COAL AGE

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Man and Machine

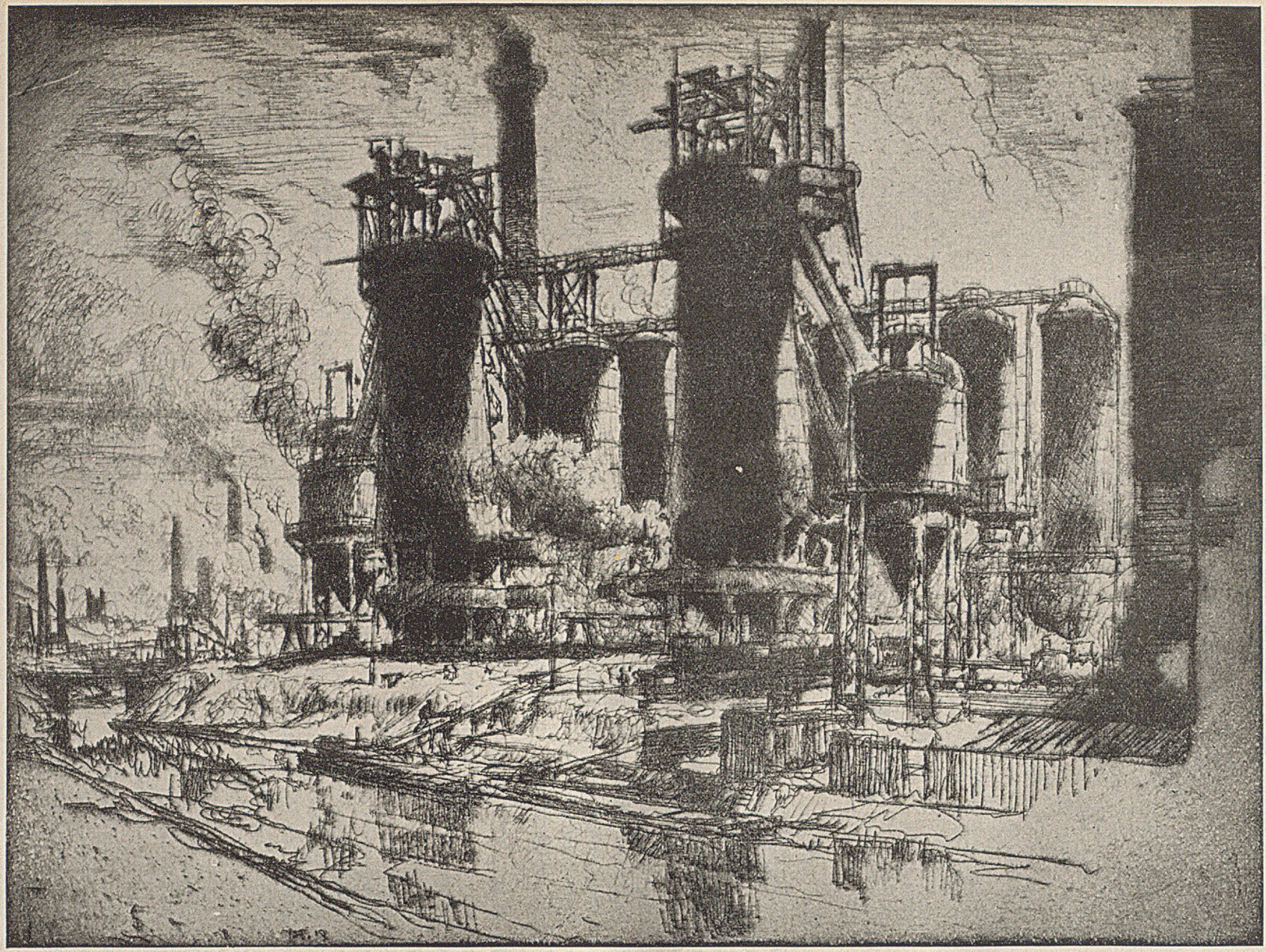
IF THE STEADY INCREASE in the quantity of coal loaded underground mechanically in recent years proves anything, it is that the machine has won its title to consideration from the standpoint of performance. Because nothing worth while is static, there will be improvements and refinements in design and construction as time goes on, but the age of experimentation stretching back into the '80s is definitely with the past.

BUT WHAT OF MAN—both in management and in actual production? Has he advanced as far and as fast in technique and performance as the machine? The fact that the quantity of coal loaded mechanically still represents only a small percentage of the total tonnage mined is presumptive evidence in the negative. Otherwise the general acceptance of the principle of the machine would have been translated into more general application of the vehicle itself.

PROGRESS of the machine has been impeded because, in many cases, neither management nor men have been in tune with the underlying philosophy that the introduction of the machine connotes. Those groups which have resisted the machine solely because they have been satisfied with an older order may be dismissed from consideration. Unless theirs is a situation where the old order is indisputably the best, the impact of improvement will wipe them out.

IT IS THE GROUP that accepts the principle of the machine without fully sensing the terms of its application which must concern the industry. Upon the education of this group rest the hopes of future development. Many of this group made the initial mistake of thinking the machine was something which could be grafted upon any existing system and would function under conditions which limited, if they did not completely destroy, its effectiveness.

OUT OF THIS MISTAKE has grown the realization of the need for co-ordination. Successful operation of the machine may mean a new mining system, a new underground haulage system, a new preparation plant above ground. It means new problems in personnel and in training—even, perhaps, new theories of compensation. These are but phases of the broad problem of co-ordination. And co-ordination is the key to speeding up mechanization.



Courtesy Kennedy & Co., N. Y.

Coal at Work at Greengates

From an Etching by Joseph Pennell

PNEUMATIC PICKS

+ Cut Down Fines in Long-face Work

In Alabama Mines

By J. H. EDWARDS

Associate Editor, Coal Age

AT least two Alabama companies are using pneumatic picks—otherwise known as "clay diggers" and "pneumatic diggers"—to break or cut coal. These producers, however, have applied the air hammer in entirely different ways. The Southern Coal & Coke Co., of Boothton, employs the air tools on long-face conveyor work to dislodge and break the coal to proper size after it has "set down" following undercutting with an electric machine. The Montevallo Coal Mining Co., of Aldrich, utilizes the tool to make a shearing cut along the rib in driving the haulage heading for long-face advancing work.

The pneumatic diggers are available in several sizes and from several manufacturers. The one weighing approximately 21 lb. without digging tool or about 25 lb. complete with tool finds preference in the Alabama mines. In their construction the pneumatic diggers resemble light riveting or chipping hammers. The blows delivered, however, are lighter and faster and there is a tool-retaining device making it impossible to shoot out the pick. The speed is around 3,000 blows per minute.

Apparently the Southern Coal & Coke Co. was a pioneer in the use of pneumatic coal picks in this country. At the Boothton mines riveting hammers were used to some extent for this purpose several years before the special tools were purchased. Now the company owns twelve of the pneumatic coal picks.

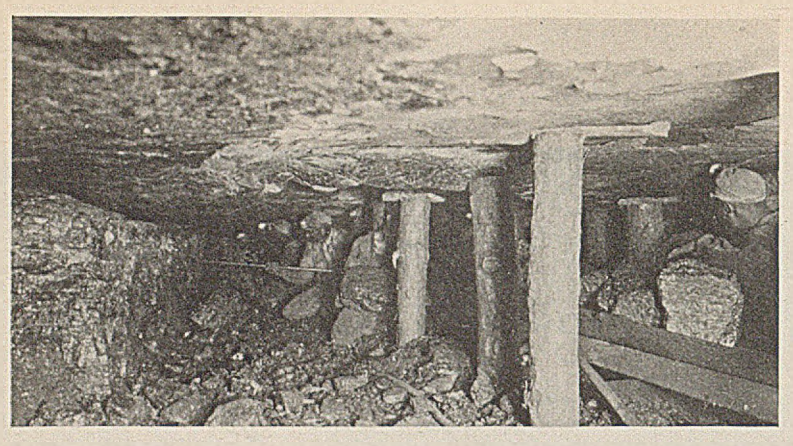
Boothton mines are in the Cahaba field, where the measures pitch 12 to 15 deg. for several thousand feet from the coal outcrop and then flatten in a basin. The upper or Gholson seam, which is free of parting, averages about 34 in. in thickness but varies from a few inches up to 5 ft. Sixty feet lower is the Clark seam, which is about 50 in. thick and contains a 3-in. parting 10 in. from the top.

Using the Pneumatic Pick on a 300-Ft. Wall. Two Men Can Loosen Enough Coal to Keep Eleven or Twelve Loaders Busy

No. 1 mine, in the Gholson seam, was opened on the room-and-pillar system, but in 1920-21 it became evident that if it was to continue in operation it would be necessary to substitute a mining system which could cope with the local areas of thin coal. It was about this time that the company began experiments with long-face conveyor mining.

The present system, which has been past the experimental stage for at least five years, consists of working 300-ft. walls with special conveyors of the drag type which are built at the mine. The walls extend up the pitch from a loading entry driven on the strike. The conveyor consists of a series of 10-ft. pans pressed from No. 11 gage ($\frac{1}{8}$-in.) steel, and a single strand of Link Belt No. 82 chain without flights. Two pieces of wood, 2x4 in. x 9 ft. 11 in., set on edge and bolted 10 in. apart to the bottom of the pan, provide clearance for the return run of the chain, which drags on the mine bottom.

The pans are not bolted together but instead are lapped about 1 in. or to the extent that their two-b, -fours butt together. The equipment does not make an ideal conveyor in that fine coal is not moved by the single strand of chain unless lumps are loaded simultaneously, and even lumpy coal requires a boost by hand



Using Bars, Wedges and Hammers Before Pneumatic Picks Were Introduced. Note the Conveyor Trough With Two-by-Fours Bolted on Edge Underneath.

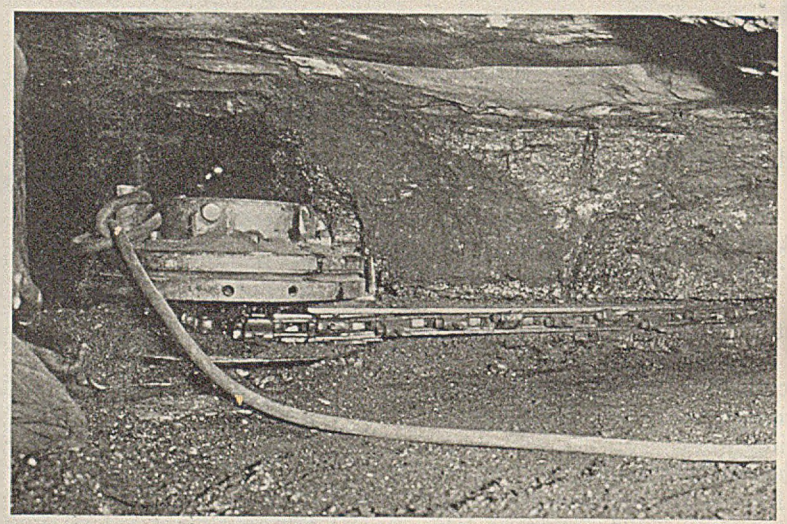
at times where the pitch of the wall is under 10 deg., but the relatively low cost of the equipment more than compensates for the disadvantages. For working future territory where the seam flattens, a more positive conveyor will have to be employed.

The roof over the Gholson seam appears to be non-yielding; that is, it cannot be eased down by bending. Three or four rows of props on 4½- to 5-ft. centers each way, are maintained back of the face. In the lowest places only three rows are necessary. After the face has been undercut with a longwall machine, and after a new row of props has been set and the conveyor moved, the props of the back row are shot out. Falls usually occur every one or two cuts.

By continuous vigilance the mines have been operated for over five years without loss of any conveyor equipment. "If extra weight at the face indicates that there is a roof slip ahead," said G. L. Chamberlin, vice-president and general manager of the Southern company, "we set props as thick as we can put them until we get past the slip." Experience has demonstrated that careful inspection of each long-face or wall on idle days and holidays is necessary. When roof action indicates trouble, men are rushed in to set extra props.

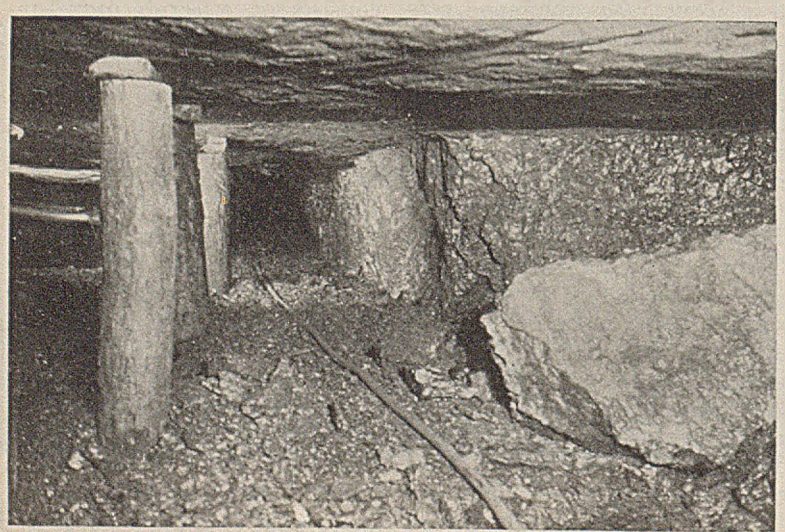
The walls are not worked on a schedule; that is, one complete cut is not loaded out each day. Instead the conveyor is moved whenever the loading and undercutting are completed. It takes the day crew about one hour to dismantle, move and assemble the conveyor. A night crew of three men drives the haulage heading and utilizes its surplus time on the wall, undercutting, timbering, or moving conveyor pans.

Weight causes the coal to break and drop down after the undercut has been made. With it comes an inch or so of drawslate. If shooting is employed to break up the coal, this drawslate is broken into fragments which cannot be separated by the loaders. Moreover, the shooting materially increases the total percentage of fines, an economic disadvantage, since much of the mine output goes to the domestic market.



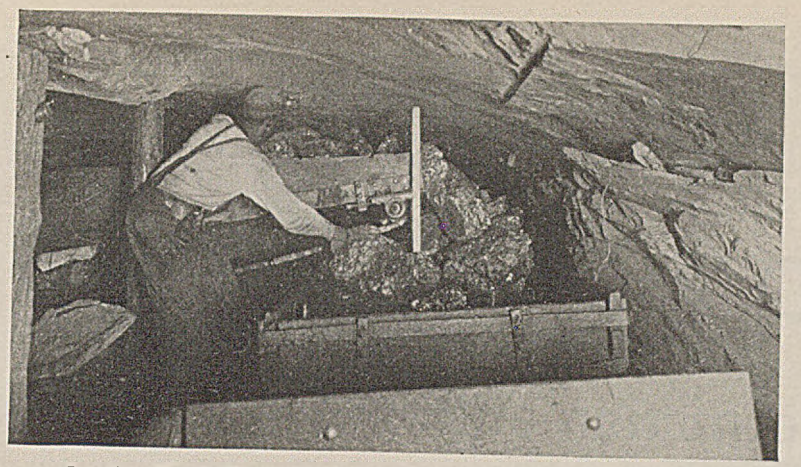
Electric Machine Starting a Cut on the 300-Ft. Face

Undercut and "Set Down" Ready for the Pneumatic Pick. Another Photograph Shows the Large Lump in the Foreground Broken Into Manageable Pieces by the Pick



Consequently it became the practice to recover most of the coal by hand, using wedges, bars, and hammers. But this labor far exceeded that of the actual loading onto the conveyor, so the officials began to look for a cheaper method. The first experiments were with a riveting hammer that was purchased for construction work on a steel tipple. This indicated the advantage of an air tool for the work, but the practice proved dangerous because the pick at times would shoot out of the holder. After some experimenting with a home-made tool retainer, the regular pneumatic picks became available and were purchased for the work.

In favorable coal two men operating pneumatic picks along the 300-ft. wall can loosen enough coal for eleven



Loading Head Showing the Single-Strand Chain Without Flights

or twelve loaders. In operating the tool, the hammer complete with the pick is often utilized as a bar. After the pick is driven into the coal the operative often pushes the hammer side-wise to pry down the lump that has been cracked loose. In some instances the pneumatic picks have increased the tonnage per man of face crew to 13 where it formerly was 10. The face crew in this calculation includes only the loaders and the men engaged in loosening the coal by hand or with the pneumatic picks.

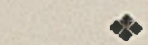
Another advantage of the pneumatic picks, as explained by Mr. Chamberlin, is that their use cuts down the number of men that must be experienced in the loosening of the coal. Contrary to the opinion that a casual observer might gain, it does take considerable practice to become proficient in selecting the best points of attack in breaking down the coal. With a few key men available it is possible to bring in inexperienced labor for the actual loading and quickly increase production to meet market demands.

The pneumatic picks are not used invariably on all of the walls in the three Boothton mines. Where the coal is quite soft the pick enters too easily and with no tendency to break off a large lump. Where the coal seems to be too hard, the pick cuts a hole but does not have sufficient wedging action to crack the block.

IN each mine an 8x10 single-cylinder compressor furnishes air for the picks. In some instances the air piping serves a dual purpose. In cool weather, when the roadways are sprinkled to allay dust, the pipes are utilized at night as water lines.

The Aldrich mine of the Montevallo Coal Mining Co., where pneumatic picks were recently put into use driving headings, has been described in previous issues of *Coal Age*, Vol. 28, pp. 915-919; Vol. 33 pp. 617-618. The working height is about 52 in. and the headings are driven 30 ft. wide with 3 to 4 ft. of top taken above the track, which is located along the rib that forms the lower end of the wall or conveyor face. The refuse is put into a pack wall between the track and an airway along the other rib.

After the 30-ft. face is undercut with an electric machine, the pneumatic pick is used to make a shearing cut in the coal along the rib, thus affording an open end for shooting. The advantage lies in the decrease of fines, due to lighter shooting. This application of the pneumatic pick is not extensive because but one roadway is driven per 300-ft. wall. It does, however, call attention to another possibility for the air tool which already is used extensively in the bituminous coal mines of Germany.



REDUCING ACCIDENTS

From Falls of Roof in Coal Mines

INFORMATION Circular 6225, recently released by the Bureau of Mines, should be useful to the management of every coal company, for it analyzes concisely and comprehensively the dangers of, and conditions leading to, accidents from falls of roof and coal. The circular is made up of three parts: (1) "Six Essentials for Mine Roof Support," by J. W. Paul; (2) "Methods and Importance of Roof Testing," by H. Tomlinson, and (3) "Accidents in Coal Mines Due to Falls of Roof," by C. W. Owings.

While procedure for making roof safe is generally known, testing and timbering are loosely practiced in many mines. The seriousness of this situation is borne out by the records of fatalities from falls. Of significance is the fact that 52.5 per cent of all accidents in bituminous mines for the last half of the 10-year period 1919-1928 were caused by falls, as against only 49.48 per cent for the entire period. A number of specific cases and remedies covering the hazards of roof falls are cited.

Some definite method of roof support should be adopted by all mines, based on an intensive study by underground officials. Minimum requirements ought to be established for every plant, with the proviso that additional timbers be set where required. The final plan should have the approval of the state mine inspector.

No more effective scheme to check accidents from falls is known than that of keeping a daily record of inspections for the purpose of spotting and concentrating attention on the careless, indifferent workman. It is recommended that some schedule of penalties be set up covering neglect of workmen and also supervising officials.

To two classes of workmen supervisory attention must be particularly paid. One constitutes the men who work in the mines only to fill the gaps of unemployment in another industry. They are not vitally concerned with learning the tricks of the trade and are a liability to their employer. The other is composed of experienced miners who have become hardened to danger.

If as much time were spent in planning and rigidly enforcing rules and methods of testing and caring for roof as is consumed in seeking to place the responsibility on the victim of an accident, in many cases the causes would be eliminated, lives would be saved and compensation claims avoided. The vibration method is recommended in preference to the sound method for testing roof.

Weakness in certain types of roof cannot be detected by testing, owing to peculiarities in shape and structure. When doubt is entertained as to the soundness of the roof, the place should be timbered.

SEALING OLD WORKINGS

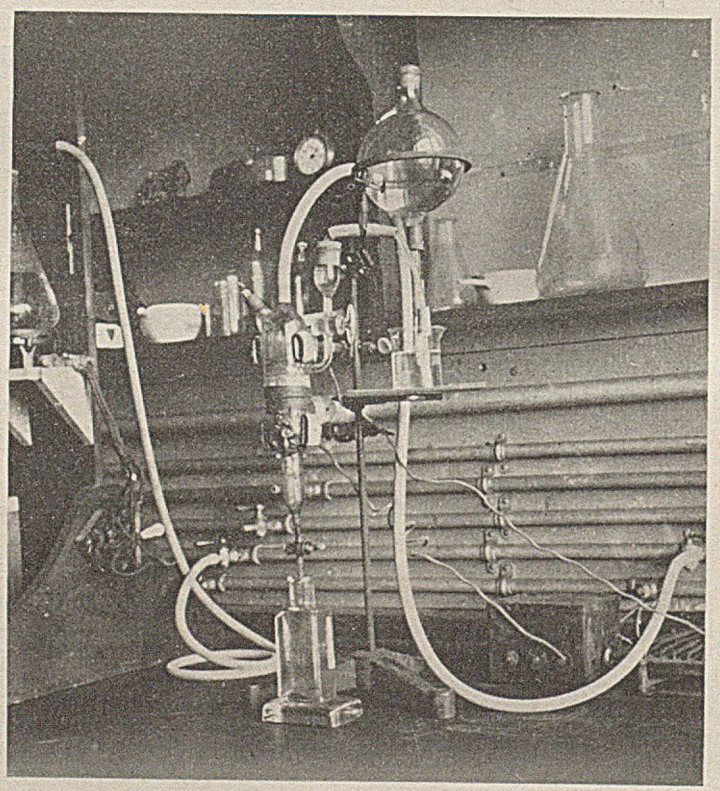
+ Prevents Acid Formation and Saves Pipes and Streams

By R. D. LEITCH[1] and W. P. YANT[2]

Pittsburgh Station
U. S. Bureau of Mines

THE accepted theory of acid formation in coal mines is as follows: Iron pyrite (FeS_2) is oxidized to form the sulphates of iron [$FeSO_4$ and $Fe_2(SO_4)_3$]. These iron sulphates are readily soluble in water and therefore are picked up and carried in solution by water with which they come in contact in the mine. On continued exposure to oxygen present as air a further reaction known as hydrolysis of the iron sulphates takes place, and results in the formation of what are known as hydrated iron oxides and free sulphuric acid. The hydrated iron oxide is the material which settles out of mine drainage if the water remains relatively quiet for a few hours, and is commonly called "sulphur mud." The free sulphuric acid is destructive to pipe lines and pumps, and constitutes the chief offending constituent of coal-mine drainage.

According to chemical theory, therefore, it would seem that if the iron pyrite could be kept out of contact with the oxygen of the air, the sulphates of iron could not be formed and that, consequently, the iron oxides and free sulphuric acid would be absent from the mine drainage. This has been demonstrated (unpublished report, Bureau of Mines) in the laboratory.



Apparatus for Determining Acid-Forming Properties of Pyrite and Marcasite

It has also been repeatedly observed (Leitch, R. D., and Yant, W. P., Reports of Investigations 2895, Bureau of Mines, 1928, pp. 2, 7) that water flowing from abandoned mines which are sealed by natural caving is much less acid than the water from other mines in the same locality which are still open. Frequently the waters from these sealed mines are not acid and generally approach ordinary surface waters in appearance and chemical composition. All of these facts point to the conclusion that sealing worked-out or abandoned section of mines to exclude air would result in a great saving of time and expense by reducing corrosion of pipes and pumping equipment and also would mitigate the general nuisance of stream pollution by acid coal-mine drainage.

The effect of sealing abandoned sections on the character of the drainage has been further studied in a group of eight mines scattered over the southwestern section of Indiana.

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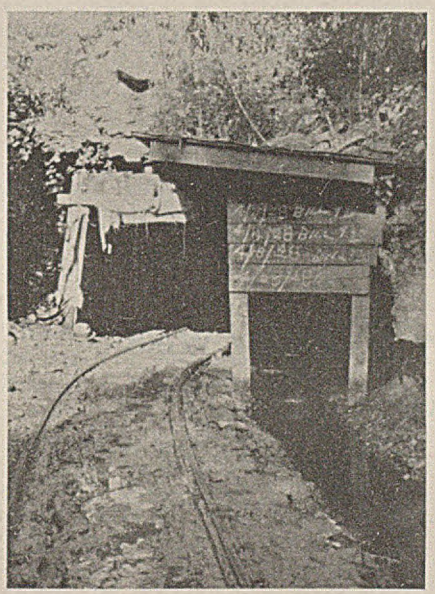
[2]Supervising chemist, U. S. Bureau of Mines, Health Laboratory Section, Pittsburgh Experiment Station.

Above: Apparatus for Determining H-ion Concentration (Acidity or Alkalinity) of Mine Waters



Right: Typical Entrance to Small Drift Mine, Showing Drainage Stream

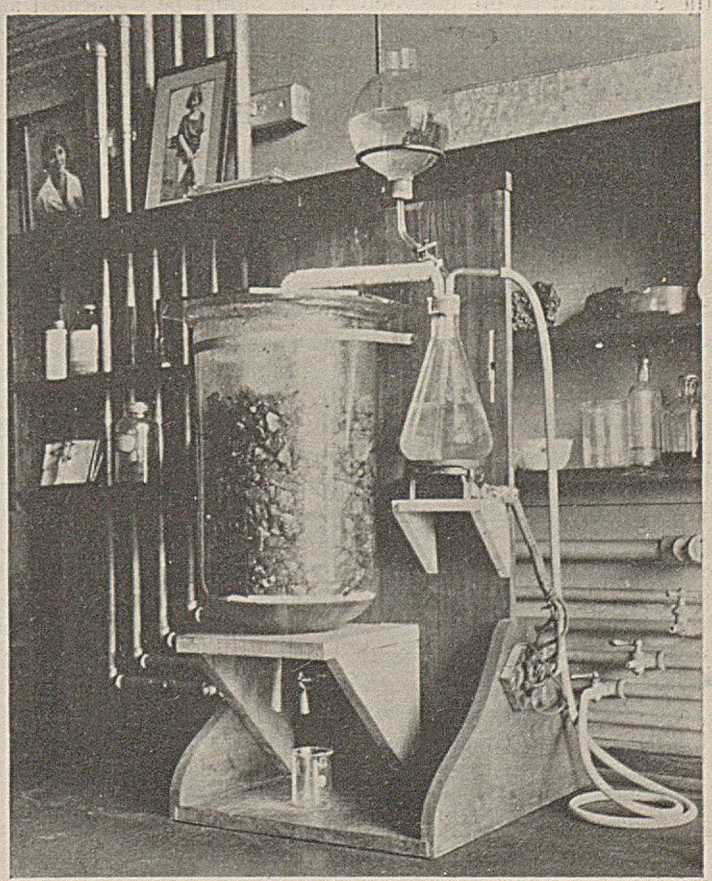
The sealing of worked-out and abandoned sections is a regular procedure in these mines. The seals ordinarily are of concrete about 3 ft. thick, extending into the ribs about 3 ft. and set deep enough into the floor to strike rock, which as a rule is found at distances of 18 to 36 in. The seals generally are flat and provided with a short section of pipe and a valve for releasing excess water pressure, if necessary, and for taking air samples. Some seals are made concave, so as to withstand pressure better. As a rule the pressures amount to only a few pounds, but in one mine the pressure was said to build up to as much as 75 lb. per square inch from time to time; this was released by drawing off the water into an old and low section of the mine near by. Most of the seals appear to be watertight; if not actually so, the leakage is small. The effectiveness in excluding the air is regularly ascertained by sampling and analysis of the atmosphere behind the seal. The oxygen content usually is less than 1 per cent.

Six of the eight mines were working in No. 5 coal bed, one in No. 4, and one in No. 3 bed. All were shaft mines varying in depth from 260 to 325 ft., and most of them were opened between 1914 and 1918. The room-and-panel system of mining generally is used, and entries to old sections can readily be sealed off. The No. 5 bed is overlain by gray slate several feet thick which contains great numbers of dolomitic boulders. The bottom is hard fireclay. Above the slate top a thick gravel bed generally is found, and this is said to be the water-table for the locality. Limestone in one or more beds of varying thickness usually is present (U.S.G.S. 11th Annual Report, 1889-1890, Part I, Geologic Structure of Indiana, pp. 720-740) in the strata above and below the coal beds mentioned. These conditions seem to result in waters of a highly alkaline nature.

Water from all available sources, both open and sealed, in these mines was examined. Of the eight mines visited, three were found to have no acid water in either open or sealed sections; it can be assumed, therefore, that the acid-forming material is insufficient to form appreciable quantities of acid or that the acid is neutralized by the alkalinity of entering waters. The data obtained from the remaining five mines confirm the theory and preliminary experimental evidence already mentioned for inhibiting the formation of acid drainage by exclusion of air.

Only one of the twelve samples taken from behind seals had sulphates of iron in solution, and even in this sample there was no free acid. On the other hand, the samples were alkaline to the extent of 200 to 1,300

Below: Apparatus for Determining Acid-Forming Properties of Coal or Top and Bottom Rock From Mines



p.p.m. All samples of water taken in open sections were acid, and the majority were high in both sulphates of iron and free sulphuric acid. The free-acid content ranged from 270 to 33,000 p.p.m., and the total acidity from 1,800 to 92,000 p.p.m. All samples taken from pools formed by leakage or seepage of the water from behind the seals and in contact with air and acid-forming material, were found to be acid. The quantity of acid depended largely on whether the pools had been standing a long or short time.

All the evidence, whether of an experimental or practical nature, seems to point to the same thing; if the iron pyrite (FeS_2) can be kept out of contact with air, acid will not be formed.

It is believed that sealing abandoned or worked-out sections of mines will effect a saving in the labor and money heretofore necessary to cope with drainage of a highly acid nature inside the mines, and also will materially decrease pollution of natural streams by acid coal-mine drainage. It is assumed, of course, that such sealing would result in the exclusion of air from the areas sealed. Where drift or slope mines work close to the outcrop, sealing may not exclude air.

The writers are indebted to John Stiveley, Indiana state district mine inspector, and C. A. Herbert, supervising engineer of the U. S. Bureau of Mines, Vincennes, Ind., for making contact with the coal companies where samples were taken, and to all the officials of these mines for assistance in the work.

PRECAUTIONS Necessary in Drilling Wells Through Coal Mine Workings

THE ADDED HAZARDS to mining incident to oil and gas wells penetrating the coal measures in proximity to mine workings have long been recognized in those fields where the extraction of oil, gas, and coal has been in progress for a number of years. Several of the coal-mining states now have more or less comprehensive regulations governing the drilling of oil or gas wells through workable coal beds, others have regulations that are inadequate, and some have none at all.

Coal companies who were fortunate enough to have acquired all mineral rights, including oil and gas, by purchase or lease, have been in a position to demand proper protection by those drilling the wells, says C. A. Herbert, in U. S. Bureau of Mines Circular 6195, "Notes on Precautions to be Taken When Drilling Oil or Gas Wells Through Workable Coal Beds or Through Mine Workings." However, in many instances the original owner of the land disposed of the coal and oil-gas rights separately.

The exact location of all oil and gas wells penetrating workable coal beds is of much importance, and should be the subject of a careful survey. A map showing their location should be prepared, on which the exact distance and direction of every well from the reference corners are shown. It is also desirable that a careful log of the strata passed through in drilling the wells should be kept and should be shown on the map.

Where it is possible to do so, the wells should be so located as to conform as nearly as possible to a definitely projected plan for development of the coal beds; the wells should be drilled through permanent pillars, or located where pillars may be left around them with the minimum loss of coal, and where they will cause as little inconvenience to the operation of the mine as possible. A well should not be located within less than 15 ft. of any underground haulageway, airway, or traveling way.

Drillholes may deviate materially from the vertical, hence it must not be taken for granted that the intersection of the drillhole with the coal bed will be vertically beneath the top of the hole. The provision of a pillar of coal to protect the drillhole from distortion by movement of the overlying strata after coal has been extracted and to protect the mine from leaking gas or oil must allow for a variation of several feet (5 to 25 or more) in the estimated point of intersection of the well with the coal. Where coal beds have thick cover (over 1,000 ft.) surveying of drillholes should be considered necessary in connection with any proposed planning to protect mine workings.

Since it has been determined that a coal pillar surrounding an oil or gas well cannot be depended upon to keep either the oil or gas from finding its way into the mine workings, either through the coal or through the overlying or underlying strata, essentially its only function is to protect the well from damage due to possible movement of the strata resulting from the extraction of the coal. Hence, the size of the pillar to be left will be governed by the depth and thickness of the coal and by the character of the overlying and underlying strata. A pillar of over 100 ft. in diameter would seldom be necessary, while, on the other hand, one of less than 50 ft. in diameter is not advisable.

Every oil or gas well should be properly plugged when abandoned, particularly where the well penetrates workable coal beds. Any coal mine operating in a field where oil or gas wells have been drilled or are being drilled should take the utmost precautions against possible ignition of gas or oil. Among the most vital of these precautionary measures are the use of permissible electrical equipment and permissible lights and the maintenance of absolute control over ventilating currents at all times. Also, such properties should be kept thoroughly rock-dusted throughout; no blasting of any kind should be done while the working shift is in the mine, and then only with permissible explosives fired electrically.

WHILE unquestionably every operator drilling oil or gas wells through workable coal beds should use the necessary precautions to prevent a seepage of the oil or gas into the coal beds or into the strata above or below them, it is hardly to be expected that he will go to the expense of doing so unless it is required of him by the terms of his lease, or by law; and since the lessor too often fails to realize the necessity of such precautions and to provide for them in the lease, the coal-producing states should enact suitable laws to give this very necessary protection. Although the framing of these laws or regulations should have as their primary purpose the protection of the lives of those engaged in mining, every precaution feasible should be taken to safeguard property rights, including not only those of the mine or prospective mine but also those of the persons involved in the drilling or ownership of oil or gas wells.

BELGIUM

+ Cuts Her Steep Seams By Machinery

By F. C. CORNET

Consulting Engineer
Mons, Belgium

A LONGWALL coal cutter not only must mine the coal but also haul itself across the face. In heavily pitching seams, especially where, as in Belgium, the working faces always run up the full pitch, the dragging of an ordinary longwall machine up along the face may require so much of the power developed by the motor that too little is available for cutting, thus making the operation of the cutter unprofitable. To illustrate what I mean, I will take the example of a well-known American machine, cutting with the same bar in the same seam against different gradients. The figures under the degrees of slope show the length of face cut per hour of actual running time:

Deg.	18	25	28	32	38
Ft.	83	66	52	41	32

In Belgium, a single face will have a diversity of gradients. For example, a face may start on a 15-deg. slope, continued on 25 deg. and end on 20 deg., and yet such a face would be considered normal. Belgian operators regard 45 deg. as the steepest pitch up which it is practicable to operate a coal cutter which relies on its own power to drag it up the face. So far in Belgium, in fact, no grade steeper than 43 deg. has been actually overcome by a machine of this kind, and that grade was essayed at only one operation, the Hornu mines, near Mons. Of this, more will be said later. Except experimentally, Belgian operators have never used machines the progress of which up the face is facilitated by the pull of a rope reaved round a hoist at the top of the working place.

Such machines are made for grades steeper than those to which Belgian cutting practice, in its present state of development, must confine itself. For reasons that will appear in the course of this article, the use of mining machines on grades steeper than 38 or 40 deg. is not now, at least, favored by Belgians. The work done at the Hornu mine was nothing more than an experiment. The seam undercut was the "Jausquette" bed, the coal in which is highly valued for the making of gas. It is too hard to be cut profitably by hand. Machine work did not prove more profitable. The bits wore out so fast that they had to be changed 47 times in cutting a face 296 ft. long. Considering actual running time only, the operation was done at the rate of 18 ft. an hour. The time lost in changing bits, however, made the net hourly rate only 12½ ft. Here are the figures: Actual running time, 16½ hr.; time lost in changing bits, 7 hr.; total time, 23½ hr. The experiment was stopped after the first week.

It will be said that cutting in the downward direction is favored by the very conditions that hinder upward cutting. Quite true, but with the longwall cutters now on the market, the cutter's position is in front of the machine. That cutter remains to be found, at least in Belgium, who would be willing to place himself in front—that is, on the lower side—of a heavy longwall cutter working downward on a grade where nothing could hold it from carrying its cutter to death if something went wrong or broke. Should the cutter bar, for example, straighten itself up suddenly, or become detached somehow from the machine's main body, what might not happen! Safety devices, the use of which is made compulsory by law on all gradients exceeding 10 deg., have been designed to prevent a machine which from any cause gets loose, from running downhill. Belgian miners, however, have no faith in them.

It must be borne in mind that, in Belgian mines, thousands of feet underground, roof conditions compel the miner to carry timbering nearly up to the face at all times, reducing the space reserved along the coal as a machine way, to an alley-like passage seldom more than 36 in. wide. Quite often a row of props must be set right against the face.

These props are removed, one or two at a time, to allow the cutter bar to pass. They are reset carefully immediately afterward, to minimize the chances of the seam settling upon the bar, under pressure of the roof. On the gob side, outside and on the edge of the narrow, alley-like way along which the machine travels, roof subsidence may have made quarters too low and cramped to offer more than a bare chance of escape, especially to a man who has but a second or less to get out of the way of a heavy machine suddenly starting to slide downhill on a steeply pitching floor.

I remember a case where a Sicilian miner, in West Virginia, saved his life by leaping onto the top of a trolley locomotive bearing down rapidly upon him. But that was in coal 7 ft. high. No Belgian machine runner could escape death in this acrobatic fashion where seams average little c er 2 ft. and where the clearance, above even the lowest of mining machines, seldom exceeds a foot.

The grade upon which a machine will slide depends on the nature of the pavement, as well as on the ratio of

bearing surface to weight of the machine. On a hard, smooth floor, a longwall cutter of the American chain type may begin to slide on as flat a grade as 26 deg., while, on a soft pavement, the same machine may not slide on any slope with an inclination less than 30 deg.

Of course, a machine cutting uphill, on a grade sufficiently steep, may, if it breaks loose, run away downhill as well as if it were cutting in the downward direction. But in this case, the runner would be in no danger because he would be above the machine. As to his helper, the chances of his being hurt would be few. Where grades reach 22 or 24 deg.—that is, before they get critical—the coal issuing from the kerf gets out of the way of the machine by gravity, and needs no shoveling. Hence, on grades considered dangerous, the helper squats or lies down flat on the gob side of the machine, venturing behind the latter only occasionally, always for a very short time, to fix up things that go wrong, as for example, to disentangle the electric cable or to straighten the air hose.

When props set against the coal must be removed and reset, as before mentioned, to permit the machine to travel across the face, a special timberman must be employed. Quite often, two such men are necessary. Theirs is a job that requires great skill, unerring judgment and unfailing courage. Men of this kind are not scarce among Belgian miners, men who, for wages not exceeding 50 fr. ($1.40), labor 8 hr. a day, half-naked, barefooted, on a treacherously sloping floor, under a murderous roof, where ventilation tempers but little the heat derived from deep-lying strata and where gas often permits of no other luminary than one that hardly dispels darkness.

IN BELGIAN mines, at depths ranging from 2,500 to more than 3,000 ft., temperatures of 90 to 95 deg. F. (dry thermometer) are not unusual at the working faces. Yet the ventilating current always is so sluggish that only with smoke-stick methods can its velocity be measured. (For a description of such methods, see *Coal Age,* Aug. 26, 1926.)

The work of the machine timbermen is made especially difficult and, I might say, somewhat hazardous when, as is unfortunately the case 90 times out of 100 in Belgium, the noise made by the machine prevents the miners from hearing the working of the roof. Just what I mean will appear later. It has been my opinion for several years that the kind of work reviewed above is one that becomes more strenuous, more difficult and more risky, in succession, as the pitch of the seam increases. Hence, I was not surprised to learn recently that at present there is in Belgium no machine-worked seam whose pitch exceeds 38 deg. The Belgians may succeed some day in working their steeper seams with mining machines, but that day will not come before radically different operating methods have replaced those at present used.

FOR THE purpose of writing this article, I made inquiries from 55 mining companies which I knew were using coal cutters in at least some of their workings. All but two of these collieries operate seams of all inclinations up to the vertical. Only eleven of them, however, use machines in seams steeper than 30 deg., drawing the line at 38 deg. The other 44 do not cut coal by machine if the slope exceeds 30 deg.

Altogether, 177 faces are cut daily by an equal number of machines. In 114 cases out of the 177, timbermen are employed at the face with the machine men, it being found necessary to carry a row of props right against the coal. Everywhere cutting is done uphill. Out of the 177 machines used, only seventeen are of the chain type, the remaining 160 being what R. Dawson Hall, in last September's issue of *Coal Age,* rightly called horn machines. While 69 machines are electrically driven, 108 are driven by compressed air.

Where the pitch exceeds 30 deg., no cutter bar longer than 40 in. is in use, but in flatter workings, 5-ft. bars are the rule, 8-ft. cutters even being used at the Maurage mines, where 100 per cent of the coal produced is machine-mined and where no bed steeper than 25 deg. is at present worked.

Cutter bars are made shorter on steep grades than on moderate ones, for two main reasons: First, because it is necessary to complete the cutting operation within the 8-hr. shift assigned to it and, second, because no more coal must be undercut than can be loaded out within the 8-hr. shift assigned to coal loading. Only by observing both these requirements, can the face be made to progress with regularity, one cut every 24 hr., which permits of the best roof control and which leaves the third 8-hr. shift of the day entirely available for timbering, slate work, backfilling, tracklaying, conveyor shifting, hopper moving, cable or pipe work, and so on.

To make it easier for the reader to understand my final conclusions I find it necessary to say a few words concerning the machine mostly used in Belgium at the present time. The description of this coal cutter, formerly used to some little extent in West Virginia, will be found in *Coal Age,* Vol. 2, p. 914. See also what Mr. Hall says about it in the last September issue of *Coal Age.*

A horn machine grinds the coal. The cuttings it makes are dust that cannot be washed. The cuttings made with a chain cutter are almost entirely washable. This gives the chain cutter a big advantage over its competitor in a country like Belgium, where seams average only 25½ in. in thickness. In a seam so thin the cuttings represent 25 per cent of the total coal.

When cutting in a slate parting, or in the pavement, the chain cutter is still preferable to the other machine, the horn of which leaves in the kerf 90 per cent of the dust it makes, which dust will, for the greater part—entirely, I might say—find its way with the coal into the cars. The cuttings of a chain machine, to the contrary, are automatically thrown out of the mining and can be easily taken care of. If some remain in the kerf, their coarse condition makes their eventual separation, either by hand or by washing, almost certain.

IT MIGHT be said that the cuttings left in the mining by a horn machine could be easily removed by a scraper. This practice, however, has proved most objectionable, because of the dust it makes, creating conditions unbearable to the men in the practically still atmosphere ruling at the face. Coal dust is bad enough; slate dust is much worse. For this reason in Belgium the kerf is only rarely cut in the slate, as, for example, when the seam is too thin to provide sufficient headroom for the machine and additional space must be provided by cutting in the pavement.

A horn machine depends on side pressure to compel it to hug the face, and to obtain that pressure props must be set to hold rubbing timbers in place. These are often forced out of position by the machine, especially when hard spots or sulphur balls are encountered suddenly in the mining. Chain machines cannot put any pressure on props, because they do not touch them but hold themselves to the

face without timber guides. The independence of props, which is characteristic of chain machines, almost eliminates the possibility that machine vibration will be transmitted to the roof through timbers and cause falls. Such falls may occur even when props are not actually forced out of place by the side pressure.

Corners are cut with chain machines with much less delay than with horn machines. This advantage is of first importance on short faces, where the time usually occupied in cutting up to the rib is a serious proportion of the total cutting time.

Chain cutting machines found a promising field in Belgium for a few short years after the war. Quite a number of them were sold there. That they gave satisfaction is attested by all who had anything to do with them. If Belgian money had not depreciated to the point that it has, the chain cutters would have made more progress.

Those which were delivered in Antwerp for about 20,000 fr. in 1920 cannot be had now for less than 90,000 fr., yet the price charged by American manufacturers has not changed. Sea freight also has remained stationary. But at present it takes 36 Belgian francs to buy a dollar's worth of American goods, whereas 9 years ago it took only 8 fr. British and German horn machines, as made for Belgium, sell for much less. Five of them may be had for the price of two American cutters.

Cutting kerves of the same depth in the same coal, horn cutting machines cross the face at the same rate of speed as a chain cutter, consuming, however, 20 to 25 per cent more power than the latter. This they do so long as they are new, but they do not stay new long. Lack of strength makes them deteriorate rapidly and causes a correspondingly rapid decrease in their capacity for work and a still faster increase in their power consumption. Strength prevents undue flexing, twisting, and warping under the severe stresses to which coal cutters are exposed. Without it the machine loses alignment, causing heating and the inevitable wear of bearings and other parts.

Strength does not, of course, prevent a machine from deteriorating, but the inexpensive replacement of a few worn parts will make such a machine as good and efficient as new. A well-designed and well-built machine may thus be made to keep indefinitely in first-class condition. Under the severe test of mining work, a machine without backbone soon gets affected with a kind of general fatigue that no amount of doctoring and no replacement of parts will allay. A machine of this kind is dear at any price.

A fatigued horn cutter reveals its condition to all in the mine by the terrific noise it makes as compared with the quietness of a good chain cutter. That the latter is the safer instrument to use will appear to all who know the importance of being able to hear the working of the roof, an importance that is paramount when, as is often the case in Belgium, props set against the face must be removed and replaced, one or two at a time, to allow the cutter bar to pass.

It is seldom that work of this kind can be done without causing other props, or the roof itself, to make a noise of some kind which the ear must be able to catch and interpret. It is this that explains why air-driven coal cutters were found objectionable in Belgium until some appeared that were driven by a practically noiseless turbine.

At the bit point of view also the horn machine is at a disadvantage as compared with the chain cutter. Bits for the latter can be made inexpensively at the mine, either by hand or with a machine, from commercial bar steel. They may cost 1 fr. a piece. The bits of a horn machine are complicated in shape. Their manufacture at the mine proves so expensive that it is found preferable to get them from the machine maker who invoices them at about 6 fr. apiece.

Resharpening these high-priced bits costs four times as much as resharpening chain-machine bits. The latter can be resharpened five or six times;

Fig. 1—In the Thin Seams of Belgium Space Is at a Premium Courtesy of Sullivan Machinery Co.

the other bit not more than three times. The Hornu experiment, already described, which was made with a horn machine, cost for bits alone the equivalent of 97c. for every ton of coal produced.

In order to understand how much room for improvement there is in the adaptation of machine cutting to Belgian practice, a description of the practice as it now stands is necessary. The working day is divided in three shifts of 8 hr. each. The morning shift, which begins at 7 a.m., is devoted to loading, the afternoon shift to machine mining, and the night shift to slate work, conveyor shifting, and so on.

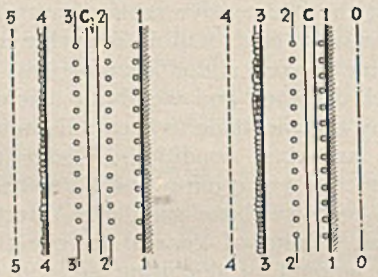
When the machine men come to work at 3 p.m., they find conditions as in Fig. 2, where line *1-1* indicates the face as left by the loaders at the end of the morning shift. Against the face is shown a row of props set by these loaders. Two other rows of props, *2-2* and *3-3*, are shown, between which is the conveyor, *C*. The line *4-4*, delimits the packwall built by the slate men during the previous night shift. The broken line *5-5* shows the position of the packwall 24 hr. before packwall *4-4* was built.

When the loaders come to work next morning, they find conditions as shown in Fig. 3, where lines *1-1* and *2-2* have the same meaning as in Fig. 1, while dotted line *0-0* shows the depth of the cut made the previous afternoon by the machine men. As to the conveyor, *C*, it has been moved forward to the position shown by the night men, who have also built a new packwall on line *3-3*, as they had built one 24 hr. before, on line *4-4*.

IT GOES without saying that all the lines mentioned above are evenly spaced, the distance separating them being equal to the depth of a cut. What slate and other débris the daymen want to remove while loading coal on the conveyor, they throw away over the conveyor toward packwall *3-3*.

Some of this gob may be used the following night for packwall building, together with the slate obtained from roof brushing and bottom lifting, and in extending or maintaining the tramways and dummy ways. The packwalls may or may not be continuous, depending on the facility and cost of procuring the necessary slate. If, perchance, there is an excess of such material, it is thrown summarily behind the packwall, without any attempt at stowing.

With such roof as they have in Belgium, it seems poor practice to let a whole 8-hr. shift intervene between the time a cut is completed and the time when the loaders begin their work. Seldom do the latter find more than the appearance of a kerf. Always the coal is so tightly held between roof and floor that its dislodging requires the hardest kind of work with pick, crowbar, hammer and wedge, a manner of doing business little calculated to promote rapidity of production or conservation of the coal produced. Work of this kind obviously is harder and slower on steep than on moderate gradients, which serves to further explain the fact reported above, that in Belgium cutter bars as short as 40 in. are used exclusively where grades exceed 30 deg., in order to permit of cleaning out a cut within 8 hr.



Figs. 2 and 3—Face Conditions at 3 p.m. (Left) and in the Morning (Right)

However, the difficulty which the cutting machine experiences in pulling itself uphill while cutting furnishes still another reason. The fact that loading out a cut is made so difficult by roof subsidence, combined with the fact that the cuttings made by a horn machine are dust, explains why the proportion of lumpy coal obtained in Belgian mines is nowhere higher, and in many cases is lower, than before mining machines came into use.

On moderate grades, machine mining, as now understood and practiced in Belgium, proves preferable all-around to hand mining. Its superiority over the latter, well maintained up to 22 or 24 deg., decreases rapidly as grades become steeper, until hand mining becomes the cheaper when 30 or 32 deg. is reached. Investigation shows that mining machines are operated on grades steeper than 32 deg. only in seams hard enough to make hand cutting unusually difficult and expensive.

In seams of ordinary hardness, on the steeper grades, hand work is found preferable to work with machines which have bars less than 40 in. long, because the undercuttings in the latter case are dust, and because 8 hr. intervenes between cutting and coal loading, during which interval all traces of mining practically disappear under roof pressure.

Great progress will be made by Belgians when they so arrange the sequence of operations that mining machines will do their work during the night, immediately before the loaders' arrival at the face. Influences are now at work to bring about such a result.

❖

Need Trained Operatives On Locomotives

ELECTRIC locomotives in coal-mine service most frequently suffer damage from inefficient operation by men not familiar with the various working parts, asserted Mason Smith, electrician, Loup Creek Colliery Co., in a recent address before the Loup Creek Mining Club, Beards Fork, W. Va. While the majority of men are honest and do the best they can, they are handicapped in the upkeep of equipment by lack of training (in most cases) prior to being required to haul the average tonnage. The result is that the motor gets little of the care it requires.

First-class motormen are quite frequently regarded as those who hustle about and haul more than the average tonnage. But if the motorman slights oiling, keeping bolts tightened and controller adjustment, among other things, the time he gains is soon lost in repairs. Therefore, the man who can haul a good tonnage and keep his machine in good working condition—and continue to do so day after day, barring accidents and natural wear—is superior as a motorman to the one who gets a large tonnage but neglects his locomotive.

It is a bad practice to place incompetent men in charge of the operation of machinery, but at a large number of mines there are few extra men available to take the place of regular men who are frequently off duty. Consequently, the foreman is obliged to draft a substitute whose sole interest, quite frequently, is to haul the coal, care being a minor consideration. Were it practical, such men should be required to take an examination or answer a few questions, asked by a competent person, on the care and operation of the machine before being placed in charge.

CHECKERBOARD SYSTEM

+ Permits Machine To Load Full Trips

By R. DAWSON HALL

Engineering Editor, Coal Age

THAT mechanical loading is dependent on good management is well illustrated by the Standard Coal Co., of Wheatland, Ind. For many years its loading machines produced only about 100 tons per unit, but now, with better methods, they consistently average 300 tons daily, and at times will give as much as 500 tons, and yet each unit employs only ten men; two on actual loading, two on transportation, two on cutting, two on drilling and shooting, and two on laying track and timbering. All the men except the loaders and transportation men assist in other ways when their regular work is accomplished.

They have manifested a desire to assist in the output of coal by fitting themselves in wherever work is to be accomplished. It is not a co-operative mine; all the men own some stock in the enterprise but not by any means the major part of it, but the men, being convinced that steady work can be insured only by co-operative effort and having in view in addition the profit that the stock brings them, are earnest in their desire to increase output.

Only a few—a very few—of the men are of foreign birth, and even these have been in the country many years. The old attitude of every man for himself seems to have disappeared. The men have the interest of the enterprise at heart and manifest that interest in many unexpected ways. Monthly dinners are held at which cost reduction and cleaner coal are discussed. As a result the common interest in economy and productivity has been recognized by everyone, and the machines and transportation are kept going at the utmost efficiency.

But morale is not the sole reason for the large output. Much credit is given to the "checkerboard system," which is a development peculiar to this mine. The roof is not strong enough to support itself over a greater room width than 30 ft. with safety, so that is the width of room usually chosen. Pillars somewhat less wide might be provided, but the company prefers to leave big pillars (40 ft. wide), weakening these by

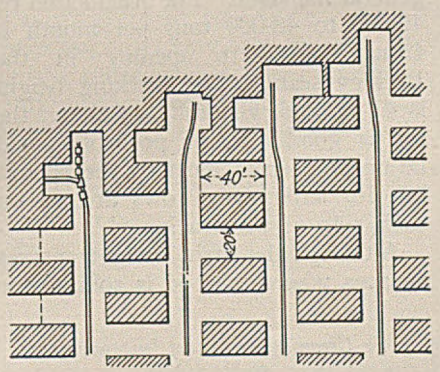


Fig. 1—Checkerboard System of Mining

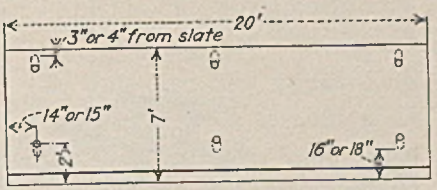


Fig. 2—Method of Shooting Room Face

20-ft. crosscuts located 20 ft. apart in the clear, which alternate first on one side and then on the other side of the room.

Thus the coal between rooms is divided into pillars 20x40 ft., with crosscuts or spaces between also measuring 20x40 ft. The area of the pillar left is thus halved, the 40-ft. pillar, because of its crosscuts, having an area equivalent to one which is 20 ft. through. The depth of the coal is 238 ft. at the shaft. As coal and surface alike are level, the depth at the shaft is approximately that all over the area to be mined.

The crosscuts are driven half through from one room and half through from the other. Thus all the coal can be picked up and placed in the car by a loading machine. About 40 per cent of the coal comes from the crosscuts, but much of the coal at the face can be handled by the machine with the track in position for loading from the crosscuts. In fact, nearly all the coal can be loaded into the side of the cars and little need be loaded on the car ends. A trip of several cars can thus be filled at one time. Sometimes four are delivered, sometimes more, though when loading from the center of the room only one may be placed. Just how many cars shall be spotted is determined by the man who operates the machine. As many as seven have been placed at one time.

But the car trip nearly always is loaded from the side and rarely is there any spotting of individual cars. The four or more cars are placed and loaded in series, one after the other, without delay. And they are big steel cars of Lorain Steel Co. design, 12 ft. long and 6 ft. wide, running on a 42-in. track. When the machine piles the coal into them without the aid of a trimmer, as is the general practice, they hold 4 tons

apiece. At that, they are by no means well filled. Having solid ends they are dumped on an Allen & Garcia overturning cage. Being constructed without end gates they do not leak at the ends, and not being "built up" like the hand-loaded cars of earlier days, they do not spill on the track. Consequently it is never necessary to remove coal from the road. Open lights are used for illumination.

Five 5-BU Joy machines with their wide range of swing are used for loading. The coal seam is the No. 5 and runs from 6 ft. 6 in. to 9 ft. in thickness. This is undercut to a depth of 5 ft. and drilled by Dooley electric drills made by the Chicago Pneumatic Tool Co. These are supported on standards.

In a 20-ft. place three holes of 2¾-in. diameter are drilled to the full depth of the cut just above the sulphur band, so that when the shots are fired, this will be thrown down. These holes are located about 24 in. above the floor at the front and about 16 or 18 in. above it at the rear.

Near the roof three holes are drilled so as to be 3 or 4 in. below the slate at the back. The side holes are 14 or 15 in. from the ribs on either side, and the third hole is in the center. When the place is 30 ft. wide, eight holes are drilled, four near the roof and four above the sulphur band. Pellet powder is used for dislodging the coal.

Fortunately, the roof is exceptionally good. Above the coal is a strong slate from 4 to 6 ft. thick and above that is a "steel band" 14 to 30 in. thick that is unusually strong, and then as a climax there is 80 ft. of lime rock just above the band. The slate may break if left unsupported over too wide a span in the rooms, but the steel band with its lime rock has been left untimbered over an area 90x900 ft.—almost 2 acres—and yet it failed to fall.

ON THE main roads 60-lb. rail is used; on cross entries, 40-lb.; and in rooms, 35-lb. Heavy rails cannot be used in the rooms or they will be too stiff to be swung from side to side when loading, now from one side, now from another. Five- and ten-ton locomotives haul the coal. In order to keep everything moving, telephones are placed at every parting.

On Nov. 12 of last year the output was 1,623 tons, yet on the payroll are only 100 men and usually there are 6 or 7 absentees, so the production was more than 16 tons per man-shift for every man employed. However, the average per man per day is more nearly 12 tons. It is the intention later to put in conveyors and thus get 500 tons or more regularly from each machine.

The checkerboard system achieves its results because the coal is loaded in solid trips instead of into single cars, and because the track-laying problem becomes merely a matter of extension as the face advances. The only additional track labor is throwing the track from side to side of the room near the face.

EARLY ADOPTION

Of Improved Methods Keeps Mine Busy

GOOD engineering and ready adoption of improved equipment and methods as experience of the industry proved their practicability has enabled the MacAlpin Coal Co., McAlpin, W. Va., to improve its product and control cost so that the mine is seldom idle for lack of orders at a "living" price. In July, a second dry cleaning table was added to the preparation plant and a dust collector for both tables was installed.

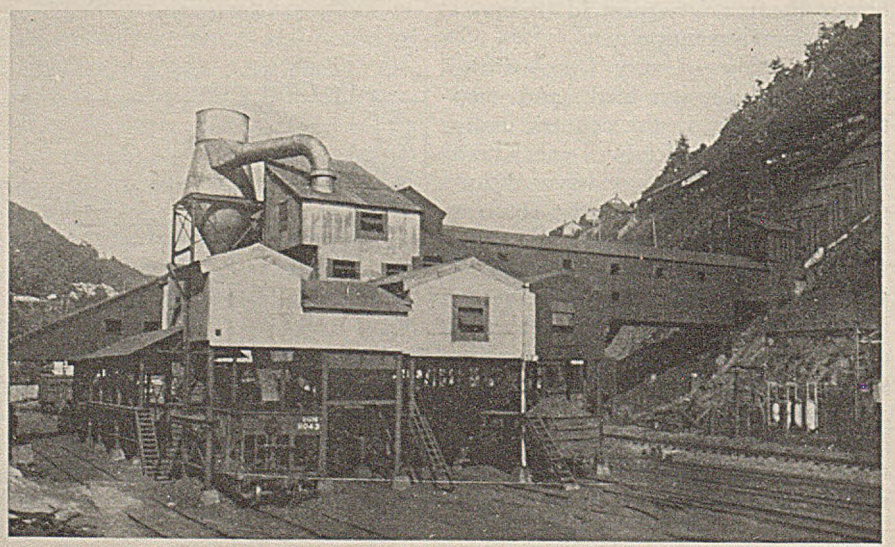
The company is controlled by the Laing interests, of Charleston. John Laing is president and A. W. Laing, general manager. The production of 45,000 to 48,000 tons per month is from one drift opening in the Beckley seam. The working height is 4½ ft. and, generally speaking, the top is good. Props probably could be omitted from most of the rooms, but for safety two rows are set on each side of the track.

Although the main entry traverses an area where the bed is rolling, the locomotive haulage track has been held to a uniform grade. Along one stretch where the bed variation from the mean is too great for ordinary grading methods, a rock tunnel 1,800 ft. long cuts through below the roll.

Solid-body steel cars of a low and wide design are used. The top edge is only 27 in. above the track and the width is 6 ft. With track in the center of a room of standard width, which is 28 ft., this wide-body car cuts the maximum shoveling distance to 11 ft. and the average to 5½ ft. All original bearings of the cars were replaced by tapered roller bearings when the management recognized an advantage in that type.

The tipple and cleaning plant, which are joined as one building, load on six tracks. Four are served by the Virginian Ry. and two by the Chesapeake & Ohio. The new table is cleaning ½x1-in. and the old 1x2-in. Both are "American," rated at 30 tons per hour. A dust collector of the centrifugal type keeps the air table section of the building freer of dust than is the old section containing the screens.

Air Cleaning Is Latest Improvement at McAlpin



TRACK-MOUNTED MACHINE

+ Removes Blue Band

In Illinois Mine

By ALPHONSE F. BROSKY

Associate Editor, Coal Age

WHAT should be the face-preparation methods in the mining of a coal seam divided by a rock parting? That is a question which many mining men have been asking themselves ever since mechanized methods took root. The statement of the problem is simple enough; but not so the solution, which must—besides obviating excessive labor—co-ordinate machine movements to avoid delays in the unit-operation cycle.

For some time now the Peabody Coal Co. has been seeking a solution to the problem of eliminating the blue band in the process of working the No. 6 seam at its No. 9 mine, near Taylorville, Ill., which has been put on a 100 per cent mechanical-loading basis. The seam is 7½ to 8½ ft. thick and is divided by the blue band, ¾ to 2 in. thick, at a horizon ranging from 18 to 24 in. above the bottom.

After much experimenting, the broad outline of a cutting method has been developed, using track-mounted cutting machines for entirely removing the material composing the parting before the coal is shot and otherwise made ready for loading by machines. It is not to be expected that the main elements of this method in their entirety are adaptable to all operations, but in some measure they may serve to suggest modifications for the building of a more appropriate scheme to meet each specific case.

Because of their high productive rate, resulting from design that avoids those delays characteristic of undercutting machines, in making ready and in moving, track-mounted cutters were chosen. A further, and no less important, feature of the track-mounted machine considered in the development of a cutting method is the range of adjustment of the cutter bar on machines of this type. The cutting element may be arranged to cut on the bottom or at various levels above the bottom, the degree of this flexibility depending upon the design of the particular machine.

Three makes of track-mounted cutters are being tried to determine which will fit best into the mechanization program at this mine. As all three machines have been more or less equally satisfactory in their speeds of cutting, ruggedness and ease of handling will be the deciding factors in the final choice.

The cutting horizons selected for trial of results were three: at the bottom, in the blue band, and lastly in coal directly under the blue band. Undercutting with the track-mounted machines was found difficult, even when special bits were used, chiefly because in places the coal in the lower region of the seam is hard and because the bottom is rolly. Though hard coal and rolls at the bottom are not general, the fact that these conditions are sometimes encountered in this mine likewise precludes the shortwall as a machine suitable to the plan of mechanization. Sporadic delays may be almost as influential as those that constantly recur in disturbing the working cycle.

Cutting in the blue band is little, if any, more desirable. All the cuttings must be gobbed, a procedure that in-

TWO IN ONE

In attempting to eliminate delays in mechanized mining, more and more cutting machines and locomotives are being pressed into service. This procedure now appears merely to be a tendency, but later it may grow into an evil, stimulated by a desire to keep the loading units going. Additional machines up to a certain number may accelerate production profitably, but beyond that limit the installing of still more units merely causes traffic congestion and raises costs. A track-mounted cutting machine is capable of taking the place of two, three or four undercutters and therefore has big possibilities for relieving mine-traffic congestion and lowering costs.

volves a needless expense for labor. Roughly, 60 to 85 per cent of the cuttings is good coal mixed with refuse, which, when gobbed, is not only wasted but by its presence in the workings creates a fire hazard.

When considered in itself and also as an element in the general plan of mechanization, cutting in the coal directly under the blue band gives greatest promise. At this horizon the coal is softer and cuts more freely than elsewhere in the seam. The operation, therefore, produces a relatively coarse grade of screenings. Cutting under the blue band requires roughly one-third the number of bit changes necessary for cutting in the parting itself. Furthermore, a longer cutter bar may be used, because of the easier cutting characteristics. Although employment of a longer cutter bar usually is reflected unfavorably in the results of blasting, in this particular case the ill effect is offset by placing the cut above the bottom and dividing a face cut into two benches.

IN THE system of mining followed, rooms are driven 28 ft. wide. The cutting bar is sumped into the coal along the right rib and fed to the left, across the face, in the customary manner. Thereupon the machine is unsumped and prepared for raking out the blue band. The bits in the uppermost position are reversed and adjusted to extend ½ in. further out than they do when fixed for cutting. Then the cutter bar is raised to cover the blue band and the bar feed is reversed in a sweep across the face from left to right, breaking and raking out the blue band in fairly large pieces. Whatever remains of this material is then removed from the cut and gobbed by hand by the follow-up crew. A nine-position, seven-way cutting chain is used on the machines.

The time actually consumed at the face in this operation is about 25 min. —15 min. for cutting and 10 min. for changing bits and raking. This is the average time. One machine timed with a stop-watch cut a 28-ft. room face in 13 min. and raked out the blue band in 8 min., including 3 min. for changing the bits.

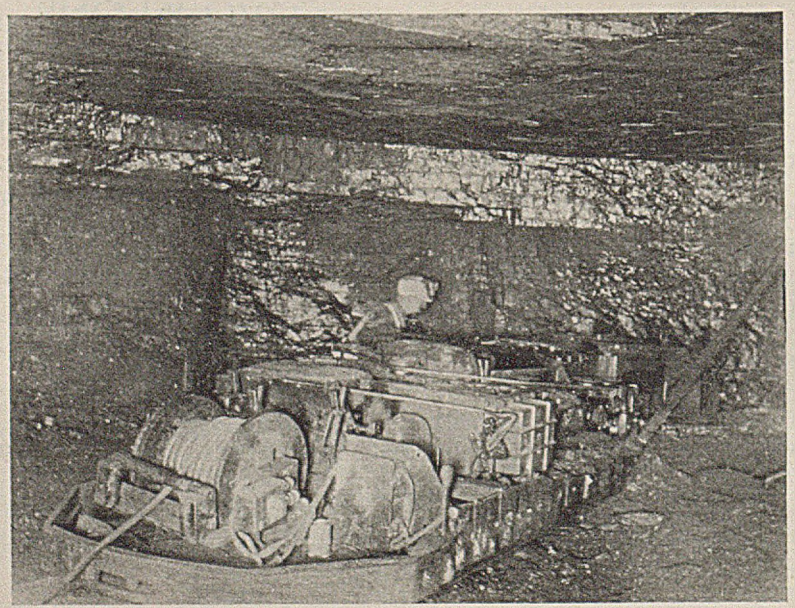
When equipped with an 8½-ft. cutter bar the machines produced 62 tons from each cut in a 28-ft. room face. Increasing the length of the bar to 9 ft. raises the yield per cut to 65 tons. The average number of places cut and raked by one machine in a shift of eight hours is ten, giving a yield of 620 to 650 tons. Under favorable conditions one machine has cut and raked as many as fourteen places in eight hours, yielding nearly 900 tons. As the mechanical loaders which handle the coal prepared by the cutting machines average 280 tons per shift, including development work, one cutter will serve two and in some cases three loaders. Incidentally, where bottom cutting is unusually hard, four undercutting machines will jointly produce no higher tonnage than a single track-mounted machine in one shift.

It must be conceded that the track-mounted cutter in this work has its disadvantages, but the shortcomings are far less important than the gains growing out of its use. In a wide place the face of the kerf cut by a machine of the swing-bar type is rounded, the degree of curvature of this face decreasing as the width of the place is lessened. This disadvantage is being largely offset by the effect of changes in blasting methods used in connection with mechanical loading, increasing the number of holes and decreasing the quantity of explosive per unit charge. In the Peabody No. 9 mine, room faces cut by the track-mounted machines are each blasted by eight charge holes, four in each bench.

THE loaders used in Peabody No. 9 mine are of the caterpillar type. While this machine is loading coal it is necessary to keep the end of the room track 18 ft. from the solid face. On the other hand, in order to use a track-mounted cutting machine the end of the track must be maintained within 3½ to 4 ft. of the solid face. Thus the track must be alternately shortened and lengthened according to the requirements of the two machines. This improvisation of the track arrangement is permissible inasmuch as it in no way interferes with the mechanized operation cycle.

Whereas, if undercutting machines were used, only one track layer would be needed for each loading machine, the track-mounted cutter requires the employment of three track layers for every two mechanical loaders. Though each track-mounted cutting machine adds one man, and at most two men, to the track-laying crew, each simultaneously releases from service two or three cutting machines and the four or six men required to operate them.

Raking Out Blue Band



ELECTRICITY

+Guards Doors and Air Currents

By HERBERT S. LITTLEWOOD

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East Pittsburgh, Pa.

TO PREVENT the accumulation of gas, which if ignited will result in an explosion, all parts of gaseous mines should receive a sufficient and continuous supply of air. Under normal conditions the ventilation provided at such mines affords safety in operation, but the supply of air always is subject to failure. Though spare fans be installed, dual drives be applied to the regular fans and additional power sources be provided against emergencies, these precautions will not afford complete protection unless means are provided either to indicate when any one of the many items of the ventilating system has failed or to call attention when the velocity of the air in any part of the mine has fallen below a safe operating value. In order to prevent a short-circuit, or ground, from igniting the gas which will accumulate when the ventilation is insufficient, means should be provided also for automatically disconnecting the power supply whenever the ventilating system fails.

The need for protection should the air supply fail is of prime importance and has often been discussed. The most recent discussion was that presented before the twentieth annual convention of the Mine Inspectors' Institute of America, at Knoxville, Tenn., during May, 1929, by J. H. Edwards, associate editor of *Coal Age*. This paper was entitled, "Use Electricity to End the Uncertainties of Sectional Ventilation." It thoroughly outlined a system of providing remote indications of the ventilation conditions.

For the foregoing application, a sensitive air-vane relay has been developed. This relay may be located in any part of the mine and serves as the master element of the safety-control equipment, to give electrical indications, either local or remote, and also to control the power supply. Standard apparatus, such as indicating lamps, alarm gongs, timing relays, and circuit breakers are used in conjunction with the air-vane relay to

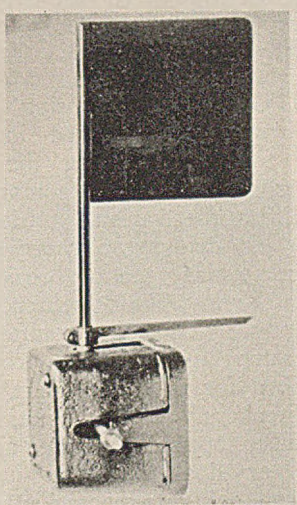


Fig. 1—Air-Vane Relay

form the various complete safety-control schemes. Where doors are used to direct the air in a regular path, which if left open will interfere with the air supply, they should be equipped with marine-type door switches. These may be incorporated in the complete safety-control scheme.

In connection with the ventilation of gaseous mines, the air-vane relay and the door switches are used as the master elements in three different control schemes. They are: (1) remote indications, (2) control of manually operated circuit breakers, and (3) control of automatic reclosing circuit breakers.

In the first, the air-vane relay will be arranged either to close or to open a contact when the velocity of the air falls below a safe operating value. The closing of the contact will energize a pilot-wire circuit, which in turn will give a visual indication, by means of a lamp; an audible indication by means of an alarm gong, or a graphic indication by means of a recording instrument. If the closed-circuit scheme is used, the operation of the relay will open the contact, which will de-energize a pilot-wire circuit, which in turn will extinguish a lamp, drop an auxiliary relay which will energize the alarm circuit, or de-energize the recording instrument. The former scheme, using circuit-closing contacts, will not necessitate using auxiliary devices, except where it is necessary to give indications or alarms at several points. When marine-type door switches are applied to the mine doors, they will function to give the same indications as the air-vane rela: However, in some installations it may be desirable to provide a separate pilot-wire circuit with indicating devices for the door switches.

In the control of manually operated circuit breakers the main power-

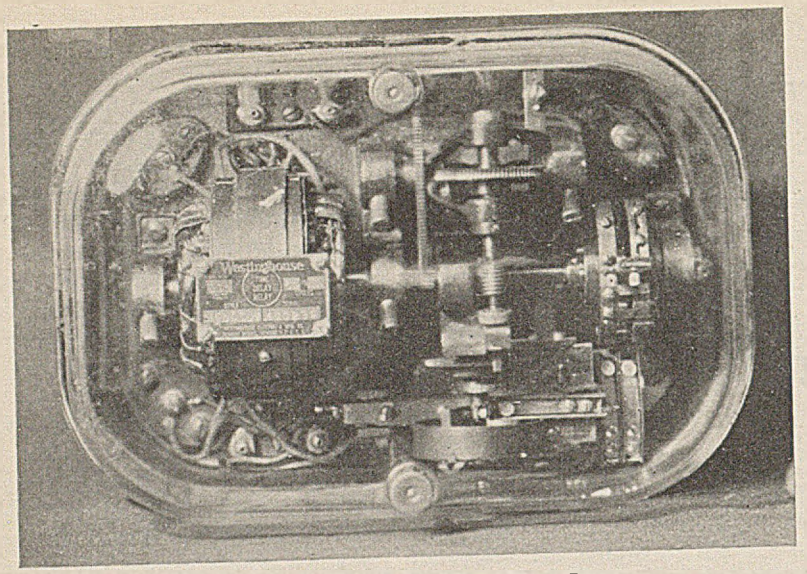


Fig. 2—Timing Relay With Glass Cover

feeder circuit or individual circuits, are to be provided with manually operated air circuit breakers, full automatic on overload, and equipped with a shunt trip attachment. The air-vane relay is to be located at the desired point, in the aircourse or the entry. Several breakers may be operated by one air-vane relay and auxiliary devices, however, it recommended that a relay be placed in each entry, which has a manually operated circuit breaker. The functions of this scheme are as follows:

When the velocity of the air falls below a safe operating value, the contacts of the air-vane relay will close; this operation will energize a timing relay, which will provide a time element adjustable from 1 to 30 min. This time element prevents the opening of the circuit breaker in case of momentary failure of the air, and for most applications will be adjusted to operate from 2 to 5 min. Some applications, however, may permit a longer time element of this relay. At the end of the time element of the timing relay, its contacts will close and energize the shunt trip attachment on the manually operated circuit breaker, thereby, causing this breaker to open, and to disconnect the power circuit. An indication, either visual or audible, may be given at some remote point, by means of an auxiliary switch on the circuit breaker with the necessary indicating lamps or alarm gongs.

A MARINE-TYPE switch may be applied to the mine door or doors to close or open the contact when the door is opened. This contact will be arranged to energize the timing relay in the same manner as the air-vane relay. The circuit breaker will, therefore, be tripped if the mine door is left open longer than the time element of the relay. This time element will permit the opening of the door for trains to pass through, without giving an alarm or an indication and without opening the breaker. In an emergency, such as the derailment of the locomotive or trip, the door switch can be arranged to be cut out of the circuit temporarily. The door switch may also have a contact arranged to de-energize a pilot-wire circuit, if the closed circuit indicating scheme is used.

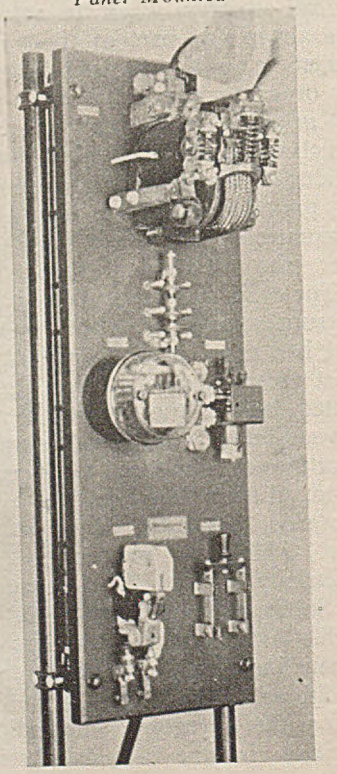
AUTOMATIC reclosing circuit breakers are applied in many cases for both feeding the entire mining distribution system and sectionalizing the various feeder sections. In applying a safety-control scheme to this type of breaker, the air-vane relay, door switches and timing relay will be connected in the same manner as previously described for manually operated circuit breakers. The automatic feeders, when opened by the air-vane relay, or door switches, may be arranged either to be locked out of service, until reclosed by hand, or to be reclosed automatically when the air is restored. However, the former method, of locking the feeder out of service, would seem to be the most desirable arrangement for most applications. Provision may be made also by auxiliary switches on the breaker and by indicating lamps and alarm gongs for giving remote indications in case the breaker is opened.

The air-vane relay used for this application is illustrated in Fig. 1. The standard relay is designed to operate on the minimum air velocity of each application. The contacts of the relay are of the mercury type, and are, therefore, flameproof. In order to obtain a high degree of sensitivity, the bearings supporting the air vane, mechanism, and contacts, are of ball-bearing type, and are protected by shields that seal the end of the bearing. The complete relay is made of bronze, with the exception of the air vane and shaft which are made of aluminum. The mechanism is completely enclosed, with the exception of the opening provided for the shaft extension through the side of the cover. A conduit connection is provided for the control wires entering the relay.

The timing relay, as shown in Fig. 2, is mounted in a dustproof case, with a glass cover. This timing relay is motor-driven and operates through an electrically operated clutch, which provides for the return of the contacts to their normal position when the relay is de-energized. The timing adjustment on this relay is made by increasing or decreasing the spacing between the moving and secondary contacts.

The circuit breakers for this application are of the air-break type. They are equipped with standard overload and shunt trip attachments, and are manually reclosed. A typical air-circuit breaker, as used in this application, is illustrated in Fig. 3. Some applications may require these

Fig. 3—Automatic Reclosing Feeder, Panel Mounted



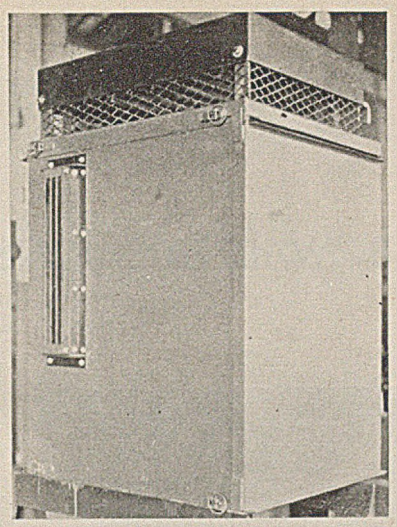


Fig. 4—Similar Feeder, Steel Inclosed

circuit breakers to be enclosed in a steel housing. This arrangement can be readily made.

The circuit breakers may be of the automatic reclosing type, either panel-mounted or steel-enclosed. These two classes of breakers are illustrated as Figs. 3 and 4.

The marine-type door switches are totally enclosed in a watertight case. The switches are mechanically operated from the door by means of a plunger which extends through the side of the switch case. The contacts may be of the circuit-opening or circuit-closing type, as required by the particular application.

The indicating lamps may be of either the switchboard type, or the ordinary socket type. The most desirable arrangement would be to use the switchboard-type lamps, with red and green colors. The green lamp will indicate normal conditions of the doors and ventilation, and the red lamp abnormal conditions.

THE foregoing is presented primarily to suggest the desirability and practicability of protection in case of accidents to the ventilating system whether caused by failure to close a door, by interruption in the airway due to a rock fall, or in any other way.

The main object of this protection is to eliminate the possibilities of ignition of the gas by an electric arc. It is impossible to prevent short circuits on the mine power circuit, which invariably cause an arc. Dangerous accumulations of gas can usually be prevented by means of a sufficient and continuous supply of air, but some means should be provided to assure the attendants that the air supply is normal, and to disconnect the power supply in case of insufficient ventilation.

Though this protection is especially important in gaseous mines, the indicating-and-alarm scheme is desirable in non-gaseous mines also, for it will assure the attendants that the ventilation is sufficient to carry off the impurities, thus providing pure air for the employees.

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MACHINE

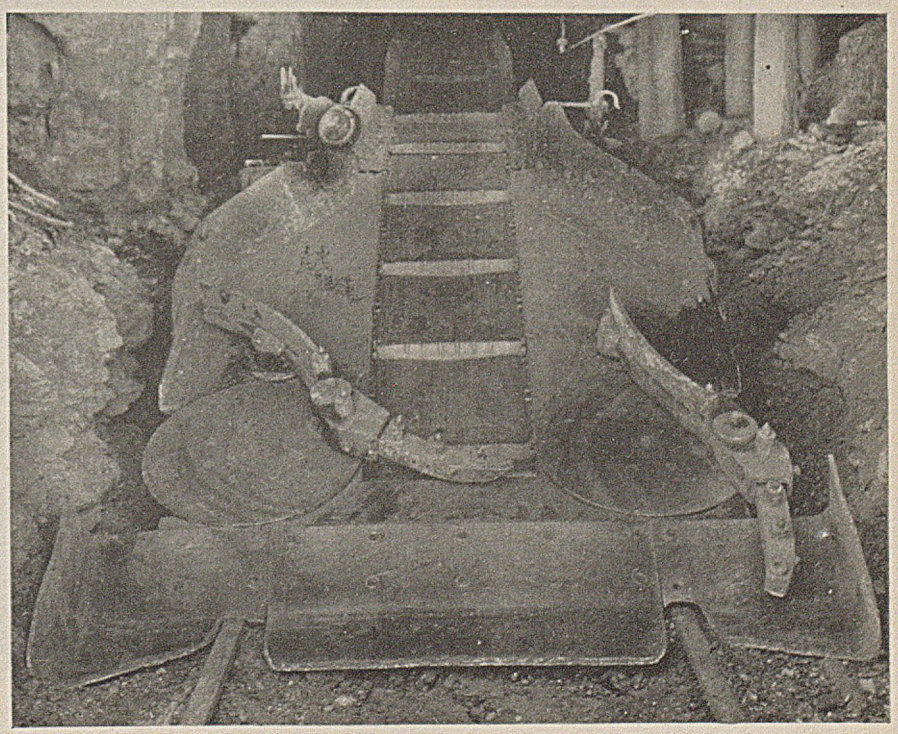
+ Saves Labor in Track Cleaning

A NUMBER of underground tasks, apart from those performed in actual mining, are gradually being reduced to simple operations by mechanization. A comparatively recent addition to this rapidly growing list is mechanical cleaning of mine tracks. A machine operating intermittently, in the hands of a few men, will now clean as much track as will a large, regularly-employed force of men working with shovels.

At the Valier mine of the Valier Coal Co., located in southern Illinois, for example, track is now kept clean by a Joy loader equipped with a patented head. The machine, a locomotive and three men (a runner and two haulage attendants) ordinarily clean up one-half to one mile of track in a shift of eight hours. The cleanings removed from the track during a shift fill an average of 36 cars, each with a capacity of 4½ tons of coal when topped and loaded by hand. Before this mechanized method was adopted this mine employed a regular crew of twenty men to keep the tracks clean. All these men have been shifted to other jobs.

The track-cleaning head, which is now an optional accessory for the Joy machine, was developed by Edward Bottomley and Frank Welch, both of the Sheridan-Wyoming Coal Co. As illustrated in the accompanying halftone, the head is fabricated of steel plates and so arranged as to reach downward between, and on the sides of, the track rails. It is supported by two shoes which rest on and slide over the track rails. As the machine moves ahead, the head digs under the coal and other material lying on the track and lifts it to the gathering arms on the machine proper.

Loading Machine Arranged for Cleaning Tracks



FOOTPRINTS

+ Found in Alabama Mine

By WALTER B. JONES

State Geologist of Alabama
University, Ala.

EARLY in December, 1929, Arthur Blair, geologist, and I. W. Miller, of the land department, of the Tennessee Coal, Iron & R.R. Co., brought in a small slab of slate from the No. 11 mine of the Galloway Coal Co., near Carbon Hill, Walker County, Alabama. This slab contained a beautifully preserved trail of a five-toed animal, with hind feet larger than the front, measuring $1\frac{3}{4}$ and $1\frac{1}{4}$ in. in length respectively. The hind feet had an outside toe which projected outward, while the other four were closely grouped and slightly curved. The toes of the front feet were rather evenly spaced and comparatively straight (Fig. 1). Subsequent investigations by the Geological Survey disclosed tracks of several other species.

As we have only the tracks for guidance, it is difficult to determine whether the animals were amphibians or reptiles, or both. The tracks are found in several parts of the mine and are always approximately 30 in. above the coal. The seam being mined here is the Jagger, which is near the base of the Coal Measures in Alabama, or in older Pottsville than that of Illinois and of other places where amphibian fossils have been found in the past.

The size and variety of tracks indicate a rather rich fauna, and future studies probably will bring out some interesting details. That there were such tracks has been known to the writer for a decade. Nevertheless, the credit for the discovery should go to I. W. Miller and Arthur Blair, who brought them to light.

In Fig. 1 note difference in front and hind feet. Track marks of Figs. 2 and 3 respectively are actually 8.5 and 5.7 times respectively as long as those shown. In Fig. 2 the animal appears to have three toes on front and hind feet. In Fig. 3 the two-toed tracks between and just outside the large tracks show the front feet.

Fig. 1—First Tracks to Be Discovered

Fig. 2—Track of Light Footed Animal

Fig. 3—Largest Tracks Found in Mine; Hind Feet Fully 10 In. Long

TROLLEY-CIRCUIT CODE

+ Proposed by Electrical Engineers

Of U. S. Bureau of Mines

A MODEL CODE of regulations governing trolley-circuit installations in coal mines has been worked out by L. C. Ilsley, electrical engineer, and R. A. Kearns, assistant electrical engineer, U. S. Bureau of Mines, Pittsburgh Experiment Station. The code, which uses the Pennsylvania bituminous mining law as a framework, is based upon a study made by the authors of 175 regulations now carried in 26 safety codes in 22 states.

The results of this study are summarized in Table I. Detailed analysis of the various provisions shown in the headings of this table are embodied in Information Circular 6220 of the Bureau of Mines, entitled "The Hazard of Trolley Wires." State safety codes, say the authors, give more attention to the question of trolley-wire installation than to any other phase of mine regulation pertaining to the use of electrical equipment. Nevertheless, as examination of the table reveals, there is a wide variation in the regulations embodied in the codes of individual states. No state code carries all of the 24 regulations listed and no single regulation is common to the codes of all states.

"The three major hazards presented by a trolley circuit are: (1) Shock to persons, (2) the igniting of mine explosions, and (3) the igniting of mine fires. Most of the regulations are intended to lessen the first danger." The fire hazard is greater in metal than in coal mines, although some coal-mine fires have been charged against trolley circuits.

The percentage of fatal accidents caused by contact with trolley wires is high in some states "and in all states it is greater than necessary were proper precautions observed." But the hazard most to be feared, in the opinion of the authors, is the danger of gas and dust ignition. "The arc from a 250- or 500-volt trolley wheel is most certain to set off gas if an explosive mixture is present at the point where such arcing takes place.

"Track return is one of the greatest objections to the trolley circuit, because it almost always uses a

Table I—Rules Relative to the Use of Trolley Wire in Mines

States	Trolley wire to be shown on plan map	Hangers to be efficiently insulated	Hangers to be properly placed to prevent sag	Trolley wires to be suitably supported	Sag between supports "limited" to	Trolley to be installed on one side of roadway	Trolley wire to be shielded	Trolley to be maintained	Rule for termination of trolley wire	Forbidden to use trolley in working rooms	Power or lighting wires or both on same side as trolley wire	Trolley installed outside of rail	Operating locomotives in gassy section of mine prohibited	Lighting circuits fastened to drilled trolley car	Voltage on trolley circuit limited	Means of cutting off power on branch circuits specified	Method of shielding or guarding suggested	Specific requirements for surface circuits	Stricter requirements for future installations	Height above rail or floor a safety factor	Size of trolley wire specified	Indirect mention of trolley wire	Illumination requirements for shielded points	Trolley wire to be sectionalized
Alabama	....	....	....	....	....	....	Yes	....	....	....	....	....	....	....	....	....	....	....	....	Yes	....	....	....	....
Arizona	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	Yes	Yes	....	....	....	....
California (all mines)	....	....	....	....	....	Yes	Yes	....	....	....	....	Yes	....	....	Yes	....	....	Yes	....	Yes	....	....	....	....
California (mines other than coal)	Yes	Yes	....	Yes	3 in.	Yes	Yes	....	....	....	Yes	Yes	....	....	Yes	....	Yes	Yes	Yes	Yes	....	Yes	Yes	....
Colorado (coal)	Yes	....	....	....	....	....	Yes	....	....	....	....	....	....	....	....	....	Yes	....	....	....	....	Yes	....	....
Colorado (metal)	....	....	Yes	....	3 in.	Yes	Yes	....	....	....	....	6 in.	....	....	Yes	Yes	....	....	....	Yes	....	....	....	Yes
Idaho	....	....	....	....	....	....	Yes	....	....	....	....	....	....	....	....	....	Yes	....	....	....	....	....	....	....
Illinois (coal)	....	....	....	....	....	....	Yes	....	....	....	....	....	....	....	Yes	....	....	....	....	....	....	....	....	....
Illinois (metal)	Yes	Yes	Yes	Yes	3 in.	Yes	Yes	....	....	....	Yes	....	....	Yes	....	....	Yes	....	....	Yes	....	Yes	Yes	....
Indiana	....	Yes	[2]Yes	Yes	....	Yes	Yes	Yes	....	....	....	5 in.	....	....	....	Yes	Yes	....	....	....	....	....	....	....
Iowa	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	Yes	....	....
Kansas	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Kentucky	....	Yes	Yes	Yes	....	....	[3]Yes	....	....	....	Yes	....	....	....	....	....	....	....	Yes	Yes	....	....	....	....
Maryland	....	....	....	Yes	....	....	Yes	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Michigan	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	Yes	....	....
New Jersey	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	Yes	Yes	....	....	....	....
New York (mines other than coal)	Yes	Yes	Yes	Yes	3 in.	....	Yes	....	....	....	....	....	....	....	....	....	....	....	Yes	....	....	Yes	Yes	....
Ohio	....	Yes	Yes	Yes	....	Yes	Yes	....	Yes	Yes	Yes	6 in.	....	....	Yes	....	Yes	....	Yes	....	....	....	....	....
Pennsylvania (bituminous)	Yes	Yes	Yes	Yes	3 in.	Yes	Yes	....	....	....	Yes	....	Yes	Yes	Yes	Yes	Yes	....	....	Yes	....	Yes	....	....
Texas	....	....	Yes	Yes	....	Yes	Yes	Yes	....	....	....	6 in.	....	....	....	....	....	....	Yes	Yes	....	....	....	....
Utah (coal)	Yes	Yes	Yes	Yes	....	Yes	Yes	....	Yes	....	Yes	....	Yes	....	....	....	Yes	....	Yes	Yes	....	Yes	....	....
Utah (metal)	Yes	Yes	Yes	Yes	3 in.	Yes	Yes	....	....	....	Yes	....	....	....	....	....	Yes	....	Yes	Yes	....	Yes	Yes	....
Virginia	....	....	....	....	....	....	Yes	....	....	....	....	....	....	....	Yes	....	Yes	....	....	Yes	....	....	....	....
Washington	....	....	Yes	Yes	3 in.	....	Yes	....	....	....	....	....	Yes	....	Yes	Yes	Yes	....	Yes	Yes	....	Yes	....	....
West Virginia	....	....	....	....	....	....	Yes	....	....	....	Yes	....	Yes	....	....	....	Yes	....	....	Yes	....	....	....	....
Wyoming	....	....	....	....	....	Yes	Yes	....	....	....	Yes	....	....	....	....	....	Yes	....	....	....	....	....	....	....

[1] At all places less than 6½ ft. above rail. [2] Wire to be kept taut [3] At landing or partings where trolley is less than 6½ ft. above rail.

ground. This return often presents a hidden and unexpected danger, due to the wandering of the return circuit in finding the best path back to the generators. Improper bonding of the track or no bonding may force the return current beyond the limits of the trolley-wire installation, even to the face workings, where arcing at unbonded joints offers a serious hazard to the safety of all in the mine."

The composite code, "containing the essential requirements of all the codes considered," reads as follows:

"1. A plan shall be kept at the mine, showing the location of all stationary electrical apparatus in connection with the mine electrical system, including permanent cables, conductors, lights, switches, and *trolley lines*.

"2. In underground roads the trolley wires shall be installed as far to one side of the passageway as is practicable, and securely supported upon hangers, efficiently insulated and placed at such intervals that the sag between points of support shall not exceed 3 in.

"3. All other wires, except telephone, shotfiring, and signal wires, shall be on the same side of the road as the trolley wires.

"4. At all landings and partings where men are required regularly to work or pass under *trolley* or other bare power wires which are placed less than 6½ ft. above the top of the rail, a suitable protection shall be provided. This protection may consist of channeling the roof, placing boards along the wire, so as to extend below it, or the use of other approved safety devices.

"5. All branch trolley lines shall be fitted with an automatic trolley switch or section insulator and line switch, or with some other device that will allow the current to be shut off from such branch headings.

"6. Where wires for electric incandescent lamps are connected to the trolley circuit, the trolley ear to which connection is made shall be drilled to receive the lighting wires and provided with a setscrew for securing the wires in place. Lighting wires shall not be wrapped or tied about the stems or studs of trolley hangers. The ground connection for lighting wires taken off the trolley circuit must be made to the track circuit.

"7. All trolley and positive feed wires shall be placed on the opposite side of the track from refuge holes or necks of rooms.

"8. No trolley wire shall be extended into or maintained in any room while it is being used as a working place; no trolley or feed wire shall be extended into any entry beyond the outside corner of the last breakthrough. Trolley wires must be kept back of the last breakthrough and at least 50 ft. back of the first room where pillars are being drawn.

"9. Trolley wires shall be hung and kept not less than 5½ ft. above the rail and shall be securely fastened and not permitted to sag.

"10. All trolley wires shall be carried at least 6 in. outside of and parallel with the track rail.

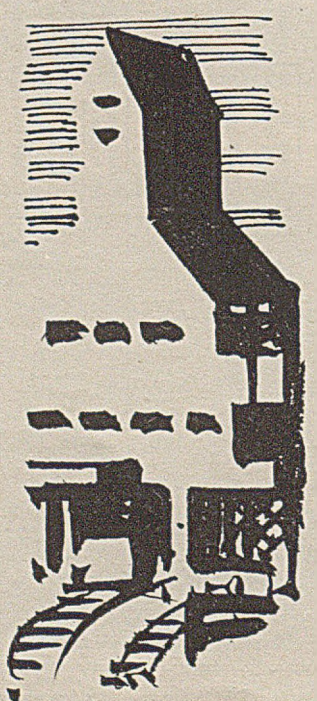
"11. Electric haulage by locomotives operated from a trolley wire is not permissible in any gassy portions of mines, except upon the intake air, fresh from the outside.

"12. Trolley wires or other exposed electrical wires shall not carry a pressure above 275 volts.

"13. In new installations the wire shall be shielded unless it is at least 7 ft. above the top of the rail.

"14. Underground trolley lines should be sectionalized by placing at every thousand feet in the line a switch which can entirely disconnect the line from the power supply.

"15. Overhead lines above ground: Overhead transmission lines between the generating station or substation and the mine entrance shall be supported upon insulators, which shall be adequate in quality, size, and design for the voltage transmitted. Where such a line is more than 500 ft. long, lightning arresters shall be installed in connection therewith at the entrance to the mine. Such line except in the case of *trolley wires*, shall be maintained not less than 14 ft. above the ground at the lowest point, except at the point of entrance to the mine."



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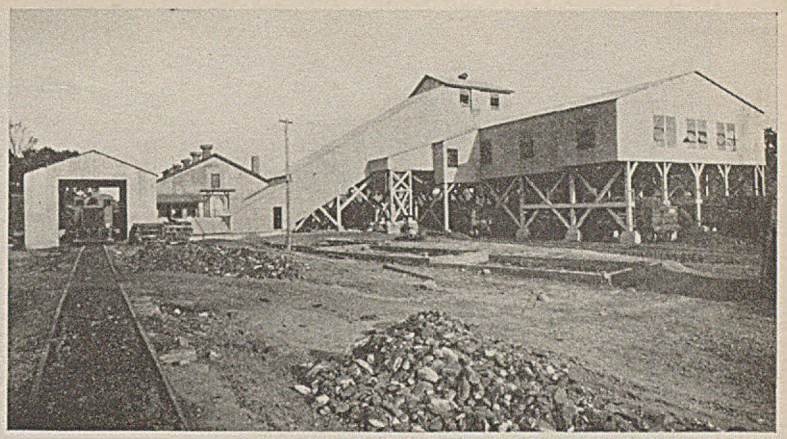
Slope of Jig Screens Influences Results

Results in the jigging of coal in most instances can be markedly improved by sloping the screens downward toward the refuse draw, studies conducted in Alabama by the U. S. Bureau of Mines and the University of Alabama, Tuscaloosa, Ala., show. In nearly all flat screen jigs the refuse tends to work slowly up to the refuse draw. As a result, the deep bed of refuse near the feed end fills up that part of a jig and delays stratification of the incoming raw coal. Furthermore, because the refuse bed is shallow near the refuse gate the jig operator is constantly liable to draw coal with the refuse.

Tonnage of feed and specific gravity are the factors determining the correct slope of a jig screen. These in turn depend upon the proportion and character of refuse in the feed. No definite rule as to the slope can be made; each operator must determine this for himself. However, experience thus far indicates that the slope might safely be tried at ½ in. per ft. initially. It should be increased until the rock bed on the screen stays at practically uniform depth when the jig is running normally. But in case of doubt, it is better to err on the side of having the refuse bed a little deeper near the refuse draw than elsewhere on the screen.

If the slope of the screen plate is increased to about ⅝ in. per foot it will be necessary to bore special screen plates, placing the perforations closer together near the overflow end than at the feed end. This will prevent the coal bed from becoming too tight near the overflow end and too loose at the feed end of the jig compartment. No harm is done, however, if the jig bed is a little freer at the feed end than at the overflow end. The point to watch is that the bed at the overflow is mobile, all the way to the screen, on the pulsion stroke.



A Modern Stripping Tipple in Illinois

STRIPPING

+ Problems and Progress Discussed by Illinois Engineers

STRIP MINING has reached a stage of development where it is no longer viewed as merely another method of producing coal, but is looked upon as a distinct branch of the industry. The growing importance of strip mining was featured at the forty-fifth annual meeting of the Illinois Society of Engineers, held at the Broadview Hotel, in East St. Louis, Ill., Jan. 22-24, when the mining, mechanical and electrical section devoted a special session to this subject.

An illustrated talk on "Prospecting and Exploration of Coal-Stripping Areas," pertaining chiefly to Illinois, by Dr. M. M. Leighton, chief of the Illinois State Geological Survey, and G. H. Cady, senior geologist, was presented by Dr. Leighton. Western areas of the state offer the best prospects for extensive stripping, said the authors, largely because the major dip of the strata is from the west toward the east. In the western portion the dip amounts to only 25 to 30 ft. per mile; in the southern field the strata drop about 100 ft. to the mile. Where the topography is gentle, softer materials are found in the overburden. The Danville district is highly adaptable to stripping, because broad flat valleys have been carved in glacial deposits by meandering streams.

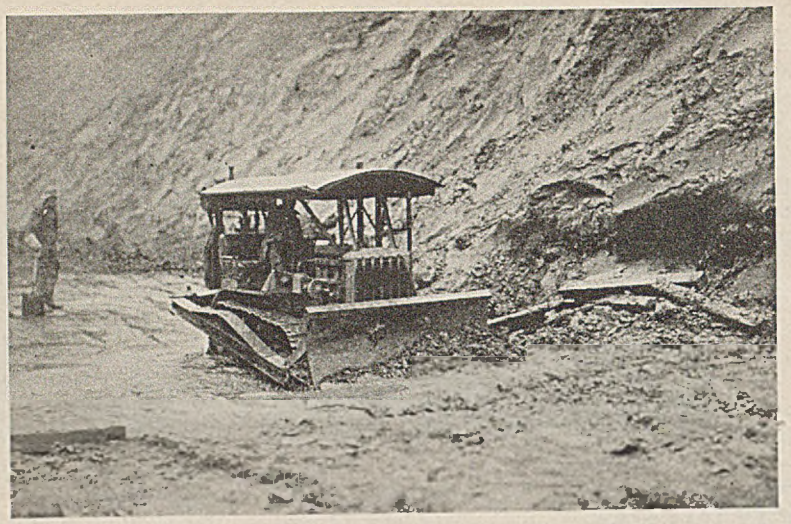
The general layout of the Du Quoin stripping operation of the United Electric Coal Cos. was discussed by James C. Anderson, vice-president of the company. The Fidelity mine in this section was described in a recent issue of *Coal Age* (Vol. 34, pp. 729-732). Developments in the design, construction and use of stripping shovels were outlined in a paper entitled "Mechanical Appliances Used in Strip Mining," by D. J. Shelton, vice-president, Marion Steam Shovel Co. This paper, read by J. D. Crew, manager of the engineering department of this company, in the absence of the author, traced the development in the short space of three years from the front-end combination of a 90-ft. boom with a 60-ft. dipper handle and an 8-cu.yd. dipper stripping coal economically from areas with a cover of 40 to 50 ft., to the 15-cu.yd. shovels designed to carry a 20-cu.yd. dipper on a 100-ft. boom to handle 65 to 70 ft. of overburden. A complementary development are the larger draglines with capacities of 6 to 10 cu.yd. per dipperful on booms as great as 200 ft. in length.

An innovation in haulage equipment is constituted in the substitution of automotive trucks for rail haulage by four or five stripping companies in the Kansas field, one installation comprising six-wheel trucks with capacities up to 10 tons. These trucks have been in service but a comparatively short time and consequently a just comparison cannot be made between them and track cars. It is said, however, that the results have been satisfactory and the prediction is made that these units will be pressed into more general use. Thin coal and thick overburden peculiar to the strip areas of Kansas are more favorable for truck haulage than are those conditions found in the fields to the east.

The finding of "10 or 20 ft. of hard rock in the overburden might have been an excuse for the abandonment of a stripping project ten years ago, but not today," according to Don B. McCloud, Du Quoin, Ill., who read a paper on "Modern Explosives in Strip Mining." Such overburden is now being stripped at a number of large operations, he said. The development of better blasting methods has pushed aside hard strata as an obstacle to economical stripping and at the same time has so eased the job of the handling equipment that maintenance costs have declined.

Mr. McCloud described the blasting methods recently developed at the strip operation of the Pyramid Coal Corporation near Pickneyville, Ill., using L.O.X. as the explosive. The average overburden is 35 to 40 ft. thick and consists (from top to bottom) of clay, a 4- to 18-ft. bed of hard limestone and, lastly, a stratum of slate which in places is replaced by the limestone. Soft shales and pockets of sand occur over limited areas.

Holes of 6-in. diameter are put down by churn drills in staggered formation on centers of 21 ft. in a row. These holes are drilled to



Tractor Plow in Illinois Stripping

within 18 in. of the coal, the accuracy of drilling being checked by sinking a hole to the coal every 100 ft. Instead of shooting a number of holes in a single round, each hole is detonated individually. The drills proceed along the overburden wall *in echelon*, making rows of holes parallel to the cover face. The drill making the first row is about 50 ft. in advance of the drill in the second row, and this spacing is continued for the remaining drills. As soon as a hole is drilled it is blasted, the drilling rig first being moved to the location of the next hole.

This method has been in use for several months. Before its adoption, trouble was being experienced in trying to shoot a round of six or eight holes simultaneously. As it took time to put down that number of holes, some would cave before the round was made ready. The present method saves the time and expense incidental to the cleaning out of the holes, and more effective results are obtained because the explosive can be lowered to the very bottom of the hole.

Each hole is charged with 7 lb. of liquid oxygen per foot of rock. A buffer row of shotholes is left standing against the face, for which reason the bank is not shot down into the cut. The shooting of a single hole has been effective as far back as 160 ft. from the face. Except where a boulder formation is encountered, the rock is so uniformly shattered that nearly all of it passes through the dipper of the shovels.

Agitation by the farmers is on the increase toward the enactment of legislation to compel operators to repair the damage done to the landscape by stripping, said E. G. Searls, general manager Crerar-Clinch Coal Co., Chicago. Some sons of the soil would have the strip operator so level and pack the spoil as to practically restore it to its original state of solidity and topography. He and his associates believe that the earth removed from shallow-lying beds of coal by stripping is or can be made more productive than it was in its original state.

His company roughly levelled 10 acres of spoil bank and planted fruit trees—principally apple, cherry and peach—on the bank. These trees, now in the soil about two years, are in perfect foliage. He is confident that at the end of five years the orchards will be so productive as to make the land at least as valuable as it was before it was stripped of coal. But in carrying out a program of this sort, he added, ways and means must be found to provide adequate drainage of the area planted. One of the largest stripping companies in the state, with the co-operation of the University of Illinois, is preparing to plant several hundred thousand timber trees, including locust, ash, Scotch pine, larch and oaks.

L. E. Sawyer, extension forester of the state, told of a stripping at Danville, abandoned 35 years ago, on which is an excellent growth of timber. Among the trees are sycamore, soft maple, elm, honey locust and cottonwood. On this tract have been seen stumps of cottonwood measuring 20 in. in diameter at an age of 26 years, as determined by counting the growth of rings. He thinks the possibilities of reclaiming strip wastes at a profit are bright.

Stripped areas can be converted into parks for recreation purposes, of a beauty accentuated by the drab monotony of the flat contiguous country, asserted W. J. Putnam. The channels which are filled with water will support fish, said A. M. Buswell, chief of the Illinois water survey. He has found that the waters, which at first are acid gradually, are neutralized in a few years by the alkalinity in the rocks and by the frequent flushings brought about by rainfalls. Furthermore, the water is not stagnant but is fed by springs. While it is highly mineralized, fish will thrive in it.

He asked Mr. Searls the cost of leveling the banks which his company planted in fruit trees. This cost was $25 an acre, using a dragline for evening off the bank roughly. To do a thorough job might cost as much as $1,800, Mr. Buswell believes.

H. B. Lee, vice-president, Maumee Coal Co., declared that about eight years ago the same sort of legislation as is now threatening Illinois strip operators was lobbied for in Indiana. His company planted one orchard of 3,000 peach trees in a stripped area without leveling; these yielded 5,000 bu. of fruit last year. The picking of this fruit from trees on the steep slopes of the spoil piles presents a problem which can be solved by constructing hillside paths. It has been his observation that peach trees on waste land in dry seasons thrive better than those on natural ground.

INDIANA stripping companies, in conjunction with the state forestry department, are planting many trees on their waste lands without advance preparation. The foresters asserted that 75 per cent of the plants would thrive. Actual experience has proved that this percentage is exceeded.

Spruce trees in eight years reach a growth which makes them acceptable for Christmas trees. His company has turned over sixty acres of waste land to a troop of boy scouts who are planting spruce trees on it. These will be marketed and the profits will be shared by the scouts and the company alike. Furthermore, the scouts have made a camp on the land and will have boating, fishing and swimming privileges.

Near Pittsburg, Kan., a state park has been developed on 300 acres of stripping waste. The waterways are meandering; there are lakes; winding roads have been built, and camp sites have been prepared. F. W. Richart, Carterville, Ill., said that sweet clover does well on spoil banks. It can be planted in fruit orchards without robbing the trees of elements necessary for their growth.

GERMANY

+ Finds Better Lighting Increases Production

By W. SAUER

Consulting Engineer
Ludwigsdorf, Kreis Neurode, Germany

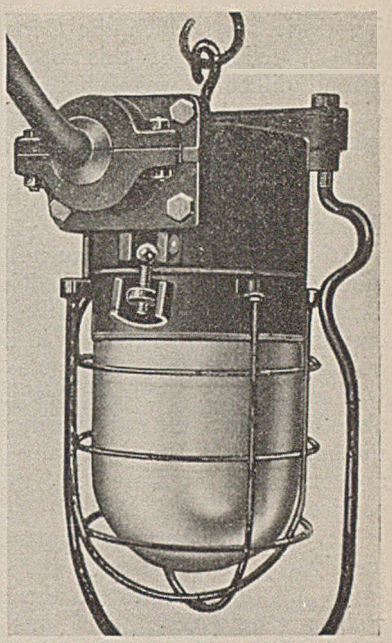


Fig. 1—Siemens-Schuckert Lamp

THE thought that the hard working miner laboring under hazardous conditions should be provided with light facilities equal to those almost universally provided in industry is not new. England made a trial of electric incandescent lighting in the nineties, but the manufacturers of flame safety lamps frustrated the displeasing competition, alleging that the new method of lighting was not safe. Germany then conceived the same idea, and tests were made first in Upper Silesia and then in Lower Silesia at the Wenceslaus mine. There may have been other installations also.

It seemed easy to connect the lighting socket to an electric cable already installed in the mine and to insert a 25-watt incandescent lamp into the socket. This size of lamp seemed ample compared with that of the ordinary 2-volt portable lamp of 2 to 4-watt capacity.

But the test was a failure. Though the lamp burned clearly and steadily, one saw hardly anything, because the lamp made so much glare. Owing to the black, light-absorbing, surroundings the illumination it gave was insufficient for vision.

A larger bulb increased the glare, and it became necessary to decrease the intensity of the light from the filament by using a suitable outer globe. Frosted-glass globes did not, however, hide the glowing filament; consequently the light was not distributed uniformly.

Enameled globes gave a smooth distribution at first, but not for long, for the rough surface of the enamel collected coal dust, rapidly rendering the globe generally non-transparent. Only by the use of opalescent glass globes could 150-watt bulbs be introduced. Bulbs of this power gave the desired light at the face.

Fig. 1 shows the lamp and Fig. 2 a lamp with a globe not made entirely of opal glass, that glass forming merely a 2-in. ring around the lamp, and the rest of the glass being clear. This type of lamp eliminates glare and yet has a high standard of efficiency. The lamp proved a success.

A system of flood-lighting provided for a longwall face, 525 ft. long in a 6-ft. seam on a 25 deg. incline may be presented (see Fig. 3). Setting the lamps 13.12 ft. (4 m.) apart, the number of lamps will be 40 and the power consumption 6 kw. In order that the installation may be made by unskilled labor, all connections should be made detachable.

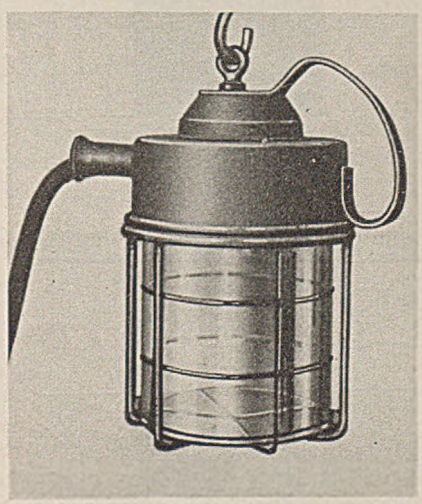


Fig. 2—Schanzenbach Lamp

The transformer is connected with the main circuit and may be considered stationary, as it will not have to be moved more frequently than once every one or two months, provided the light cable is sufficiently long. The light-connecting cable between the transformer and lighting feeder is detachable. The cable is removed whenever the coal is drawn from the longwall face, which is at intervals of about two days.

To facilitate the work, the lighting cable is divided into detachable lengths 39 ft. (12 m.) long, it being easier to drag out these shorter lengths than to handle a single string of 525 ft. From each cable-section three detachable branch cables lead to the lamps. Fig. 7 shows one such lamp disassembled.

As the price and weights of the connecting plugs for the cable sections were prohibitive, ordinary connecting boxes without switches were adopted. By means of hoop-iron locks (Fig. 7) provision was made for locking the plugs so that they could not be unlocked except with the aid of a separate key kept by the chief electrician, who, was instructed not to unlock the plugs when the line was charged. Special plugs are now being designed with simplified lock-

Article entitled "Die Entwicklung und Practische Durchbildung der Abbaubeleuchtung," published in *Technische Blaetter, Wochenschrift zur Deutschen Bergwerkszeitung*, 1929.

ing devices by which the electrician can be relieved of this work. A second difficulty was found in providing suitable fuses for the lamp cable because of its reduced gage. Labyrinth branch plugs eventually were adopted, complying with the national electric code.

At first, cable fuses were not provided, as fuses were embodied in the lamp itself. The fuse in the lamp case did not prove a success in actual operation, so a suitable cable fuse was soon developed. The design enables the user to extend the length of the lamp cord, which is usually 3 ft., a convenient feature in mining service.

At first, the lamp was protected merely by a cast-iron outer case (Fig. 1), but to protect the glass globe a strong wire guard was provided. By using a sheet-iron body (Fig. 8) the weight of the lamp was reduced from 13.8 lb. to 5.3 lb. The former threaded glass globes were found to be unsuitable and were replaced by globes with flanges. Guided by a desire to provide means whereby the lamp, in case of emergency, could be opened easily and quickly without the possible loss of small parts, the number of bolts and screws has been reduced to a minimum. A knee-lever lock similar to that used for bottles (Fig. 6) has been found satisfactory.

A third requirement is strength. The lamp must withstand the rough usage so typical of mining service. It has to endure blows, the fall of pieces of roof, the corroding effect of moisture and the strains of the cable. The connecting plugs are inclosed in heavy cast-iron casings. The lamp and the cable must therefore be of careful design.

Rubber-coated cable has been submitted to many tests to ascertain its mechanical strength and resistance to moisture. The lamps also have proved satisfactory. Last year the system stood an acid test. The roof in the workings fell for a length of 82 ft. Three lamps were completely buried. One of these went on burning. The rest of the installation continued in operation entirely unaffected.

Safety regulations require that adequate protection be afforded against casual contacts with live parts and against fire or explosion hazards. By reducing the operating voltage against ground to 43, apprehension is entirely removed on this score.

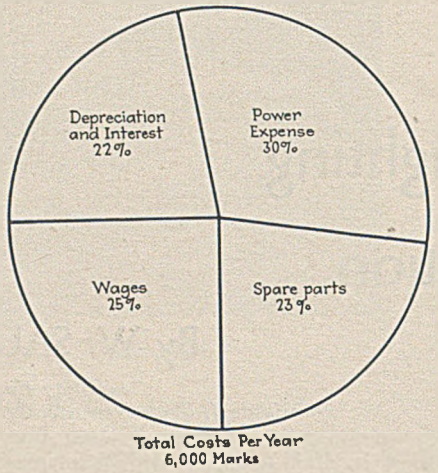


Fig. 4—Cost Distribution for Floodlighting

Fire- and explosion-proofness in any electrical equipment, of course, must be only relative; 100 per cent of safety is not feasible. Assuming that compliance is made with all safety regulations, two sources of danger remain: The cable and the incandescent lamp.

The cable is always exposed to danger of rupture should the roof fall. First, the copper conductor will rupture owing to its lower elasticity; after that the elastic rubber coating of the cable may break; if, however, it does not do so, there will be a vacuum around the break in the cable and the spark created by the rupture will do no harm. Moreover, by letting the cable sag loosely the roof in falling will not subject the cable to any excessive tensile stress.

It has been proved that such falls do not injure the insulation between the copper wires or the outside protective coating, except possibly when the cable is forced upon sharp edges such as those of conveyor pans or when shots drive objects against the cable. It is assumed, of course, that only the best quality of rubber-hose cable is used.

The incandescent light with its glowing filament and its brittle glass bulb is a source of danger. For this, unfortunately, there does not seem to be any substitute. However, the bulb can be protected by a heavy glass globe, and the latter in turn by a strong wire guard, and then the protection is substantially equal to that afforded by the flame safety lamp.

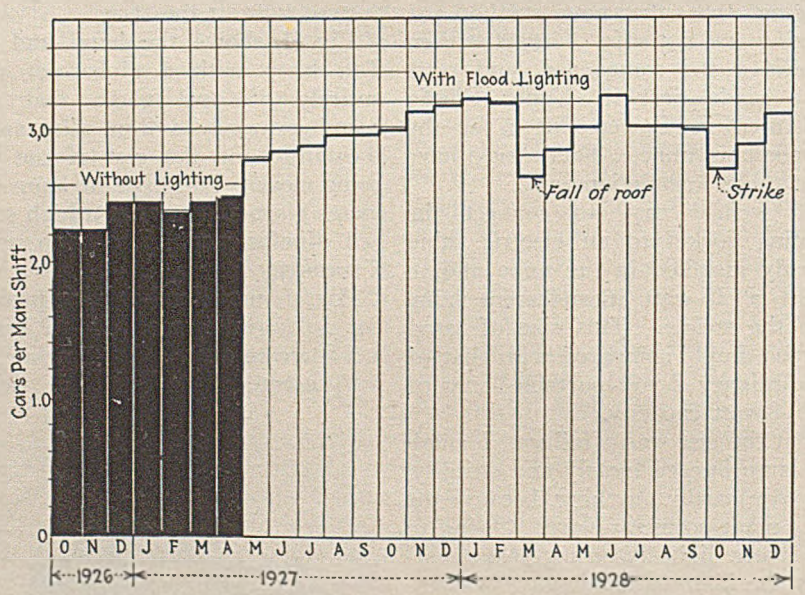


Fig. 5—Increased Production From Floodlights

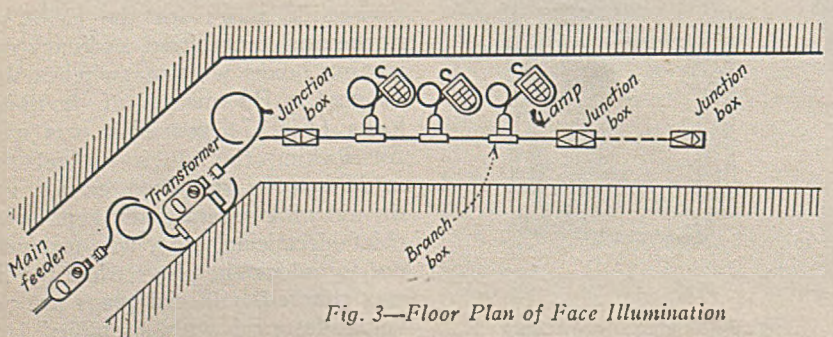


Fig. 3—Floor Plan of Face Illumination

It has been suggested that gas under pressure be provided in the space between the bulb and the glass globe, the object being to disconnect the circuit of the bulb automatically by means of a diaphragm switch if, owing to the glass globe breaking, the gas pressure falls. This plan has been adopted for electro-pneumatic lamps. But the method is not without fault. The action of the diaphragm is slow and consequently an explosion was not averted in cases where the bulb and the globe broke simultaneously.

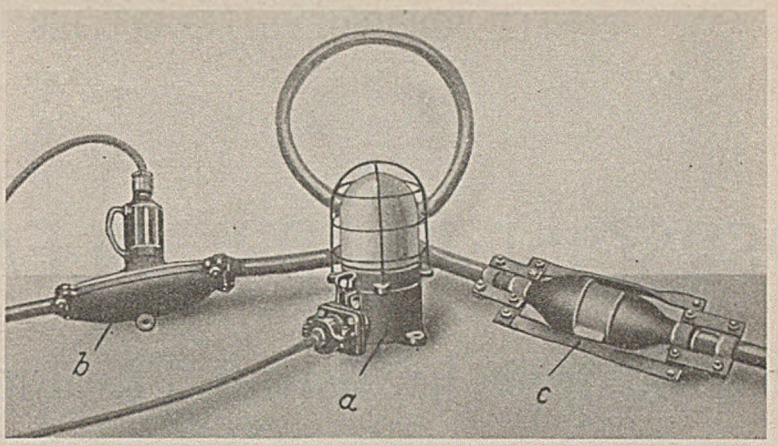


Fig. 7—Parts of Siemens-Schuckert Lamp; a, Lamp; b, Connection Box; c, Section Box with Hoop-Iron Lock

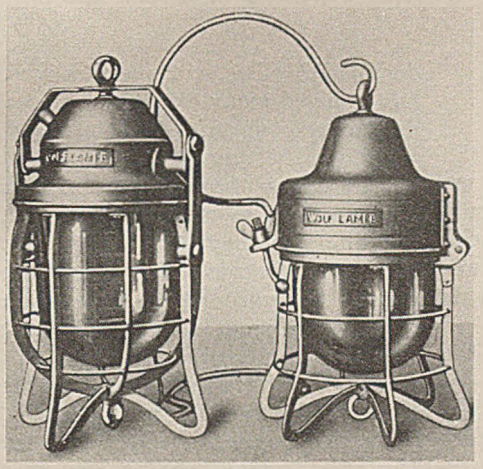


Fig. 6—Friedman & Wolf Lamps With Knee-Lever Lock Similar to That Used on Bottles

Another suggestion was that an inert gas cushion of, say, carbon dioxide should be placed between the bulb and the globe, and that the globe should be of glass reinforced by wire. In case the globe breaks, the wire net in the glass prevents large pieces from dropping out. The carbon dioxide, accordingly, can escape only slowly into the methane-air mixture surrounding the globe.

If the bulb is broken at the same time, the inrushing air and carbon dioxide will burn out and cool the glowing filament before an explosive mixture of gas can form within the bulb walls. There is a danger that the attendant will let the lamp continue to burn if the bulb is not broken by the violence that crushes the globe. Such a lamp would be inadequately protected; therefore a radial armature of metal bars has been put between the bulb and the globe so that when the globe is broken, the bulb also will be shattered and consequently the attendant will have to replace both or go without light. This second suggestion has been preliminarily covered by a patent application.

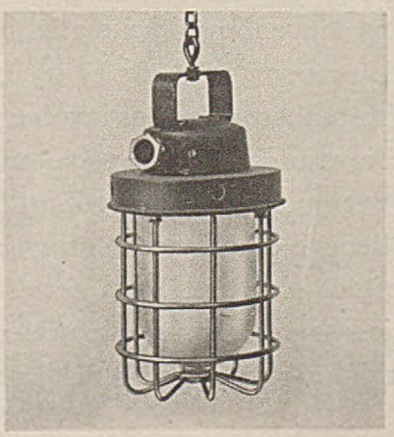
After two years' operation, an investigation of the cost of upkeep showed that the installation with 40 lamps described in the early part of the article was operated for an annual cost of $1,429 and this charge was distributed as shown in Fig. 4.

The cost of floodlighting when compared with wage costs was 3.5 per cent, which is a charge not out of line with that now incurred in other industries. The cost per ton mined was 2.38c. The increase in coal production, if only that from April to May is considered, equals 0.276 car per miner per shift (see Fig. 5).

Assuming a wage of $1.43 per shift the results can be summarized:

Per Mine Car	Cents
Wages without floodlighting	57
Wages with floodlighting	51
Wage savings due to floodlighting	6
Cost of floodlighting	2.38
Savings from floodlighting	3.62

Fig. 8—New Siemens-Schuckert Lamp With Special Key



To keep on the safe side, let the savings be assumed as 2.38c. only. If 73,286 cars are mined per year, as in the mine considered, the net saving will be $1,785. But the profits really are higher, for they are in direct proportion to the wages paid. In the calculation these have been set quite low in comparison with those in other coal-mining districts. Moreover, the greater cleanliness of the coal produced may be of more economic importance than any productive efficiency.

There are other advantages in good light. A miner due to the noise of modern machinery, cutters, conveyors, loaders, hoists and locomotives, is deprived of his sense of hearing. Danger sounds for him no audible warning. A good illuminating system is, indeed, a welcome substitute. With it he can see danger: the early formation of crevices in the roof, the approach of a piece of timber in a conveyor or chute and so forth.

He may also spare his eyesight. It is conceivable that the system will eliminate the eye disease known as nystagmus. The increased volume of illumination reveals his fellow workers as human beings, not merely shadows; without effort he discriminates between coal and slate; both hands are free for work.

Voluntarily he works harder; without realizing it, the quality of his work improves. Management is simplified, inspection duties are made less arduous. Is not floodlighting worthy of adoption by reason of its contribution to safety, even supposing, contrary to the facts stated, that the system does not furnish any savings in operation whatsoever?

PERSONNEL PROBLEMS

+ Challenge Industrial Thinking

MAN AND THE MACHINE is a phrase which commands increasing attention as industry at large takes stock of the developments in recent years and the obligations those developments entail. The human equation, never an unremembered factor in industry, is coming more and more into the limelight as industrial leadership acquires a broader and a deeper understanding of the sociological implications of the machine age. Topics formerly discussed only by the pure students of the social sciences are now absorbed in the agenda of the business conference.

Personnel, personnel training, hiring and firing age limits, dismissal wages, middle-age obsolescence and old-age pensions have lost the blight of academic interest. Management, enlightened labor and social workers are all laboring to find solutions to these and kindred questions which shall be sound industrially and sound socially. Industry and society at large are definitely linked because it is realized that, in the long run, no system can be sound industrially which is anti-social. And, conversely, no system which is industrially unsound can be socially beneficial in its ultimate effects.

Underground mechanization in the loading phase has given the coal industry a new appreciation of the importance of personnel and of personnel training. At the meeting of the program committee of the American Mining Congress at Pittsburgh, Pa., last month, the topic of personnel training was one which many operators felt strongly should have a prominent place in the discussions at the Cincinnati convention next May. In a number of cases, it was stated, an early start on a mechanization program had been held up because the machinery for training personnel to do the new job had not been set up.

How shall the industry soften the blow of technologic unemployment which threatens the lower ranks of workers when the machine becomes dominant? This is a question which has troubled many executives of coal-producing companies who have been weighing the advantages of greater mechanization from the standpoint of reductions in operating costs. As a matter of fact this question of what is to become of the displaced worker has encouraged some executives to seek out some intermediate step in the mechanization process.

One of the most successful answers to the question has been given by a large company in the Rocky Mountain region. When the management of that company decided to go in whole-heartedly for mechanization, the support and good-will of the workers were enlisted in the program by the promise that the introduction of the machine would cost no man his job. The inevitable reduction in working forces was made by letting turnover do the work. When a worker, moved by natural wanderlust or some other cause, quit his job, management did not rush out to find another to take his place. As a result of taking advantage in this way of separations through turnover, disciplinary dismissals, old-age retirements, and death, the

Industrial relations have long since ceased to be a simple problem of rates and hours of pay. As now conceived by modern industrial leadership, these relations involve vital questions once considered the sole province of the sociologist. Many of these questions are now troubling employers in the mining industry as they have challenged employers in other industrial activities. The present article—the first of a series of little journeys to other industries—gives a brief picture of how sympathetic management is thinking on some of these problems.

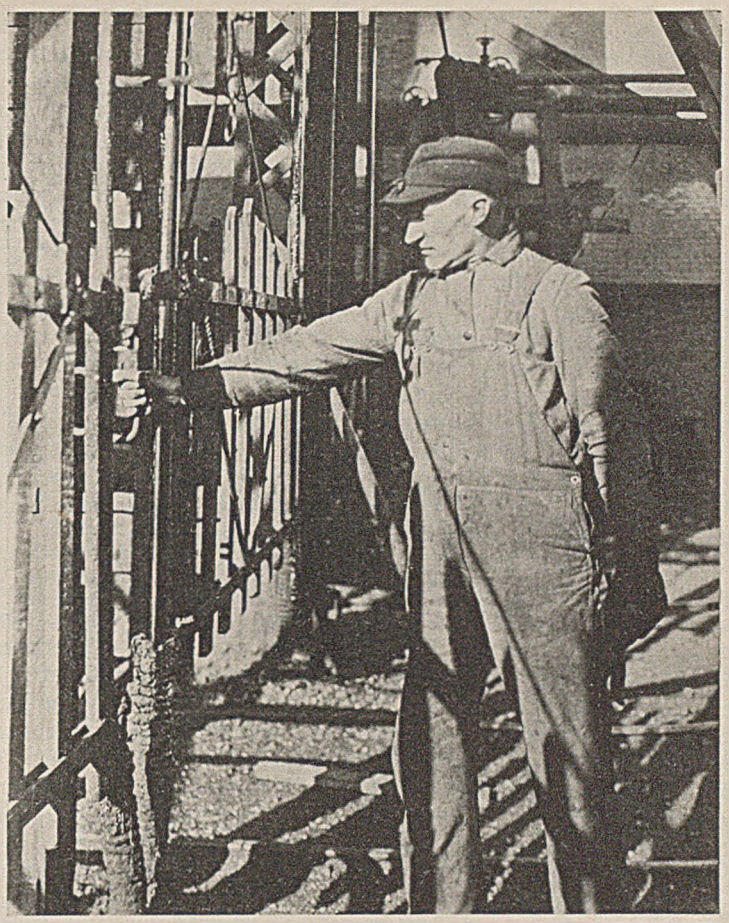
working force was reduced nearly 40 per cent in the space of five years. By taking advantage of natural eliminations, another company operating east of the Mississippi River reduced its working force 40 per cent in one year!

Such results, of course, can be achieved only in isolated cases. Obviously if there were strong indications of a general adoption of such a system, workers would hesitate to quit one mine unless they had definite assurance of early employment at another operation or in another occupation, and the rate of turnover would fall so low that it would cease to offer the employer a way out of a difficult situation.

IS the problem, therefore, to be met by the establishment of a dismissal wage such as in effect in certain of the garment-working factories or as adopted by the United States Rubber Co. when its reorganization plans demanded the permanent shutdown of several of its older plants? Or, looking still further ahead, will industry generally and the state come to an understanding and agreement to inaugurate a policy of old-age pensions? Germany has had such a plan in force for approximately thirty years. Within the past few days, France has made a national old-age pension law effective. The experience of Germany has not been wholly happy, according to critics of the system. and some groups of French workers already have voiced bitter objections to the rate of assessment called for under the new law.

General industry thinking on this and related topics formed the basis of a three-day conference on personnel administration held at the Hotel Statler, Cleveland, Ohio, Jan. 29-31, by the Personnel Division of the American Management Association. Even aside from social and humanitarian considerations, the cost of industrial pension plans is fully justified because such plans promote a high degree of safety and efficiency in the personnel of an organization, asserted J. C. Clark, Equitable Life Assurance Co., at that meeting.

There are four main causes for employees becoming unable to give satisfactory service, said Mr. Clark. These causes are: (1) Impairment of physical and mental faculties due to old age; (2) impairment of these faculties due to accident or disease; (3) inability of those workers of comparatively low mental capacity to keep pace with industrial requirements; and, (4) failure of the employer to provide adequate training.



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Topman Pulling Lever on Safety Box at Shaft Mouth

Preventive medicine has been a factor in delaying the physical impairments due to age. A comprehensive training program planned to keep the minds of employees active and open to new ideas also helps to prolong the period of industrial usefulness, suggested Mr. Clark. Another speaker laid the responsibility for most of the mental obsolescence of the middle-aged worker directly on the doorstep of management.

Some of the aims of modern personnel activity, concluded Mr. Clark, cannot be achieved completely unless and until employment is stabilized. "This means a longer average period of service, which will result in higher pension costs unless the pension plan is designed to counteract this tendency. The best financial results, as measured by the charge to production costs, can be obtained from a fully funded pension plan that will permit employees to work as long as they can perform their work with safety and efficiency. Such a plan will harmonize with other personnel activities if carefully administered."

In considering age, Dr. Eugene L. Fisk, Life Extension Institute, Inc., pointed out, it is necessary to differentiate between the infirmities normal to a certain period of life and infirmities common to that period. The latter are subject to check and correction. Unfortunately, however, the United States has not kept pace with other civilized countries in lowering the death rate of the middle ages. "Silent sickness"—chronic diseases affecting the heart, the circulatory system and the kidneys—is taking too great a toll.

The obsolescence of workers in middle ages—frequently characterized by profane complaints that "the old fool is too dumb to learn"—is not primarily a result of psychological deficiencies resulting from growing older, insisted Elliott Dunlap Smith, professor of industrial engineering, Yale University, but occurs most often when periods of managerial stagnation are followed by spurts of intensive progress.

Where there has been continuity on job requirements, repetitive skill usually more than compensates for any loss in inherent nimbleness with the passing of the years. If there has been continuity in the develop-

ment of the job and job requirements, middle-aged workers have been able to adapt themselves to the change. It is in the spurts following stagnation that the middle-aged worker is hard hit, because then he is confronted not only with the task of learning something new but also with the more difficult task of unlearning strongly developed and often unconscious habits.

The theory of age enunciated by Dr. Fisk and Professor Smith was strongly supported by Prof. Elton Mayor, of Cambridge University, who also stressed the employers' responsibility in preventing conditions which cause atrophy of the workers' mental and physical powers. "Old fogeyism," not calendar years, is the thing which is dangerous. That age measured in years does not bar employment was the claim put forward by J. P. Jordan, of Stevenson, Harrison & Jordan, who maintained that it was the failure to make good before the age of 40 that is the real trouble.

Another speaker who felt that the difficulties facing a man over 45 in getting a job had been considerably exaggerated was Murray W. Latimer, Industrial Relations Counselors, Inc. At the same time the speaker frankly recognized the existence of age restrictions in employment, but these, he said, go back to the beginning of the industrial revolution, over a century ago.

Examination of the age data in the United States Census of Occupations, supplemented by a special investigation made by Mr. Latimer's organization last year, indicated that for gainful occupations outside of agriculture, employment of men above 45 has been increasing for at least 40 years. In certain industries the change has been unusually rapid. In steel the proportion of persons 45 to 54 has increased 61 per cent in the last 20 years; from 55 to 64 years, 142 per cent; 65 years and over, 143 per cent. Possibilities of a man over 45 obtaining employment appear small in railroad and public utility service, but in manufacturing enterprises the chances are two to one.

HIRING age limits also were defended by E. Grosvenor Plowman, Associated Industries of Massachusetts. Unless we are to throw overboard the theory that jobs ought to be given to those best fitted to hold them, he argued, "we must agree that a reasonable hiring age limit crystallizes the fact of discrimination on efficiency and safety grounds which has always existed against the older person. From a purely social standpoint, society would be worse off if industry gave its jobs to the less efficient and more expensive of the two applicants.

"Unless old age is to mean universal retirement on savings or pension benefits, we must recognize that older workers can be kept in employment until very much more nearly the end of their lives if the salvage point of view dominates our labor policy. This means that workers as they grow older must be adjusted medically and socially to their work and to their decreasing ease of performance.

"The publication of a hiring age limit is an aid too in the administration of labor policy along these lines. It reduces the competition of older workers for the few positions which can be held by the less efficient in the particular organization. It increases the likelihood that the worker will remain at his familiar occupation, since he will realize the valuable protection afforded him in his own company and the barrier to re-employment in this or other companies if he should attempt to change his job."

HIRING ages and retiring ages are closely connected when there is a pension plan involved. It has been generally recognized that the absence of age limitations in hiring might easily have an adverse effect upon the operation of a pension plan open on equal terms to all employees. Considerable flexibility in retiring ages seems to be favored. The age appropriate for one organization may not necessarily be appropriate for another. "An organization desiring to develop a proper pension plan should make a careful study of its own needs and build its plan accordingly rather than adopt a plan developed by another organization," said George B. Buck, consulting actuary, in discussing age requirements of pension plans at the American Management Association meeting.

Mr. Buck was of the opinion that the requirement of a period of service alone does not work out fairly for the individual employees or for the employer. A provision permitting all employees who fulfill the same service requirements to retire, regardless of age, might result in the early retirement of efficient employees and the retention of employees who had been with the organization a shorter period beyond their real usefulness. If service is the sole requirement, hiring ages must be sharply limited and such a limitation might hamper the company in selecting personnel.

Dismissal wages were brought to the attention of the meeting in a paper by Miss E. H. Little, United States Rubber Co. When that organization was faced with the necessity of permanently closing down certain of its plants, employees in those plants who were not to be transferred or who objected to transfer were given a dismissal wage. This wage was paid to all workers who had been with the company 15 years and, in the case of workers over 45, to all who had been employed 10 years. The dismissal wage was equivalent to one week's pay for every year of service and ranged from $125 to $2,000. The good-will returns, it was stated, have been tremendous.

INTEREST is shifting from formal apprentice training to supervisory or foreman training, job training and management training, according to a report presented by Byron F. Field, superintendent of training division, Commonwealth Edison Co., and chairman of the industrial training group of the American Management Association. Formal apprentice training is carried on by a larger number of companies than any other kind of training. Supervisory or foreman training comes next. This is followed by job training and management training, but there is little correlation between the order of activity and the type of information which the same companies wish to have. Most companies desire further information on supervisory training and supervisory training is followed closely by management training, in which the smallest number of companies say they are carrying on active work.

Another tendency in industrial training is for the preparation of instructional materials and their presentation by men from within the companies. In management training the major executives take a more or less active part in the preparation of the material for the training of future executives in two-thirds of the cases and in more than one-half of the cases line executives actually conduct the managerial training course. In the great majority of companies having apprentice training, part or all of the training takes place on the job.

LETTERS
. . . to the Editor

Scientific Merchandising Need of Coal Industry

Between coal producer and consumer stands the sales agency, and upon the latter falls the burden of disposing of the product, and seeing that it and the user get a square deal. Every mine owner is desirous of some continuity of operation, which he can secure only in a stable market. But to retain this market he must cater to the enlightened purchaser of coal who will buy where he can get the fuel best suited to his requirements. This tendency may be expected to become more pronounced as purchasers more and more become acquainted with the possibilities of particular coals for particular uses.

Merchandising coal, therefore, resolves itself into, in addition to salesmanship, a knowledge of combustion; sufficiently thorough to give the customer the kind of coal that suits his requirements, as well as assistance in obtaining the most value from it. Sales talk no longer convinces the purchaser, though it may suffice to obtain a trial of the particular product the salesman is pushing. But the trial usually fails unless the test is carried out in a scientific manner and the results recorded.

Too many customers are prone to shift from one coal to another for the sake of a few cents, or because a buyer is hypnotized by sales talk into trying another product. The coal then goes into the plant with only the plant operators as judges. They generally are either incompetent or disinterested; all the faults of the plant are blamed on the coal and, in the long run, it labors under a big handicap. It would seem desirable that both producer and consumer establish the facts in each case, decide on the coal best suited and arrange conditions to obtain the greatest benefit from it. The basis of competition should not be the price per ton but the ultimate value received.

Merchandising coal is vastly different from merchandising other commodities, largely because the blame for failure is too easily misplaced. "Poor coal" is too often offered as an excuse for all kinds of faulty conditions, while thousands of tons are burned daily with attendant waste and dissatisfaction. Combustion methods are too seldom understood by the producer and mining methods and coal characteristics by the consumer. All of this should be known to the person intrusted with securing and keeping a market for any particular coal—in other words, the salesman should know his product and how it should be burned.

A plan of merchandising by which a combustion expert would make a survey of the plant to determine what results might be obtained from the coal which the user is asked to buy, and a follow-up service to enable him to burn it in the most economical way, will go far toward stabilizing the producer's market and enabling him to hold his customers. Salesmanship plus combustion knowledge may be expected to result in a large percentage of satisfied users.

Lynch, Ky. E. Woodson.

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Does Age Disqualify A Mine Foreman?

Speaking, I believe, for the majority of the old mine foremen, I would like to ask if scrapping a man who still has several years of service ahead of him is a fair or economical thing to do? As for my own experience, I have seen 30 years of service as a mine foreman in five states, including Tennessee and Alabama. During that time, I made some money but lost it through misplaced confidence and must still work for a living. Though 62 years old and practically as strong as ever, all my applications for positions are turned down with the comment, "Too old."

I have forgotten more than a lot of these young bloods will ever know, at the rate they are looking after the business of their employers. Their thoughts turn more to pleasure than the responsibilities of their jobs and, as a result, they cover up their deficiencies by making their men work like the devil. And we old duffers must take a back seat and want for work just to give the young lads a chance they often do not appreciate. Why can't we old heads have a part of the soup while it is still hot?

In my time I have handled as gassy mines as the next one; have never had a man seriously burned and only one man has ever been killed in any of the mines I have bossed. No mule has ever been killed on any of my jobs and I have never lost an order by letting men load dirty coal. My record has never been marred by a discharge and the mines I have been in charge of have always been kept in such shape that they passed the state inspectors and the insurance people. Yet I can't get a job, because of my age. What do the mining companies expect us to do after we have given them all our time in our younger days, only too often at a fraction of its worth to them?

Mining is just as important today as it was twenty or even forty years ago, and needs a few old heads to keep it going along in the right direction. As I see it, good, sound mining sense is more necessary now than ever, as the mines go deeper into the earth and dangers unheard of in the old days present themselves. I cannot see why the older men, with mature judgment and a long acquaintance with the dangers and problems of mining, should be arbitrarily dropped from the list of eligibles, and take this opportunity of asking others who read *Coal Age*, particularly the old timers, for their views on this question.

A. H. Stansberry.

Chattanooga, Tenn.

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Urges Study of Psychology By Management

How the other fellow's mind works is something the average mine official of today fails to understand. The viewpoint expressed in the editorial "Rewards for Scholarship" *(Coal Age,* July, 1929, p. 433) might further be extended, I believe, in the interest of harmonious relations between employer and employee. Many men, however, still shy away from that big word "psychology," even though the day of the "big stick," when an understanding of the employee's thoughts and opinions was unnecessary, is past. But putting a few of the fundamental laws governing the working of the mind to work, will go a long way toward getting men to put their heart into their work.

Years ago, when I started firebossing, most of the men employed in that mine were older, English and Scotch miners—good, practical miners. Being new to my work, I tried to tell them what, how and where to do certain things which they, as older, more experienced miners, sometimes resented. One morning on my second round I decided that instead of *telling* them I would *ask* them what they thought best for their places. This practice brought about a great change in their attitude toward myself and the company. They were glad to help me by giving their ideas and thereby helped themselves. By asking for their opinions and as to whether they had sufficient posts, supplies or tools, I could get them to do the work without a direct command in the majority of cases.

This method of getting men to do work is known as the law of suggestion and is widely used in modern schools today. Men or children will work their heads off to put into operation a suggestion which they have made. and it is the duty of the mine official to so guide them that they will make constructive suggestions.

Plumville, Pa. C. A. Balliet.

COAL AGE

SYDNEY A. HALE, *Editor*

NEW YORK, FEBRUARY, 1930

Underestimating the handicap

ONLY a man who is thoroughly experienced in mine operation and trained in production and cost investigations is capable of drawing true conclusions from a test of one or two pit-car loaders or of a single loading machine when it is operated amid the flurry of a hand-loading section which is under regular production. The handicap which such a condition imposes on the work of the mechanical loader is quite likely to conceal the full measure of profit that would accrue from complete mechanization on an efficient basis.

The trial should serve more as a check as to the manner in which local mining conditions will affect the operation of the machine than as a means of estimating the quantity of coal it would load when given a fair opportunity. Except in mines with quite peculiar natural conditions it may be safer to arrive at the production figures by comparison with best practices of fully mechanized mines operated in seams of comparable thickness. And it is well to exercise caution in estimating the effect of a local condition which appears unfavorable to the machine. Unless concerted effort is made to devise a means of overcoming that condition the trial may serve only to delay the introduction of machines in a mine well suited to complete mechanization.

It is most difficult to give a single unit a fair trial side by side with hand loading, especially if the installation was not made at the suggestion of the mine foreman. Deductions and conclusions from limited trial installations should be made only after a most exacting and accurate analysis of the greater possibilities offered by a complete equipment.

How old is middle age?

DISCUSSION has so illuminated the subjects of depreciation and obsolescence of equipment that the formulas and methods are open to all who care to study the available literature. Obsolescence of the human worker in industry is less understood and less susceptible to reduction to fixed rules. Those who have delved into the question discover something akin to the popular conception of the Einstein theory. Age, it seems, no less than time and space, is relative.

This fact was convincingly developed at the recent conference of the Personnel Division of the American Management Association at Cleveland. Sharp distinction was there made between the infirmities common to a certain period of life and the infirmities normal to that period. Physical depreciation, say the doctors, may be measurably retarded by preventive medicine. Obsolescence in industrial usefulness and capacity, however, is not so much the result of physical and mental deterioration as of habit and opportunities, or the lack of them. The gap between ripeness and decay can be definitely widened.

In this view of obsolescence, set forth by Prof. Elliott Dunlap Smith, of Yale, there is a real challenge to the human side of industrial leadership. Management which condemns the worker to the rôle of an automaton and so atrophies his faculties of development is placing itself in an unenviable position. In many cases, it is unconsciously convicting itself of stagnation. If management hastens the advent of middle age by denying the worker reasonable opportunities for development and growth, management cannot shift the responsibility for the results to the calendar.

Mechanization and weak roof

STEADILY the economic advantage of mechanization affects a widening circle of hand-loading mines which have roof conditions less and less favorable. How to support the immediate roof and keep the posts out of the way of a machine has become a topic of wider interest.

Those who meditate the use of steel beams at the face are likely to magnify the apparent difficulties and dismiss the thought without sufficient investigation. They figure the cost of three or four beams for each room of their present territory, imagine a high labor cost for moving and lifting them into place, and perhaps do not realize how easily the supporting posts can be shifted to accommodate the loading unit.

At a mine of the Ogle Coal Co., Sullivan County, Ind., steel beams have been used with loading machines for over five years (*Coal Age,* Vol: 34, p. 410). The investment is but $30 to $50 per working place, and the beams are raised into position by two men without the aid of jacks. One post at a time is removed and replaced to provide clearance for the loading machine by the men who operate the loader, and the labor only slightly reduces the actual operating time.

With the concentration that mechanical loading makes possible, especially where shooting is permissible during the loading shift and where the working is double-shifted, carrying charges for two to four steel beams in each active place are not necessarily prohibitive. In few, if any, mines can the operator afford to set less props at the face than before mechanization. He has, therefore, in almost every instance to be moving posts, and he can almost as easily set them under a beam, though they must all be replaced when the beam is moved forward. The advantage of setting steel beams at the face is deserving of more attention from mine operating officials.

Dangerous occurrences

BRITISH INSPECTORS' reports contain details of "dangerous occurrences" with information as to the inquiries and inspections that followed. As the name suggests, these occurrences were not accompanied by fatalities or accidents; in fact, in many cases the lives and limbs of men were not put in direct jeopardy. Nevertheless inquiries were instituted and reports made. In one district there were 38 such cases. Three hoisting ropes and one balance rope broke while hoisting coal. Samples of the ropes in each case were sent to the Safety in Mines Research Board, which found fatigue and wear, and in two cases, corrosion. Three of the ropes had been in service 41, 29 and 26 months respectively. Three cases of broken wire conductors were investigated. An overwind and the failure of a detaching hook are reported, as also an underground fire due to a trailing cable being caught by cutter bits.

Care in examining cases which do not result in injury but which point to possible accident is the secret of safety. A technical accident should be treated with every consideration as an index finger pointing to hazard. What happens once may happen again, and fortune may not then be favorable. At the next or at a later time a life or a limb may be involved. The repetition may even be the initiating cause of a major disaster. In a mine without "dangerous occurrences" there will be no accidents.

Training for the firing line

WHETHER the colleges shall attempt to give their students training that will render them as graduates fitted for all the duties in the industrial world that they may have to perform, shall merely ground them in fundamentals leaving the "little tricks of technology" for the field practice or attempt to teach only the broader lines of technology is a matter for debate wherever engineering professors meet.

President Lewis, of Lafayette University, holds that the college must always lag somewhat behind industry, that technology is variable and changes as machines become obsolescent, and that consequently, too great attention to machine details is concentration on the evanescent. However, as a man is judged by such superficial matters as his social manners, so an engineer is judged by his ability to perform some one or two simple tasks. It is not by his knowledge of fundamentals that the young college man is weighed when he comes into the field but by matters far more superficial. If he is to carry conviction in dealing with men without college training, he must excel in their line of work as well as in those fundamentals which are less tangible.

College men who have passed successfully into industry will be less severe in their judgment of the superficial weaknesses of neophytes from college. Even today the test is less severe for them than in the past when they were judged by their ability to set a timber, drive a spike, strike a drill or lick a bully rather than by their geological or chemical knowledge or their acquaintance with divers mining methods.

Picking-table design

IS THE WIDTH of some picking tables in use at bituminous plants out of proportion to the quantity of coal handled by them, and to the ability of the picker to remove impurities on them? If a table is wide, impurities traveling along the mid-section of the unit may be missed entirely by the picker, either because he cannot reach them or because he is not inclined to exert himself beyond average effort in the task. Large lumps passing the picker at a distance greater than arm's length can be handled only with difficulty and frequently not at all.

If the picker is required to bend far over in order to reach a large lump, he cannot drag that lump to his side when the table is filled. Should he attempt to lift it, he may injure himself. Pickers have been seen to bend so far forward that their feet slipped backward from under them. Tables at which men slip in this manner, at least, are too wide.

This inquiry is framed while mindful of the fact that to cut down the width will reduce the capacity of the table or will increase the depth of the flow of coal, thus limiting the opportunity of making a proper inspection of all the coal passing. It is well to be liberal in providing adequate picking facilities, but not at the expense of making the tables too wide. If the desired capacity cannot be derived from one comparatively narrow table, obviously the coal should be divided between two tables and reunited after picking.

Value received

SOMETIMES the cynical business man looks over his record of payments for association dues and sourly asks himself what the organizations have done for all this outpouring—or, as is not infrequently the case, dribbling—of money into their coffers. Sometimes, however, an association renders a greater service in preventing something being done than in positive accomplishment. The activity of the National Coal Association in connection with the threatened withdrawal of countervailing duties on coal is in point. Tariff debate is something in which the average coal man takes little interest. But what would have been the effect upon the industry if the proposal to eliminate countervailing duties from the new tariff law had passed unchallenged and unchecked?

NOTES

. . . from Across the Sea

BRITISH physicians are still wondering what causes in Great Britain that peculiar "clonic spasm of the eyeball" known as nystagmus and why American miners seem to be free of the disease. Honors have been handed around to physicians for their contributions to the study, but after all has been said perhaps A. Freeland Fergus, in his address to the Institution of Mining Engineers, comes nearer to a conception of the cause of the disease than all his predecessors.

He dismisses as a cause poor light or light striking the eye obliquely and suggests that some mines seem to develop nystagmus in the men who work in them and some don't. In some mines that are poorly lighted, he says, nystagmus has never occurred; in others that are well lighted, nystagmus is rife. Then also he says the occurrence is in a degree seasonal and that strong light aggravates a case after it has occurred.

He recalls that in the transactions of the Institution in 1926-27 he suggested that the disease was due to a toxin. Discussing symptoms, he mentions night blindness, day blindness, pulse rate of 120, pain in skull and at the junction of the occiput with the spinal column and in some cases twitching in the arms and legs.

In America, despite what Dr. Fergus may say, there is lighting of all kinds, good and bad, and yet, as he also says, there is no nystagmus. It is natural, therefore, to think that the difference is not due to contrasts in lighting but to the presence or absence of specific germs or seam emanations. Dr. Fergus' word "toxin" is suggestive. The frequency of septicaemia in British mines suggests a condition different from our own, for American mines are relatively aseptic.

In 1928 there were 9,755 persons of the mines of Great Britain receiving compensation for nystagmus, 2,547 of whom were added during that year. Since July, 1913, the disease has been held as covering cases where the symptom of oscillation of the eyeballs is absent. The disease appears to be so fundamental in character that it can scarcely be caused by the incidence or intensity of light on the eye, though it might be premature to assume that as a fact.

That wire netting be used for lagging in mines has been suggested by W. S. Spellmann in *Glückauf*. The netting is used in pieces a meter (39 in.) long and 7 in. wide, which is long enough to reach between metal sets. The lengths of wire netting apparently are not always set close together, it not being necessary in every case to lag "skin to skin."

In Great Britain, the Safety in Mines Research Board is issuing a series of popular bulletins entitled "What Every Mining Man Should Know." Bulletin No. 1, "Safety in Coal Mines: Some Problems of Research," introduces facts which, perhaps, our readers may not know. It states that quartered props are as strong as round props of the same sectional area, except where the props are thin, and that props soaked in water are only half as strong as dry props.

A hollow timber cog, 4 ft. square and 6 ft. high, built of 4-in. props, gave way, says the bulletin, under a load of 22 tons. Another cog filled with mine rubbish but otherwise just like the first did not give way until 131 tons was loaded on it, and was therefore almost six times as strong.

MUCH greater strength was obtained when the cog was built with three props in each layer and filled in with rubbish. The third prop of each course goes through the center and helps to bind the cog together; the rubbish takes a large part of the load and is held in position for this purpose by the props.

The bulletin also explains that when a hot surface is the source of ignition of methane and air the most readily ignitible mixtures contain between 5 and 7 per cent of methane; when an electric spark, between 8 and 9 per cent; when certain explosives are the source of ignition, about 9 per cent of methane. The most violent explosions are obtained when just about 10 per cent of methane is present.

When the switch for an electric current, say the authors, is in a case filled with oil, the arc made when the current is broken decomposes some of the oil and forms gases. The mixture of gases produced inside the switch case has been found to be more explosive than methane when mixed with air. This has led to the conclusion that oil-immersed switches are less safe than those without oil, provided the latter be properly inclosed in a flameproof case.

The Board states that by the correct mixing of oils a mixture can be found that will give a better light than any of the oils of which it is composed but it adds cautiously that the changes might bring in unforeseen disadvantages. It states also that a lamp with an incandescent mantle has been designed and is now in the hands of manufacturers to adapt for practical use. These popular bulletins, bound in red paper as symbolic of hazard, are sumptuously illustrated and written in simple and lucid language in a most entertaining way. They are welcome additions to the literature of mining and will be read with advantage by all kinds of mining men.

And here perhaps one may be justified in calling attention to a comment made by J. A. Horsely, electrical inspector of mining of Great Britain, in his annual report for 1928, which appeared a month or so ago. It elaborates on what the Safety in Mines Research Board said as to the gases distilled by the electric arcs from the oil in switch boxes.

He remarks that the gases given off include 66 to 82 per cent of hydrogen and from 26 to 10 per cent of acetylene, and these, says he, with a sufficiency of air will make a highly explosive mixture. Hydrogen when mixed with air is flammable between limits of approximately 4 per cent and 74 per cent, and for acetylene the corresponding limits are 2½ per cent and 80 per cent.

Fortunately, he adds, where large haulage motors are installed, firedamp is not normally a hazard, but fire below ground is a serious matter; therefore, it would appear to be desirable that an oil-immersed controller for such situations should be equipped with ventilators that have sufficient open area to effectively release pressure in the event of an oil-gas explosion, yet without permitting of the ejection of burning oil. Vents that are flameproof when only firedamp has to be considered are likely to be ineffective in preventing the ignition of external firedamp when hydrogen is ignited within the vented inclosure.

THERE is some evidence that explosions in oil switch boxes usually are associated with "inching"; that is, the repeated use of the switch to make and break the circuit so as to move a haulage rope slowly.

H. M. Hudspeth, mine inspector for the Yorkshire Division of England, in making his report under the Coal Mines Act, calls attention to a practice of placing a chain with a hook at one end around a prop when it is being drawn, and hitching the chain to the hook and then pulling the chain. The hook is attached to the prop by driving into the timber a prong which forms part of the hook. The natural result is that when the chain is pulled, being at a distance from the prop of about 2 in., it has a leverage on the prop of several inches and causes it to turn. This twisting of the prop makes its withdrawal less difficult than with a straight pull. By using one of the many pulling devices—Sylvester, Blair, Hardy or Hadfield—the prop can readily be dragged out of position, even when the roof presses heavily upon it.

In New South Wales many of the miners employed by private owners have been desirous of state ownership, and it is said that many participating in the strike now in progress seek some such consummation. It is interesting to note that Queensland has closed down its

state colliery at Mount Mulligan, but has made an offer to its employees at the mines to work it "on tribute," turning over to the Mines Department $1.25 on every ton mined to pay interest and to redeem the capital expended in the opening and development of the mine. Yet that capital charge has been scaled down 66 per cent. Verily, the way of the advocate of public ownership is hard!

R Dawson Hall

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On the ENGINEER'S BOOK SHELF

Pocahontas County, West Virginia Geological Survey, by Paul H. Price, Assistant Geologist, State of West Virginia. West Virginia Geological Survey, Morgantown, W. Va.; 555 pages; cloth. Price $3, with topographic and geologic map in separate case.

Pocahontas County, West Virginia, is not one of the subdivisions of the Pocahontas field, being separated by both Monroe and Greenbrier counties from the Pocahontas region. The West Virginia Geological Survey in the person of D. B. Reger, assistant geologist, in a letter to the Governor, declares that the minerals of the county are of potential importance, three different zones of rocks outcropping in the area. One of these zones, however, is valuable not for its coal but for its soil, its cement- and road-making materials, another for its reserve of iron ore. "In the northwestern part," continues the letter, "there is a wide zone of Carboniferous, or Pennsylvanian, rocks containing a large reserve of New River semi-smokeless coal none of which has yet been commercially mined but much of which will eventually come into the market."

This is quoted because the report itself gives little as to the quantity and value of the coal into which one can put one's teeth. The development of the county is so slight and the outcrop so covered by soil and forest that little is known as to the value of the carboniferous deposits. The geological work largely consists in mapping the areas covered by the various formations and in locating the streams.

The Appalachian uplift has rendered much of the county bare of coal measures, but it has not exposed anything more profound than the Red Medina Series of the Devonian measures. All the coal seams, and they are neither many nor thick, are of the Pottsville Series, both the New River and the Kanawha Groups being represented. The Fire Creek seam is said to be from 1½ to 2 ft. thick, the Sewell from 2 to 6 ft., the Hughes Ferry from 3 to 4 ft., the Gilbert from 0 to 6 ft. and the Gilbert "A" (bony) 2 ft. A complete evaluation must await a later day. At present the biggest town in the county, Marlinton, has only 1,600 inhabitants and the second town, Cass, not quite 1,200.

Materials Handling Equipment, by Edward J. Tournier; McGraw-Hill Book Co., Inc., New York City. 363 pages, 6 x 9 in. Price, $4.

This book starts at the beginning and traces the evolution of mechanical handling devices from the simplest of agricultural aids, as used many generations ago in the Far East, to the major types of today. Each type is put in its place by precise definition, but not all types are considered in details of use in pages following. The equipment that is suitable for handling coal and ashes in the steam plant receives most attention from the writer. Pains are taken to make it clear that the small plant and the large plant present two entirely different problems. No space is given to the matter of handling coal or ores at the mines.

An exposition is made of fundamentals in selection, purchase and installation. These show the way to the determination of facts essential to the success of an installation. Thus, the question is considered as to whether the equipment is to be installed permanently or temporarily, keeping in mind the possibility of compulsory change in the layout from time to time. Formulas are presented for advance determination of economies that might be expected from a particular job. A pitfall is pointed out: elaboration of plans beyond the dictates of sound judgment and economy by overzealousness for an ideal system. The author's comments thereon are interesting: "To the mind of the writer, there is always in materials handling what is visualized as the straight line solution of the problem. . . . It may be that after following a number of cycles of lifting and dropping, a straight-line method will be discovered or invented that will further conserve wealth, both human and financial." Search for the ideal is still in progress.

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L'Industrie Minière, Ses Principes Fondamentaux, Ses Bases Economiques, by George Moreau. Gauthier-Villars et Cie, Paris. 168 pages, 6½x10 in. Price $5.

Most industries are started with only a few hundreds of pounds or a few tons of the raw material on which they will thereafter operate. They live on a hand-to-mouth basis. A plant in the mineral industry, on the other hand, starts with all the mineral it probably ever will have, though its owners may not know exactly how much or how little of that material is available.

It is this ownership by the plant of all the material needed for its entire life that gives mining a peculiar economic problem, for the cost of carrying the investment in this valuable resource material must be considered. In mining, a rapid turnover is almost as important as in a chain store, even though the material turned over is taken from stock and not bought now and again as the sale of the commodity makes purchase of other material necessary. The overhead cost for equipment and development may be reduced if the mineral is carried for a longer time, and the charges of interest and taxes on excess or more costly equipment must, in each case, be balanced against the deferred interest and yearly taxation on the mineral. Moreover, the plant cannot be moved without leaving its raw material behind. For this reason all the economic factors of the site must be considered with unusual care before the plant is erected.

George Moreau, in this volume, discusses the fundamental economics of mining and addresses not only technicians but all interested in mining questions. Too little analysis of economics of development and operation has been attempted.

This analysis is more concerned with the metals than with the coal branch of the study, though in some ways the conditions of coal and metals are parallel. It discusses, first, mineral occurrences, then the examination period and lastly the relation of speed of extraction and life of equipment to ultimate profit.

* * *

Map of the Coal Fields of Pennsylvania, by James D. Sisler; 35x57 in.; paper; price 50c.

This map shows the Pottsville, Allegheny, Conemaugh, Monongahela and Dunkard formations, with the county lines, stream lines and railroads of the State of Pennsylvania. In the anthracite region only the Pottsville Measures are designated. Other measures are delineated as "Anthracite," no attempt being made to divide up the area into the formations recognized in the bituminous regions.

It is surely time that some attempt should be made to establish a correlation between the beds in the two fields. It is perhaps unfortunate that the Pottsville Conglomerate is separately designated in the anthracite region, not that it is not a distinction of geological interest but because it raises a doubt in the mind of the uninformed whether the coal in the Pottsville Conglomerate where it occurs is anthracite or bituminous. Of course, in the State of Pennsylvania at least the location and not the horizon determines the rank of the coal unless the bed be of cannel.

THE BOSSES TALK IT OVER

Training Haulage Extras To Stabilize Tonnage

"WHY the frown, Jim?" asked Mac as he entered the Super's office.

"The Old Man has been raising sand with me about the jerky production performance of some of our motors. He says there is no reason why we shouldn't be able to count on about the same number of cars from a given motor every day, with all the loaders working and no unusual conditions encountered. No. 6, for example, has been pulling over 100 cars a day, but yesterday she gathered only 52. This has been happening to one motor or another almost every day, and the Old Man wants to know why we can't stop it."

"You know as well as I do what is causing this trouble, Jim. The big slumps come when a motorman or brakeman lays off and a green man fills his place. It's quite plain the sub can't get as much coal as a regular."

"I know that, Mac, and so does the Old Man; but the excuse doesn't let us out. We'll have to do something to stabilize the tonnage. It looks as if we'll have to keep some extra men on the job who have the qualifications to fill the vacant places about as well as the regular men."

WHAT IS YOUR PLAN?

1. *How do you avoid these declines in tonnage?*
2. *How do you employ the extra haulage men when the regular crews are on duty?*
3. *With all the day men working, how do you keep the employment of these extra men from increasing the cost?*
4. *Is it better to use men of known ability or to fill in with those who profess ability?*
5. *How do you train the extra men?*

All superintendents, foremen, electrical and mechanical men are urged to discuss these questions. Acceptable letters will be paid for ▶▶▶▶

Your Problem

The problem presented in this issue was sent in by a mine official. You, too can take advantage of the facilities provided in these pages for the solution of your most pressing problems, as has this operating man. All that is necessary is to give details and point out the factors involved, either in formal or in conversational style. If your problem suggestion is of sufficiently broad interest to warrant publication, it will be paid for, as also are letters of solution.

Fitting the Man to the Job Is the Most Important Factor

AN ORDER, such as that issued by the Old Man, arbitrarily fixing an age limit of 45 years for employment would, if enforced, precipitate an acute labor situation, involving both employer and employee in a most distressing snarl. Old and trusted workers, approaching the dead line, would live and work in fear and trembling for their jobs. Confidence in their employer would vanish, and suspicion and resentment would replace their former respect and trust in the integrity and character of the institution and officers for which they worked.

In so far as the mining industry is concerned, such a policy is evidence of gross ignorance in the handling of labor. Any industry or official that would seriously consider the promulgation of a policy of this nature should first study the needs of his business and weigh carefully the costs of such a drastic order. I would view with alarm, as did Mac and Jim, the adoption of such a plan. It would seem expedient to take the matter up with the Old Man and ask for a more thorough and extended investigation before attempting an experiment which might well prove disastrous to the company.

There is a certain group of mines in this state which will not employ men over 55 years old. All applicants must pass a physical examination and give satisfactory answers to questions on their previous employment, as well as their experience and qualifications as miners, before being hired. No difficulty was experienced in getting the highest type of labor or in putting the age limit in effect, though no little part was played by a better-than-average wage scale. However, to set an age limit of 45 years for mine labor is to exclude a very large number of experienced, able-bodied miners and mechanics, all highly skilled and nearly all married and with dependents.

Mining men of 45 are more dependable, more careful and have, in many instances, attained the peak of skill. They assume responsibilities more readily than younger men and their maturer judgment makes them less liable to injury. These reasons should offset the only objections to their employment: lack of youth, energy and strength. We are living in, or rather entering into, an age of mechanization, and brain power, not brawn, is demanded. To scrap the most reliable and skillful workmen for the sake of injecting young blood is an experiment that should not be resorted to.

It is advisable to adopt some definite age limit for certain classes of employment, or for certain jobs. Making a safe brakeman out of an old man is an impossibility, nor is the young man usually selected for the job of fireboss, timberman, pumper, hoist runner, or machinist. Elderly men are frequently selected to head crews for the construction or maintenance of main haulage roads and many mines place great dependence on the older men for the operation of haulage locomotives. For jobs where considerable skill is necessary, we must admit that several years of experience are necessary.

The whole problem then resolves itself into the selection of the right man for the right job. After all, the plant superintendent and mine foreman have a definite and proper right to pass judgment on the age, experience and other qualifications of applicants. Theirs is the responsibility for the safety, efficiency, and ultimate success or failure of their men, and this daily contact should invest these officials with the power of passing on those they will later direct.

All employees should be required to pass a physical examination—in which age should be considered—to determine their fitness for performing the duties assigned them. They also should be closely questioned and given probationary work to establish their ability and skill as safe workers before being given a permanent job. It cannot be said that the company loses by retaining older men. The correct answer lies in the quality of the men employed and the kind of work assigned to them. At this point we must revert to the discretion of the boss. Certainly he cannot retain any man beyond his days of usefulness.

Stanaford, W. Va. H. A. McCoy.

Age Brings Reliability

AS SOME MEN at 50 years are in better physical conditions and able to do more work than many others who are younger, I do not believe an age limit should be set on employment. A man should be measured by his ability and physical fitness to perform the tasks assigned him, rather than by his age. Mac and Jim may be able to double up some of the older men as means of increasing their production, thereby satisfying the Old Man and helping them as well.

In defense of the older worker, I can offer as examples men in my own mine who have passed the age of 45. Some of these old timers lead the list throughout the year in tonnage loaded and, in addition, are settled in the community and raising families. Consequently, they have a good reputation for steadiness, reliability, and sobriety. Large companies, instead of barring such men from making a living by honest labor, should arrange to pension steady and faithful employees who have passed their period of usefulness.

Of course, everyone realizes that a man begins to slow up after passing 45, but the majority still retain enough energy to do a day's work for several years afterward. In other words, the experience, the store of knowledge, the tempering of muscles and intellect, and the added responsibilities will more than make up for the loss in youthful vitality — and its inexperience and shiftlessness.

Aside from the above, this business of earning a living is not an endurance contest; at least we are endeavoring to prevent it from becoming one. Why are industries modernizing their mills and mines and going in for mechanization if not for the purpose of increasing production and, at the same time, lightening the labor of the worker? Isn't a man of 45 just as able to handle the controls of a machine as one of 20?

The chief objection to the employment of older men is that they are thought to be physically incapable of doing as much work as a younger man. But do those executives who believe in the superior ability of the younger man, also believe that a younger man would be as capable of handling their own job? If so, they should step out

and give the younger man a chance, as they are more able financially to do so than the laborer who depends on the bosses' intelligence for his daily bread. And perhaps their successors could solve the problem of taking care of the laborer who has passed 50 years. Any man or group of men who are heartless, selfish, and stupid enough to put such a plan in force does not belong in American industry, and any business operated in accordance with such inhuman practices cannot, and should not, prosper. VICTOR G. GANDY.

Hepzibah, W. Va.

Enlightened Action Will Relieve Hardships of the Older Worker

THE mechanization of coal mines seemingly bids fair to cast into the discard the human relationships that have heretofore played such a large part in the smooth functioning of the coal mining industry. Tonnage and still more tonnage is the paramount issue, and so far the human element has tacitly been submerged in statistical conclusions. And despite the country-wide wail of "too old at 60" which tugged at the heartstrings of the nation a decade ago, the industry probably will, as in the past, emulate the ostrich in burying its head in the sand, apparently oblivious of the imposing portion of its anatomy left exposed to dangers all the more fearful because they are refused cognizance.

Is the modern frenzy for greater production per man or per mechanical loader presaging an age of physical perfection for workers engaged in the industry? Will the Old Man's ultimatum to Mac on the 45-year age limit become the battle cry of the industry? During the past year, *Coal Age* sponsored a series of articles on the handling of labor in an intelligent and humane manner by a large coal corporation. One wonders why much the same system cannot be made broader and more general.

It has long been my contention that all coal-mine employees should be hired by a specially trained body, as it is doubtful if the average mine manager can rise above petty prejudice and depart from the all-too-common procedure of building up an espionage system to bolster his own position, rather than placing the man in the position he is best qualified to fill. Even so, this is no barrier to the adoption of a humane attitude toward employees in general, especially those from whom the ravages of the years are taking toll.

One coal corporation in this state has long had a policy of taking care of employees incapacitated by years of service. When too old, or rendered inactive by injury, they are used in cleaning haulage roads, are made door tenders, or otherwise employed where the physical exertion is not too great. This system, however, would scarcely be commended in this day of efficiency experts.

If some plan of providing for the older worker is adopted, it should be so arranged that any assistance given would not smack of charity. Where the industry insists on a certain quality of physical perfection, it is unthinkable that men who have spent their lives in this work be ruthlessly cast aside when they cannot come up to the performance of a younger man. Let a board composed of miners and operators pass on the merits of each case and grant a living allowance from a fund supported by both.

Senseless prejudice-baiting has enjoyed too long an inning in the coal industry; it is time for the co-ordination so urgently needed. If those issuing inhuman orders and exacting the obedience from others that they would never give themselves were placed in the category of the ordered, a better understanding undoubtedly would result. The age of progress has brought us the machine, but it is utter folly to suppose that the benefits of its use must be bought at the cost of unemployment and its attendant human misery.

ALEXANDER BENNETT

Panama, Ill.

Retain the Man of Forty-Five; He Has Reached the Heights

WHAT to do with the older man is a subject I have been discussing for a number of years, and I have come to the conclusion that the young mining man lacks the years of practical experience that the man of 50 has been storing away since he was perhaps 20 years old. But to show how the system usually works, I will quote from my own experience. I was put in charge of a mine as night boss, where it was the practice to cut the coal both at the top and bottom. This seemed to me a wasteful practice, but it was not my position to say so. Finally, however, the general manager came around.

"Now," he said, "I'm no egotist, so if you see anything that would cut down the cost and not be a more dangerous practice, I'd appreciate hearing about it."

"Then cut your coal from the bottom and shoot it," I answered. "It will fall from the top."

The general manager put that system in force the next month. (No, he did not raise my salary—I am a man past 50.)

Now I must hurry to show you a respectable way of solving the problem of age: *pay the man of 50 for what he knows!* He may not be able to talk as fluently, dance as gracefully or tell as good a joke as one a little younger, but put him on a life salary or a pension and gather with him at the round table. I imagine he can point out where savings in lives and dollars can be made that will far overbalance his salary. Any man who has managed to handle his job, escape injury, and live through 30 years of mining deserves to draw a salary for the rest of his life.

Milburn, W. Va. R. C. MITCHELL.

Examples Show the True Value Of the Mine Worker Over 45

GRAY hairs may be honorable but they are very unhandy for a man that must work for a living. Jim and Mac should stand out against the Old Man and try to show him where he is wrong. From my own experience, I can pick out a number of rather old men who are conspicuously good workers. One man now driving a mule for me is 56 years old and can haul more coal than any of the younger men. Furthermore, he is a steady worker, which is more than can be said for the young fellows. Another man in my employ is 54 years old and is now skipping a pillar by pickwork, where 39 in. of slate comes down with the coal, and averaging 6½ tons a day—a big day's work under these conditions. In 1908, he was superintendent at a mine where I was fireboss. A few years ago, the company changed hands, and of course the new manager wanted young men. The old man's age was against him, so he is back where he started years ago—loading coal.

I have another man past 55 and two more who are over 50, all three acting as shotfirers. When these men shoot a place we know it is done right and that it has been thoroughly inspected by a reliable man who appreciates the dangers of mining. In addition, they have little difficulty in getting safety posts set, as the miners respect the judgment of the older men. In looking around the coal fields it will be observed that the coal company that specializes in young men for bosses is always changing them, and most of the mines have a squeeze as the result of mismanagement. Any man can start a squeeze, but it takes a practical man to get away from one.

Mine transportation is a young man's job, but other mining work, especially that at the face, requires, in general, men with the experience and technical knowledge that the younger man has not had the opportunity to acquire. Many mine foremen, too, have never worked at the face and consequently are not as well equipped to look after the interests of their men. One case of which I have personal knowledge is that of a young men who had been a driver and fireboss before becoming assistant mine foreman. It was part of his duties to stay with the rib men and instruct them while they were drawing posts and making a fall. He afterward confided to me that he had never been so afraid in his life. But the miner in the first place where this was necessary happened to be a good man, and he got by without trouble. From that time on until he became familiar with the work, he took

an experienced man with him—at an added cost to the company. A young man cannot be blamed for having trouble occasionally, but I think it is as much a crime to put him in charge and not help him as it is to discriminate against an older man.

I started turning gray at the age of 16 and was white at 30, so I know what it is to be turned away because I looked too old to some man who did not know what he wanted. I am sure that anyone who discriminates against a man because he is gray has not begun as a breaker boy with third-grade education and burned the midnight oil for the rest of it as I did. I fail to see where it costs any more, or perhaps even as much, with proper supervision, to keep an old man on the payroll.

Washington, Pa. S. C. HELLER.

Older Men Improve Morale

IS AN age limit of 45 justified? Let us assume that all operators were of the same opinion and set the limit at that figure—a drastic and inhumane action. Then, since action and reaction are equal and opposite, the employees would retaliate in just as vicious a manner. However, most employers are as yet human and level-headed and have a feeling that business is run primarily for the benefit of mankind. Occasionally, right-thinking employers are obliged to deviate from these principles to meet the competition of those who think of dollars only. But, as the latter are in the minority, such deviations are the exception rather than the rule. If, however, the dollar chasers were to get their way for a short time, the reaction probably would hurt them worse than they hurt others. The Old Man had better get some sense into his cranium if he expects to succeed in his business.

One superintendent of my acquaintance says that success in business can be attained only by practicing the Golden Rule. Consequently, though "wildcat" strikes prevail in his neighborhood, he has had no trouble for almost six years. But the situation probably would be vastly different if an age limit of 45 years was in force. This official carries his full quota of men over 45, which, I believe, has a stabilizing effect on the morale of the other employees. Treating the older man with consideration costs little in dollars but certainly marks a gain for the operator. Manifestly, it would be impossible to run a mine with men all over 45 or, on the contrary, a crew composed entirely of young men. The most satisfactory condition would result from a mixture, just as Nature sends them.

My son is at present taking a postgraduate course at high school and, in common with other youths in this district, is prevented by a local union rule from working in the mines until he reaches a suitable age. This is the answer that employees most likely will make to operators who put on an age limit with the expectation of hiring younger men.

INDIANA MINER

Competitive Conditions Operate To Force Adoption of Age Limit

AS FAR as Jim and Mac are concerned, being the Old Man's agents, they can do little except obey his orders to hire nobody over 45. But aside from the question of duty, it is my opinion that the Old Man is a victim of circumstances. He may be the most humanitarian soul in the world, but, when faced with the necessity of meeting the price of his competitors, he must cut his costs or go out of business.

Aware that compensation insurance costs more when men are older and that permanent disability is more likely to result from an accident, it is only natural that he should try to hire younger men. Mac and Jim should try to show him that the older men are just as efficient, but in the face of insurance statistics, I would hesitate if I were in their shoes.

However, I am not in favor of such an order and believe that the cause of the condition should be removed rather than an attempt made to treat the result. To accomplish this, we must go farther afield than either of the three. Personally, I know that I am a better miner now, at the age of 40, than I was at 20, and will still be improved at 50. Despite all this, I can appreciate the reason for an age limit—the meeting of cut-throat competition. The only cure is to get a decent price for a ton of coal.

Mechanization is inevitable, but when it is 100 per cent completed, we are back to the starting point as far as competition is concerned. Consequently, I believe the answer lies in mergers, where the company can control the output and the sales force can get a price commensurate with the capital involved. The human side of the question, therefore, resolves itself into an economic one.

In my field, as a result of the union demand for the Jacksonville scale, the companies were unable to compete and we were idle for two years. Men in good physical condition had to tramp the country looking for work solely because of their age. The bitter talk that came to my ears probably would set most anyone thinking. After all, it was all so silly, for if these men must be clothed, housed, and fed, why not keep them producing? Even if they were only half as efficient, it would still be good economics for the country to see that they were kept employed.

As far as the good of the commonwealth is concerned, the adoption of an age limit is a very short-sighted policy and will not stand for long. Every unfair practice toward humanity produces its Patrick Henry, and if the tea is not dumped, the coal is spilled. In Indiana, it is impossible to find a coal miner over 40 years, as they are aware of the orders that have gone out. I fully sympathize with Mac and Jim. The Old Man probably would be a good scout also, if he were not fighting for his scalp.

Vincennes, Ind. THOMAS JAMES

Preference the Best Reward Of Greater Age and Experience

ENFORCING an age limit of 45 years will prove detrimental to any organization, for the reason that many men are fully fit and physically able to attend to their duties for many years after that age. Railway employees may be taken as an example. Most of the conductors, trainmen, locomotive engineers, and yardmen who have positions of responsibility requiring brains and experience are more nearly 55 or 60 years old than 45.

Some men start downhill as early as 45, but why issue a blanket order and deprive many others of jobs at the time when they are at their best—especially from the standpoint of experience? Men who have devoted the best years of their life to the service of a company should not be summarily kicked out at any fixed age limit; on the contrary, they should be given preference because of their loyalty and the difficulty they will have in making new connections for the remaining years of their usefulness. V. S. VEAZEY.

Daytona Beach, Fla.

Older Worker Is Trail Blazer

YES, JIM, I am with you. But I do not believe the Old Man is childish; perhaps he hasn't stopped to think it over. Or perhaps he is not close enough to the men to understand their position. As I still have about 15 years to go before reaching the 45-year limit, what I have to say represents my thoughts at present. But I have talked the matter over with others a number of times and believe the older man has his place. What he lacks in the brute strength of his younger days he more than makes up in knowledge of his work—gained through years of experience.

I do not say that I would want a whole mine full of men 50 years old, but I do say that a man of this age has an important place in any mine. Perhaps the Old Man does not class miners with skilled workmen, which is the wrong attitude to take. If I were approached by two men seeking employment, one 30 years old with 1 or 2 years of experience and the other 47 with 15 years of experience, I would unhesitatingly choose the latter. This does not mean that the younger man does not have his place, but the old timers must blaze the trail and, through

example, make better workmen out of them. And I think that any man who will take time to reason out the matter will agree with me.

ERNEST SCHULL.
Warwood, W. Va.

Age and Experience vs. Youth

THE only proper plan of taking care of the older men is to rearrange their work. They should not be thrown aside like a worn out tool after giving their industry all they possess. There is no loss in retaining old and faithful workers. If their services were of any value in the past, there is no doubt that they are of some future value if placed in positions where they can make the most of their remaining powers.

WILLIAM J. DAVIES.
Edwardsville, Pa.

Wisdom Increases With Age

IS A MAN obsolete at 45? If not, why make a derelict of him when he reaches that age? Why let a matter of years be the criterion of a man's worth? Can you find any justification in saying that all men are obsolete at 45? Could you, by the same process, say that a certain piece of machinery had a certain number of years of usefulness, after which it must be scrapped? Naturally, you say "No," because your board of directors and the stockholders of the company would not permit such wanton waste. You would not judge by age alone but would operate this piece of machinery just as long as it gave good and efficient results.

The greater part of all the real accomplishments in the realm of business or science have been made by men past 45. If you had to undergo a serious operation you naturally would pick the best of surgeons—and where would you find one at the head of his profession under the age of 45. Thomas Edison's greatest progress was made after 1910, when he had reached the age of 60. What would have been the loss to humanity if he had been scrapped at 45?

The United States government, the biggest business in the world, with 40,000,000 shareholders (voters), has a new head on the average of every 4½ years. Of all the past 31 Presidents elected by the people, only one (Roosevelt) has been under 45. Their average age at inauguration has been 54. Why? "With the ancient is wisdom and in length of days understanding." Man should not be judged by his years but by his physical condition, mental ability, and proficiency in his trade. There may be some industries in which brawn alone is required. If so, one might be justified in establishing an age limit of 45. However, this does not apply to the coal industry, where brains, experience, loyalty, and proficiency are paramount. Brawn plays a minor part.

R. G. STEVENS, Supt.
Loup Creek Colliery Co.
Beards Fork, W. Va.

Keeping Older Man Depends On Ability to Do the Work

REGARDLESS of how old a man may be, the first consideration is: can he do the work? My experience leads to believe that the older man, who has to support a family, usually works better than the younger fellow. Ordinarily, unless sickness prevents, he will never miss a shift. The young man, on the contrary, shows a disposition to pick and choose in taking a job, whereas the older worker will not be so particular and, in addition, will stick with it when he gets it.

In regard to the question of the danger to the life of other workers and the protection of the employer's investment, the evidence is all in favor of the older man. He is more likely to obey safety regulations, and the longer he works the more opportunity he has to try his hand at all the jobs about a coal mine, with a corresponding increase in ability to do more and better work.

Most, or nearly all, of the younger men who are holders of a mine foreman's certificate are filling in on so-called "company jobs." In my opinion, these men could better be employed as miners, and the company work given to the older men, who are more capable of doing it efficiently. This is of particular importance as far as the young man who wants to become a foreman is concerned. Only by working as a miner can he fit himself for directing a number of men with the greatest safety and the maximum of efficiency. But whatever steps an operating company may take, it will not lose by keeping its older men on the payroll as long as they do the work.

FREDERICK NEUMAN.
Scranton, Pa.

Age Is Not a Barrier

THE OLD MAN, in spite of his order to the contrary, probably thinks, and rightly so, that he is better able to hold down his job than when he was younger. And if I were in the place of Jim and Mac, I would point out this fact to the Old Man and ask him to reconsider. There is no doubt that his ruling is unjust to the older men and, as a corollary, their younger relatives are not likely to try any harder to help him after it goes into effect.

I know of men who are considerably over 50 years old, and would rather place my safety in their hands than in those of a younger man with something else on his mind besides his work. And I have found that the older workers have their efficiency always in mind and are proud of doing a good job. We have one man here who, despite his 60 years, takes more pains to clean his coal and loads a heavier car than any other loader in the mine. He takes every precaution to keep his place safe and is always on duty. It would take a lot of argument to prove that he is not one of our best men.

WALTER HORNSBY.
Stickney, W. Va.

Give the Older Man a Chance

WHY do old men who have spent 30 or 40 years in an industry pass rules to prevent the other fellow doing the same thing? Several of the big companies are setting age limits and are forcing employees to stand an examination before giving them work; some have even gone so far as to remove all who are above the limit from the payroll. In each of these companies' mines, the employees stand a good chance of receiving a serious injury and all drawing nearer the age limit. When it is considered that a boy cannot begin work until he is 16, and is obligated to his parents until he is 21, it can be seen that with an age limit of 45, he has 24 years in which to make enough money to keep him the rest of his days. But if the young man were to ask for a wage scale that would allow him to save that much, he would immediately be dubbed a "radical."

Everyone knows the result of smacking a mule with a board, but I wonder if the executives who promulgate rules that in many cases force the older men and their dependents to live on charity ever think of the impression they make on labor. Narrow-mindedness such as this is doing more to teach Socialism than all the soap-box orators in the country. The writer is not a radical and is yet only 36 years old, but he believes that there should be some middle ground between ruthless discharge and the unnecessary employment of men unfit for work.

Acme, W. Va. W. B. OTEY

Cast-offs Can't Find New Jobs

MAC must have in mind only the older men employed at his plant, who have served him long and faithfully, in good and bad conditions alike. What the Old Man is to do, other company heads have already done. Mac and Jim cannot take the cast-offs and compete in a market guided by low prices and high insurance rates. But I am sure the Old Man doesn't want Mac and Jim to cut off any of the regulars.

Probably the Old Man thinks that if every company adopted the same plan, Mac's labor turnover would decrease and the efficiency of his labor would be noticeably improved. My experience has been that an organization is strengthened when the men know that only the best workers are wanted or tolerated. The men respond to the policies of a company that wants the best and gives the best.

C. R. JONES.
Coxton, Ky.

AMONG THE MANUFACTURERS

R. B. McKinney, director of purchases, Hercules Powder Co., Wilmington, Del., has been made assistant to the general manager, explosives department. F. P. H. Sholly, formerly assistant director of purchases, will succeed Mr. McKinney.

* * *

Sullivan Machinery Co., Chicago, has established a branch office at Johannesburg, Transvaal, under the name Sullivan Machinery Co., Africa (Proprietary), Ltd. Charles C. Smith, recently manager, Barlow's Johannesburg (Proprietary), Ltd., will be manager of the new office. Messrs. Barlow's Johannesburg (Proprietary), Ltd., and Thos. Barlow & Sons (S. A.), Ltd., Durban, Natal, continue as Sullivan agents in their respective territories. A branch office, warehouse and service station for Sullivan equipment has also been established at N'Dola, in northern Rhodesia.

* * *

Lockwood Hill, a member of the Blackman Hill Co., St. Louis, Mo., has organized the Hill Equipment Engineering Co., St. Louis, and will handle the products of the Lincoln Electric Co., Cleveland, Ohio, in the St. Louis metropolitan district and in eastern Missouri and southern Illinois. R. B. Tuhey, of the Lincoln company, has been made district representative at Indianapolis, Ind., with offices at 517 Peoples Bank Building. S. H. Taylor has been promoted to the position of district representative, with headquarters at 812 Mateo St., Los Angeles, Calif.

* * *

General Refractories Co. has appointed the Bison Builders Supply Co., Buffalo, N. Y., as its high temperature cement dealer representative in Erie County, New York State.

* * *

Charles H. Nuckolls, formerly of the International Harvester Co., Chicago, has accepted a position with H. H. Conkey & Co., Mendota, Ill. Mr. Nuckolls will have charge of the design and development work in the crane department.

Linde Air Products Co., Inc., New York City, has opened an oxygen plant at 60 Knott St., Portland, Ore.

* * *

Gardner-Denver Co., Chicago, has opened a new branch office at 38 North Guthrie St., Tulsa, Okla., under the management of J. F. Ward.

* * *

The Boston Office of the Ohio Brass Co., Mansfield, Ohio, has been moved to the Statler Building, 20 Providence St.

* * *

Manganese Steel Forge Co., Philadelphia, Pa., announces the closing of its Cleveland (Ohio) office. J. H. McKinley, manager, Pittsburgh (Pa.) office, will take over the territory. P. M. Hobbs has been transferred from Cleveland and will have charge of the company's Chicago office. W. H. Potter, formerly manager of the Chicago office, has been promoted to general sales manager with headquarters in Philadelphia, Pa.

H. O. Anderson, formerly a special sales engineer for the Rockbestos Products Corporation, New Haven, Conn., has been made sales manager of the company.

* * *

Gustave Kahn, formerly with the steel products division of the Truscon Steel Co., is now sales executive for the pressed steel division, with headquarters in Cleveland, Ohio. Mr. Kahn will devote his time to the promotion of a patented extension rail for mine and quarry use.

* * *

An expenditure of $1,500,000 will be made by the Westinghouse Electric & Mfg. Co. in the construction of a central engineering laboratory and an addition to the present direct-current laboratory, both in East Pittsburgh, Pa., according to an announcement by F. A. Merrick, president.

* * *

Barrett-Cravens Co., Chicago, has been linked in ownership and management with the Walker Vehicle Co., Chicago, and the Automatic Transportation Co., Inc., Buffalo, N. Y., for the development and merchandising of electric and hand-lift trucks.

* * *

Wagner Electric Corporation, St. Louis, Mo., has removed its Chicago sales office and service station to 1935 Indiana Ave.

Trade Literature

Design Standards for Oxwelded Steel and Wrought Iron Piping; Linde Air Products Co., New York City. Pp. 67, illustrated.

Everything for Mine and Industrial Safety; Mine Safety Appliances Co., Pittsburgh, Pa. Catalog No. 4, pp. 160, illustrated. As the title indicates, all safety devices for use in and around the mines are included in this catalog.

Why You Should Use Flow Meters; Brown Instrument Co., Philadelphia, Pa. Pp. 32, illustrated. Describes 24 ways in which to reduce steam costs.

Mines, Quarries, Clay Plants, a booklet recently published by the Caterpillar Tractor Co., San Leandro, Calif., and Peoria, Ill., shows pictorially the many uses for the caterpillar tractor in scraping, stripping, etc.

Weldite Welding Rod; Fusion Welding Corporation, Chicago. Descriptive Bulletin No. 4, describing its use for welding alloy steels which resist corrosion.

Condulets, Groundulets and Plugs and Receptacles; Crouse-Hinds Co., Syracuse, N. Y. Catalog 2200 (supersedes all previous listings); pp. 280, illustrated.

Automatic Control Devices for Automatic Stokers are covered in a catalog recently issued by the Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.

A brochure of 32 pp., illustrated, has been issued by the Pittsburgh Testing Laboratory, outlining the professional service and facilities it offers.

Ball Bearing Manual; Gurney Ball Bearing Division, Marlin-Rockwell Corporation, Jamestown, N. Y.; pp. 202, illustrated. Describes 14 types of ball bearings each suited for its own particular duty and includes other data on bearing fits and shoulders, seals, designs. The book is step-indexed for ready reference.

Pipe; the Youngstown Sheet and Tube Co., Youngstown, Ohio; pp. 61, illustrated. Gives a brief description of manufacturing processes and data on tubular materials.

"Firebond—High Temperature Cement," is the title of a 12-pp. illustated catalog issued by the Harbison-Walker Refractories Co., Pittsburgh, Pa.

Pneuma-Lectric Lubricating System is illustrated and described in a folder issued by the Keystone Lubricating Co., Philadelphia, Pa.

Canton Automatic Switch Throwers and Derailers (mechanically or electrically operated) and the Automatic Signal and Flagger, are two bulletins issued by the American Mine Door Co., Canton, Ohio. Both have 15 pp. and are illustrated.

General Electric Co., Schenectady, N. Y., has issued the following bulletins: Synchronous Motors for Pumping, GEA-1152; CR7006-D7 and D9, A.c. Enclosed Magnetic Switches for Alternating-current Motors, GEA-181B; CR7009-B5 and B6 Enclosed Magnetic Reversing Switches for Alternating Current, GEA-83A; Mechanical-Drive Turbines, Type D-54, Condensing or Non-condensing up to 500 hp., 1,200 to 4,000 r.p.m.; Mechanical-Drive Turbines, Type D-53, Condensing or Non-condensing up to 600 hp., up to 6,000 r.p.m., GEA-957A.

OPERATING IDEAS

From PRODUCTION, ELECTRICAL

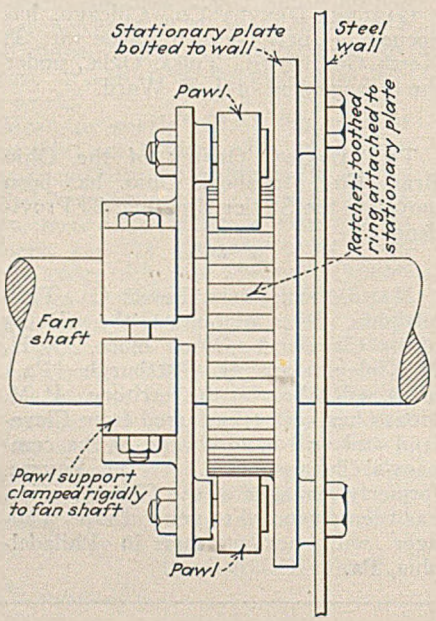
And MECHANICAL MEN

Model Fan Installation in Alabama Mine Has Reverse Rotation Stop

LAST SEPTEMBER the Sloss-Sheffield Steel & Iron Co. put into use at Flat Top, Ala., a new electric driven mine fan, complete with stand-by motor and power generating unit, which embodies several unusual features. The fan shaft is fitted with a device to prevent reversal, and the stand-by equipment is proportioned to provide full-speed rather than only reduced-speed operation.

The installation replaced a steam-driven fan and completed electrification of the top works, thus eliminating the generation of high-pressure steam and thereby effecting a considerable saving in operating expense. The fan is 11 ft. x 93 in. and it is operated at 293 r.p.m., exhausting 230,000 cu.ft. per minute from a vacuum of 6 in. water gage.

Because of this high vacuum at the fan and the fact that the mine covers an extensive territory, the inrush of air taking place for a short time after fan is stopped would cause the wheel to reverse if it were not for a ratchet device that has been applied to the fan shaft. The air reversal effecting the pressure equalization is sufficient to start the wheel and cause it to run for 15 minutes or more. Electrical difficulties would be encountered if power were reconnected to the driving motor with the fan turning opposite to normal direction. Also if it were a case of motor failure there would be difficulty in manipulation of the square jaw clutches for shifting to the spare motor.



Allows but One Direction of Rotation

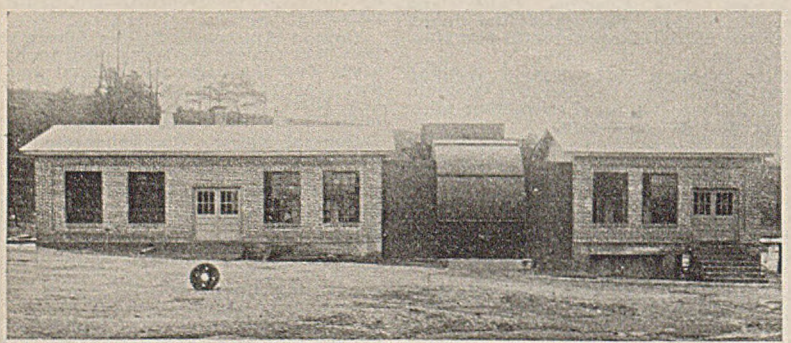
The accompanying sketch shows the non-reversing device. During normal operation of the fan centrifugal force holds the pawls away from the stationary toothed ring. If rotation ceases, coil springs cause the pawls to engage the teeth and stop reversal of the fan.

The regular and stand-by motors are each 400 hp., 2,200-volt and both are of the slip-ring induction type. They are mounted at opposite ends of the fan shaft and are connected to the shaft extensions by silent chain. Square jaw clutches form direct connections between the fan shaft and the extensions.

In the same building with the regular motor there is a 565-hp. Sterling gasoline engine direct-connected to a 400-kw. 2,300-volt generator. This unit has sufficient capacity to drive the fan at full speed, which feature together with the large spare motor insures 100 per cent ventilation in case of line failure or motor breakdown.

Although the building is heated with a stove for comfort of the fan attendant the engine is kept warm by an electric heater. The heater element, which consumes 660 watts, is installed in a water connection to the cylinder jackets.

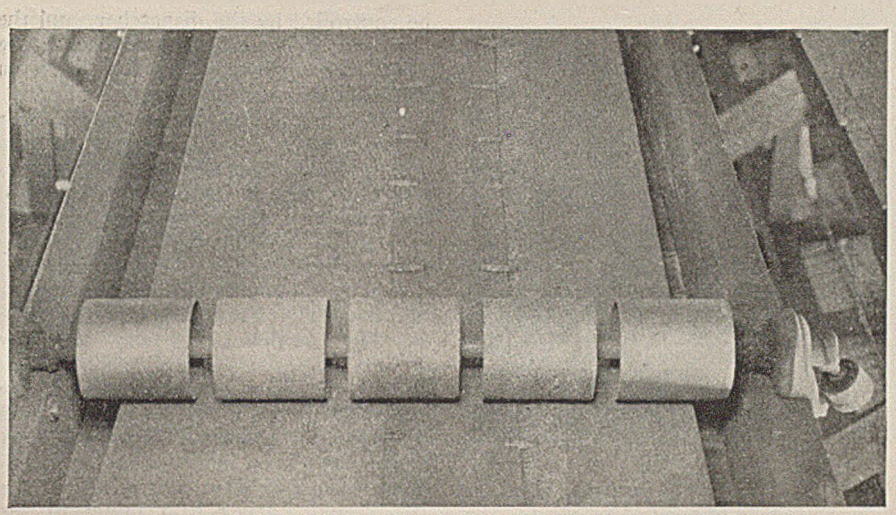
The Engine, Generator, Main Drive and Control Equipment Are in the Building at the Left and the Stand-By Motor in the One at the Right



Repair to Conveyor Belt Was Worth While

Experience at Mine No. 4 of the Spruce River Coal Co., Ramage, W. Va., indicates that repairing a conveyor belt may be a paying proposition instead of a waste of time, as some contend. The belt at Mine No. 4 split for a length of 156 ft. after it had handled 900,000 tons of coal. At the time of this writing it had handled 160,000 tons since the repair was made and was showing no further sign of failure.

The belt, which is a 6-ply construction 36 in. wide with $\frac{1}{8}$ in. rubber on the working face, operates on a conveyor that is 358 ft. in length between pulleys and has an 8- to 10-per cent grade in



View of the Patch Looking Up at the Bottom Run of the Belt

favor of the load. It carries about 250 tons per hour.

The split was in a vertical plane—not a loosening of the ply—and was located to one side of the center. The repair was made by applying a patch consisting of a 160-ft. length of 4-ply 8-in. rubber power belting. The patch was put on the working face and secured by single clips made by cutting Bristol belt fasteners. These were applied 8 in. apart along both sides of the patch. The belt has now handled a total of 1,060,000 tons and appears capable of handling perhaps a hundred thousand or so more.

U-Bolt Clip Holds Beam On Wooden Legs

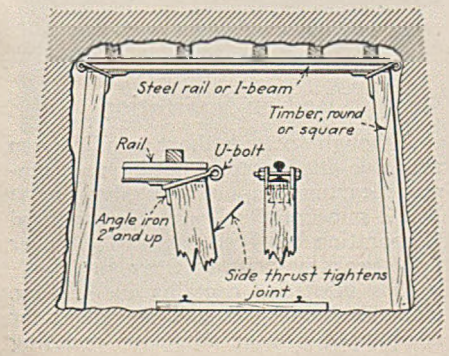
Where natural conditions are such that a steel roof beam cannot be hitched into the coal ribs, the only alternative is to support this horizontal member on legs. It may be that the requirements for the support of roof at a point are not sufficient to justify the installation of a completely fabricated steel timber set. The weight may be such as to require only the use of pieces of scrap rail supported by wooden legs.

In this type of timber set, however, there is danger of the legs being pushed out from beneath the rail beam by a fall of slate. This danger, according to C. H. Farmer, mining engineer, Green River Fuel Co., Mogg, Ky., can be avoided by tying the beam to the wooden legs by a U-bolt clip, as shown in the sketch. This U-bolt is carried around a piece of angle on the inside of the joint between the beam and the leg. Under ordinary conditions the lagging running lengthwise on the track will serve to brace the timber sets in that direction, and cross-thrust is taken care of by the U-clip. A fall of slate behind the wooden leg and the attending side thrust merely serve to tighten this clip at the joint.

A supply of the angles may be built up by utilizing the third turn of the crew. The angles may be set 4 to 5 in. long from pieces of scrap. The U-bolts, likewise, may be made from scrap rods of ½-in. diameter and up.

This arrangement has been found particularly valuable in the timbering of roof at the mouth of crosscuts. At those points hitching is impracticable and the probability of slate falling and pushing against the legs of a timber set is greatest.

Details of Timber-Set Clip



Exchange for Ideas

When ideas are exchanged the world moves forward. If everyone makes his contribution, methods are improved and everyone benefits. It is by a suggestion here and a suggestion there that technical progress is made. If you have an operating idea, a system or a practice that you think is new, let us have it to pass on to others for their help, and in return for your proposal, if accepted, a check for $5 or more will be sent you. A rough sketch or a photograph should accompany the manuscript. COAL AGE *artists will make the illustration if the sketch is clear enough to be understood. It will be strange indeed if at your mine there is nothing that is suitable for reproduction elsewhere.*

Used Belting Does Well As Trolley Guard

An ideal material for guarding trolley wires should possess the following properties: (1) It should be a good insulator; (2) it should be so stiff that it will not sag though supported by relatively few hangers; (3) it should be non-absorbent; (4) it should yield and thus cause least injury in the event a man bumps his head against it—possessing this flexibility, neither will it be broken by a heavy blow such as that caused by a wheel leaving the wire; (5) it should be low in cost.

Experience at Federal No. 1 mine, New England Fuel & Transportation Co., Grant Town, W. Va., indicates that strips cut from used composition belting come closest to filling all of these requirements.

Over two years ago this material was tried as a substitute for wood at a point in the mine where the guards were frequently broken. The belting has successfully resisted the abuse received in that location, so its use is being extended to other parts of the

Belting Guards Trolley on Main Bottom

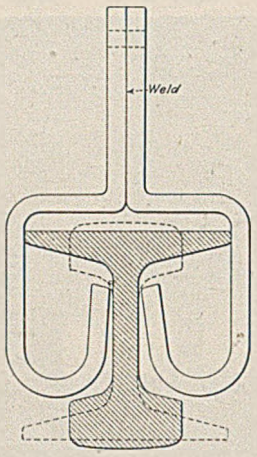
mine. In the installation shown in the photograph the strips were cut from 8-ply canvas-and-rubber belting. They are bolted to hanger supports in the same manner as wood guards usually are fastened.

All-Purpose Car Stop

Relatively few of the many types of car stops developed for underground use at the face are designed to hold mine cars firmly in place regardless of the direction of dip or the condition or position of the rails at the end of the track. Frequently a block is used, being placed on the top of the rail, where it is held by a chain or a clevis and pin. In some instances that arrangement is satisfactory, but not always. A. R. Long, superintendent of the New River Co.'s mine at Scarbro, W. Va., has devised a slide-clamp car stop which fits over the end of the rail, either over the ball or the web, depending on whether the rail is in a normal or an inverted position in a track-extension arrangement.

When used in places going to the rise, it is provided with a chain and a long-pointed hook which, when attached to the wheel, serves as a sprag. If the working place is going to the dip, the clamp to which the chain is attached merely blocks the wheel. How this clamp slides over the end of a rail, in either the normal or inverted position, is indicated by the accompanying sketch.

When the top of the clamp is pushed either way, it binds in that position. This action is positive on a rail that is laid in the inverted position, with web uppermost, but not so when the rail section is in normal position, with the ball uppermost. For that reason a bolt, with a nut run on a short distance by hand, is put through a fishplate hole at the end of the rail, in those working places driven to the dip. This prevents the clamp from slipping off the end of the rail. Application has been made for a patent covering this device.



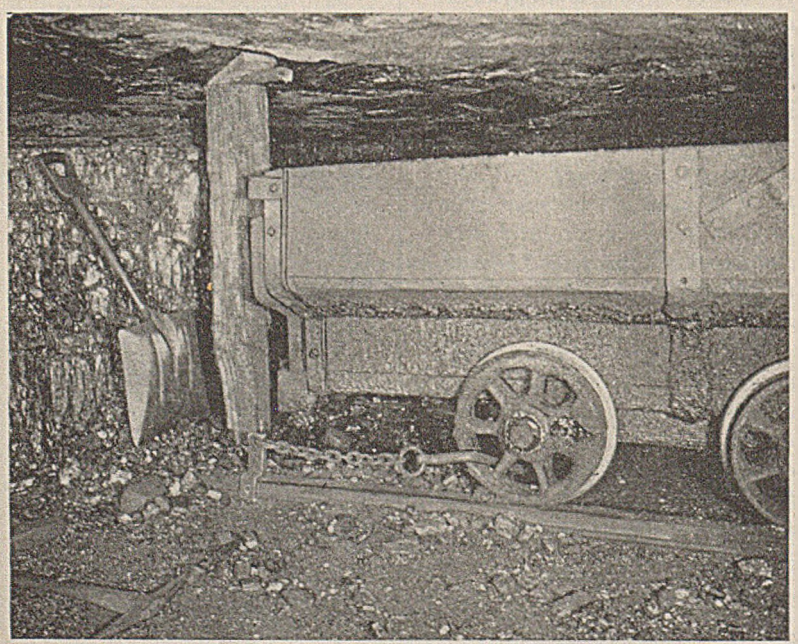
This Clamp Fits Whether Rail Is Laid Normal or Inverted

Peak Load Limiters Cut Haulage Cost

Extraordinary peaks created by the operation of fourteen gathering locomotives under various grade conditions were found to occur fifteen or twenty times a month at the Sands mine of the Continental Coal Co., Fairmont, W. Va., when all the locomotives were pulling at one time. It was found that the operation of these machines could not be controlled by the dispatcher, and the company, in an effort to cope with the unsatisfactory condition, fell back on the installation of a demand limiter.

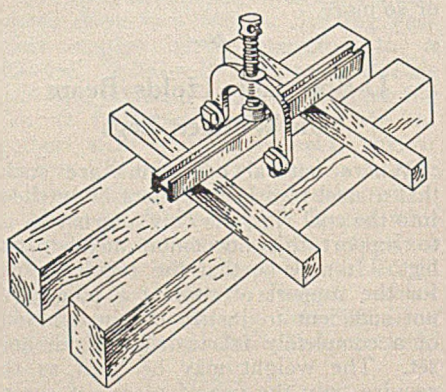
One such device, a General Electric "peak load limitator," was put in at a cost of $300. Then, when all the locomotives come on at one time and an extraordinary demand was about to be created, the "limitator" automatically opened the d.c. circuit breaker at a predetermined point. These interruptions did not interfere with the haulage schedule and insured the company against fluctuating and abnormally high demands. Since the installation of the equipment, the billing demand has been constant and savings of about $200 per month have been made. Similar equipment also has been installed at the Brock and Parker Run mines of the company, with comparable economies.

Car Stop in an Uphill Place on an Inverted Rail



Bends Rail With Speed And Safety

For bending rails outside the mine a device has been used as illustrated herewith. Instead of being arranged to grip the rail to be curved, the claws of the bender are permanently engaged in eyes at the end of two strong anchor bolts set in heavy logs which comprise the base. Two pieces set at right angles to the logs serve as supports for the rails. By the use of this arrangement time is saved in bending, as well as in adjusting, the rails; also minor accidents are avoided, for the rail will not move about under the leverage applied to the screw.



Rail-Bending Job Set Up

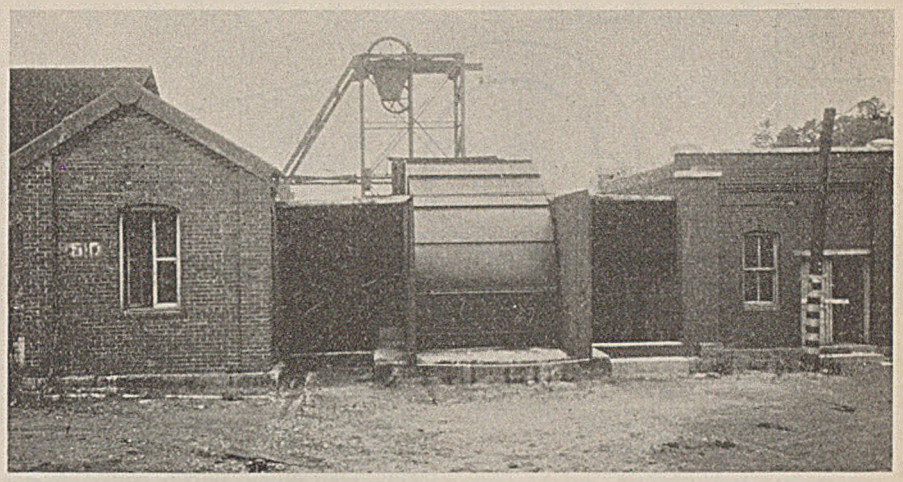
Distant Manual Control Used on Substation

Although located about a mile from available attention and not having automatic starting equipment, a substation at No. 2 mine of the Boone County Coal Corporation has been operated for over three years without an attendant.

This substation contains one 150-kw. induction motor set and the generator is equipped with an automatic reclosing

breaker. The 2,300-volt line feeding the substation starts from a distribution panel located at the machine shop. Here there is connected in series with the line an additional starting compensator equipped with a no-voltage release and an ammeter.

The low-voltage release has been eliminated from the starting compensator at the substation. In case of a power failure the release at the shop operates and upon return of voltage the set is started manually from the shop location. The ammeter serves to indicate if the set starts normally and to show the amount of load assumed. The substation compensator is used in case of inspection or repairs when an electrician wants to stop or start the set from that point.



Building at the Left, Now Housing the Auxiliary Motor, Is All That Remains of the Steam-Driven Fan Displaced

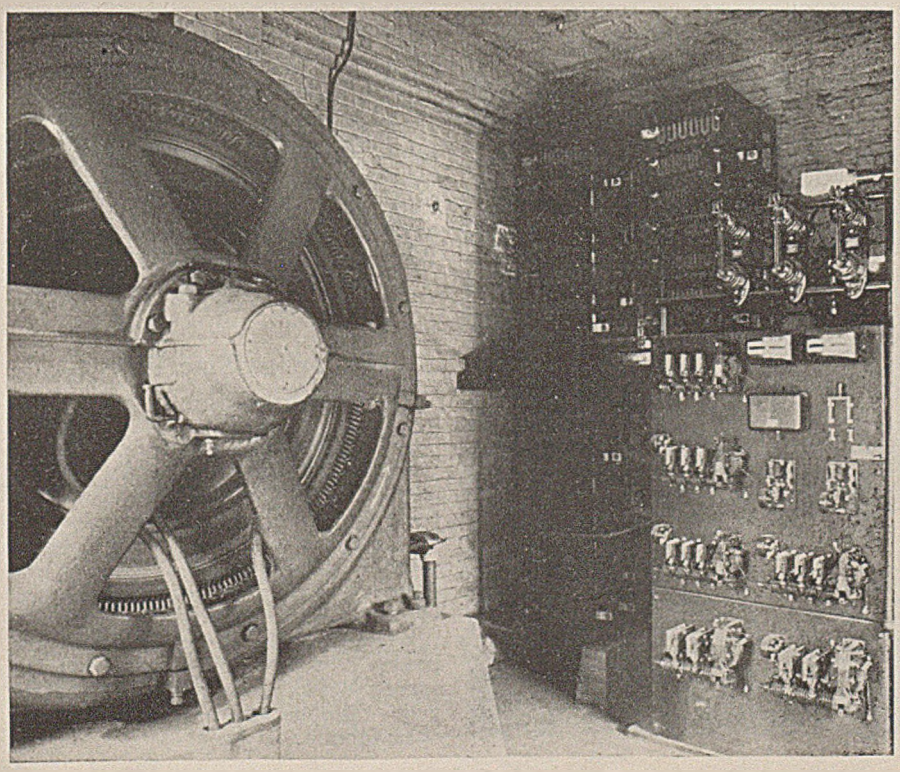
Slow-Speed Direct-Connected Motor Installed on Grant Town Fan

ON a large mine fan the mechanical connection with a standard speed motor involves considerable expense, be it a long flat belt which can be housed in only a large building or one of the several types of close-up drives which require less space. A direct connection between motor and fan allows maximum saving in the cost of housing. If properly installed, its reliability is unquestioned. However, the motor may cost several times more than one of standard design because, to deliver the same horsepower at fewer revolutions per minute, it must be of larger physical proportions. From the various choices, the slow-speed motor with direct connection was selected for driving a new mine fan at Federal No. 1 mine of the New England Fuel & Transportation Co., Grant Town, W. Va.

This installation consists of a 11½x7-ft. Robinson fan and a 350-hp., 257-r.p.m. General Electric motor connected through a Falk flexible coupling. The fan is of the double-inlet backward-curve-blade type designed to deliver 300,000 cu.ft. against a 4½-in. water gage. The motor is the slip-ring induction type having a 28-pole 2,300-volt stator winding. Automatic starting is effected by time-limit acceleration.

Insurance against a prolonged or complete interruption of ventilation by reason of failure of the large motor is obtained by a 200-hp. standard speed motor, which is connected through a Falk reduction gear and a Falk flexible coupling to the other end of the fan shaft. Normally the spring connection is removed from this coupling, thereby leaving the drive disconnected. The large motor can be connected or disconnected in the same manner.

The Slow Speed of a Direct Drive Demands a Motor of Large Dimensions

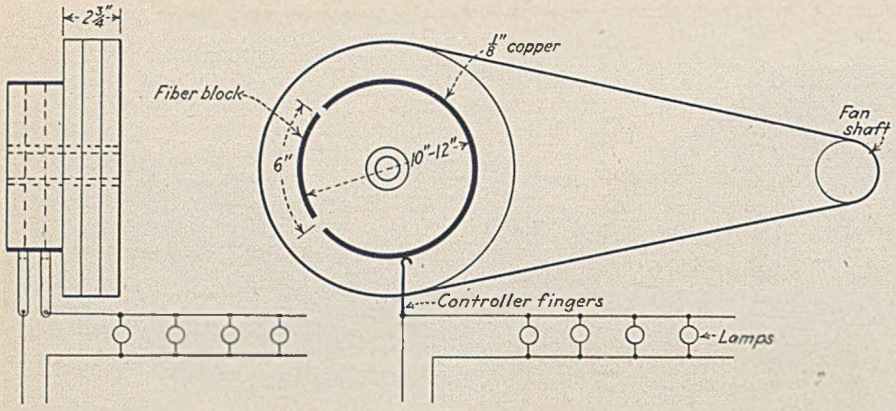


Fan Operation Shown By Blinker

Visual evidence of whether or not the fan is running is always available to the operating men at the mines in the West Virginia division, Consolidation Coal Co., by the operation of a blinker system driven from the fan shaft. Its construction is shown diagrammatically in the accompanying illustration.

It consists essentially of a wood pulley made of three slabs of maple with the grain so laid together that they will not split. To this is bolted a second block carrying a copper contact strip and a fiber insulating strip ¼ in. in thickness. Next, the pulley is bored for the shaft and a bushing is pressed through the hole. The assembly is then placed in a lathe and turned to make it perfectly true. During this process, the fiber block is turned down to a thickness of ⅛ in.

The pulley and block carrying the contact strip is then mounted on the wall of the fan house. Two locomotive controller fingers serve to make or break the lighting circuit, as shown. As long as they are on the copper, the lights burn. Conversely, the lights go out when the fiber block comes opposite the contacts.



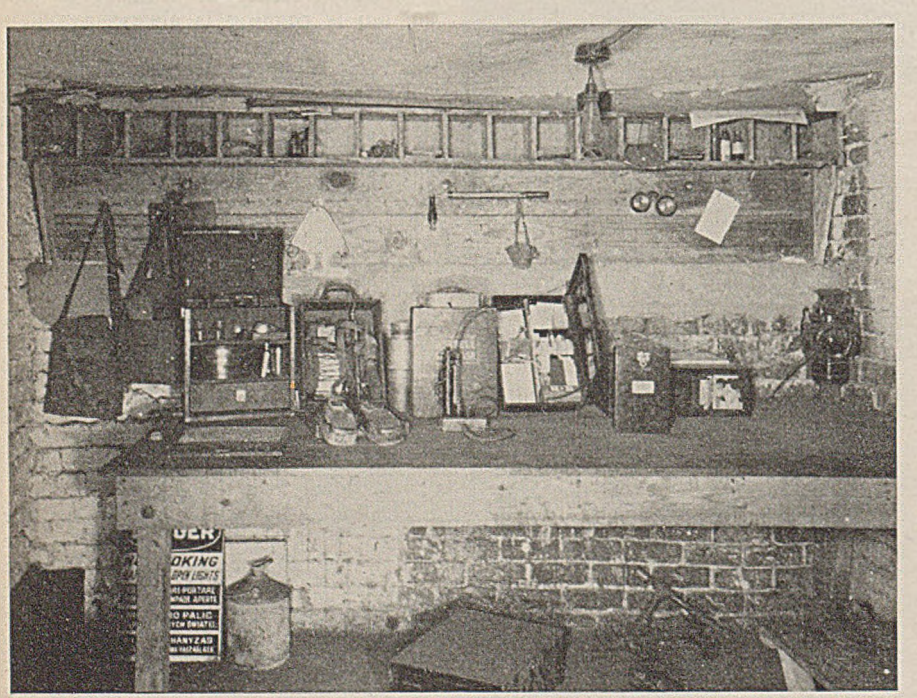
Construction Details, Blinker System

The pulley diameter is not constant and may be varied to suit the fan speed. Ordinarily, the system is adjusted so that lights blink about 50-60 times a minute. Any number of lamps may be placed in the circuit, so that observers at strategic points may always have them in view. As long as they continue to blink, the fan is running. But if they remain either bright or dark, trouble may instant be detected and steps taken to remedy it.

Underground Office for Safety Engineer

At the Valier mine of the Valier Coal Co., Franklin County, Ill., an office has been established underground for the safety engineer, which he uses not only for much of his office work but also for storing his instruments and other safety paraphernalia and for conducting the simpler tests. The many advantages of this arrangement, one of which is that the safety man does not have to lug the equipment into and cut of the mine, are immediately apparent.

This Is Something Any Safety Man Would Appreciate



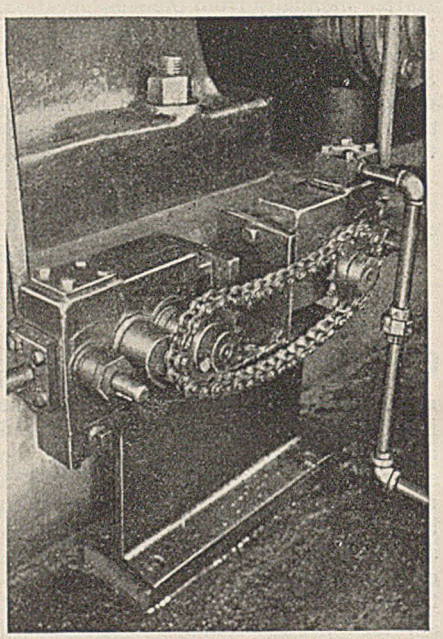
Blowout-Coil Polarity Affects Controller

Certain types of d.c. controllers, such as those used on mine locomotives, give better service if care is exercised in connecting the blowout coils so as to obtain the correct polarity relation, according to J. F. MacWilliams, electrical engineer of the Pennsylvania Coal & Coke Corporation, Cresson, Pa.

"It makes a difference which way the arc is blown, and polarity determines the direction," is the way he put it. He affirmed his theoretical conclusions by conducting a number of tests under actual working conditions.

Loading-Machine Pumps Handle Drain Oil

In the power plant of the Colcord Coal Co., Montcoal, W. Va., a steam pump was needed for forcing oil from the engine drains up to a storage tank and filter. For this duty a satisfactory unit was made up from two chain-driven rotary oil pumps removed from discarded loading machines.



Operates as a Turbine-Driven Pump

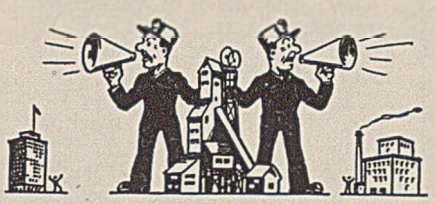
This unit, as installed beside the base of a 500-kw. engine-driven generator, is shown in the accompanying photograph. One of the oil pumps is utilized as a steam turbine and the other as the oil pump proper. The sprockets and chain connecting the two are also parts from the loading machines.

No governor is needed to regulate the speed. With the steam valve properly regulated, the pump speed does not vary sufficiently to cause trouble. The base on which the two elements are mounted is a short piece of I-beam.

Use Yellow-Pine Poles for Transmission Lines

As a result of its experience of many years in the generation and transmission of power, the Old Ben Coal Corporation, in Illinois, has concluded that it is cheapest and best to use poles of yellow pine, with the ground end thoroughly creosoted, for the supporting of transmission lines where the use of steel is not economical. It is said that in this service a pole of pine will last approximately thirty years as compared with a life of seven years for a stick of chestnut.

WORD from the FIELD



Tariff on Canadian Coals To Be Restored

Following protests by the National Coal Association and a number of individual operators, Senator Smoot, chairman of the Senate Finance Committee, has promised that the provision for a countervailing duty on coal, struck out by his motion, Jan. 27, will be restored. Under the provisions of the Underwood tariff bill, coal was placed on the free list. It was so continued with the passage of the Fordney act, except that a countervailing duty was provided for in case the tariff regulations of any foreign country called for a duty on coal imported from the United States.

Elimination of the duty, it is said, would have its greatest effect in areas in the United States into which Canadian coal enters. If the charge of 50c. per ton is removed, it is feared that Nova Scotia mines will be in position to make big inroads in the New England territory; that British Columbia producers will capture the entire Pacific Coast, and that Alberta coal will have free access to the border states from Minnesota westward to the Pacific Coast region.

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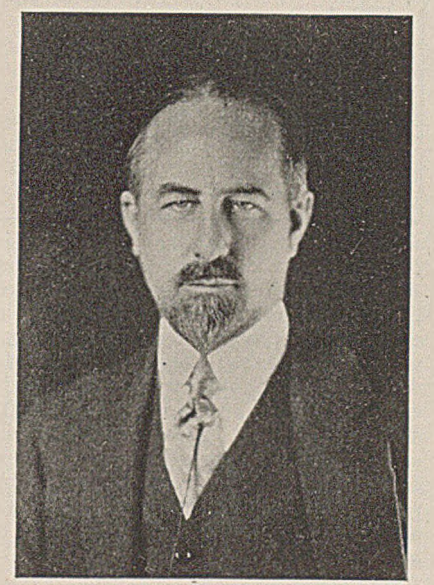
Financial Reports Issued

The preliminary report of the Virginia Iron, Coal & Coke Co., for the year ended Dec. 31, shows a net loss of $24,019 after interest, depreciation and depletion, but subject to inventory and other annual adjustments, as compared to a net loss of $64,222 in 1928. For the quarter ended Dec. 31, the net profit of the company was $15,874, or 63c. per share on 5,000 shares of 5 per cent preferred stock, as against a net profit of $34,095, or $1.36 per share in the same quarter in 1928.

For the year ended Dec. 31, the Truax-Traer Coal Co. reports net profits of $775,393, equivalent to $3.16 per share of common stock outstanding, as compared to approximately $566,000 for the preceding year, equivalent, on the same basis, to $2.31 per share of stock outstanding.

The Pennsylvania Coal & Coke Corporation, for the year ended Dec. 31, reports a net profit of $134,542 after depreciation, depletion, ordinary taxes, etc., but before federal taxes. This compares with a net loss of $510,152 in the preceding year. Net profit for the quarter ended Dec. 31 was $102,281, as compared to $37,214 for the corresponding period in 1928.



John Van Nostrand Dorr

Prominent in metallurgical engineering and president of the Dorr Co., New York City, has been awarded the James Douglas Medal of the American Institute of Mining and Metallurgical Engineers, in recognition "of his invention of apparatus and achievement in developing and improving hydro-metallurgical practice." Formal presentation will be made at the annual meeting of the Institute in February. Mr. Dorr is the inventor of the classifier, thickener and agitator which bear his name and which have become virtually standard in the treatment of metalliferous ores, and in many branches of chemical, industrial and sanitary engineering.

N.&W. to Build Extension

An eight-mile extension of the Jacob's Fork branch of the Norfolk & Western Railway has been authorized by the Interstate Commerce Commission to tap undeveloped coal lands in McDowell County, West Virginia, and Tazewell County, Virginia. Construction is to be started in 90 days after approval is received and is to be completed in one year from that date. After completion, the Pocahontas Fuel Co., and other companies will begin the development of the more than 20,000 acres of coal land situated on upper Jacob's Fork and Horsepen Creek.

A.I.M.E. Holds Annual Meeting This Month

A wide range of subjects of interest to both coal and metal mining men and metallurgists will be discussed at the 139th annual meeting of the American Institute of Mining and Metallurgical Engineers, to be held at the Engineering Societies Building, New York City, Feb. 17-20. Coal men will be especially interested in the sessions on ground movement and subsidence, engineering education, and coal and coal products. Titles of papers to be given in these sections and their authors are:

Ground movement and subsidence (in part)—"Barrier Pillar Legislation in Pennsylvania," George H. Ashley; "A Case of Subsidence in Thick Freeport Coal," John M. Rayburn.

Engineering education (in part)—"Presentation of a Possible Code of Ethics in Employing Engineering Graduates," E. A. Holbrook.

Coal and coal products—"Factors Involved in the Stabilization of Credit and Operation in the Bituminous Coal Industry," Frank Haas; Constitution and Nature of Pennsylvania Anthracite, With Comparisons to Bituminous Coal," H. G. Turner; "Loss in the Agglutinating Power of Coal Due to Exposure," S. M. Marshall, H. F. Yancey, and A. C. Richardson; "Report of the Committee on the Evaluation of Coal for Coke-Making Purposes," F. A. Jordon; "Natural Groups of Coal and Applied Fuels," M. R. Campbell; "Coal Classification, a Review and a Forecast," George H. Ashley; "Outline of a Suggested Classification for Coals," David White; "Status of Coal Classification in Canada," R. E. Gilmore; "The Multibasic Coal Chart," H. J. Rose.

"Coal Storage Effects of Moderate Oxidation on the Properties of Coking Coals," H. J. Rose and J. J. S. Sabastian; "Review of Methods Used in Coal Analysis, With Particular Reference to the Classification of Coal," A. C. Fieldner; "Present Status of Ash Corrections in Coal Analysis," A. C. Fieldner and W. A. Selvig; "Determination of Mineral Matter in Coal and Fractional Studies of Coal," E. Stansfield and J. W. Sutherland; "Splint Coal," Reinhardt Thiessen; "A Résumé of Commercial Classification of Coal," F. R. Wadleigh; "Commercial Description of Pennsylvania Anthracite," E. W. Parker; "Properties of Coal Which Affect Its Uses for the Manufacture of Coal Gas, Water Gas and Producer Gas," Gilbert Francklyn.

In addition to the above, Henry F.

Hebley will present a paper on "Ventilation Problems at the World's Largest Coal Mine," at the session on mine ventilation.

Coal Used per Kilowatt-Hour Shows Decrease

Public utility power plants in the United States consumed but 1.67 lb. of coal per kilowatt-hour of electricity produced during October and November, 1929, according to figures released by the statistical research department of the National Electric Light Association. This is approximately 50 per cent of the total consumption per kilowatt-hour in 1919, which was 3.2 lb.

During the period Jan. 1-Dec. 1, 1929, there was installed 1,836,000 kw. of additional generating capacity. Of this amount, 1,638,000 kw., or 89 per cent, was in steam engines or turbines; 34,000, or 2 per cent, in internal combustion engines and only 164,000 kw., or 9 per cent, was in water power. This is the smallest figure for water power construction since 1922, and reflects the changing relationship between hydroelectric energy and that produced by fuels. Steam carried the entire expansion of electric output during 1929, while the production of energy by water power showed an actual decrease over that of the year before.

Industrial Coal Reserves Rise To Twenty-Nine Days

Stocks of anthracite and bituminous coal in the hands of industrial consumers in the United States and Canada on Jan. 1 were 36,432,000 net tons, according to the monthly report of the National Association of Purchasing Agents, Inc. This figure is equal to 29 days' supply, based on the December consumption of 39,861,000 tons.

Production of bituminous coal during December ran slightly ahead of that in November, 1929, and was 3,000,000 tons ahead of that in December, 1928. Anthracite production also showed a gain over the preceding month of 1,500,000 tons, while the production of anthracite during the months of November and December, 1929, was practically equivalent to that of the corresponding months in 1928. While the stocks of bituminous coal in the hands of industries in the United States showed a decline of 900,000 tons, there is little likelihood of any attempt being made to build them up again this winter. Consequently, production during January and February should closely follow consumption (except in the case of coal taken from stocks on the docks at the Head of the Lakes), with the strong probability that during March or April there will be some further reductions—not material—in total stocks.

Production of bituminous coal during January, 1929, was 51,000,000, tons; February, 47,250,000 tons and March, 39,000,000 tons. However, during March of 1929, stocks were reduced about 4,000,000 tons, so there is a strong likelihood that the production of bituminous coal during the first quarter this year will be as follows: January, 47,000,000-49,000,000 tons; February, 45,000,000,-47,000,000 tons, and March, 44,000,000,-46,000,000 tons. These estimates make some allowance for decreased business during the first quarter of 1930, as compared to the same period in 1929, and are subject to adjustment in case of abnormal weather.

Days' Supply of Bituminous Coal in Various U. S. Industries

Byproduct Coke	28	Railroads	18
Electric Utilities	50	Steel mills	27
Coal Gas plants	73	Other industries	27
Average total bituminous stocks throughout the United States			27

Estimates of Output, Consumption and Stocks in Net Tons

	United States Production	Industrial Consumption	On Hand in Industries
December, 1928	49,606,000	37,354,000	41,010,000
January, 1929	58,500,000	35,518,000	41,492,000
February	54,000,000	38,175,000	40,808,000
March	44,391,000	40,566,000	40,108,000
April	43,329,000	37,750,000	35,385,000
May	46,480,000	37,298,000	33,468,000
June	42,969,000	34,485,000	31,282,000
July	45,635,000	34,640,000	31,415,000
August	49,843,000	34,361,000	32,712,000
September	51,307,000	34,943,000	34,289,000
October	59,567,000	39,482,000	34,947,000
November	51,719,000	38,747,000	37,313,000
December	53,858,000	39,861,000	37,512,000
January 1, 1930			36,432,000

Smokeless Fuel Plant Started in Utah

Construction of a new plant for the production of a smokeless fuel by the low-temperature process has been started in Salt Lake City, Utah, by the Smokeless Fuel Co. The first retort, with a throughput of 25 tons per day, is expected to be completed in 90 days. Company officials say that as the market develops, additions will be made to the initial equipment to give an ultimate capacity of 250 tons per day at the close of 1930.

Bureau of Mines Issues Permissible Plates

Two approvals of permissible equipment were issued by the U. S. Bureau of Mines during the month of January, as follows:

(1) American Mine Door Co.; Type H rock-dusting machine; 20-hp. motor, 500 volts, d.c.; Approval 180-A; Jan. 17. (Original Approval 180, issued Oct. 30, 1929, covered 230-volt equipment only.)

(2) Sullivan Machinery Co.; Type CLE-2 longwall mining machine; 30-hp. motor, 440 volts, a.c.; Approval 181-A; Jan. 6. (Original Approval 181, issued Dec. 2, 1929, covered 220-volt equipment only.)

Logan Operators to Form Coal Trade Bureau

At a meeting of Logan County (West Virginia) operators held at Huntington, W. Va., Jan. 15, under the auspices of the Logan Coal Operators' Association, a decision to organize the Logan Coal Trade Bureau was reached. A committee headed by J. D. Francis, vice-president, Island Creek Coal Co., had prepared for submission a tentative code of fair trade practices. The committee was continued, with some additions, and was instructed to draw up a constitution and bylaws for the bureau, report on nominations for officers and directors, and present the completed code at a future meeting.

Powdered Coal Offers Hope To Washington Mining

That an increase in the state's consumption of powdered coal as a fuel holds out the only hope of reviving Washington's lagging coal industry was the opinion of Prof. Joseph Daniels, College of Mines, University of Washington, speaking before the annual mining institute of the Washington College of Mines, Jan. 24. The institute, extending over the entire week of Jan. 20, was open to all persons interested in mining, metallurgy and ceramics, and consisted of a series of lectures and laboratory demonstrations given by members of the faculty of the College of Mines and by practicing engineers.

"Because of the wide range of coal adaptable to the powdered process, it offers a method of utilizing Washington coal to the utmost," said Professor Daniels. "The greatest increase has been in the field of power generation, for there it has won a permanent place. Its high thermal efficiency and low operating cost overshadow the high cost of installation."

Gas Ignition Kills Seven

Seven men were killed Jan. 13 by the ignition of a pocket of gas liberated by firing a shot in the Peerless mine of the Peerless-Cahaba Coal Co., near Straven, Ala. The Peerless mine ordinarily employs 174 men and produces 450 tons per day. On the above date, however, a wrecked trip caused the mine to be shut down and most of the men came out, leaving the men who lost their lives to complete an undercut and get their place ready for work the next day.

To facilitate the completion of the undercut, a shot was fired, the men returning to the wall twenty minutes later. The mine is gassy and regulations required that the places be examined for gas after a shot was fired. The examination was omitted, however, and when the mining machine was again put in operation an arc or spark from the bits is assumed to have ignited the gas released by the shot. No violence attended the ignition and the area covered by the flame was only 625 sq.ft.

Varied Program Being Prepared for Coal Men At Cincinnati Convention

PROGRAM plans for the annual convention of practical operating men and national exposition of equipment to be held May 5-9 at Cincinnati, Ohio, under the auspices of the Manufacturers' Division of the American Mining Congress are rapidly shaping up. The program committee, headed by P. C. Thomas, manager of mines for the Koppers Co., had its first general meeting Jan. 11 at Pittsburgh, Pa., and spent the day in outlining the sessions to be held and the subjects to be discussed. The preliminary program adopted at that meeting calls for addresses on a general review of conditions in the coal mining industry, mechanized mining, coal cleaning and preparation, personnel training, cost accounting, safety, and transportation and maintenance.

Outstanding developments in bituminous coal in 1929 and 1930 will be considered at the first session on May 5, presided over by Dr. L. E. Young, vice-president, Pittsburgh Coal Co. The progress of mechanized mining will be outlined by G. B. Southward, mechanization engineer of the American Mining Congress, and statistical analyses on mechanized mining by a representative of the Bureau of Mines, probably F. G. Tryon. Developments in fuel utilization and developments in mining machinery in the United States and Europe will be reviewed.

Mechanized mining and transportation and maintenance will be considered at the sessions on May 6. The program for that day will cover face preparation and a description of mechanized loading operations in West Virginia, Pennsylvania, and Kentucky; a gathering method developed for mechanized loading in Illinois; power at the loading machine in anthracite mines; keeping costs and statistics in connection with mechanized loading in the Far West; large locomotives in long haulage in Pennsylvania bituminous mines; maintenance, repairs and lubrication in anthracite mines; increasing the capacity of mine cars in Indiana mines; locomotive haulage in strip mining in Kansas and Missouri.

Personnel training will be taken up at the morning session on May 7, when addresses will be made on a national survey of what is being done by the coal mining industry in training men, particularly in Maryland; training men at the face of mines in Alabama; utilizing the mine school graduate; and developing bosses and coaching men in anthracite mines. Mechanized mining in thin coals seams will be the topic for addresses at the afternoon session, covering entry developments with conveyors in Ohio; conveyors in room-and-pillar operations in Pennsylvania; conveyor mining in the anthracite field; and longwall mining in Alabama and West Virginia.

Methods for cleaning coal are scheduled for discussion at the morning session on May 8, when addresses will be made on various types of coal-washing and dry cleaning machines and on cleaning coal with modified tables and jigs. Addresses will be delivered on mechanized mining in high coal seams at the afternoon session, covering development and operation with conveyors in Colorado; and stripping in Kansas and Missouri mines.

Addresses on accident prevention will be delivered at the morning session of May 9. Dr. Young will talk on the "Relation of Mechanical Mining to Safety" and T. E. Lightfoot of the Koppers Co. on "Physical Examinations in Relation to Accident Prevention." Other speakers will discuss methods in developing, maintaining, and enforcing safety codes; and the method of winning safety competition awards, in both bituminous and anthracite mines.

The final session, the afternoon of May 9, will be featured by addresses on completely mechanized mining operations, covering 100 per cent pit-car loader operations in Illinois and Indiana; a 100 per cent conveyor or scraper operation in an anthracite mine, and a 100 per cent mechanical loading operation in the Wildwood bituminous mine in Pennsylvania, the latter illustrated by a moving picture. A moving picture of a modern coal stripping operation in Illinois also will be shown.

E. S. Wade

Superintendent of the Windsor Power House Coal Co., Power, W. Va., and a past president of the West Virginia Mining Institute, has been re-elected president of the Panhandle Mining Institute. This makes the tenth term for Mr. Wade, who has for years been a leader in institute affairs in West Virginia.

Erie Interests Organize New Company

Announcement was made last month of the organization of the Pittston Co. to take over the operations of the Pennsylvania Coal Co. and the Hillside Coal & Iron Co. In addition to taking over the operation of the old Erie R.R. anthracite properties under lease, the new company is also taking over a number of distributing organizations, including prominent retail coal companies in New York City, Boston, Mass., and Hoboken, N. J.

Under the terms of the lease, which runs for 25 years with option of renewal, the Pennsylvania Coal Co. will receive a royalty of 30c. per gross ton of commercial coal, and an annual rental of $360,000, plus the sum of 12c. per ton for each ton shipped in excess of 3,000,000. For each ton short of that figure, the annual rental will be reduced 12c. Production in 1929 was 4,817,551 gross tons, as compared to 4,812,539 in 1928.

The wholesale and retail outlets acquired include: United States Distributing Corporation, Stephens Fuel Co., Inc., Owens & Co., F. J. Kerner Coal Co., and the Prospect Coal Co., all of New York City; Jagels, Inc., and Jagels, Bellis & Co., Hoboken, N. J.; Metropolitan Coal Co. and Pratt Coal Co., Boston, Mass., and Marcy Bros. & Co., Belmont, Mass., a suburb of Boston. Through purchase of the United States Distributing Corporation, the Pittston Co. also obtains control of the United States Trucking Co. and Pattison & Bowns, Inc.

With an authorized capitalization of 2,500,000 shares of no-par common stock, the Pittston Co. will offer 1,075,100 shares at $20 each to stockholders of the Erie R.R. in the ratio of one share of Pittston stock for each two shares of Erie first preferred, second preferred or common stock held, to finance the acquisition of the distributing concerns, said to have cost $22,500,000.

Officers of the Pittston Co. are as follows: president, Michael Gallagher; vice-president in charge of operations, John C. Brydon; vice-president in charge of sales, Gardner Pattison; comptroller, Charles R. Nash, and secretary-treasurer, R. W. Radcliffe. Mr. Gallagher was formerly chairman of the board, and Mr. Brydon, general manager, of the Pennsylvania Coal Co.

Crescent Mining Co. Formed

The Crescent Mining Co. has been formed to take over the properties of the Crescent Coal Co., located in Peoria and Tazewell Counties, Ill. The officers of the new company are as follows: president, G. D. Cowin; vice-president, Paul Weir; secretary, Clifford Off, and treasurer, O. M. Gordon. Operation of the properties and the sale of coal will be under the direction of the Bell & Zoller Coal & Mining Co., Chicago.

Operators to Ask Reopening Of Lake Rate Case

Operators from western Pennsylvania and eastern and southern Ohio, at a meeting on Jan. 30, in Pittsburgh, Pa., decided to ask the Interstate Commerce Commission to reopen the lake cargo coal case, according to press reports. J. D. A. Morrow, president, Pittsburgh Coal Co., is reported as saying that the new petition had not been drawn, as the decision to make the appeal had just been reached. He stated: "We want the rates out of this district that we ought to get and which the Commission said we ought to have." The lake cargo case was before the Commission for a number of years, finally going to the Supreme Court and then ending up with a compromise rate, promulgated by the railroads.

World Power Conference Plans Under Way

The United States of America will be one of the leading participants in the World Power Conference, says the American committee, Washington, D. C., of which O. C. Merrill is chairman. The conference will be held in Berlin, Germany, June 16-25, and will call together engineers, economists, chiefs of industry, agricultural experts, and specialists in education from 49 countries for the exchange of views on the use and development of power and the discussion of methods by which power resources of the world may be utilized more completely.

Subjects assigned for discussion will be divided into four classes, as follows: Class A—Sources of Power; Class B—Power Production, Power Transmission and Storage; Class C—Utilization of Power, and Class D—General Topics. Arrangements have also been made, it is announced, by which delegates to the conference may witness the latest industrial developments in the German Republic. Visits will be made to works for the manufacture of electrical machinery, turbines and gas-plant equipment; power plants utilizing lignite and powdered fuel; technical colleges and trade schools; commercial works and soft-coal mines; iron and steel mills; hydro-electric, steam and electro-chemical plants; metallurgical works; ship yards, and other industrial establishments.

Refuses to Review Patent Case

The Supreme Court of the United States last month denied the petition of the defendants in *Sutton, Steele & Steele and American Coal Cleaning Corporation vs. Gulf Smokeless Coal Co. and Roberts & Schaefer Co.* for a writ of certiorari. The case (see *Coal Age,* Vol. 34, p. 709) involved an action charging the defendants with the infringement of patent rights on processes and apparatus for separating and grading material.

Following the action of the court of last resort, Judge George W. McClintic, U. S. District Court, issued a perpetual injunction against the defendants and appointed Luther G. Scott, of Bluefield, W. Va., as master to handle an order of accounting.

To Hold Safety Congress In Pittsburgh

The nineteenth annual Safety Congress of the National Safety Council will be held at Pittsburgh, Pa., Sept. 29-Oct. 3. Sessions of the mining section will be held on Sept. 30, Oct. 1 and Oct. 2. The luncheon meeting of the section will be held on Sept. 30.

Because the Congress is to be at Pittsburgh, members are hopeful that there will be a larger attendance of coal men than usual. At a meeting of the executive committee of the mining section held at Chicago on Jan. 18 it was agreed that half the time of the meetings would be given to a discussion of safety problems in coal mining and half to metal-mine problems. The last half hour of each session will be devoted to a question box discussion. Frank Dunbar was named to head up this particular feature of the meetings.

A special drive will be made to have a substantial representation from the executive groups in the mining industry. With this end in view, H. C. Henrie, chairman of the executive committee, is asking a number of prominent coal and metal men to act as district leaders in building up attendance at the Congress.

Lambie Appoints Inspectors

Five appointments to the inspection force of the West Virginia Department of Mines have been made by Chief Robert M. Lambie. The new coal mine inspectors are as follows: John E. Hamilton, Raymond City, to be located at Grafton; James F. Crockett, Morgantown; Everett Stover, Ameagle, and W. N. Copely, Matewan. C. B. Bischoff, Manheim, was made inspector of sand mines and quarries.

Fordson Changes Staff

J. A. Helms, superintendent of the Pond Creek operations of the Fordson Coal Co., has been transferred to the Twin Branch (W. Va.) properties of the company, where he will serve in a similar capacity. Mr. Helms has been located in the Pond Creek area for a number of years and has been in charge of the Fordson mines since 1926. H. S. Homan, superintendent of the Twin Branch operations of the company since 1924, succeeds Mr. Helms in the Pond Creek district. Among other changes made by the company were the following: R. L. Shelley, superintendent, transferred from Hardy to McVeigh, being succeeded at Hardy by Herbert Caines.

N.C.A. Contact Committee Meets With Heating Men

Committees of the National Warm Air Heating Association and the trade relations section of the Market Research Institute of the National Coal Association discussed problems of mutual interest at a joint meeting on Jan. 28 at the Benjamin Franklin Hotel, Philadelphia, Pa. It was generally agreed that furnace defects, improper firing, or a poor selection of coal are responsible for the major portion of domestic fuel complaints, and representatives entered into a general discussion on how to give greater heating satisfaction, including the desirability of standard chimney construction, firing instructions, and co-operative effort between the coal dealer and the furnace man for inspection and repair. A decision was reached to invite the National Retail Coal Merchants' Association and the American Wholesale Coal Association to participate in a later joint meeting, at which it is hoped that plans such as co-operative effort may be evolved.

Coal men attending the meeting included members of the newly appointed contact committee of the National Coal Association, headed by H. A. Glover, general manager of sales, Consolidation Coal Co., New York City. Other members of the committee are H. B. Cornog, president, Cortright-Cornog Collieries Co., and Louis Rodman Page, Jr., treasurer, Crozer Coal & Coke Co., both of Philadelphia, Pa.

New Plant Construction

New contracts for topworks and construction under way or completed at various coal operations reported in the month of January include the following:

Amherst Coal Co., Amherstdale, W. Va.; Kanawha Mfg. Co. now constructing four-track tipple equipped with shaker screens, loading booms, and mixing conveyors for preparing lump, egg, nut and slack; capacity, 250 tons per hour.

Black Diamond Coal Mining Co., Whitwell, Tenn.; washing plant, consisting of two Elmore jigs, for preparing all coal under 1 in. now in operation; capacity, 100 tons per hour.

Clinton Coal Co., Clinton, Ind.; contract closed with the Morrow Mfg. Co. for steel tipple equipped with shaking screens, loading booms and mixing conveyors for preparing a maximum of six sizes; capacity, 300 tons per hour.

Consolidation Coal Co., Coalwood, W. Va.; contract closed with the Fairmont Mining Machinery Co. for new steel headframe and tipple. Tipple to be equipped with shaking screens and loading booms, for loading on five tracks; capacity, 5,000 tons per day.

Lehigh Coal & Navigation Co., Hazelton, Pa.; contract closed with the Chance Coal Cleaner for the installation of two cones in the Cranberry breaker to wash egg to buckwheat, inclusive; total capacity, 400 tons per hour.

Mary Helen Coal Corporation, Coalgood, Ky.; contract closed with the Pittsburgh Coal Washer Co. for all-steel tipple equipped with shaker screens, picking tables, loading booms, and mixing conveyors for preparing a maximum of six sizes of coal; capacity, 400 tons per hour.

Mill Creek Coal & Coke Co., Krag, W. Va.; contract closed with the Fairmont Mining Machinery Co. for three-track tipple equipped with shaker screens; capacity, 350 tons per hour.

Republic Coal Co., Roundup, Mont.; contract closed with the Pittsburg Boiler & Machine Co. for steel tipple, equipped with shaker screens, loading booms and mixing conveyors; capacity, 300 tons per hour.

Fair Practice Code for Bituminous Industry Approved by Federal Trade Commission

RULES of business practice adopted in the first trade practice conference of the bituminous coal industry have been acted on by the Federal Trade Commission. The conference was held Dec. 3 in Salt Lake City, Utah, for operators in the state of Utah, but coal producers in other parts of the country were interested and representatives of the Southern Appalachian Coal Exchange, covering the states of Tennessee, Kentucky, Alabama, and Virginia, attended and, after wiring home for their credentials and receiving them, participated in the conference.

Besides adopting rules of business practice the industry formulated a set of definitions upon which the Commission has taken no action. These definitions covered "the industry"; a producer; a retail dealer; and such preparations of coal as "dust," "screened slack," "slack," "nut," "domestic lump," "stove or cobble or California lump," "lump," and "mine-run."

Rules affirmatively approved as condemning violations of the law apply to such practices as misrepresentation of analyses or sizes of coal, unlawful use of a competitor's trade mark, disparagement of competitor, inducing breach of contract, secret giving of rewards, and selling coal below cost to injure competitors.

Former resolutions 9 and 14 as adopted by the industry, being of a similar nature, were combined in one rule and amended by the Commission to read as shown in rule 8, as follows:

> The effecting of adjustments of claims with purchasers of coal in such manner as to grant excessive allowances; excessive rebates or excessive concessions, or the granting by any producer or retail dealer of prices and terms of sale not extended concurrently to all his customers under like conditions, where the effect of such discrimination may be to substantially lessen competition or tend to create a monopoly, in any line of commerce, and where such discrimination is not made on account of differences in grade, quality or quantity, and makes only due allowance for differences in cost of selling or transportation, or made in good faith to meet competition, is an unfair trade practice.

Rules accepted as expressions of the trade pertain to such subjects as cancellation of contracts, payment of freight charges by a seller of coal, giving discounts with the effect of altering retroactively the price quoted, discrimination in price through post-dating or predating an invoice or contract, according a purchaser the equivalent of a discount on coal purchases through the furnishing of equipment or yard facilities, publication of price lists, quoting false prices, discriminations through consigning coal otherwise than on bona fide order, and arbitration.

Resolution 19, adopted by the industry at the conference and dealing with an enforcement committee within the industry, was not accepted by the Commission as part of the rules. This resolution read as follows:

> Districts or regions which have adopted or may adopt a trade practice code shall each select its own administrative or enforcement committee empowered to investigate whether the rules adopted are being observed; to make complaints concerning alleged violations thereof; to co-operate with the Federal Trade Commission, and generally to perform such other acts as may be reasonably necessary and proper to put such rules into effect and accomplish the objects and purposes thereof.
>
> A natural committee similarly empowered shall be formed at the earliest practicable time.
>
> A committee plan of national scope shall be formulated and then submitted by the National Coal Association to a meeting of properly accredited representatives of districts which have adopted trade practice codes.

Operators in the northern Colorado lignite field have organized the Northern Colorado Coal Producers' Association and have drawn up a code of fair-trade practices for the guidance of the members of the organization. M. D. Vincent, president, Rocky Mountain Fuel Co., heads the new association. P. M. Peltier is vice-president and N. C. Brooks, secretary.

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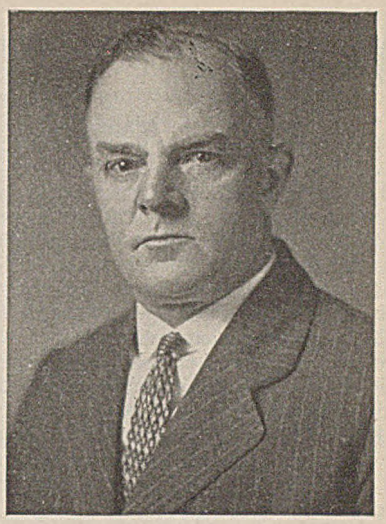
Fishwick Remains in Control On Illinois Union

In the struggle for control of the Illinois union, Harry Fishwick, president, and the subordinate officers of District 12, United Mine Workers, comprising the State of Illinois, were successful in resisting the efforts of International President John L. Lewis to remove them from office when Judge Norman L. Jones, Circuit Court of Sangamon County, on Jan. 23 continued a temporary injunction granted last October restraining Lewis' ouster.

Judge Jones made no decision on the charges preferred by Lewis in attempting to remove the officers of District 12, but concluded that in the absence of actual revocation of the charter and failure to allow Fishwick to reply, as provided by the constitution of the international organization, the Illinois district president had a right to resort to a court of equity. The injunction was therefore continued until a complete hearing of the issues is held. Lewis will carry the fight to dissolve the injunction to the appellate court of the third district.

The coming expiration of the wage agreement on Sept. 1 cast its shadow over the hard-coal region last month, giving rise to calls for a meeting of the three district boards of the United Mine Workers at Hazleton, Pa., Feb. 2, at which it was expected that plans would be laid for a conference with the operators on the new wage scale. At the same time, the National Miners' Union, charging that the construction of central cleaning plants and the consummation of mergers were direct attempts to reduce the number of workers employed, announced its intention of organizing the miners for a finish fight against a wage cut.

Another development in the anthracite region was the action of the policy committee representing fourteen local unions in the Plymouth-Larksville district demanding the removal of James A. Gorman as umpire of the Anthracite Conciliation Board for alleged decision in favor of the operators.



Harry Fishwick

The National Miners' Union also was actively engaged in lining up the young miners in southern Illinois in preparation for a state-wide conference at Belleville, Feb. 9, to organize against the operators and the United Mine Workers. In the Pittsburgh region, the National body was actively engaged in recruiting striking miners at Waltersburg and Bittner.

Reports from Alabama indicate that an attempt will be made to reorganize the workers into local unions. A meeting was held at Jasper, in Walker County, at which representatives from ten of the principal coal-mining centers discussed ways and means of putting the union, dissolved some eight or ten years ago, back on its feet. A tentative program was adopted and leaders from several of the mining towns were appointed to further the organization plans.

In Kentucky, 400 miners of the Norton Coal Co., Nortonville, walked out a few weeks ago, after operators refused to grant the 1917 wage scale. On Feb. 1, 300 employees of the Glendale Gas Coal Co., near Moundsville, W. Va., struck in protest against a wage cut of approximately 12 per cent. Hand loaders were cut from 51c. to 45c. per ton and pit-car loader men were cut from 44c. to 40c. per ton. Employees also demanded their own check-weighman.

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Utah Explosion Kills Fourteen

Fourteen men were killed in a gas explosion in the Standard mine of the Standard Coal Co., Standardville Carbon County, Utah, Feb. 6. Four others of the 29 men at work at the time were rescued alive, but the fate of the others has not yet been ascertained. The explosion occurred while the night shift only was in the mine, which produces about 2,000 tons per day.

Washington Letter

By Paul Wooton
Special Correspondent

PRODUCTION of bituminous coal from stripping pits reached a new high level in 1929, figures just compiled by the Bureau of Mines show. The total was 22,500,000 tons. This is 10 per cent greater than the output of 1928. In comparison with the pre-war period, this is an increase of seventeen-fold. In 1914 the quantity mined by stripping was 1,280,000 tons.

Production from underground mines, in the meantime, had increased only 20 per cent. In fact the output has declined since the war, while the stripping mines have forged ahead.

Strip mining became well intrenched in the period of fuel shortage during the war. The high price and the shortage of cars between 1916 and 1920 broke down consumer resistance to the strip-mine product. During that time anyone who could get a railroad car could sell coal. The strip mines shared equally with their underground competitors in the limited supply of cars available. As a matter of fact, when cars were short, the strip mines often obtained higher realizations than did the deep mines, because they had larger proportions of free coal that could be sold on the spot market.

Once established, the stripping industry maintained its position, even during the post-war depression. Effective measures were taken to reduce costs and to improve the quality of coal produced. In competing with the deep mines of the Middle West the strippers benefited as a result of the high wage rates. In stripping, the man-hours per ton run from one-third to one-fifth of the man-hours required in underground mines in the same fields. With day wages underground pegged at $7.50, the premium on the mechanical shovel was multiplied several-fold over that existing before the war. Post-war prices of timber and of farm land also favored the strippers.

Costs were slashed further by improvements in operating efficiency, by opening larger pits, by increasing the size of the shovels, and by the use of special explosives. The electrification of properties and other advances have acted to curtail costs more and more.

In 1914 the production per man per day in power stripped pits was only 5 tons. In 1928 it increased to 13 tons. Most of this increase has come about since 1918.

Of the greatest importance to the stripping industry has been the improved quality of the product. Most of the coal from such mines now compares favorably with the output from underground mines in the same area. Shaker screens, picking tables and loading booms have been installed at most of the strip pits. For the country as a whole, one-half of the strip-mine product is screened for shipment. Increased attention has been given to the preparation of the coal seam prior to loading. Moreover, with the gradual exhaustion of outcrop coal it became necessary for the stripping operators to go deeper for their output. Coal beneath 20 or 30 ft. of compact shale and limestone and at a considerable distance from the original outcrop, generally is not much different from coal coming out of the shaft in the same district.

West Virginia Blast Kills 8

Eight men were killed and four others injured in an explosion of gas on Jan. 19 in the No. 1 mine of the Lillybrook Coal Co., ten miles from Beckley, W. Va. At the time of the explosion, 24 men were in the mine, which normally employs 180 workers on the day shift. Company officials expressed the opinion that a fall of roof released a quantity of gas, which was later ignited.

Obituary

T. E. B. Siler, prominent Charleston (W. Va.) coal operator, died at his home in that city Jan. 19. Mr. Siler, who was 71, was at one time president of the Seng Creek Coal Co., Marsh Fork Coal Co., and Birch Fork Coal Co., and was interested in the sale of coal and timber lands in West Virginia.

John H. Moffitt, 60, president, Lilley Coal Co. and Moffitt Sterling Gas Coal Co., died at his home in Charleroi, Pa., Jan 23, of heart disease. Mr. Moffitt was the first Controller of Washington County, becoming president of the Lilley and Moffitt companies after giving up the controllership.

Joseph Randle, 74, president, Fullerton Coal Co., died at his home in Belleville, Ill., Jan. 24, after an illness of several months.

Personal Notes

W. H. Cunningham, president, Truax-Traer Coal Co., Chicago, for many years secretary of the West Virginia Coal Association, has resigned the latter position because of the pressure of affairs connected with his own company. Mr. Cunningham's successor has not yet been named.

George Gordon Crawford, Birmingham, Ala., has resigned his position as president of the Tennessee Coal, Iron & Railroad Co., a subsidiary of the United States Steel Corporation, to go with the Jones & Laughlin Steel Co., Pittsburgh, Pa., as president. Before going with the Tennessee company in 1907, when it was taken over by the Steel Corporation, Mr. Crawford was superintendent of the Edgar Thompson plant of the Carnegie Steel Co. Herbert C. Ryding succeeds Mr. Crawford as president of the Tennessee company. Mr. Ryding came with the company at the same time as Mr. Crawford, as assistant to the president, and was appointed vice-president in 1917.

John C. Nicholson, formerly acting superintendent, has been made general superintendent of mines for the British Empire Steel Corporation, Glace Bay, Nova Scotia, vice the late J. J. McDougall. Starting as a boy in the mines, Mr. Nicholson's career has been a steady series of promotions and includes experience in most of the mines in the Nova Scotia field.

Fred C. Caldwell, superintendent of the Shamokin division, Philadelphia & Reading Coal & Iron Co., has been made general superintendent of all the collieries tributary to the new Locust Summit central breaker, which includes the Alaska, Reliance, Locust Gap, and Potts operations. L. F. Jerbetz, superintendent of transportation, Shamokin division, succeeds Mr. Caldwell as superintendent.

Bureau of Mines Approves Cardox

No additions, removals or changes in the active list of permissible explosives were made during the month of January, but the U. S. Bureau of Mines made extensions to Approvals 1 and 2 (covering Cardox Model A and Cardox Model G, respectively) to cover the use of a heater mixture containing potassium perchlorate. Dimensions of the two blasting devices are as follows: Cardox Model A, length, 38⅝ in., diameter, 3⅛ in.; Cardox Model G, length, 31¼ in., diameter, 3 in. Their use is governed by regulations promulgated by the Bureau under Schedule 20, and permissible charging conditions are as follows:

Permissible Charging Conditions, Cardox Model A

	Thickness of Steel Disk, Inches	Maximum Weight of Heater Ingredient,[2] Grams	Permissible[1] —Carbon Dioxide— Charge Minimum, Pounds	Maximum Pounds
Minimum, sodium chlorate or potassium perchlorate heater respectively.....	¼, 7/32	200	2½, 3	4½
Maximum, potassium perchlorate heater	¼	200	3½	4½
Maximum, sodium chlorate heater.....	5/32	200	2½[3]	4½

Permissible Charging Conditions, Cardox Model G
(Sodium Chlorate or Potassium Perchlorate Mixture)

Minimum.....	¼	140[4]	2	2¾
Maximum.....	7/32	140	2¾	2¾

[1] Tolerance, plus or minus 10 per cent. [2] Tolerance, plus or minus 5 per cent. [3] This weight of charge to be used only with 200-gram heater. [4] For potassium perchlorate only; for sodium chlorate, use 125 grams.

Sale of Burning Equipment by Coal Dealers Argued at Anthracite Club Meeting

THE advantages and disadvantages of the sale of anthracite-burning equipment were discussed by manufacturers and coal dealers attending the regular monthly meeting of the Anthracite Club of New York, held in New York City, January 15. Vernon B. Bickmore, vice-president, Combustion Specialties Corporation, New York City, the speaker of the evening, opened the discussion by reading a paper entitled "Should the Coal Dealer Sell Equipment?"

Reviewing the decline in the consumption of anthracite, Mr. Bickmore stressed the fact that it was due to the failure of the operators and the dealers to supply modern, convenient and automatic equipment for burning it. He sketched recent attempts to improve equipment and said that of the devices so far developed, the stoker was the best adapted to automatic operation. Use of the stoker also has tended to take the steam sizes out of the industrial field and put them into the domestic classification, where they properly belong.

Anthracite-burning equipment is now sold by manufacturers directly, their representatives, and through dealers, steam fitters, coal retailers, and coal equipment organizations. Coal dealers handling equipment would be in position to render additional service to their customers, prevent their loss to oil, obtain new ones by interesting them in equipment and reduce overhead. On the other hand, unscrupulous customers would place all the blame for all heating trouble on the shoulders of the dealer, and lack of knowledge of combustion or boiler operation, trained men for installation, modern merchandising methods necessary to market a specialty and sufficient sales volume to maintain a trained service force would work to his disadvantage.

To obtain a reaction on the subject, a questionnaire was mailed to 300 coal dealers in the New York metropolitan area. Fifty-one replies were received, indicating that twenty dealers did not handle equipment of any type; three did not favor it; seven did not handle it but recommended various types to their customers; six were favorably considering taking on some type of equipment or had already made arrangements to do so, and fifteen were selling it at the present time. Of those handling equipment nine questions were asked, a résumé of the replies following:

The first four questions dealt with the type of equipment sold, the length of time the dealer has been selling it, reasons for discontinuance, if so, and the reaction of the customers. Replies indicated that blowers, stokers and thermostats were the principal articles sold; that the period of time ranged from two months to four years; that one dealer discontinued sales because of heavy losses incurred on unsatisfactory equipment, and that the reaction of the customer was satisfactory in nine cases. Six dealers failed to reply on the latter question.

The next four questions asked, and the replies received, were as follows: "Has it proved successful?"—eleven dealers replied "yes"; one, "no," and three failed to answer. "Have you lost money?"—ten replied "no"; two, "yes," and three failed to answer. "Has it brought you additional business?"—five dealers replied "no"; six, "yes," and four failed to answer. "Has it enabled you to prevent the loss of customers to oil?"—three dealers replied "no"; nine, "yes," and three failed to answer.

Question 9 asked for the remarks of the dealer. Among the suggestions received were these: stokers should be cheaper; furnaces should be redesigned for greater efficiency to enable coal to better compete with oil, and a method of burning the larger sizes automatically should be developed. Dealers also remarked that selling equipment afforded an excellent argument against the use of substitutes; increased the tonnage of coal sold; provided an excellent advertising medium, and afforded more comfort and convenience to the customer.

Coal-burning equipment is divided into two classes: non-residential and residential, said Mr. Bickmore. In the non-residential, economy is paramount. Users of residential equipment, however, are more interested in comfort and convenience. Therefore, the two classes of equipment require two different methods of marketing.

Non-residential equipment, Mr. Bickmore declared, should be sold, installed and serviced directly by the manufacturer, his representative, or an organization specializing in combustion equipment. Residential equipment presents a different problem. A large central organization should be formed for leasing at a fixed rate—or selling, if the customer so desired—equipment approved by some competent and unbiased testing bureau, the leasing and selling to be done by the dealer.

When leasing the equipment, the dealer would also contract to supply the coal (buckwhaet, rice, or some new size) at a specified rate per ton.

In the discussion following Mr. Bickmore's paper, other equipment manufacturers and dealers present represented themselves as generally in favor of the dealer selling equipment, and emphasized the necessity of service to the user. The only opposition to the plan was expressed by Robert Jack, *Domestic Engineering*, New York City, who said that coal dealers were not generally in position to give good service.

Changes Made by Lorado

Stanley B. Johnson has been elected president in charge of operations of the Lorado Coal Mining Co., with operations in Logan County, West Virginia, succeeding Judge R. L. Wildermuth, resigned after seventeen years of service. Mr. Johnson is the son of Edward Johnson, founder of the company and chairman of the board. Judge Wildermuth also resigned as manager of the Lorain Coal & Dock Co., with operations in Ohio, his place being taken by Mr. Johnson, as vice-president in charge of operations. James W. Johnson and George W. Wyss have been named general manager and assistant general manager, respectively, of both companies.

Locomotive Shipments Show Slight Decrease

Shipments of mining and industrial electric locomotives for the quarter ended Dec. 31, 1929, as reported to the Department of Commerce by nine firms, comprising practically the entire industry, were 214 valued at $1,251,729, as against 216 locomotives valued at $1,516,397 for the quarter ended Sept. 30, and 184 valued at $1,149,678 for quarter ended Dec. 31, 1928. Total sales for 1929 were 825, valued at $5,137,359, as compared with 569, valued at $3,468,070, in 1928.

	Grand Total		Mining Locomotives				Industrial Locomotives			
			Trolley Type		Storage-Battery Type		Trolley Type		Storage-Battery Type	
	Number	Value	Number	Value	Number	Value	Number	Value	Number	Value
1927										
Quarter ended:										
March 31	283	$1,372,225	202	$985,659	70	$257,701	4	$47,500	7	$81,365
June 30	233	1,053,812	153	732,851	56	235,116	9	51,025	15	34,820
Sept. 30	193	898,970	129	640,092	48	156,696	6	41,659	10	60,523
Dec. 31	173	866,106	102	508,599	52	155,497	2	50,000	17	152,010
Annual total	882	$4,191,113	586	$2,867,201	226	$805,010	21	$190,184	49	$328,718
1928										
Quarter ended:										
March 31	133	$728,629	81	$487,173	42	$109,998	1	$10,545	9	$120,913
June 30	111	729,458	68	333,648	30	88,845	6	148,937	7	158.028
Sept. 30	141	860,305	71	372,644	50	137,145	14	219,716	6	13 ,800
Dec. 31	184	1,149,678	104	524,303	65	181,823	11	416,887	4	26,665
Annual total	569	$3,468,070	324	$1,717,768	187	$517,811	32	$796,085	26	$436,406
1929										
Quarter ended:										
March 31	207	$1,248,071	124	$614,924	56	$174,945	22	$437,702	5	$20,500
June 30	188	1,121,162	90	536,356	83	234,731	10	148,697	5	201,378
Sept. 30	216	1,516,397	112	638,209	84	221,734	18	612,888	2	43,566
Dec. 31	214	1,251,729	142	930,737	65	174,883	6	144,389	1	1,720
Annual total	825	$5,137,359	468	$2,720,226	288	$806-293	56	$1,343,676	13	$267,164

Stockholders Approve Plans For L.C.&N. Segregation

Segregation of the coal and mining properties of the Lehigh Coal & Navigation Co. was approved by the stockholders on Jan. 15. The coal properties of the Navigation company will be sold to a corporation to be formed on terms to be determined later, said Samuel D. Warriner, president, and will then be operated as a unit, using the charter of the old Alliance Coal Mining Co., with some changes in the name.

The stockholders at the same meeting also approved a proposal to increase the outstanding capital stock of the Navigation company from 643,355 shares of $50 par common to 3,500,000 shares of no par common. The conversion will be made on the basis of three shares of the new common for one share of the old.

Hazard Operators Elect

Better trade practices and a greater price realization were the keynotes of the annual meetings of the Hazard Coal Operators' Exchange and the Hazard Coal Bureau, held Jan. 31 at the Phoenix Hotel, Lexington, Ky. Reports showed that the trade bureau was making progress in the elimination of harmful trade practices and in bettering trade conditions. Following a talk by John F. Daniel, chief inspector of mines for Kentucky, provision was made for the continuation of the mine rescue station at Hazard and the first-aid and mine-rescue courses given there. The operators also went on record as opposed to any liberalization of the rules applying to the reconsignment or diversion of coal.

Coal Exchange officers were elected for the coming year as follows: president, W. E. Davis, president, Midland Mining Co. and Davis Collieries; vice-president, John P. Gorman, president, John P. Gorman Coal Co.; treasurer, H. E. Bullock, president, Kentucky Block Coal Co., and secretary, J. E. Johnson. All the officers are from Lexington, Ky. The present officers of the Hazard Coal Bureau were re-elected, as follows: president, J. H. Bowling, Lexington, vice-president, Sun Coal Co., and commissioner, J. E. Johnson.

Coming Meetings

American Institute of Mining and Metallurgical Engineers; annual meeting, Feb. 17-21, at Engineering Societies Building, 29 West 39th St., New York City.

Anthracite-Lehigh Valley Section, American Society of Mechanical Engineers; meets at Pottsville, Pa., Feb. 28.

Canadian Institute of Mining and Metallurgy; annual meeting, March 5-7, at Toronto, Ontario, Canada.

American Mining Congress; annual Convention of Practical Coal Operating Men and National Exposition of Coal Mining Machinery and Equipment, May 5-10, at Cincinnati, Ohio, under auspices of Manufacturers' Division.

Mine Inspectors' Institute of America; annual meeting, May 12-14, at Deshler-Wallick Hotel, Columbus, Ohio.

Second World Power Conference; June 16-25, Berlin, Germany.

Williamson Operators Adopt Code of Ethics

Operators of the Williamson field, representing about 85 per cent of the tonnage mined in that field, adopted a code of business ethics at a meeting held in Williamson, W. Va., and organized the Williamson Coal Bureau to further its workings. The bureau will attempt to prevent misrepresentation of analyses and sizes and the making of misleading statements as to the character, quality or origin of coal; secret concessions; selling coal below production cost to injure a competitor; cancellation of contracts, except by mutual consent; attempts to nullify contracts between producer and consumer; discrimination in freight payments; post-dating or predating of invoices with discriminatory intent, and the unlawful use of trademarks and slogans. J. J. Ardigo, secretary, Operators' Association of the Williamson Field, was named commissioner of the new Bureau.

Pocahontas Operators Win

The Pocahontas Operators' Association won the first skirmish in its case against one jobber and certain retail dealers of Indianapolis, Ind., when the judge of the U. S. District Court for the Southern District of Indiana overruled all motions to dismiss the case. The operators' association has applied for an injunction to restrain the defendants from substituting inferior coal and for misusing the trade name "Pocahontas."

King Coal's Calendar for January

Jan. 6—Governmental, employers' and workers' delegates from nine European countries begin a two weeks' discussion of hours, wages, and working conditions at the International Labor Office of the League of Nations, at Geneva. Information on the practicability of an international convention creating uniformity in hours and, perhaps, even of real wages throughout the coal-producing countries of Europe is sought as one practical measure toward a United States of Europe.

Jan. 10—Miners' force, numbering 6,000 men, abandons attempt to eject non-union workers from the government-owned Rothbury colliery in New South Wales, Australia. Rioting has prevailed in the district since the refusal of the miners to agree to a wage settlement made Sept. 29, 1929.

Jan. 11—Delegates to the conference being held at the International Labor Office of the League of Nations, Geneva, agree that the hours of a coal miner in the Continental coal-producing countries shall begin when he enters the cage to descend into the mine and end when he returns to the surface.

Jan. 13—Seven men are killed in an explosion of gas in the Peerless mine of the Peerless-Cahaba Coal Co., near Straven, Ala. No damage was done to the mine which ordinarily employs 175 men.

Jan. 15—Operators in the Logan (W. Va.) coal field, at a meeting in Huntington, W. Va., decide to organize the Logan Coal Trade Bureau and ask a special committee to prepare a code of fair trade practices.

Jan. 15—Stockholders of the Lehigh Coal & Navigation Co. approve segregation of the coal and mining properties of the company. These will be sold to a corporation to be formed later, and will then be operated under the charter of the old Alliance Coal Mining Co., with some slight change in name.

Jan. 15—Operators in the Williamson field, at a meeting in Williamson, W. Va., adopt a code of business ethics and organize the Williamson Coal Bureau to further its workings.

Jan. 15—Police break up a series of demonstrations by the Labor Defense Corps in the northern coal fields of New South Wales, Australia. The first clash occurred when 2,500 miners from Cessnock marched on the Ahermain mine. The police then proceeded to Kurri and routed a contingent of 1,000. The 1,500 miners marching on the Stamford Merthyr pit, at Paxton, dispersed upon finding the police in possession. Seventeen miners were injured in bayonet charges made during the day.

Jan. 16—Erie R.R., in a program of segregation, announces lease of its chief anthracite properties to the Pittston Co., a Delaware corporation. These are the ones at present operated by the Pennsylvania Coal Co. and the Hillside Coal & Iron Co., and which have an estimated value of about $75,000,000. The new company will lease the properties for a term of 25 years, with option of renewal, and will purchase coal mined on the payment of royalties.

Jan. 19—Eight miners killed and four others injured in an explosion in the No. 1 mine of the Lillybrook Coal Co., Lillybrook, W. Va. Company officials believed the explosion occurred when a fall of roof released a quantity of gas.

Jan. 21—Natural gas from the Monroe and Richland fields of Louisiana reaches Atlanta, Ga., through a 900-mile line costing $25,000,000, the longest single high-pressure line in the world.

Jan. 23—Temporary injunction staying John L. Lewis, head of the United Mine Workers, from ousting Harry Fishwick and other officers of the Illinois miners' union, sustained by Judge Norman L. Jones, of the Sangamon County circuit court, until a complete hearing of the issues is held. Judge Jones made no decision as to the merits of the controversy.

Jan. 27—Representatives from ten of the principal coal-mining centers of Walker County, Alabama, meet at Jasper to consider reorganizing the local unions of the United Mine Workers. A tentative program of procedure was adopted and it is understood that another meeting will be held in the near future.

Jan. 30—Operators from western Pennsylvania and eastern and southern Ohio, at a meeting in Pittsburgh, Pa., decide to ask the Interstate Commerce Committee to reopen the lake cargo coal case.

Jan. 30—Thirteen miners killed in a terrific explosion in a coal mine near Zoungouldak, Turkey, the third disaster within the past three months.

Coal-Mine Deaths in 1929 Higher Than in 1928; Rate per Million Tons Decreases

ACCIDENTS in the coal-mining industry of the United States in December, 1929, resulted in the death of 236 men, according to information received from state mine inspectors by the U. S. Bureau of Mines. Forty-three men were killed in the anthracite mines of Pennsylvania; the remaining 193 deaths occurred in bituminous mines in various states. The death rate per million tons of coal produced during the month was 4.38, based on a production of 53,858,000 tons of coal, as compared with 3.45 for December, 1928, based on 173 deaths and 50,197,000 tons of coal. The fatality rate for bituminous mines alone, for December, 1929, was 4.18, based on a production of 46,200,000 tons, and that for anthracite was 5.62, with a production of 7,658,000 tons. Owing to an explosion in which 61 lives were lost, the fatality rates for bituminous mines and for the industry as a whole for December, 1929, were not as favorable as those for December a year ago, but the rate for anthracite mines was lower. Because of the explosion the combined fatality rate for December was also less favorable than that for the preceding month of November.

Two major explosions (causing 5 or more deaths) occurred in December, 1929. On Dec. 1, seven men were killed at West Frankfort, Ill., and on Dec. 17, 61 men were killed at McAlester, Okla. These two accidents brought the number of major disasters in 1929 to 7, with an aggregate loss of 151 lives. All of these disasters were in bituminous mines and, with the exception of one fall of slate, causing the death of five men, all were explosions of gas or coal dust. The record for 1929 is better than that for 1928 in which year there were 14 major disasters (all explosions), with a loss of 326 lives.

Figures covering the calendar year 1929 show a total of 2,181 deaths from accidents at all coal mines in the United States. Of the 2,181 fatalities, 1,701 were in bituminous mines and 480 in anthracite mines. These figures indicate a death rate of 3.62 per million tons for the entire coal-mining industry for 1929, the rate for bituminous mines being 3.24 and that for anthracite mines 6.26, based on an estimated production 525,358,000 tons of bituminous and 76,640,000 tons of anthracite. As the figures now stand, the year 1929 shows an increase of 5 deaths over the year 1928, but as the production of coal in 1929 was 25,905,000 tons more than in 1928, the fatality rate per million tons for 1929 was slightly lower than in 1928.

Comparative fatality rates for 1929 and 1928 are shown in the following table:

	1928	1929	Dec. 1928	Dec. 1929
All causes	3.777	3.623	3.446	4.382
Falls of roof and coal	1.854	1.957	1.833	1.783
Haulage	.626	.683	.757	.798
Gas or dust explosions:				
Local explosions	.087	.083	.060	.074
Major explosions	.566	.241	.119	1.263
Explosives	.128	.146	.199	.130
Electricity	.153	.134	.100	.093
Other causes	.363	.379	.378	.241

Safety Drive Cuts Accidents In Hanna Mines

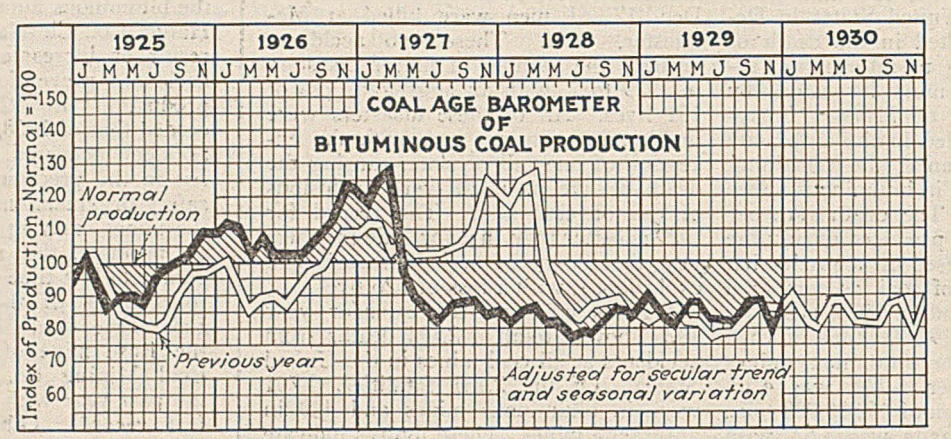
New safety records were made in the bituminous mines of the M. A. Hanna Co., Cleveland, Ohio, as a result of increasing attention to accident prevention. Although production in 1929 greatly exceeded that of 1928, only two fatal accidents occurred, as compared to six in the preceding year. New safety organizations formed at all the mines early in 1929 did much to promote the movement and eliminate lost-time accidents. The four mines of the Wheeling & Lake Erie Coal Mining Co. and the Rose mine of the Massillon Coal Mining Co. went through the past year with an almost perfect record. Other mines also achieved a marked improvement as compared to the previous year.

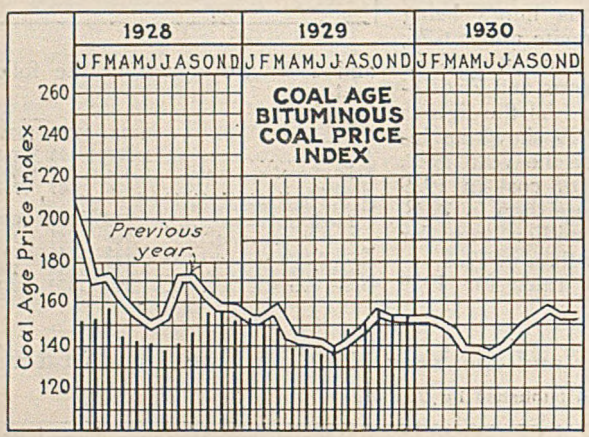
Coal Mine Fatalities During Month of December and the Year 1929, by Causes and States

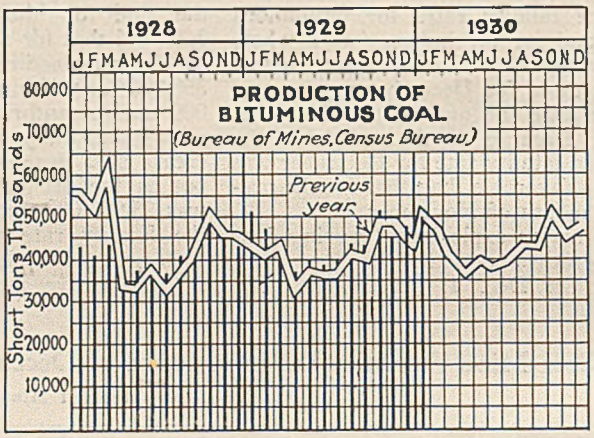
(Compiled by Bureau of Mines and published by *Coal Age*)

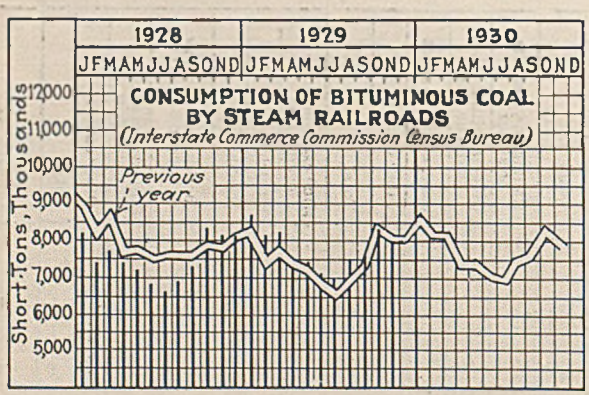
State	Underground												Shaft					Surface							Total by States	
	Falls of roof (coal, rock, etc.)	Falls of face or pillar coal	Mine cars and locomotives	Explosions of gas or coal dust	Explosives	Suffocation from mine gases	Electricity	Animals	Mining Machines	Mine fires (burned suffocated, etc.)	Other causes	Total	Falling down shafts or slopes	Objects falling down shafts or slopes	Cage, skip or bucket	Other causes	Total	Mine cars and mine locomotives	Electricity	Machinery	Boiler explosions or bursting steam pipe	Railway cars and locomotives	Other causes	Total	1929	1928
Alabama	3	....	4	....	....	....	2	....	....	....	....	9	....	....	....	....	....	....	....	....	....	....	....	....	....	9	8
Arkansas	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	1
Colorado	3	2	1	....	....	....	1	....	....	....	....	7	....	....	....	....	....	....	....	....	....	....	....	....	....	7	3
Georgia and North Carolina	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	4
Illinois	6	....	3	7	....	....	....	....	....	....	....	16	....	....	....	....	....	....	....	1	....	....	....	1	1	17	14
Indiana	1	....	1	....	....	....	....	....	....	....	....	2	....	....	....	....	....	....	....	....	....	....	....	....	....	2	6
Iowa	....	1	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	1	1	2	2	2
Kansas	1	....	....	....	1	....	....	....	....	....	....	2	....	....	....	....	....	....	....	....	....	....	....	....	....	2	0
Kentucky	7	....	9	....	....	....	1	....	....	....	....	17	....	....	....	....	....	....	....	....	....	....	....	1	1	18	21
Maryland	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0
Michigan	....	....	1	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	1	0
Missouri	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0
Montana	1	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	1	0
New Mexico	....	....	1	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	1	0
North Dakota	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	1	1	0
Ohio	5	....	2	....	....	....	....	....	....	....	....	7	....	....	....	....	....	....	....	....	....	....	....	....	....	7	8
Oklahoma	....	....	....	61	....	1	1	....	....	....	1	64	....	....	....	....	....	....	....	....	....	....	....	....	....	64	1
Pennsylvania (bituminous)	9	2	2	....	....	....	....	....	1	....	1	15	....	....	....	....	....	....	....	....	....	....	....	....	....	15	16
Tennessee	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	1
Texas	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0
Utah	3	....	....	....	....	....	....	....	....	....	....	3	....	....	....	....	....	....	....	....	....	....	....	....	....	3	1
Virginia	....	....	1	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	1	5
Washington	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	2
West Virginia	17	7	10	2	1	....	....	....	2	....	....	39	....	....	....	....	....	....	....	....	....	....	....	....	....	39	39
Wyoming	3	....	....	....	....	....	....	....	....	....	....	3	....	....	....	....	....	....	....	....	....	....	....	....	....	3	
Total (bituminous)	59	12	35	70	2	1	5	....	3	....	2	189	....	....	....	....	....	....	....	1	....	....	....	3	4	193	136
Pennsylvania (anthracite)	20	5	8	2	5	....	....	....	....	....	1	41	....	....	....	....	....	....	1	....	....	....	....	1	2	43	37
Total, December, 1929	79	17	43	72	7	1	5	....	3	....	3	230	....	....	....	....	....	....	1	1	....	....	....	4	6	236	....
Total, December, 1928	75	17	38	9	10	....	5	1	2	....	9	166	....	....	2	....	2	1	....	2	....	....	1	1	5	....	173
Total year, 1929:																											
Bituminous	785	134	347	168	45	5	75	1	28	1	22	1611	9	1	5	2	17	19	8	8	1	10	27	73	1701	1729
Anthracite	202	57	64	27	43	7	6	2	....	....	22	430	10	1	1	....	12	9	5	5	1	3	15	38	480	447
Grand total	987	191	411	195	88	12	81	3	28	1	44	2041	19	2	6	2	29	28	13	13	2	13	42	111	2181	2176

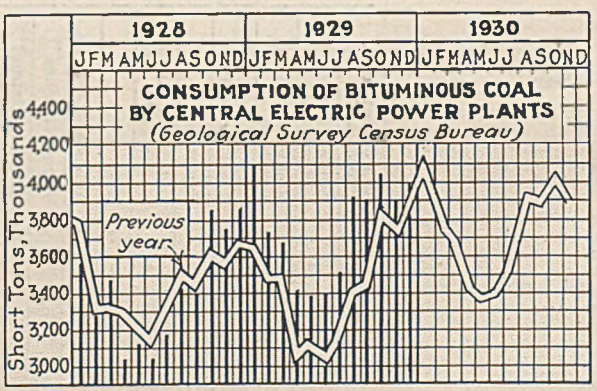
Indicators of Activities in the Coal Industry

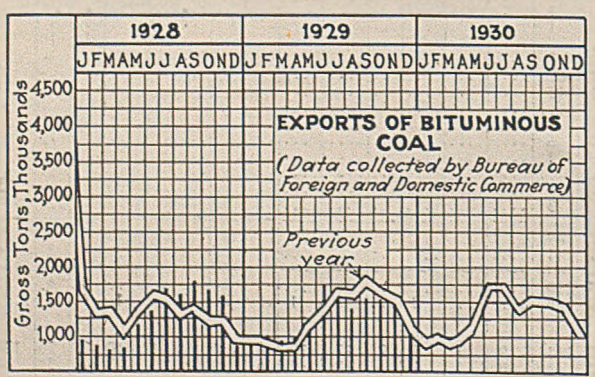


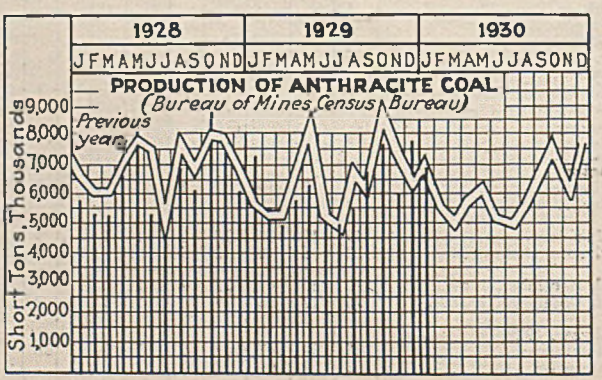












MARKETS in Review

BUOYED up by real winter weather, the coal markets of the United States in January kept up without slackening the activity begun in December. Though the vagaries of the thermometer had a considerable influence on the state of business at any one time, domestic and industrial demand, with few exceptions, continued at a high rate throughout the month. Prices moved up slightly in all but a few markets, as compared to the level prevailing in December and, on the average, were substantially higher than in the same month last year.

The only element of weakness discernible during the month was in the market for screenings. Because of the increased production of prepared sizes, producers, especially in the Middle West and in the Rocky Mountain region, were plagued with an excess of screenings, which depressed the price and, quite frequently, carried the mine-run realization down with it. Buying in general still continued to be of the hand-to-mouth variety, but some disposition to replenish stockpiles was evident, though it was not translated into a great amount of tonnage.

January coal production is estimated by the U. S. Bureau of Mines at 49,750,000 net tons, an increase of 3,550,000 net tons over December, 1929, and a decrease of 1,706,000 net tons as compared to the production in January, 1929. *Coal Age* Index of spot bituminous prices (preliminary) was: 155, Jan. 4, 11 and 18; and 154, Jan. 25. The corresponding weighted average prices were as follows: $1.89, Jan. 4, 11 and 18; and $1.88, Jan. 25. The revised Index figures for December, 1929, were: 155, Dec. 7; 154, Dec. 14 and 21; and 155, Dec. 28. The corresponding weighted average prices were: $1.89, Dec. 7; $1.87, Dec. 14 and 21; and $1.88, Dec. 28. The monthly Index for December, 1929, was 154½, as compared to the unrevised figure of 154¾ for January.

Conditions in the anthracite markets of the country were, in January, largely controlled by the weather. Activity in the domestic sizes on the whole was only fair, however, with consumers and dealers still reluctant to lay in stocks. Chestnut was the most active size. Steam sizes, on the contrary, enjoyed a fairly active demand as a result of the rising demand for buckwheat for use as a domestic fuel, which carried the others along with it.

SUB-ZERO temperatures and snow during January quickened the demand for all coals in the Chicago market, though both retail and industrial buying was characterized by caution. High grades were in the best demand, with prices on the secondary grades firm or weak in accordance with the temperature. Aside from the cold spells, seasonable temperatures prevailed, except in the first ten days of the month, when business lagged badly. Curtailed production, however, kept most of the operators from storing up embarrassing reserves of tonnage.

"No-bills" accumulated at Illinois, Indiana, and western Kentucky mines in the first half of the month, but were rapidly moved out when freezing temperatures arrived. Most of the Illinois operators were booked ahead also on lump and egg, and the demand for good grades of screenings kept pace with the increased production of domestic sizes. Secondary grades of screenings, however, were weak and slow. Industries were compelled to turn to the higher qualities to carry the increased heating loads, which left the secondary grades without the usual outlets. Prices on Indiana No. 5, central Illinois, and Belleville (Ill.) varieties went off 15c.@25c., offers being made at $2.10@$2.20, delivered at Chicago.

SMOKELESS prepared sizes and premium high-volatile grades enjoyed a fair demand. Smokeless lump dragged, but egg and stove were active and mine-run moved well on dealer contracts. Of the Eastern high volatile coals, well-known brands, without especial regard to quality, enjoyed the best demand. Ordinary grades were slow. Screenings, both high- and low-volatile, were scarce and tight, with Chicago retailers paying a premium of 10c.@15c. on spot buys.

Toward the last of the month, both retailers and industrial consumers tightened up on their buying, taking only enough for immediate requirements. New smokeless contract prices for Feb-

Current Quotations—Spot Prices, Anthracite—Gross Tons, F.O.B. Mines

		Week Ended— Jan. 4, 1930		Jan. 11, 1930		Jan. 18, 1930		Jan. 25, 1930	
	Market Quoted	Independent	Company	Independent	Company	Independent	Company	Independent	Company
Broken	New York	.....	$8.20@$8.50	.....	$8.20@$8.50	.....	$8.20@$8.50	.....	$8.20@$8.50
Broken	Philadelphia	$8.40@$8.50	8.40	$8.40@$8.50	8.40	$8.40@$8.50	8.40	$8.40@$8.50	8.40
Egg	New York	8.60@ 8.70	8.70	8.60@ 8.70	8.70	8.60@ 8.70	8.70	8.60@ 8.70	8.70
Egg	Philadelphia	8.60@ 8.85	8.60	8.60@ 8.85	8.60	8.60@ 8.85	8.60	8.60@ 8.85	8.60
Egg	Chicago*	7.77	7.77	7.77	7.77	7.77	7.77	7.77	7.77
Stove	New York	9.10@ 9.20	9.20	9.10@ 9.20	9.20	9.10@ 9.20	9.20	9.10@ 9.20	9.20
Stove	Philadelphia	9.10@ 9.35	9.10	9.10@ 9.35	9.10	9.10@ 9.35	9.10	9.10@ 9.35	9.10
Stove	Chicago*	8.22	8.22	8.22	8.22	8.22	8.22	8.22	8.22
Chestnut	New York	8.65@ 8.70	8.70	8.65@ 8.70	8.70	8.65@ 8.70	8.70	8.65@ 8.70	8.70
Chestnut	Philadelphia	8.60@ 8.85	8.60	8.60@ 8.85	8.60	8.60@ 8.85	8.60	8.60@ 8.85	8.60
Chestnut	Chicago*	7.77	7.77	7.77	7.77	7.77	7.77	7.77	7.77
Pea	New York	4.75@ 5.00	5.00	4.75@ 5.00	5.00	4.75@ 5.00	5.00	4.75@ 5.00	5.00
Pea	Philadelphia	4.90@ 5.15	4.90	4.90@ 5.15	4.90	4.90@ 5.15	4.90	4.90@ 5.15	4.90
Pea	Chicago*	4.46	4.46	4.46	4.46	4.46	4.46	4.46	4.46
Buckwheat	New York	2.70@ 3.00	3.00	2.70@ 3.00	3.00	2.70@ 3.00	3.00	2.70@ 3.00	3.00
Buckwheat	Philadelphia	2.75@ 3.00	2.75	2.75@ 3.00	2.75	2.75@ 3.00	2.75	2.75@ 3.00	2.75
Rice	New York	1.70@ 2.00	2.00	1.70@ 2.00	2.00	1.70@ 2.00	2.00	1.70@ 2.00	2.00
Rice	Philadelphia	2.00@ 2.25	2.00	2.00@ 2.25	2.00	2.00@ 2.25	2.00	2.00@ 2.25	2.00
Barley	New York	1.40@ 1.50	1.50	1.40@ 1.50	1.50	1.40@ 1.50	1.50	1.40@ 1.50	1.50
Barley	Philadelphia	1.50@ 1.60	1.50	1.50@ 1.60	1.50	1.50@ 1.60	1.50	1.50@ 1.60	1.50

*Net tons, f.o.b. mines. †Domestic buckwheat, $3.50 (D., L. & W.).

ruary reflected the slack demand for prepared sizes and the fair call for mine-run. Standard producers reduced lump 50c.@75c. and egg 25c.@50c., and advanced stove and nut 25c. in order to even up for the loss on mine-run. Quotations on mine-run and slack were unchanged at $2.25 and $1.50, respectively. Anthracite demand was a negligible quantity, and regular contract deliveries were barely maintained.

IN THE St. Louis market, both domestic and steam sizes entered into the month of January on a firm basis, which was maintained until the middle of the month. In the last half, however, severe cold weather and snow brought on a heavy demand for prepared sizes, and producers, though running at the maximum, were far behind their orders. The increased production of prepared sizes adversely affected the screenings market, however, and accumulations forced several mines to shut down. Prices on prepared sizes were unchanged. Screenings, however, went off 25c.@35c.

Heavy shipments from the Docks at the Head of the Lakes during January and the light stocks in dealers' and industrial consumers' bins lead dock operators to believe that the shipments of 32,754 cars in January and 31,390 in February, 1929, will be exceeded this year. Dealers and public utilities lead in the buying, but hopes are held that industrial demand will increase in the near future. Dock operators assert that their coal is reaching a much wider territory than in previous years. Large tonnages of Pocahontas coal and Kentucky and West Virginia high-volatile varieties moved from the docks to the Twin Cities, replacing the strongly competitive all-rail coal. Stocks of bituminous and anthracite coal on the docks on February 1 were 4,800,000 tons and 400,000 tons, respectively. Anthracite demand was active, with dealers in that fuel claiming to have regained markets lost to cheaper substitutes.

Prices on Jan. 31 were as follows: Pocahontas lump, egg and nut, $7.90@$8; stove, $7.75; mine-run, $5; screenings, $4.10; Kentucky block and lump, $5.65@$7.25; stove and egg, $5.85; stove and dock-run, $5.35; stove, $5.90; dock-run, $5.50; screenings, $4.10; splint block, $5.85; egg, $5.35; lump and egg, $5.60; stove, $5.35; dock-run, $4.75; screenings, $3.85; Youghiogheny block, lump and egg, $5.75; stove, $5.40; dock-run, $4.50; screenings, $3.85; Hocking block, $5.85; lump and egg, $5.35; stove, $5.10; screenings, $3.85; anthracite egg and nut, $12.85; stove, $13.35; pea, $9.25; buckwheat, $7.45.

SEVERE weather in the Southwestern region in January improved the demand for coal, but also interferred with production, especially of the Kansas shovel varieties. Shovel lump advanced 25c. to $3.25. Kansas deep-shaft lump was firm, selling largely at $4, with some few lots going as low as $3.50.

Sub-zero weather throughout most of the Rocky Mountain and Missouri territory in January brought on an abnormal demand for Colorado coals. Mine running time increased to 90 per cent and the call for lump sizes far exceeded the production, with orders booked two and three weeks in advance. Steam sizes, due to the increased production, were, however, somewhat difficult to move. Lignite producers advanced prices 50c. on Jan. 27, because of the scarcity brought on by the large demand. Prevailing prices at the middle of the month were as follows: Walsenburg-Canon City lump, $5.50; nut, $4.50; mixed washed chestnut, $3.25; Trinidad coking lump, $3.75; nut, $3.50; chestnut, $3.25; Crested Butte anthracite 5x2-, 2½x1½- and 2x1-in. egg, $8.25; northern lignite 6-in. lump, $3; 2½-in. lump, $2.75; Rock Springs (Wyo.) lump, $4.25; nut, $3.75; Colorado and Wyoming steam sizes, $1.35@$1.50.

Unusually severe winter weather resulted in a good demand in the Louisville market in January, in which both domestic and steam coals shared. Jobbers reported a better local movement, as well as a fair demand from retailers and other jobbers in the north and Northwest. The mines enjoyed a fair running time and prices were, on the whole, steady throughout the month. Eastern Kentucky quotations were as follows: 4-in. and 6-in. block, $2.25@$2.75, with some specialty varieties at $3.50; lump, $1.75@$2; egg, $1.60@$1.90; mine-run, $1.35@$1.75; screenings, 80c.@$1.15. In western Kentucky, block sold at $2@$2.25; lump and egg, $1.75@$2; nut, $1.15@$1.75; mine-run, 90c.@$1.25, and screenings, 40c.@60c.

The effort of that part of the smokeless trade selling on contract to maintain circular prices at $3.75 for lump and egg; $3.25 for stove, and $2.25 for mine-run as against a determined drive by the rest to get rid of excess tonnage in the spot market at a lower figure absorbed the attention of the Cincinnati trade in the month of January. As a result of the conflict of opinion, lump sold down to $2.50; egg, $2.75, and mine-run below $2 in a demoralized market. Smokeless screenings, which were in good demand at $1.50@$1.60, were the only sound spot in the list. Some ground was gained by the price-cutters, however, as the February circular showed marked reductions, with prices as follows: lump and stove $3; egg, $3.25; nut and mine-run, $2.25.

HIGH-VOLATILE coals had their ups and downs in accordance with the position of the thermometer. Mild weather during the first half of the month resulted in a lagging trade, with block and lump dropping to $1.75, but lower temperatures at the last speeded up deliveries and stiffened the price list. Toward the end of the month, screenings gradually dropped in price as the heavy production of prepared sizes increased the supply. Mine-run continued in its accustomed groove. Retailers voiced the complaint that public interest in higher priced coals had slackened. This fact, however, was of considerable benefit to cheaper grades and steam sizes.

Conditions in the Columbus market in January, especially the domestic division, were controlled largely by the vagaries of the weather, with good business in periods of low temperatures and poor business when the thermometer rose. Prices at the mines fluctuated in response to the demand, registering, however, a decrease of 25c.@35c. in the general level. The end of the month

Current Quotations—Spot Prices, Bituminous Coal—Net Tons, F.O.B. Mines

LOW-VOLATILE, EASTERN	Market Quoted	Week Ended Jan. 4, 1930	Jan. 11, 1930	Jan. 18, 1930	Jan. 25, 1930
Smokeless lump	Columbus	$3.50@$3.75	$3.25@$3.50	$3.25@$3.50	$3.50@$3.75
Smokeless mine-run	Columbus	2.00@ 2.35	2.00@ 2.25	2.00@ 2.25	2.00@ 2.35
Smokeless screenings	Columbus	1.50@ 1.65	1.50@ 1.65	1.50@ 1.65	1.50@ 1.65
Smokeless lump	Chicago	3.00@ 3.75	3.00@ 3.75	2.75@ 3.75	2.75@ 3.75
Smokeless mine-run	Chicago	2.00@ 2.25	2.00@ 2.25	2.00@ 2.25	2.00@ 2.25
Smokeless lump	Cincinnati	3.00@ 3.75	2.75@ 3.75	2.50@ 3.75	3.00@ 3.75
Smokeless mine-run	Cincinnati	2.00@ 2.25	1.85@ 2.25	2.00@ 2.25	2.00@ 2.25
Smokeless screenings	Cincinnati	1.50@ 1.60	1.45@ 1.60	1.50	1.50
*Smokeless mine-run	Boston	4.55@ 4.65	4.55@ 4.65	4.50@ 4.60	4.40@ 4.50
Clearfield mine-run	Boston	1.60@ 1.85	1.60@ 1.85	1.60@ 1.85	1.60@ 1.85
Cambria mine-run	Boston	1.80@ 2.10	1.80@ 2.10	1.80@ 2.10	1.80@ 2.10
Somerset mine-run	Boston	1.70@ 1.95	1.70@ 1.95	1.70@ 1.95	1.70@ 1.95
Pool 1 (Navy Standard)	New York	2.30@ 2.50	2.30@ 2.50	2.30@ 2.50	2.30@ 2.50
Pool 1 (Navy Standard)	Philadelphia	2.35@ 2.60	2.35@ 2.60	2.35@ 2.60	2.35@ 2.60
Pool 9 (super. low vol.)	New York	1.90@ 2.25	1.90@ 2.25	1.90@ 2.25	1.90@ 2.25
Pool 9 (super. low vol.)	Philadelphia	1.90@ 2.15	1.90@ 2.15	1.90@ 2.15	1.90@ 2.15
Pool 10 (h. gr. low. vol.)	New York	1.75@ 1.85	1.75@ 1.85	1.75@ 1.85	1.75@ 1.85
Pool 10 (h. gr. low. vol.)	Philadelphia	1.75@ 1.95	1.75@ 1.95	1.75@ 1.95	1.75@ 1.95
Pool 11 (low vol.)	New York	1.60@ 1.75	1.60@ 1.75	1.60@ 1.75	1.60@ 1.75
Pool 11 (low. vol.)	Philadelphia	1.55@ 1.75	1.55@ 1.75	1.55@ 1.75	1.55@ 1.75
HIGH-VOLATILE, EASTERN					
Pool 54-64 (gas and st.)	New York	$1.20@$1.35	$1.20@$1.35	$1.20@$1.35	$1.20@$1.35
Pool 54-64 (gas and st.)	Philadelphia	1.15@ 1.35	1.15@ 1.35	1.15@ 1.35	1.15@ 1.35
Pittsburgh so'd gas	Pittsburgh	1.90@ 2.10	1.90@ 2.10	1.90@ 2.00	1.80@ 2.00
Pittsburgh gas mine-run	Pittsburgh	1.65@ 1.75	1.65@ 1.75	1.60@ 1.75	1.60@ 1.75
Pittsburgh mine-run	Pittsburgh	1.50@ 1.75	1.50@ 1.75	1.40@ 1.65	1.40@ 1.65
Pittsburgh slack	Pittsburgh	1.00@ 1.10	1.00@ 1.10	1.00@ 1.10	.90@ 1.00
Kanawha lump	Columbus	2.00@ 2.50	2.00@ 2.40	2.00@ 2.40	2.00@ 2.40
Kanawha mine-run	Columbus	1.40@ 1.60	1.40@ 1.60	1.40@ 1.60	1.40@ 1.60
Kanawha screenings	Columbus	.75@ 1.00	.75@ .90	.75@ .90	.75@ .90
W. Va. lump	Cincinnati	2.00@ 2.75	1.65@ 2.75	1.85@ 2.75	1.85@ 2.75
W. Va. gas mine-run	Cincinnati	1.40@ 1.60	1.35@ 1.60	1.40@ 1.60	1.40@ 1.60
W. Va. steam mine-run	Cincinnati	1.20@ 1.35	1.20@ 1.35	1.15@ 1.35	1.15@ 1.35
W. Va. screenings	Cincinnati	.85@ 1.10	.85@ 1.10	.75@ 1.10	.70@ 1.00
Hocking lump	Columbus	2.00@ 2.25	2.00@ 2.25	2.00@ 2.25	2.00@ 2.25
Hocking mine-run	Columbus	1.35@ 1.60	1.35@ 1.60	1.35@ 1.60	1.35@ 1.60
Hocking screenings	Columbus	.85@ 1.00	.85@ 1.00	.85@ 1.00	.80@ .95

*Gross tons, f.o.b. vessel, Hampton Roads.

was characterized by a trend toward higher prices and a bright outlook for February.

Steam business was fairly good throughout the month, with screenings attracting the most attention. A slight weakness developed at the last of the month, however, especially in the high-volatile varieties of slack. Some inquiries on contract coal were made during the month, against the expiration of agreements on April 1. Movement through the Columbus gateway to northern Ohio, Indiana, and Michigan was good, and production in the Hocking and Jackson fields of Ohio was well maintained.

The prevailing dullness in the Pittsburgh market at the end of last year carried over into January, though domestic sales gained slowly as the month went by. But they failed to reach the usual level, despite the fact that January and February are the replacement months. Prices weakened during the month to $2.25@$2.40, and even at the lower figure, showed little signs of strength. Industrial and railroad demand was under par. Mine-run and industrial lump prices did not change during the month, but slack slid off to as low as 65c.

THE Central Pennsylvania market in January varied in accordance with the temperature, a descent of the mercury stimulating production and strengthening the price trend, and a rise having the opposite effect. Prices were practically unchanged during the month, the latest quotations being as follows: Pool 1, $2.40@$2.60; Pool 9, $1.80@$2; Pool 10, $1.70@$1.80; Pools 11 and 18, $1.60@$1.70, and Pool 71, $2.10@$2.25.

A slight decrease in the general price level was the distinguishing feature of the New England market in January. Contract prices on No. 1 Pocahontas and New River coals on cars at Boston announced for February are $5.85 for mine-run and $5.50 for nut-and-slack. These figures correspond to the spot prices in January, although these classifications sagged somewhat at the Virginia terminals in the last week. An advance in marine freights offset the reduction, however. Nut-and-slack was quoted at $4.10, though the base price for the most of the month was 20c. higher. An increase in stoker coal at tidewater was the cause of the slump. Mine-run was in a strong position until the last week, when it dropped 10c. to $4.40@$4.50.

All-rail shipments were small, with no change in quotations. Some Pennsylvania bituminous was absorbed, though the territory within reach of tidewater remains in the hands of the Southern shippers.

The New York market was inactive during the month of January. Buying was light and of the hand-to-mouth variety, in spite of the fact that stocks are at a low level. Prices, however, were maintained at the same level throughout the month, with the possible exception of some light shading in the last weeks.

After a period of slackness at the first of January, a temperature drop in the last half brought the Philadelphia trade back to normal. Consumers, however, seemed disposed more to the use of stocks, with the exception of the railroads, which came into the market for more liberal supplies. With favorable reports on business activity, it is expected that a good tonnage will be moved until April. Prices showed no change from the unsatisfactory level extending over the past three months. Tidewater business was good, with bright prospects of its continuance.

January proved to be the best month for domestic sales the Birmingham trade has enjoyed all winter. Heavy snows, intermittent cold and rain helped to maintain a continuous demand for household fuel and, though users bought conservatively, dealers enjoyed a good business. The active retail market also stimulated wholesale buying, though the total was not enough to keep mine tracks clear of loads. Domestic prices were as follows: Montevallo-Aldrich lump and egg, $5.75@$6; nut, $3.50; Dogwood lump, $5; egg, $4.75; nut, $3.75; Cahaba lump, $4.25@$5; egg, $4@$4.75; nut, $3.25@$3.50; Black Creek lump, $4.75; egg, $4.50; nut, $3.50; Corona lump, $3.25; egg, $3.10; nut, $2.75; low-grade, white-ash lump, $2@$2.75; nut, $2@$2.50.

THE industrial market was quiet and weak, though railroads are gradually increasing their takings to normal quotas. Spot sales showed no change, but several fairly large consignments of bunker fuel went to tidewater. Prices were as follows: Low-grade mine-run, $1.35@$1.75; washed, $1.50@$1.85; high-quality mine-run, $1.75@$2.25; washed, $1.85@$2.25; screenings, $1.25@$1.65.

Weather controlled the New York anthracite market in January. After a good start at the first of the month, accompanied by a shortage of coal, the domestic trade fell into the doldrums, which continued over the rest of the month. Steam sizes were in good demand, chiefly because of purchases of buckwheat for domestic use. Consequently, this size was scarce at all times, and at the last of the month commanded a premium price. Attempts to substitute pea also resulted in a heavy movement of that particular size.

AS IN New York, weather was the controlling factor in the Philadelphia anthracite market. After a warm spell at the first of the month, a drop in the temperature generated an active demand. Chestnut and pea were the most active of the domestic sizes, and buckwheat led the list of steam coals. Conditions in the steam coal market were satisfactory and, because of the growing use of buckwheat in domestic furnaces, all sizes enjoyed a good movement.

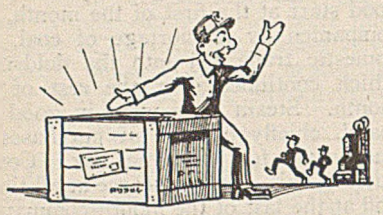
Exports of bituminous and anthracite coal from the United States in December, the latest month for which figures are available, were 1,083,996 and 313,088 gross tons, respectively, as compared to 1,093,685 and 258,637 gross tons in 1928.

Imports of anthracite and bituminous coal during the month of December were 39,818 gross tons and 49,206 gross tons, respectively, as compared to 55,153 gross tons and 71,795 gross tons in the same month in 1928.

Current Quotations—Spot Prices, Bituminous Coal—Net Tons, F.O.B. Mines

		Week Ended			
MIDDLE WEST	Market Quoted	Jan. 4, 1930	Jan. 11, 1930	Jan. 18, 1930	Jan. 25, 1930
Franklin, Ill. lump	Chicago	$3.15	$3.15	$3.15	$3.15
Franklin, Ill. mine-run	Chicago	2.15	2.15	2.15	2.15
Franklin, Ill. screenings	Chicago	1.30@ 1.60	1.30@ 1.60	1.30@ 1.60	1.30@ 1.60
Central, Ill. lump	Chicago	2.40@ 2.65	2.40@ 2.65	2.40@ 2.65	2.40@ 2.65
Central, Ill. mine-run	Chicago	1.70@ 1.85	1.70@ 1.85	1.70@ 1.85	1.70@ 1.85
Central, Ill. screenings	Chicago	.95@ 1.25	.85@ 1.25	.75@ 1.25	.65@ 1.25
Ind. 4th Vein lump	Chicago	2.85@ 3.00	2.85@ 3.00	2.85@ 3.00	2.85@ 3.00
Ind. 4th Vein mine-run	Chicago	1.50@ 2.10	1.50@ 2.10	1.50@ 2.10	1.50@ 2.10
Ind. 4th Vein screenings	Chicago	1.40@ 1.60	1.40@ 1.60	1.40@ 1.60	1.40@ 1.60
Ind. 5th Vein lump	Chicago	2.00@ 2.25	2.00@ 2.25	2.00@ 2.25	2.00@ 2.25
Ind. 5th Vein mine-run	Chicago	1.25@ 1.75	1.25@ 1.75	1.25@ 1.75	1.25@ 1.75
Ind. 5th Vein screenings	Chicago	1.00@ 1.10	.90@ 1.10	.80@ 1.10	.70@ 1.10
Mount Olive lump	St. Louis	2.10@ 2.50	2.10@ 2.50	2.10@ 2.50	2.10@ 2.50
Mount Olive mine-run	St. Louis	1.75	1.75	1.75	1.75
Mount Olive screenings	St. Louis	.90@ 1.25	.90@ 1.25	.90@ 1.25	.75@ 1.00
Standard lump	St. Louis	2.00@ 2.25	2.00@ 2.25	2.00@ 2.25	2.00@ 2.25
Standard mine-run	St. Louis	1.65@ 1.75	1.65@ 1.75	1.65@ 1.75	1.65@ 1.75
Standard screenings	St. Louis	.65@ .85	.65@ .80	.55@ .80	.55@ .70
West Ky. block	Louisville	2.00@ 2.25	2.00@ 2.25	2.00@ 2.25	2.00@ 2.25
West Ky. mine-run	Louisville	.90@ 1.25	.90@ 1.25	.90@ 1.25	.90@ 1.25
West Ky. screenings	Louisville	.50@ .65	.40@ .60	.40@ .60	.40@ .60
West Ky. block	Chicago	2.00@ 2.25	2.00@ 2.25	2.00@ 2.25	2.00@ 2.25
West Ky. mine-run	Chicago	1.05@ 1.15	1.05@ 1.15	1.05@ 1.15	1.00@ 1.10
SOUTH AND SOUTHWEST					
Big Seam lump	Birmingham	$2.00@$2.25	$2.00@$2.25	$2.00@$2.25	$2.00@$2.25
Big Seam mine-run	Birmingham	1.35@ 1.50	1.35@ 1.50	1.35@ 1.50	1.35@ 1.50
Big Seam (washed)	Birmingham	1.50@ 1.75	1.50@ 1.75	1.50@ 1.75	1.50@ 1.75
S. E. Ky. block	Chicago	2.50@ 2.75	2.50@ 2.75	2.50@ 2.75	2.25@ 2.75
S. E. Ky. mine-run	Chicago	1.40@ 1.60	1.40@ 1.60	1.40@ 1.60	1.40@ 1.60
S. E. Ky. block	Louisville	2.25@ 2.75	2.25@ 2.75	2.25@ 2.75	2.25@ 2.75
S. E. Ky. mine-run	Louisville	1.35@ 1.75	1.30@ 1.75	1.35@ 1.75	1.35@ 1.75
S. E. Ky. screenings	Louisville	.85@ 1.25	.85@ 1.25	.90@ 1.25	.80@ 1.15
S. E. Ky. block	Cincinnati	2.00@ 2.75	2.00@ 2.75	1.85@ 2.75	1.85@ 2.75
S. E. Ky. mine-run	Cincinnati	1.25@ 1.60	1.15@ 1.60	1.15@ 1.65	1.15@ 1.60
S. E. Ky. screenings	Cincinnati	.85@ 1.10	.85@ 1.10	.75@ 1.10	.70@ 1.00
Kansas shaft lump	Kansas City	3.50@ 4.00	3.50@ 4.00	3.50@ 4.00	3.50@ 4.00
Kansas strip lump	Kansas City	3.00	3.00	3.25	3.25
Kansas mine-run	Kansas City	2.50@ 2.75	2.50@ 2.75	2.50@ 2.75	2.50@ 2.75
Kansas crushed mine-run	Kansas City	1.60@ 1.80	1.60@ 1.80	1.60@ 1.80	1.60@ 1.80
Kansas screenings	Kansas City	1.25@ 1.50	1.25@ 1.50	1.25@ 1.50	1.25@ 1.50

WHAT'S NEW
IN COAL-MINING EQUIPMENT



Electric Hoist Line Is Announced

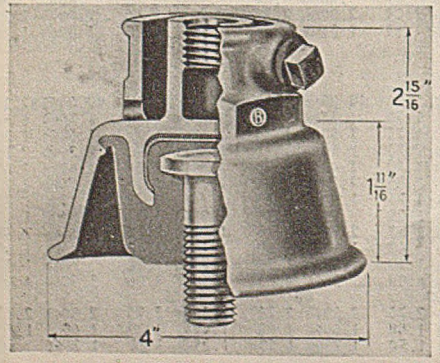
A complete line of electric hoists in sizes ranging from $\frac{1}{8}$ to $7\frac{1}{2}$ tons in capacity is now being manufactured by Robbins & Myers, Inc., Springfield, Ohio. Features noted by the company are as follows: Savings in weight, space and headroom; cast-steel trolley adjustable to nine sizes of I-beam; safety inclosed bottom block which guides itself easily into the rope flare when swinging; alloy steel gears, which allow for the maximum strain of constantly reversing tooth loads at top motor speed; Hyatt roller bearings in the hoisting mechanism; main frame of Aremite alloy steel, and an attractive aluminum finish throughout as a guard against damage from exposure.

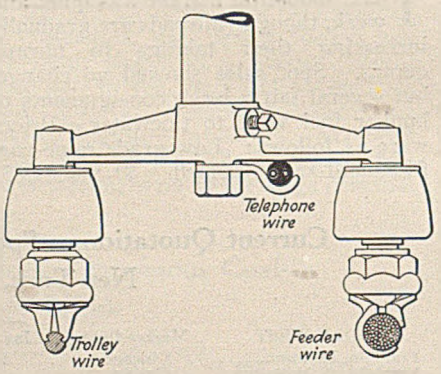
Flashover of 20 Kv. Claimed For Air-Gap Mine Hanger

Dissipated current caused by insulator leakage is an expense which the mine operator can easily avoid, according to the Ohio Brass Co., Mansfield, Ohio, by the use of the new "Air-Gap" mine hanger, for which high electrical efficiency is claimed. It is adaptable to either pipe ends, expansion bolts or mine hanger screws for timber supports. In construction, a hot-dip, galvanized, malleable iron shell extends out over the insulation, interposing the extra protection of an air space and increasing the leakage path from the stud to the shell, as well as affording mechanical protection to the insulation. This increased distance, it is said, makes the hanger particularly effective in cases where the face of the insulation is likely to become coated with a layer of conductive material.

Another feature claimed for the device is its ease of installation. The boss of the casting has a standard $\frac{5}{8}$-in. thread and accordingly fits almost any type of roof construction without special attachments. If an expansion or other type of bolt is used, the hanger attaches to the stud in the usual fashion. Two setscrews mounted at right angles provide connection to the end of a $1\frac{1}{4}$-in. pipe. The over-all height from bottom of insulation to top of casting is $2\frac{13}{16}$ in. When pipe suspension is used, the distance from the end of the pipe to the bottom of the insulation is $1\frac{11}{16}$ in.

Ohio Brass "Air-Gap" Hanger





Triple Feeder Hanger

To avoid the accumulation of water in the pipe socket, a drain hole is provided in the casting. Dirigo insulation, which the company recommends for this class of service, is used in the hanger. The routine factory final test of each hanger is made at 7,000 volts, but the company says that the tested flashover value from stud to shell is approximately 20,000 volts.

Another new product of the company is the triple feeder hanger, which it is stated can be accommodated to a variety of roof conditions and affords three points of suspension from a single roof attachment. The new device may be attached to the mine roof by direct connection to the stud of a mine hanger, by fitting to the end of a vertical pipe, or by suspension from an insulated hanger where such insulation is necessary. The boss of the hanger accommodates any mine ceiling equipment with $\frac{5}{8}$-in. threads, or it may be secured to the end of a $1\frac{1}{4}$-in. pipe.

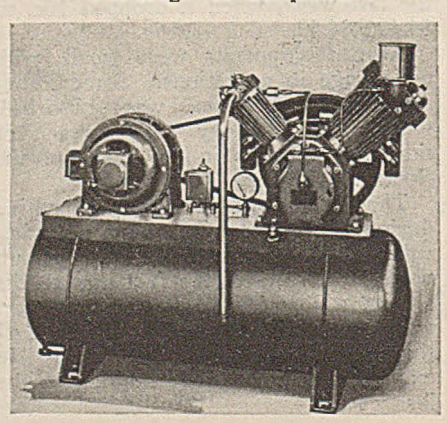
Operators who have several circuits to be strung through haulageways will find this hanger economical, both as to material and installation cost, the company claims. One of the outside studs may be used to support the trolley wire from clamps and insulated hangers, while the other stud may be used to carry the feeder wire similarly supported. This leaves the center stud for a telephone wire suspended from a clip or other device. A combination said to be used under certain conditions is that of suspending the positive and negative d.-c. feeders on the outside studs, retaining the center one for a large, 3-phase, a.-c. feeder cable.

New Air Compressor Units Are Self-Contained

The Ingersoll-Rand Co., New York City, has announced a new line of air-cooled, two-stage compressors, known as the Type 30. A V-type belt drive is employed and both motor and compressor have ball bearings. The units are self-contained, the motor and compressor being mounted on a steel base which is attached to the top of the air receiver. With this arrangement, the company asserts, no special foundation is required for correct alignment of the compressor and motor, and the compressor is ready to operate as soon as the electrical connection can be made to the motor and the crankcase filled with oil.

The intercooler is located behind the fan-type flywheel and a constant current of air is driven directly across the cooling coils, reducing, it is said, the

Ingersoll-Rand, Air-Cooled, Two-Stage Air Compressor

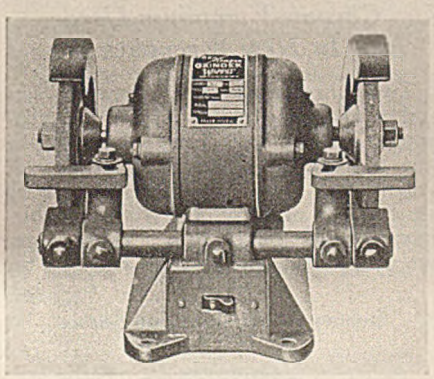


temperature of the discharge air. Automatic start and stop control, which is furnished as standard equipment, operates independently, but in conjunction with the unloader. When the pressure in the air receiver reaches a point at which the regulator is set to unload, the motor is automatically shut off. A centrifugal governor allows the air in the high-pressure cylinder and the intercooler to exhaust through the crankcase, preventing the compressor starting against a load.

Other features claimed by the company are as follows: Honed cylinders and two oil rings, reducing oil in discharge air to a minimum; oil reservoir formed by the base of the compressor, eliminating an oil pump; self-cleaning air cleaner; elimination of dirt by entirely inclosed construction and destructive vibration by balanced crankshaft, and a 10 to 30 per cent reduction in power required, with less floor space. These compressors may be obtained in four sizes: ¾, 1½, 3 and 5 hp.

Electric Bench Grinder Is Portable

Wappatt, Inc., Pittsburgh, Pa., has added to its line a portable electric bench grinder for general grinding purposes and tool sharpening. The company claims that it is light enough to be easily moved from place to place, yet

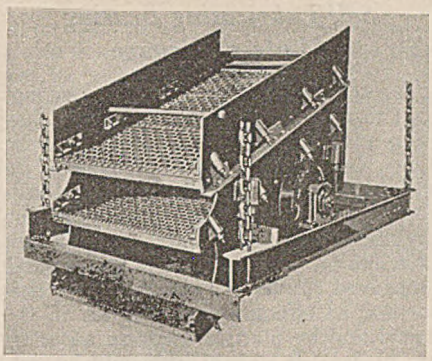


Wappatt "Red Streak" Bench Grinder

possesses plenty of power for the uses for which it is designed, in addition to being sturdily constructed. Two 6-in. grinding wheels are provided, equipped with adjustable safety guards. Perfect balance and absence of vibration is claimed. The switch is located at the base for convenient operation.

Vibrator Screen Offered

The Stephens-Adamson Mfg. Co., Aurora, Ill., now offers the "S-A Vibrator," a power-actuated screen which the company believes to be correctly designed and built to give satisfactory separating service over long periods. Ability to develop positive vibration has been incorporated in the machine as a fundamental principle, the company states, along with a sturdy con-



Triple-Deck S-A Vibrator

struction that will withstand constant vibration without detrimental effects on the life of the equipment. These screens are available in different widths and lengths, ranging from 2x4 ft. to 5x8 ft. in either single-, double- or triple-deck assemblies.

Sixteen features of importance in the construction of this machine are pointed out by the manufacturer, as follows: positive vibration; grid-type screen support; suspended sub-frame; high duty, self-aligning ball and roller bearings; pressure lubrication; bronze grease seals; adjustable balancing device; rigid cross member; standard screen panels; quick-action clamps; demountable mechanism; detachable deck construction; stone box; adjustable angle of inclination; V-belt drive, and inclosed, fan-cooled driving motors.

Plugs and Receptacles For High Frequency

New products announced by the Crouse-Hinds Co., Syracuse, N. Y., include plugs and receptacles for high-frequency tools and an interlocking safety switch condulet. The plugs (Type BP) and condulet receptacles, the company states, provide means for a safety circuit or grounding conductor, and are N.E.C. standard for such conditions. They are for use with the new high-frequency portable tools recently placed on the market for grinding, drilling, screw-driving and nut-running. The electric tools have a 220-volt, 3-phase, 3-wire, 180-cycle rating. A motor-generator charger is used to supply potential to the plug receptacle line. The 180-cycle frequency, it is said, increases the speed approximately three times, resulting in a powerful, light-weight tool. Normally open switches in the tool handle aid materially in protecting the tool against overload.

The 30-amp., 3-pole, Type BP plugs are suitable for use with either small or large tools. Provision is made on the plugs for a grounding wire in the cable to connect the frame of the portable device to the shell of the plug. The grounding, or safety circuit, is completed through the shell, the detent spring, the receptacle housing and the conduit system. The detent spring in the plug has three branches, two of which make contact before and break contact after the main circuit contacts. Four styles of the condulet receptacles may be obtained; with spring door, plain, threaded and with brass cap.

The interlocking safety switch condulets (Type FSQ) are for use with small portable electrical appliances, such as hand lamps and portable tools, or for similar purposes where switches and plugs are used, especially in locations where dust and gases are present. It is furnished complete with tumbler switch, vaporproof cover; Hubbell 3-pole, twist-lock receptacle and plug, and a cast Feraloy door. The switch is a standard, 20-amp., 2-pole, single-throw tumbler switch and operates in a vaporproof compartment. Provision is made for connecting the Type FSQ device to a ¾-in. rigid conduit.

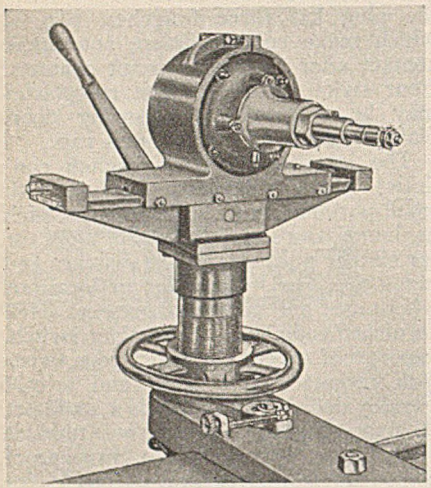
Asbestos Used to Insulate Motor Cables

Permanence, resistance against deterioration and high insulation resistance are features of the AVC cable, according to the Rockbestos Products Corporation, New Haven, Conn. This cable, designed for use as motor leads in coal-mining equipment, is made up of a wall of felted asbestos directly over the conductor. Three layers of varnished cambric are then placed over the asbestos, and are followed by another wall of felted asbestos. The outer layer consists of an asbestos braid, both walls and the braid being impregnated with a flameproof and moisture-proof compound. As the cable is fireproof in construction, the company says that it may be used with entire safety in wiring equipment where considerable heat is present and there would be danger of fire with the ordinary rubber covered cable.

Commutator Undercutter Motor-Driven

New products announced by the Martindale Electric Co., Cleveland, Ohio, are a lathe-type, motor-driven commutator undercutter and an adjustable "growler" for testing armatures. The undercutter is designed for mounting on a lathe and, the company states, is especially adapted for undercutting commutators in shops where it is customary to pull the armatures out of the motors for overhauling. Advantages claimed for the equipment are as follows: sturdy construction; accurate and sufficiently speedy work; adaptability to varied conditions; positive action, and direct drive, without belt and pulley complications.

The "growlers" furnish, the company claims, a means of reproducing in a d.-c. armature or a wound a.-c. rotor, without assembling in its housing, the same conditions under which it will operate when assembled in its motor. By thus



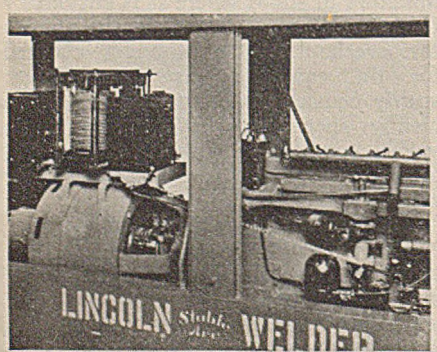
Martindale Lathe-Type, Motor-Driven Commutator Undercutter

testing the armature before it is assembled in its housing, it is said that labor can be saved and defects discovered promptly. The external type is for use with armatures and may be secured in five sizes for use with armatures from ¾ to 20 in. and larger in diameter. Two sizes of the internal type may be had, one with sufficient current to test stators 5¼ to 30 in. in diameter and the other with current for stators 5¼ to 72 in. in diameter.

Idling Device Controls Arc Welder

An automatic idling device or throttle control for regulating engine speed in Lincoln "Stable Arc" welders of the gasoline-engine-driven type has been perfected by the Lincoln Electric Co., Cleveland, Ohio. The new device automatically increases the speed of the engine from normal idling speed to the proper speed for welding service whenever the arc is struck. When welding is discontinued, it automatically reduces the engine speed to normal. In addition, it is claimed that a momentary interruption in welding will not cause a reduction in speed of the engine. The company estimates that the use of the automatic idling device will effect a saving in fuel consumption of approximately 25 per cent.

Automatic Idling Equipment Installed on "Stable-Arc" Welder



Self-Lubricating Bearing Made of Bronze

A self-lubricating bronze bearing, said to be the only one of its kind, has been announced by the Johnson Bronze Co., New Castle, Pa. According to the manufacturer, it provides for a uniform area of bearing surface on the pressure line and insures an efficient distribution of lubrication compound. Improved results are obtained by a new method of effecting indentations in the metal and by placing them on an angle of 30 deg. It is said that only by cutting these indentations can an effective receptacle be formed for the lubricating compound.

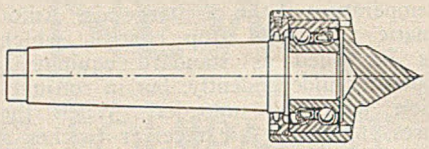
The bearing is recommended by the company for use with machinery and parts subject to intermittent or periodical operation, such as brake levers, clutch levers, shock absorbers, rocker arms, slow-running journals, starting motors, landing gears, guide rollers, sliding door rollers and similar applications.

Tailstock Live Center Has Ball Bearings

The greatly increased speeds at which metal removing machines now operate, in order to take full advantage of the new cutting tool materials, have practically necessitated the use of anti-friction bearings in the work-centering devices of many machines, according to the Ready Tool Co., Bridgeport, Conn., and led to the development of the new ball-bearing tailstock live center now offered by the company. Giving, the company claims, a rigid and non-deflecting support for the work, the device is said to eliminate chatter and thus protect the edges of cutting tools made of the new high-speed material.

A New Departure double-row bearing of the angular contact type is employed, it is stated, and is so assembled that the two rows of balls are opposed in a definite preloaded condition, giving rigid and accurate support. Features pointed out by the manufacturer are given below. When the center is set up, the work is brought close to the tailstock proper, so that the rigidity of the bearing is not offset by the deflection of other parts. The housing closure or seal is located on the side opposite up, the work is brought close to the the direct force of the cutting compound. In addition, the rotating housing helps to keep the lubrication in, but throws compounds and chips away from the seal.

In this center, the bearing is so mounted that the outer race rotates with the nose and is ground after assembly, causing it to run true. Since the center nose rotates with the work, regrinding is infrequently required. If necessary, it may be readily accomplished without removing the center from the machine. The nose is driven by a belt around the bearing housing while a cut is taken by a small grinder adjusted to the angle of the point. The center may be obtained in the most used taper sizes, and special sizes will be made to order.



Ball-Bearing Tailstock Live Center

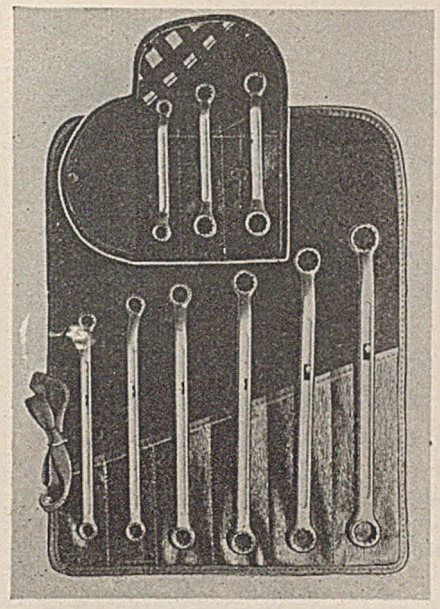
Large-Bore Manometer

With a view toward overcoming the difficulty often met in filling manometer tubes of the usual type, the Meriam Co., Cleveland, Ohio, has placed on the market a specially designed instrument with a tube of larger bore than is commonly employed. This, the company states, not only makes it easy to introduce the measuring liquid but also facilitates the disengagement of air bubbles which would affect the accuracy of the reading. Another advantage pointed out by the Meriam company is that the bigger bore largely neutralizes the capillary action of the sides of the tube, thus flattening the tops of the liquid columns and making the instrument easier to read.

Chrome-Vanadium Used In New Wrenches

Two chrome-vanadium wrench sets and a complete range of chrome-vanadium sockets have been added to the line of Bonney Forge & Tool Works, Allentown, Pa. The No. 29 wrench set consists of three short-type, double-hexagon box wrenches. These three wrenches are said to take care of the

Bonney Double-Hexagon Socket



No. 29 Set (Above) and
No. 31 Set (Below)

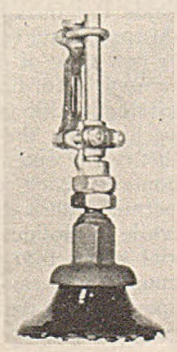
six most commonly used nuts and bolts. The No. 31 set consists of six double-hexagon, double-end box wrenches of the regular length—and are the 12 most frequently used sizes, according to the company. These wrenches are broached with double hexagon openings, making it possible, the company claims, to remove nuts or bolts even though obstructions will permit only a one-twelfth turn at a "bite."

Chrome-vanadium is employed also in the manufacture of a new line of double-hexagon sockets. Because of the great strength claimed for the alloy steel used, the company states that it has been possible to design these new sockets with very thin walls. They are covered by the Bonney guarantee "to replace, free of charge, any wrench which breaks in service."

New Guide Clamp Stops Breakage of Conductors

A frequent cause of trouble in outdoor station installations is the fact that the conductors often break as the result of crystallization close to the point where they are rigidly held to the connection members of oil circuit breakers, transformers and disconnecting switches. This danger has been eliminated by a guide clamp recently placed on the market by the General Electric Co.

The clamp is made in a variety of sizes suitable for attachment to conductors in sizes from No. 2 A.W.G. up to 2½ in. iron pipe size copper tubing, and can be applied to the terminals of standard outdoor station apparatus, and to tubular conductor connector fittings in outdoor bus work.



Extended Guide Clamp

Endless Cord Belt Of New Design

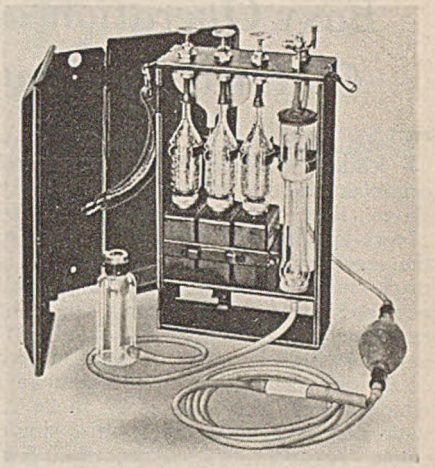
The Goodyear "Compass" endless belt, a new design of endless cord transmission belt, has been announced by the Goodyear Tire & Rubber Co., Inc., Akron, Ohio. This belt, according to the manufacturer, differs from ordinary fabric belts, made endless with a splice, in that it has no splice in the core of cords which carries the load. The cords are imbedded in rubber and are covered by an elastic, rubberized, fabric envelope. This envelope takes all of the surface wear and, since it is elastic, all of the load is properly thrown on the load carrying cords.

Goodyear "Compass" Endless Cord Belt

Advantages claimed are that the belt is practically stretchless, extremely flexible and much thinner than previous designs of equal power capacity. It is recommended by the manufacturer for belt drives on such equipment as air compressors, vacuum pumps, rock drills, ice machines, feed grinders, wood cleaners, spinning frames, Lenix drives, Pullman drives and other high-speed small pulley drives. Cut lengths for oil field work and for cone drives in textile plants may also be secured.

New Features Claimed for Gas Analyzers

Features claimed for the new Hays improved gas analyzer (Orsat) now being marketed by the Hays Corporation, Michigan City, Ind., are as follows: Light weight and compact design; heavy molded-glass absorption pipettes, which are attached to the molded hard-rubber chemical bottles with soft rubber gaskets and finger compression nuts; steel wool method of gas absorption, making it possible to take a CO_2 reading in 30 seconds and a complete analysis for CO_2, O_2 and CO in from 4 to 5 minutes; Monel metal needle valves and easily renewable nickel needle valve seats instead of pinch clamps and stop cocks; molded hard rubber chemical bottles held in place by a slidable flat spring which can be raised after loosening the holding screw, permitting disassembling of the entire instrument for cleaning in two minutes' time; improved supporting method obviates danger of breakage; the instrument may be carried in any position without spilling or mixing the solutions, and the leveling bottle and aspirator and tubing are clamped inside the case after tests. When the doors are closed, all the accessories are in the carrying case with the tubing so arranged that kinking is impossible.



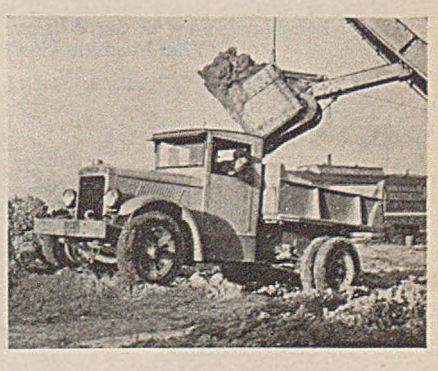
Hays Improved Gas Analyzer

Six standard ranges, the company announces, are available in a light metal carrying case, weighing 8 lb. and measuring 15x7¾x4¼ in. In addition, three special ranges are available in a slightly larger case.

Truck Model Announced

The Model 50D, 6-cylinder truck, in 2-, 2½- and 3-ton sizes, has been added to the line of the Relay Motors Corporation, Lima, Ohio. It is built with wheelbase lengths of 139½, 161 and 185 in., of which the 139½-in. type is particularly recommended by the company for dump-truck operation where short turning radius is an absolute necessity. Five speeds forward and two in reverse are provided.

Model 50D Relay Truck



Easy Operation and Large Capacity Claimed for New Loading Machine

THE WHALEY "Automat" coal-loading machine, similar in general organization to the Myers-Whaley shovel, is the latest contribution of the Myers-Whaley Co., Knoxville, Tenn., to the mechanical loading of coal. It is track-mounted, self-propelling, and powered with a single motor. The front end, carrying the shovel and front conveyor, swings laterally through an arc of 90 deg., according to the company, which asserts that a place 22 to 24 ft. wide can be cleaned up from a single track. An accurate movement of 40 deg. is possible with the rear conveyor also, allowing the machine, according to the manufacturer's statement, to load cars on curves or, in some cases, on parallel tracks.

Outstanding features pointed out by the maker are as follows: large capacity, with a maximum of over 4 tons and an average of over 2 tons per minute; minimum degradation as a result of improved shovel design. In service, coal loaded by this machine showed an increase in lump and a decrease in screenings as compared to coal loaded by hand; perfect "clean-up," with no coal left to be loaded by hand; ease of handling and flexibility. The machine can be trammed through places as narrow as 5 ft. 8 in. and can negotiate small-radius curves; and has high mechanical efficiency, which is reflected in the low power consumption per ton of coal loaded. A detailed description of the construction and operation of the machine, as set forth by the manufacturer, is given in the following paragraphs:

Two principal new features have been incorporated in its design. The first is the shoveling mechanism, which consists of a wide, short, one-piece shovel, supported in inclined guides at its lower rear end and also connected at this end to driving rods for moving the shovel backward and forward. Another set of driving rods for tilting the shovel is connected to ears on the side pieces. In the position shown in the accompanying illustrations, the shovel is being forced forward parallel with the floor to enter the coal. Then the lifting rods, which are set in advance of the reciprocating rods, lift the front end of the shovel so that the material slides backward onto a receiving plate below the shovel and between the guides. The reciprocating and lifting rods work together, moving the entire shovel backward along this plate and forcing it onto the conveyor.

The entire action of the machine is continuous and automatic and, due to the short distance through which the coal must be lifted, the shovel operates smoothly at a comparatively rapid speed (40 to 50 strokes per minute). Forty-seven inches is the width of the shovel and, when full, it carries 300 to 400 lb. of coal. Consequently its capacity in loose material is very large. A capacity of 4 to 6 tons per minute has been registered in timed tests and in underground operation, an average of over 2 tons per minute has been noted.

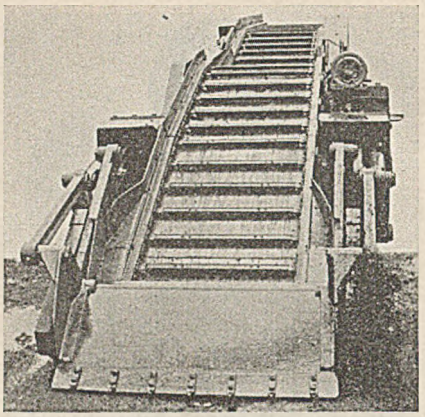
The shoveling mechanism is mounted upon a yoke for vertical adjustment, which is effected very rapidly by means of a hydraulic jack. As a result, the shovel can be set to load several inches above, or to make a bottom 10 in. below, the track level. The control is very sensitive and the operative is able to set the shovel so it will work on a soft bottom without digging into it. The receiving plate below the shovel also serves to insure a perfect "clean-up," and, with this machine, little if any hand cleaning is necessary in a room. This construction also makes it practically impossible to derail the machine in the ordinary course of tramming or loading.

Another new feature which is peculiar to the "Automat" is the parallel-lift rear conveyor. This is so arranged that the operative, by turning a valve, can adjust the height of the conveyor to suit the height of the car or drop it to work under a low roof—a valuable feature where there is little headroom. Bearings on the machine are fitted with automatic pressure cups and Alemite lubrication for quick and easy greasing. The driving rods and connections to the shovel are fitted with hard steel bushings and pins. Dependability of service and low upkeep have been kept in mind in its design and construction.

In addition to the efficiency of the shovel mechanism, the machine is easy to operate. It does not require reciprocation, but advances continuously into the pile of coal—making the handling of the car under the rear conveyor easy.

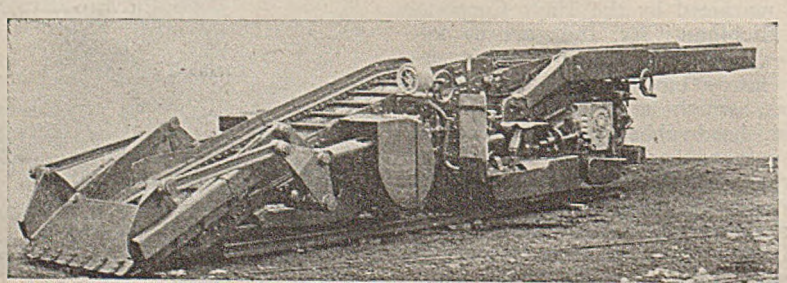
One of the principal advantages of the "Automat" is the gentleness with which it handles the coal. Tests in the mine, loading very fragile coal, show that the proportion of lump in the coal loaded by it is 2 or 3 per cent greater than in corresponding coal loaded by hand. In view of its large capacity, the actual power consumption is between 20 and 25 hp., indicating a considerable advance in mechanical efficiency.

The machine shown in the illustrations is built on the No. 3 chassis, and has a minimum height of 48 in. to the top of the guards on the rear conveyor and 42 in. to the top of the troughing plate. This height is possible with the rapidly adjustable rear conveyor frame. With lower rear conveyor frame such as the one used on standard Myers-Whaley shovels, a minimum over-all height of 45 in. is obtained, with 39 in. to the top of the conveyor trough. Two traveling speeds are provided. One, 70 ft. per minute, is used in loading and the other, 200 ft. per minute, for tramming. The same type of shovel also is built on the No. 4 frame, giving a minimum over-all height of 54 in. above the rail. This machine is capable of cleaning up a 24-ft. room from a track in the center.



Front View of the Whaley "Automat"

Left-Hand View of the Whaley "Automat" Coal-Loading Machine (This Machine Has Permissible Equipment)



Flexible Coupling Refined

Improvements made in the standard flexible coupling of the Poole Engineering & Machine Co., Baltimore, Md., include the installation of a combination dustproof and centrifugal oiling feature. A new type of double-flanged end plate is used, according to the company, containing within its inner lip a deep felt packing for the exclusion of dust and dirt. The outer section is grooved and contains back drain oil holes which permit lubrication of the coupling while in motion. In addition, the material going into the manufacture of the coupling is said to be subjected to a special heat-treating process, and all parts have been made interchangeable.