tight hitching also prevents coupling pins from falling out during rotation. Only in case of dumping the first car of a broken trip is there chance of the pin dropping. That happens only two or three times a day and entails but slight inconvenience.

A distinctive feature of the dump is the absence of mechanical rods and levers extending from rail treadles. Instead electric switches just below the treadles are operated by direct pressure. Circuits from these switches are completed to the stationary electrical control wiring by a group of six steel leaf springs which, when the dump is level, contact that number of copper shoes, each 2 in. long and mounted on the same structure as the four stationary limit switches. Ward J. Heacock, electrical engineer, Link-Belt Co., developed this idea.

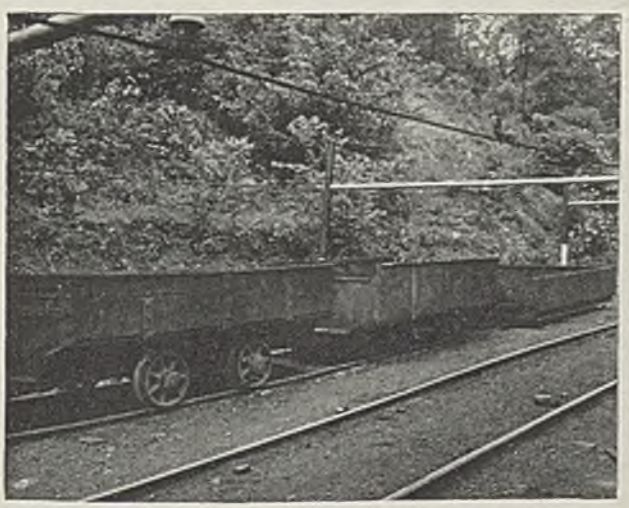
Operating rollers of the limit switches are moved by cams positioned on the dump frame. These switches function to change the dump motor connections from high to slow speed near the end of the revolution, to cut power from the motor and apply the Thrustor brake for final stopping and as an interlock to prevent starting of the car feeder unless the dump is level. Motors of both dump and car feeder are started with windings connected for the high speed.

The dump operator sits at a desk-type control board which, in addition to the necessary momentary push-buttons, has green and red signal lamps to indicate weigh-basket and dump positions. Burning of the green lamp indicates the weigh basket is closing or is still closed. Burning of the red lamp indicates

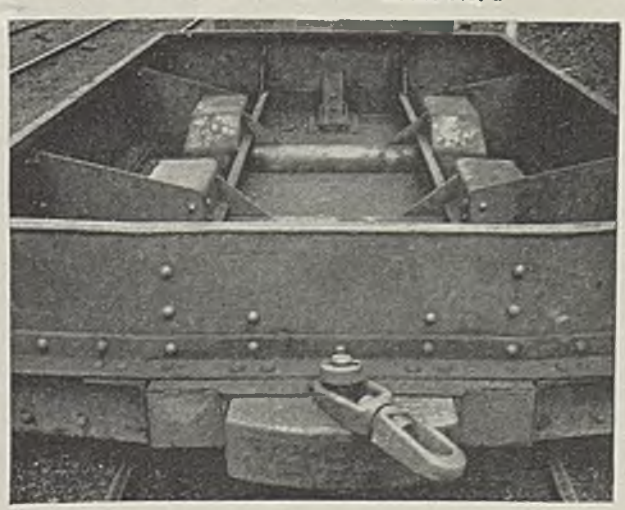


"A" points to the limit-switch rollers which stop and spot the dump, "B" is the long cam which operates another limit switch (mounted low and out of view) which throws the dump-drive motor into low speed for slowing. "C" is part of the guard over the leaf springs which contact copper shoes mounted on stationary structure "D"

Three types of cars to be handled by the dump. Even the wheelbases are different

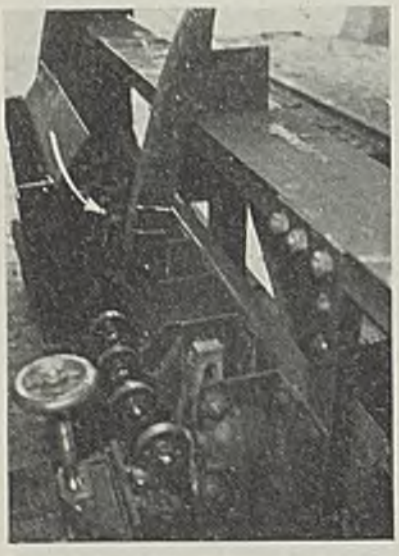


Looking at the draft gear end of the new rubber-mounted steel car used at Boone No. 2



that the car is properly spotted in the dump. The green lamp lights when the dock boss, who is stationed on a lower floor near the weigh basket and alongside the mine-run conveyor, pushes a momentary button to start closing the weigh basket.

Assuming that, as is normally the case, the red lamp already indicates a car properly spotted in the dump, the dumper pushes a button to start rotation of the dump on the instant that he "gets" the green light. Thus the dump is turning over at the same time that the weigh basket is closing and just in the nick of time the



To this view, made before the dump installation was completed, an arrow has been added pointing to one of the six leaf-spring contactors which were protected later by guards

basket closing is completed as the coal begins to flow out of the car. The dump operator depresses the car-haul button before the dump rotation is completed; thus the instant that the dump level switches operate the car haul is set in motion. No time is wasted.

A limit switch on the weigh basket functions to keep the green lamp burning after its initial lighting when the dock boss pushes the momentary button to start closing the basket. Thus the dump operator, by observing the turning off of the green light, knows when the weigh basket is opened by the dock boss. The dumper's control panel also carries a pushbutton for controlling the rock gate and another for starting a skip hoist that carries tipple refuse and mine rock to a disposal bin on the hillside. A plug fuse on the same panel protects the control circuits and operating coils of all equipment.

Record dumping for a shift was 1,104 cars of coal (tonnage 3,009) and 32 cars of mine slate. As a rule the dumping of coal cars per shift varies less than 30 cars each side of an average of 1,050.

The two wheelbase dimensions, 36 and 40 in., involved a difficulty in arranging the dump rail treadle switches. The car-haul stop treadles are on one rail and the car-haul slow-down treadles on the other. Both treadles of a pair must be depressed at the same time to complete the circuit. The front treadle of the stop pair is a short type requiring an exact position of the front wheel. Because of the two wheelbases the rear stop treadle, however, must be several inches long. The large new steel cars are spotted in the exact center of the dump but the old cars are spotted slightly out of center, because of the wheelbase difference.

Slow-down treadles are on the other rail and are both of the long type. In this case, when a short car moves onto the dump, the difference in wheelbase causes the car-haul slow-down to take place slightly ahead of the ideal time. With the new steel cars the slow-down starts when the trip is 18 in. short of the spotting point for dumping.

Rubber mountings of the 100 new steel cars, built by Brown-Fayro, give promise of an important maintenance advantage by cushioning the track jars and bumps. Two rubber sleeves are mounted on each axle, which is the through type; they fit into the axle housings and thus support the car body. These sleeves consist of spools into which a filling of rubber extending $\frac{1}{4}$ in. above the flanges has been vulcanized. The rubber proper is 6 in. long with an outside diameter of $4\frac{3}{4}$ in. Axle keepers allow $\frac{1}{2}$ in. vertical play of the rubber bushing in the axle housing.

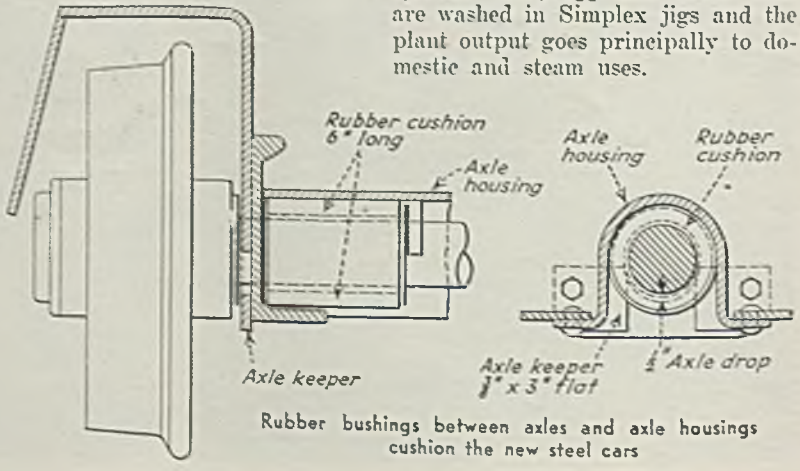
Axles are $2\frac{3}{4}$-in. S.A.E. 1045 steel and the wheels are 16-in. chilled type

The dumper has the red signal, indicating the car is spotted in the dump, and with his thumbs on the buttons is ready to start the dump the instant the green light indicates that the weigh basket has started to close

with Timken bearings. Principal dimensions of the car are given in Table I. With a 6-in. surcharge the capacity becomes 169.2 cu.ft. Because low top is a limiting factor, these cars are used principally in the conveyor sections, where the loading is 3.85 tons.

The inby end of each car is equipped with a Miner spring draft and buffer and carries a swivel coupling with fixed pin. Thus the plain drawbar end is attached to the haulage locomotive. Coupling pins have large safety washers at the top (see p. 54) to forestall mashed fingers in case of incorrect handling coupled with a sudden jerk which might throw the top of the pin back against the car body.

Not in any one calendar year since 1929 has the production of Boone No. 2 mine dropped below 650,000 tons and during certain months the mine has been the largest single producer on the Chesapeake & Ohio system. Nut, egg and stove sizes are washed in Simplex jigs and the plant output goes principally to domestic and steam uses.



Rubber bushings between axles and axle housings cushion the new steel cars

This plant prepares coal from Nos. 23 and 24 mines on separate days or separate shifts. The drying plant is behind the settling cone

TWO SEAMS STRIPPED

+ And Prepared in All-Welded Plant

At New Maumee Collieries Operation

STRIPPING the same ground twice is rare in the bituminous industry, yet this is the schedule at the Linton Supreme No. 23 mine of the Maumee Collieries Co., south of Linton, Ind., on the Chicago, Milwaukee, St. Paul & Pacific R.R. This arises from the fact that the Indiana Fourth Vein, which will yield the major tonnage from this particular tract, is partly overlaid with a "rider" seam being recovered in a separate operation known as the No. 24 mine. An interval of about 20 ft. betweeen the No. 4 coal and the rider vein above it, in turn overlaid by an average of 16 ft. of overburden, makes this dual stripping operation possible.

Coal from the two mines is prepared separately in a screening, crushing, washing and drying plant with an over-all capacity of 2,600 to 2,700 tons and a washing capacity of 2,100 tons in seven hours. A distinguishing feature of this operation is the fact that it is almost entirely welded, including not only the structure but also the equipment, such as screens, conveyor frames, chutes, bins, etc.

Nos. 23 and 24 mines replaced the old Linton Supreme No. 19 mine, north of Linton, worked out in July, 1937. Equipped with a five-track tipple and mining the Fourth Vein, No. 19 has a capacity of 2,000 tons per day. It, like the two new operations, was engaged in recovering territory on the fringe of the old Linton deep-mining field. With the opening of Nos. 23 and 24, Maumee transferred this work south of Linton, with the new operations working to the south and west of the old shaft mines, largely those of the Vandalia Coal Co., abandoned and filled with water years ago. In fact, initial stripping in the Fourth Vein at No. 23 mine abutted some of the old water-filled workings, which now supply the washing plant.

The move from No. 19 mine to the new location took place in the first half of August, 1937. For about a year prior to that time, the Maumee shop and construction forces were engaged in detailing the new preparation plant, fabricating the equipment and erecting it at times when they were not engaged in other necessary work. First shipments from Nos. 23 and 24 mines were made in October, 1937.

No. 24 stripping and coal loading is done on contract. In the case of No. 23 mine, however, the equipment used at No. 19 was moved in. This operation involved, among other things, bringing the Marion 5480 stripping shovel overland a distance of about five miles, which task was under the supervision of Thomas Lynch, superintendent. The loading shovel (Marion 480) was shipped

in by rail, along with other pit equipment (tractor, bulldozer, drills, etc.).

As a preliminary to moving the stripper, the company bought a 100-ft. easement over the intervening land and made arrangements for crossing four railroad lines, one State highway and four county roads. In addition to the four main rail lines, the shovel also was taken across the empty tracks above the preparation plant upon its arrival at the new location. To supply power for the move, an auxiliary substation was erected about midway between No. 19 substation and the new mine. When the shovel reached a point about half way between No. 19 and the auxiliary substation, the cable line was switched, this operation being repeated between the auxiliary station and No. 23 mine.

Dragline Accompanies Shovel

During the move, the shovel was accompanied by a Northwest dragline with a 75-ft. boom and 2-cu.yd. bucket, which did all the necessary cutting and filling, so that it was necessary to use the shovel dipper only a few times during the trip. Mats 10 ft. wide, 18 ft. long and 14 in. thick were used all the way. In crossing roads, particularly State Highway 54, fills of 6 to 7 ft. in depth were made. Highway 54 was crossed at a point where it ran in a cut, which facilitated the work. After a detour had been made, filling of the highway was started at 3:30 p.m., and the operation was completed and the road swept at 1 the following morning. In crossing the railroads, dirt fills were made as approaches and the tracks were built up above the level of the rails with timbers, on which the mats were laid. In all cases the approaches were made so that the shovel had a downhill pull when it started, and in no case did such a crossing take more than 30 minutes. Also in no case was the track affected, even to pulling the ties away from the rails.

Two creeks also were crossed. One was negotiated with the mats alone, while 18-in. corrugated pipes were placed in the other and a fill was made across them. Later, the fill and pipes were dug out with the dragline. About the maximum grade, 12 per cent, was encountered in pulling out of one of these creeks. Maximum depth of fill in any one place over the shovel route was 10 to 12 ft.

Time required for the move was ten days. The shovel in question started work at No. 19 in 1931, and to date the only major repair job has been rebuilding the boom, although two weeks was spent in reconditioning the unit just before it left No. 19. The shovel is equipped with an American Manganese Steel dipper with a capacity of 19 cu.yd., which replaced a 14-cu.yd. old-type dipper. Loaded weight in each case was 101,000 lb. Old 14-yd. dippers are kept on hand for installation on the shovels in case of breakage or overhauling, and the new dippers, which originally were designed as lightly as possible to do the work, with the idea that they would be discarded, are being built up by welding when worn. This process will be continued indefinitely. With a 92½-ft. boom and 54-ft. dipper sticks, the No. 23 shovel can strip to a maximum depth of 48 ft. on a straightaway and 55 ft. on an outside curve.

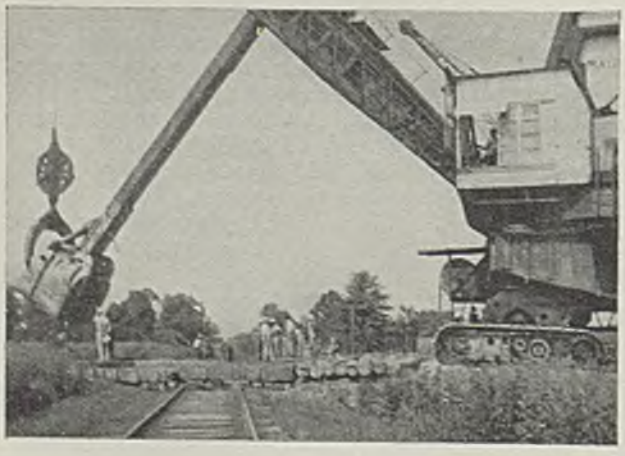
The 480 loading shovel transferred from No. 19 is equipped with a Maumee-constructed Man-Ten-steel coal-loading dipper with a capacity of 4 cu. yd. This dipper replaced a 3-yd. unit. Finkl alloy-steel teeth are used on both the stripping and loading dippers.

Other pit equipment at No. 23 includes a Cleveland diesel "Trac-Tractor" equipped with a Bucyrus-Erie bulldozer, a horizontal drill, four Ingersoll-Rand electric pit pumps and two reserve gasoline pumps. Seepage from the old deep-mine workings, in addition to rainfall, surface water, etc., is a major source of water in the pit. Coal is hauled from both No. 23 and No. 24 mines by three Autocar tractors pulling 21½-ton Austin-Western semi-trailers. This equipment is able to serve both mines by reason of the fact that they are operated on either separate shifts or separate days, depending upon coal demand.

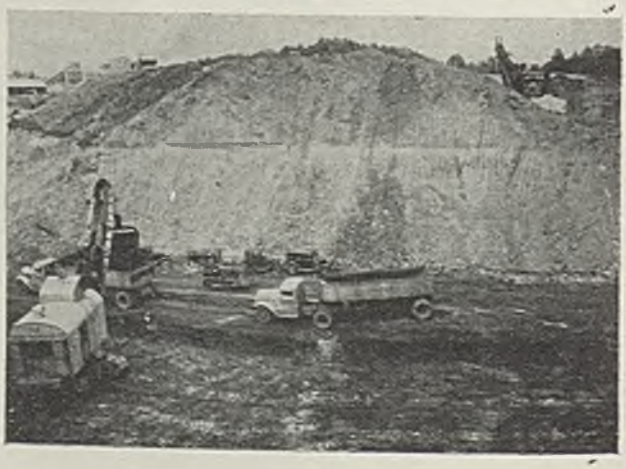
Field for Power

Power to operate the No. 23 pit equipment is brought in by means of a Type R.J.I.J. ground cable with interlocking armor. General Electric junction boxes, each with the necessary oil-switch equipment, are inserted in the main ground cable at 900-ft. intervals. Rubber-covered cables conduct 4,000-volt power to the stripping and loading shovels and to the auxiliary transformers serving low-voltage equipment (pumps, drills, etc.). Each conductor in the 4,000-volt field cables is surrounded by a shielding tape and accompanied by a separate ground wire. Braided shields are used around the conductors in all 4,000-volt trailing cables, with a single ground wire for all three. The company is considering the use of current-limiting reactors in the substations as an added protection.

Stripping shovel crossing a railroad track on its way over from the old No. 19 mine



View of the Maumee No. 23 pit, with the stripping shovel around the turn at the right



Thickness of the No. 4 seam being stripped and loaded by the above equipment is 34 to 44 in., averaging about 40 in. As a matter of fact, however, the seam is the upper of two benches, and both benches were loaded at the eastern edge of the first area mined (see Fig. 1). In this case, the parting was as low as 12 in., and after the coal was uncovered the top bench was loaded. Then the parting was dug up and spoiled by the loading shovel, which then took up the bottom bench. As the workings were extended to the west, however, the parting thickened to about 12 ft., and consequently, the bottom bench, about 21 to 25 in. thick, was left in place.

The upper bench is characterized by the presence of numerous fireclay slips, this consideration, plus loading of the lower bench over part of the territory and a decision to recover the rider coal, resulting in the installation of the washing and drying equipment, which it was not expected would be provided immediately, although the plant was designed to permit its incorporation in the system at any time.

Horsebacks in the rider seam, casual refuse left by the bulldozer and bottom material are about the only other impurities of any note in the coal as it is loaded, although a parting up to 8 in. in thickness is present in the No. 4 over an area of 12 acres. Thus, the coal from both No. 23 and No. 24 offers a fairly easy cleaning problem and could have been shipped with only hand preparation, although much more care and time would have been necessary in the pits. For this reason, as well as to assure uniformity at all times, particularly in the finer sizes, it was decided to start washing immediately.

East Side Stripped First

First stripping at No. 23, as indicated in Fig. 1, was in the southeast corner of the property east of Highway 59. At the time this article was prepared, it was expected that this would be completed about July 1, whereupon the stripping shovel and loader would move across the highway to start a box cut west of the road, as indicated in Fig. 1, this box cut turning at the highway corner and extending out along the No. 4 outcrop to the west. As the box cut is against the highway, spoiling on the opposite side was scheduled, with the idea that it would be rehandled in routine stripping operations later, as was done in the original tract to the east of the road.

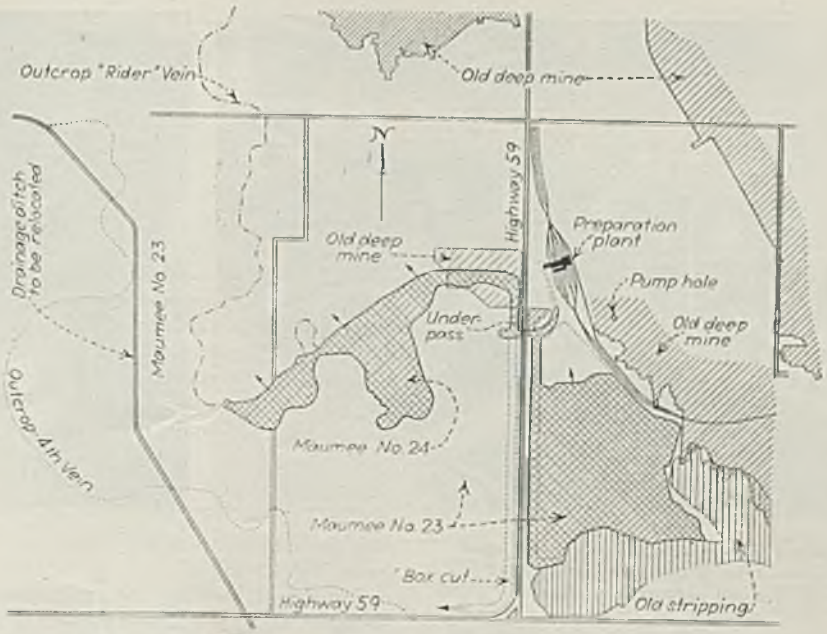


Fig. 1—No. 24 stripping operations cover territory which eventually will be stripped by No. 23 equipment, expected to start a new box cut west of Highway 59 in July

Under this system, the corner represents the only real problem, and here an outside curve increases the spoil area, thus compensating for the other disadvantages. To ease the task of opening the box cut, the No. 24 contractor's dragline was put to work taking off the top clay and soil, particularly at the corner, spoiling it back far enough to leave a clear space 110 ft. wide on the bank for the shovel spoil.

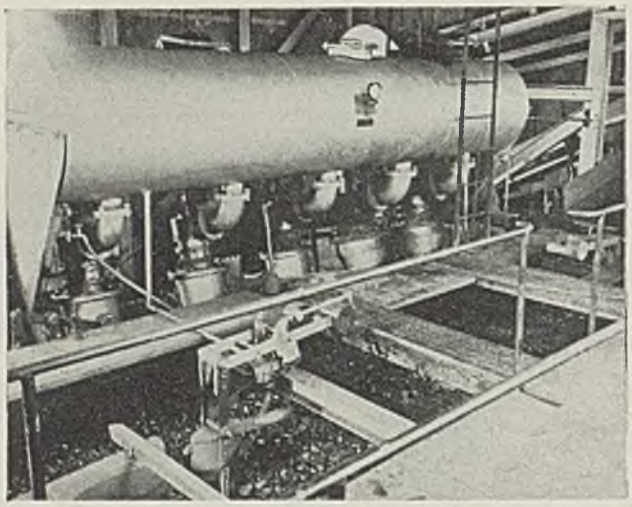
Average thickness of the overburden over the tract to the west of the road is about 36 ft., including the average of 16 ft. of material over the rider seam and excluding the rider seam itself, which runs about 17 in. on the average. The minimum over the No. 4 is about 15 ft. at the outcrop and the maximum is about 50 ft. over the rider-coal area. After the box cut is made, it is intended to work the corner off and then start stripping in a generally northwesterly direction, pivoting on the truck underpass under Highway 59. In this operation, of course, the shovel will work through the rider-seam area previously stripped, rehandling this spoil along with the interval between the rider and the No. 4 seam.

Standard pit width in the No. 4 work is 78 ft., and this will not be narrowed as a general rule, even in maximum-thickness overburden, as it is planned to conduct operations so that outside curves will be available in heavy cover if possible. It is not expected that regular shooting will be necessary for a period of about three years in the new tract, as the overburden can be dug as a rule without blasting until it reaches about 38 ft., at which thickness the blue shale over the coal hardens and a thin sandstone appears about half way up the bank. Where required, the overburden is drilled with 4- to 4½-in. holes, using a horizontal drill, and is shot with either 30 per cent gelatin, if the holes are wet, or "Hercomite 4" if the holes are dry.

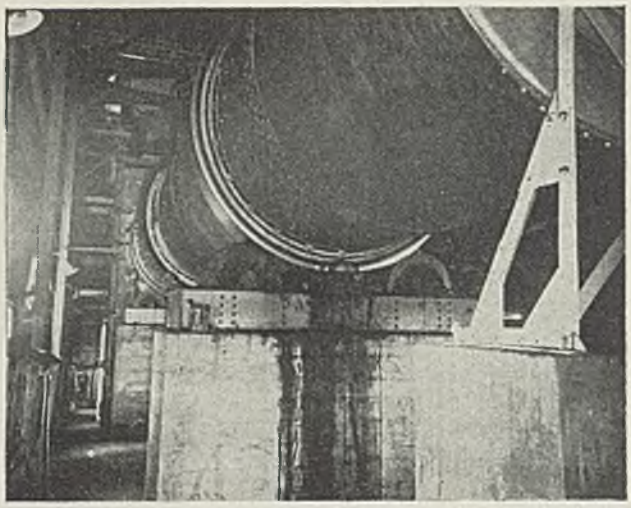
Berm Width 30 Ft.

With a pit width of 78 ft., 48 ft. of the coal is loaded, leaving a 30-ft. berm for the haulage units. This width is sufficient for the trucks to pass and with 3 to 5 ft. more to turn if necessary. As conditions prohibit the use of runways, all haulage will be conducted on the coal from the main road to the pit mouth, and this dictated the use of the wide berm. Average one-way haul over the life of the tract west of the road will be 3,000 ft., and it is expected that as the present short haul lengthens additional tractor-trailer units will be added. Incidentally, the regular haulage units are helped out by a 10-ton International end-dump truck, which brings a load of refuse into the pit and takes a load of coal back.

Average thickness of the rider coal being stripped in the No. 24 pit is 17 in. As noted above, average thickness of the overburden over this seam is 16 ft. Originally, recovery of this seam was not contemplated, but in the course of prelim-



Minus 6- or 4-in. coal, depending upon which mine is operating, is cleaned in this five-cell automatic washer



Dryer for minus ⅜-in. coal, with the furnace in the background. Heat is supplied by two stoker firing units

inary drilling operations it was found to be very uniform over the area in which it occurs and to be about equal in quality to the underlying No. 4, including having an ash-fusion temperature of 2,500 to 2,600 deg. F. Consequently, it was decided to recover the rider if at all economically possible, and, after canvassing the various alternative plans of operation, separate stripping was adopted as the cheapest feasible method, even though it would be necessary to rehandle this spoil. However, the latter is not the disadvantage that it might seem at first glance, as the overburden over the rider would have had to be handled in any event, and by separate stripping an added supply of good-quality coal was assured. Other tracts of rider coal in the vicinity are relied upon to keep up the supply when the acreage now being stripped has been exhausted.

No. 24 Stripping Contracted

As Maumee stripping equipment adaptable to the light overburden over the rider seam was required in other work and as a loading shovel of the small size required was not in the company's equipment list, it was decided to contract the stripping and loading of the rider coal. This contract was let to L. C. Miles at so much per cubic yard of overburden moved and so much per ton of load loaded, Mr. Miles also to keep the pit dewatered. Maumee assumed the task of building and maintaining a main haulage road and hauling the coal, using, as noted above, the three tractor-trailer units and the end-dump truck which also serve No. 23 mine.

Equipment used by the contractor includes a Page 620 diesel-driven walking dragline with a 100-ft. boom and a 5-cu.yd. bucket and a Koehring diesel loading shovel with 3-cu.yd. Man-Ten dipper, which replaced the smaller dipper with which the shovel originally was equipped. The dragline makes a cut from 50 to 110 ft. wide, although the usual width is 60 to 70 ft. With this width, a berm around 15 to 20 ft. wide is left and the remainder of the coal is loaded in two stages. In this process, one half of the coal cut is picked up and dumped on the other half on an idle shift or day, as the coal is so thin that loading it directly would considerably increase the time required on the working shift and thus limit the production. Piling the coal up in this fashion enables the loader to keep the haulage units busy on the working shift. It is not necessary to shoot the overburden over the rider seam.

Coal from the Fourth Vein, No. 23 mine, is sold under the "Maumee Linton Fourth Vein Washed" trademark. At present, shipments from No. 23 mine average 2,000 tons, which figures will be increased. Coal from the rider vein, which falls in the Fifth Vein classification, is sold as "Maumee Sponsler No. 5 Washed." No. 24 mine production averages about 1,200 tons at present, with 1,600 per shift of seven hours as the maximum. Coal from the two mines, although prepared in the same plant, is shipped separately, and to make this possible the two mines are worked on separate days or separate shifts, depending upon market demand.

Seven sizes can be shipped from the preparation plant at a time, with an eighth track available for box-car orders. The general layout of the plant was prepared by the McNally-Pittsburg Manufacturing Corporation so that its washing equipment could be fitted into it, but the detailing, construction of equipment, and erection were done by the Maumee organization, with J. R. Harmon, master mechanic; F. C. Horton, engineer, and Sylvester Hadley, construction superintendent, in direct charge of the work.

One Mine Ships Two Sizes

Only two sizes of Sponsler No. 5 coal are shipped as a rule: egg and screenings. And while seven loading tracks are available, only six Fourth Vein sizes normally are shipped, with a 6- or an 8-in. lump on the seventh track only at times when there is a good demand for this size. When shipping a full list, primary sizes usually are as follows: 6- or 8-in. hand-picked lump; washed 6x4- or 8x4-in. furnace lump, 4x2-in. egg, 2x1½- or 2x1¼-in. nut, 1¼x¾- or 1¼x¾-in. nut, ¾x⅜-in. nut; and minus ⅜-in. washed and heat-dried carbon. Mixing equipment is provided for making combinations of any two or more up to all seven of these sizes, and a grade frequently shipped is 2-, 1½- or 1¼, or ¾-in. screenings. The four largest sizes are loaded over apron-type booms which can be raised to discharge into the mixing conveyor when desired. This mixing conveyor also carries coal to the box-car loader, a belt-type unit designed and built by Maumee. The three smaller sizes are loaded by means of belts and chutes.

Coal from the Nos. 23 and 24 pits is dumped into a "two-track" hopper

with a capacity of 85 tons. Electric eyes and indicating lights show the haulage units which side to come in and thus eliminate the waiting which would be necessary in case a unit came in over a side already full. Another electric eye in the bottom of the hopper signals the plant operator in case the coal runs out and thus enables him to stop with the system full of coal, which is conducive to better washing results. An adjustable reciprocating feeder moves the coal out of the hopper into a 48-in.-wide chain-and-flight conveyor with flights 10 in. high which carries the raw feed up into the preparation plant. Inclination of the conveyor is 30 deg.

Two Screening Plans

Raw mine-run falls off the conveyor into a Gruendler 24x36-in. double-roll crusher adjustable between 2 and 12 in. In the case of Sponsler No. 5 coal, this crusher reduces the feed to minus 6 in. and discharges it directly onto the conveyor feeding the washing unit. When No. 4 coal is being prepared, however, the crusher discharges onto two 6-ft.-wide shaker screens. Length of the upper screen is 18 ft.; the lower, 30 ft. Crank-driven through 4-in. extra-heavy pipe arms, these screens have a throw of 6 in. and operate at 120 strokes per minute. If lump is being shipped, the screens separate the feed from the crusher into lump, furnace lump and minus 4-in. resultant, the latter going into the washer-feed conveyor. Otherwise, the screens make furnace lump and minus 4-in.

Lump and furnace lump are run onto the picking sections of two of the picking table-loading booms, or, if only furnace lump is being produced, this size is split between the two tables. Two General Electric mercury-vapor lamps are installed over each table, and the picked products go on out on the boom sections either to the cars or to the mixing conveyor. Picking is arranged to give two products: a pure refuse, which goes directly to the bin, and a secondary product containing recoverable material. This latter product is conveyed to a 20x14-in. Gruendler ring crusher, which discharges the broken product into the washer-feed conveyor.

Washing is done in a McNally-Norton five-compartment automatic washer with McNally-Norton reject control. No. 4 coal is washed at a gravity of 1.45, and Sponsler No. 5 at 1.50. Consequently, the washer setting is changed from one mine product to the other. Clean coal from the washer flows with the water to two 6-ft.-wide shaking sizing and dewatering screens, also crank-driven and operating at 125 6-in. strokes per minute. Length of the upper screen is 27 ft.; the lower, 38 ft.

The sizing and dewatering screens separate the washed coal into minus $\frac{3}{8}$-, $\frac{3}{8}$x$\frac{3}{4}$-, $\frac{3}{4}$x1$\frac{1}{4}$- or 1$\frac{1}{2}$-, 1$\frac{1}{4}$- or 1$\frac{1}{2}$x2-, and plus 2-in. fractions. If Sponsler No. 5 coal is being shipped, these fractions are combined to make egg and screenings. If No. 4 coal is being shipped, the various sizes (after supplementary treatment in the case of minus $\frac{3}{8}$) may be loaded separately or in various combinations either with themselves or with the larger hand-picked coal.

Two additional Gruendler crushers (one ring and one single-roll) follow the dewatering and sizing screen for crushing 2x1$\frac{1}{2}$- or 1$\frac{1}{4}$-in., or 1$\frac{1}{2}$- or 1$\frac{1}{4}$x$\frac{3}{4}$-in., for making stoker coal.

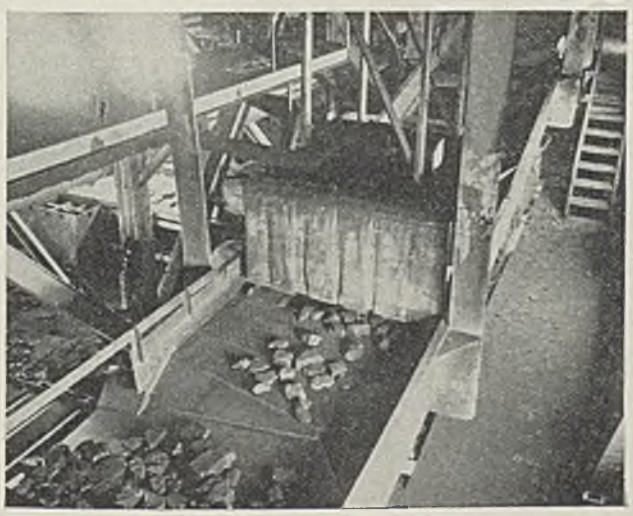
Minus $\frac{3}{8}$-in. coal, or at times minus $\frac{3}{4}$-in., although this is not the usual practice, flows with the wash water to two sets of high-speed dewatering screens fitted with $\frac{1}{2}$-mm. phosphor-bronze wedge wire. Width of these screens is 5 ft. and the over-all length of each set of two is 30 ft. Water and fines through the screens flows to a sump from which they are pumped up to a settling cone by a 10-in. McNally-Pittsburg centrifugal pump. Once a week, the slurry in the cone is emptied out and the cone refilled with fresh water.

Water for filling the cone and for make-up purposes, incidentally, is derived from the workings of the old Island Valley No. 3 mine by means of a shallow well and a 1,000-g.p.m. Fairbanks-Morse deep-well turbine pump. Not all of this pump capacity, however, is required for make-up water. Well location is shown in Fig. 1.

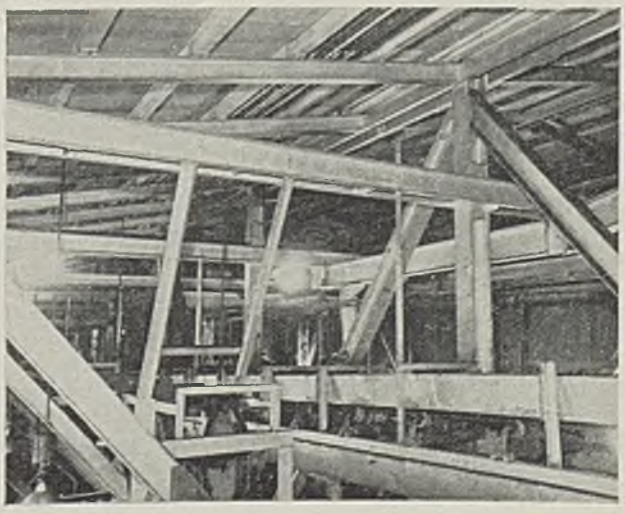
Small Coal Heat Dried

Dewatered coal off the ends of the high-speed screens usually is loaded without further treatment in the summer, but in cold weather—and also in summer when desired by the customer—the coal is run to a heat-drying plant. This plant is designed to totally remove all surface moisture from the minus $\frac{3}{8}$-in. fraction so that the dried product will, of course, not freeze when it is loaded separately and so that when it is mixed with $\frac{3}{4}$x$\frac{3}{8}$-in. coal from the main dewatering and sizing screen the resultant average moisture will be low

Like all other elements in the plant, main shakers are completely welded. Furnace lump is oil-treated in the hood over the screen (center)



Showing application of welding to conveyor frames, structural members, etc., in the preparation plant serving Maumee Nos. 23 and 24 mines



enough to obviate freezing. Minus ¾-in. coal also may be heat-dried, but this is not the normal practice.

The drying plant, in a separate structure, consists of a Christie dryer 8½ ft. in diameter by 64 ft. long supplied with heat by two Type-2AFG "Firite" stokers burning minus ⅜- or ¼-in. coal, as the case may be. A Clarage fan pulls the heated air through the drying unit, which has a capacity of 60 tons per hour. Temperature of the gases at the dryer inlet usually averages 1,200 deg. F.; at the outlet, about 200 deg. F. Dried coal is conveyed to a 25-ton storage bin, from which it is returned to the normal loading cycle. This bin permits running the dryer empty in case of a stoppage in coal flow and thus eliminates the possibility of a fire in the unit itself. It also acts as a storage bin to assure a supply of minus ⅜-in. at all times for mixing to make screenings.

All plant refuse is conveyed to a 15-ton bin from which it is hauled by truck to the pit for disposal. A clean-up conveyor is installed under all the tracks clear across the length of the preparation plant for use in handling all material gathered up in house-cleaning operations. This conveyor discharges into a 25-ton bin at the main dump hopper, into which this clean-up material is run at intervals to mix with the mine-run.

The preparation plant herein described is the third welded installation to be put in service by the Maumee organization. The first was at the Chieftain No. 20 mine (*Coal Age*, September, 1934, p. 294; March, 1937, p. 117) and the second was Old Glory No. 17 mine (*Coal Age*, January, 1938, p. 67). Both the earlier installations were considerably simpler, inasmuch as they did not embody washing or drying equipment. Welding at the new plant was extended to all elements, structure as well as equipment, with the exception of equipment purchased as a unit, such as the washer. Shaker screens, conveyor frames, chutes, etc., were fabricated or built in the company's shop at Jasonville and then were trucked or shipped to the plant site and swung into place. Experience with both the earlier and the present plants has been good. One result of welding is that, in the case of the screens, for example, the equipment units are lighter in proportion to their size.

With the exception of G.E. equipment which came with the washer, Fairbanks-Morse linestart squirrel-cage motors with gears and pinions or belts, or Fairbanks-Morse gearmotors are used throughout the plant. All the motors operate on 440 volts. "Square D" linestarters are used, with a "Square D" safety switch in each motor circuit. Motor control is centralized in a pushbutton panel in the plant operator's quarters overlooking the loading points. All wiring is installed in rigid conduit, with the exception of flexible-conduit for connections to motors with sliding or pivoted bases, etc.

Provision is made for "Waxolizing" all sizes at the new plant, using a Viking dual-unit heating system. Where possible, the treating material is sprayed on the coal while it is falling through the air, but where this is impossible, as in the case of coal in chutes or on the ends of the screens, sprays are directed down on the coal as it passes through hoods built over the chutes or screens.

WHAT FACTORS

+ Are Important in Briquetting?

By J. L. KNIGHT
Division Master Mechanic
Koppers Coal Co.
Powellton, W. Va.

SLACK for briquetting should be as clean as it is possible to mine it. The lower in ash and volatile the better. If the ash content is high, a larger per cent of binder is required because it will not adhere to slate or a number of other refuse materials that create a high-ash condition. The lower the volatile content the better, as this is what creates the smoke nuisance the public is trying to avoid.

Provisions for storing the slack prior to briquetting are essential. Immediate conversion of slack into briquets as soon as mined is impracticable, as part of it will be dry while the rest may be wet if it comes from a wet section of the mine. It is desirable, therefore, to store a large quantity of slack in a bin or even in the open so that the moisture will be distributed more evenly throughout the stored coal. When the slack has been stored for the proper length of time, it is transferred from the bin to the dryer unit by conveyors or some similar method.

The most popular dryer is a large revolving cylinder supported on rollers and rings constructed on such an angle that the coal will flow through the machine by gravity, and having a number of projecting plates so arranged inside that the coal will be thoroughly mixed while traveling through the cylinder. Hot gases from a Dutch oven at the discharge end of the dryer are passed over the coal in a dryer unit. While either an exhaust fan or stack may be used, an exhaust fan is to be preferred, as it permits a much closer regulation of draft.

A very even temperature regulation must be maintained during drying. If the coal is permitted to reach 250 to 300 deg. F., it will enter the mixing machine so hot that the binder will not amalgamate with the coal and the mix will break. In general a temperature of 100 to 200 deg. suffices. If the coal is run directly from the mines into the plant, the drying equipment is not equal to the sudden changes caused by the moisture in the slack and the desired even temperature cannot be maintained.

Dried slack is carried to the crusher unit and crushed to the required density. This, too, is an important step. If coal is crushed too fine it will require an excessive quantity of binder; if left too coarse, the briquets will be weak, since the coarse particles of coal will retain only their original strength. Due to the different characteristics of coal, the proper amount of crushing for a specific coal can be determined only by experiments carried on at the briquetting plant. Ground to 40 per cent through a 200-mesh screen and using a 6½ to 7 per cent binder content makes a good, firm briquet with some coals; other coals require a much coarser crush to yield the desired product. In starting a new plant it is much better to begin with a medium-coarse coal. Test the first batch for strength of briquet and carefully note the binder content; if the desired strength is not obtained, increase the fineness of the coal, carefully watching the mixing process.

Crushed Coal Preheated

After the coal leaves the crusher it is conveyed to the preheater. This machine has two parallel shafts and a number of paddles welded on the shafts to form a very coarse thread. When the coal and binder are inserted in one end of this machine and the shafts revolved, a thorough mixing of the binder occurs while it slowly moves along to the discharge end. Some preheaters have steam jackets around the case to bring the temperature of the coal up to that of the binder or to a point where the coal and binder will amalgamate. In other instances, steam nozzles are inserted in the machine and the steam is applied directly to the coal. Steam thus applied greatly assists the process of mixing.

From the preheater the mix goes to the fluxer, which is very similar to the preheater, with the same equipment in all respects, to continue the process commenced in the preheater. Coal and binder next go to the conditioner—a third machine constructed along the same general lines as the preheater and fluxer but somewhat longer than either and equipped with steam nozzles. The temperature of the mix must be reduced after leaving the preheater and fluxer before it reaches the rolls. A mix that is too hot will not form a perfect briquet, has a tendency to stick in the rolls, gum up the press or make halves if used too hot.

The press is the last stage in briquet making—and a critical one. The degree of pressure necessary to assure uniformity in the product is regulated by a pressure bar which controls the quantity of mix entering the press rolls. The distance between the rolls usually is adjusted to 0.007 in. when no coal is between them. If rolls are set up to a greater clearance, a large fin will be left on the finished briquet, increasing degradation of the finished product. Care must be exercised not to allow the rolls to touch, for that would score the edges of the pockets and prevent proper freeing of the briquets.

"The actual process of making coal briquets," declares Mr. Knight, who was formerly superintendent of the Davy briquetting operation of the Winding Gulf Collieries Co. (*Coal Age*, January, 1932, p. 15), "has been treated as a secret in most plants. It is my opinion that all would profit by inviting an interchange of information regarding process developments. This article briefly describes some of the many steps in successful briquetting from the mine mouth until the fuel is loaded into the cars."

What binder and how to handle it are major considerations. The cost of the binder is the determining factor in whether you should convert slack into briquets or dispose of it in other ways. To handle hot asphalt at a temperature of 300 deg. and apply the desired percentage to the coal was long a problem. Pumps that would give a very even flow of the liquid asphalt could be had, but no means were available to synchronize accurately the flow of asphalt with the flow of coal until the automatic proportioner was perfected. This machine automatically weighs both coal and binder; any percentage of binder may be applied and that percentage maintained throughout the manufacturing.

Binder Mixed in Fine

In briquetting it is common practice to mix the finely comminuted coal with a cementious and waterproofing agent for the purpose of uniting the coal particles into a condition suitable for use and then maintaining the prepared briquet in that condition. This agent must be distributed as completely and uniformly as possible throughout the mass in order to coat more thoroughly all particles of coal and completely fill all voids or interstices and thus serve more efficiently as a binder and waterproofing medium. Special asphalts manufactured by several companies perform excellently in these respects. Properly bonded and waterproofed briquets have been produced using a minimum quantity of these asphalts.

In addition to meeting these two requirements, however, a suitable binder must be readily mixable with the comminuted coal. This is a property of fluidity at the mixing temperature that enables complete and uniform distribution of binder to be obtained with regular type of mixing equipment at moderate temperature. Furthermore, the binder must not interfere with attainment of other desired briquet characteristics, namely:

1. Maximum compacting density.
2. Hardness sufficient to withstand all handling shocks.
3. Heat value must not be decreased.
4. Ash must not be increased.
5. Briquets must be smooth and regular.
6. Briquets must retain shape and not disintegrate during storage or burning.
7. All desirable characteristics of original coal must not only be maintained but improvement of fuel qualities is expected and should be actually obtained.

Special Properties Needed

The most satisfactory asphalt binders possess certain characteristic properties not usually essential to asphalt used for other purposes. Free carbon content should be extremely low for the most satisfactory results. Binders containing high percentages of oily constituents (petrolenes) and high quantities of asphaltic requisites in every particular are very much desired. The special asphalts meet these specifications.

On leaving the rolls the finished briquet has a temperature of 100 to 150 deg. F. and is very fragile, owing to the fact that the binding agent has not cooled to a setting point. Some mechanical method must be used to assist the cooling process; the one most commonly employed is a long, flexible chain which moves very slowly and permits the heat to be dissipated into the surrounding air. This chain also serves to remove the fins and other degradations from the briquets before reaching the point of loading into cars. In some plants cornstarch or similar ingredients are added to the binder to increase the strength of the briquet while hot, thus allowing direct loading without expensive cooling equipment.

SHAKER CONVEYORS

+ Plus Modern Rail and Truck Tipple

Feature New Centennial Mine

By IVAN A. GIVEN
Associate Editor, Coal Age

ADDING to its capacity for producing sub-bituminous coal from Boulder County, Colorado, the Boulder Valley Coal Co. has loaded as much as 1,236 tons in one day from its New Centennial mine, on which work was started April 3, 1936. Within eighteen months after sinking was begun, New Centennial, designed for a maximum production of 2,000 tons per day, was leading Boulder County in output. Production this winter is expected to average 1,400 tons per day, of which 75 to 80 per cent will be derived from shaker conveyors. In summer, devoted to development, these conveyors account for all the tonnage, which is prepared in a modern truck and railroad tipple.

The seam being recovered at New Centennial is known as the Laramie formation and is one of several running through that district. Three is the most that any single operation has worked successfully. The mine, which is two miles east of Louisville, two miles south of Lafayette and twenty miles north of Denver, is on a low plateau ten miles east of the front range of the Rocky Mountains. Depth of cover ranges from 264 to 288 ft. and the seam dips generally about 2 per cent to the southeast, with local grades running up to 10 or 11 per cent for short distances. The hoisting shaft is about 1,000 ft. from the northern boundary of the property and consequently the majority of the mining will be done to the south.

Seam thickness ranges from 4 to 7 ft., with the average about 6 ft. Of this total, 1 to 2 ft. is left in place to protect the roof, which consists of about 3 ft. of soft slate overlaid by a bed of sandstone. Both strata are poor in quality and are filled with slips. That part of the seam left up is known as "gray coal," and its quality is such that it is practically unmarketable unless it is crushed to steam sizes. Beneath the gray coal, the seam usually is free of regular banded or other impurities, although there are exceptions in certain parts of the mine. The seam is underlaid by a soft slate 1 to 2 ft. thick resting on about 2 ft. of sandstone. Thickness of the soft slate determines the depth to which the bottom is lifted for height in haulageways. As a rule, no attempt is made to go down into the sandstone.

After preparations were made, sinking of the air shaft was started, as indicated above, on April 3, 1936, with operations at the site of the hoisting shaft beginning on April 13. While the property previously had been drilled to determine the coal thickness and reserves, a special drill-hole was put down between the places where the air and hoisting shafts were to be sunk. From the surface down, the strata were found to be as follows: 0 to 16 ft., surface soil; 16 to 24 ft., gravel carrying considerable water; 24 to 50 ft., fireclay and joint clay; 50 to 266 ft., varying formations every few feet, including several streaks of fireclay, joint clay, soapstone, soft black slate, brown slate, shale, smut, sandstone, iron stone and several thin seams of coal; 266 to 267 ft., iron stone; 267 to 277 ft., gray sandstone; and 277 to 280 ft., soft slate.

After drilling was completed and while the sinking plant was being installed a concrete collar was placed

Heading face ready to load in New Centennial mine

at each shaft to support the headframes. The sinking plant consisted essentially of a 40-hp. single-drum Vulcan electric hoist at the air shaft, installed incidentally for permanent use, a 50-hp. DeWalt portable electric saw with dado head and a 440-c.f.m. Gardner-Denver electrically operated air compressor for operating drills and Cameron sinking pumps. The saw was set at the timber pile and was used for all crosscutting, ripping and framing and for making all wedges and lagging. Its use was reflected in a substantial saving in labor. Electric lights were installed for night work.

A sinking headframe was installed over both shafts, with the one at the air shaft designed for permanent use. Two 1-cu.yd. round sinking buckets were used in each shaft, with a fifth bucket as a spare. Sinking headframes were designed so that the hoistman could control the dumping doors by a counterweighted lever in the hoist house. Buckets also were designed to permit dumping by the hoistman, and in the case of the air shaft the hoistman also operated the dump car which carried the spill out on a tram extending out about 150 ft. from the shaft. Spoil from the hoisting shaft was trucked away and used in the construction of the railroad tracks serving the tipple. To service the sinking equipment, a temporary shop, comprising a forge, electric blower and anvil was constructed. Air was supplied by a Jeffrey blower and 10-in. ventilating tubing.

Air Shaft Hoist Installed

Over-all size of the air shaft proper is 8x10 ft. Size of the hoisting compartment is 6x8 ft.; quarter shaft, equipped with a spiral stairway, 3 ft. 8 in. x 8 ft. A 6-ft. Acrovane fan connected with the hoisting compartment by a concrete fan drift now supplies ventilating air for the mine. Over-all size of the main shaft is 10x17 ft. Hoisting compartments are 6 ft. 3 in. x 10 ft. Size of the quarter shaft, which accommodates pipe lines and signal and telephone lines, is 3 ft. 10 in. x 10 ft. This shaft is the upcast. Electric power to serve the mining equipment is taken down the drillhole between the two shafts noted above.

Oregon fir was used in both shafts. Square sets in both shafts were made of 10x10- or 12x12-in. timbers. In the air shaft, 4x12-in. planking and buntons were employed with 6x12-in. in the hoisting shaft. Wall plates were grooved with end plates and buntons tongued. Two- to 3-in. planking was used for lagging, and wedges also were made of Oregon fir.

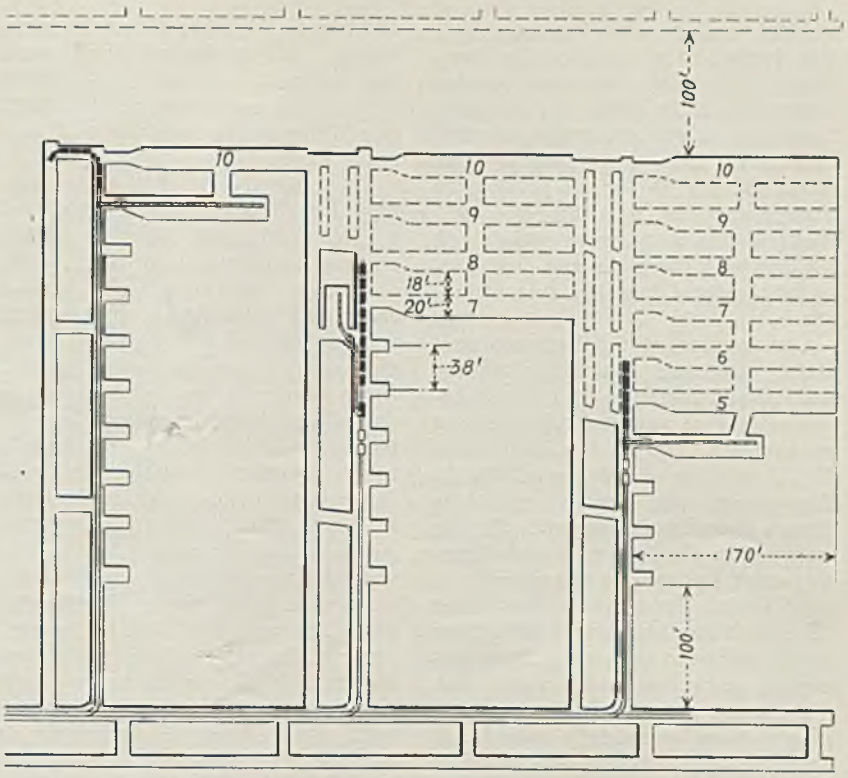


Fig. 1—General plan of extraction used at New Centennial mine

About the only difficulties encountered were in going through the 8 ft. of gravel and sand and the 26 ft. of fireclay and joint clay, through which a considerable quantity of water flowed. Through these strata the size of the shaft was increased and false sets were employed from the 16-ft. down to the 50-ft. levels. At the latter point, the first square set was placed and then installation of the main shaft timbers was begun, working up from the square set. One main set was placed at a time and the false timbers then were removed and the space was filled with ground blue clay puddled into place to make a watertight seal. This process was repeated up to 2 ft. below the gravel formation, from which point up the danger of slides made it necessary to leave in the false timbers, puddling around them. But removing the false timbering below the gravel was sufficient to assure a waterproof seal.

The air shaft was sunk 6 ft. below the coal seam, making the total depth 293 ft. and providing a temporary sump. Working three shifts a day seven days a week, a total of 45 days was required to complete sinking and puddling. Average sinking rate was 2.17 ft. per shift, or 6.51 ft. per day, and a total of 33,385 cu.ft. of spoil was removed. Each shift consisted of three sinkers at $6 per shift; one carpenter, $5.75; and one hoistman, $5.50. The blacksmith, at $6.50, worked an average of two days per week. Three men, at $4.75 each, were employed for four days in puddling the gravel bed. Thus the total labor cost for the air shaft was $4,009.25, or $13.69 per foot.

The main shaft was sunk 304 ft. deep in 55 days. The extra depth was to permit starting the bottom in rock and also provide a 10-ft. sump. Under this plan, the entire coal seam was left as the roof at the shaft bottom. Main-shaft crews consisted of four sinkers, one carpenter, and one hoistman, in addition to a truckman one shift a day, a blacksmith about two days a week and ten men preparing blue clay for puddling six days. Total labor cost was $6,366.50, or $20.94 per foot. A total of 70,000 cu.ft. of spoil was removed, and the sinking average was 1.84 ft. per shift, or 5.53 ft. per day. The main shift was equipped with a double-straight-drum (7-ft. diameter) geared hoist driven by a 350-hp. motor. Hazard 1⅛-in.-diameter ropes are used.

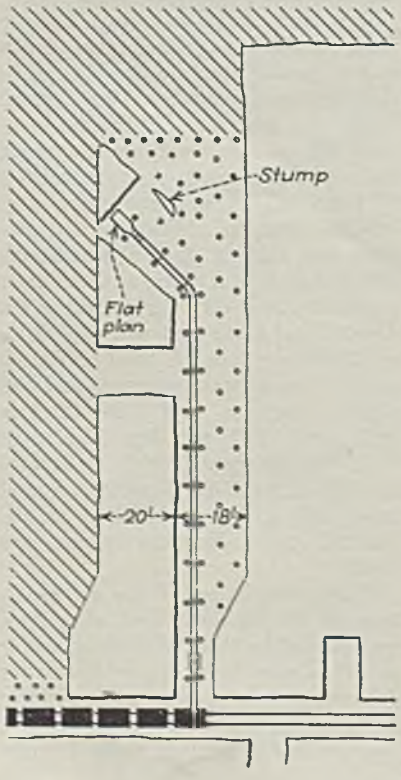
Upon completion of the air shaft, driving of headings and aircourses was started in three directions, using two Goodman G-15 shaker conveyors delivering coal into the sinking buckets. In all, 5,000 tons of coal was produced by this method prior

to Dec. 13, 1936, when the main shaft was temporarily equipped for handling coal. This screening equipment still is in place in the main tipple, which was not completed until September, 1937, for emergency use. After driving as far as possible in three directions with the first two shakers, two more were added, one shaking into the other and thus permitting several hundred feet of advance.

Construction of the bottom immediately followed completion of the main shaft, taking 7 ft. of rock beneath the coal and gradually driving up into the seam on the loaded side 15 ft. wide for a distance of 300 ft. The bottom was double tracked to give a capacity of 55 cars. On the empty side, the bottom was designed to permit the cars to run down to a back switch, from which they come off onto a car haul which lifts them up an incline to the empty track connecting with the motor runaround.

Although a total of 22 rooms and pillars were completely mined out near the shaft bottom and caved to provide coal during the early stages of the operation, the general plan of mining is to drive to the boundary and work back. Consequently, much of the work to date has been entry driving, although 26 rooms have been driven and the pillars removed in addition to the other 22 places noted above. Major entry-driving work now is directed to opening up territory to the northwest of the shaft, in addition to the main body of coal to the south.

Fig. 2—Method of mining a room pillar with shaker conveyors



The majority of the entries employed at New Centennial consist of a haulageway and airway. Each opening is driven 9 to 10 ft. wide and centers are adjusted to give a chain pillar 30 ft. thick. The bottom is taken up down to the hard sandstone in all haulage roads the full width of the place. All entries are driven by shaker conveyors accompanied by 10-in. Jeffrey and Buffalo tubing blowers. Usually, the conveyor is set up and the haulageway is driven 250 to 300 ft. Then, the conveyor may be moved to the airway and the bottom in the haulageway taken up by hand. The general plan, however, is to break the conveyor at the drive before it is moved and start to take up the bottom, putting on pans as the work progresses until the end of the conveyor is reached. The place then is ready for the installation of the track. When the conveyor is moved from the haulageway to the airway, the drive unit usually is skidded over by the cutting machine. But when the unit is to be moved ahead 250 or 300 ft., the drive is pulled up on a low truck and hauled to the new location by a locomotive. Three-man shifts, on the average, are required to dismantle a conveyor, load up the drive, move it to the new location and set it up again ready to run. Drives may be set on the bottom or on a foundation of planks, and are held in place by the jacks. The conveyor line is supported by chains and monkeyfaces at each pan joint. Pan lengths are 10 ft.

Eleven Conveyors Used

Conveyor equipment at New Centennial consists of nine Goodman G-15 20-hp. and two Vulcan (Denver) units. Each conveyor is accompanied by a Sullivan CE-7 shortwall cutter with a 6½- or 7½-ft. bar, a Cincinnati LCU one-man drill and a tubing blower. In addition to the above cutting equipment, two CLU track-mounted units are on hand for use in hand-loading territories in the winter time.

Extraction of the coal is accomplished through the medium of ten-room panels turned off the main or cross entries. Room width, with the exception of the last place on each panel entry, is 17 to 18 ft. Centers are 38 ft., and depth is 170 ft. Necks

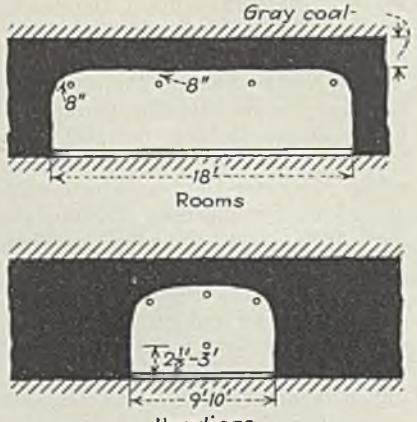


Fig. 3—Drilling plans for headings and rooms at New Centennial

are made 9 ft. wide for about three cuts and are driven as the heading is advanced by the conveyor. All widening is done on the side opposite the pillar, with the exception of the last room noted above, which is widened on both sides, inasmuch as there is no pillar in this room to be removed. Widening on one side only, of course, places the conveyor line close to the pillar and thus facilitates its extraction.

A barrier pillar 100 ft. thick separates No. 1 room from the main or cross entry and in fact 100-ft. barrier pillars are general throughout the mine, not only for adequate protection but also with the idea that they will yield a good tonnage in final retreat work.

Pillars Taken by Conveyors

When a room-panel entry is driven up, including brushing the haulageway, the conveyor unit is set up in No. 10 room neck and this room is driven up to its maximum depth of 170 ft. Then No. 9 room is driven, widening on the right and driving one crosscut in the pillar about half way up. With the completion of No. 9 room, the pillar is removed by open-ending as in Fig. 2, using a swivel to throw the conveyor line across the end on an angle of about 35 deg. When the stump at the mouth of the place is reached, it is loaded out as far as possible and if any remains it is shot to make sure it will not cause trouble later on. Substantially the same system is followed in hand-loading places, using track instead of conveyors. Open-end cuts usually are 18 to 20 ft. wide.

When Nos. 10 and 9 rooms have been completed, the chain pillar is drawn back by driving a crosscut if one is not already present and then

splitting the pillar. In this process, the conveyor drive is set at the corner of the crosscut and two swivels are used, one to turn a string of pans down the heading far enough so that a trip sufficiently large to handle one cut may be placed and the other to turn the conveyor line up the center of the pillar. This process of splitting the pillar is repeated about every two rooms. In working rooms, timbers are employed to hold the top far enough in by the conveyor discharge for the storage of enough cars to clean up a cut. Where this is impossible, however, split trips and extra changes by the gathering locomotive are required.

As soon as the rooms on one panel are worked down far enough, No. 10 on the adjoining panel (Fig. 1) is started and driven across into the caved area on the first panel. Usually, places on the first panel are kept about two rooms ahead, this rule also applying to all succeeding room panels.

Conveyor units working in headings are operated by three-man crews, usually two at the face and one trimming cars when the conveyor is in operation. Room units are operated by four-man crews, with one man trimming. All men are available, however, for face preparation, extending pans, setting timbers, etc., when required.

Two Men Undercut Place

When the place is cleaned up, the crew extends the conveyor line and timbers and also begins to undercut the place. Usually two men do the cutting while the rest of the crew attend to the other activities. Timbering in rooms is done about as indicated in Fig. 2, with two rows along the conveyor line to which the chains are attached and two additional rows, staggered as indicated, on the wide side of the place. This, with a road post 7 ft. from the face, is the minimum timbering requirement. As pillars are mined out, posts either are recovered or shot out so that there will be no interference with roof action and so that savings may be effected by the recovery of props for use elsewhere.

Undercuts are made about 6 or 7 ft. deep, and standard cutter bits are employed, as these have been found to give best results where "niggerheads," which occur in some localities about 6 in. to 1 ft. off the bottom, are encountered. The conveyor is kept running while cutting is going on and the dust is shoveled directly into it. Finally, the dust is cleaned out of the cut and the coal is drilled, using conveyor augers and molefoot bits.

Four holes usually are put in in both headings and rooms, about as indicated in Fig. 3. Holes are drilled 8 in. shorter than the undercut and about 8 in. inside on each rib. Top holes, in particular, are put in as straight as possible under the gray coal, which is the parting to which the coal is broken. In headings, the lower, or "buster," hole, is set off first, followed by the top buster and the two rib holes. In rooms, one of the two middle holes is set off first, depending upon which side of the place the conveyor is on, followed by the other middle hole and the two rib holes.

Cardox is used to break down 80 per cent of the coal, with permissible powder for hanging corners and other special shots and for hand-loading places. Cardox originally was adopted because it permitted resumption of operations immediately, in addition to an improvement in coarse-coal yield and a reduction of checking of lumps, with consequent disintegration, but has been continued for still another reason, even at times when powder might be indicated. This reason is that it does not tend to break up into the gray coal, and thus results in better roof conditions.

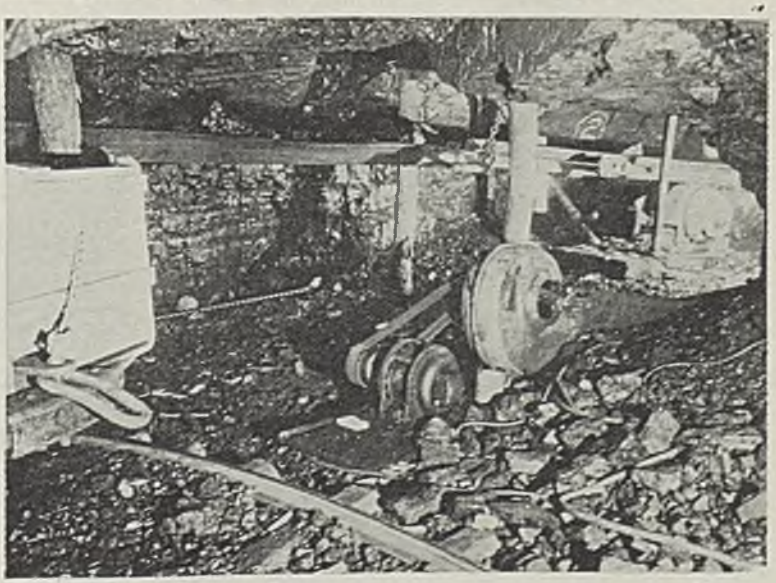
Holes are set off one at a time, and before the first is ignited a flat pan is run under the cut and the shaker is started. Thus, a substantial part of the tonnage is loaded without shoveling. Duckbills are not employed because of the soft nature of the bottom.

The mine at New Centennial operates three shifts a day and the tipple one. Three-man crews driving headings average about 21 to 22 cars (3,500 to 3,700 lb. per car) per seven-hour shift, advancing the place about three cuts. In rooms, four men get about two cuts, or 30 cars, per shift.

Coal is gathered by 5- and 7½-ton storage-battery locomotives supplied with current by Exide-Ironclad batteries. Six Ironton and one General Electric units at present haul to the shaft bottom. Plans, however, call for the installation of a trolley system on the main lines, whereupon the gathering locomotive will deliver to main partings. A total of 301 Card Timken-bearing steel cars with an over-all height of 33 in. over the rail are in use, with 100 more scheduled for delivery in September to give the necessary reserve for loading on the two off shifts. Rated capacity of these cars, with a 36-in. gage, is 3,700 lb. level full or conveyor loaded. Hand loaded, the capacity is about 2 tons. Cars, when possible, are distributed to conveyors in trips large enough, as indicated above, to completely load a cut. In driving entries, the track is turned through the crosscut and down the back heading to provide the necessary storage.

Aside from the trolley system to be installed, which of course will be direct current, 440-volt alternating current is employed to operate cutters, conveyors, pumps and other underground equipment, with the exception of the battery locomotives and the coal drills, which are 110 volts. The drill voltage was adopted both because it was felt that 110-volt units were better designed and also because of the safety features

Discharge end of heading conveyor, showing also drive and 10-in. tubing blower



of the lower pressure. Small 1-kva. transformers mounted in the fuse compartment of the cutting machines supply the drills (cutters are equipped with circuit breakers instead of the original fuse blocks).

From the surface substation, 440-volt power is taken down through the borehole mentioned above by a three-conductor No. 6 "Okocord" cable. Main underground circuits are individual, rubber-insulated braid-covered wires (4/0 on main lines and 2/0 on branch circuits). Batteries are charged from an m.g. set on the surface.

Coal is prepared at New Centennial in a steel and concrete tipple designed by the E. C. Horne Machinery Co., representing the Jeffrey Mfg. Co., for both truck and rail loading. Seven storage bins with a capacity of 475 tons, including one bin now under construction, supply the truck trade, which constitutes 75 per cent of the business. The majority of all rail shipments is made in box cars. Lump is not produced except when truck or rail orders are on hand; at all other times it is crushed and rescreened.

Cars from the shaft dump into a weigh basket which, however, is preceded by a flop gate to divert rock to the rock-storage pocket as the first step in its disposal. From the weigh basket, coal may be run in emergency to the shaker screen put in for handling coal during development days. This screen sizes it into lump and screenings, with the lump passing directly to trucks and the screenings falling into a small bin under the screen. From this bin the screenings are discharged into a four-cornered conveyor which elevates them to the main screen for sizing.

Normally, however, the coal goes from the weigh basket to the aforesaid main screen, which is equipped to produce five sizes at one time, viz: 6-in. lump, 6x4-in. egg, 4x2½-in. nut, 2x1¼-in. pea and 1¼-in. screenings. By proper manipulation of the gates, the screen can be used also to make 2½- and 4-in. lump and 2½-in. screenings. A vibrating screen also is available for making a 1½x¾-in. modified pea, or special stoker coal, and ¾-in. screenings from 1¼-in. screenings, completing the list of ten sizes which can be shipped.

Essentially, the New Centennial preparation plant consists of the screening plant proper, which also contains the picking tables, lump crusher and box-car loaders, and the truck-loading plant, comprising the modified-pea screening installation and seven round storage bins, four with a capacity of 50 tons each, two with a capacity of 100 tons each and one with a capacity of about 75 tons. These bins accommodate the following sizes: 6x4-in. egg, 4x2½-in. nut, 2x1¼-in. pea, 2½-in. screenings, 1¼-in. screenings, 1½x¾-in. modified pea and ¾-in. screenings. Scraper-type conveyors connect the screening plant and the truck-loading plant and elevate the coal to the bins. The egg, nut, pea and modified-pea bins are equipped with spiral lowering chutes and rescreening-type loading booms, the degradation from these booms going by conveyor and elevator to the 1¼-in. screenings bin.

New Centennial preparation plant. The screening section is built onto the shaft headframe and is connected with the truck-loading bins by inclined conveyors. At the extreme right is the tail tower of the aerial tramway.

Picking tables are installed at approximately right angles under and at the end of the main screen for hand-picking lump, egg and nut. When lump is not being prepared, this size is run to a 36x48-in. single-roll crusher where it is reduced to 6, 4 or 2½ in. and recirculated to the main screen. All the picking tables are reversible, feeding on one end to the box-car loading equipment and on the other end to the conveyors to the storage bins, except in the case of lump, which feeds out onto a long conveyor with a hinged loading end. This conveyor has a storage capacity of approximately 3 tons, which is all the lump that is kept on hand, and that only in times of brisk demand. Apron-type tables are employed, and pickings are conveyed back to the four-cornered unit previously mentioned, which elevates them to a chute to the refuse bin.

Lump Stored on Conveyor

Lump, when a rail order is received, is discharged off the end of the picking table into a rescreening-type lowering conveyor, which in turn discharges into a chute to an Ottumwa scraper-line box-car loader. A new belt-type Ottumwa box-car loader may be employed in loading either egg or nut on separate tracks. This loader was designed for installation in the space between two loading tracks and is mounted on trucks so that it can be moved back and forth on two standard-gage rails; also so that it can be revolved to load a car on either track.

Tramp iron is removed from the 1¼-in. screenings by a Midwest Electric Co. chute-type magnet before the screenings go onto the conveyor to the truck bins. This latter conveyor is equipped with grizzly bars near the discharge end to take out part of the minus ¾-in. material in making modified pea. The remainder is taken out on a Jeffrey screen which receives the conveyor discharge.

Refuse and mine rock at New Centennial are disposed of by means of a single-bucket reversible aerial tramway (Hill design). Length of the tramway is 800 ft. between towers. The bucket, with a capacity of 75 cu.ft., is loaded through a manually operated gate in the refuse bin and is moved back and forth by head and tail ropes operating off a single-drum hoist driven by a 20-hp. motor. Track-rope diameter is 2 in.; head and tail ropes, ⅝ in. The bucket dumps automatically when the travel is reversed.

ARC-WELDED JOINTS

+ "Look Better All the Time"

At Koppers Stanaford No. 6 Mine

• *Inquiring Editor* (while on a visit back at a mine where he worked in the pre-mechanization days): "A couple of years ago you told me you were welding main-line track in No. 6. How has it worked out?"

• *Division Electrical Engineer:* "Why just fine and we're doing more of it, but here's the man who lives with it."

• *General Mine Foreman:* "After three years it's looking better all the time. One and a quarter miles of track was welded three years ago and now we have over three miles."

FURTHER inquiry into this rail welding, which is in a Sewell seam slope operation of the Koppers Coal Co. at Stanaford, W. Va., indicated a highly satisfactory performance, and no disadvantages were brought to light. "From the track maintenance standpoint alone—that is, not counting the bonding consideration—the welding is well worth while," was the final assertion of the general mine foreman.

Grades are severe and the haulage units consist of 20-ton locomotives operating in tandem. Replacing the original 45-lb. steel with rails of 60-lb. section was the occasion for beginning the welding three years ago. It was an experiment in bonding rather than in track maintenance, which latter, however, proved equally attractive. Without any attention whatsoever, joints have remained in perfect condition. Benefits to rolling stock by reason of smooth joints are considered another important advantage.

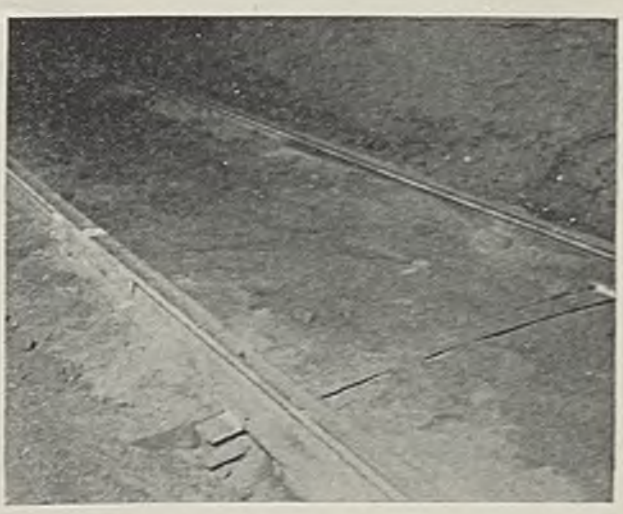
Joints are made in the usual way by angle bars and bolts. Next the ball sections of the rail ends are V'ed by a carbon arc and following this the ends are arc-welded. In addition, each angle bar is arc-welded to the rail at five places: to the base across each end and to the side of the ball for a 6-in. length at the center and for a 3-in. length near each end.

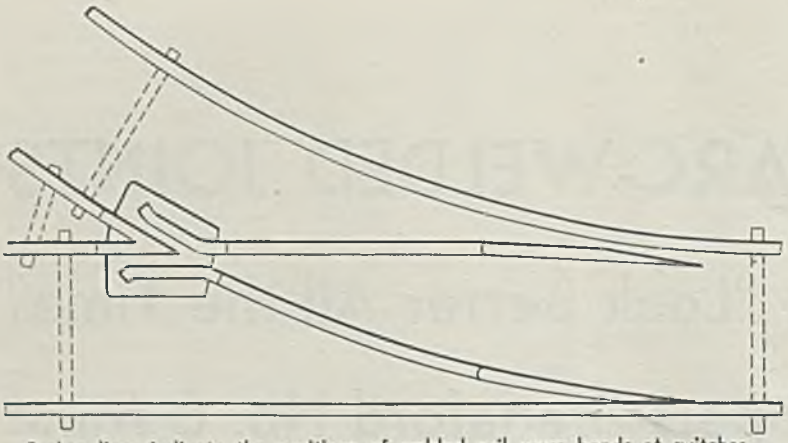
Tests by the usual bond-survey methods have indicated full equivalent rail conductivity. Derailments on the track have been few and, even though angle-bar bolts have been sheared off in some instances, the mine management has not seen any necessity to go to the expense of replacing them, inasmuch as the welds continue to hold the joint rigid. A derailment which will shear off a bolt is very likely to destroy a bond of the long type.

It is well known that rail joints held by bolts alone remain rigid only for a comparatively short time. Bolts soon loosen and consequently should be inspected and tightened every few weeks. Worn or poor-fitting angle bars do a highly unsatisfactory job of holding bolted rail joints but are practically as usable as new ones in building welded joints.

Pointing to a welded joint of the 60-lb. main-line track in the Stanaford No. 6 mine, William Jayne, general mine foreman, standing at left, and C. O. Gallaher, electrical engineer, agree that it is the "only method."

Chalked points indicate welds at ball of rail, along edges of angle bar and to crosstie. Two of the original bolts of the joint (left) were sheared off by a wreck, but neither mechanical nor electrical service was impaired.





Broken lines indicate the positions of welded rail cross bonds at switches.

Cross bonding consists of ties of 30-lb. scrap rail, one every 300 ft., turned base up against the bottom of the track rails and welded thereto along the inside and outside of both rails. These cross rails also serve incidentally to gage the track. Switches are bonded by the same welded 30-lb. rail method.

Carbon-arc V-ing and the electrode welding are done with a 200-amp. motor generator (250-volt d.c. motor) formerly used in a mine shop where d.c. power only was available. This welding set is mounted on a mine truck and is pulled by a locomotive. As compared to a resistance welder the motor-generator type has the advantage of safer operation, correct polarity (rod negative, rail positive), better control of the arc and lower cost. Possible electrolysis of drainage piping is the principal objection to operating the mine with reversed power (trolley wires negative), which would provide correct polarity for use of a resistance set.

Average total cost per rail joint is slightly over $2, including the pair of angle bars complete with four bolts, labor for V'ing and welding, electrode material and power used. Deducting the cost of the angle bars leaves approximately $0.70 as the total welding cost. Long bonds applied would cost at least $1.40 each; thus the saving per joint is calculated at $0.70. One man does the welding and the normal actual time per joint is 30 minutes.

As yet there has been no occasion to recover any of the rails that have welded joints; however, no particular difficulty is contemplated. The angle bars can be loosened by heavy chisels and wedges and the weld at the ball of the rail broken by raising the free end of the rail.

Welds are made with Fleetweld $\frac{3}{16}$-in. No. 5 coated electrode except that the top layer of the rail-joint weld is finished with Wearweld, which produces a harder surface. The exposed weld length is quite short and to date the joints show no signs of becoming low. If any smoothing of the welded surface is necessary it is done by hand peening or hand filing. On some of the first work a gas torch was used instead of a carbon arc for cutting the V.

All told, the experience with this arc-welded track has been most promising. The extra cost of approximately $0.70 per joint for the welding is considered worth while even if bonding were not necessary, as would be the case, for instance, if heavy battery locomotives were used for main-line haulage. Consequently welding has been done on a number of joints that still have copper bonds that are in good condition.

On the strength of the three years of satisfactory service in No. 6 mine the same plan of welding rail joints has been started recently in No. 1 mine, the other Stanaford operation, which is in the Beckley seam.

$900 SAVED ANNUALLY

+ By D.C. Braking of A.C. Motor

At Consolidation 93 Mine

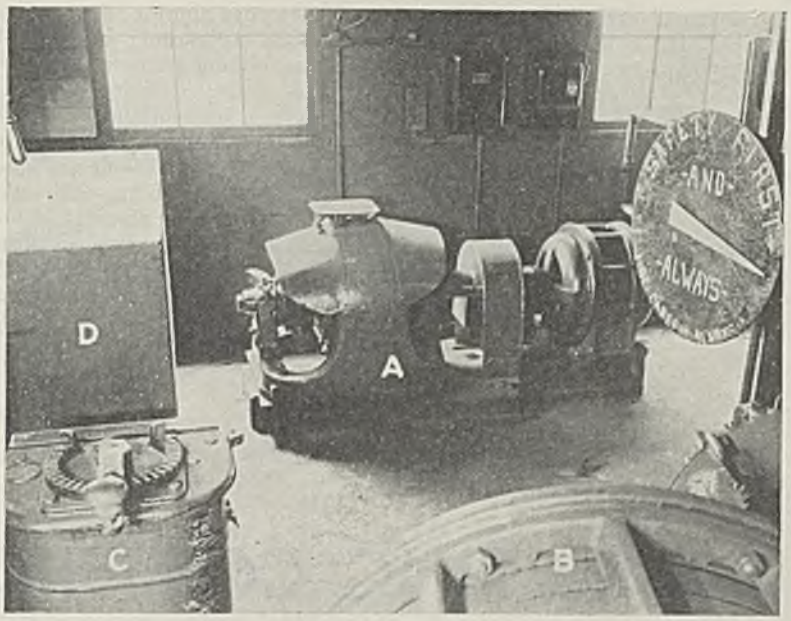
TANGIBLE savings of over $3,000 have resulted from the use of d.c. dynamic braking on a 125-hp. 2,300-volt motor of the slip-ring, or wound-rotor, type driving a refuse-disposal hoist at Mine No. 93 of the Consolidation Coal Co., Jordan, W. Va. This method of dynamic braking, first used commercially in 1918 on a hammer-head crane, has been applied in few if any other instances in coal mining. It was installed at No. 93 in May, 1935, to augment and practically replace the former methods of braking by friction band and by a.c. regeneration. The latter form of braking was not suited to the local conditions and hence was not used.

In the d.c. dynamic method of braking, the hoist-motor stator is disconnected from the a.c. line and a source of direct current is connected to two of the three leads of the stator. Energy resulting from braking of the hoist is dissipated in the rotating parts of the motor and in the secondary resistor which serves also for starting and controlling the hoisting. A maximum torque exceeding the motor-starting torque by as much as 25 per cent may be secured at synchronous speed and the braking torque diminishes as the motor speed decreases. Thus zero speed results in zero torque.

As compared to plugging, otherwise known as reversed-phase operation, d.c. dynamic braking obviates using energy from the line, is not as hard on equipment and has no tendency to bring the hoist to a complete stop and then cause reversal. The principal application of d.c. dynamic braking has been for quick emergency stopping of flywheel motor-generator sets used for supplying power to reversing mills and to large hoists. A flywheel set may coast for nearly an hour unless some braking effect is applied.

At Mine No. 93 the 125-hp. motor hoists mine rock from a car-dumping point at the mine-track level 450 ft. up a steep hillside to a bin, from which it is hauled to the disposal space by a gasoline-driven pneumatic-tired "Dumptor." The incline-car capacity equals that of a mine car and the maximum live load is close to 6 tons. Prior to the electrical control changes, the empty car was lowered by means of a hand brake, with the result that the maple blocks with which the brake drum is lagged had to be renewed once a month. This in itself cost $75 plus at least two man-days of labor. Also, as was demonstrated by one or two cases of overspeed, the lowering was not as safe and reliable as required.

Not a single renewal of brake blocks has been made since a complete renewal at the time the new electrical control was applied. At the date of this writing the set of blocks had been in service forty times as long as the average life of the former sets, yet the blocks have been worn only $\frac{1}{8}$ in. The hand brake is used only for final stopping during the last 20 to 30 ft. of travel and for holding the car at rest at the top or bottom of the incline.



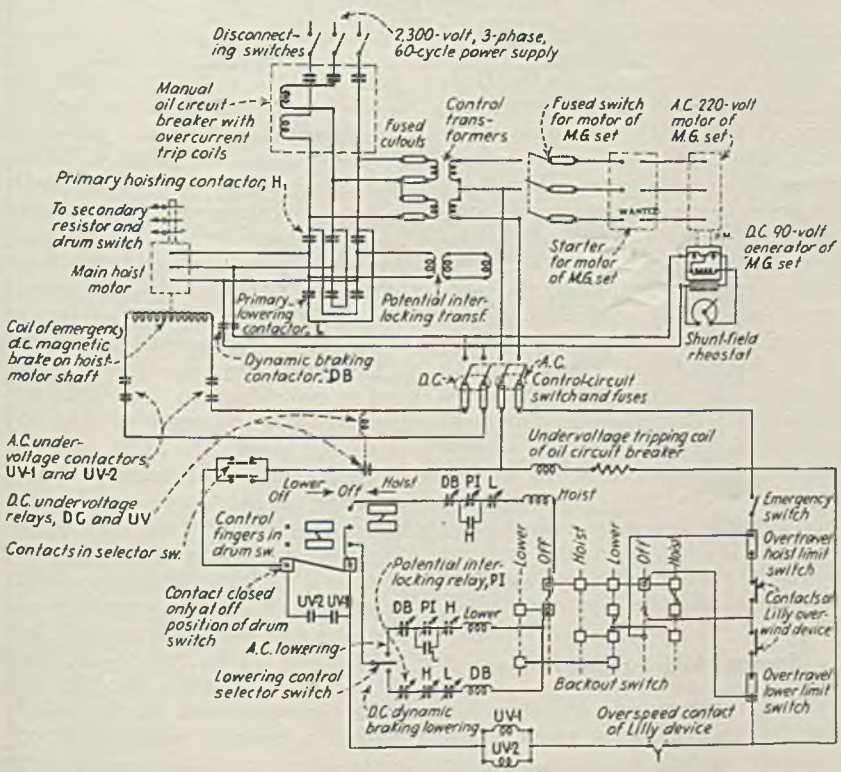
"A" is the motor-generator which supplies d.c. to the a.c. motor; "B" is the 150-hp. hoist motor; "C" is the drum switch which was revised to include control of the d.c. dynamic braking; and "D" is the steel cabinet inclosing the secondary resistance

As indicated by the accompanying elementary wiring diagram, a 90-volt motor-generator set is used to supply direct current to one phase of the 2,300-volt motor. The dynamic-braking contactor which makes the connection is interlocked with the primary hoisting contactors so that the former can close only when the latter are open. The original semi-magnetic hoist control, consisting of air-brake primary contactors and drum-switch secondary, was utilized in the new arrangement.

A solenoid brake (d.c., spring-set, magnetic-release) was added to the motor shaft and the two poles of a knife switch feeding this brake are combined in a four-pole switch, the other poles of which feed the 220-volt a.c. control circuit. Thus, pulling the switch to open the control circuit sets the solenoid brake. Contactors in the solenoid-brake circuit and also contactors for the d.c. dynamic braking are interlocked with the a.c. control circuit. To permit use of the drum-switch lowering position for either d.c. dynamic braking or for straight a.c. lowering, a selector switch was installed. Adding a jumper between two fingers was the only change in internal connections required in the drum switch.

Before starting the hoist, a switch is closed manually to start the motor generator. Its d.c. voltage is adjusted to 90, the potential required to force through the stator 55 amp., which is a predetermined safe amount and torque-sufficient requirement. This value of d.c. current is 37 per cent greater than the 2,300-volt a.c. full-load rating of the motor. To begin

Elementary wiring diagram for the revised hoist control, which to date has saved $3,000



d.c. dynamic braking when lowering the car, the drum switch is moved quickly from neutral position to full lowering position and then is advanced back toward neutral to effect greater braking.

In addition to the hoist operator, two other men are employed in the disposal system. One operates a gooseneck dump by which the cars of mine rock and tipple pickings are tipped over a pit where the incline car is loaded and the other man operates the "Dumptor" over a ¼-mile maximum haul at the top of the hill.

The motor-generator set is one built from idle equipment picked up at the Consolidation mines. It incorporates a 15-hp. 220-volt a.c. squirrel-cage motor, a 15-hp. 250-volt d.c. motor, shunt field rheostat, d.c. voltmeter and d.c. ammeter. Instead of being supplied by this separate motor-generator set, direct current could have been obtained from the mine trolley line (275 volts), but the former method, which depends on one source of power supply for both alternating and direct current, offered the advantages of closer direct-current voltage regulation, more certain control of the hoist and greater electrical safety because it precludes the possibility of impressing 2,300 volts onto the mine trolley line if the interlocks should fail.

OPERATING COST PARED

By Better Roof Support, Pipe Couplings And Refuse-Disposal Equipment

By R. DAWSON HALL
Engineering Editor, Coal Age

MECHANIZATION is but one of many ways in which the Hudson Coal Co., of Scranton, Pa., has sought to reduce the cost and thus offset the declining price of anthracite. Timber which requires frequent renewal, and sometimes is inadequate for the purpose, has been replaced by steel arches, but only where the expected life of the place to be kept open is seven years or more, for the cost of steel is 2½ times that of wood, both for the arch itself and for its permanent lagging.

Improved pipe couplings with rubber gaskets have been introduced in compressed-air piping to give tighter and more flexible joints, longer life, and greater speed and ease in coupling. Many dumping installations for reducing the disposal cost of the vast quantity of breaker refuse and mine rock have been devised and erected in the course of years, all showing marked economies in operation. These have culminated in an installation which gives minimum expense and delay in the disposition of material and, by its applicability to great heights in dumping, is sparing in its inroads on valuable storage space.

Steel arches are used by the Hudson Coal Co. to afford permanent support and always are made heavy enough to keep places open without renewal or readjustment. For these, no pressure-accommodating stilt supports are provided, such as customarily are used in European mines where greater depths afford pressures less readily controlled. These arches are constructed by shaping 4- or 5-in. I-beams (see Fig. 1*A*) giving a clear span of 10 ft. and a radius of 5 ft. with a leg length of 2 ft. 6 in. A steel-arch set consists of two units, each embodying a 30-in. leg with a quadrant. The quadrants of two units are connected at what becomes the crown of the arch by a heavy steel splice, 18 in. long, held in position by four ¾-in. steel bolts.

Sprags Hold Arches in Place

Arch members are drilled at the factory with holes to accommodate six pipe sprags, or struts, held by ⅞-in. screwed rods, by which the members are kept at the desired distance from each other and prevented from twisting, the latter a failing such sets have if not loaded wholly within their plane and if not secured to each other for greater stiffness. At each sprag location, two holes have been drilled so that the sprags can be set either in a direct line or staggered at every set at 6-in. centers.

Distance between adjacent arch sets is maintained by ⅞-in. rods acting as tension members and by standard pipes of 2⅜-in. exterior diameter cut to the required length and serving as compression, or distance, members. Before erecting the first arch set, all its sprag holes are fitted with these distance members or sprags. Where the sprags are in line and not staggered, in each hole to be used, a ⅞-in. bolt, 2½ in. long, is inserted, as shown in Fig. 1*B*. Over the screw end of the bolt is slipped a special washer with an outer diameter of 2 in. and an inner

diameter of 1 in. This washer, which is pushed back until in tight contact with the web of the arch set, holds the screw of the bolt in place by its inner diameter and the pipe in place, when fitted, by its outer diameter, because the interior of the pipe has a diameter of 2 ⅛ in.

Onto the free end of the bolt is screwed, until it reaches the washer, a hexagonal buckle, 8 in. long and measuring 1½ in. across the flats. A tierod, which is of ⅞ in. diameter and 2 ft. 10 in. long and is threaded for 6 in. at each end, is screwed into the

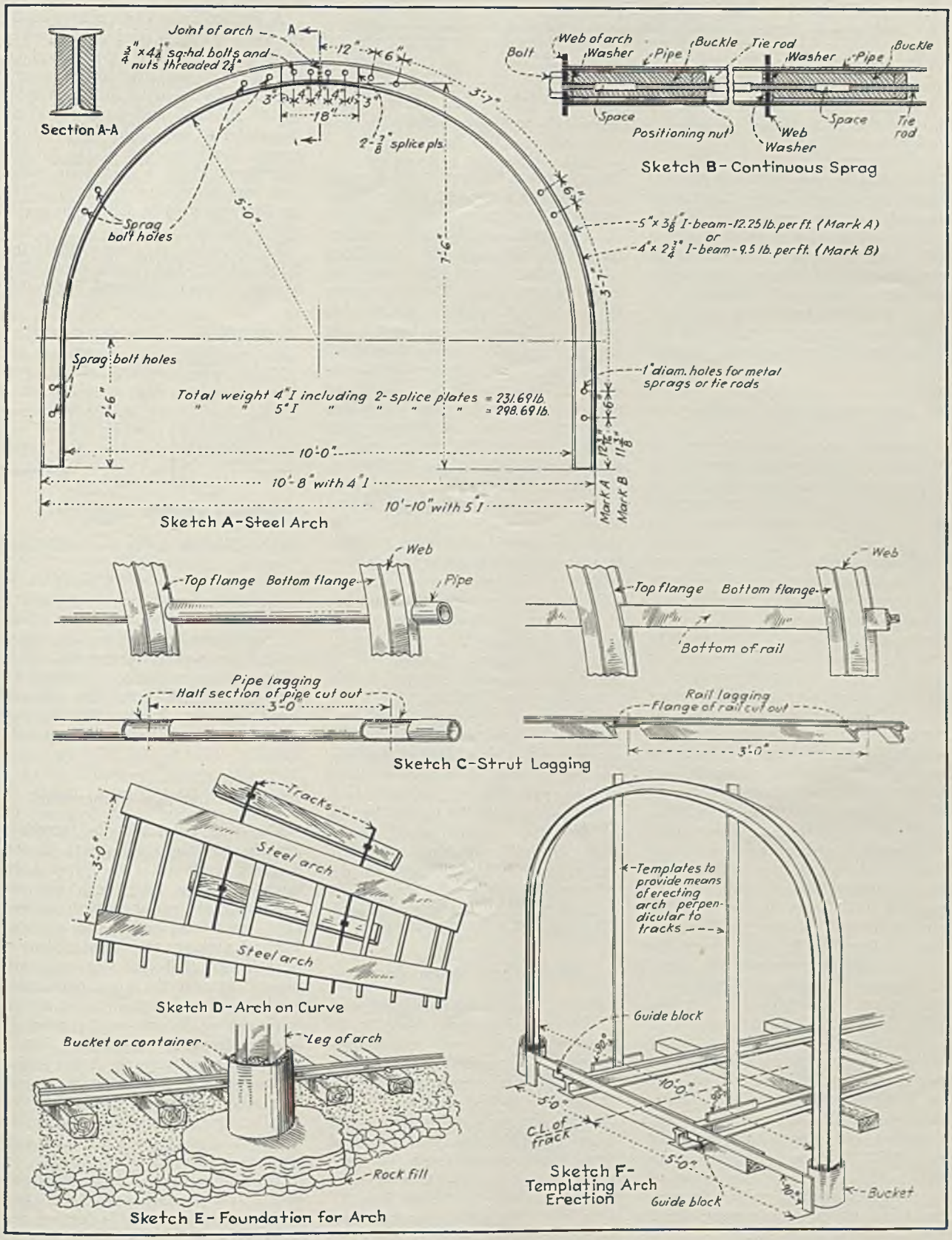


Fig. 1—Steel arches, their details and emplacement

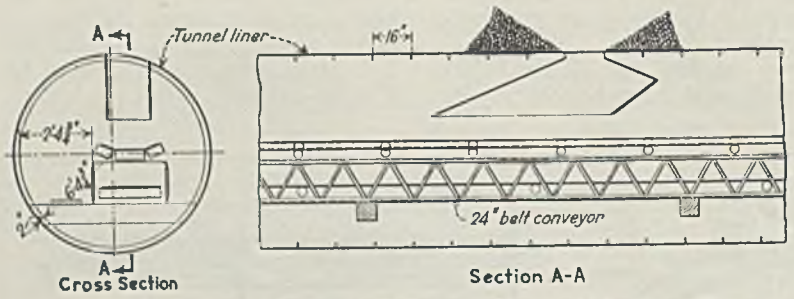


Fig. 2—Equipment for removal of a waste-dump at Marvine colliery

free end of the buckle. How far it is caused to advance along the thread depends on the proposed distance between adjacent arch sets. A standard ⅞-in. positioning nut has been run onto the tierod screw, and on the location of this nut the distance the screw rod will enter the buckle is determined. A space may be left between the ends of the bolts and tierod.

Pipe Resists End Pressure

Over the entire assembly on the inner side of the arch, a pipe of the required length is then set covering washer, buckle, positioning nut and part of the screw tierod. Then, when all the several sprag assemblies are completed, the two arch members are erected into position and the joint at the crown of the arch is bolted into place. It will be noted that the free screw of the tierod will extend far enough to pass through the web of the next arch set, when erected, to permit of the insertion of a washer and sufficient engagement with the buckle of that arch. With staggered sprags, the screw tierod is secured merely by ⅞-in. nuts at each end; washers are provided at the web of each arch set and a standard pipe is added to keep the arch sets apart.

Sometimes sprags are placed on the periphery of the arch. Such sprags are made of rail or pipe grooved to fit down on the arch sets and to act not only as sprags but as lagging (see Fig. 1*C*). However, the lagging may be separate and consist of shaking chute pans, steel rail, steel pipe or shaker-screen jackets which have served their time.

The 4-in. I-beams out of which arches are constructed weigh 9.5 lb. per linear foot and the cost of each set is $7.50; the 5-in. I-beam material weighs 12.25 lb. per linear foot, and each arch therewith constructed costs $11.80. These costs cover splice plates and bolts and two coats of heavy black asphalt paint. To protect this coating, the sets when stored are separated by plank.

Sets are placed at varying centers, but where the arching is on a curve the outer legs are set at the same spacing as has been chosen for sets on a tangent, and the sets are arranged radially with the inner legs much nearer to each other than the outer (see Fig. 1*D*). Before erection the gradients, if possible, are evened, and the method adopted for placing the sets in true alignment and at right angles to the gradient is shown at *F* in the same figure. They are erected with due attention to posture and regularity, for not only do they present a better appearance but, so placed, will develop the utmost resistance to deformation.

To protect the feet of the arches from corrosion by mine water, either normally present or during freshets, they are shod with discarded circular buckets, which in turn rest either on solid floor or on a block of suitable rock set on the floor or on a rock fill; the bucket is filled with a mixture of 50 per cent of sand and 50 per cent of asphalt, tamped solidly into place (see Fig. 1*E*).

Before arch sets are placed, authority must be requested by the superintendent in a written application accompanied by a print showing location and size of job, and each authorization must be signed by the vice-president in charge of operations. In 1927, 500 such sets were erected; in 1936, 425, and in the following year, 553. In the present year, 100 such sets have been placed, making in all 1,578 sets.

Dished Plates Form Arch

Heavy pressure has deformed some of the sets, but none have to be strengthened, replaced or supplemented. In pumprooms and similar stations containing machinery, Schaefer concrete arches are used.

In one instance, and this on the surface, at Marvine breaker, steel tunnel liner plates, such as have found extensive application in sewer work, have been used (see Fig. 2). Here, with the aid of careful forepoling, a tunnel 100 ft. long using liner plates 16 in. wide was driven into a loose bank of crushed jig refuse. The opening measured 6 ft. 8¾ in. in diameter inside of the steel plates. As the dishing of these sections was 2 in., the clearance was 6 ft. 4¾ in.

A Barber-Greene belt conveyor, 24 in. wide, having a minimum capacity of 20 and a maximum capacity of 60 tons per hour was erected in the tunnel. The dump to be loaded was 90 to 100 ft. high, and the removal of the material soon formed a crater around the inner end of the tunnel, to extend which a two-drum hoist with scraper was provided. A vibrator feed was used to deliver the material to the belt.

Experience has shown that the joints of air and water pipes frequently become battered, corroded and weakened and that the pipes are not easily coupled and that, where they are to be thus joined, they must be laid in perfect alignment. For this reason, a joint devised originally for oil and gas lines, the Dresser coupling (Fig. 3), has been introduced in the Hudson company's mines.

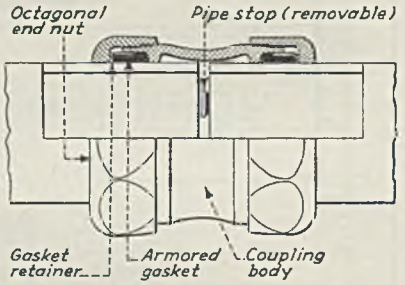


Fig. 3—Couplings for air and water pipes

Why Pipes Are Unthreaded

The pipe joints may be threaded, but the practice is to cut off the threaded portions, if the pipes have threads, before their ends are inserted into the coupling with its end nuts, gasket retainers and gaskets. The end nuts are then tightened by a wrench so that the gaskets are pressed against the pipe, holding it firmly in place. As the gasket, which is of rubber, is outside the pipe, it is not affected by the air or liquid which the pipe conveys. Being short, the coupling readily can be tightened even when the pipes are not wholly in alignment and, within reason, it will hold tightly regardless of any changes in the lay of the pipe.

Threads deprive a pipe of 40 per cent of its strength and the 60 per cent remaining is still further reduced by corrosion. As the pipe ends are separated and as in other ways

the connection is not rigid and, as the sliding contacts between coupling and line make the pipe line compressible and extensible, breakage from bending, compression, extension, water hammer and change of temperature need not be apprehended.

After six months trial at specified collieries of the Hudson Coal Co., permission for requisition at all collieries was granted, and now all the Hudson mines are using them. In 1937, about 1,300 such couplings were installed, including 38 three-way couplings and 150 ells, all for ¾- to 2-in. pipes.

Plug valves are used because of the damage done to valve stems by flying coal, by mishandling and by derailed cars. Valves are placed not only near the equipment but also in the gangway. Every effort is made to prevent the use of compressed air for ventilation. Only by providing an excess of low-pressure ventilation at the working face can the temptation of miners to use compressed air for ventilation be curbed satisfactorily, and such provision always is made.

Cuts High Disposal Cuts

Dumping, so easy a matter with coal, because the breaker conveyor or railroad locomotive removes the material as it is dumped, is a costly operation with mine rock or breaker refuse, and the number of forms of equipment for this purpose is legion. As, in the anthracite region, dump fires are unusual and rarely if ever spontaneous, permanent equipment can be installed on rock or coal banks without risk of loss.

At the Grassy Island plant of Olyphant colliery (see Fig. 4) an air-operated dump car, with its body mounted on a movable carriage arranged to discharge the load of rock forward or on either side, is used to build a rock bank on a 40-per-cent gradient. Though the trucks stand on the gradient, the body of the car is horizontal. The track on which the car runs is supported by 7x9-in. ties at 24-in. centers. Near the dumping end, the track is held down by anchors at 10-ft. intervals which are hung on the front of the dump and buried in it as it is built. These anchors are rough timbers of about 10 in. diameter and 8 to 10 ft. long, and at each end are wrapped around twice by ropes which are attached by clips to other ropes 12 ft. long, with their ends fastened to angle irons passing from tie to tie, for which purpose the ropes are looped at the upper end with the aid of clips, which loops, in turn, engage hooks held by bolts to the angle irons. Second-hand mine hoisting ropes of about 1¼ in. diameter are used for these purposes.

At the top of the rock bank, the hoisting head sheave is mounted on a structural-steel frame which consists of two heavy girders with cross members and supports two rails elevated about 30 in. above the main dump track, with which they are aligned. Trailing rails mounted on a structural-steel ramp section connect the elevated rails with the main track and enable the dump car to be hoisted onto the frame and dumped over the edge of the growing rock bank, the car dumping its load to either side or straight ahead, as desired.

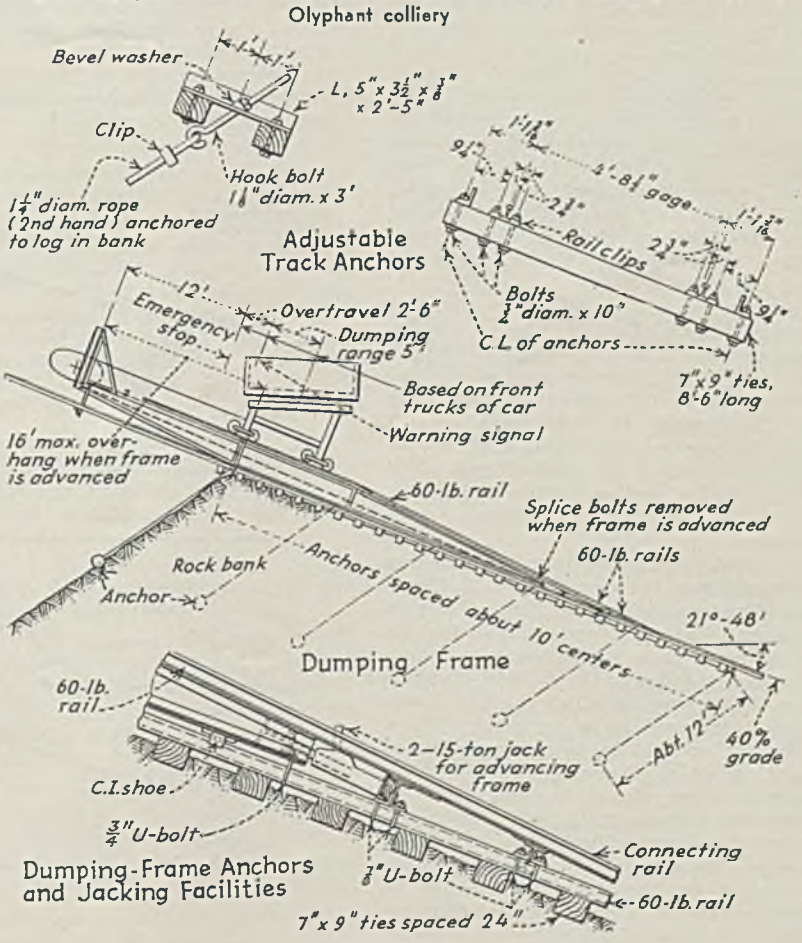
The structural frame with its trailing rails is advanced by two 15-ton jacks, the frame sliding on track rails which are added as needed. By jacking up the frame, when necessary to compensate for any bank settlement, the correct gradient is maintained.

As the elevated frame track and elevated car body raise the dumping point several feet above the bank, a fairly wide and stable dump can be built even when it has reached a great height and slides have occurred, for enough material to build a permanent road always can be deposited.

40 Days Without Attention

A compressed-air cylinder supplied from a storage reservoir mounted below the dump body automatically causes the car to dump on the bank its rock load of about 25,000 lb. This reservoir is automatically recharged at the end of each return trip from a coupler valve at the foot of the rock plane. No labor is required on the rock bank except when the frame is moved forward. At the present height of the bank, a 5-ft. advance of the frame provides about 40 days' dumping space when 225 mine-rock cars are being discharged per shift. The installation was designed to handle 250 cars per shift with a maximum haul of 1,170 ft., which distance represents a 20-year storage life. The storage capacity of the bank will increase rapidly after a fair height is reached and, therefore, fewer frame movements will be needed than at present.

Fig. 4—Equipment for building a rock dump at the Grassy Island plant at Olyphant colliery



Notes . . . FROM ACROSS THE SEA

IN THE APPLICATION of rock dust, declares the 1936 report of E. H. Frazer, divisional inspector for the Scottish mines, the dictum should be heeded that several light treatments are preferable to a single heavy one. If four bags are needed per month in any location, it is better to apply a bagful each week, so that the coal dust will be covered at more frequent intervals and more intimately mixed with the rock dust. One might add also that with this provision the inert dust will be more dispersable.

The Fife Coal Co., Mr. Frazer adds, has introduced a conveyor that, by flights on a moving chain, so retards the progress of the coal that the latter can be lowered gently to the haulageway, even though the face is at an inclination as steep as 1 in 2. Before the change, the coal was thrown into stationary chutes and slid down these at such high velocity that much coal was broken and dust raised. Safety, hygiene and larger coal were alike promoted by this mechanical retardation.

At Bestwood Colliery, starting January, 1935, reports J. R. Felton, divisional inspector, North Midland Division, England, 80,100 ft., or about 15 miles, of main roadway has been cleaned, limewashed and rock-dusted and three miles of roadway has been cleaned and limewashed. A gang of men (usually five) are employed solely for this work. Starting at one end of the road, they clean, limewash and rock-dust 240 ft. a day. Two or three men, with hand brooms, brush roof, floor and sides and load the dust and dirt thus collected into cars. Behind them follow two men with a limewash machine who spray the roof and sides.

A short ton of lime will cover roof and sides of 642 ft. of roadway of an average cross-section of 75 sq.ft. After spraying a length of 30 ft., the two men return and throw rock dust by hand on roof, sides and floor, while the whitewash is still wet. A long hundredweight (112 lb.) of rock dust is used per yard of road of 75 sq.ft., average section. When finished, a thick layer of rock dust adheres to all surfaces.

A hood, suspended over the loading point, declares the report of W. J. Charlton, divisional inspector, North Western Division, England, draws dust-laden air at conveyor ends into a series of pipes arranged as follows: (1) A 24-in.-diameter pipe, 18 in. long, in which the dust meets a mist delivered by a projector; (2) a reducing funnel, 6 in. long, tapering from 24-in. to 9-in. diameter; (3) a 9-in.-diameter pipe, also 6 in. long; (4) an enlarging funnel, 12 in. long, which increases in diameter from 9 to 24 in. and incorporates a water ring from which six jets play on the dust, reducing it to sludge; and (5) a pipe of 24-in. diameter and 18 in. long, which collects the sludge so that it can be scraped into a car. About 72 U. S. gal. of water is used per shift for mist and sprinkler, and together they enable the work at this loading point to be done in comfort.

At some North Staffordshire (England) mines, a mechanically driven fan is used to suck, through a pipe, the dust-laden air from the steel hood which covers the delivery end of a conveyor. This dust is deposited in 36 vertical cloth pipes, 6 in. long and 9 in. in diameter; 3.27 oz. of dust is collected for every short ton of coal the conveyor loads. Since the equipment has been installed, the attendant at the loading point has been able to discard his respirator.

Short experimental lengths of roadway at a few mines in the North Western Division have been treated with wetting agents, and in one mine, a half-mile section has been sprinkled with Permimal, permitting the attendant to perform his duties with greatly increased comfort.

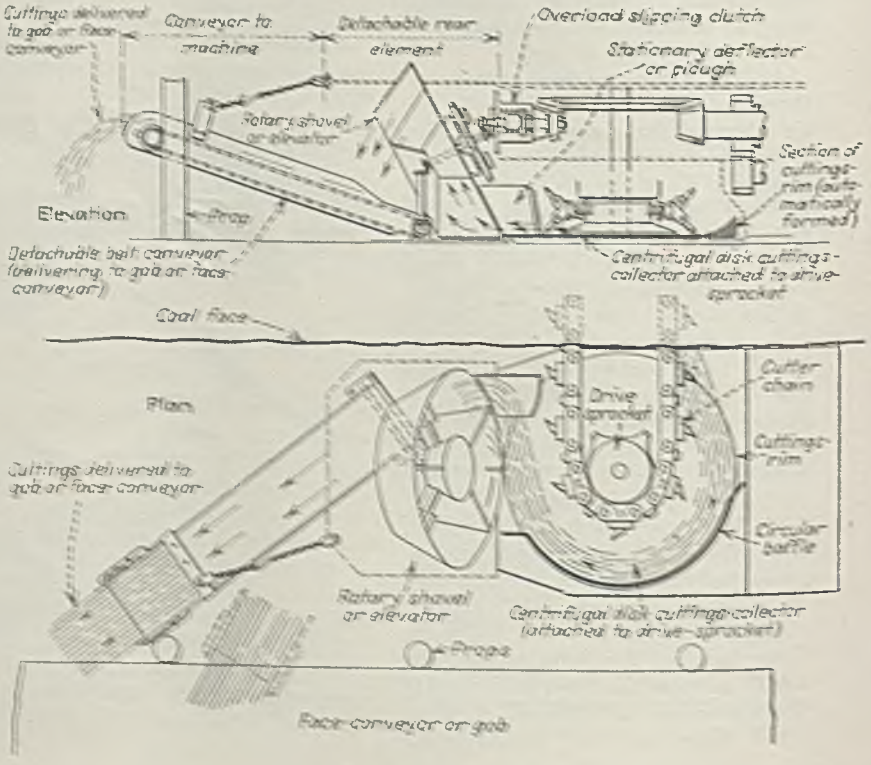
Shale dust is displacing limestone dust in some collieries in the Cardiff (South Wales) and Forest of Dean (Gloucestershire, England) Division, asserts J. M. Carey, divisional inspector, because it mixes more freely with coal dust in suspension; every shot fired raises by its concussion a cloud of inert dust. Nevertheless, others question whether shale dust is preferable to limestone, because the former may cause silicosis. In some gate roads where the dust of the friable coal is deposited in quantity, roads are cleaned daily and then rock-dusted.

Importance of bagging the collected dust and not merely piling it is stressed by T. Ashley, inspector of the Swansea Division of South Wales. When thus piled, it too often is dispersed by the air current. At one mine, over the delivery end of each loading conveyor, he adds, a wood or sheet-iron hood is placed; thence the dusty air is carried by 12-in.-diameter air pipes and compressed-air-driven electric fans into the nearest gob space between the longitudinal packwalls. Across the ends of these spaces near the face, brattice cloths are hung to prevent the dust from reaching the working area. Brattice sheets, sometimes for the full height of the road, also are hung at both ends of the car being loaded, thus forming a chamber into which the attendant goes only when he has to move or replace the car. But, where ventilation necessities so require, only a single sheet is hung, inby of, and to the height of, the car.

Exhaust fans are being provided in the Swansea Division to carry the dust by means of air pipes from the coal dumps on the tipple and from other points where dust is made. Shaker screens also are being separated by partitions from the picking belts to keep dust from the pickers. In some instances, more attention should be paid to the disposition of the dust thus drawn from the tipple. It should not be allowed to pollute the atmosphere. One method of dealing with this dust has been to deliver it into chambers where it is converted into sludge by exhaust steam.

BUG DUST—"kirvings" or "gum," as our British cousins term it—is dragged out of the cut by the bits of the undercutter and much of it is drawn in again to be wedged at the back of the undercut and broken by the bits into real

Collects bug dust from cutting machine



dust, for bug dust is an unfortunate, uneuphonious name for something that is only in part powdered material. Some leave these compacted cuttings in the back of the kerf. Others have a man go around from place to place to dig them out with a long-handled shovel, being impressed with the fact that to leave them in place causes them to hold up the coal when the shots are fired, necessitating the use of more powder and the drilling of more holes and incidentally, therefore, the making of more dust in shooting and drilling.

Thus, anything that will remove the cuttings promptly will: (1) cause the coal to fall more cleanly to the back of the cut; (2) decrease the likelihood of injury from falls of coal at the face; (3) decrease roof falls; (4) save explosive; (5) reduce drilling costs; (6) give more coal of salable size; (7) reduce dust at the face; (8) prevent stalling of the machine; (9) increase bit life; (10) enable more cuts to be made; (11) save in power; (12) enable posts to be erected as fast as the coal is undercut; (13) give the drilling crew prompt access to the face; (14) remove dangerous dust from the mine floor; (15) save a helper or give him less work.

The first seven advantages will be obtained if a man is hired to clean out the cut after the cutting is done, but that adds to the cost of production. For these reasons in Great Britain, with its favoring longwall faces, efforts are being made to divert the cuttings by a stationary plow after they have left the cut as they are being carried around by the bits. A rotary shovel or excavator actuated by the undercutter lifts the cuttings thus diverted and puts them on a belt, similarly actuated, which delivers them to the face conveyor or drops them into the gob.

In describing the cuttings-loading machine of Austin Hoy & Co., the *Iron & Coal Trades Review* declares that with modern speeds and undercut depths the human "gummer"—machine helper—fails to remove enough of the cuttings to prevent the machine from stalling and that the churning, grinding and packing of cuttings may well absorb from 10 to 15 hp. The "gum-loading gearhead" is at work at the mine of the Ashington Coal Co., Ltd.

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. Where no price is appended in the notice of a publication of the U. S. Bureau of Mines, application should be directed to that Bureau. 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 are in the review notice.

Ventilation at the Anthracite Collieries of the Northern Pennsylvania Field, by G. E. McElroy, U. S. Bureau of Mines. I. C. 6965, 23 pp.; paper; mimeograph.

This mimeograph has, in addition to its 23 pages, 18 full-page charts. The author declares that in the Northern Anthracite Field somewhat more than nine tons of air is delivered per long ton of coal produced. Its fans circulate more than 25,000,000 c.f.m. of air at a yearly cost of about $3,500,000; more air is mechanically handled than at all the metal mines of the United States, Canada and Mexico combined. From 10 to 1,600 cu.ft. of methane per ton mined is produced and a maximum of 6,500,000 cu.ft. of methane is driven out of the workings every 24 hours at one of the largest gassy collieries. Main doors are in groups of three, two to form an air lock and a third as a spare to replace a door should one be damaged. Temperatures in working places range from 50 to 65 deg. F. and humidity ranges from about 75 to 90 per cent.

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Wood Preservation, by G. M. Hunt and G. A. Garrett. McGraw-Hill Book Co., New York. 457 pp., 6x9 in.; cloth. Price, $5.

This authoritative publication meets a protracted demand for a book that would collate the information available on wood preservation. It describes the field for such preservatives, the agencies that make for wood deterioration, the preparation of material for treatment, the many wood-preserving processes, the factors affecting penetration and absorption, the economics of preservative treatment, the properties of treated wood, treating plants and equipment, ways of protecting timber other than by chemicals, also fire-retarding treatments. The large number of preservatives available will surprise those who have not made an exhaustive study of this subject. The killing concentration of a host of preservative chemicals is given and, where this is not known, the total inhibition point is stated.

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Coke Reactivity Determined by a Modified Ignition Point Method, by J. J. S. Sebastian and M. A. Mayers. Cont. 59; 19 pp.

Kinetics of the Dry and Water-Catalyzed Reaction Between Carbon Monoxide and Oxygen at and Above the Upper Explosion Limit, by G. von Elbe and B. Lewis. Cont. 60; 9 pp.

Kinetics of the Explosive Reaction Between Hydrogen and Oxygen Sensitized by Nitrogen Peroxide, by G. von Elbe and B. Lewis. Cont. 61; 8 pp.

Direct Microdetermination of Oxygen in Organic Substances by Hydrogenation, by W. R. Kirner. Cont. 62; 13 pp.

The Ignition of Gases by Local Sources, by H. G. Landau. Cont. 63; 14 pp.

The Mechanism of the Combustion of Hydrocarbons, by G. von Elbe and B. Lewis. Cont. 64; 10 pp.

Theory of Flame Propagation, by B. Lewis and G. von Elbe. Cont. 65; 12 pp.

Comparisons of Ideal and Actual Combustion Temperatures and Pressures: Anomalous Effects; Gas Vibrations, by G. von Elbe and B. Lewis. Cont. 66; 8 pp.

Ultimate Yield of Solvent Extraction of Coal: Calculation From Rate of Extraction, by H. G. Landau and R. S. Asbury. Cont. 67; 3 pp.

Carbonization of Typical Bituminous Coals: Effect of Rate of Heating and Final Maximum Temperature, by W. B. Warren. Cont. 68; 17 pp.

All these are publications of the Coal Research Laboratory, Carnegie Institute of Technology. 6x9 in.; paper.

A simple and easily operable apparatus for measuring rise in the temperature of coal over a small increment of time has been devised; this, as a means of determining the exact point at which the combustible shows evidence of spontaneous or self-heating; that is, when it from being merely a recipient of heat begins by its reaction with oxygen to start to burn itself. Combustion is often not a direct combination of the gases involved and several of these contributions attempt to explain the regroupings of the several elements or the "mechanism of combustion."

The order of actions in coke making perhaps are, says Dr. Warren: (1) depolymerization, (2) a mild decomposition with release of water and of simple gases, and (3) reaction of the depolymerized molecules, probably by condensation, to form larger ones. This last is the so-called "sensitive stage" because it determines the yields of coke, oils and gas. With slow heating, this third stage is more complete than with rapid heating, and the molecules accordingly are larger when the fourth stage—extensive distillation—arrives. The relative quantities of solid, liquid and gaseous products depend upon the extent of condensation which has occurred while the coal was still in the sensitive range.

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Active List of Permissible Explosives and Blasting Devices Approved Prior to June 30, 1937. R. I. 3361. U. S. Bureau of Mines. 22 pp.; mimeograph.

One hundred and ninety-six brands of explosives are recorded with their classification, weight, smallest permissible diameter, rate of detonation and manufacturer's name.

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Report of H. M. Inspectors of Mines and Quarries for the Year 1936, 56 pp.; Electrical Inspector of Mines, 105 pp.; Scotland Division, 80 pp.; Northern Division, 52 pp.; Yorkshire Division, 64 pp.; North Midland Division, 51 pp.; North Western Division, 48 pp.; Cardiff and Forest of Dean Division, 29 pp.; Swansea Division, 45 pp.; Midland and Southern Division, 56 pp.; British Library of Information, New York. Prices of all ten reports, except that of the electrical inspector, are 35¢ each; that of the electrical inspector is 70c.

Such matters as are of interest in these reports are or will be treated in "Notes From Across the Sea."

This cutter is putting on his first pair of F-3147 Ful-Vue Goggles . . . safeguarding against one of the chief risks to himself and his employer. For now he is no longer wide open to loss of working time, loss of personal efficiency or complete loss of livelihood through serious eye-injury. And his employers are no longer wide open to losses in compensation, production, sunken morale and other hidden charges that often run up cost-per-ton anywhere from 3c to 5c . . . *run profits into the ground.*

Many mines have found that Ful-Vue Goggles give miners a new attitude toward eye-protection. For Ful-Vues are light, cool, comfortable, good-looking, with high temples that give full side vision. F-3147 shown is one of three sizes. For full details and demonstration, get in touch with the local representative of Mine Safety Appliances Co. Make a note now to drop him a line today.

AMERICAN OPTICAL COMPANY

REPRESENTED IN THE MINING INDUSTRY BY MINE SAFETY APPLIANCES COMPANY

5084

OPERATING IDEAS

From

Production, Electrical and Mechanical Men

Self-Service Man Hoist Used at Kings Station

Through the installation of standard elevator controls and pushbutton stations at the top and bottom landings passengers now are able to operate the man hoist at the Kings Station mine of the Princeton Mining Co., Princeton, Ind., by themselves. The controls were applied to a standard mine hoist, which was reduced in speed to adapt it to handling men.

The hoist operates in the escape shaft, which is 400 ft. deep between landings. When in coal service, for which it originally was designed, the hoist, a 6-ft. straight-drum unit, was driven through spur gears by a 300-hp. motor to give a rope speed of 1,000 f.p.m. When installed on the man-hoist, the speed was cut to 300 f.p.m. by replacing the original gear drive with a new drive consisting of a new pinion, a flexible coupling, a Westinghouse speed reducer, a Thrustor brake and a 75-hp. motor.

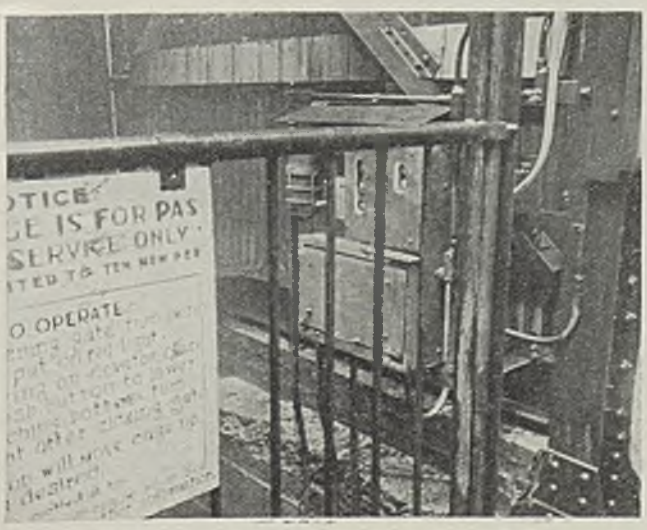
The Thrustor brake is mounted between the motor and the reducer and is used to bring the cage to rest at the top and bottom landings and hold it there until it again is called into service. The motor is started from the pushbutton stations at the top and bottom landings, after which the movement of the cage and its stoppage at the other landing is controlled automatically by a standard Westinghouse elevator control with limit switches to govern the distance traveled. The single cage in use, which is counterweighted, has a capacity of 24 men. As the shaft is the upcast, the cage is fitted with a grilled bottom to reduce resistance. Rope size is 1¼ in. Normally, this cage is used by only a few men on the bottom and by men who must go down or come out of the mine during the day when it is inadvisable to stop the regular hoist, on which most of the men are handled before and after the working shift. In the future, however, it is planned to handle all men and also materials on this cage, at which time a tunnel will be run from a landing just below ground level to the wash house so that, particularly in the winter time, men will not be subject to sudden changes of temperature. Materials will be handled from the ground level under this plan.

Gates naturally are installed at both landings, and these gates are interlocked with the elevator control so that the cage cannot be started until the gate is closed and latched. The pushbutton stations, as indicated in an accompanying illustration, include not only the regular operating buttons but also a set of inching buttons, for positioning the cage at the landing, and a red signal light. When a passenger is about to board the cage, he first throws a switch to turn on the red lights at both the top and bottom landings and thus show that the cage is in service.

If the cage is at the landing, the passenger opens the gate and gets aboard. While the gate is opened no one—not even a person at the other landing—can start the cage. If the cage should happen to be at the other landing, the prospective passenger, after turning on the red light, presses the proper button to bring it to him. As long as the cage is away from a landing, an interlock prevents opening the gate. Once the passenger is on the cage and the gate is closed and locked, he presses the proper button to set the cage in motion. When the cage arrives at the opposite landing, a limit switch operating off the hoist drum makes contact to break the motor circuit and set the Thrustor brake. At the slow speed of operation, stoppage is practically instantaneous. After the cage stops, the passenger, if he desires, may level it up with the landing by using the

Showing the new drive which was applied in converting this hoist to passenger service. At the extreme left is elevator-control panel which automatically controls the operation of the hoist.

Passengers start cages from pushbutton stations at the top and bottom landings. Stopping at the other landing is automatic. The stations also include inching buttons and a red service light.



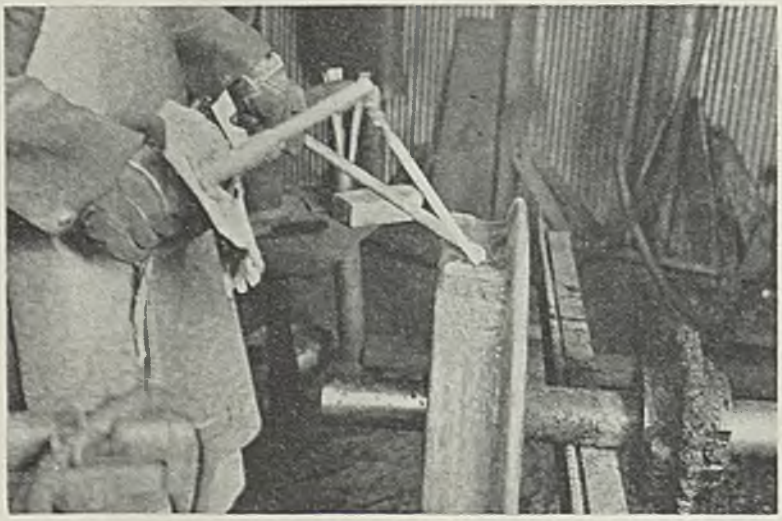
inching buttons. On leaving the cage, the passenger closes the gate and turns off the red lights to show that the cage is ready for a new passenger.

So that the operation of the cage always will be under the scrutiny of a responsible person, a system of indicating lights on a separate circuit has been installed, with the lights in the main engine room. A green light shows that power is on the motor circuit, a red light that the cage is traveling, and a white light that the power is off the motor circuit. Thus, when the cage is in service, both the green and red lights are on; if it is out of service, only the green light burns. A white light indicates power off with the cage at either the top or bottom landing, while white and red lights indicate that the power is off and the cage has stopped somewhere between the two landings.

In case of power failure the cage, of course, stops automatically if it is in service between the two landings. After such a stoppage, the cage does not start automatically upon resumption of power, but must be started from the pushbutton station at either the top or bottom. This makes it possible to warn any passengers in advance and thus prepare them for a resumption in service. The hoist also is provided with an overspeed trip and also a mechanical overtravel trip for use in case the regular limit switches should fail. Either of these trips will release a weight which applies a band brake on one end of the hoist drum. The motor circuit is broken at the same time.

Arc Plus Feeding Filler Rod Cuts Time of Tire Repair

Arc-weld filling of worn treads of locomotive wheels and tires by the manual method, using a coated electrode in combination with a high-carbon filler rod, has been the practice for nearly a year at the Prenter (W. Va.) mine of the Red Parrot Coal Co., in the Coal River District. Some time before arc-weld filling was begun at the mine a start was made toward changing from the old wheel centers and tires to wrought-steel wheels, and now practically all of the locomotives have been equipped with this new type. Only the spare trucks still have the old wheel centers and tires. Both tires and wrought-steel wheels have been filled with equal success by the arc-weld-and-filler-rod method.



In starting a weld a "dam" is built with the coated electrode and then the high-carbon filler rod is melted in the arc and puddled with the electrode material

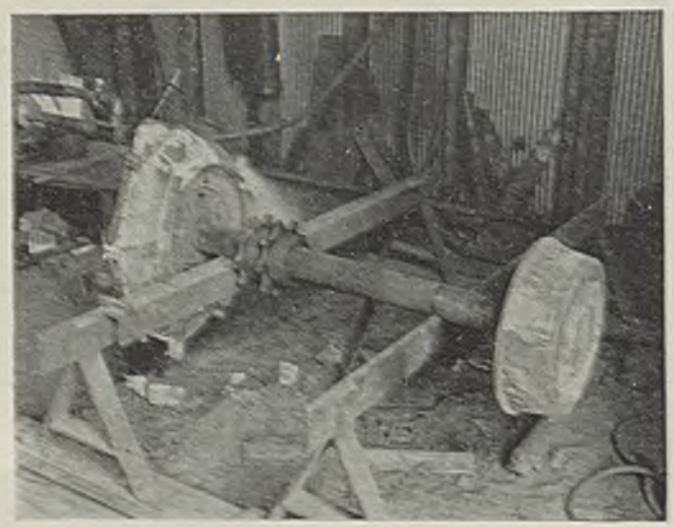
As indicated in an accompanying illustration, the welding is done by drawing an arc with a ⅜-in. coated electrode and at the same time fusing in the arc a ¾-in. rod which is held with the other hand and which has no electrical connection. This type of welding must be done with the wheel or tire turned to a convenient position for puddling the fused metal to a sufficient depth to complete the filling at one application—that is, with one complete turn of the wheel.

Reversed polarity is used—that is, the electrode is connected to the positive terminal of the machine and the work to the negative. The ¾-in. filler rod contains 0.80 to 0.90 per cent carbon. Annealing is done immediately upon finishing the welding and before the work has a chance to cool; otherwise, the wheel or tire probably would break. Machining in a lathe follows and is the final step of the operation.

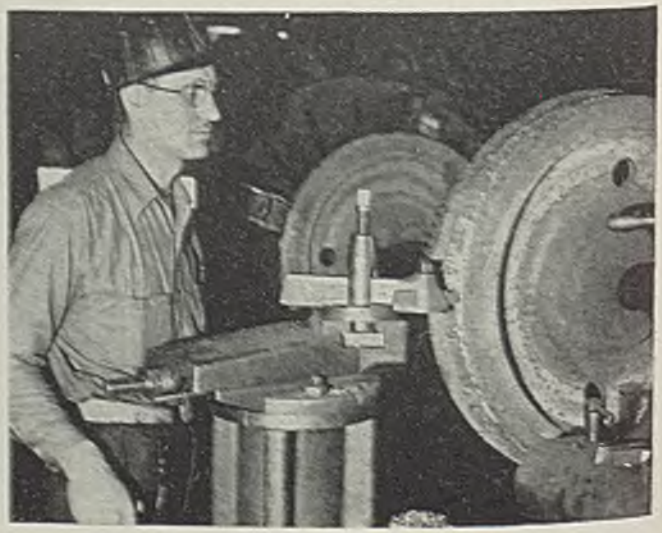
Thus far, only one break has occurred and that happened to a wrought-steel wheel. The welding was completed late and the annealing was not done the same day. Next morning it was discovered that a large segment of the rim of the wheel had broken out. The break was V'ed, welded and wheel annealed and put into service after the customary turning. It has been demonstrated that, without much danger of breakage, as much as half of the circumference can be welded and the wheel allowed to cool without annealing.

Rod proportions are as follows: To

Here a mining-machine truck wheel is being annealed immediately after completing the weld by the combination method



The first cut in truing a 30-in. welded tread. A skilled welder can apply the fill so that it is necessary for little metal to be turned off



each 14 in. of ⅜-in. coated electrode, from 3½ to 5 in. of the ¾-in. high-carbon rod is melted into the weld. Instead of using a holder of the type which clamps the electrode, attachment and electrical connection are effected by fusing the end of the new electrode to the remaining stub of the old one.

In an eight-hour shift one man welds and anneals two 25-in. wheels. If working on 30-in. wheels it is the practice to weld and anneal one wheel (five hours) and to have the welder spend the remainder of his shift at other welding jobs or at miscellaneous shop work. The total cost of filling, annealing and turning a set of four 30-in locomotive wheels is $42.00. The new cost of four wrought-steel wheels is $90. The wheels are purchased oversize, so can be turned and reused several times before welding.

In spite of this apparent saving of $48 per set of trucks the management is keeping a "fingers-crossed" attitude toward continuance of the method. They doubt if the wearing qualities of the filled tire are as good as the new wrought steel and they seek further assurance that the safety features are equal.

For this tire job and for other shop welding work a new Westinghouse 500-amp. Flexarc portable welding machine was purchased. It is driven by a Type CS 440-volt induction motor operating at 1,750 r.p.m. Williams equipment is used for protection of the welder operator. These items include "Wild Hog" leather gloves, apron and cuffs, and "Sta-Clear" cover glass for the eyepiece of the helmet.

Flat Washer Pins on Cars Save Mashed Fingers

Outstanding safety records are made only after eliminating physical hazards to the utmost practicable degree. Mashed fingers by reason of cars jerking ahead before the coupling pin has been dropped down far enough to engage the lower hole has been a common cause of transportation injuries. Now a number of companies use pins which are guarded at the top to prevent the possibility of the upper end being pulled over against the car body. One in this list is the Boone County Coal Corporation, Sharples, W. Va., where the accompanying illustration was made.

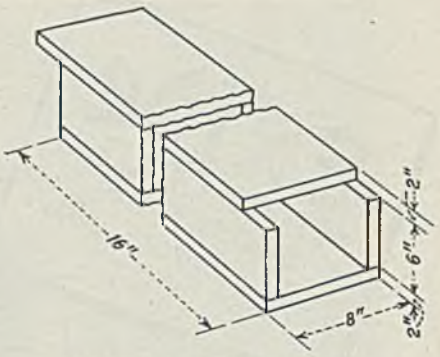
In this case the guard is a flat washer welded to the pin. The outside diameter of the washer is such that it is just large enough to hold the top of the pin ⅝ in. away from the car body when the pin is cocked over to the limit. The cars shown are a part of a recent purchase of a lot of 100 with the bodies mounted on rubber (see p. 28 of this issue). Instead of a flat washer, certain other mines use a saucer-shaped washer arranged with the concave side up. Without greater diameter it provides increased finger clearance by positioning the bumping edge closer to the end of the pin. Weight of the washer material is practically the same in either case. If the "saucer" is made rather deep it interferes with handy grasping of the pin.

Demonstrating the safety-collar coupling pin. The washer maintains a clearance between the top of the pin and the car body.

Creosoted Box-Type Ducts Drain Mine-Track Fill

Successful drainage of a mine-track fill at the LaMarsh No. 1 mine of the Crescent Mining Co., LaMarsh, Ill., is accomplished by means of a system of drainage ducts made of box sections buried in the fill. These box sections, of pressure-creosoted wood, were made by nailing the treated lumber together to form the sections, which then were joined together to form ducts as long as desired. As the ducts, as noted above, are buried in the fill, treating was adopted to make sure that they would remain in condition as long as required.

Installation of the ducts was part of a general grading and track-reconstruction program started at LaMarsh No. 1 in 1935. The ducts were placed in a section of main line 1,500 ft. long which ran through a wet swag. Work in this section included taking down enough roof for the fill necessary to raise the track 1 to 6 ft. and adjust the grade to the desired figure. It still left, however, the problem of water seeping in under the fill from old workings.



Perspective sketch of drain box

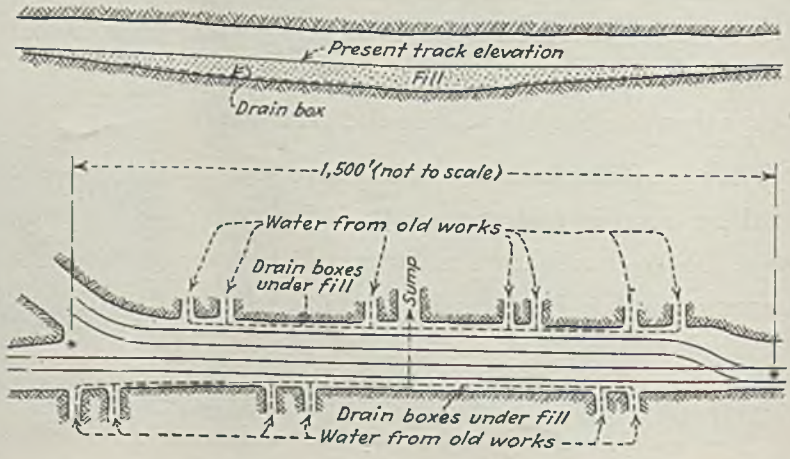
Accordingly, two drainage ducts were installed along each rib for the entire 1,500 ft., as shown in an accompanying illustration. These ducts were placed on the old grade line and were covered by the fill. The boxes were made of pressure-creosted pine lumber supplied by the Wood Preserving Corporation, using two 2x8-in. x 16-ft. and two 2x6-in. x 16-ft. pieces. The duct system drains the water to a central sump, as shown. Before reconstruction of the track, three locomotives were necessary to bring out 1,800 tons per shift. Now, two locomotives handle 2,200 tons per shift.

Bench-Type Drill Press Is First Need of Shop

According to mechanics in the Prenter (W. Va.) shop of the Red Parrot Coal Co., "the handiest tool in the shop" is a light-weight bench drill press recently purchased. A highly important feature of the new equipment is a set of 29 high-speed drills ranging in sizes from 1/16 in. to ½ in. by sixty-fourths and a special stand to hold them in proper order.

Like so many coal-mine repair shops, the Prenter shop heretofore had only the large machine-tool drill presses and an

Showing diagrammatically the location of the drainage ducts in the 1,500 ft. of fill noted in the accompanying text

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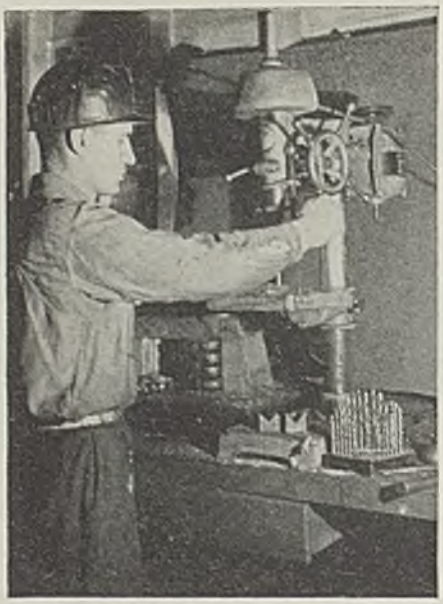


This bench drill and a set of high-speed drills has cut the time of small drilling jobs to one-tenth

electric hand drill for the entire range of work. Difficulty in drilling holes even approximately perpendicular to a surface and the likelihood of breakage when using small drills make the portable drill unsatisfactory for many jobs. Objections to using the large machine-tool drills for light jobs are the time required to fit and adjust the machine to accommodate the small drilling, lack of proper speed for certain jobs, and a feed control not sufficiently sensitive for obtaining the proper pressure for small drills.

The new drill is used for all light work that can be brought to the bench and especially for drilling dowel holes in bronze bearings. Because small drills were broken so often by the former methods of drilling, only the lower-priced carbon-steel drills were purchased. As usually happens, those drills were used up rapidly by frequent sharpening and by not infrequent burning of the cutting edges. The new high-speed drills stand rapid feeding and are not easily burned even though oil or cutting compound is not used with them. Furthermore, there is an advantage because better repair jobs are done by reason of having in ready reach the proper size of drill for any work.

A drill can be placed in the Jacobs chuck and the drilling of a hole of special size completed in less than one-tenth of the time that would be required with the large drill press. Moreover, the large machine very often would be found in use or set up for some special job and thus a delay would ensue.

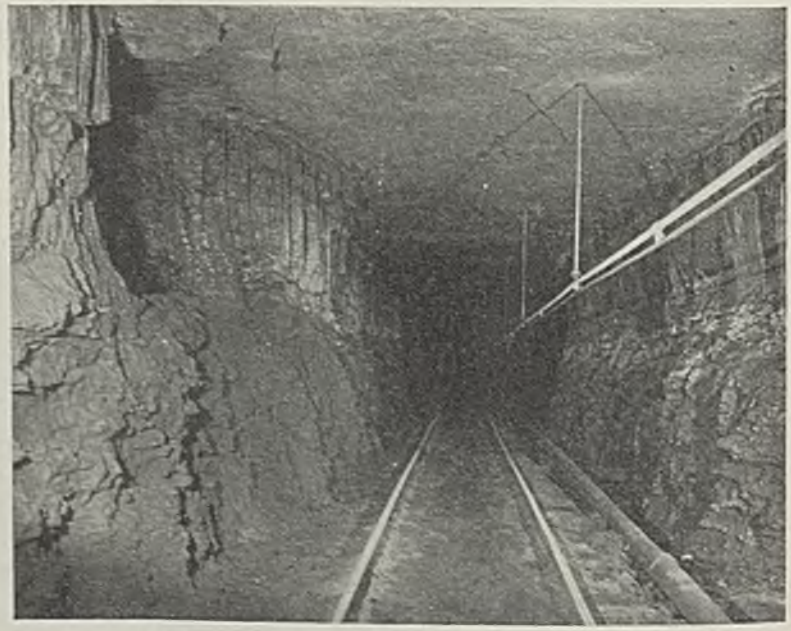
The particular drill selected for the Prenter shop is a Driver supplied by the Walker-Turner Co., Inc., Plainfield, N. J. It is equipped with SKF ball bearings and a ⅓-hp. 1,740-r.p.m. ball-bearing motor. Chuck capacity is ½ in. and throat clearance is 7½ in. Four speeds are available, but as a rule the lowest step (500 r.p.m.) is used. The set of drills was made by Whitman & Barnes, Inc.

Strain Clamps on Feeders Save Switch Bodies

If section insulator switches are used when large feeder cable is carried on combination hangers with the trolley wire, these switches are likely to be broken, assuming sufficient tension is put on them to hold the feeder and trolley wire without unnecessary sag. A slate fall on the wire also is quite likely to break the switch. Placing anchored strain clamps on the feeder on each side of the switch will eliminate breakage by reason of normal feeder and trolley-wire strain and will materially lessen the likelihood of breakage caused by the falling of slate.

The accompanying photograph made at the junction of South Main and Old Mains in Stanaford No. 6 mine of the Koppers Coal Co., Stanaford, W. Va., is typical of the standard method of relieving the insulator switch bodies of undue strain. In this case the feeder is 1,000,000-circ.mil and the trolley wire No. 6/0. The straight condition of trolley wires in this mine is testimony that a high tension is used. Smooth operation of the trolleys with little sparking and minimum wear is one gain. Reduction in delays and safer operation because of fewer times that trolleys leave the wire is another.

Strain clamps on 1,000,000-circ.mil feeder relieve switch of excessive strain



Without risk to switch bodies sufficient strain can be placed on the 1,000,000-circ.mil feeder and the 6/0 trolley to maintain a really efficient trolley.

WORD FROM THE FIELD

Recent Coal Developments To Engage Engineers

Centering its attention on recent developments in producing and preparing coal for industrial and home use, a meeting of coal engineers and operators from various sections of the country will be held Oct. 13-15 at the Palmer House, Chicago, under the sponsorship of the American Society of Mechanical Engineers (Fuels Division), American Institute of Mining and Metallurgical Engineers (Coal Division) and Western Society of Engineers. Cooperating with these will be the Illinois and Indiana mining institutes.

With the first two days devoted to technical sessions, consideration will be given to such subjects as the following: stokers; coals for steam generation and domestic use; coal hydrogenation; strip-mine equipment; screening and materials handling in coal-preparation plants; effects of the properties of coal ash; underground mechanization, ventilation, etc. A high point of these sessions is expected in a projected panel discussion by four authorities, each handling a different phase, regarding coal purchasing.

Three separate inspection trips are scheduled for the third day. One tour will be to the strip pit and preparation plant of the Northern Illinois Coal Corporation at Wilmington; an alternative trip will be to the Indiana Harbor plant of the Inland Steel Co., where coal handling, coke ovens, blast furnaces and power plant will engage the attention of the visitors; and the third will be, first, to the plant of the Goodman Mfg. Co. to witness modern mining machinery in process of manufacture, and thence to Fisk Station to view two pulverized-coal-fired boilers in operation.

At the regular dinner, in the evening of Oct. 14, Dr. W. L. Abbott, formerly of the Commonwealth Edison Co., will be toastmaster, and H. N. Eavenson, president, Clover Splint Coal Co., and a past president of the A.I.M.E., will be the principal speaker. A. C. Carlton, Museum of Science and Industry, is chairman of the combined committees from the three societies, in charge of arrangements, among the other members being Paul Weir, consulting engineer, and H. F. Hebley, Commercial Testing & Engineering Co.

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Soviet Coal Pact Renewed

The commercial agreement between the United States and the Soviet Union whereby the excise tax of $2 per ton once levied on Soviet anthracite is waived (*Coal Age*, September, 1937, p. 98) was extended by agreement with the State Department at Washington on Aug. 6. The understanding that coal imports will be limited to 400,000 tons annually remains in force, although shipments during the last agreement year actually were less than half that amount.

Oust Progressive Organizers

Organization efforts of six representatives of the Progressive Miners in Logan County, West Virginia, were abruptly halted on July 30 when State police escorted them to the county line after a melee in which 75 men were involved. Barney Flaherty, directing the membership campaign, said the drive would continue.

Keeping Step With Coal Demand

Bituminous Production

	1938 (1,000 Tons)	1937* (1,000 Tons)
July 2	5,360	7,300
July 9	4,730	6,494
July 16	5,785	7,214
July 23	5,850	7,373
July 30	5,900	7,814
August 6	5,792	7,430
Total to Aug. 6	180,352	260,884
Month of July	23,460	31,990

Anthracite Production

July 2	951	999
July 9	317	679
July 16	559	585
July 23	641	481
July 30	1,000	575
August 6	540	435
Total to Aug. 6	27,164	31,011
Month of July	2,571	2,748

* Outputs of these two columns are for the week corresponding to those in 1938, although these weeks do not necessarily end on the same dates.

Bituminous Coal Stocks

	(Thousands of Net Tons) July 1 1938	June 1 1938	July 1 1937
Electric power utilities	8,070	8,201	8,457
Byproduct coke ovens	5,000	4,867	7,770
Steel and rolling mills	716	722	1,540
Railroads (Class 1)	4,814	4,996	7,701
Other industrials*	9,002	8,962	12,268
Total	27,602	27,748	37,736

Bituminous Coal Consumption

	(Thousands of Net Tons) June 1938	May 1938	June 1937
Electric power utilities	2,843	2,803	3,505
Byproduct coke ovens	2,931	3,236	5,788
Steel and rolling mills	589	603	982
Beehive coke ovens	82	92	439
Railroads (Class 1)	5,284	5,609	6,653
Other industrials*	7,152	7,531	10,000
Total	18,881	19,874	27,367

* Includes coal-gas retorts and cement mills

Alabama Interests Organize To Fight Oil and Gas

In order to combat competition from so-called laborless fuels, principally oil and natural gas, the Alabama Coal Trade Extension Association, representing coal producers and miners' and railroad unions, has been organized. The new group will begin immediately an educational and promotional campaign to recover some of the lost business that has reduced annual coal output in the State from 21,500,000 tons mined by 30,000 men in 1926 to an estimated 11,000,000 tons by between 18,000 and 20,000 men in 1938.

H. S. Salmon, president of Alabama Coals, Inc., was elected president; P. H. Haskell, Alabama By-Products Corporation, and William Mitch, president, District 20, United Mine Workers, are vice-presidents, and N. E. Cross, secretary, Alabama Coals, Inc., was named secretary-treasurer. The executive committee consists of R. T. Daniel, president, National Coal & Coke Co.; H. T. DeBardeleben, president, DeBardeleben Coal Corporation; J. H. Terry, international representative, United Mine Workers; A. R. Long, president, Brookside-Pratt Coal Mining Co.; George F. Peter, president, Southern Coal & Coke Co., and Thomas J. McQuaid, president, Local 590, Brotherhood of Railway Trainmen.

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Protest Cut in Oil Duty

Vigorous protests against proposals to reduce or cancel the existing duty of 0.5c. per gallon on crude petroleum and fuel oil imported from Venezuela, in negotiating a new reciprocal trade treaty with that country, have been filed with the Committee for Reciprocity Information, which acts under the auspices of the State Department, by the National Coal Association, the Citizens' Anthracite Conference, acting for the chambers of commerce of Scranton, Wilkes-Barre, Hazleton, Pottsville and Pittston, Pa.; the Anthracite Institute, United Mine Workers, National Bituminous Coal Commission, the Retail Solid Fuel Industry of New York City and by other interested organizations.

"The coal industry is vitally concerned with this question of importation of foreign oil, which in major part comes directly from Venezuela or from refineries in the Dutch West Indies," said John D. Battle, executive secretary of the National Coal Association. "So far as these oil imports consist of fuel oil they are in direct and destructive competition with American coal and ought to be entirely stopped."

Louis C. Madeira, 3d, executive director of the Anthracite Institute, pointed out that in 1936 and 1937 imports of crude oil from Venezuela totaled 48,000,000 bbl., equal to 12,000,000 tons of coal, and urged that further inroads on the anthracite industry be headed off.

In addressing the New River and Wind-

(*Turn to page* 60)

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MOST DEPENDABLE DETONATOR IS THE SAFEST DETONATOR

BLASTING ACCESSORIES

ing Gulf Electrical and Mechanical Institute, Charles E. Lawall, director of the school of mines at West Virginia University, declared that the markets for coal are being taken by competing fuels because producers of other fuels are spending money to teach the public more and better ways to use such fuels. He stated that oil companies spent no less than $15,000,000 last year to enlarge markets for oil, as against $500,000 expended by bituminous coal companies.

Director Lawall urged the establishment of a bureau of research for the bituminous coal fields at West Virginia University, stating that money for research work or for a research body has been appropriated by the National Bituminous Coal Commission. As illustrating the necessity for a research bureau, he reminded the members of the institute that railroads, power companies, factories and homes were turning to other types of fuel than coal in increasing numbers each year. He remarked that whereas each kilowatt of electricity once represented 4.5 lb. of coal, now it takes only 1.23 lb. of coal. Railroads, he added, are turning to diesel electric power and factories are being equipped with natural gas.

West Virginia Operators Revamp Association

With a strong turn-out present on July 20 at Fairmont, W. Va., the Northern West Virginia Coal Association was organized to replace the organization formerly known as the Northern West Virginia Subdivisional Coal Association. After a series of meetings attended by about 100 representative operators, who pledged loyal support, Charles Dorrance, vice-president, Consolidation Coal Co., was elected president; William Findley, Jr., general superintendent, Simpson Creek Collieries Co., was made vice-president, and T. E. Johnson, vice-president, Robinson Coal Co., was named secretary-treasurer. Meetings are to be held quarterly.

J. D. Battle, executive secretary, National Coal Association, and J. V. Sullivan, secretary, West Virginia Coal Association, stressed the desirability of cooperative effort against competing fuels, as well as the need for research. Brooks Fleming, Jr., Consolidation Coal Co., and president of the old association, was toastmaster at the banquet, which climaxed the reorganization proceedings.

Mid-West Agency Organized

Middle States Fuels, Inc., has been organized as a marketing agency, with John A. Howe, vice-president, Truax-Traer Coal Co., as president, and has made application to the National Bituminous Coal Commission for provisional approval. The organization is now composed of four companies, most of the output of which is of the strip mine variety: Central States Collieries, Inc., St. Louis, Mo.; Little John Coal Co., Inc., and Midland Electric Coal Corporation, Indianapolis, Ind.; and Truax-Traer Coal Co., Chicago, but invitations to participate in the agency have been extended to all producers in that section of the country.

Coal Commission Prosecutes Task Of Establishing Prices

WASHINGTON, D. C., Aug. 21—Prosecuting its work for the establishment of minimum prices, the National Bituminous Coal Commission announced today that it had ordered all district producers' boards in the Central and Southwestern States to file proposed minimum prices and marketing rules and regulations for their coal by Sept. 14. With the release of this order all producers' boards in the country have been notified to present such proposals. The latest order directed the boards to base their proposed prices on the weighted average cost of production, determined by the Commission as follows: Minimum Price Area 2 (Districts 9-12, including western Kentucky, Illinois, Indiana and Iowa), $1.772 per ton; Area 3 (District 13, Alabama), $2.474; Area 4 (District 14, comprising Arkansas and part of Oklahoma), $3.617; Area 5 (District 15, including Missouri, Kansas, Texas and part of Oklahoma), $2.049.

The order to the boards in Minimum Price Area 1, comprising Districts 1 to 8 (Pennsylvania, West Virginia, Ohio, eastern Kentucky, Virginia, Michigan and part of Tennessee), was issued on Aug. 12. The Commission announced that it had determined the weighted average cost of producing coal in the area to be $2.157 per ton, and directed the boards to propose mine prices based on this not later than Sept. 6.

All producers' boards in the Rocky Mountain and Pacific Coast regions have been directed by the Commission to file proposed minimum prices and marketing rules and regulations for their coal by Aug. 24. The boards were directed to base proposed prices on determined weighted average costs: Minimum Price Area 6 (Districts 16, 17 and 18, covering Colorado, New Mexico and Arizona), $2.758; Area 7 (Districts 19 and 20, including Wyoming, Utah and eastern Idaho), $2.285; Area 9 (District 22, Montana), $1.590; Area 10 (District 23, covering Washington, Oregon and Alaska), $3.206.

The commission has issued a simple form to be followed as closely as possible in presenting the thousands of specific price quotations to be proposed by the 22 producers' boards. The prices will cover every kind and size of coal mined by nearly 9,000 code members—acceptances of the code totaled 8,905 as of July 18, according to the Commission, less than 5.5 per cent of total production being represented by non-code members.

All of the various tables in the form are arranged systematically, being indexed for quick reference. A section is devoted to price instructions and exceptions; a table shows a numerical key for each size group and another for each subdistrict. An alphabetical list of code members shows the price classifications quoted for each member under each size group, so as to show the prices for the various grades of each producer's coal. In this table, also, the name of the mine and the seam or kind of coal for each price classification are shown. Then follow the actual price quotation tables, which will reflect the price differentials showing the price classification relationship between coals of the mines within the district. Finally comes a geographical description of the market area.

In connection with the framing of contracts, the Commission issued an order declaring that it is not in contravention of the code for producers to enter into contracts for the sale of coal to Federal agencies, States and the political subdivisions thereof for more than a 30-day period. The Commission stated that it will not be considered a violation of the code "to enter into a contract for periods not exceeding one year in any case where a State or political subdivision thereof or any other governmental agency opens bids to purchase coal for periods in excess of 30 days, but such contract must provide for a reasonable price to continue until minimum prices are made effective by the Commission and that thereafter no coal will be delivered thereunder below the minimum prices."

Quiz to Prevent Price Abuses

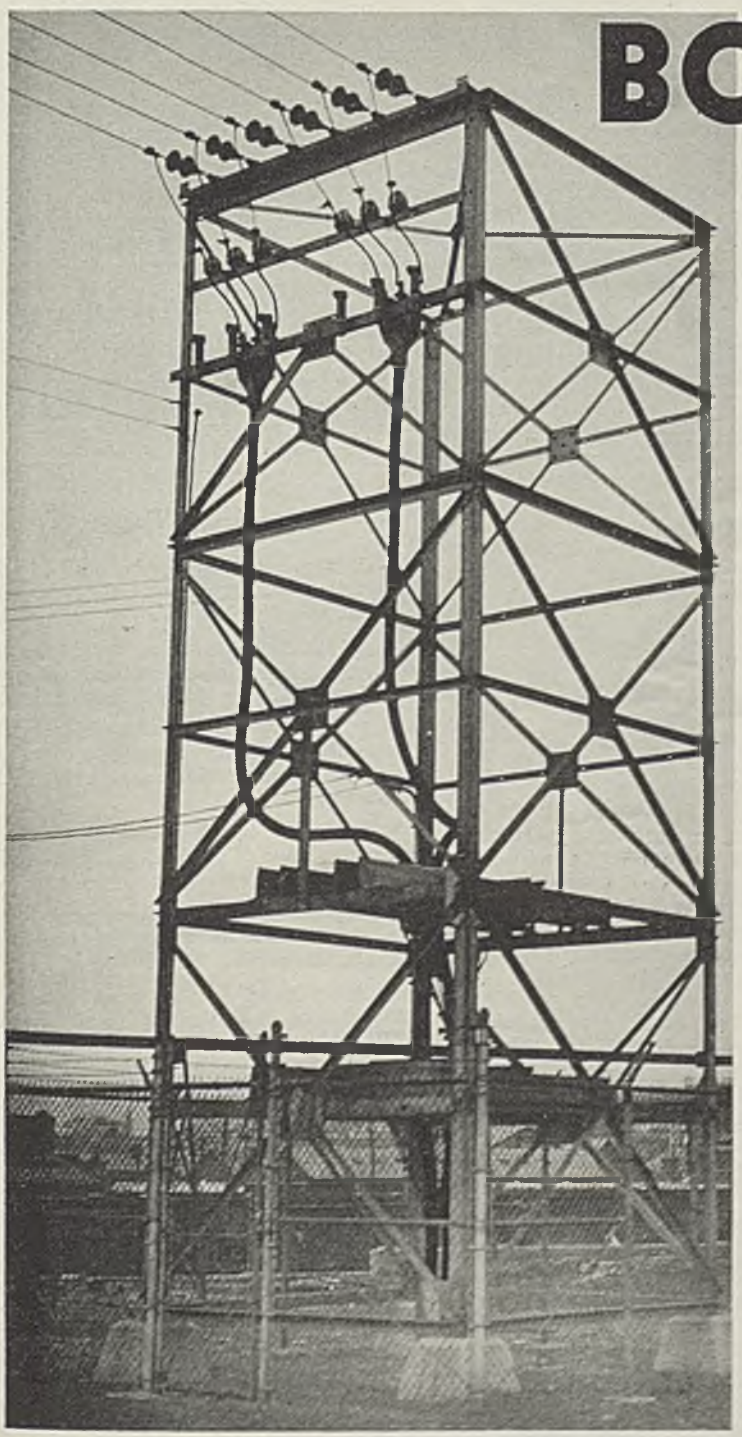
An order by the Commission on Aug. 5 provides for an investigation to obtain information to enable it to promulgate, following a hearing, rules and regulations to prevent evasion or violation of the coal act "by or through the use of docks or other storage facilities or transportation facilities, or by or through the use of subsidiaries, affiliated sales or transportation companies or other intermediaries or instrumentalities, or by or through the absorption, directly or indirectly, of any transportation or incidental charge. . . ." The marketing division is to conduct the quiz, being directed to seek the collaboration of producers' boards, which are requested "to consider and propose to the Commission such rules and regulations as, in their respective judgments, would serve to prevent evasion or violation of the price provisions of the act by means set forth in Sect. 4-II (g) of the act." The division was instructed to report on the investigation and to submit the boards' proposals to the Commission not later than Aug. 28.

The Mallory Coal Co. and several co-

Price Setting Takes Time

Ascertaining costs of production for 5,756 coal mines, as well as for thousands of wagon mines, is causing the National Bituminous Coal Commission to violate all New Deal conceptions of hours standards. "Informative" hearings have been completed. With all cost data in hand, consideration now turns to prices that will allow income equal to the average cost of production. Denial of the injunction sought by operators who did not want their individual costs revealed will expedite proceedings, but final determination of a coherent, competitive price structure may take until January.

HAZARD



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This most important circuit should be carried through the most reliable cable obtainable.

Hazard Borehole Cables by their performance over a period of more than 40 years prove their reliability.

Hazard rubber jacketed and steel wire armored cable is in many cases the most efficient for deep holes. Because the rubber jacket takes the place of a lead sheath, the cable is comparatively light and low in cost.

Our Engineering Department will gladly check your conditions with you and make specific recommendations.

HAZARD INSULATED WIRE WORKS

DIVISION OF THE OKONITE CO.

WORKS: WILKES-BARRE, PENNSYLVANIA

New York Chicago Philadelphia Atlanta Pittsburgh Buffalo Boston Detroit
Seattle Dallas Washington San Francisco St. Louis Los Angeles

plaintiffs failed to obtain an order from the U. S. Court of Appeals at Washington barring the Commission from making public individual cost reports, the court dismissing the petition on Aug. 1 on jurisdictional grounds. In denying a review, the court ruled that the Commission's order was "preliminary" rather than "definitive" in character and therefore was not appealable. It also stated that the petitioners had not exhausted administrative remedies because they did not apply for a new hearing of their protests by the Commission before challenging the order in the courts.

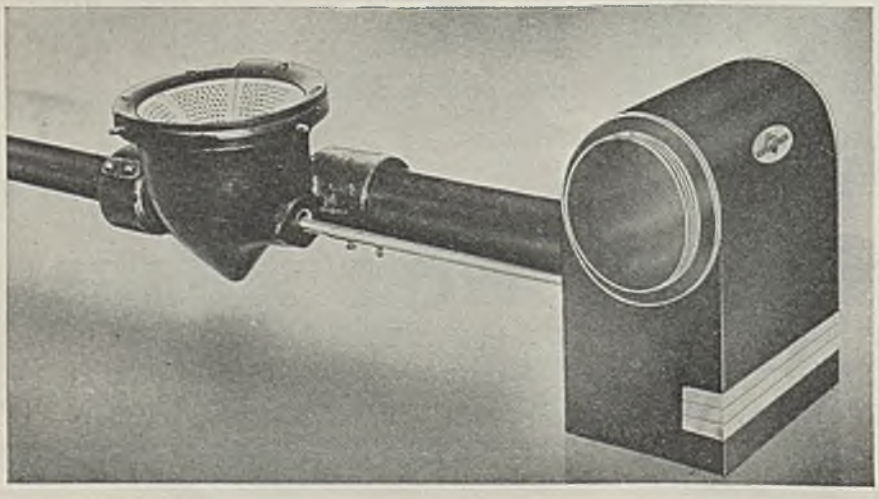
Consumers and dealers in domestic sizes of bituminous coal were urged to purchase at least part of their winter requirements before the burning season starts in a statement issued Aug. 6 by John Carson, Consumers' Counsel. "While stocks of industrial coal on hand this year," said Mr. Carson, "are considerably less than last year, there is no certainty that the demand for screenings and small sizes used for industrial purposes during the winter will balance the demand for domestic sizes. If there should be this unbalanced demand next winter, the inevitable result will be higher prices to the domestic consumer."

New Stoker Models

Four models of anthracite-burning stokers comprising fifteen units have been introduced by General Stokers, Inc., Philadelphia, Pa., market affiliate of the M. A. Hanna Co. Designed by Lurelle Guild, the aims sought have been simplicity in construction, neat appearance, small space requirements, and utilization of a wide range of coals. Three models feed from bin to boiler and one is a hopper model; one has an ash remover. Firepot sizes range from 10 to 20 in. in diameter, feeding 9 to 44 lb. of coal per hour, with capacities up to 1,320 sq.ft. of steam or 2,100 sq.ft. of hot water.

A "start and stop" coal feed is a feature of a new stoker developed by the Carrier Corporation, Syracuse, N. Y., for use with either anthracite or bituminous coal. This sequence of feed produces a slightly jerky action to aid distribution of air throughout the fire bed by preventing formation of crusts or trees. Equipment includes five-speed transmission, totally inclosed standard-make motor, shear pin for safeguarding delicate parts against strain from any foreign particles in the fuel; oversize fan, removable air ports and a clear-out door. An ash remover of automatic design is supplied for use with anthracite.

Bin-feed model General stoker for use in average-size homes



Mechanical Stoker Sales Continue Upgrade

Sales of mechanical stokers in June last totaled 6,088 units, according to statistics furnished the U. S. Bureau of the Census by 112 manufacturers (Class 1, 64; Class 2, 31; Class 3, 38; Class 4, 30; Class 5, 10). This compares with sales of 4,969 units in the preceding month and 8,717 in June, 1937. Sales by classes in June last were: residential (under 61 lb. of coal per hour), 5,365 (bituminous, 4,544; anthracite, 821); small apartment-house and small commercial heating jobs (61 to 100 lb. per hour), 271; apartment-house and general small commercial heating jobs (101 to 300 lb. per hour), 258; large commercial and small high-pressure steam plants (301 to 1,200 lb. per hour), 150; high-pressure industrial steam plants (more than 1,200 lb. per hour), 44.

Pittsburgh Agency Ready

The Western Pennsylvania Coal Corporation, a marketing agency, formally got under way during the last week in July when a meeting was held at Pittsburgh and J. O. Smith, formerly of Appalachian Coals, Inc., and more recently with the National Bituminous Coal Commission as head of its marketing division, was elected president. Byron H. Canon, secretary of District Producers Board 2, was made secretary-treasurer. The directors include: E. W. Bratton, vice president, W. J. Rainey, Inc.; R. E. Jamison, secretary, Jamison Coal & Coke Co.; George H. Love, president, Union Collieries Co.; J. T. M. Stoneroad, president, Carnegie Coal Corporation; H. M. Wassum, vice-president, Henderson Coal Co.; C. S. B. Ward, president, Pleasant Valley Mining Co.; F. G. West, general manager, Butler Consolidated Coal Co.; W. J. Curley, Ross I. Davis, J. L. Eysmans, Jr.; Julian Kennedy, Jr.; and E. C. Robertson.

Fairmont Coals, Inc., Formed

Fairmont Coals, Inc., was formally organized as a regional coal agency on July 26 at a meeting of stockholders held at Fairmont, W. Va. These officers have been elected: president, Dr. Stephen P. Burke, director of technical research, Consolidation Coal Co.; vice-presidents, Howard Zeller, vice-president, Jamison Coal & Coke Co., and R. A. Courtney, president, Courtney Coal Co.; secretary-treasurer, T. E. Johnson, vice-president, Hutchinson Coal Co. Directors include: D. T. Buckley, Koppers Coal Co.; S. D. Brady, Jr., president, Pioneer Coal Mining Co.; R. M. Hite, president, Virginia & Pittsburgh Coal & Coke Co.; J. Howard Magee, West Virginia Coal & Coke Corporation, and Frank Miley, president, District 31, United Mine Workers.

Personal Notes

L. H. ARTHUR has been appointed foreman at Beards Fork mine of the Koppers Coal Co., Beards Fork, W. Va.

D. F. BUCKINGHAM has been elected secretary of Bituminous Producers' Board 22 (Montana), vice M. F. PURCELL, resigned.

ALEX DOOLEY has been made foreman at Hugheston mine of Kanawha Coals, Inc., Hugheston, W. Va.

E. E. EVANS has been named foreman at Penman mine of the Beckley Fire Creek Coal Co., Beaver, W. Va.

V. G. GANDY has been appointed foreman at Rosedale mine of the Rosedale Coal Co., Maidsville, W. Va.

J. E. GRAHAM, Eastern sales manager, Consolidation Coal Co., has been elected to Bituminous Coal Producers' Board 1 (eastern Pennsylvania), vice J. Noble Snider, resigned.

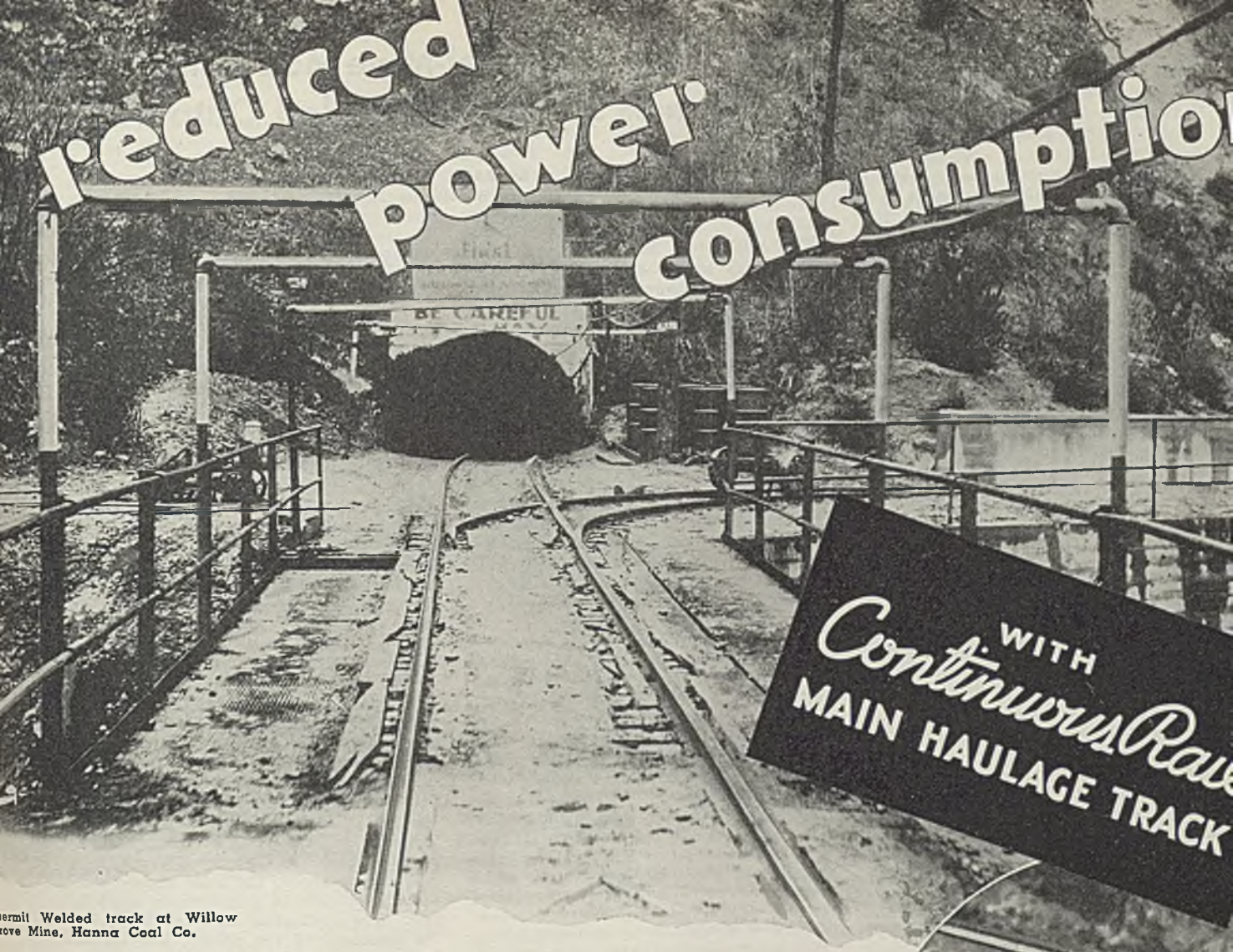
A. F. HARPER, formerly superintendent, ore mines, Sloss-Sheffield Steel & Iron Co., Bessemer, Ala., has resigned to accept a position as superintendent of coal mines for the Woodward Iron Co., Mulga, Ala.

ROBERT P. KOENIG, president, Electric Shovel Coal Corporation, has been elected to Producers' Board 11 (Indiana), under the Bituminous Coal Act, to succeed Fred S. Martin, resigned.

F. D. MCCONNELL, president, F. D. McConnell Coal Co., has been elected to Bituminous Coal Producers' Board 11 (Indiana), vice William R. Bootz, resigned.

V. F. PARRY, U. S. Bureau of Mines Experiment Station, Denver, Colo., has been appointed to the committee on solid fuels of the American Society of Heating and Ventilating Engineers.

DAVID A. REED has resigned as general manager of operations of the Consolidation Coal Co. on account of ill health. He served in every capacity from mine foreman upward during his tenure with the company. His latest duties will be taken



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IN addition to many other basic advantages, Continuous Rail assures lower power consumption because Thermit welds have electrical conductivity equal to the rail itself. The need for bonds is eliminated and rails can be used as return circuits up to 100% of their electrical capacity.

Power leaks are completely eliminated where Thermit welds replace rail joints. Approximately 20% more conductivity is obtained in track with Thermit welded joints than in new tracks where rail bonds are employed.

What's more, the high conductivity of Thermit welds is permanent. There never can be loss of current, as with ordinary joints, through defective or corroded plates and bonds . . . no reduction of locomotive power with a consequent increase in the amount of power required for hauling. Because of the excellent electrical characteristics of the Thermit weld, combined with the smooth-riding qualities of continuous rails, considerably less power is required at all times to haul trains over Thermit welded track.

Modernize your main haulage track with Thermit Welding. Avail yourself of the greater operating economies made possible by Continuous Rail. Send today for details on the permanent economies provided by this most advanced type of mine track. Ask for the pamphlet "Continuous Rail for Main Haulage Track".

6 BASI
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over by CHARLES DORRANCE, vice-president in charge of operations, F. F. JORGENSON, manager of production, has been named assistant to the general manager; FRED E. BEDALE, safety engineer, has been made assistant to the vice-president in charge of safety and operating efficiency, and A. K. THURNES, assistant to the general manager, has been appointed assistant to the vice-president.

GEORGE SCARERO has been named foreman at Slab Fork mine of the Slab Fork Coal Co., Slab Fork, W. Va.

CHARLES W. SHINNAMON, executive secretary of the Bituminous Coal Producers' Board for District 3, has been appointed traffic manager by the Northern West Virginia Coal Association.

A. K. SMITH has been made foreman at Besoco mine of the Leecony Smokeless Coal Co., Besoco, W. Va.

ROY SMITH has been appointed foreman at Powellton No. 4 mine of the Koppers Coal Co., Kimberly, W. Va.

JOHN L. STEINBUGLER, formerly president of William C. Atwater & Co. and recently counsel to District 7 Producers' Board (West Virginia and Virginia), has been temporarily appointed as special advisory counsel in the legal division of the National Bituminous Coal Commission in Washington.

J. E. TOSSY, manager, fuel engineering division, Appalachian Coals, Inc., has been chosen to serve on the public service committee of the national Smoke Prevention Association, Inc., during 1938-9.

R. J. WHITE has been named superintendent at Ameagle mine of the American Eagle Colliery Co., Ameagle, W. Va.

W. R. WOODS has been made foreman at Ajax No. 2 mine of the Ajax Coal Co., Oakmont, W. Va.

Marissa Sticks to U.M.W.

Two petitions against the Marissa Coal Co., operator of the Okay mines, at Marissa, Ill., were dismissed on Aug. 15 by the National Labor Relations Board. The complaints were filed by the Progressive Miners, which charged the company with violation of the Wagner act, and by the United Mine Workers, asking for an election to determine a collective bargaining agent. As the company's predecessor recognized the United Mine Workers, the Marissa company continued that policy.

R. & P. Names Personnel Head

A new department having direct jurisdiction over personnel and labor matters, headed by F. R. Vinton, named director of personnel and labor relations, has been organized by the Rochester & Pittsburgh Coal Co., Indiana, Pa., effective Aug. 15, according to L. W. Householder, vice-president. Mr. Vinton formerly was general superintendent. All mining operations are placed under the direction of George L. Smith, general manager, and all superintendents and heads of engineering and service departments are to report directly to him.

RFD Encourages Coal-Mine Modernization; Denies Aid for Unneeded Output

By PAUL WOOTON
McGraw-Hill Washington News Bureau

READING of the millions of dollars which have been loaned by the Reconstruction Finance Corporation in the past four years, one unfamiliar with the way this government agency operates might gain the impression that here was a care-free Santa Claus ready to dish out Uncle Sam's money to any who asked. Such, of course, is not the case. Loans are made only after the general situation of an industry has been studied. Where it is known, for example, that potential capacity is greater than is likely to be needed within the next few years, the general attitude at RFC is to refuse loans to finance new and additional output. Special conditions which take a particular project out of the general class must be shown before loans in this category will receive favorable consideration.

On the other hand, it has never been the policy of RFC to withhold loans for new machinery simply because the mechanical equipment purchased with such a loan will reduce the number of men employed at a particular property. It is recognized that the new machinery itself represents employment and also that any property failing to keep pace with the mechanization parade soon might be in a position where it could not repay its loan.

It is pointed out at RFC that coal mining is not the only industry in which there is a tendency toward overproduction. In any such industry no loan will be considered if it cannot be shown definitely that it will not contribute to further demoralization. At the same time there are localities where the rehabilitation of a coal mine will provide employment where it is desperately needed and where the additional production will not have an appreciable effect on the general situation.

Up to July 1, loans had been authorized for 38 coal-mining companies. These loans aggregated $7,945,803.93. After the authorization was made by RFC, however, applications involving $3,353,226.22 were withdrawn. In most instances, withdrawal of an application means that local banks or other interests are willing to advance the money once it has been demonstrated that the project meets RFC approval.

Most industrial loans being made by RFC are to run for periods of three to five years. Frequently repayments are arranged so that there will be a large "balloon" instalment on the expiration date, with the expectation that the project will have to be refinanced for a longer period. Practically all limitations on the amount that may be loaned an industry have been removed. The loans that have been made to coal-mining companies have been principally for the purchase of new machinery and for additional working capital. All recent loans carry an interest rate of 5 per cent.

A coal-mining company needing additional working capital or additional plant must make its application to the RFC agency in that region. There are 32 loan agencies scattered throughout the country. These agencies of the RFC are located at Atlanta, Ga.; Birmingham, Ala.; Boston, Mass.; Charlotte, N. C.; Chicago, Ill.; Cleveland, Ohio; Dallas, Texas; Denver, Colo.; Detroit, Mich.; El Paso, Texas; Helena, Mont.; Houston, Texas; Jacksonville, Fla.; Kansas City, Mo.; Little Rock, Ark.; Los Angeles, Calif.; Louisville, Ky.; Minneapolis, Minn.; Nashville, Tenn.; New Orleans, La.; New York, N. Y.; Oklahoma City, Okla.; Omaha, Neb.; Philadelphia, Pa.; Portland, Ore.; Richmond, Va.; St. Louis, Mo.; Salt Lake City, Utah; San Antonio, Texas; San Francisco, Calif.; Seattle, Wash., and Spokane, Wash.

When requested, the loan agency will assist applicants in preparing an application. The application then is studied by the personnel of the agency, and is referred to the advisory board composed of bankers, business men and industrialists of the region. Next the application is forwarded to Washington with the agency recommendation. There it is studied by specialists who in turn make a recommendation which is laid before the board of directors of RFC.

Under the law the RFC must report first to Congress. This means that there is a delay of a month before figures are made public. The report for May, for example, was not submitted to Congress until early in July. That report showed that industrial loans made during May aggregated $13,091,802.59. This was nearly double the number of loans made in April. During June the total rose to $17,656,760.21. At the time of this writing July figures had not been made public, but it is understood that the sharp upturn which characterized May and June continued.

Permissible Plates Issued

Three approvals of permissible equipment were issued by the U. S. Bureau of Mines in July:

Goodman Manufacturing Co.: Type L-49CLS coal-cutting machine; 50-hp. motor, 500 volts, a.c.; Approval 348-A; July 1.

Jeffrey Manufacturing Co.: Type 2-400 loading machine; 50-hp. motor, 220-440 volts, a.c.; Approvals 349 and 349A; July 18.

Coal Campaign Intensified

Launching of an intensive campaign to get everyone in Illinois "coal minded" in cooperation with the National Coal Association's program was announced on Aug. 2 by the Illinois Reciprocal Trade Association, Belleville. It is purposed to complete thorough organization of the association in all parts of the State, according to J. W. Spresser, president.

The program contemplates enlistment of

all persons in the coal industry and dependent upon it to exercise their influence through representatives in Congress or candidates for Congress, State authorities and legislators to obtain requisite legislative or administrative action to eliminate unfair competition in the campaign to recover lost coal markets. The plan will follow the same general lines as that of N.C.A., which was adapted from the Illinois group, including curtailment of "dumping" of natural gas and Federal subsidy of hydro-electric power and adequate taxing of fuel-oil imports.

Butler Colliery Explosion Called Unavoidable

The explosion on June 2 at the Butler colliery of the Volpe Coal Co., in Pittston Township, Pa., in which ten lives were lost, was an "unavoidable accident," according to a coroner's jury verdict on Aug. 3, delivered after listening to four hours of testimony in the Dupont Borough town hall. The jurors found that "there was no negligence on the part of the employer or any of the employees, and no one was criminally liable."

Mine Inspector Henry R. Owens, Scranton, expressed the theory that gas was fired by friction, by a flame or a spark from a motor or electric drill. He declared, however, that up to a minute before the explosion, No. 1 lift, scene of the blast, was free of gas. Many other witnesses also maintaied that there was no gas present on the morning of the explosion.

The verdict of the coroner's jury, it was pointed out, will not interfere with the pending legislative inquiry to be made by a commission named by Governor George H. Earle to investigate the Volpe disaster and mine safety conditions in general throughout the anthracite region.

Owings Team Wins Safety Meet

The first-aid team from No. 32 mine of the Consolidation Coal Co., Owings, was the winner of the seventh annual safety day contest of the Central West Virginia Coal Mining Institute on July 23 in a keenly waged struggle, held at Jackson's Mill. It was only after three extra problems and a lengthy argument that the Owings team nosed out the team from Federal No. 1 mine of the Koppers Coal Co., Grant Town, by one point. Both teams had perfect scores in the regular contest and the first extra problem. Third place went to the Bergoo team of the Pardee & Curtin Lumber Co.; fourth, Barton No. 2 team of the same company.

The victory of the Owings team means that Consol will have three teams in the State Safety Day meet in Fairmont Oct. 8, as No. 93 team, Jordan, and No. 97, Rivesville, finished first and second in the Monongahela Valley Coal Mining Institute's meet at Sunset Beach, near Morgantown, a week before.

A negro team from the Koppers Grant Town operation won in its division from Consolidation No. 63 team, Monongah, 1,996 to 1,993. In the junior division, the Watson Boy Scouts, Troop No. 30, won a hollow victory, being the only team entered. L. S. McGee, district mine inspector, was director of the meet.

Anthracite Control Measures In Keystone Assembly

The scheme of the Anthracite Commission of Pennsylvania to rehabilitate the hard-coal industry through State control of production and distribution started on its way through the Legislature at Harrisburg on Aug. 4. Four bulky measures embodying the commission's recommendations were introduced, approval of the House Committee on Mines and Mining being the first obstacle to overcome. Briefly the bills propose:

1. Creation of a three-man Pennsylvania Anthracite Commission for 50 years with power to regulate the industry and operate closed mines.

2. Making the commission an anthracite public authority empowered to finance the plan through bonds or through other obligations not payable by the State as debts and with a $10,000,000 appropriation to start.

3. To empower the commission to fix prices and production and marketing quotas for every mine; license producers and police the industry.

4. To authorize cooperative marketing corporations of three or more producers to eliminate antiquated sales methods and encourage new uses for anthracite and development of new burning equipment.

Appointed by the Governor, the commission would be composed of one miner; one member to represent operators, coal-land owners or others financially interested in the transportation and sale of anthracite; and one representing neither of the foregoing groups. They would have graduated terms of three, four and five years, the chairman to receive a salary of $10,500 and the others $10,000 a year. Members would be required to sever any private connections with the industry.

The commission would "mine and refine coal in order to provide employment in territory where unemployment is deemed a serious problem, endangering the health, safety and peace of the people of the community; and transport, sell and market such coal directly or through any cooperative marketing corporation organized under the laws of the Commonwealth." Such property would be tax exempt.

In June each year the commission would fix production quotas for the year beginning the following August, with the right of hearing accorded on objections, and

Coming Meetings

- West Virginia Coal Mining Institute: annual meeting, Oct. 7, Charleston, W. Va.
- National Safety Council: Silver Jubilee Congress, Oct. 10-14, Stevens Hotel, Chicago.
- Coal Producers' Association of Illinois: annual meeting, Oct. 11, Springfield, Ill.
- Coal Division, A.I.M.E.; Fuel Division, A.S.M.E., and Western Society of Engineers: joint meeting, Oct. 13-15, Palmer House, Chicago.
- Illinois Coal Mining Institute: 46th annual meeting, Oct. 21, Hotel Abraham Lincoln, Springfield, Ill.

Michael J. Hartneady

marketing quotas for producers. Minimum and maximum prices would be fixed at the mine for distribution within the State. Profits of cooperative marketing corporations would be regulated, the corporations being required to distribute orders equitably among members in proportion to the commission's quotas. Licenses at $5 each would be required of every operator after July 1, 1938.

Industrial Notes

Link-Belt Co. has appointed William W. Bond as Western sales manager of the positive-drive division of Link-Belt Co., with headquarters in Indianapolis, Ind., vice C. Howard Sackbolder, deceased. Mr. Bond joined the company's engineering department in Philadelphia, Pa., in 1911. Ralph S. Dyson, for many years manager of stock chain and roller chain drives through distributors, will also head up roller-chain sales to duplicate machinery manufacturers. He has been with the company since 1899.

Fuller-Shrapnel Co., Inc., has transferred Edward S. Coe, Jr., from its Buffalo (N. Y.) plant to its Chicago branch office, where he will promote sales of herringbone gears and gear units.

Hooker Electric Corporation, Buffalo, N. Y., has elected William S. Corbaley, New York, and Lester D. Bigelow, Chicago, as vice-presidents, and Joseph H. Hopkins, secretary, has been made a director.

Bredenick & Vilsack Iron Co., St. Louis, Mo., has purchased the business and patents of the Murray Safety Sling Co., Pittsburgh, Pa. Mr. D. Murray, of the latter firm, has joined the purchasing company and will be in charge of the Murray division factory in Pittsburgh.

Ohio Chain Fittings, Inc., has appointed C. W. Crumb as central division sales manager with headquarters in Chicago. He has been sales engineer with the company for the last eleven years.

John A. Brashear's Sons Co. has established a branch office and warehouse at 835 North Ave., West, Pittsburgh, Pa.

M. J. Hartneady Is Dead

Michael J. Hartneady, 60, Secretary of Mines of Pennsylvania, died at his home in Nesquehoning, Pa., on Aug. 12 following a heart attack. A notable figure in the anthracite industry, he went to work in the mines at an early age, became president of District 7, United Mine Workers and held the post for 26 years. As district leader he played an important role in negotiating agreements between the union and the operators. He broke with the union in the 1937 session of the Legislature when he sought to have a new anthracite code passed and the union blocked it. Recently he was reinstated in his local and then campaigned for district president, but was defeated.

Florence Mine to Reopen

Idle since early in April, the Florence mine of the Youghiogheny & Ohio Coal Co., Martins Ferry, Ohio, was scheduled to resume operations on Aug. 22, according to an announcement by the company on Aug. 12. More than 400 were to be recalled to their jobs, said A. G. Squibb, general manager.

Haddock Leases Tomhicken

The Tomhicken colliery, near Hazleton, Pa., has been leased to the Haddock Mining Co., Wilkes-Barre, Pa., according to an announcement by Coxe Brothers & Co. It is planned to reopen the mine about Sept. 1 after having been idle since March. Coal is to be railroaded to the Silver Brook breaker for preparation. The operation normally employs nearly 200 men.

Glen Alden Builds Breaker

Improvements are under way at the Maxwell colliery of the Glen Alden Coal Co., Ashley, Pa., which, with machinery, will involve an outlay of close to $2,000,000. The old breaker is being replaced by a new steel structure containing modern machinery, including hoisting, loading, conveying and other up-to-date equipment. In addition a new generator is to be installed for the new boiler plant and practically all of the surface facilities are being replaced or renovated, including new colliery tracks in place of the old ones.

Battelle Broadens Research

Increasing activity in the field of organic research at Battelle Memorial Institute, Columbus, Ohio, is marked by the appointment of Richard S. Schutt as supervisor of chemical research, announced by Clyde E. Williams, director. Working in cooperation with Bituminous Coal Research, Inc., the Institute has found that in fuels, as well as in metallurgy and in ceramics, chemical problems are assuming major importance, while the opportunity for useful research in the chemical indus-

Richard S. Schutt

tries themselves is well recognized. It is felt, therefore, that further expansion of research in industrial organic chemicals, besides yielding direct results, will broaden the viewpoint and supplement the resources of staff members engaged in every type of research.

Dr. Schutt, a graduate of Kenyon College, with advanced degrees from Ohio State University, goes to his new post from a research position with the American Cyanamid & Chemical Co. Previously he was employed in similar work with Sherwin-Williams Co. and for several years was a research chemist with E. I. duPont de Nemours & Co.

Southern Appalachian Exhibit Has Technical Sessions

Featured for the first time by two technical sessions at which four interesting papers were presented and discussed, under the sponsorship of the Southwest Chapter, West Virginia Society of Professional Engineers, the Southern Appalachian Industrial Exhibit was held Aug. 18-20 at the Norfolk & Western Freight Terminal, Bluefield, W. Va. The papers were: "Preparation of Coal at the Face," Andy Whitt, general superintendent, West Virginia Coal & Coke Corporation; "Modern Ventilation Installations," William Norris, safety director, Carter Coal Co.; "Horsepower Loss in Mines," W. A. Buchanan, Appalachian Electric Power Co.; "Segregation of Power Use and Cost in Coal Mines," T. J. Jackson, West Virginia Engineering Co.

Motion pictures played a prominent part in the exhibits of the Air Reduction Sales Co., Appalachian Electric Power Co., Bethlehem Steel Co., Bluefield Supply Co., Charleston Electrical Supply Co., Hazard Insulated Wire Works, Johns-Manville Corporation, Linde Air Products Co., Mine Safety Appliances Co., Pure Oil Co., Republic Steel Corporation, Socony-Vacuum Oil Company, Standard Oil Co. of New Jersey, Sun Oil Co., U. S. Bureau of Mines, United States Steel Corporation and Virginia Polytechnic Institute.

Other exhibitors included Acme Com-

pressor Co., Advance Car Mover Co., Allen-Bradley Co., Allis-Chalmers Mfg. Co., Louis Allis Co., American Abrasive Metals Co., American Car & Foundry Co., American Mine Door Co., American Steel & Wire Co., Ames-Baldwin-Wyoming Co., Anaconda Wire & Cable Co., Banks-Miller Supply Co., A. Lee Barrett Co., Beckley Machine & Electric Co., Black & Decker Co., Blackhawk Mfg. Co., Bluefield Hardware Co., Boston Varnish Co., Boston Woven Hose & Rubber Co., Browning Mfg. Co., Buffalo Scale Co., Cardox Corporation, Carnegie-Illinois Steel Co., Chain Belt Co., Chicago Pneumatic Tool Co., Coffing Hoist Co., Colt Patent Firearms Co., Continental Paint & Varnish Co., A. D. Cook, Inc.

Dayton Rubber Mfg. Co., Deming Co., Diamond Chain & Mfg. Co., Joseph Dixon Crucible Co., Duff-Norton Mfg. Co., E. I. duPont de Nemours & Co., Inc. (paint division), Duquesne Mine Supply Co., E. & J. Mfg. Co., Economy Fuse & Mfg. Co., Electric Railway Equipment Co., Electric Railway Improvement Co., Elliott Service Co., Enterprise Wheel & Car Corporation, Fafnir Bearing Co., Fairbanks, Morse & Co., Forest City Paint & Varnish Co., Gaines-Noell-Gentry Co., Inc., General Cable Corporation, General Electric Co., General Tire & Rubber Co., L. H. Gilmer Co., Goodman Mfg. Co., B. F. Goodrich Co., Goodyear Tire & Rubber Co., Gould Pumps, J. G. Green Co., Gulf Oil Corporation, Guyan Machinery Co.

Many Manufacturers Exhibit

Hobart Brothers Co., I-T-E Circuit Breaker Co., Ideal Commutator Dresser Co., Industrial Bearing & Supply Co., Ingersoll-Rand Co., Irwin Mine Car Co., Jeffrey Mfg. Co., Joy Mfg. Co., Joyce-Cridland Co., Kanwaha Mfg. Co., LaDel Conveyor & Mfg. Co., Leetonia Tool Co., A. Leschen & Sons Rope Co., Lincoln Electric Co., Lincoln Engineering Co., Long Super Mine Car Co., Manhattan Rubber Mfg. Co., Marathon Coal Bit Co., Marlin-Rockwell Corporation, Martindale Electric Co., Maynard Machine & Electric Shop, Mines Equipment Co., Morrow Mfg. Co., Mosebach Electric & Supply Co.

Nail City Bronze Co., National Carbide Corporation, National Carbon Co., National Electric Coil Co., National Tube Co., Norfolk & Western Railway Co., Ohio Brass Co., Ohio Injector Co., Pennsylvania Electric Coil Corporation, Persinger Supply Co., Pocahontas Fuel Co., Inc. (stoker division), Portable Lamp & Equipment Co., Post-Glover Electric Co., Princeton Foundry & Supply Co., Frank Prox Co., Rockbestos Products Corporation, Safety First Supply Co., Sanford-Day Iron Works, Inc.; Shell Union Oil Corporation, Simplex Wire & Cable Co., Smith Welding & Equipment Co., Solvay Sales Corporation, Southern Oxygen Co., Charles W. Speidel Co., Square D Co., Stockdale Co., Sullivan Machinery Co., Superior-Sterling Co.

Tamping Bag Co., Templeton, Kenly & Co., Trumbull Electric Mfg. Co., W. S. Tyler Co., Utility Mine Equipment Co., Van Dorn Electric Tool Co., Weinman Pump Mfg. Co., West Virginia Armature Co., West Virginia Geological Survey, West Virginia Rail Co., West Virginia University School of Mines, Westinghouse Electric & Mfg. Co., Westinghouse Lamp Co., Williamson Supply Co., Willson Products, Inc.; Wilson Welder & Metals Co., Inc.

To Canvass Coal Chemistry

With more than 30 representatives of the Bureaus of Mines of the United States and Canada, Carnegie Institute of Technology, University of Iowa, and the Universal Oil Products Co. as speakers, recent research developments in the chemistry of coal will be discussed by the Division of Gas and Fuel Chemistry of the American Chemical Society at the society's 96th meeting, to be held Sept. 5-9 at Milwaukee, Wis. The themes will range from the cracking characteristics of coal to the oxidation of anthracite and its relationsship to the decrease in heating value, according to an announcement by the chairman of the division, Dr. H. H. Lowry, director, Coal Research Laboratory, Carnegie Institute of Technology.

Lorado Mine Reopened

After seven months' idleness, the No. 1 mine of the Lorado Coal Mining Co., Lorado, W. Va., was reopened on Aug. 8. At capacity production the mine employs about 200 men.

Illinois Conference Deferred

The sixth annual Illinois Mineral Industries Conference, previously scheduled to be held Sept. 30 and Oct. 1 at Urbana, Ill., has been postponed until some time next year so as to coincide with the date of dedication of the Natural Resources Building to be erected on the University of Illinois campus.

Another Harlan Operator Cited

A complaint against the High Point Coal Co., of Harlan County, Kentucky, charging coercion of employees, sponsorship of an independent union and discharge of 38 men for alleged union activity was issued on Aug. 9 by the National Labor Relations Board. The complaint was issued by Philip G. Phillips, regional director, on the basis of charges filed by the United Mine Workers.

James O. Ewell, trial examiner for the board, recommended on Aug. 2 that the Stearns Coal & Lumber Co., Stearns, Ky., reemploy, with back pay, 67 workers said to have been discharged for union activity. In his report, the examiner also directed that the company cease interfering with organization efforts of employees and cease discouraging membership in the United Mine Workers, which filed the original charges.

Obituary

EPHRAIM NESBIT, 73, vice-president in charge of operations and secretary of the Boulder Valley Coal Co., operating in Boulder and Weld counties, Colorado, died suddenly July 20 in Denver, Colo. He became interested in the coal industry at the age of 21, later forming a partnership with the late Peter M. Peltier in operating the Big Four mine and subsequently in forming the Boulder Valley company.

JAMES T. HATFIELD, 73, chairman of

the board of the Hatfield-Campbell Creek Coal Co., died July 20 at his summer home at Falmouth, Mass. Starting his business career at 17, he attained a position of eminence in the bituminous coal industry. He retired from active business in 1933.

GEORGE F. RUCH, 40, assistant to the president, H. C. Frick Coke Co., died Aug. 7 in a Pittsburgh (Pa.) hospital.

New Preparation Facilities

AJAX COAL CO., Ajax mine, Bulan, Ky.: Contract closed with Morrow Mfg. Co. for feeder, shaking screens, shaking picking tables, loading booms and mixing conveyor; capacity, 150 tons of mine-run coal per hour; probable date of completion, Sept. 15.

ALLEGHENY RIVER MINING CO., Cadogan mine, Cadogan, Pa: Contract closed with Roberts & Schaefer Co. for complete preparation plant in connection with tipple; all prepared sizes to be made; mine-run capacity, 225 tons per hour, to be crushed to minus 4-in.; 4x½-in. coal to be cleaned in hydroseparator at 155 tons per hour; ½x0-in. to be cleaned in Stump "Air-Flow" cleaners at 70 tons per hour; to be completed Nov. 1.

CARTER COAL CO., Coalwood, W. Va.: Contract closed with Jeffrey Mfg. Co. for rescreening plant of steel with seven Jeffrey-Traylor FB-4 screens, belt conveyors, loading boom and 50-ton slack bin; capacity, 250 tons per hour of minus ¼-in. coal.

ELM GROVE MINING CO., Mine No. 1, Elm Grove, W. Va.: Contract closed with Morrow Mfg. Co. for weigh pan, apron feeder, shaking screens, loading booms, rescreen and refuse conveyors; capacity, 350 tons of mine-run coal per hour; probable date of completion, Oct 1.

HANCE & LARSEN, strip mine near New Concord, Ohio: Contract closed with Morrow Mfg. Co. for feeder, shaking screens and loading booms; capacity, 100 tons of mine-run coal per hour; probable date of completion, Sept. 15.

MOUNT OLIVE & STAUNTON COAL CO., Staunton, Ill.: Contract closed with Jeffrey Mfg. Co. for rescreening plant and washery addition to existing tipple; screening-plant equipment includes Jeffrey-Traylor vibrating screens, also scraper and belt conveyors; washery to be equipped with 84-in.-wide three-compartment Jeffrey jig, shaker-type dewatering and sizing screens, multi-compartment conveyor for washed coal and water-clarification and circulating system; capacity, 400 tons per hour of 6-in.x0 coal to screening plant and 350 tons per hour of 6x¼-in coal to washery.

Safety Team Has Perfect Score

At the sixth annual safety meet of the Truax-Traer Coal Co., held Aug. 13 at Leewood, W. Va., and attended by about 10,000 people, the first-aid team of the Marfork mine of the company, captained by Omark Elkins, won first place in competition with fifteen other teams. The winners had a perfect score of 1,500 points; Raccoon West mine, with 1,499 points, was second, and the United mine team was third.

The contest was under the direction of W. R Perfater, safety engineer for the company, assisted by Clarence O. Morris, of the State Department of Mines, and secretary of the Kanawha Valley Mining Institute. Chief judge was Joe Mulligan, of Montgomery, Department of Mines inspector, and his chief assistant was M. E. White, safety director of the Pocahontas Fuel Co., Pocahontas, Va.

City Air Low in Sulphur

A 15-month survey to determine the average amounts of sulphur gases in the air of American cities, long a subject of speculation and dispute, shows them to be comparatively small, according to Air Hygiene Foundation and the Mellon Institute of Industrial Research. Twenty-five cities were studied and more than 50,000 separate air tests were made by six chemists driving a fleet of cars equipped like traveling laboratories. Most of the tests, covering all hours of day and night and all seasons of the year, were made in five metropolitan districts, shown in order of their sulphur-dioxide pollution (figures indicate parts of sulphur dioxide per million parts of air):

City	Within 15-Mile Radius of Center of City	
	Average	Maximum
St. Louis-East St. Louis	.128	2.266
Pittsburgh	.057	.897
Detroit	.028	.396
Philadelphia-Camden	.027	.424
Washington	.009	.290

These figures are of no significance from a public health standpoint, according to the hygienists connected with the investigation—that is, "in the concentrations found, the contaminants do not exert harmful physiological effects." The survey showed, however, that the home fires are among the large contributors to sulphur pollution, particularly in districts using coal of high sulphur content. The type of coal burned in a locality was mirrored in the results of the study. The fuel factor also explains why sulphur pollution in most districts was approximately 50 per cent higher in the heating season than in the summer months. Some industrial operations also discharge sulphur fumes unless properly safeguarded. A close relationship was found between wind velocity and the quantity of sulphur dioxide in the air: the higher the wind, the cleaner the air. Fogs catch and store up the sulphur fumes: some of the highest concentrations were noted on foggy nights.

Trade Literature

ACCESSORIES FOR MINE EQUIPMENT—Jeffrey Mfg. Co., Columbus, Ohio (Catalog 675, 52 pp., illustrated). Lists various accessories for use on mine locomotives, coal cutters, loading machines, etc., with features of operation and construction.

COAL-WASHING TABLES—Deister Concentrator Co., Fort Wayne, Ind. Bulletin No. 10 (4 pp.) describes the "Diagonal-Deck" No. 10 Concenco Duplex washing table, telling about its design, construction and uses. Bulletin 19A (4 pp.) is devoted to the features and advantages of

PRIMARY SCREENING

done better in the

modern manner

Economy, efficiency and low breakage are the reasons why the Gyrex Screen is so rapidly supplanting the slow shaker for primary screening in coal tipples. While the action of the Robins Gyrex Screen is not violent, it is of a character which eliminates the shatter cracks and the lumps remain solid during transportation.

Robins Gyrex Screens reduce the cost of the primary screening. Furthermore, Gyrex Screens do their job so efficiently that in subsequent screening for the finer sizes there is less bulk and more uniform coal to handle.

Accurately sized coal is clean coal. Greater marketability of coal screened with Robins Screens would alone warrant their adoption. Greater speed, less floor space and lower power costs are further advantages.

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MATERIAL HANDLING ROBINS EQUIPMENT

the No. 7 "Diagonal-Deck" Deister-Overstrom table. Catalog No. 23-B (20 pp.) also covers accessory equipment.

CORROSION INHIBITORS—Mutual Chemical Co. of America, New York (8-pp. booklet). Briefly summarizes studies and experience in the use of chromium chemicals in various industries for the purpose of inhibiting corrosion.

ELECTRICAL EQUIPMENT — General Electric Co., Schenectady, N. Y., has issued the following bulletins: GEA-432C, Direct-Current Generators and Exciters; GEA-841H, A.C. Magnetic Switch; GEA-1283A, Cam-Operated Master Switches; GEA-1297B, Electric Cable-Reel Equipment for Gathering Locomotives; GEA-1437C, Gear-Motors; GEA-1542C, Type B D.C. Motors; GEA-1607B, D.C. Generators and Exciters, Type B; GEA-1724A, Controllers for Synchronous Motors; GEA-1929A, Modernizing Low-Speed Drives with G-E Gear-Motors; GEA-2003B, Automatic Oil Circuit Recloser for Protection of Suburban, Branch and Rural Lines; GEA-2026A, Brake-Motor; GEA-2170A, Directional Distance Relays; GEA-2234B, Manual Motor-Starting Switch; GEA-2426A, Outdoor Oil-Blast Circuit Breakers; GEA-2625, Brake-Screw Locking Device for Mine and Haulage Locomotives; GEA-2638, Plugs and Sockets for Storage-Battery Locomotives; GEA-2640A, Incandescent Headlight Equipment for Mine Locomotives; GEA-2714, Wound-Rotor A.C. Crane Motors; GEA-2742, Pyranol Capacitors for Low-Voltage Industrial Applications; GEA-2823, Commercial Testing Instruments; GEA-2889, Magnetic Motor-Starting Switches; GEA-2892, Duplex Switchboards with Secondary Control and Protective Equipment; GEA-2963, Type TSA-14 Automatic Time Switches for Control of A.C. or D.C. Circuits.

ELECTRICAL EQUIPMENT—Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., has issued the following bulletins: Catalog Section 43-131, Voltage Transformers; Price List 11-200, De-ion Linestarters; Catalog Section 31-260, Silverstat Regulators; Descriptive Data 33-675, Type "U" De-ion Air Circuit Breakers; Price List 13-020 (p. 13), Pushbutton Stations; B-2137, Steam Turbines.

GOGGLES—American Optical Co., Southbridge, Mass. Four-page pamphlet tells how to fit eye-protection goggles to workers for greatest comfort and safety; divided into two sections, one devoted to instructions on the fitting of eye-cup goggles, the other to the spectacle type.

PORTABLE ELECTRIC TOOLS—Independent Pneumatic Tool Co., Chicago (48-pp. catalog). Gives complete descriptions, specifications and prices on the entire Thor line of universal type electric drills, drill stands, screw drivers, nut setters, tappers, saws, hammers, grinders, polishers, sanders, heat guns and electric tool accessories.

RESCUE APPARATUS—Mine Safety Appliances Co., Pittsburgh, Pa. Bulletin ED-3 (8 pp.) describes in detail M.S.A. industrial gas masks and canisters, listing types for protection against various gases. Bulletin RM-2 (4 pp.) gives details of the light-weight one-hour oxygen breathing apparatus designed for complete respiratory protection in atmospheres containing concentration of gases too high for safe use of canister-type masks or where the oxygen content is below the minimum necessary to support life.

ROLLER CHAINS AND SPROCKETS—Link-Belt Co., Chicago (Data Book No. 1757, 174 pp., illustrated). Gives practical information, application pictures, and engineering data on Silverlink roller chains and sprockets.

SAFETY SHOES—Lehigh Safety Shoe Co., Inc., Allentown, Pa. Booklet (32 pp.) entitled "Stop Foot Injuries" contains informative material on general industrial safety, including factory-tested suggestions on how industrial injury frequency rates can be reduced; case histories also are given in word and picture.

SHORTWALL CUTTERS—Goodman Mfg. Co., Chicago (Bulletin M-384, 4 pp.). Contains complete description and specifications on the Type 612 unit, designed particularly for conveyor mining.

UNIT WASHERIES—Jeffrey Mfg. Co., Columbus, Ohio. Folder 665A pictures by word and diagram the Jeffrey self-contained washery for small tonnage requirements, citing characteristic results.

VIBRATING SCREENS — Deister Machine Co., Fort Wayne, Ind. (Bulletin No. 26, 12 pp., illustrated). Explains construction, operation and advanced features of the Deister Plat-O unit.

WELDING—Metal & Thermit Corporation, New York City. Booklet 18c (36 pp.) tells of the Thermit welding process and its applications, including use on coal-mine track. Booklet 3a (30 pp.) describes Murex welding rods, giving brief data on the physical properties and chemical analysis of the weld metal deposited by each of the twenty-odd electrodes in the Murex line.

WIRE CLAMPS—Ohio Brass Co., Mansfield, Ohio. Bulletin 641-H points out simplicity and economy of the O-B neutral clamp. Bulletin 642-H cites time- and money-saving features of the improved O-B angle clamp.

WOOD PRESERVATIVE—Carbolineum Wood Preserving Co., Milwaukee, Wis. (Folder 102, 4 pp.). Contains description, advantages and specifications for use of Avenarius Carbolineum, telling also how and where it may be used to advantage.

Coal-Mine Fatality Rate Registers Decline

Accidents at coal mines of the United States caused the deaths of 48 bituminous and 28 anthracite miners in June last, according to reports furnished the U. S. Bureau of Mines by State mine inspectors. With production of 22,850,000 tons, the death rate among bituminous miners was 2.10 per million tons, compared with 2.99 in the corresponding month of last year.

The anthracite fatality rate in June last was 6.45, based on an output of 4,338,000 tons, as against 5.49 in June a year ago.

For the two industries combined, the death rate in June last was 2.80, compared with 3.30 in June, 1937.

Fatalities during June last, by causes and States, as well as comparable rates for the first six months of 1937 and 1938, by causes, are shown below.

COAL-MINE FATALITIES IN THE UNITED STATES IN JUNE 1938, BY CAUSES AND STATES

State	Underground: Falls of roof	Falls of face	Haulage	Gas or dust explosions	Explosives	Electricity	Suffocation	Other causes	Total underground	Open-cut and surface: Persons falling down shafts	Mine cars	Falls of persons	Other causes	Total surface	Grand total
Alabama	2	..	..	3	..	..	..	..	5	..	..	..	..	..	5
Colorado	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Illinois	..	1	1	..	3	..	..	..	5	..	..	..	..	..	5
Indiana	2	..	..	..	..	..	..	..	2	..	..	..	..	..	2
Iowa	..	..	..	..	..	..	1	..	1	..	..	..	..	..	1
Kansas	..	..	..	..	..	..	..	1	3	..	..	..	..	..	3
Kentucky	..	..	1	..	1	..	..	..	2	..	..	..	..	..	2
Ohio	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Pennsylvania (bit.)	5	..	1	..	..	..	..	..	6	1	..	1	..	1	8
Virginia	1	..	..	..	..	..	..	..	1	..	..	..	..	..	1
West Virginia	2	1	2	..	..	4	..	..	9	..	..	..	..	..	9
Wyoming	1	..	..	..	..	..	..	..	1	..	..	..	..	..	1
Total (bituminous)	26	2	5	3	4	4	1	1	46	1	..	1	..	1	48
Pennsylvania (anthracite)	7	3	2	10	2	1	..	..	25	..	1	1	1	3	28
Total	33	5	7	13	6	5	1	1	71	1	1	2	1	4	76

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

January–June, 1937 and 1938

Cause	Bituminous: Number Killed 1937	1938	Killed per Million Tons 1937	1938	Anthracite: Number Killed 1937	1938	Killed per Million Tons 1937	1938	Total: Number Killed 1937	1938	Killed per Million Tons 1937	1938
Falls of roof and coal	287	305	1.288	1.383	73	72	2.600	2.988	360	377	1.434	1.577
Haulage	114	58	.511	.382	17	13	.606	.539	131	71	.522	.404
Gas or dust explosions:												
Local	8	13	.036	.086	..	1	....	.042	8	14	.032	.080
Major	37	60	.121	.396	..	18	.747	.747	37	78	.108	.444
Explosives	25	10	.112	.066	8	7	.285	.290	33	17	.131	.097
Electricity	28	18	.117	.119	2	2	.071	.083	28	20	.111	.114
Machinery	19	10	.085	.066	2	..	.071	....	21	10	.084	.057
Shaft	10	3	.045	.020	2	2	.071	.083	12	5	.048	.028
Miscellaneous	15	7	.067	.046	9	4	.321	.166	24	11	.096	.063
Stripping or open-cut	12	1	.054	.007	5	8	.178	.332	17	9	.068	.051
Surface	36	16	.161	.106	11	5	.392	.207	47	21	.187	.120
Total	579	401	2.597	2.647	129	132	4.593	5.477	708	533	2.821	3.035

*All figures subject to revision.

WHAT'S NEW

In Coal-Mining Equipment

COAL DRILLS

A new line of coal drills has been developed by Black & Decker Co., Towson, Md., which states that these units are offered to make available the full operating economy of closer shotholes and consequent lighter powder charges at both anthracite and bituminous mines. The line comprises four different-sized drills suitable for one- and two-man operation.

Features listed by the manufacturer include: reasonable price, strong construction, light weight, a selection of speeds to meet varying drill requirements, spade handle or breast plate, full-capacity dustproof switch, detachable pipe handle, ball-bearing gears, Timken-bearing spindle, spindles threaded (1 in., 8-thread, right-hand) to accommodate various standard augers, sockets or adapters; and reversing switch on three of the models. The tools are available for either a.c. or d.c., 110, 220 or 250 volts.

CORDS AND CABLES

Triangle Conduit & Cable Co., Elmhurst, New York City, offers the new Tricord line of "Rubber-Armor" cords and cables, for which it notes the following features: high resistance to acids, oils, grease and alkalis, and to breakage from repeated sharp bends or twists; ability to withstand repeated heavy hammer blows and severe abrasion and long exposure to sunlight; exceptional waterproof qualities; great flexibility; non-kinking qualities; and "all-rubber" construction.

Cords offered are the Type S for heavy-duty service where extra flexibility is desired ,and Tricord "Junior," Type SJ, with a slightly thinner jacket, thus reducing the outside diameter. Tricord cables include: mining-machine cable, twin parallel, twisted or concentric conductors; reel cable, single conductor; dredge and electric-shovel cables; welding cables, etc. Conductors, stated by the company to be extra flexible, are covered with Triangle standard 30-per-cent insulation with colored insulation tracers, followed by a 40-per-cent rubber jacket, double seine-twine reinforcement applied in reverse directions and, finally, the special 60-per-cent "rubber armor," after which the cable is vulcanized in metal molds under high pressure for toughness, density and elasticity.

Where certain types of oils, acids, chemicals, etc., are encountered, the company offers Triaprene cords and cables in which the outer jacket is compounded of Neoprene, a synthetic rubber product.

CONVEYING UNITS

Atlas Conveyor Co., Clintonville, Wis., offers the new Model BU-18 horizontal car unloader, said to handle stone, sand, gravel and similar materials at the rate of 50 to 70 cu.yd. per hour. The machine

is designed to be laid across the rails without digging into the ballast to provide a secure base. Power is supplied by a geared-head 3-hp. 220- or 440-volt motor, with a 5-hp. gasoline engine optional.

Atlas also offers the Model 35 flight-type conveyor, described as a lighter machine for coal handling which can be transferred quickly from one place to another. It is built for both piling and reclaiming. Weight is 1,600 lb.; capacity, 35 tons per hour. Lengths are 20, 24 and 27 ft.; trough width is 15 in. Power is provided by a 3-hp. 220- or 440-volt motor.

LAMP TRANSFORMER

A new "TuLamp" transformer, designed to operate two 400-watt Type H mercury lamps at peak efficiency and 90 to 95 per cent power factor, is announced by the General Electric Vapor Lamp Co., Hoboken, N. J. Use of the double-duty unit, it is stated, permits a reduction of some 20 per cent in transformer costs, as well as additional installation saving. Transformer losses are reduced 30 per cent. Should one lamp burn out, the other will operate normally without transformer injury.

ELECTRIC ETCHER; SOLDERER

An electric etcher for permanently marking on metal surfaces in the same manner as writing with a lead pencil is offered by the Ideal Commutator Dresser Co., 1013 Park Avenue, Sycamore, Ill. Two points are provided with the unit, one of copper that may be sharpened for fine marking and the other of a special alloy for ordinary marking. The complete unit consists of a fiber handle with two points, a 4x7-in. work plate and 5 ft. of No. 6 flexible wire with a carbon-rod resistor and connector halves for attaching the unit to a No. 5A7 "Deluxe" transformer.

Ideal also offers a new all-purpose "Deluxe" Thermo-Grip soldering unit for all types of soft soldering work. The complete unit consists of a transformer and four heads, or tools, as follows: "Midget," small and lighter soldering, restricted spaces, small terminals and lugs up to 150 amp. or sweating threadless copper tubing up to ⅜ in.; "Standard," common soldering work, lugs and terminals up to 400 amp., up to 1-in. copper pipe and fittings, stator connections, heating solder cups, etc.; "Fork," heating small terminals and lugs impossible to reach with other tools; "Pencil," soldering seamed joints, spot soldering and tight places. Where speed is necessary, a new foot-operated switch, adaptable to all "Thermo-Grip" tools, is available.

BUCKET LOADER

A new full-crawler-mounted high-capacity self-feeding bucket loader (Model 552) is announced by the Barber-Greene Co., Aurora, Ill. Features of

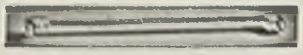
this new "Junior" bucket loader cited by the company include: tank-type chassis frame, synchronized spiral feed, automatic overload release, optional high traveling or slow crowding speed and the B-G patented floating-boom principle.

LINE MATERIALS; HEADLIGHTS

Ohio Brass Co., Mansfield, Ohio, announces a new heavy-duty section-insulator switch (M-6) for sectionalizing mine trolley circuits. This switch, according to the company, is distinguished by heavy copper throughout and is designed for currents up to 1,000 amp. Adjustable feeder lugs accommodate feeder cable up to 500,000 circmils. Operation is easy and positive, it is stated, and the operator is protected by a heavy rubber handle. The switch

may be locked so as to permanently break the circuit. Other features are: stationary center section for smooth collector passage whether the switch is open or closed; easily renewed wearing parts; bronze end runners; hot-dip-galvanized malleable-iron center runner and support castings, design for support from the center or both ends; and suspension hardware on the ends set back for low headroom.

An improved steel-arc-weld rail bond (AW-20, hook type) is another Ohio Brass development. The pressed-steel terminal is bent at right angles to the direction of the strand, and a small steel hook embraces the rail to hold the bond firmly in place while it is being welded.



The 4/0 strand is welded into the terminal and is further secured in position by a copper sleeve. Regular lengths are 12, 16, 20, 22, 24, 26, 28, 30, 32 and 34 in. Easy installation and reclamation are claimed for the new bond. The weld is made on the outside edge of the right-angled hook and is only 1¼ in. long, compared with the usual 3-in. weld, thus cutting cost and welding time, in addition to facilitating reclamation—a simple tap with a chisel across the weld and the terminal is pried off easily without injury. The strand extends to the end of the terminal, and consequently the copper-to-rail path never exceeds ¼ in., measured from the center of the copper section. Resistance values, it is asserted, are exceedingly low as a result.

The Type MF permissible explosion-proof headlight is another Ohio Brass product designed to meet the demand for a small and very durable incandescent headlight for gaseous condition. An explosion-proof resistance is available for use with this headlight. No flame or gas, it is stated, can escape from either headlight or resistance; 3 ft. of heavy duplex cable enters the Feraloy casing of both the headlight and resistance through a watertight and flameproof stuffing box. An Alzak corrosion-resistant reflector (non-chipping, peeling or cracking; resistant to high temperature; and easily cleaned) is said to provide maximum light output. Two focusing arrangements are available: a push-pull mechanism with medium screw base or a medium pre-focus base. The MF headlight uses a 94-watt 115-volt P25 bulb. Any bulb with a light-center length of approximately 2 1/16 in. and a maximum over-all length of 4¾ in. can be used with the push-pull focusing arrangement. Stationary or turret bases are available.

Accurate focus adjustment for incandescent mine headlights is the objective of other Ohio Brass developments. The Type MB headlight (gathering) and Type MSS headlight (haulage locomotives) now are available with an externally operated focusing mechanism with medium-screw base, push-pull focusing mechanism with medium screw base, and medium pre-focus base. Type MS and the new Type MF explosion-proof headlights are furnished in push-pull and pre-focus designs. The externally operated focusing mechanism eliminates opening the case in any way for adjusting the beam. All headlights now are furnished with Alzak reflectors.

To meet the current requirements of mine headlights, Ohio Brass offers a porcelain-tube-

type resistance, which it describes as strong in design and with ample insulation and heat-dissipation facilities. The complete resistance is protected by a perforated steel case. Units are available for line voltages of 220 to 675, and accommodate lamps from 32 to 115 volts and 56 to 500 watts.

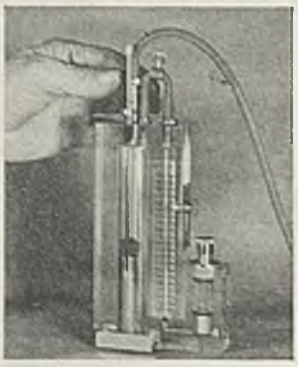
MINE JACKS

Five new Simplex automatic raising and lowering jacks have been brought out by Templeton, Kenly & Co., Chicago. Nos. 84A, 85A and 86A are new 5-ton jacks superseding Nos. 84, 85 and 86, respectively. Some features of the new models listed by the company are: stronger cadmium-plated springs and links, shorter fulcrum centers, longer and wider rack-bar toe lifts, larger trunnion bearings, larger and stronger pawls, or dogs, reinforced inner-rib housings and greater strength throughout.

No. 1017 is a new lightweight, easy operating jack with a lifting capacity of 10 tons. It is said to be especially suited for use under low loads. Exceptional ease and speed of operation are cited for the new Simplex No. 24A 15-ton jack. Superseding the No. 24, it is said to be an even stronger unit.

CO_2 ANALYZER

A new pocket CO_2 indicator is announced by the F. W. Dwyer Mfg Co., Chicago, which gives the weight of the instrument, including carrying case and all accessories, at less than



3 lb. Tests are made while the indicator is held in the hand or fastened in a clip provided in the carrying case. Accuracy and ease of operation are claimed by the company.

DRYING OVENS

Despatch Oven Co., Minneapolis, Minn., offers the 1938 Despatch cross-flow (horizontal) forced-draft ovens for baking and drying of paints, enamels, varnishes, lacquers and other finishes, aging and curing and other processing requiring controlled temperature conditions. Electric or gas heated, variation in interior temperatures ranges from 1 to 1½ deg. C., plus or minus, depending upon oven size. This is accomplished by bimetallic thermostats which maintain a given temperature within ½ to 1 deg. C., plus or minus, over the entire operating range, the company asserts. Other features are heating up to 150 deg. C. in 20 to 25 minutes and recuperation after charging in 2 to 8 minutes.

CORE-DRILL BIT; AIR VALVES

Sullivan Machinery Co., Michigan City, Ind., announces what it describes as a revolutionary type of core-drilling bit. These "Koebelite Korbits" consist essentially of a number of bortz-bearing inserts accurately located and firmly brazed into radial slots in the face of the bit blanks. Matrix and stones are bonded together by a new process said to eliminate even the effects of temperature changes. In comparison with any other type of bortz-set core-drill bit, savings of 15 to 20 per cent per foot of hole drilled are claimed. The new bits are available in any style and size.

Sullivan also offers improved "Dual Cushion" valves in its Class WG-7 single-stage horizontal compressors. These strong, simple valves are said to give higher efficiency, quiet action and long wear.

Improvements in "Stringalite," described as the moisture-proof lighting cable that provides the safety and utility of a permanent installation with the wiring simplicity of a temporary job, are another Sullivan development. These improvements include a new molded-rubber socket as well as revisions in end- and lamp-connector construction for trouble-free service.

WELDING HOSE

Electric Hose & Rubber Co., Wilmington, Del., has developed "Electric-Siameez" welding and cutting hose consisting of two regular hoses joined together by an integrally molded web. In sizes of ¼, 5/16 and ⅜ in., the hose is recommended by the company for working pressures up to 200 lb. The end can be separated at the factory, if desired, for attachment of equipment. The present hose supplements the "Supero" and "Junior" types already on the market.

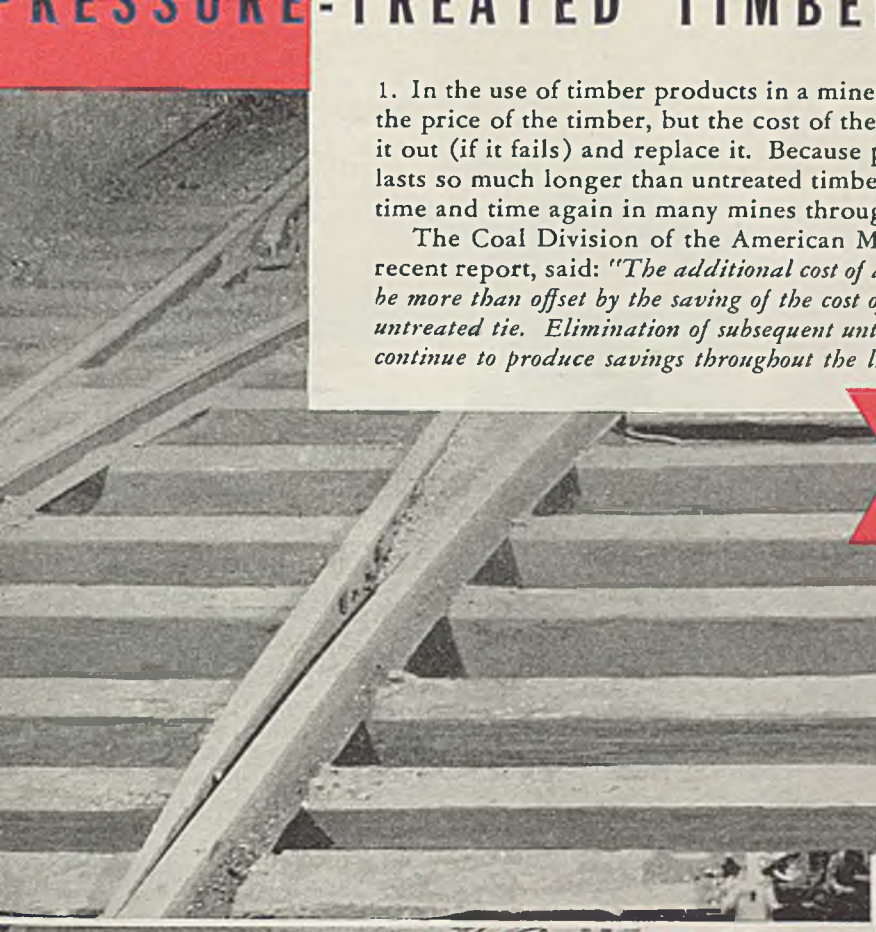
RESPIRATOR; GOGGLE

A new dual-disk respirator for protection against Type A, or nuisance, dusts and said to employ unusually inexpensive throw-away filters has been developed by Willson Products, Inc., Reading, Pa. This respirator (No. 750) has been approved by the Bureau of Mines. The dual-disk filters provide 28 sq.in. of filtering surface and are stated to have

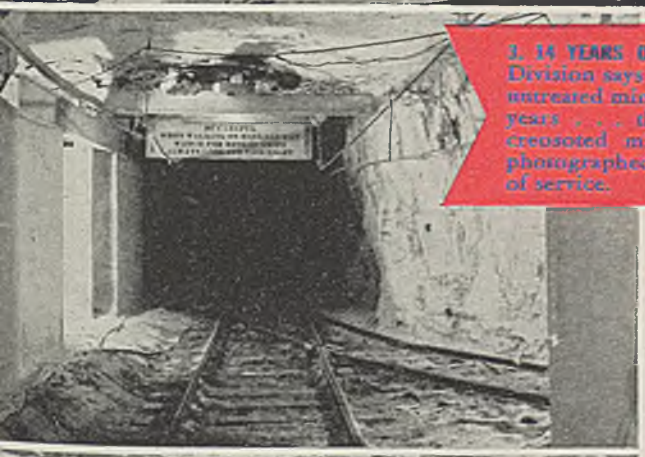
RESSURE-TREATED TIMBER PAYS FOR ITSE

1. In the use of timber products in a mine, the greater cost is not the price of the timber, but the cost of the labor to put it in, take it out (if it fails) and replace it. Because pressure-treated timber lasts so much longer than untreated timber, it is paying for itself time and time again in many mines throughout the country.

The Coal Division of the American Mining Congress, in its recent report, said: *"The additional cost of a treated tie usually will be more than offset by the saving of the cost of the first renewal of an untreated tie. Elimination of subsequent untreated tie renewals will continue to produce savings throughout the life of the track."*



2. 15 YEARS OLD. This photograph shows the splendid condition of these pressure-treated switch ties after 15 years.



3. 14 YEARS OLD. The Coal Division says average life of untreated mine ties is 2 to 5 years . . . these pressure-creosoted mine ties were photographed after 14 years of service.

4. 7 YEARS IN WATER. These pressure-creosoted yellow pine timbers show no evidence of decay after seven years in a foot of running water.

5. MANY OTHER USES are found in and around mines where pressure-treated timber products pay for themselves. In mine entrance supports . . . cribbing . . . buildings, and other places.

OTHER PRODUCTS AND USES FOR PRESSURE-TREATED

6. Piling 7. Guard Rails 8. Fences 9. Poles 10. E
Bins, Sheds 11. Tipples 12. Piers, Docks, Wharves 13. Pl
14. Flooring 15. Tanks, Sumps, Vats 16. Crossing Plank 1
Sides and Bottoms 18. Cable Ways 19. Conduit 20. (
21. Flumes 22. Trench lining & covers 23. Conveyor decking & s

OTHER KOPPERS PRODUCTS FOR THE MINING FIE

Koppers Rheolaveur Process... Menzie's Automatic Cone Sep
... Koppers-Llewellyn Automatic Washers ... K-R-M Dry-C
Separators... Coal Tipples... Koppers-Birtley Dedusters... Ca
Centrifugal Dryers... Boiler and Power Plants... Mine Shops.
Couplings... American Hammered Piston Rings... Cylinder
... Bronze and Iron Castings... Flotation Oils ... Bitumino
Paints... Coal Tar Roofing... Waterproofing... Tarmac for

THE WOOD PRESERVING CORPORATION

PITTSBURGH, PA.

NATIONAL LUMBER & CREOSOTING COMPANY

TEXARKANA, ARK.-TEX.

Send for this booklet, "Pressure-treated Timber"

K O P P E R S subsidiaries

the advantage of very little resistance to breathing, in addition to quick filter changes as required.

Equipped with "Super-Tough" lenses and bearing the designation Style WV1, a new-type spectacle goggle is offered by Willson Products. Said to be

designed for maximum protection and comfort, this new goggle is available in various assemblies to meet wearer requirements, such as rocker or saddle nose bridges, wire screens, leather or transparent "Sonite" side shields and, when specified, "Willsonite" lenses.

TOOL BALANCER

A new device for suspending large powerful electric and pneumatic drills, nut setters and other tools above the working location is offered by the Independent Pneumatic Tool Co., Chicago. Known as the Thor "Torque-Arm Balancer," this equipment, according to the company, not only supports the tool but also absorbs the torque and completely eliminates the danger to the operator resulting from stuck tools. Range of travel is 3 to 6 ft.; load capacity is 45 to 100 tons; weight is 143 lb.

FIBER CONDUIT

Fibre Conduit Co., New York, offers the new Orangeburg "Nocrete" fiber conduit for use underground without concrete incasement. It is suggested for installation where iron formerly has been used, and is said by the manufacturer to have the advantages of high strength, permanence, protection of the cable against soil corrosion and electrolysis, and decreased material and installation cost. Crushing strength of the conduit is said to be more than double that established for soil tile and also greater than usual culvert requirements. A complete line of fittings is available.

WELDER

Harnischfeger Corporation, Milwaukee, Wis., offers the new P&H-Hansen 200-amp. "Special" engine-driven welder, which it states has been designed to supply the demand for an engine-driven welder with a somewhat wider operating range than the average 150-amp. unit, yet lower in price than the standard 200-amp. unit. With an intermittent welding range of 35 to 225 amp., the new unit is built to handle electrodes up to 7/32 in. under continuous manual operation. Although in its standard form a stationary machine, the new welder can be supplied with the standard P&H two-wheeled pneumatic running gear used on 150-amp. portable machines.

PIPE COUPLING

Simplicity of construction, strength, flexibility, durability and ease of application on plain and beveled-end pipe are claimed for the new "Rolagrip" pipe couplings offered by Gustin-Bacon Mfg. Co., Kansas City, Mo. The coupling consists of two halves, two bolts and a gasket. In joining lengths of pipe, the rubber-ring gasket is first slipped over one end. The two pipe ends then

are brought together and the gasket is moved to cover the joint. Over this the two halves of the coupling are placed and bolted tight.

Special tools are not required, it is stated, and the couplings have almost 100-per-cent salvage value. Rollers in the coupling housing permit expansion and contraction of the pipe line, and a maximum deflection of about 5 deg. can be accommodated. "Rolagrip" couplings are built, according to the company, to withstand a working pressure of 1,000 lb. per square inch, temperatures up to 175 deg., and vacuum.

TRACK TOOLS

Gibraltar Equipment & Mfg. Co., St. Louis, Mo., offers a new line of alloy-steel light-weight ratchet-type rail benders. The tools, according to the company, are stronger, faster, easier to operate and more economical even than the standard tools already developed by the organization, which can be converted by installation of the new ratchet and screw assemblies. "Gemco Tru-Blu" ratchet benders are available in the following sizes: B.R. 2, weight 30 lb., 12- to 25-lb. rail; B.R. 4, 39 lb., 20- to 40-lb. rail; B.R. 8, 67 lb., 40- to 80-lb. rail.

Gibraltar also offers new improved "Gemco Tru-Blu" ratchet-type rail punches, described as quicker, easier and requiring much less effort to use. The

ratchet is fully inclosed to prevent the entrance of dirt and freezing of the working parts. It also is separate from the punch screw, so both punch and ratchet last longer. Standard "Gemco" punches may be converted by installing ratchet-and-screw assemblies. The ratchet-type punches are available as follows: P.R. 4, weight 30 lb., 20- to 40-lb. rail; P.R. 7, 34 lb., 20- to 70-lb. rail.

TRAILER TIRE

Goodrich Mfg. Co., Akron, Ohio, announces a new heavy-duty trailer-type tire designed to eliminate unusual wear growing out of the wiping action of the non-skid tread on tires for free-rolling wheels. With four circumferential ribs, the new tire has a modernistic side-wall design and all the features of the regular line of Goodrich commercial tires, including: "Plyflex" for the distribution of stresses; "Plylock," giving protection against short plies tearing loose above the beads; and the new "Hi-Flex" cord, stated to retain its stretch and prevent dangerously high internal temperatures.

RAIL PUNCHES

Tallman Mfg. Co., Shelbyville, Ill., offers a new line of "Talloy" lightweight high-strength alloy-steel rail punches for punching ½- to 7/8-in. holes accurately through either new or rerolled rails for attaching splice bars or installing rail bonds. The carrying handle is a part of the frame. All wearing parts, the company says, are of special-analysis alloy steel and are easily replaceable, including the special steel bushing in which the screw operates. The punches are available in two styles: No. 40P, weight 33 lb., 12- to 40-lb. rail; No. 60P, 35 lb., 12- to 60-lb. rail. Either size, if desired, can be furnished in the ratchet type at a slight additional cost.

DRIFTER

Sullivan Machinery Co., Claremont, N. H., has developed the Sullivan automatic "Adjust-O-Feed" drifter for which it claims outstanding ease of handling, flexibility and low upkeep. Main features cited by the company are: only automatic drifter with an adjustable feed for efficient drilling in

changing rock; chain drive, doing away with expensive feed-nut and feed-screw replacement; more positive feeding, permitting drilling upholes with ease; and use of an air-operated rotation release, aiding materially in collaring holes and freeing stuck steels.

DRILL—PUMP

Ingersoll-Rand Co., Phillipsburg, N.J., offers the new JA-35 "Jackhamer," described as a light-weight yet extremely powerful drill styled after the JA-45 and 55 models. Weighing less than 35 lb., it is said to be adaptable to cutting hitches, trimming, taking up bottom, making holes for trolley hangers, popholing, etc., besides having sufficient power for much general drilling work.

Ingersoll-Rand also offers a new turbine-driven pump which combines both turbine and pump on a common shaft. Known as Class TRV, suitable for use wherever a turbine-driven pump is desirable and replacing many older duplex steam pumps, the new pumps are offered for applications where hazardous gases are present, for general industrial service where process steam is available and for boiler-feed service at boiler pressures up to 200 lb. per square inch. The turbines can be operated on compressed air where steam is not available. Single-stage sizes in the new line have capacities from 5 to 1,000 g.p.m. at heads up to 220 ft.; two-stage sizes, up to 275 g.p.m. at heads up to 550 ft. The construction adopted, it is stated, reduces substantially weights and sizes, with a 15-hp. single-stage unit, for example, having a length of only 32 in.