COAL AGE

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

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Retort Courteous

THE TVA SUGGESTION, addressed to its outstanding critics in the coal industry, that the Authority is eager to engage in a research program to develop a greater utilization of coal from the Tennessee Valley, moves C. A. Bockus, president, National Coal Association, to observe gently that the TVA power program jeopardizes 6,000,000 tons of annual production. This, in a year of normal activity, would throw 6,000 mine workers out of their jobs. The mining industry, which already has planned research on a national scale through Bituminous Coal Research, Inc., naturally welcomes any project that has increased consumption as its objective. Sponsorship of such research by an agency actively engaged in a campaign to wreck existing markets for coal, however, hardly can be expected to move the industry to wild jubilation.

Underdraw

THE EXPRESSION "underdraw" was coined to designate the squeezing of clay from under a big pillar toward its edge, or edges—a movement so commonly recognized that no name seemed needed for it until it was found how active it was in the very heart of the pillar. Underdraw has nothing to do with "draw"; it does imply the tension of anything, as draw does, but the word has become so well established that search for a more expressive designation seems futile.

Plastic masses under compression move toward points of lower pressure. What is more natural, therefore, than that the clay would be squeezed into the goaf, which is often not loaded at all? But if the load on the edge of the pillar is greater than in its heart, that unbalance would tend to drive the clay not only into the goaf but toward the heart of the pillar. In this latter direction it could not well travel to any extent, but the tendency to move inward would effectually inhibit any disposition to travel outward. It seems obvious, therefore, that as clay moves from points in the heart of the pillar toward its edges there must be points within the pillar more heavily laden than those at the edge.

The phenomenon underdraw therefore confirms the idea that pressures are greatest somewhere in the pillar and not at the face, and that if safety is sought, headings should avoid these highly stressed areas.

Intermission

WITH THE APPOINTMENT of John Wellington Finch as director of the U. S. Bureau of Mines last month the curtain falls on another act in the tragi-comedy which began with the Roosevelt election and rose to a new climax of absurdity on July 2 when the induction into office of the new director was hastily called off on the discovery that his commission had been "held up temporarily because of political objections by P. M. G." On the basis of of training and experience, Mr. Finch appears to be well qualified for the post he now holds. Friends of the mining industry must unite in wishing him every success in restoring the Bureau to the position it occupied before curtailed appropriations, decentralization and dismemberment, ostensibly undertaken

in the sacred name of economy, so weakened its service and its influence.

Loud hosannas that the Secretary of the Interior has snatched the directorship from the patronage bag of the Postmaster General, however, should not make us indifferent to the fact that the appointment represents a distinct break with the tradition that heads of technical bureaus should not fall with a change in national administration. Regardless of the new incumbent's admitted qualifications, in the larger sense this break with tradition makes the appointment a political one. Whether there is any greater virtue in Mr. Ickes' politics than in Mr. Farley's brand remains to be seen. Beyond that, the new precedent having been established, upon another change in administration, Mr. Finch's tenure becomes as insecure as that of his predecessor.

Emphasis is placed upon the political aspect of the situation because, in a technical bureau, policies and plans must flow from the chief of that bureau. If the position is to be one of the political spoils, long-range planning, so essential in the determination of a national government policy on mineral resources, becomes increasingly difficult. Morale also suffers. It is not too soon for an aroused mining industry to impress upon the politicians of both major parties that the old tradition and not the new precedent must prevail in the future and that no technical bureau chief should be required to work in the shadow of the political axe.

Routing

WHO should receive a report is a question too often left to the man who makes it. If he makes it to a manager, he is regarded as telling tales. If he makes it to a superintendent, it may be pigeonholed, if not flouted and disregarded. The man making the report should be able to justify himself for the routing he gives it, and he can keep his action from misrepresentation only by positive orders, given in writing. His sole responsibility, if he routes his report as ordered, is for the correctness of the report. With reports in duplicate or triplicate, his reports get immediate attention, and on promptness of reporting depends the value of any report he may make. When a report to the manager is demanded, the superintendent and foreman can regulate his actions to conform with the fact that the manager has been informed, and he cannot condemn his equal or subordinate for the action he has taken.

Storekeepers kept informed as to the relocation of equipment can keep a record of the location of all equipment. Dispatchers properly informed can be governed in their work by the reports made. When writing was an unusual accomplishment, written reports were impossible. Today even the miner can fill requisitions for material. Such written reports can be filed, if the recipient is busy, and used later for making a combined report. When forms are furnished, questions can be supplied so that the report maker will not fail to check all items and give answers accordingly and without annoying omissions.

Seasonal Exemptions

IF OBJECTION to the 7-hour day and the 35-hour week as the norm per shift in bituminous mining still exists, it has ceased to be vocal. But, as the time draws near when fall and winter orders should call for more tonnage, particularly from mines leaning heavily upon the domestic market, the question of seasonal exemptions again becomes pertinent. Double- or triple-shifting may not be justified by the additional tonnage involved, and employment of more men on a single shift, even if practical, may work hardship and injustice to regular workers denied the opportunity of full-time employment in the spring and summer months. The question certainly seems to be entitled to more consideration than it apparently received at the time NRA imposed the new maximums last spring.

Check of the first 400 codes approved shows that in only ten cases, excluding bituminous coal, was a 7-hour maximum fixed. Moreover, in each of these ten cases provision was made for a flexible working week of 35 to 54 hours. That bituminous coal should have been among the few major industries to acquiesce in the establishment of the shorter work-day and the shorter work-week is a distinction of which it may well be proud. It revealed a genuine willingness to go along wholeheartedly with the recovery movement. But that willingness should not operate as a barrier against consideration of proper seasonal exemptions which in nowise break down or menace the basic minimums.

CONVEYOR MINING

+ Enters Picture in Southern Fields

In Response to Changing Conditions

A FEW years ago many companies in the Southern fields experimented with conveyor mining, but in Alabama only did hand-loading into face conveyors become a regular practice on a large scale at several mines. Within the last year, however, conveyor mining has made tremendous strides in the general territory comprising southern West Virginia, Virginia, northern Tennessee and eastern Kentucky. A recent survey of mines in this territory reported to be using underground conveyors revealed that over 100,000 tons per month is thus being loaded and indicates that in a few months the figure will be more than double that amount.

The increased loading rate granted to labor by the code is popularly given as the basic reason for this rush to conveyor mining, but in this survey the personal interviews with executives of companies using conveyors revealed a number of other reasons, several of which, in some instances, outrank that of reduced cost. Although several companies admit an attractive saving, it is significant that one installation reputed to be making a handsome reduction in production cost was perfected before the increased labor rates were in sight. The survey also revealed that existing systems of conveyor working, as regards face length and recovery, are now few in number and that three-fourths of the mines use essentially one system.

Nineteen mines have conveyor equipment in use and officials of many other mines are seriously contemplating its adoption within a year. For obvious reasons, no attempt was made to obtain a complete list of mines for which conveyors are contemplated, but authoritative information was collected for eleven mines where conveyors are planned.

For room transportation, chain conveyors are used at fourteen of the mines, shaker conveyors at three, and both shaker and chain types at two. Of the twelve installations made since Jan. 1, 1933, two are shaker, one is shaker and chain, and nine are chain. The principal reason advanced for the selection of the chain-type conveyor is that it can be reversed to carry timbers to the face. Another reason advanced in several instances is that the maintenance cost of this type is lower. A report is current that one manufacturer will soon offer a reversible shaker. As to the maintenance feature, it should be noted that in several instances the comparisons were based on shaker equipment manufactured a number of years ago. It is reasonable to assume that the improved shaker equipments now being offered can be maintained at a much lower cost than the older equipments.

The mining system now being followed at more than half of the mines is to drive a room 40 to 75 ft. wide and 275 to 300 ft. deep, and abandon the pillars. Room width depends upon top conditions and method of paying the crew. Only one of the mines working the room system is uniformly successful in taking the pillar with the conveyor upon retreat from the room. Several others are making the attempt, but it is doubtful if they will meet with success.

Because the conveyors are used in every instance in low coal, and in many cases in coal, or in a split, so thin as to have been considered unprofitable to work, there has been a tendency on the part of the landlord or lessor to reduce minimum royalties or lower the percentage of recovery. In certain cases where the mining company owns the mineral there is no worry about the small pillars abandoned. Quoting one executive: "What do we care about the small pillars left if we can mine the room coal cheap enough to make more total profit than by taking the pillars?"

When percentage of recovery is considered the longface installations are outstanding. The face lengths at these mines range from 95 to 300 ft. On the 300-ft. face the work is progressive and insures total recovery of the panel. In the other installations, relatively small pillars are left between wide rooms. These pillars crush as the top caves from one to three rooms back of the place being worked. Apparently only a small percentage of the mines have roofs sufficiently strong close above the coal and yet sufficiently weak above so that falls occur at the right time and to sufficient height to make the method based on the wide room and narrow safety pillar workable.

The range of coal thicknesses being worked with conveyors at the nineteen mines is 18 in. to 52 in., but the lower limit of regular working is 22 in. The 18-in. coal that is worked at one mine occurs only through rolls in a seam that runs up to 48 in. The average thicknesses in inches at each of the 19 mines are: 22, 29½, 30, 32, 32, 33, 33, 33½, 36, 36, 37, 37, 39, 40, 40, 42, 42, 42 and 52.

In a number of cases, the major reason for the installation has been difficult to separate, but an attempt to classify the first, or most important, reason gives results, in number of mines, as follows: five mines, speed of production or development to fill orders to regular customers or handle new contracts; three, lower production cost; three, depletion of thicker seam, making it necessary to begin mining coal too thin to work with cars in rooms; two, production of cleaner coal; two, production of large lump and/or a higher percentage of prepared sizes; one, weak top, preventing the use of cars on track parallel to slabbing face; three, miscellaneous reasons.

Lower cost of mining figures in practically every case, although many of the installations are as yet so new or incomplete that the real advantage of low cost has not been attained. At one mine a higher cost appears certain, but the increased realization by reason of larger coal exceeds the difference. Mother conveyors are planned for sev-

Locations of Conveyor Mines in General Territory Covered by Survey.

eral mines, but as yet are used in only two. In each instance, these mother conveyors are belts. It is the general opinion that the lowest costs are realized only with a complete unit of four to six room conveyors feeding onto a mother conveyor installed on the panel heading.

Four of the conveyor installations are in new mines opened in low coal; four are in old mines in territory so low that it was skipped in the regular mining; two are in old mines in territory where the parting is so thick as to render taking both benches, or splits, unprofitable, thereby limiting mining operations to but one bench; and one in a mine where one bench instead of two is worked, because the one bench produces a much higher quality coal than both.

Six mines out of the nineteen pay the face workers a day rate, others pay on a piece-rate basis such as per foot of face loaded, per cut or for contract or gang work. It is significant that two mines recently were changed from the day-rate to piece-rate basis. This action coincides with the opinion voiced by the majority of operators that the day rate is not successful. An exception is one mine where the tonnage per man, including the foreman of the unit, is in the highest bracket. At this mine, face men, excluding the machine man and helper, are paid the unskilled labor rate. Although $4.76 is the minimum 7-hour rate specified in several districts for conveyor face men, the workers are able to make $6 to $7 per shift at certain mines where the pay is on an accomplishment basis. In several of the fields the wage agreements make no mention of conveyor loading.

Productions per shift per man at the face, which includes the work of conveyor extension, cutting, drilling, shooting, timbering and loading onto the conveyor, vary from 4 tons to 16 tons at the various mines. Conveyor work in one mine with coal 31 to 33 in. thick produces an average of 10 tons per man per shift, including the foreman of the unit and the motorman who delivers the coal to the parting.

Ten of the mines that work rooms up to 70 ft. in width operate two shifts and three operate three shifts. Of the ten, however, two are about to be changed to three shifts. The conveyor operations employing 180- to 300-ft. faces load on one shift and reserve the next shift for cutting, conveyor moving, timbering and other activities. Although most of the operators agree that conveyors must be worked two shifts to make the investment in conveyor equipment and extra mining machines pay, there is a wide diversity of opinion as to whether it is practicable to operate three shifts. Apparently it can be done in most cases, but considerable planning may be necessary in order to work out a satisfactory system of delivering materials and taking care of inspections and repairs between shifts.

During the survey, operators who have had experience with conveyors were asked for their opinions as to the height of coal below which it would pay to equip for conveyor mining instead of taking mine cars to the face. The assumption was a roof condition favorable to conveyors and the availability of modern low-height cars and locomotives. One was of the opinion that conveyors enter the picture only when the coal is below 30 in., but many agreed on a height of approximately 36 in. A few feel certain that conveyors show economy below 40 in. Character of the coal, as determined by size of lump to be loaded or demanded by the market, has much to do with the height within which coal can be loaded into a mine car without taking top or bottom in the room.

Apparently there is need for more experimentation and study of the most advantageous depth of undercut for conveyor mining. In many cases, considerations of shooting or breaking down the coal, lump percentage desirable, and general action of the face dictate a definite ratio of undercut depth to coal thickness. However, there are, apparently, many instances where these considerations do not apply or at least where they may be outweighed by the factor of depth of cut the crew can clean up once or twice per shift. The experience of one operator indicates that the same crew can clean up two 8-ft. cuts per shift almost as easily as they handled two 5½-ft. cuts previously.

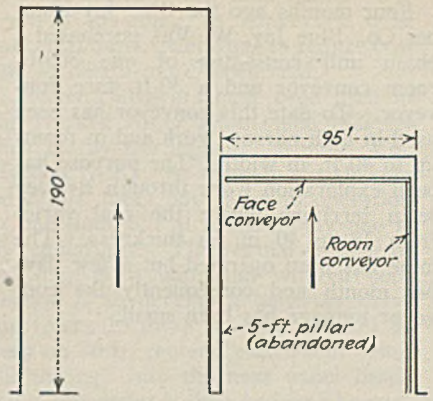
Of the eleven mines mentioned as candidates for conveyor mining, instal-

lations are classified as follows: Four will be in new openings in thin seams, two are projected to reduce mining cost, one to increase lump and decrease cost, one to speed driving rooms so drawslate can be held in place, one to mine one split where the parting is too thick to handle, one to mine territory skipped as being too low, and one for speeding the driving of headings for a drainage project in 36- to 48-in. coal.

At numerous mines, the thicker seam first opened is nearing exhaustion, with the result that the companies must soon turn to a thinner seam available on the property. This is particularly true of the Winding Gulf field, where most of the mines were opened about the same time in the Beckley seam. One of these mines was finished within the last month, and several others will be about through in two years. To most of these plants the Pocahontas No. 3 seam, lying at lower elevation and less than 4 ft. in thickness, is available. Considerable core drilling is now being done in the field to prove areas to be opened. In nearly every case it is the intention to operate with conveyors.

As to size of the nineteen going conveyor installations, the total output per day from conveyors at these mines ranges from 40 to 2,000 tons. The accompanying map indicates the approximate locations of these operations.

At the Riverton Coal Co. mine, Crown Hill, W. Va., the Coalburg seam had been nearly exhausted, with the result that mining was no longer profitable. In May, 1933, a new opening was started in the Cedar Grove seam, 34 to



Plan of Working at Leckie Collieries Co. Operation.

36 in. thick and free of parting. The Cedar Grove is a high-volatile coal and a contract was secured for delivery of 10,000 tons per month to a chemical concern. Because of the thinness of the seam and the necessity for speed to fill the contract, conveyor mining was adopted. Equipment consists of three 10-hp. shaker units, each equipped with 400 ft. of pans and one 90- and one 30-deg. angle turn. The 30-deg. turns are angle swivels adjustable between 0 and 30 deg.

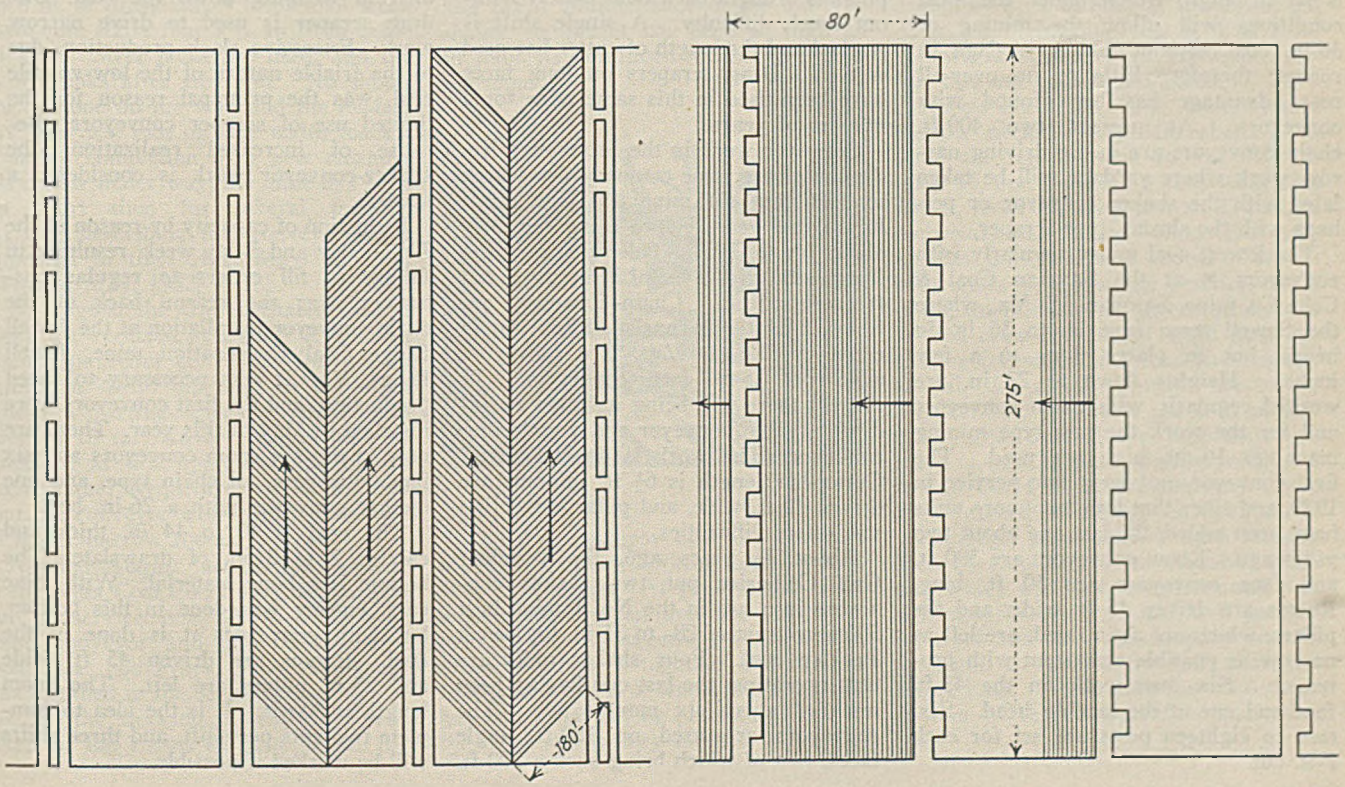
Rooms are driven 70 ft. wide, leaving pillars as narrow as is deemed safe. These pillars are abandoned. The face pan is driven from the room conveyor by means of the 90-deg. turn. About 12,000 tons per month is being loaded with the four conveyor units, and for the most part these are worked three shifts. In narrow work (24-ft.) six cuts are loaded in 24 hours, averaging 54 ft. of progress. Roof is a hard blue slate and only a few safety posts are needed in the rooms. The mine bottom also is favorable. In narrow work, four face men produce 40 tons per shift and in rooms seven face men produce 84 tons. This includes conveyor extension, cutting, drilling, shooting, loading and timbering.

In July another opening was made in the Belmont seam, consisting of a splinty coal 42 in. thick and free of parting. Although the shaker conveyors have been quite satisfactory in the other seam, chain conveyors have been installed in the Belmont. Present equipment consists of one 300-ft. room conveyor and two 52-ft. face conveyors. Chain conveyors were given the preference because of provision for reversal for hauling timbers, slightly greater capacity and positive action.

Because of adverse natural conditions, a neighboring shaker-conveyor installation, at the the Great Kanawha Barge Line mine, has not been so successful. About May 1 there was installed one 300-ft. shaker unit to work in the 42-in. Dorothy seam under tender top. The conveyor was first tried in narrow work and is now being tried in driving a 30-ft. room and bringing back the pillar on an angle face about 60 ft. long. Bad top, water and local grades have been the principal difficulties. The conveyor will not move the wet coal up the adverse grades encountered. About 25 tons per shift was the conveyor production in narrow work.

In 1931, a new company, the Wini-

Left, Indicating Method of Working Shaker Conveyors at Winding Gulf Collieries Mine; Right, Plan of Working at Hardburly.



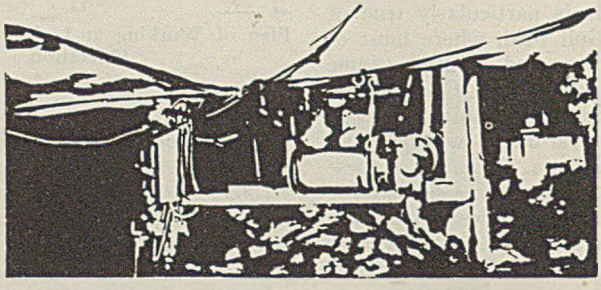
frede Collieries, reopened the old Winifrede (W. Va.) mine, using shaker conveyors to take the 30-in. split of coal in a territory which had not been mined because the parting was too thick to handle. Equipment consists of three 10-hp. drive engines and two 300-ft. pan lines with 90-deg. turns. Faces up to 80 ft. wide were tried, but when a space 80x80 had been mined the top fell and the face was lost. Now the work is confined to 55-ft. rooms and no attempt is made to recover pillars. The greatest difficulty has been in face preparation. Cutting is done in a lamination below the coal and therefore every particle of the cuttings must be removed from the kerf. Scraping this out and shoveling the waste material back over the conveyor takes much time. The men available in the locality are not accustomed to low coal and this hampers their accomplishment. It has not been easy to find high-class machine men who are willing to load coal.

At Powellton, W. Va., the Elkhorn Piney Coal Mining Co., a Koppers company, began to use chain conveyors extensively in the 32- to 34-in. bottom split of the Powellton seam where the parting between splits is too thick to handle, in November, 1933. Conveyors are used in both narrow work and rooms, and as yet no attempt has been made to recover pillars. Equipment consists of twelve room conveyors 310 ft. long and 30 face conveyors. Conveyor units are worked two shifts.

For about five years the Gauley Mountain Coal Co., Ansted, W. Va., has experimented with chain conveyors and with shaker conveyors in 36- to 38-in. coal. The mine-car equipment is 23 in. high, which under the local conditions will allow the mining of 36-in. coal without taking yardage in rooms; therefore little or no over-all cost advantage has been found with conveyors. At present two 400-ft. chain conveyors are in use driving narrow work where yardage will be taken later with the shaker conveyor or perhaps with the slusher-type scraper.

The lowest coal mined regularly with conveyors is at the Saxman Coal & Coke Co. mine, Saxman, W. Va., where the Sewell seam runs up to 36 in. in height but in places thins to a few inches. Heights down to 22 in. are worked regularly with chain conveyors and for the work the new-type mining machines 16 in. high are used. The first conveyor unit went into service in 1929, and since that time two more units have been added, the last one about two years ago. Room conveyors are 300 ft. and face conveyors are 30 ft. long. Rooms are driven 45 ft. wide, and the pillars, which are abandoned, are left as narrow as possible consistent with protection. Six men work on the 45-ft. face and one at the loading head. Sixteen to eighteen posts are set for each 7-ft. cut.

Four months ago the Blue Jay Lumber Co., Blue Jay, W. Va., purchased a chain unit consisting of one 300-ft. room conveyor and a 30-ft. face conveyor. To date this conveyor has been used in both narrow work and in rooms up to 40 ft. in width. The purpose has been exploration work through Beckley seam territory where the coal varies from 18 to 40 in. in thickness. The mine has been operated but a few days per month and consequently the conveyor tonnage has been small.



The C. C. B. Smokeless Coal Co., another Koppers company, has had about a year's experience with chain conveyors in its Glen White (W. Va.) mine. Until recently, two room conveyors and five 12-ft. face conveyors were in use. In addition, there were on hand and scheduled for installation during the latter part of August two additional room conveyors, two 35-ft. face conveyors and one gathering or mother conveyor. The Beckley seam, 30 to 44 in. thick and containing a 0-3-in. parting, is operated. Rooms are driven 40 ft. wide, 200 to 300 ft. deep, and the pillar is brought back immediately without much difficulty. A single shift is worked and the length of cutter bar used is 8 ft. Drag scrapers on long faces have been used in this same mine for a number of years.

Conveyor work in the Stotesbury No. 8 mine of the same company dates back to 1926, but the mine was shut down for several years before being reopened about Jan. 1, 1934. This mine is in the Pocahontas No. 4 seam, 39 in. thick and free of partings. Chain conveyors are in use and these consist of four room conveyors, seven 12-ft. face conveyors and two 35-ft. face conveyors. In August there was being installed an additional room conveyor and a gathering conveyor. The work is double-shifted. Cutter-bar length is 6½ ft. Rooms are driven 40 ft. wide, and pillar extraction still offers difficulties.

About 1½ years ago, the Winding Gulf Collieries put two shaker conveyors into use in the No. 1 mine in a 500-acre tract of 28- to 31-in. top bench Beckley coal. Four shaker units are now operating, the last one having been installed about six months ago. The conveyors are used on 180-ft. angle faces, two of which bring back a 200-ft. block of coal. The blocks are developed by narrow rooms driven in pairs with chain pillars between. These chain pillars, serving as a protection between blocks, are abandoned. Six to 8 in. of drawslate comes down and is shoveled back over the conveyor. Above that, in most places, is about 4 ft. of weak slate. About 30 timbers per cut are set on the 180-ft. face. Cutting, conveyor moving and timbering are done on one shift and loading on another shift. Six loaders clean up a face in one shift. In this section of the mine the lower bench of coal, 14 in. thick, is separated from the other by 12 to 18 in. of parting. With the old equipment of cars, about 40 in. is the minimum height of rooms into which cars can be taken for hand-loading.

The principal reasons for trying conveyor mining were to gain experience, as the company owns a large tract of undeveloped low-seam coal, and to get a higher percentage of prepared sizes. A large increase in prepared sizes has been obtained. Only a few very light shots are fired, these as a start for the men in wedging down the coal. One drag scraper is used to drive narrow work. Excessive slack production, due to the friable nature of the low-volatile coal, was the principal reason for the limited use of scraper conveyors. Because of increased realization, the shaker-conveyor work is considered a success.

Reduction of capacity by reason of the 7-hour day and 5-day week, resulting in failure to fill orders to regular customers, was the reason back of the chain-conveyor installation at the Jewell Ridge Coal Corporation mine, Jewell Ridge, Va. It was necessary to speed production, and the first conveyors were installed in May of this year. There are now in use six room conveyors and six face conveyors, all chain type, and one mother conveyor with a 26-in. belt.

The coal is 40 to 44 in. thick and carries 2 to 3 in. of drawslate. The bottom is a bony material. With mine cars, cutting was done in this bottom, but with conveyors it is done in the coal. Rooms are driven 45 ft. wide and 25-ft. pillars are left. The room length is 300 ft. It is the idea to complete two cuts per shift, and three shifts will be worked if possible.

The Derby (Va.) mine of the Stonega Coke & Coal Co. is worked exclusively by conveyors and is the largest producer of conveyor-mined coal studied. In 1930, conveyors were put to work at Derby in a new opening in a 36-in. seam lying below the high seam. Early efforts were based on the use of belts on long faces. For a while two 400-ft. faces making a block 800 ft. wide were advanced. A strong roof which refused to break and relieve the weight caused abandonment of this method. At present, rooms are driven 75 ft. wide and the pillars are left in place. Face conveyors are of the chain type, room conveyors are equipped with 18½-in. belts and mother conveyors with 26-in. belts. Cuts average 5½ ft. and about 18 posts are set per cut. Five men work at each face and under favorable conditions complete two cuts per shift. The work goes on for three shifts a day.

Early this year a conveyor was put into use in 40-in. coal at the Mayflower mine of the Blue Diamond Coal Co., Bonny Blue, Va. Present equipment consists of one chain-type room conveyor and one chain-type face conveyor. Rooms are being driven 75 ft. wide. As yet the work is only experimental; therefore no idea has been formed as to the practicability of taking pillars. Speed of development and lower mining costs are the principal objects in going to conveyor work. If the work is successful it is the intention to install eight room units and one mother belt conveyor.

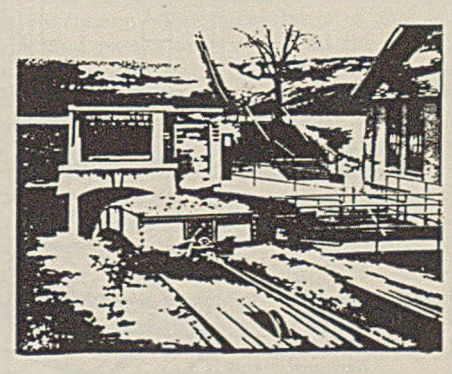
Since 1929 a shaker conveyor on a 300-ft. face has been operated by the Pruden Coal & Coke Co., Pruden, Tenn. It is now in service in Jellico coal, 30 to 42 in. in thickness and topped by 6 to 8 in. of drawslate, 4 to 5 ft. of weak slate and, above that, a 6- to 10-in. seam of coal. Steel jacks are used, and the roof breaks after each cut. No shooting is done on the wall and the loaders are paid per foot of face width loaded. Pending completion of a new cleaning plant now under way, the mine has been on short time for several months. Articles describing this conveyor work appeared in *Coal Age*, May, 1931, p. 234, and May, 1932, p. 185.

In August, the United States Coal & Coke Co. received at Lynch, Ky., three chain-type room conveyors for use in mining a 40-in. top split in a section where a parting appeared and thickened to 18 in. Cover runs as high as 2,000 ft. at this operation and bumps occur rather frequently. It is expected that the conveyor work will be confined to rather narrow rooms.

Another August installation was that of the Ajax Coal Co., Bulan, Ky., which put in service one 300-ft. chain-type room conveyor and one 60-ft. chain-type face conveyor. This equipment was installed in the 32-in. Hazard No. 4 coal, in the working of which top was taken in the rooms to gain height for loading directly into mine cars. Objectives in going to conveyors were concentration of workings to reduce cost and to obtain more block coal.

Shaker conveyors have been used in the Hazard No. 7 seam since 1927 by the Hardy-Burlingham Mining Co., Hardburly, Ky. As many as six shakers on 275-ft. faces have been in operation at one time, but at present only one is in regular use. The regular system of working, both with and without conveyors, is to develop a panel by driving rooms 15 to 18 ft. wide and 275 ft. deep on 80-ft. centers, each room being cut through into the next panel heading. The room is then widened by successive slabbing cuts, working back in the direction of the room last widened. When a cut breaks into any of a series of pockets made along one side of each room as it is driven in the narrow, work in the room is stopped and the pocketed pillar adjacent to the mined-out area is abandoned. Soon after a room is completed the top falls and the pillar stumps between that room and the previously fallen area are crushed.

The coal is 52 in. thick, free of parting and is topped with 12 to 24 in. of drawslate. Ordinary room-and-pillar work was not successful because weight caused crumbling of the drawslate and resulted in dirty coal. With the long-face plan there is not sufficient weight on the face to crumble the drawslate. Ordinarily a track is maintained parallel to the face to accommodate mine cars for a loading crew. Only where the roof is too weak to allow sufficient open space for a track is a conveyor substituted. The conveyor at this mine is looked upon purely as a transportation medium requiring less width than track and cars. Maintenance of the old-type shaker equipment has been so high as to limit its continued extensive use in the mine.



The one conveyor now in operation at Hardburly is working under about 400 ft. of cover. At present the eight loaders working on the face are being paid a gang rate because this particular group works well together and prefers that method. As a whole the company has found that paying per foot of face is the most satisfactory method.

In February of this year the Wells Elkhorn Coal Co. installed one chain unit consisting of a 300-ft. room conveyor and a 42-ft. face conveyor, the principal object being to load cleaner coal from the Elkhorn No. 1 seam, 33½ in. thick. With car mining, cutting is done in the bottom, which is a rather soft material, and 6 to 12 in. of this bottom is taken up in rooms. With conveyor mining the cutting is done in the coal. One of the principal difficulties is a ½- to ¾-in. vein of slate near the center of the bed to which the coal sticks.

Rooms are driven 54 ft. wide and the pillars (20 ft. wide) are abandoned. The undercut is 6 ft. and timbers are set on 6-ft. centers each way. Two 7-hour shifts are worked, and three shifts are not considered practicable. Because this mine is equipped with cars only 20 in. high (12 in. at the back end), with a capacity of 2½ tons level full, and because of adverse parting conditions, the conveyor has as yet not shown economy. Experience has been limited, however, because of slack run for the last two or three months. Under the local conditions encountered it is calculated that to show an economy the conveyor unit would have to handle 60 tons on each of two shifts per day, and that this could be accomplished with more favorable conditions.

Leckie Collieries Co., Aflex, Ky., on the other hand, finds conveyor work an outstandingly successful departure from old methods in working the 32-in. Pond Creek seam. The primary objective in starting conveyor work last October was to offer the market a higher-quality coal. Lower mining cost was the secondary object, also being attained. Separated by 8 in. of bone at the top of the 32 in. of high-grade coal is 4 to 5 in. of low-grade coal. With conveyor mining this top coal is not taken.

Rooms are driven 95 ft. wide without narrow necks, and pillars about 5 ft. wide are left between rooms. Up to Aug. 15, one chain unit, consisting of a 190-ft. room conveyor and an 85-ft. face conveyor, was in use. Since that date another unit has been added. Two 7-hour shifts have been the practice, but it is the intention to try three shifts soon. A face crew consists of eight men, including foreman and locomotive runner, all paid day rates. Timbers are set on 3-ft. centers, two rows per 6-ft. undercut. Close behind the face conveyor there is kept in place lightly wedged a row of 14x14-in. square timbers. These are advanced with each conveyor move.

Although panel entries have already been developed in a considerable territory which will be conveyor mined, and although these entries are high enough for track and cars, the company intends to install a 1,300-ft. mother conveyor before long. Apparently the whole production of the mine will be conveyor coal.

AIR-SAND PROCESS

+ Cleans Railroad and Industrial Coal

At Chickasaw Mine

CHICKASAW mine illustrates concretely the stress now being placed by industrial plants and railroads on well-cleaned and well-sized coal. At first, cleaned coal was sought only by metallurgical and gas-making plants. Then the public utilities began to appreciate its value, but railroads, industrial plants and big heating installations for a long time were relatively indifferent to its appeal. Nowadays, few indeed are the installations that are not looking for fuel of high heat value and low ash, and the demand is becoming so insistent that it can no longer be ignored by coal-mining companies interested in preserving markets.

Situated in Armstrong County, Pennsylvania, Chickasaw mine and village lie north of Mahoning Creek and in the elbow between Red Bank Creek and the Allegheny River. This plant, operated by the Allegheny River Mining Co., embodies a method of cleaning known as the air-sand process, devised by Thomas Fraser and the Hydrotator Co. In this, coal is floated in sand which, by passing air through it, is kept in agitation and made fluid.

This Chickasaw plant was installed by the coal company after long experience with the air-sand process at Cadogan, Pa., where uniformly good results were obtained over a period of years. The new cleaning plant had been running about a month when the summer depression made it necessary to close some mines, and, as Chickasaw was lacking in development underground, it was decided after a month of operation to close the mine down so as to put it in good shape for the winter demand, Cadogan supplying what mechanically cleaned coal the market required.

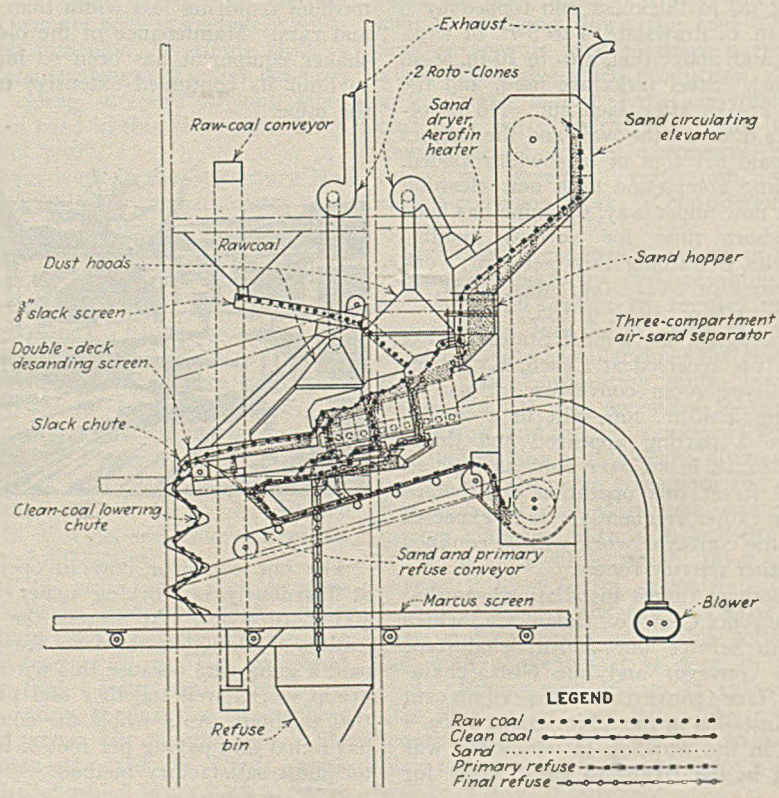
All the coal in the Chickasaw mine comes from the Lower Kittanning, or Miller, bed, which is 3 ft. 6 in. to 5 ft. thick. It is loaded entirely by hand into cars with a capacity of 2 tons when topped. Light weight of the cars is 2,200 lb., and all are of such height that they can be used in the thinnest of the coal that has to be mined.

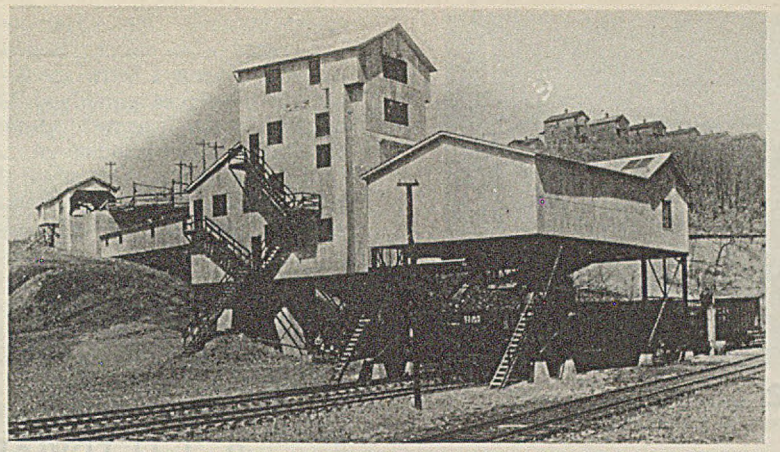
Cars come in trips to the tipple preceded by an electric locomotive, which approaches the dump at low speed. The locomotive clears the car feeder and takes a crossover to the empty track, leaving the front end of the front car over the car feeder, which is shifted mechanically so that its prongs intercept the axle of the car and bring the trip forward a car length. The car feeder automatically reverses and goes back as soon as it has fed the trip the required distance. The whole trip is thus moved forward a car length at a time toward and onto a Roberts & Schaefer rotary dump. Here the cars are discharged one by one, that operation being rendered possible by swivel couplings.

However, the cars might run away under the influence of gravity if it were not for a car stop and release about 20 ft. ahead of the car feeder, which holds the trip in place as each car is dumped. A Howe dial scale weighs the cars as they approach the rotary dump. At no time are the cars uncoupled at the tipple.

Some of the cars, of course, contain coal and some rock. The coal on leaving the rotary dump discharges onto a chute which slopes transversely across the track to the left, and a flygate is provided which, when opened for the passage of a carload of rock, carries the rock to the right and delivers it into a receptacle for disposal. This, when the mine is entirely ready for operation, will be either a larry or the bucket of an aerial tramway.

Flow Diagram, Chickasaw Air-Sand Separator





Chickasaw Preparation Plant

In the weigh-house is a pipe panel on which are grouped the various controls which regulate the car feeder, car stop and release, rotary dump and flygate. The weighman can control these by pressing appropriate buttons. Cars leave the rotary dump in a solid trip, traveling a car length at a time, till a full trip is obtained, when they are run to the end of the track all coupled and ready for attachment to what was the front end of the locomotive on its arrival from the crossover. All entering rail at the tipple and for a mile inside the mine weighs 80 lb. per yard.

Coal from the rotary dump, which has a capacity of 250 tons per hour, is discharged by the chute mentioned onto a rubber belt, 3 ft. wide and 200 ft. long between pulley centers, which runs in a gallery from dump to preparation plant. Arriving at the latter, the coal passes over a Marcus screen which separates it into plus 4-, 4x2-, and 2x0-in. sizes. The plus 4-in. coal passes over a picking table and travels to the end of the screen table, and thence by one of two loading booms to the railroad track. The 4x2-in. coal is picked by hand on two outrider screens and tables, one on either side of the lower end of the screening table. All the rest of the coal—2 in. and under—is carried by bucket conveyor to the top of the cleaner tower, where it is deposited in a 15-ton surge bin.

This coal is delivered to the cleaner by a fine wire screen 10 ft. wide and 8 ft. long, over which all but the $\frac{3}{8}$x0-in. coal passes. By an eccentric drive of small throw, a rapid reciprocation which is tantamount to vibration causes the coal to spread evenly over the cloth—a matter of great importance for good screening results. Fine coal that falls through the reciprocating screen mentioned is carried to the Marcus screen by a chute and joins the rest of the slack at that point, finally going to a slack bin. Thus the coal cleaned is 2x$\frac{3}{8}$-in. material only. It passes over the delivery end of the $\frac{3}{8}$-in. slack screen and drops into the second compartment of the air-sand separator box.

Each of the three compartments of the air-sand cleaner consists of a box 32.6 in. long and 10 ft. wide in horizontal dimensions, length meaning in the direction of the flow of material, with a 16-in. pervious Carborundum plate bottom, through which filtered air, but not sand or coal, will pass freely. Under this floor is an air-box the air flow to which is regulated by three valves in each compartment. If any one of these valves is widely opened, it will divert air to the point on the air-sand table near that valve and make any needed change in air delivery. However, over all is a master valve which regulates the total quantity of air delivered to the cleaning plant, leaving to the small valves merely the job of regulating distribution.

Coal and sand entering any compartment is lifted into suspension by the upflow of air, and the coal immediately begins to stratify, the coal floating on top and the dirt on the bottom. The sand, because of its small size, may be found in all portions of the bed. The coal and sand are delivered not to the first but to the second, or middle, compartment. The upper layer of coal and sand passes over a weir at the far end of that compartment and goes with the sand in which it is suspended to the third, or last, compartment, where the floating action is repeated. Meanwhile, the impurities, with much marketable, but relatively heavy, coal, are taken out by a vertical chute under the weir in each compartment; the Carborundum floor, which slopes 1 in. in 12, is not continuous in any of the three compartments but has a drop of about 4½ in. at the lower end, thus providing ample space for this chute opening.

The impurities from compartments 2 and 3, with the sand in which they are floating, are taken by an elevator to the top of the tipple, where they fall into the sand bin, already mentioned, for reuse. The impurities, constituting the primary refuse, are here freed from most of the accompanying sand by a small stationary screen and are fed to the first compartment of the cleaner, which is a duplicate of the second and third. The clean coal recovered from the primary refuse and its commingled sand overflow to the second compartment and thus join the raw feed. The final refuse delivered by this recleaning compartment is desanded over the lower deck of the desanding screen and discharged to the rock bin. The cleaned coal is desanded over the top deck of the desanding screen, and all the sand through both screens, with the primary refuse described above, is returned to the sand hopper in the top of the plant by a 30-in. belt-and-bucket sand elevator. Sand is fed only to No. 1 compartment of the separator and flows thence in a continuous stream through the three-compartment box and overflows at the end onto the coal desanding screen. The third compartment of the cleaning plant is an additional refinement. The Cadogan plant originally had only two compartments, the raw coal and sand being delivered to the second of the two. It was later changed to the three-compartment design.

To avoid disintegration, the cleaned and desanded coal, which is a mixture of pea and nut, is carefully lowered by spiral chutes to the Marcus screen. It travels with the 4x$\frac{3}{8}$-in. coal on that screen to the outrider picking table, which, having a screen section, provides for the separation of the coal into 4x2-in. (egg), 2x1-in. (nut) and 1x$\frac{3}{8}$-in. (pea), the two smaller sizes passing by chutes to the railroad cars and the 4x2-in. to a loading boom. Sometimes the 2x1-in. coal is loaded over the 4x2-in. loading boom.

Capacity of the cleaning part of the plant is approximately 100 tons per hour. About 2½ tons of sand is circulated per ton of coal cleaned by the process, but, as the sand is reused an immense number of times, about 3 lb. of make-up sand suffices for each ton cleaned. The coal on leaving the desanding screen is entirely divested of its sand. Make-up sand, all of which is minus 12-mesh, is brought to the tipple by railroad cars and is chuted into a steel tank, and with air at a pressure of 80 lb. per square inch from an air receiver is elevated to the sand bin through a 2-in. pipe. A bypass provides for the switching of the sand, when desired, to another 2-in. pipe, which carries it to a bin supplying the locomotives.

If the coal is moist, the sand may be dried and heated with steam coils on the shaker by which it is delivered to the cleaning plant, but if the coal is very wet, so that it cannot be screened of its $\frac{3}{8}$x0-in. coal, it is delivered to the Marcus screen without cleaning. Little, however, is of such wetness.

Air for operating the cleaning box is provided by a Connersville blower of the Roots type, which delivers 6 cu.ft. of air per revolution. Revolving at 450

(Turn to page 352)

FLOATING BATTERIES

+ Offer Possibilities for Reducing Demand

And Improving Voltage

By J. H. EDWARDS
Associate Editor, Coal Age

OPERATING officials are exploring every avenue for increasing production and reducing the "flexible" cost items to compensate as far as possible for the higher fixed costs of the shorter work-day. That the power item is receiving its share of the scrutiny is evidenced by activities in demand limiters, capacitors, synchronous motors and individual generating plants. The benefits of "better" voltage for d.c. equipment and fewer interruptions of circuits are becoming more widely appreciated, although, to a large extent, these gains may be difficult to evaulate properly in a cost analysis. One item easily separated—per ton maintenance cost of d.c. equipment—is certain to drop with radical improvement in voltage conditions. A storage battery installed underground, or possibly at the top of a borehole, and at some point between the substation and the load center, is one means of securing improved voltage which at the same time reduces peak demand on generating equipment.

Under ordinary conditions, of course, the proper way to secure "good" voltage is to locate the substation close to the load center and use ample conductor rather than to install equipment which has a comparatively short life and which under normal conditions gives up less than 80 per cent of the energy received. But, from the practical dollars-and-cents standpoint, this power loss may be insignificant compared to the sum total of savings from the several advantages to be gained at many mines so situated that the installation of a floating battery would be a profitable expenditure.

Use of a floating battery is not new in coal mining. Between 1921 and 1924, for example, there were several cases where surplus mine-locomotive batteries were thus connected to take care of small miscellaneous d.c. loads during days when mines were not working and save power by allowing the complete shutdown of substation equipment for a part of the time. Details of these earlier installations are not available, but a fairly complete record of an outstandingly successful installation made in 1925 at the Big Four mine, in McDowell County, West Virginia, has been preserved. A new battery was installed as a temporary relief to an inadequate power situation, and it proved so advantageous that its use was continued until the mine was worked out and abandoned.

After the battery had been in use six months, the installation and results to that time were described in an article by the present author early in 1926 (*Coal Age*, Vol. 29, p. 561). Because of the time element involved, this study was necessarily largely preliminary in its nature. Salient facts covering the entire life of the installation show that in seventeen months the saving in demand charge alone equalled the installation cost of the battery, which was $4,300. Use of the battery saved the purchase price and installation cost of a substation unit for which it would have been necessary to build a 2,300-volt line and drill a borehole or install in the mine an armored three-conductor 2,300-volt cable from the slope portal to a substation location. Power cost was reduced by shutting down the substation during idle days or idle hours when but a small supply of d.c. power was required for pumping.

Although it had been anticipated that use of this battery possibly would increase slightly the kilowatt-hours per ton, this change apparently did not take place. Total energy purchased per ton of production dropped from 7.3 to 6.7 kw.-hr. As a result of the increase of d.c. capacity and better voltage, however, production was stepped up from 16,000 to 21,000 tons per month. Such an increase in production normally would bring about a slight reduction in total energy consumed per ton. Meters were not available to determine the exact effect, but it is assumed that the energy loss in the battery was offset to some extent by the reduction of high current peaks through the feeder from the substation to the battery location.

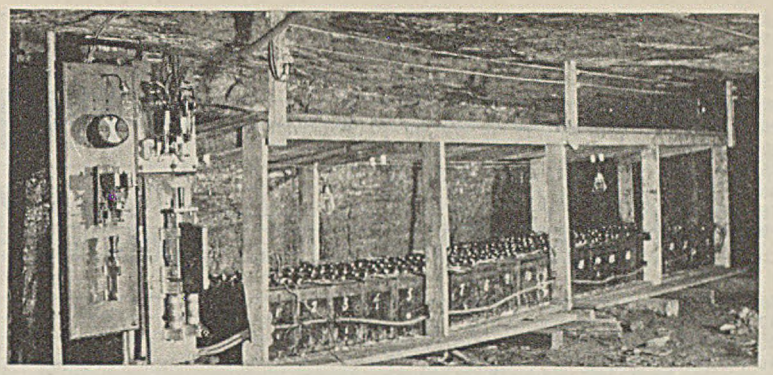
Several factors influenced the decision to try out a battery at the mine. Production had reached the peak possible with the existing 100-kw. motor-generator set, which was located on the outside near the slope portal. Feeder lines were small and any increase in their capacity would only cause a d.c. demand increase which would open the overload breaker more frequently. The remaining life of the mine was limited. The varying and unfavorable physical conditions made it uncertain in which territory the mining would be continued the longest; therefore it was desirable, if possible, to delay further the selection of a location for an inside substation. If substation capacity was to be increased, purchase of a 200-kw. converter or motor-generator with full-automatic control seemed advisable. This would be an expensive outlay for a declining mine; moreover, since the demand charge was based on connected load, the addition of the 100 kw. of capacity would boost this charge about $260 per month.

The three charts in Fig. 1 show the part that the battery played in smoothing out the generator peaks. The upper chart was taken from a typical work-day record made before the battery was installed and when production was running under 16,000 tons per month. Although the full-load rating of the motor-generator was only 365 amp., this chart shows that around 3:45 p.m. the current repeatedly exceeded 750 amp. and that the breaker opened many times. The center and lower charts, recorded simultaneously by two graphic ammeters on a typical working day after the battery had been installed and when production had been increased to 21,000 tons per month, shows the substation load fluctuating only slightly on either side of the 365-amp. full-load line, with the battery repeatedly supplying peaks of 420 amp. between its times of "soaking up" charges when the mine loads

were temporarily low. This illustrates the "flywheel" action of a battery in storing energy when a surplus is available and beginning to give it up instantaneously when the situation changes. As compared to a mechanical flywheel, the battery—an electro-chemical flywheel—retains the energy for much longer periods and with but slight "time loss."

The two charts in Fig. 2 are sections of later recording on the two simultaneous charts of Fig. 1. These Fig. 2 charts detail the electrical situation in the d.c. system during the latter part of a night when cutting was going on and during the early part of an idle day following. As the night load decreased, the battery reached full charge and then floated on the line. At about 9:30 a.m., the substation was stopped and the small load of mine pumps was shifted to the battery. The chart sections in Fig. 3 show the action when the substation was started at 5:30 the next work-day morning. At first the battery drew a large current, but by 8 a.m. it had recharged to approximate saturation and was again floating on the line. The curve of charge, disregarding the irregularities caused by the intermittent mine load, is typical of the modified constant-potential system of battery charging commonly recommended as one of the best.

This particular battery was a standard 31-plate, 110-cell unit built for duty

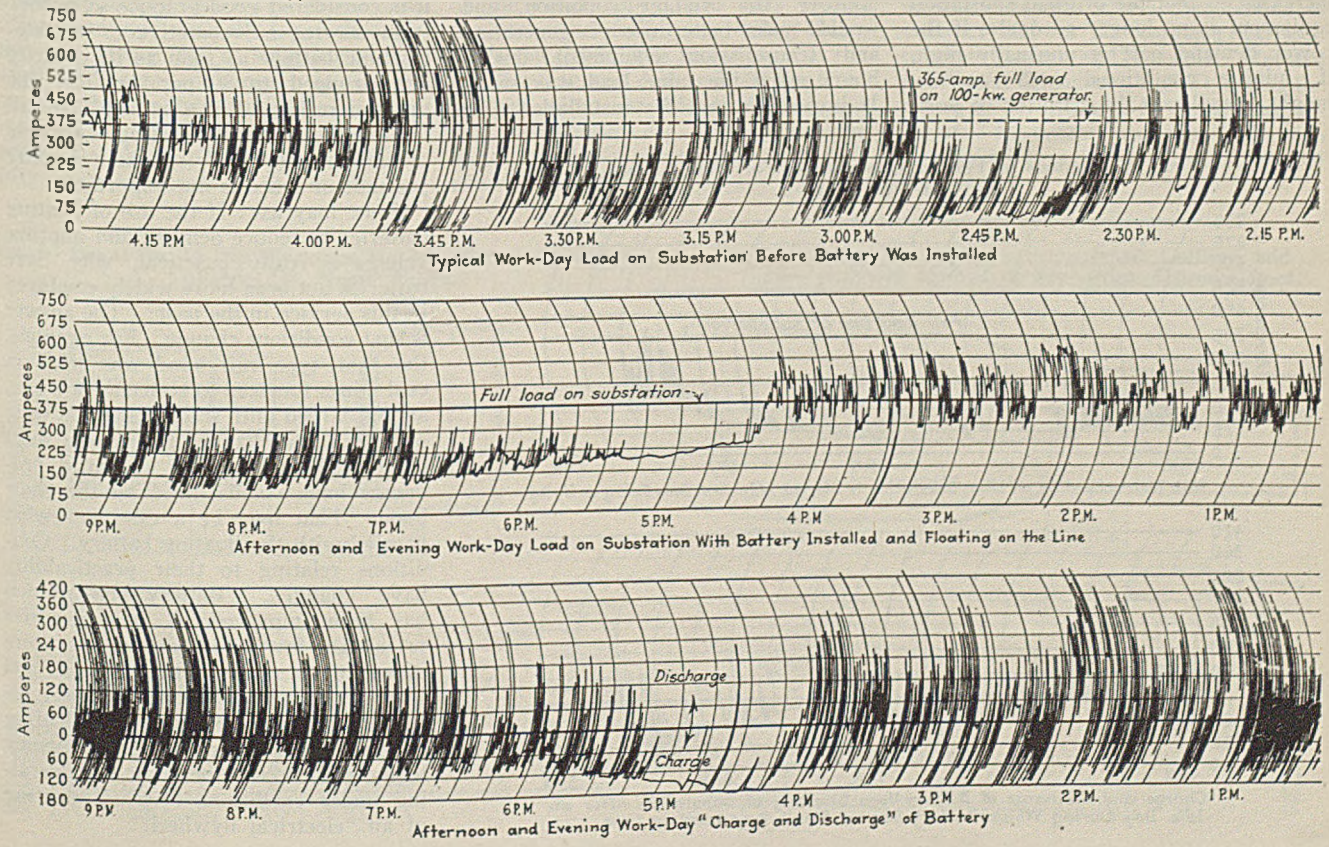


Temporary Installation That Proved Permanent for Speeded Recovery of Remaining Profitable Coal.

in a cutting-machine power tank at a "wireless" mine and was rated 45 amp.-hr., 91 kw.-hr. The open-circuit potential was 220 volts; therefore the battery was installed back in the mine at the proper distance from the substation so that it could be connected to the main feeder circuit at a point where the voltage would be 220 when the substation was carrying the allowable 400 amp. at a rheostat setting of 265 volts. The mine feeder and rail return resistance from the substation to the battery was 0.18 ohm, as compared to a recommended fixed resistance of 0.17 ohm for true modified constant-potential charging of a 110-cell battery. A shunt of German silver was added to the generator series field terminals to change the voltage compounding characteristic so that when the machine was adjusted to 275 volts at no load it would maintain 265 volts at 400-amp. output.

The service life of a battery floating on a mine circuit depends, of course, to a great extent upon the equivalent number of complete cycles of charge and discharge, but the life on this type of duty should be much longer than in mine-locomotive service, because operating conditions are more nearly ideal. Vibration is absent; ventilation is perfect; air temperature is uniformly low; and the installation can be made in a manner to promote cleanliness and provide for convenience in adding water to the cells. Adding water about once a week is practically the only attention

Fig. 1—The Upper Chart Was Recorded When a Power Shortage Condition Was Limiting Production to Less Than 16,000 Tons Per Month. The Lower Charts Were (Simultaneously) Recorded After the Battery Was in Use and Production Had Reached 21,000 Tons.



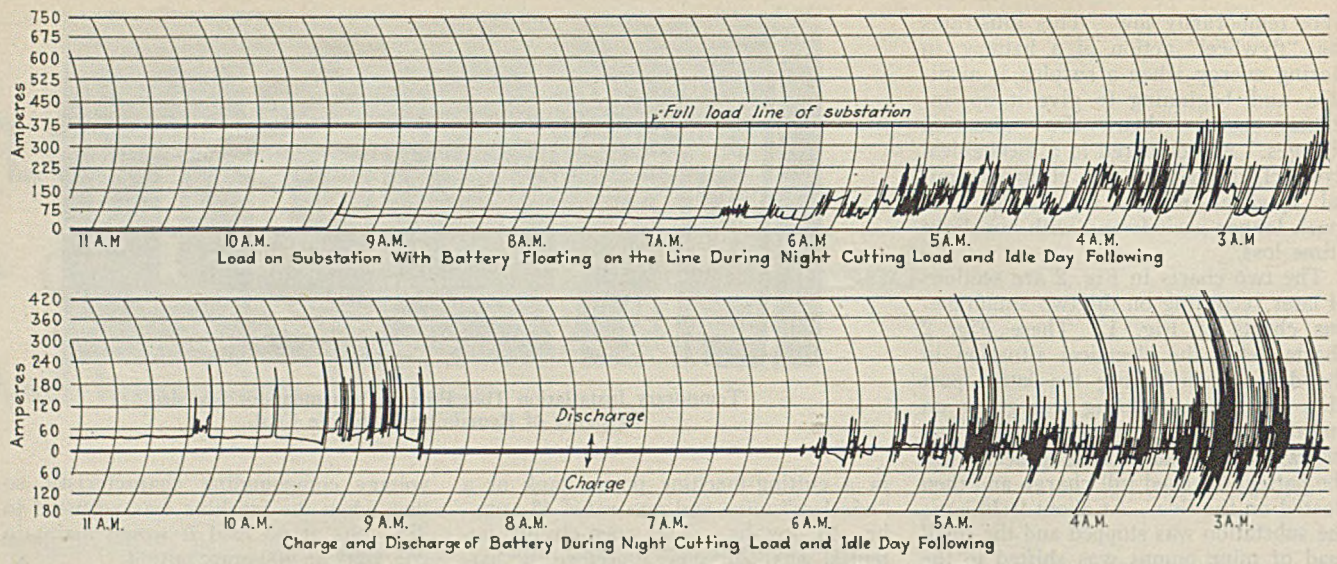


Fig. 2—Sections of Continuations of Simultaneous Charts in Fig. 1.

that is required. Under such circumstances, eight to ten years' service from a lead-acid battery does not appear an unreasonable expectation.

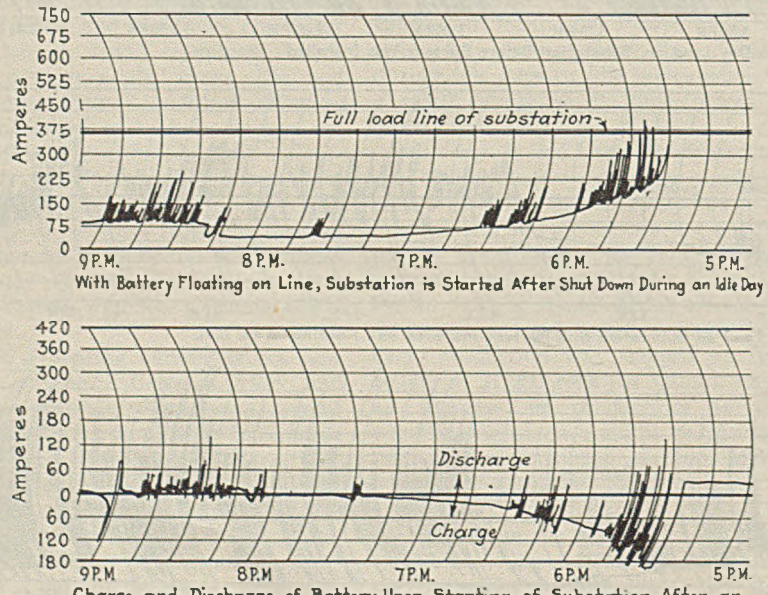
Mines with a daily output of less than 1,500 tons probably are the most likely to have conditions favorable to the use of a floating battery. If the load center has advanced far from the substation, if questions of right-of-way and/or depth of cover make the construction of a transmission line and borehole unusually expensive, if the distance is so great that the installation of a 2,300-volt armored cable from the portal to the proposed substation location would be doubtful practice, if peak loads have increased so that the original substation equipment is no longer adequate, if the power demand cost is unusually high, if mining conditions, such as low height, complicate the adoption of portable substation equipment or of installation of a stationary inside substation, and if the remaining life of the mine is but a few years, investigation of the possibility of the floating battery would seem advisable.

The idea might work out to marked advantage at a mine supplied by a direct-current generating plant. Assume that the distance of transmission has increased beyond the practical limit for the voltage employed and that perhaps at the same time the generating equipment is overloaded by the day peaks: Installation of a battery at the proper point near the load center would reduce the peak loads on the generator, would improve the voltage condition, and would make better use of generating and transmission equipment during hours when the mine load was small. It is possible that the installation of a battery would allow full depletion of the mining property without moving the power plant or arranging to generate or purchase alternating current for distribution to a substation that would have to be purchased and be erected near the load center.

Present cost of a new 220-volt, 450-amp.-hr. battery—about the smallest unit that should be considered—approximates $3,000. By utilizing used batteries from large battery locomotives or battery-powered cutting machines, however, first cost might be held to a fraction of that sum. The capacity of a battery used in portable service is so limited by available space that usually it is considered good practice to remove from service a locomotive or cutting-machine battery as soon as its capacity has dropped to 80 per cent of the original rating. But a battery that still tests at 80 per cent of rating is capable of rendering long service where capacity per unit of space is not important.

Some may ask: If the use of floating batteries to reduce demand and improve voltage is really practical, why have batteries not been more widely employed in this service in the past? The answer is that conditions change. For example, the short-type rail bond was tried in coal mines fourteen to sixteen years ago, and discarded until track standards were improved and changed to suit the short bond. Now a number of large producers have standardized on the short bond. That may be a case somewhat parallel with the floating battery. Conditions relating to their practicability have changed. Battery construction has been improved to increase life; prices are lower; it has become more important to supply better voltage; and power costs are now receiving more attention than ever before. The floating battery now holds promise of economy to the numerous mines that are operating under conditions favoring the use of an "electrical flywheel."

Fig. 3—Sections of Further Continuations of Simultaneous Charts in Figs. 1 and 2.



FIT FANS TO DUTY

+ In Susquehanna Modernization

VENTILATION is receiving increased attention in the anthracite region, where many of the fans are old and inefficient, even when used under the most ideal conditions. Many are unfitted to the mines where they are being used and almost all are of a type incapable of being accommodated to the varied demands of mines which expand or contract and increase or decrease in resistance with the progress of mining. The Susquehanna Collieries Co., in a program of reducing its power bills, is making improvements in its ventilating units that are illustrative of the change now under way as the result of quickened interest in more efficient and less costly installations.

For its No. 16 dip workings at No. 7 colliery, Nanticoke, Pa., the Susquehanna Collieries Co. has erected a 6-ft. exhaust fan of the Aerovane type with provision for two-stage operation. The motor of this fan, instead of being placed where it would interfere with the free flow of air, is located, as shown in Fig. 1, in a fan chamber under the évasé, or flaring, discharge of the fan, being connected with the latter through the fan casing by a long horizontal shaft with two couplings. In consequence, the air has only the shaft, a light but sturdy coupling and the pipe pedestal of the fan bearing to interfere with its passage from the fan to the outside air. Moreover, the coupling, being near the fan and opposite its center, is in a place where interference with the air is at a minimum. Not only is the chimney gently flaring but the fan itself is placed in an approximation to a venturi, giving the air the most favorable condition for approaching and leaving the fan.

The cross-section of the slope is 2.8 times as large as the cross-section at the fan blades, and the mouth of the évasé is about 2.2 times as large as the latter cross-section. Thus the mine air comes to the fan at a relatively low speed and leaves the mouth of the évasé at a speed almost as low—conditions which favor power economy. Angle-iron rings encircle the inside of the casing at the tips of the blades in both stages, thus preventing recirculation of the air.

The mine air comes to the fan through a slope inclined at 45 deg. to the horizontal. Wire guards prevent men from being drawn into the fan when it is running as an exhaust or as a blower, although it probably will never be used as the latter, and guard rails protect persons from falling or being blown down the slope. The motor and fan run at 875 r.p.m. and deliver 57,000 cu.ft. of air per minute at 3.5 in. water gage. The steel frame (Fig. 1) on which the motor stands is constructed so that it will accommodate itself to any make or size of motor up to 75 hp., 875 r.p.m., and also so that the bolts can be withdrawn to allow the motor to be moved out of the way when the shaft has to be disconnected at the coupling.

Another 6-ft. two-stage Aerovane fan has been installed at No. 30 plane of No. 7 colliery. This is a blower and will deliver 57,000 cu.ft. per minute at 3½-in. water gage. A 50-hp. motor drives the fan, running at 875 r.p.m. A new 6-ft. blowing fan of the same type, also two-stage, only one of which stages has been actually provided, has been placed for the ventilation of No. 11 vein, Pennsylvania Colliery. This fan has no venturi; the motor is placed in direct line with the fan and in the fan drift, and the air current makes a right-angle turn into the shaft, expanding from fan to shaft 2.8 times. The angle is eased off by an inner curve of 3-ft. diameter, the outer curve corresponding but providing for the expansion (see Fig. 2). The concrete scroll at the bottom of the old and replaced fan can be seen on the left. The set-up in this case is simpler, the flow of air coming from either side of the motor, which is placed between two walls formerly mounting the old fan.

At the Williamstown Colliery a 4-ft., two-stage fan of the same type has been erected, and at Pennsylvania Colliery a 7-ft., two-stage fan is being considered. Leakage in the roofs of fanrooms has given some trouble where the roof is made of I-beams with concrete arches between beams. The arches tended to contract and let air through between concrete arches and I-beams. Revised practice at this mine (Fig. 2) favors the use of 35-lb. rail at 2-ft. centers, or 45-lb. at 3-ft. centers, covered first with corrugated iron and then with 4 in. of concrete.

Fig. 1—Fan at No. 16 Dip Workings, No. 7 Colliery, Susquehanna Collieries Co., Nanticoke, Pa.

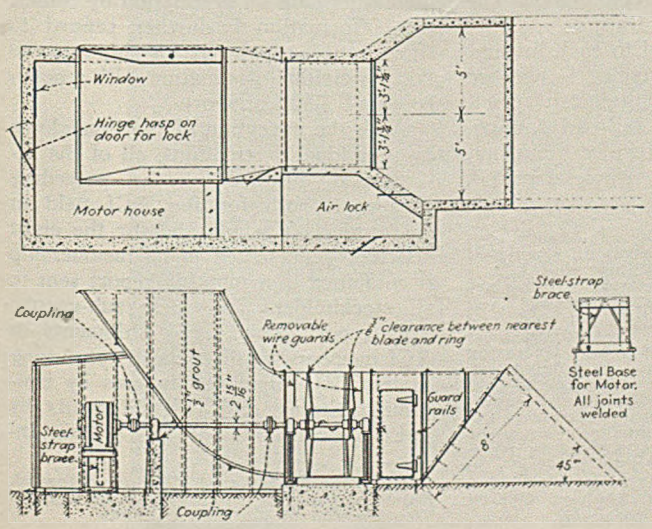
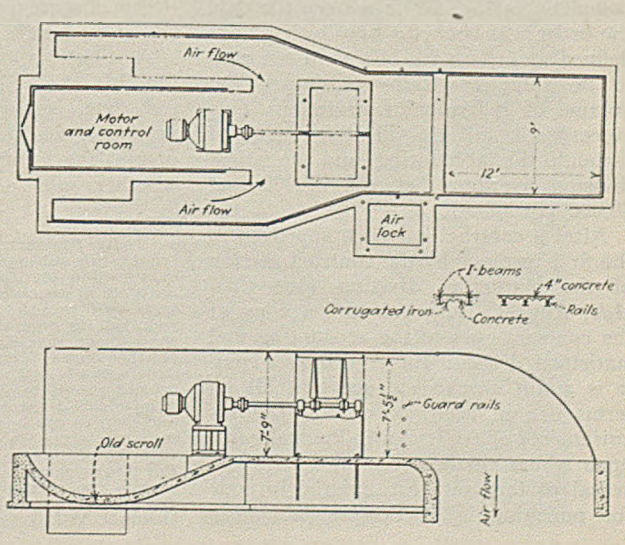


Fig. 2—Fan for No. 11 Vein, Pennsylvania Colliery, and New and Old Method of Supporting Fanroom Roof.



HOW APPALACHIAN COALS

+ Works Today and Plans for the Future

UNDER present operating conditions, the heart of the control system of Appalachian Coals, Inc., lies in its accounting and statistical division. Here the basic data drawn from contracts, orders and invoices are checked, classified, tabulated, analyzed and recorded; from these data, ACI builds up the detailed information on distribution by markets, sizes and uses, and on sales realizations which it furnishes in consolidated form to its stockholder members and their sub-agents. Through this statistical policing of all sales transactions, each individual producer-member is given assurance that every sale made by all other stockholders of ACI conforms with the prices and other terms established by the district selling agency. While the producers are subject to the NRA bituminous code, this checking also makes certain that all transactions cleared through ACI meet the prices, rules and regulations of the divisional code authorities.

Copies of all contracts, orders and invoices of ACI sub-agents are sent to headquarters at Cincinnati. For the purposes of classification, a "contract" is an order for tonnage to be shipped over a period exceeding 60 days from the date of the contract; "orders" cover shipments of ten cars or more to be completed within 60 days from the date the order was booked; "spot orders" are defined as orders for less than ten cars to be shipped within 60 days. The volume of individual transactions (invoices) of all classifications cleared through the accounting and statistical division averages between 35,000 and 40,000 per month.

After a contract has been approved in the first instance by the contract section of the marketing division (see *Coal Age*, August, 1934, p. 313), a copy of the contract goes to the accounting and statistical division for recording. Here it is again checked to see that all its terms are in accordance with the requirements of ACI. An individual card, upon which all the essential details and actual performance are entered in code for punching by a Powers tabulating machine, is made out for each contract. A separate card also is made out for each "order" (shipment of ten cars or more within 60 days). No individual card record is kept on "spot orders," but a copy of the original spot order is held in an open file until shipments on that order have been completed.

The first step in the daily checking routine for invoices is to sort them out as received by sub-agents. Invoices are numbered serially by each sub-agent. Monthly ledger record sheets are maintained for each sub-agent and a record of each invoice, including tonnage, prices, classification of business, size of coal and net billing, is later entered in numerical order on these sheets. Such listing automatically detects any missing invoice numbers and the organization is in a position to send an early tracer to the sub-agent to find out whether the missing invoices have been lost in the mails. After the month's transactions have been written up, a copy of the record sheet is sent to the sub-agent for final checking and approval. When this has been done and any necessary corrections have been made, duplicates of the approved record are sent to the sub-agent and to the ACI member for which said agent is acting. In its final form, this sheet also becomes the basis upon which ACI bills the producer for the commission[1] due the district sales organization.

A sticker is attached to each invoice. On this sticker the invoice is checked for date, sub-agent, producer, price, use, size, destination, railroad routing, originating mine, invoice number, whether sale is to a wholesaler and, if so, commission allowed said wholesaler, whether the invoice covers an old order (i. e., one taken prior to April 17, 1933) or a new order (i. e., one taken subsequent to the beginning of ACI operations) and the date of shipment. If the invoice covers a contract or order shipment, the data on the sticker are transferred in code to the contract or order card mentioned in a preceding paragraph. In the case of an invoice covering a contract shipment, the invoice is checked against the copy of the original contract; if this checking discloses any variation from contract terms or a shipment subsequent to the date of expiration of the contract, the invoice is referred to the marketing division for investigation and correction or approval before it is passed by the accounting and statistical division.

At the present time, there are twelve use classifications, viz.: (1) byproduct coking coal, (2) retort-gas coal, (3) water-gas coal, (4) producer-gas coal, (5) railway fuel, (6) electric utilities, (7) general industrial uses, (8) malleable-iron plants, (9) domestic, (10) lake coal not otherwise classified, (11) tidewater shipments not otherwise classified, and, (12) bunker coal. The size (or grade) breakdown covers: (1) block, (2) lump, (3) chunks, (4) egg, (5) stove, (6) nut, (7) resultant mine-run, (8) nut-and-slack, (9) slack, and (10) straight mine-run. In addition to tabulating data on destination by States, this information is further refined to show figures separately for shipments to every individual destination with a population of 2,500 or more.

With the exception of the breakdown by individual destinations, all of the information outlined in the preceding paragraph both for the ACI field of operation as a whole and for the eight districts[2] represented in its membership is combined in a monthly report sent to all stockholders and their sub-agents. This report shows: (1) shipments of ACI members by districts to consuming States, (2) shipments by uses by consuming States, and (3) shipments by sizes by consuming States. This in-

[1] Under the terms of the sub-agency contracts, the sub-agent receives an 8 per cent commission on its net billings and ACI is entitled to receive 2 per cent. During the last two months of 1933, however, ACI reduced its commission to 1 per cent, and that lower rate has prevailed during most of the current calendar year. Operating expenses of ACI, it should be pointed out, do not fluctuate in direct ratio to the tonnage cleared through it, nor does the number of invoices bear a direct relation to the tonnage, since in low-tonnage months the volume of one- and two-car orders rises. For these reasons, it may be necessary to charge the maximum allowable commission during periods when the tonnage cleared through ACI is low.

[2] Big Sandy-Elkhorn, Harlan, Hazard, Kanawha, Logan, Southern Appalachian, Virginia and Williamson districts.

formation is pictured graphically in a series of maps. The same data are then shown in tabular form by producing districts and a final tabulation gives the picture by use and sizes for the eight districts combined. This information, of course, is necessarily limited to shipments made by members of ACI, since no such detailed data on non-member shipments are available for publication. In so far as shipments to consuming States and certain important consuming areas are concerned, the origin and destination reports recently started by the traffic department of ACI supplement the picture of shipments by ACI members by giving shipments from all producing districts as a whole east of the Mississippi River[3].

As previously stated, these monthly reports of the accounting and statistical division to the producer-stockholders and their sub-agents are consolidated totals for each of the eight districts of the Southern high-volatile area and for the area as a whole. No data for individual producers are shown. Each stockholder member, however, is furnished with an individual report which compares his sales realizations for the month with the average for all members. Special studies, such as a recent comparison between spot and contract orders for the ten months ended June 30, 1934, are made from time to time, and the results of such studies are transmitted to the stockholders and sub-agents. This particular study revealed that during the last four months of 1933 there were spot orders for 101,373 cars and contract orders for 20,512 cars; during the first half of the current calendar year, spot orders totaled 154,991 cars and contract orders aggregated 491,936 cars[4].

As all the basic data embodied in the orders and invoices are transferred in code to the record cards by the Powers punching machines, it is a simple matter to run these cards through the sorting machine and make detailed tabulations of any type of information desired. Such tabulations are constantly made for use within ACI headquarters in the organization's study of distribution questions. Detailed records also are kept on the shipments of each stockholder member and on the range of prices at which his output is sold by his sub-agents. In this way headquarters at all times has a complete picture of the performance of each producer who is a stockholder in the district selling agency.

The present organization setup contemplates three types of field contact other than that inherent in the work of the inspection and testing department of the marketing division described in the preceding issue. Field contacts with retail distributors of ACI coals are maintained through the promotion staff of the market research department. The activities of the newly created fuel engineering staff eventually will bring the personnel of that group into close contact with the larger industrial consumers. The third type of field work which has been undertaken involves contact with both stockholder and non-stockholder producers in the eight districts served by ACI, for the purpose of keeping these producers in close touch with the activities of the organization and, in turn, of securing information from these producers which may be helpful to headquarters in the operation of ACI.

In many organizations the functions of secretary-treasurer are more or less routine in their nature. Not so with ACI. Due both to the fact that the secretary-treasurer of ACI was the first full-time executive employed by the organization and to his intimate knowledge of the marketing problems of the area served by ACI, the functions of this official extend far beyond details of in-

[3]The ACI traffic department report, while covering the same general ground as the monthly distribution reports of the U. S. Bureau of Mines, is much more detailed both as to originating districts and destination areas than the government figures. Exclusive of railway fuel, lake-cargo and vessel fuel business and certain consolidated recapitulations, the ACI report shows separate figures for 66 destination groups, as compared with 28 groups in the U. S. Bureau of Mines report. The unpublished records of ACI, where each destination with a population of 2,500 or more is listed separately, show 730 destinations. Fifteen origin groups are shown in the government tabulations; these are broken down into 36 groups in the ACI traffic department report, although the latter makes no district segregations in either Illinois or Indiana.

[4]Exclusive of railway fuel, spot orders for the prepared sizes (block, chunks, lump, egg, stove and nut) totaled 69,412 cars and contract orders only 8,697 cars during the last four months of 1933; spot orders for mine-run and nut-and-slack were 26,828 cars and contract orders totaled 11,815 cars during the same period. In the first half of 1934, spot orders on prepared sizes totaled 101,103 cars and contract orders, 187,145 cars; spot orders on mine-run and nut-and-slack aggregated 34,675 cars, while contract orders accounted for 304,791 cars.

Tabulating ACI Sales and Distribution Data.

Table I—Distribution of Appalachian Tonnage (ACI Members) by Consumer Classes and by Sizes for First Quarter of 1934

Class	Size									
	Block	Lump	Chunks	Egg	Stove	Nut	Nut-and-slack	Slack	Straight Mine-run	Resultant Mine run
Byproduct coke	207	4,018	.....	16,085	44	4,339	47,309	92,510	379,242	11,080
Retort gas	20,800	1,409	368	78,264	506	31,050	15,302	.....	113,683	4,454
Water gas	758	.....	18,193	40,269	573	6,553	1,789	.....	3,934	.....
Producer gas	131	12,062	9,206	38,546	24,385	26,605	12,733	51	28,071	40,758
Railway fuel	5,930	32,365	2,487	69,375	2,099	9,967	496,755	1,019	758,444	560,465
Electric utility	3,248	543	420	23,533	1,108	1,521	398,809	14,672	20,659	1,761
General industrial	21,476	36,152	92	214,661	23,869	151,492	2,255,655	167,033	319,928	111,542
Malleable-iron plants	827	3,240	48	6,945	48	2,331	31,350	610	49,529	373
Domestic	2,024,702	295,275	69,095	1,151,007	50,326	132,109	301,181	3,710	31,784	4,137
Lake*	9,966	6,060	.....	9,313	.....	419	67,359	399	6,489	814
Tidewater*	.....	5,629	.....	4,273	.....	6,645	943	968	25,572	9,303
Bunker coal	.....	.....	.....	66	.....	.....	230	.....	6,205	163
Total	2,088,045	396,753	99,909	1,652,337	102,958	373,031	3,629,415	280,972	1,743,540	744,850

*Use classification not otherwise designated.

Distribution of the total tonnage shipped by use classifications was: Byproduct coke, 4.99 per cent; retort gas, 2.39; water gas, 0.66; producer gas, 1.73; railway fuel, 17.45; electric utility, 4.20; general industrial, 29.73; malleable-iron, 0.86; domestic, 36.58; lake, 0.92; tidewater, 0.49 per cent. Distribution by sizes was: Block, 18.79 per cent; lump, 3.57; chunks, 0.90; egg, 14.87; stove, 0.92; nut, 3.36; nut-and-slack, 32.67; slack, 2.53; straight mine-run, 15.69; resultant mine-run, 6.70 per cent.

ternal corporate activities and office routine. As shown in the organization chart published in the August issue of *Coal Age*, the secretary-treasurer is closely tied in with the work of the accounting and statistical division and with the work of the marketing division. Questions involving relations between stockholders and those two divisions in the first instance go to the secretary-treasurer for decision.

The annual report of ACI for the year ended Dec. 31, 1933, summarized in Table II, speaks for itself on the financial success which has attended the operations of this pioneer in the district sales agency field in bituminous coal. In striking a balance sheet between the promises held out at the time the agency was launched and its actual achievement to date fairness demands that repeated emphasis be placed upon two facts which have had a controlling and, in a large measure, a limiting influence upon the activities and the rate of progress made. These facts are the election of the stockholders to handle all their coal through sub-agents and the adoption of the NRA bituminous coal code of fair competition.

Adoption of the sub-agency plan under which producer-stockholders designated exclusive sales representatives was a happy solution for member operators who had built up such an acceptance for particular coals over a course of years that they were unwilling to risk submerging this advantage in a common sales-pool despite the pledge in the sales agency contract that ACI would use its best efforts to maintain this advantage for the producer[5]. In rejecting the offices of ACI as a direct selling agent, the producers paid the customary obeisance to hoary rivalries and competitive trade jealousies. Considering the background against which ACI was born, this action was not wholly surprising.

By this choice, however, the producer-stockholders voluntarily deprived themselves of the patent economies inherent in a common selling agency. Such tangible possibilities as the consolidation of district sales offices of the producer-members in large cities and trading areas into a single branch office of ACI, with the consequent reduction in rental charges and in sales and clerical personnel, went by the boards. The opportunity for every sales representative to offer a complete line of Southern high-volatile coals to consumers also was foregone. ACI officials are hopeful that they may be able to salvage part of this lost opportunity by developing such an *esprit de corps* among the sales personnel of the sub-agents that these representatives will be willing to foster the sales of ACI coals that are non-competitive with their own special lines. This hope, which is at best a compromise with the possibilities inherent in direct selling of all coals by ACI, envisages a sub-agent handling only Harlan coal, for example, using his best efforts to persuade a customer who also is in the market for Hazard coal to place the Hazard order with an ACI sub-agent.

Work in connection with the formulation of the bituminous coal code started while ACI was still in its early organization stages as an actual functioning agency. Most of the men primarily responsible for the creation of ACI also were active in code planning and in the weary weeks of negotiation and compromise which kept coal executives in Washington the greater part of the summer in 1933. This inevitably meant a diversion of interest which retarded what would have been the normal expansion of the ACI program and plans. Although the code itself empowered sales agencies to initiate the price schedules for their fields, the benefits of price control and maintenance—one of the outstanding advantages offered to participants in the district selling agency plan—also were extended to the industry at large[6]. Moreover, freedom of action in price-fixing was circumscribed by the regulations for governmental approval of schedules embodied in the code. The fact, however, that ACI was a pre-code agency with experience in the price-fixing job it was called upon to do when the code became effective was an undoubted asset to the Southern high-volatile fields.

Bearing in mind these two limiting factors—the adoption of the sub-agency system to the exclusion of all direct selling by ACI and the establishment of the bituminous code—what has been the record of promise and performance since ACI became an operating entity on April 17, 1933? In a statement accompanying the plan of organization of ACI, approved at a meeting of producers held at Cincinnati, Dec. 30, 1931, and incorporated in the "Blue Book" of Jan. 6, 1932, "the probable results of the successful organization and operation of ACI" cited included:

(1) Better advertising of ACI coals;

(2) Better demonstrations of the advantages of these coals by competent combustion engineers;

(3) Better opportunity for all producers to share in big tonnage business in all primary markets;

(4) Balancing of grades to prevent dumping;

(5) Better market information;

(6) A wider market for ACI coals;

(7) Increased retail outlets through

[5]The fifth covenant of the contract between ACI and producer-stockholders reads as follows: "The Selling Agent agrees that, subject to the terms of this agreement, in so far as possible, it will sell the coal of the Producer in the markets to the same customers and under the mine name or trade name or names that the Producer has heretofore sold such coal, and shall maintain the trade names and good will of the Producer, and shall endeavor to broaden the market."

[6]"The fair market prices of coal of any grade and character referred to in the next preceding section, subject to the power of review hereinafter stated, shall be: (a) The minimum prices for the various grades and sizes in the various consuming markets which may be established for future application by a marketing agency or marketing agencies, of whatever form or howsoever constituted, now existing or hereafter created or organized, acting for coal producers truly representative of at least two-thirds of the commercial tonnage of any coal district or group of districts, such minimum prices to be effective when and as announced as provided in section 4 hereof."—Sec. 2, Art. VI, *Code of Fair Competition for the Bituminous Coal Industry*. For complete text of code, which also covers functions of code authorities and price-fixing in areas where no district selling agencies exist, see *Coal Age*, October, 1933, p. 327. Amendments covering new minimum wage rates under the 7-hour day are covered in the issue of May, 1934 (p. 196), and July, 1934 (p. 289).

long-term price protection and protection against dumping;

(8) Protection from credit losses;

(9) Elimination of dumping;

(10) Ultimate reduction in sales costs through elimination of duplication in effort, more uniform running time with lower costs of production and by balancing grades or sizes;

(11) Equalization of running time through better distribution of orders;

(12) Reduction in mining losses by encouraging higher percentage of extraction and other more efficient operating methods;

(13) Improvement in wage levels[1];

(14) Promotion of research;

(15) Stimulation of commercial activities generally through a restored buying power in the mining communities;

(16) Protection to the consumer on supply by keeping capacity available to meet increased demands, on fair and stable prices which will permit consumers and retail distributors to "operate in competition with coals sold by other producers or districts"; and by giving each consumer "the kind of coal best suited to his needs."

These major promises were and are all parts of one main objective: to stabilize the industry and through such stabilization to improve the economic conditions in communities dependent for their existence upon the coal industry in the Appalachian region and by this dual stabilization contribute to the betterment of general conditions. How and to what extent have these promises been fulfilled? As stated in the first article in this series, advertising plans are still in a formative state and organization of a fuel engineering service is just getting under way. The third promise contemplated direct selling by ACI for its fulfillment so that responsibility for any failure to live up to the expectations therein held out must rest upon the stockholders who elected to move their tonnage through exclusive sub-agents. Through its exchange department, ACI has made substantial progress in the balancing of grades to prevent dumping; during the year ended May 31, 1934, between 375,000 and 400,000 tons was so handled. Dumping in general was sharply curbed by the adoption of a rule prohibiting the shipment of unsold coal from ACI mines. This prohibition was subsequently written into the code, which made shipment of unconsigned, unsold coal an unfair trade practice.

There can be no question that ACI has fulfilled its promise to give its members more adequate marketing information. The data furnished by its accounting and statistical division, touched upon in earlier paragraphs, and the reports of its traffic department are major contributions to this service. Further expansion of this information is contemplated in the program of the market research department. While the sub-agency setup has militated against coordinated effort to widen the market for ACI coals, studies made by the accounting and statistical division show that the Southern high-volatile fields as a whole and the ACI groups in particular have been able not only to hold their place in the national market but in some cases also slightly increase their percentage participation in the total business in recent months.

Because of existing code regulations with respect to contract prices, ACI has not been in a position to develop fully its program on increasing retail outlets by offering long-term price protection. For the time being, therefore, efforts to expand retail distribution must depend primarily upon other activities of ACI—notably the work of the promotion section of the market research department. The importance of this development lies in the fact that the domestic trade is the largest normal consumer of ACI coals; during the first four months of 1934, for example, 33.9 per cent of the tonnage cleared through ACI was destined for domestic consumption. Lake shipments during the season of navigation, of course, will reduce the percentage specifically earmarked as domestic, but no small part of the tonnage classified as lake business eventually will find its way into the hands of domestic consumers through dock and retail channels of distribution.

Under the sub-agency plan, ACI is relieved of direct responsibility for losses due to bad debts. Nevertheless, it endeavors to protect its membership against such losses by arranging with the National Coal Credit Corporation to furnish complete credit information to all sub-agents. The cost of this service is borne by ACI. Promotion of research has taken the form of a subscription for $10,000 to Bituminous Coal Research, Inc. Few individual producers, it is contended, would be in a position to contribute as liberally to such a venture. The campaign for improved operating practices is in the hands of the inspection and testing department. While the personnel of this department has given the major part of its attention to gathering data to be used by the marketing division in its classification work, as stated in the preceding issue, it is planned to devote more and more of the time of this department to advising producer members how they can reduce their costs and improve their product through better operating methods.

ACI has been definitely barred from attempting to realize its promise of an ultimate reduction in sales costs through elimination of duplication in sales effort by the election of its stockholders to work through sub-agents. Until such time as the stockholders may decide to abandon the sub-agency system in whole or in large part and place the burden of selling directly upon ACI, there seems little reason to anticipate that the hopes for reductions in sales expenses attributable to duplication of efforts can be realized. While equalization of running time through better distribution of orders is a goal which presupposes a degree of control which probably could not be easily exercised under the sub-agency plan, the winning of that goal under ACI contracts with its producer stockholders has been made subordinate to the quota system.

This system provides that in times of slack demand each producer-stockholder shall receive his pro rata share of the business based upon the percentage said producer's car allotment was of the total car allotment to all ACI

[1]The exact phraseology used in this connection was: "By the elimination of dumping and more intelligent selling, as outlined herein, to increase the realization to the producer to a level that will enable the operator to pay labor as high a wage as the competitive conditions with coals in more favorably located freight rate zones or regions will permit."—*Blue Book*, p. 9.

Table II—ACI Profit and Loss Account

(From date of organization to Dec. 31, 1933)

Income:		
Commission on coal sold	$380,567.77	
Discount, interest on securities, etc.	1,337.18	
Total Income		$381,904.95
Expenses:		
Sales Committee*	72,424.68	
Advertising and Public Relations*	13,203.76	
Inspection and Testing*	12,093.44	
Accounting and Statistical†	22,571.75	
National Coal Credit Corporation**	6,708.26	
Special Legal Expenses††	17,660.29	
Administrative and General Expenses‡	67,334.01	
Total Expenses		211,996.19
Net Income		169,908.76
Reserve for Federal Income and Excess Profits Taxes		31,929.14
Surplus		$137,979.62

*Includes salaries, traveling and office expenses.

†Includes salaries, stationery and printing, rental of equipment and office expenses.

**Credit service to sub-agents.

††In connection with *United States vs. Appalachian Coals, Inc.*

‡Includes salaries of officers and clerical force, legal and professional services, traveling expenses of executive committee and officers, office rent, depreciation and other expenses.

mines for the second preceding calendar month.[8] Although machinery for the enforcement of this quota system has been under active discussion by the board of directors and the staff of ACI, no definite decision on the question had been reached up to the time this article was written. Where, prior to the adoption of the code, a producer complained that he was not getting his fair share of the business and the marketing division felt that the complaint was justified, reallocation was attempted through the medium of readjustment in prices. Under the code setup, of course, it is necessary to obtain the approval of the divisional code authorities before such an adjustment can be made effective and such a proposal may have to run the gauntlet of the entire bituminous coal administration of NRA.

At the time ACI was launched all of the districts embraced within its scope operated non-union; today, an overwhelming majority of the producers in these fields has contractual relations with the United Mine Workers. This change removes wage levels from the immediate sphere of ACI activities. Prior to the adoption of the code and the signing of the Appalachian wage agreement, however, ACI took a leading part in initiating the movement for higher rates of pay in the then non-union fields. Late in May, 1933, ACI recommended to its stockholders that wages at the mines be increased 10 per cent, and advances in line with that recommendation became effective June 1, 1933. When the Northern and Southern Appalachian groups joined in a proposed code, a second increase of approximately 20 per cent in wages to bring rates in line with the minima named in the proposed code became effective. Later, with the adoption of the final code and the signing of the Appalachian agreement, a further advance was made. In each case, of course, price schedules were revised to cover these general increases in labor costs.

Accurate statistical measurement of the stimulation in commercial activities which may be credited to the operation of ACI and of the protection the establishment of that agency has afforded the industrial consumer and the retail coal merchant is impossible. That the bituminous coal industry is in better shape and that communities and other businesses dependent upon coal have benefited accordingly is generally admitted. So, too, is the reserve productive capacity. Minimum price schedules are now in the province of NRA and their reasonableness is approved by the code authorities. To attempt to say how much of these particular gains should be credited to ACI, how much to NRA and how much to industrial recovery without the benefit of assistance from either agency would involve purely speculative comparisons which would prove nothing.

The measurable record of tangible achievement on the part of ACI despite the handicaps several times reiterated is sufficient evidence that the dreams of 1931 and 1932 were not in vain. With the passing or modification of NIRA control, the district selling agency seems destined to play a still larger rôle in the promotion of orderly marketing and to contribute still further to the profitable stabilization of the bituminous coal industry.

[The third article in this series, to be published in the October issue, will discuss the organization and operation of the two Ohio district selling agencies—Northern Coals, Inc., and Hocking Coals, Inc.]

[8]The contract between ACI and the individual producer-stockholders states that "in the event the demand at the time this contract becomes effective is not sufficient to operate the mines of all producers represented by the Selling Agent upon a full-time basis, then the participation of the Producer in the total sales of the Selling Agent for the first calendar month after this contract goes into effect shall be such percentage of the total sales made by the Selling Agent for that month that the total car allotment of the Producer for the three months preceding bears to the total car allotment of all the producers whose coal is sold by the Selling Agent for the same period; and thereafter the monthly participation of the producer in the total monthly sales made by the Selling Agent shall be a percentage equal to the percentage the Producer's car allotment for the second preceding calendar month bears to the total car allotment of all the producers whose coal is sold by the Selling Agent for the second preceding calendar month; it being understood, however, that these percentages are subject to variation due to variations in the sale of the different sizes, grades and qualities of coals, as above set out; but that it is the purpose of this and all similar agreements that the Selling Agent will, over each annual period, as nearly as conditions will permit, all factors considered, give each producer's mine or mines producing the same or interchangeable grades of coal as nearly its pro rata share of available orders as is reasonably possible. All coal shipped by the Producer under contracts shown in Exhibit 'B', filed herewith, shall be counted against the Producer's proportionate tonnage of coal sold by the Selling Agent, as determined in this paragraph."

Air-Sand Process at Chickasaw Mine Cleans Railroad and Industrial Coal

(Concluded from page 343)

r.p.m., it supplies approximately 2,700 cu.ft. per minute at about 12-in. water gage. To prevent entrained dust from clogging the Carborundum plates, this air is cleaned by Staynew air filters, which purify it by drawing it through felt pads. These are cleaned as soon as they become choked with dust and require renewal about every two years, indicated by experience at the earlier Cadogan plant of the same company.

All electrical machinery in the preparation plant is operated from a panel at the head of the Marcus screen. This electrical power is so connected that every switch must be thrown on. Thus every unit must be operating or none will operate. This prevents any one unit delivering coal to a unit which is not operating. In consequence no unit can be overloaded. Connected load in the cleaning plant is 89½ hp. and in the entire plant is 149½ hp., as shown in the accompanying table. This does not include motors which operate car feeder, car stop, revolving dump and flygate. Texrope drives are used throughout. Lubrication is by the Ideal system. Cars are moved under the tipple by Fairmont car retarders. Total cost of the plant was about $100,000. The tipple is provided with four railroad tracks and a locomotive runaround. It is of all-steel construction except the wood floors and is covered with Armco-iron corrugated galvanized plates.

Connected Load at Chickasaw Preparation Plant

Unit	Horsepower of Motor
Reciprocating feeder	7½
Mine-run belt conveyor	10
Marcus screen	30
Loading booms (2)	12½
Total	60
10-ft. vibrating screen	10
Blower	15
Desanding screen	10
Coal elevator	25
Sand and primary refuse elevator	20
Sand belt conveyor	7½
Separate rollers	2
Total	89½
Grand total	149½

Because of the satisfactory results obtained at the cleaning plant at Cadogan, detailed studies have not been made of the operation of this cleaner, but tests have shown that the ash in the pea coal from the Chickasaw mine has been reduced from 8.89 to 6.63 per cent, and sulphur in the same coal from 3.60 to 3.29. Nut and pea leaving the cleaner run from 6.38 to 6.19 per cent ash. All the larger pyrite is removed. That more sulphur is not eliminated is believed to be due to its presence as pyrite in microscopic form and as organic sulphur.

The plant was designed and constructed by the Roberts & Schaefer Co. in connection with the patents of the Hydrotator Co., all the equipment being of the standard makes of the former company, except the ⅜-in. slack screen and the air-sand cleaning equipment, which were furnished by the latter company.

AIR-LOCK CAGES

+ Through Ventilation Shafts

By F. C. CORNET*
Consulting Mining Engineer
Mons, Belgium

SHAFTS in the United States are, at present, usually so shallow that all the coal a mine can produce can be hoisted through a single opening, but in countries where the coal lies deeper and the time consumed in hoisting is greater, both the intake shaft and the uptake shaft must be used for hoisting. If one of these is connected with a fan, and this fan is a blower, the air drawn from the surface through the fan will inevitably go along the fan drift and up the shaft, leaving the mine unventilated. For this reason the shaft has to be air-locked. If, on the other hand, the fan is of the exhaust type, the air will go down the shaft to the air drift and pass through this drift to the fan and be thrown to the surface, again leaving the mine without air. So, in that case also, the shaft would have been provided with air locks. Thus it is clear that where both shafts are used for hoisting, one has to be kept sealed against the passage of air.

The accompanying illustration shows the method used in the air-locking of a circular shaft of moderate diameter—13 ft. 4 in. in the clear. The cage is guided with rails weighing 100.8 lb. per yard. The central bunton is a 14-in. I-beam and the side buntons are 12-in. channels.

A fan is situated a short distance from the upcast airshaft and draws its air from the latter through a brick-lined air drift. Above this drift, up to the landing, the cages travel through narrow sheath-lined compartments, built of reinforced concrete, which will be termed locks, a fragmentary horizontal section of one of which, taken through *CD* of Fig. 1, is shown at the left-hand upper corner of Fig. 2, the lower half of which is a horizontal section of the shaft proper taken along the line indicated in Fig. 1 as *AB*.

Lock dimensions exceed so little corresponding dimensions of the cage that by providing the latter with a steel-plate bottom, which overhangs it moderately on all four sides, the lock is practically entirely obstructed when the cage has been raised so far that the plate enters the lock. Only about ½ in. of play is left between the plate and the smooth concrete walls that surround it, and also around three sides of the rails by which the cage is guided.

When the cages hang in the shaft proper, these locks are tightly covered by a lid or trap, termed in Belgium a *clapet*, made of either steel or wood and provided with a center hole for the passage of the hoisting rope. To each clapet is attached a rope, which passes over two sheaves and leads to a counterweight that carries most of its weight, thus relieving the hoisting rope of much of the strain that would result if it struck a load that was not thus already partially counterbalanced. Reference to Fig. 2 will reveal how each clapet is notched around three sides of the guides and is provided with a pair of ears, to which is attached the counterweight rope for that particular clapet.

In Fig. 1, the cage has been hoisted out of its lock, leaving, however, this constricted passage still closed by the overhanging cage bottom. The cage is of the four-deck construction so common in Belgium, France and Germany. Each deck carries two cars, as shown in the left-hand half of Fig. 2. The lowest deck is about 6½ ft. high to admit horses and machinery, and the other decks are each about 5 ft. high, and, in the absence of cars, will provide space for six or seven men.

Above the cage, and taking 5 ft. of space, are four chains which unite cage and hoisting rope, and a buffer about 8 in. thick and about 2 ft. in diameter, made of tightly coiled, strongly bound hemp rope. Standing as shown in Fig.

(Turn to page 355)

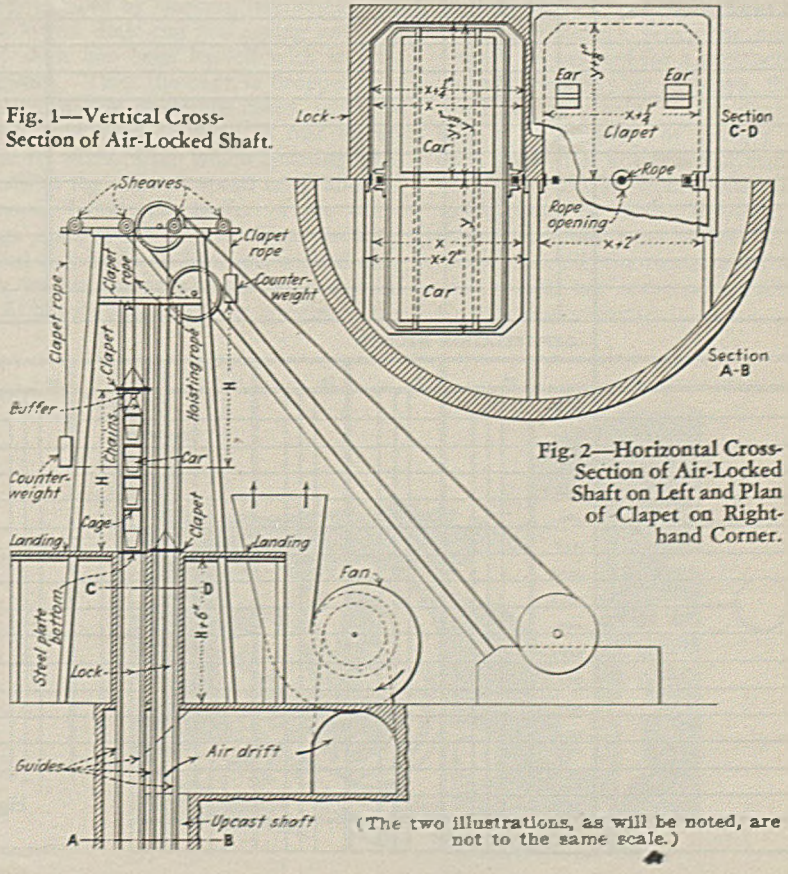


Fig. 1—Vertical Cross-Section of Air-Locked Shaft.

Fig. 2—Horizontal Cross-Section of Air-Locked Shaft on Left and Plan of Clapet on Right-hand Corner.

(The two illustrations, as will be noted, are not to the same scale.)

*Deceased March 18, 1934.

ACCOUNTING

+ For Fixed Assets

By JOHN C. McNEIL
Certified Public Accountant
McVeigh, Ky.

IN RECENT YEARS, the air has been thick with discussions of "write-down of assets," "salvage value of idle or excess equipment," "present-day values," "replacement values," etc. In these discussions, two things play a most important rôle. They are: (1) the physical property itself; (2) the full historical record of the equipment.

For years it has been clearly the intent of the income tax regulations that "the allowances for depreciation should be computed and recorded with express reference to specific items, units, or groups of property, each item or unit being considered separately or included in a group with others to which the same factors apply." It is, therefore, surprising that more concerns have not in the past adopted systematic equipment and depreciation records for individual items and groups of identical items. Too often all equipment is buried in the "Machinery and Equipment" account without any effort being made to allocate the charges for depreciation to the various groups.

Treasury Decision 4422 reopens the entire subject of equipment depreciation accounting by stating that "the burden of proof will rest upon the taxpayer to sustain the depreciation sustained." Maintenance of the standard equipment and depreciation record will materially aid management in arriving at depreciation costs, seeing that in-

EQUIPMENT RECORD

NAME OF ASSET — SYM. BOL — SUB. ACCT NO. — ACCT. NO.

STANDARD FORM C35 PRINTED IN U.S.A.

CHARLES B. HADLEY CO. PATHFINDERS, LOS ANGELES SAN FRANCISCO DETROIT — REG. U.S. PAT. OFF. STANDARD EQUIPMENT AND DEPRECIATION RECORD

DEPARTMENT — LOCATION

DESCRIPTION

MANUFACTURER'S SERIAL NO. — YEAR — TYPE — MODEL

SIZE — H. P.

FLOOR SPACE OCCUPIED — AMOUNT OF INSURANCE CARRIED $ — RATE $

ESTIMATED LIFE — YEARS — DEPRECIATION RATE — % — DEPRECIATION PER MONTH $

APPRAISED BY — WHEN APPRAISED — 19 — APPRAISED VALUE $

SALVAGE OR SCRAP VALUE $

DATE ACQUIRED	DATE OF INVOICE	FROM WHOM PURCHASED	POSTING REF	ORIGINAL COST	ADDITIONAL CHARGES		TOTAL COST

DEPRECIATION RECORD

	19	19	19	19	19	19	19	19	19	19
Amt. Fwd.										
JAN.										
FEB.										
MAR.										
APR.										
MAY										
JUNE										
JULY										
AUG.										
SEPT.										
OCT.										
NOV.										
DEC.										
TOTAL For Yr.										
Amt. Fwd.										

Fig. 1—Equipment and Depreciation Record; Actual Size, 11x11 In.
(Reproduced by permission of Charles B. Hadley Co.)

surance carried is adequate, etc. The record also should include a brief description of each piece of equipment, from whom purchased, location, estimated life, rate of depreciation and probable salvage value.

A combined equipment and depreciation record is illustrated in Fig. 1. The upper section of the record shows the important facts covering the description and cost of the piece of equipment. A separate ledger sheet should be provided for each piece of equipment or each group of equipment purchased at the same time. The sum of the total costs of these gives a complete inventory of all equipment assets and should equal the general ledger balances, "Machinery and Equipment," "Furniture and Fixtures," and "Plant Account" which are ordinarily found on the balance sheet under "Property Assets" or "Capital Assets." The equipment ledger becomes a subsidiary ledger for the general ledger account controlling the plant ledger.

Every time a piece of equipment is purchased or whenever an improvement is made to the present assets, this information should be recorded on the proper leaves in the equipment ledger so that a trial balance or list of the footings of the "Total Cost" columns on all of these sheets will agree with the balances in the "Plant Asset" accounts in the general ledger.

The depreciation record in the lower section of the form is designed to show the amount which has been charged to operating expenses for depreciation and credited to "Reserve for Depreciation" for each piece of property. The total of depreciation to date of all equipment ledger sheets should agree with the controlling account "Reserve for Depreciation" in the general ledger. The book value of any piece of equipment will be the amount shown in "Total Cost" column, less the amounts shown in the "Depreciation" column.

When the equipment ledger is first established, the amount of depreciation that has been figured against each piece of property since it was acquired should be entered in the depreciation record in the first column opposite "Amount Forward." Thus, when all equipment record leaves have been completed, the total of the amounts of depreciation shown on the different leaves should equal the credit balance in the general ledger account. The equipment ledger is, therefore, controlled by two classes of accounts in the general ledger: the asset account "Machinery and Equipment," or such other titles under which they may be carried, and the liability account "Reserve for Equipment."

Each month as the depreciation charge is figured against the entire plant, the amounts affecting the individual pieces of equipment should be entered in the respective sheets in the equipment ledger, so that it will at all times be in agreement with the "Reserve for Depreciation" account in the general ledger. As will be seen, the depreciation section of the form provides for the monthly depreciation charges, the total for each year and the total to date. The sheet will handle a month-by-month record of depreciation sustained for a period of eleven years.

The equipment ledger should be arranged in a loose-leaf binder in the order in which the asset accounts appear in the general ledger. Every piece of property should bear a number and this should be a combination of the asset account and the serial number, separated by a dash. When a piece of equipment is sold or otherwise disposed of, proper journal entry should be made to credit the asset account and to charge the "Reserve for Depreciation" for the amount of depreciation previously figured on the same asset, the information being taken from the equipment record. The difference between the amount realized and the book value should be adjusted through profit and loss, as it may develop.

AIR-LOCK CAGES

Through Ventilation Shafts

(Concluded from page 353)

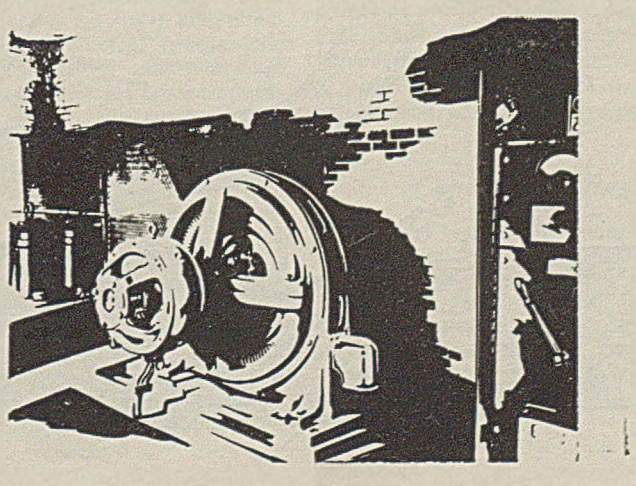
1, the cage holds the clapet about 30 ft. above the level at which it normally rests, opposite the clapet shown covering the opposing lock.

Whatever the height to which the cage lifts the clapet, the vertical length of the lock must be still greater. An excess of 6 in., however, will suffice. Thus the lock is completely obstructed by the time the buffer comes in contact with the clapet and unseats it.

The rising cage is brought up without stop to the position shown in Fig. 1. Loads are then removed from the cage and replaced by empties, beginning with the lowest deck and proceeding until the top deck has been loaded with its two empties. Then the cage is dropped at a comparatively moderate speed, until the clapet has been brought to rest alongside its mate, after which hoisting proceeds at the regular speed until about 2 seconds before the buffer of the other cage reaches its clapet. That hoisting speed may be 65 or 70 ft. per second during the greater part of the hoisting trip.

Although almost all the weight of the clapet is carried by the counterweights, the excess pressure of outside over inside air bears on the clapet, which accordingly is not entirely balanced. In a case such as described, this excess pressure may aggregate 1,000 lb. The clapet, the cage and the hitching of the hoisting rope would all suffer from the blows struck by the rising cage if caution were not taken when the buffer is brought in contact with the underside of the clapet. Despite this care in hoisting, in a shaft 2,540 ft. deep, with such a clapet covering, twenty double trips are made per hour, bringing in all 320 cars to the surface hourly, or 215 short tons, the cars holding 0.672 short ton of coal.

Most of the leakage occurs while the clapet is off the top of the lock. For this reason, clapets are never left in the lifted position any longer than is necessary. When hoisting lags, no matter for how short a time, both cages are kept below the locks. When the mine is to remain unoperated for a protracted time, as over Sundays or holidays, the cages are lifted to a point in the shaft where they approximately or exactly balance each other, but not opposite each other, because to do so would interfere with ventilation. In shafts, however, of 20-ft. diameter, and most modern shafts are so constructed, the cages, even if opposite, would not materially reduce the air-carrying capacity.



NOTES

. . . from Across the Sea

COAL will be transported by water in the underground workings of Sarang colliery, in the East Bokaro coal field, according to J. Brown, who read a paper recently before the Mining and Geological Institute of India. The seam is 50 ft. thick and dips 1 ft. in 3 toward the south of the property. The workings of the mine are shown in Fig. 1. Two inclines dipping 1 ft. in 4 and 1 ft. in 4½ have been driven from a favorable site on the surface. At a distance of 1,600 ft. two haulage "levels" on a gradient of 2 per cent have been driven, one to the right and one to the left, these levels being approximately in the middle of the seam. On either side of the haulage level are two other headings, one for ventilation and one for the loading of coal. These are located within a few feet of the floor of the seam.

The main gateways of the longwall faces *A* are driven on a 1 in 4 grade every 700 ft. or so, as also the roads *B* for bringing down sand from boreholes *C* to longwall faces *D*. A pair of headings, *E*, connect up the boreholes *C* with the main dip inclines and main return airway. These headings serve not only as supply roads for such materials as timber for the coal faces but also as passages for return air. The gradient 1 in 4 is chosen for the main gateways because it gives the best inclination for the transportation of coal in a trough by water. These gateways start not at the level of the coal-loading heading but at a point 6 or 7 ft. above the track in that heading, and they terminate at the barrier which is left near the outcrop of the seam or to protect a level above.

At first only the bottom bench of the seam will be taken, or 7½ ft., and it will be mined by advancing longwall faces starting along the lines *FK* and FK_1 (Figs. 1 and 3) and the face probably will be stepped as shown at *GH* and GH_1 (Fig. 3), each step projecting about 10 ft. and being 30 ft. from the adjacent step. Thus each face will have a loose end, and this, it is believed, will assist in bringing down the coal. After the face has progressed 10 ft. to the full rise of the seam, cutting will cease temporarily and the area of the waste in

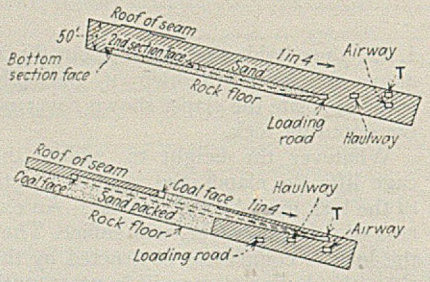
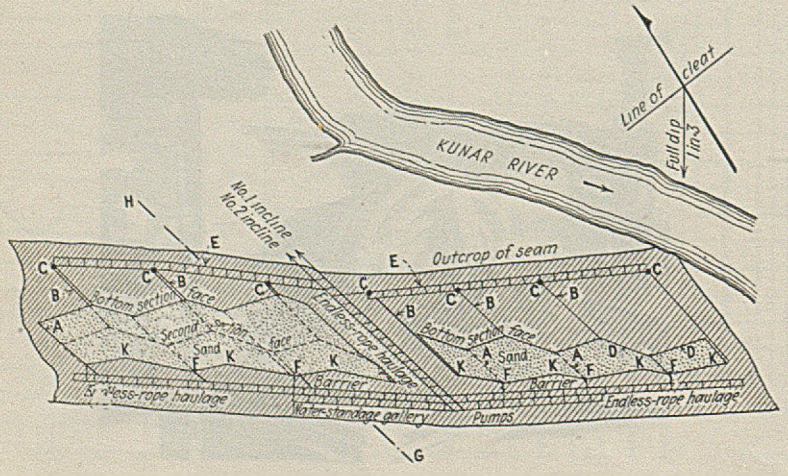


Fig. 2—Upper Elevation Showing Section Along *HG* in Fig. 1; Lower Elevation Shows Manner in Which Top Branch of Seam Will Be Extracted.

which the sand is to be deposited will be prepared for its reception.

At the same time the main gateway will be advanced about 12 ft. by building an arch of concrete blocks, bricks or steel plates with steel ring braces spaced at 2 ft. 6 in. centers. After a timber screen barrier with openly woven gunny cloth for retention of sand has been placed at the upper end of the main-gate arching, the sand will be washed in so that the arched gateway will become enveloped in sand

Fig. 1—Layout of Longwall Face—Plan.



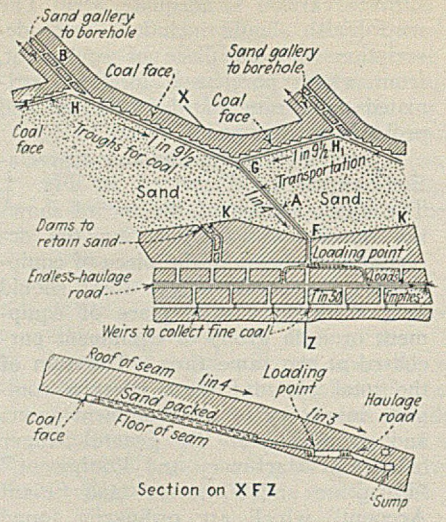


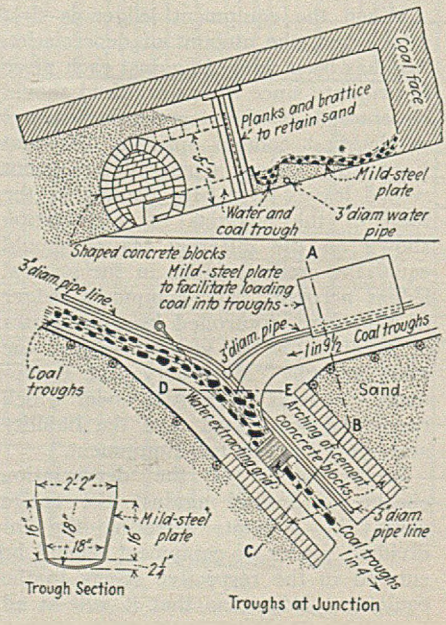
Fig. 3—Detail of Method of Working.

(Fig. 4) and the water will pass down the arched gateway on its way to a sump. This longwall face will thus be extended in the lower bench by alternate excavation and sand filling for a distance of 150 ft.

Before the longwall in the first and lowest bench is completed another longwall face will be prepared in the bench above it, the sand first stowed becoming the floor of this new longwall face. Another set of single roads will be needed for the supply of sand, upon completion of which coal getting may proceed on the second bench. In this way all benches of the seam can be extracted, though in the upper benches the coal will be delivered onto another loading level, roughly on the same horizontal plane as the rope-haulage level but some 60 ft. on the dip side of it, as at *T* in Fig. 2.

The water in the sand will pass, as stated, down the arched gateway and be led to the airway. Where the trough

Fig. 4—Manner of Bringing Coal to Head of Gateway.



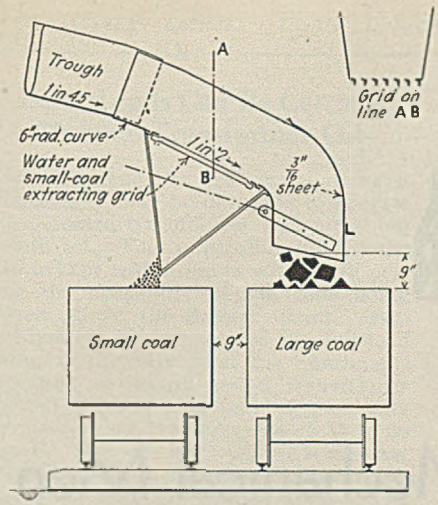


Fig. 5—Loading Point.

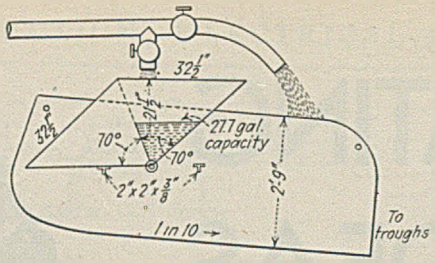


Fig. 6—Tilting Tripper to Provide Freshets of Water.

laid in the arched gateway discharges, a grid of tilted angle irons or V-shaped bars will be placed on an inclination of 1 to 2 (Fig. 5). When coal is passing along the trough, the fine coal and water will fall through the grid and drop into a car placed to receive it. The large coal will roll over the grid and fall into another car stationed alongside. Thus coal of two sizes will be delivered, each to a separate car. However, if it is desired that run-of-mine be loaded, the grids can be placed so close that only water will go through them. In this case all the coal will fall in a single car.

To carry the coal, which will be shoveled into the trough from five faces at a time, a continuous flow of water of 120 gal. per minute would suffice with a trough on an inclination of 1 in 12, but it is better to have this flow irregular, and by feeding this water to a tilting tripper, shown in Fig. 6, the troughs can be subjected to freshets at regular intervals, thus assuring the unfailing transportation of the coal along the face troughs, where the fall is as much as 1 in 9½. Any small coal that may pass out of the car with the water will be collected behind small weirs crossing the airway. This will have to be removed periodically.

A system of water transportation of coal has been in operation at the Jubilee pit, at Giridih, in an area from which the pillars are being extracted. As much as 44,000 tons has been thus handled, so the plan is not wholly experimental.

R. Dawson Hall

On the ENGINEER'S BOOK SHELF

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

A Handbook of NRA (Second Edition); Lewis Mayers, editor. Federal Codes, Inc., New York City. 842 pp. Price, $6.50; with semi-monthly supplements to end of year, $10.

The second edition of this work, bulking twice as large as the original volume, represents a notable improvement over its predecessor, issued about a year ago. A substantial part of the greater bulk, of course, is the direct result of the increase in official documents, memoranda, interpretations and court decisions affecting NRA and its operations. The text of a dozen State recovery acts and leading court decisions thereon—a new feature—also adds to the size of the present volume.

Following an introductory chapter analyzing NIRA and questions relating to its constitutionality, an outline of code procedure, PRA and the State statutes enacted to supplement the federal law, the detailed studies are grouped under six main headings. Part I is devoted to the act itself and interpretations thereof; Part II covers code principles, formulation, administration and enforcement; Part III is a comparative analysis of the outstanding code provisions; Part IV gives the text, history and interpretations of PRA and a check-list of industries that were or are under this blanket agreement; Part V takes up the story of the regulation of the petroleum industry and Part VI is given over to the State recovery acts. The complete text of 23 major codes and summaries of the more important provisions of 178 other codes approved last year are included in an appendix.

The text of the first edition was confined to a straight compilation in full or in summary form of official documents and memoranda. Such material also makes up the major content of the new edition. Mr. Mayers, in addressing his volume to the lay reader, specifically disclaims any attempt "to set forth or to appraise the economic or social problems or the results of the wholly novel system of industrial government created during the past half year." But, though critical evaluation of the law and its administration is eschewed, the treatment of certain aspects of the situation is, nevertheless, analytical by reason of the form in which the material is arranged. This is particularly true of Part III, where code provisions of different industries are grouped by major subject classifications, viz.: provisions relating to labor, production control, marketing and sales, prices and terms of sale, relations with competitors and code administration.—S. A. H.

Mechanical Power Transmission From Motor Drive to Industry, by R. W. Drake. American Leather Belting Association, New York, N. Y. 224 pp., 8½x11 in. Price, 25c.

This monograph, the result of much research, is an effort to give the actual or prospective belt user information regarding leather belting that will enable him to get maximum service and minimum grief. Mr. Drake declares that belt drives are too often designed for normal loads rather than for peak loads and load fluctuations, which always must be anticipated. This makes them inadequate whenever they are required to transmit such excessive loads. Manufacturing concerns and even salesmen of belt-making concerns, pressed by competition, the author declares, only too often recommend belts of inadequate width to their clients. Inadequate tension also often characterizes short-center drives, even when the belts are properly proportioned. He shows how this may be corrected.

Information is given in this publication on short-center drives—gear drives and gear reducers, gravity idlers, multiple-V drives, Rockwood drives and silent-chain drives—and on individual versus group drives, from the viewpoints of production and delays, relative first and annual costs, performance, annual power cost and relative first cost of installation of electrical and mechanical power-transmission equipment.

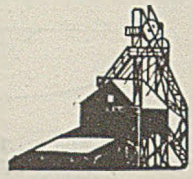
Coming Meetings

American Institute of Mining and Metallurgical Engineers, Coal Division; Pennsylvania State College, State College, Pa., Oct. 19-20.

National Safety Council; 23d annual Safety Congress, Cleveland, Ohio, Oct. 1-5.

Illinois Mining Institute; 42d annual meeting, Hotel Abraham Lincoln, Springfield, Ill., Nov. 2.

OPERATING IDEAS



From Production, Electrical and Mechanical Men

Simplified Phone Diagram For Maintenance Use

To assist in the study of the fundamentals of mine telephone circuits, the simplified wiring diagrams of two common makes of bridging-type magneto mine telephone sets are reproduced herewith to show the general arrangement of parts and circuits. Describing a set as a "bridging type" arouses curiosity regarding the reasons for its being so designated. It means the type which is connected in parallel with similar sets across the two conductors of the line. This is in contrast to the series sets of the early days, which sets were connected in series along a single conductor of a loop circuit.

Three distinct parallel paths across the line are presented by the typical bridging magneto set. One is through the condenser, receiver and primary section of the induction coil. This path normally is open and is closed only when the receiver is off of the hook. The second path is through the ringer and this always is closed. A third path is through the generator; this path normally is open and is closed only when the crank is being turned. The condenser in the first path is omitted on some telephones. Its function is to prevent impairment of line operation when a receiver is off the hook through mistake or as a result of eavesdropping. About ½ microfarad is the proper capacity for this condenser. This stops the relatively low-frequency ringing current but offers little impedance to the passage of the high-frequency voice currents.

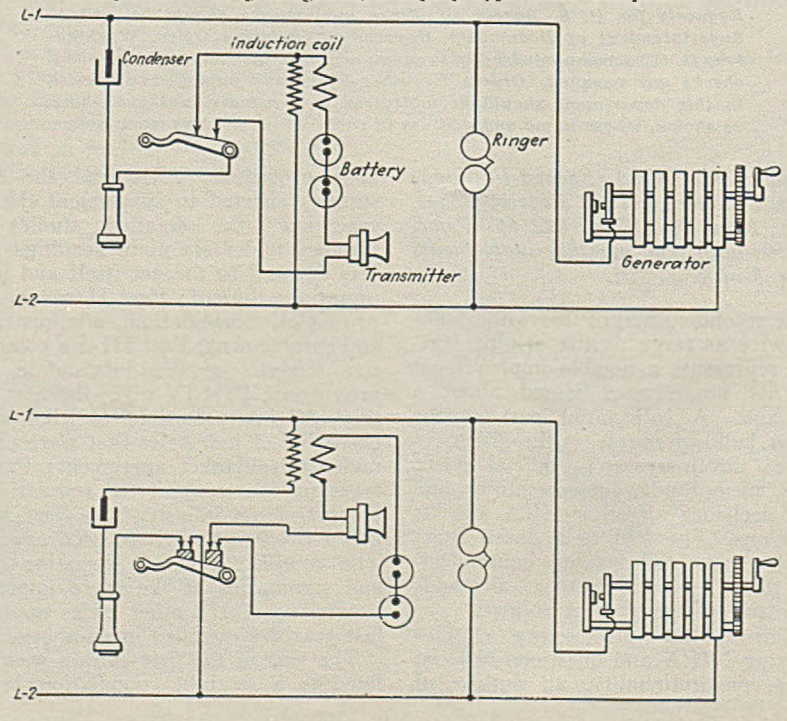
Direct current from the battery does not travel over the telephone line. Normally the battery circuit is open. Only when the receiver is off of the hook is it closed, and then a direct current flows through the local circuit consisting of battery transmitter and primary section of the induction coil. Talking into the transmitter vibrates a disk, which in turn causes change in the ohmic value of the resistance element, thus causing the direct current to fluctuate in value according to the voice vibrations. This fluctuation of direct current in the primary winding of the induction coil generates an alternating current in the secondary winding and this is the voice current which travels over the line.

Large-capacity five-bar generators are used because they must supply current sufficient to operate all the bells at once. To limit the current taken by individual bells when there are a large number of telephones on the line, ringer coils of higher resistance are used. It is the usual practice to specify ringers of 1,600 ohms when the number of phones per line is under twelve or fifteen, and ringers of 2,500 ohms when the line will serve as many as twenty phones.

The two simplified diagrams show a variation in the induction-coil and receiver-switch circuits, but in the electrical actions there are no fundamental differences. The upper diagram makes use of a simpler receiver-hook switch. The generator may be of a type which automatically short-circuits the armature, but all types are equipped with the automatic line switch, as indicated on the diagrams.

Ringers are of the polarized type in which there is no breaking of the circuit. Cores of the electro-magnets and the armature are of soft iron. A permanent magnet normally keeps the armature magnetized to a fixed polarity. Coils are connected in series, but the connection is such that a current magnetizes the armature ends of the two cores to opposite polarities. Thus one end of the armature is attracted to one core and the other end is repelled from the other core, and vice versa when the current reverses. Frequency of the alternating-current ringer current usually is under 1,000 cycles per minute.

Simplified Wiring Diagrams, Bridging-Type Mine Telephones.



Light Loads Can Be Carried Without Transformer Oil

In emergency or test installations it occasionally may be desirable to operate an oil-cooled transformer without filling it with oil. This is possible only if the load is kept within limits which will prevent the possibility of the coils being heated above the danger point. Approximately 20 per cent of the full-load rating is the safe limit for continuous operation of an oil-cooled transformer without oil, and this limit applies only for medium air temperatures of 70 to 80 deg. F. The safe limit will be somewhat lower in hotter weather and considerably higher for very low temperatures. The true test, of course, is the temperature of the coils, which should be held below approximately 80 deg. C., or 176 deg. F.

Available data on safe loads are somewhat scarce, because exact limits depend on the design of the transformer. It is interesting to note, however, that in a publication a few years ago the underwriters declared that if an oil-cooled transformer is to be run without oil, or as an air-cooled transformer, the load must be limited to approximately 40 per cent of full-load rating. This appears to be a somewhat higher rating than would be safe for the transformer windings.

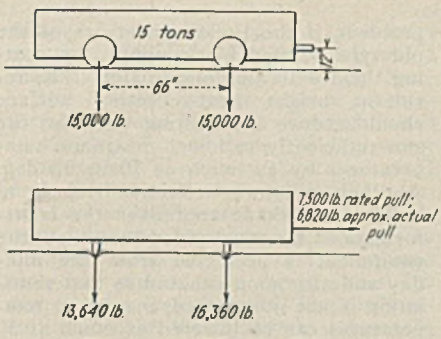
One precaution is necessary if a transformer without oil is to handle temporarily a small load within the heating limits: a conspicuous tag or sign should be attached to the transformer or the circuit stating that the transformer is without oil and that additional load must not be connected to it.

Series Operation Is Same As Reducing Weight

Starting series-and-parallel locomotives in parallel instead of in series has been the cause of differences of opinion between motormen and officials at a number of mines, chiefly as a result of broad statements that locomotives will start as many cars in series as in parallel, whereas actually the drawbar pull is reduced in series operation. On the other hand, there is a decrease in power demand.

In series operation, when a pair of wheels begins to slip, current is reduced in the motor driving the other wheels and total drawbar pull is decreased. Usually, the tendency for one pair to slip before the other is explained by lack of uniformity of rail or tire tread surfaces. However, there is another reason, where locomotives are designed so that the weight is the same on both trucks, for slippage of the front wheels in a number of cases, as a pull on a drawbar attached at any level above the top of the rail tends to add weight to the rear wheels and reduce by the same amount the weight on the front wheels. This condition is due to a rotating action about the point of contact between the rear wheels and the rail.

The exact shift in weight from the front to the rear axles requires consideration of a number of factors, but the amount can be approximated by multiplying the drawbar pull by the ratio of the height of the drawbar above the rail to the distance between the wheel centers. Referring to the upper sketch and assuming a 15-ton locomotive with a 66-in. wheelbase and a drawbar attached so that its center line is 12 in. above the rail, the normal weight on each truck would be 15,000 lb. In the lower sketch, point contacts have been substituted for wheel contacts, and the rails have been notched to show the adhesion between wheel and rail. With a coefficient of friction of 0.25, the 15-ton locomotive can be expected to exert a drawbar pull of 7,500 lb. This figure, multiplied by 12 and divided by 66 gives 1,360 lb. as the approximate shift in weight from the front to the rear axle.



Illustrating Tipping Effect.

With the motors in series, the weight on the lighter axle governs the maximum drawbar pull. In the case under discussion, the effective weight on the front axle of the locomotive is 13,460 lb. This figure doubled and multiplied by the coefficient of friction gives a drawbar pull of 6,820 lb., instead of the rating of 7,500 lb., or a reduction of 9 per cent. This figure, however, is only approximate, as all factors are not taken into consideration, but it serves to indicate the extent of the rotating, or tipping, effect.

Responsibility

Webster's dictionary of the English language defines responsibility as the "state of being responsible, accountable, or answerable, as for a trust, debt, or obligation." Operating, electrical, mechanical and safety men at a mine are obligated to promote their employer's interests by economical and safe operation. And as the progress of the industry in the long run determines the position of the individual enterprise, mining men must extend their thinking to take in the broad picture of operation in general. Efficient discharge of the immediate task requires a general fund of tested and proved operating methods, which this and other departments attempt to provide, and concern for the progress of the industry requires wide dissemination of new ideas developed from time to time. That, also, is a function of this department, and your participation is earnestly solicited. Send in your ideas, with a sketch or photograph if necessary. *Coal Age* will pay $5 or more each for those that are acceptable.

Spring Field-Coil Supports Improve Old Motors

Troubles arising out of loose field coils on direct-current motors on mining equipment are now being eliminated through the use of the spring-type field-coil support developed in the past few years. On locomotives, in particular, loose field coils resulting in grounds and shorts have been responsible for a large percentage of motor troubles. One of the major advantages of the new type of support is the fact that it can be applied to existing equipment.

It is to be expected that heavy series field coils held in place by rigid supports will loosen sooner or later through gradual compression of the insulation as a result of heat, pressure and jolting. After a certain reduction, a coil held in rigid supports begins to move slightly, due to vibration or magnetic pull, or both, and from then on wear takes place at a progressively increasing rate, bringing early circuit difficulties unless inspection detects the looseness and the condition is remedied.

The spring support provides an automatic takeup as the coil insulation shrinks or is compressed, thus forestalling coil movement. At least one manufacturer of locomotives and mining machines can now supply spring field supports in place of the rigid type for practically all types of its old equipment.

Sun Shading May Increase Transformer Rating

Painting with a bright reflecting paint or the erection of a sun shade may result in a material decrease in transformer temperatures, with consequent improvement in capacity and increase in oil life. It is not unusual for metal with a black heat-absorbing surface to attain a temperature of 130 deg. F. when exposed to the direct rays of the sun. This is hotter than the hand ordinarily can bear. Capacity of electrical equipment is determined by the maximum operating temperature, while the life of certain materials, such as fibrous insulation and insulating oil, is shortened by excessive temperature readings. These facts should not be overlooked if difficulties

should arise from apparent electrical overloading or rapid carbonization of oil in certain distribution transformers located above ground, directly exposed to the sun and possibly, in addition, located close to the side of some structure which cuts off the cooling breezes.

Assuming that on the hottest days during summer a maximum-registering thermometer has registered insulating-oil temperatures of as high as 180 deg. F., which is close to the limit and at first glance would call for a reduction in transformer load or an increase in capacity, it may be possible to solve the problem, if the transformers are of the old type painted black, simply by coating them with aluminum paint. The resultant bright heat-reflecting surface should reduce the heating effect of the sun sufficiently to lower maximum temperatures by as much as 10 or 15 deg. Another still more effective step is to build a sun-shade roof over the transformers. If constructed so that the equipment is protected from the midday and afternoon sun and so that ventilation is not interrupted, maximum temperatures can be lowered as much as 30 deg.

"Production Yardstick" Enables Executives To Plan Production and Cut Costs

PROPER statistics are the tools employed by management to increase production and cut cost. Usually, management is provided with daily figures covering tonnage produced, but frequently this is as far as statistical analyses are carried, with the result that tons per man employed or the production of individual mine sections are unavailable for the use of operating officials. To facilitate the compilation of such information, Jno. C. McNeil, McVeigh, Ky., offers the "Efficiency Report" shown in the accompanying illustration.

The report shown provides information as to the production from the five operating sections of the mine serving as the example, each of which is under the supervision of an assistant foreman, and also gives data on the work of "dusting crews," which clean up fine coal after machines. Collection of data for the report is simple and requires little additional time on the part of payroll clerks and timekeepers. Records are kept each day showing the tonnage produced in the various sections. Day men assigned to work in particular sections are charged to the respective assistant foremen. Day men not assigned to any particular section are charged to "General Inside Labor," "Haulage" or "Slate and Clean-Up."

The number of hours entered in the time books for the week are divided by the number of hours the mine runs to give the number of man-days worked. The total number of loaders at work during the week is divided by the number of days run to give the average number of loaders per day in each section. Weekly tonnage from each section also is divided by the number of days operated to obtain the average daily tonnage produced. Dividing the average daily tonnage by the average number of loaders in a section gives the average daily output per loader during the week. Similarly, average tons per day man may be secured.

Compilation of these figures for a mine requires about an hour a week, according to Mr. McNeil. Companies operating more than one mine should require a report for each mine and a consolidated report for all mines. The latter will give the average for all operations, which will serve as a basis for comparing results from each. Naturally, operating conditions at each mine will have to be taken into account in making such comparisons. In the form

Employment, Production and Efficiency Are Broken Down by Sections and Major Classes of Labor in This Weekly Performance Report.

CENTRAL OPERATION

EFFICIENCY REPORT

MINE Banner — Week Ending June 2, 1934. 193

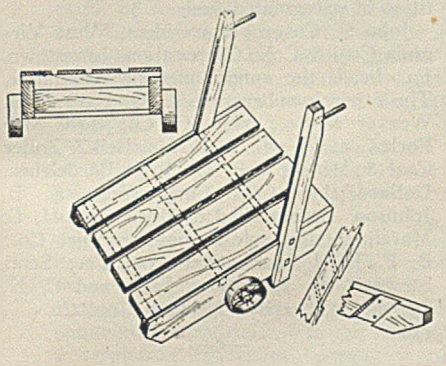
FOREMEN	BLAINE	MEYERS	BIDDLE	BREEN	JONES	BUG DUST	TOTALS			TOTALS
Coal Loaders	21	47	31	17	37	17	170			
Inside Co. Men	3	3	2	1	4	----	13			
General Inside Co. Men							61			
Outside Co. Men							20			
Machine Men							18			
Inside Salary Men	1	1	1	1	1	-----	7			
Outside Salary Men							1			
Maintenance Co. Men										
Power and Maintenance Salary Men							1			
Power and Electric Maintenance Co. Men							4			
Haulage.							21			
Slate and Clean up.							4			
Total All Men	25	51	34	19	42	17	320			
Average Tons Per Day	275	576	308	246	523	265	2,193			
Average Tons Per Loader	13.09	12.24	9.93	14.47	14.13	15.59	12.90			
Average Tons Per Inside Co. Man	81.66	192.00	154.00	246.00	130.75		188.69			
Average Tons General Inside Co. Man							35.95			
Average Tons Outside Co. Man							109.65			
Average Tons Machine Man							121.83			
Average Tons Inside Salary Man	275.00	576.00	308.00	246.00	523.00		313.67			
Average Tons Outside Salary Man							2,193.00			
Average Tons Power and Electric Maint. Co. Man							548.25			
Haulage.							104.43			
Slate and Clean up.							548.25			
Average Tons All Men	11.00	11.29	9.06	12.94	12.45	15.59	6.85			
Weekly Tonnage	1,373.00	2,879.00	1,541.00	1,229.00	2,614.00	1,327.00	10,963.00			

Remarks

illustrated, the figures are based on the 35-hour week. The employment of extra men, of course, will increase the total man-days per week and decrease the average tons per man employed. Where daily compilations are required, the same form can be used with equal effectiveness.

Handy Push Truck

A push truck capable of handling a large bulk load and which lends itself to construction with a minimum of tools or special materials is described in a recent issue of *Power* by S. H. Cooke, Vancouver, B. C. Construction is shown in the accompanying illustration, and Mr.



Details of Handy Truck.

Cooke remarks that by using two such trucks, fore and aft, heavy pieces up to steel girders may be conveniently moved.

The two side runners are made of 2x6 in. scantlings, with three cross members set down 1 in. into them. The deck of ¾-in. boards may be spaced or close-nailed. To strengthen the equipment, 1x¼-in. irons are screwed to the deck planks and up the handles. Handles themselves are made of 2x4-in. pieces which are halved into the side runners and bolted. Handle grips are made of ¾-in. pipe. They should be roughened with a cold chisel before being driven in, to prevent them from loosening up in use and falling out. Ordinary cargo-truck wheels are used, and the axle is extended the necessary extra width. The axle should be let in flush with the side runners, as shown.

Judging Motor Heat by Feel May Cause Error

"That motor is so hot you can't hold your hand on it" is a common expression, but a test of this sort is not a reliable indication of safe operating temperature, as the equipment may be extremely uncomfortable to the hand while the temperature is still below the safe value. Motors usually are rated on degrees Centigrade rise, instead of ultimate degrees Fahrenheit. Where the rise in degrees Centigrade is used, it is based on a maximum air temperature of 40 deg. C., equal to 104 deg. F. Adding to that the 50 deg. C. rise allowed on certain equipment gives a maximum temperature of 194 deg. F. The more common "40-deg. C. rise" allows a maximum temperature of 176 deg. F.

The average person finds it uncomfortable to hold his hand in water heated to 120 deg. F., and finds 125-deg. water unbearable. There is a difference of 51 deg. F. between this unbearable temperature and the motor temperature permitted by the conservative rating. In summer, when air temperature around topworks motors may range above 100 deg. F., far less than full load will result in motor temperatures unbearable by the hand.

The type of material to which the hand may be applied makes a great difference in the sensation of heat experienced. Materials, such as copper, which are good conductors of heat will feel as hot or hotter than water of equal temperature. Metal surfaces thickly coated with paint and fibrous insulating materials are not likely to feel as hot as water of equal temperature.

There is still another important point in determining safe temperatures. If the motor has operated continuously for several hours under a heavy load, the outside temperature of the case will be close to the temperature of the hottest points in the coils. But if the motor has been operated a short time and has attained a high temperature—i.e., if the rise has been rapid—temperatures destructive to insulation may be encountered in some parts of the coils before the outside of the case has become hot enough to be unbearable to the hand.

Cars Handled at Headhouse By Operatorless Locomotive

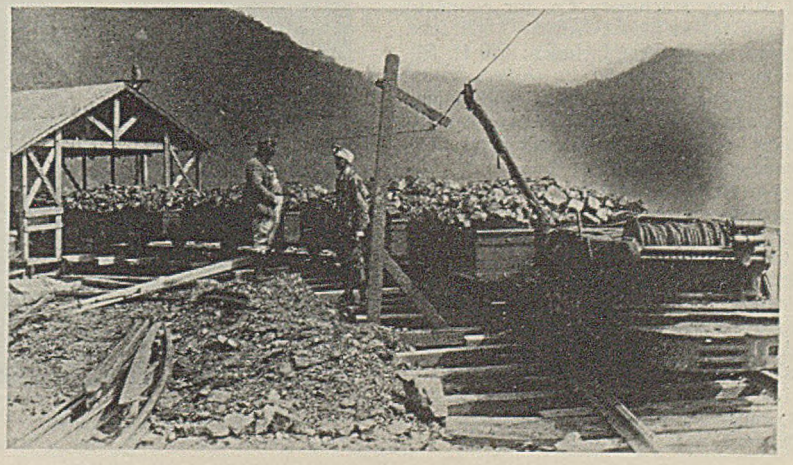
While a push motor was found to be advantageous in speeding up the handling of the 5-ton cars at the headhouse of the No. 3 mine of the Anchor Coal Co., Highcoal, W. Va., it was felt that the expense of an extra motorman for this service would not be warranted. In casting about for a means of retaining the locomotive while eliminating the runner, it was decided to install an extra controller and resistance in the headhouse to allow the weighman to control the movements of the locomotive.

Under this system, according to Van B. Stith, superintendent of mines, the trolley circuit from which the locomotive operates is energized through the controller and resistance in the headhouse. When the locomotive is placed behind a trip, the controller in the headhouse is closed and the controller on the locomotive is opened up to the last point. Thus, to move the trip, the weighman opens the controller in the headhouse, and when the trip is through the dump the controller is reversed to run the locomotive out to the end of the wire. At any time the locomotive is to be operated by its own controller, all that is necessary is to close the locomotive controller and open the headhouse controller to the last point, which puts full power on the trolley wire. No change is necessary in the locomotive, which is used in tramming a shearing machine in the mine on the night shift.

Standards Include Limits Of Axle Wear

One of the most difficult tasks involved in maintenance supervision is the establishment of limits of allowable wear on the various parts of mining equipment. These limits should be low enough to guard against the difficulties that excessive wear causes and yet high enough to insure that worn parts are not removed sooner than is economical. Wear of mine-locomotive axles at the journal bearings is a major maintenance difficulty at practically every mine, exceptions including new locomotives equipped with anti-friction journal and axle bearings. Typical of the larger organizations, which usually lead in setting standards and base their practices on a careful study of all the factors involved, one company has included in its maintenance standards a rule that axles are to be renewed when the diameter at the journal bearings has been reduced ⅛ in. from the diameter as new, or when the diameter reduction at axle bearings has reached ⅛ in.

Pusher Locomotive Operates Without a Motorman.



WORD from the FIELD

New Preparation Facilities

New contracts and construction of preparation-plant facilities were reported as follows in August:

CANONSBURG COAL CO., Canonsburg, Pa.; installation of Marcus screen, egg loading boom, local trade conveyors and vibrating screen in steel structure completed by the Roberts & Schaefer Co.; capacity, 500 tons per hour.

INGLE COAL CO., Wick mine, Little, Ind.; contract closed with Roberts & Schaefer Co. for pneumatic cleaning plant for ¾x0-in. coal, including Stump air-flow cleaning units, vibrating screens for preliminary and final sizing and dust-collecting equipment; capacity, 100 tons per hour; to be completed Sept. 15.

PEABODY COAL CO., No. 14 (Crerar-Clinch Majestic) mine, DuQuoin, Ill.; contract closed with McNally-Pittsburg Mfg. Corporation for cleaning plant; capacity 150 tons of 3x0-in. coal per hour. Equipment includes a Norton washer for the 3x5/16-in. size, capacity of 105 tons per hour, and an American Coal Cleaning Corporation pneumatic table for cleaning and dedusting the minus 5/16-in. material. The installation will produce the following sizes: 3x2-in., 2x1½-in., 1½x¾-in., ¾x5/16-in., 5/16-in. x 48-mesh and 48-mesh x 0. To be completed Nov. 15.

RIVER SEAM COAL CO., Booth, W. Va.; contract closed with Roberts & Schaefer Co. for Marcus screen in present tipple. Capacity, 300 tons per hour of lump, nut and slack; to be completed Sept. 1.

WESTMORELAND COAL CO., Hutchinson mine, Yukon, Pa.; contract closed with Roberts & Schaefer Co. for crushing and screening plant; capacity, 260 tons per hour. Equipment includes: 24x54-in. crusher, elevating and conveying machinery, shaker screens and steel structure.

BIG BEND COAL & CLAY CO., Center Point, Ind.; contract closed with the Morrow Mfg. Co. for mine-run conveyor, four-track shaker screen, loading boom, slack conveyor and crusher; capacity, 300 tons per hour.

CONSOLIDATION COAL CO., Mine No. 155, Van Lear, Ky.; contract closed with Fairmont Mining Machinery Co. for complete new preparation plant; capacity, 600 tons per hour. Equipment includes: 600-ft. 54-in. wide belt conveyor in slope, shaker screens, four loading booms, rescreening and refuse-handling equipment, complete crushing and remixing machinery and domestic-coal facilities.

JEFFERSON CO., Smithfield (Ohio) strip mine; new preparation plant completed by Fairmont Mining Machinery Co.; capacity, 250 tons per hour. Equipment includes: 200-ft. mine-run conveyor, shaker screen and loading booms.

OAKMONT SMOKELESS FUEL CO., Abrams Creek mine, Oakmont, W. Va.; contract closed with Fairmont Mining Machinery Co. for new screening and loading equipment; capacity, 75 tons per hour.

ROSEDALE COAL CO., Maidsville, W. Va.;

contract closed with Fairmont Mining Machinery Co. for new preparation plant equipped with shaker screens, two loading booms, nut and slack bins, slack conveyor and vibrating screen; capacity, 250 tons per hour.

WHEELING VALLEY COAL CO., Warwood, W. Va.; contract closed with Fairmont Mining Machinery Co. for shaker screen and loading equipment; capacity, 300 tons per hour.

Safety Council Organized

Operators and safety men, meeting at the offices of the Pocahontas Operators' Association, Bluefield, W. Va., Aug. 3, organized the Pocahontas-Tug River Council of the Joseph A. Holmes Safety Association. Officers were chosen as follows: president, William Beury, vice-president, Algoma Coal & Coke Co., Algoma, W. Va.; vice-presidents—Thomas Stockdale, State mine inspector, Bramwell; Jesse Aquino, Welch; and William Lester, Matoaka; secretary-treasurer, A. F. Marshall, safety engineer, Pocahontas Operators' Association. The executive committee is composed of A. J. Bartlett, Welch, W. Va.; J. H. Bowen, Booth-Bowen Coal & Coke Co.; E. I. Chatfield, Welch; R. R. Estill, Killarney Smokeless Coal Co.; B. C. Hylton, Lake Superior Coal Co.; Jesse Redyard, New River & Pocahontas Consolidated Coal & Coke Co.; and H. F. Warden, American Coal Co. of Allegany County.

Harris & Ewing

John Wellington Finch
New Director, U. S. Bureau of Mines

N.C.A. Meeting in October

"What Follows NRA" will be the keynote of the fifteenth annual meeting of the National Coal Association, to be held at the Mayflower Hotel, Washington, D. C., Oct. 26-27. Committee meetings will be held on Oct. 25. Included in the tentative list of topics is proposed legislation bearing on the problems of the bituminous industry, development of sales agencies and their future, credits, the encroachment of the government on private business and the use of the taxpayer's money in the development of hydro-electric projects, and the competition of unregulated fuels.

John C. Cosgrove, president, West Virginia Coal & Coke Corporation, Johnstown, Pa., heads the annual meeting committee. The other members are L. G. Ball, J. H. Weaver & Co.; Wm. G. Caperton, Slab Fork Coal Co.; G. D. Cowin, Bell & Zoller Coal & Mining Co.; H. T. DeBardeleben, DeBardeleben Coal Corporation; S. B. Johnson, Lorain Coal & Dock Co.; H. C. Marchant, Pinnacle-Kemmerer Fuel Co.; B. F. Reed, Black Star Coal Co.; Scott Stewart, W. J. Rainey, Inc.; and C. N. Templeton, Sterling-Midland Coal Co.

Hazard Votes Research Funds

An assessment of one-twentieth of a cent per ton on the 1932 production of its members has been voted by the Hazard (Kentucky) Coal Operators' Association for the support of the program of Bituminous Coal Research, Inc., it was reported in August.

Finch Heads Bureau of Mines

John Wellington Finch, dean of the School of Mines, University of Idaho, and director, Idaho State Bureau of Mines and Geology, was appointed director of the U. S. Bureau of Mines Aug. 16. Dr. Finch, who succeeds Scott Turner, mining engineer, of Lansing, Mich., was born at Lebanon, N. Y., in 1873, and attended Colgate University. His technical experience includes the following positions: geologist, Rock Island R.R., Oklahoma and Texas; Colorado State geologist, 1901-06; consulting engineer, mining geologist and manager of mining companies in the Eastern and Western States, Canada, Mexico, South Africa, China, Siberia, Siam, Burma and other Asiatic countries; industrial adviser to the Yunnan Province Government, China, 1920-24; and, at various times over twenty years, Department of Justic expert in the investigation of frauds in the sale of mining stock. Dr. Finch was instructor at Colgate University, 1898; University of Chicago, 1899; lecturer on mining, University of Chicago, 1912; professor of mining geology, Colorado School of Mines, 1925-29; and dean of the Idaho School of Mines and director of the Bureau of Mines and Geology from 1930 until his present appointment.

TVA Chief Target in Continuing War On Competitive Fuels

WHILE inactive on one front, due to the failure of the U. S. District Court to set a date for a hearing on its petition, the coal industry of Alabama, with the assistance of ice companies, carried its fight against the TVA power program to the State Circuit Court at Montgomery, Aug. 10. Action in the State court grew out of the Alabama Public Service Commission's refusal to rescind its approval of a contract for the interchange of power between TVA and the Alabama Power Co. and the TVA purchase of certain of the utility's properties in northern Alabama. The coal industry requested suspension of the commission's approval until its charges of market losses due to unconstitutional actions by TVA could be threshed out in the courts. Circuit Court Judge Leon McCord issued a temporary restraining order against the sale of the utility properties and set the coal companies' petition for a hearing on Sept. 14.

Coincident with the filing of the suit at Montgomery, the Alabama Power Co. asked the Public Service Commission to approve a second contract involving the sale of additional properties in fourteen northern municipalities to TVA. Hearing on the petition was set for Sept. 18. On Aug. 14, representatives of the fourteen communities transmitted to the commission a resolution requesting abrogation of its previous ruling that TVA file rate schedules and otherwise come under State regulation where it acts as a utility. The municipalities also asked the coal and ice companies to drop their fight against TVA and "support the President in his program for the development of the South."

The National Coal Association opened its general publicity campaign against the government's hydro-electric program last month with a broadside entitled "The Facts About the Billion-Dollar Water-Power Development of the Federal Government." Existing power facilities, declared the association, are double those required to meet present demands. To burden taxpayers with additional facilities increasing capacity to three times the demand is an unwarranted assumption of governmental power which would throw thousands of miners out of work and demoralize the coal industry. The pamphlet has been widely distributed to coal men, railroads, banking institutions, chambers of commerce and other organizations which might be affected by the federal program.

The association also paid its respects to the coal research program proposed by TVA in July. In a letter to A. E. Morgan, TVA chairman, C. E. Bockus, president of the association, pointed out that any movement tending to relieve soft coal of the distress growing out of recessions in markets would be welcomed. While the industry had no complaint to make where losses have been incurred as a result of fair and open competition, it felt justified in opposing vigorously the action of the federal government assuring a loss of over 6,000,000 tons annually in the Tennessee Valley area alone as a result of a direct expenditure of the taxpayers' money.

TVA was asked if it would be willing to ascertain and advise the public of the relative cost of steam and hydro-generated power in the area, as well as the over-all cost of TVA's total power program if developed with steam plants in the coal fields of the section. "I cannot but believe," Mr. Bockus declared, "that the TVA program, with its threatened expansion over the United States, will result in the annihilation of the bituminous coal industry and that such a research program as proposed by TVA and others would bring only fractional relief." The industry and the public, he held, have the right to a fair study and statement of all the economic facts involved in the TVA program in relation to coal, and the industry will be glad to cooperate to that end.

A substantially similar position was taken by the Alabama Mining Institute, which also asked if the proposed research program would embrace study of the more economical use of coal under present market conditions and the possibility of government financing of coal-burning equipment on a plan similar to that employed in the sale of home appliances by the Electric Home and Farm Authority, a TVA subsidiary. The institute offered to make available to TVA "a vast amount of data, embodying a study of the question over a period of years by competent engineers, to establish our contention that steam plants can produce more power at less cost."

Supplementing previous announcements, Chairman Morgan on Aug. 20 issued a statement on TVA's attitude on coal research. TVA, said Mr. Morgan, is not interested primarily in any one product but in the greatest general development of the region. One of the aims of the organization is to reduce as much as possible any loss to any particular industry or interest which may result from the general advancement of the region, but "such conflicts are bound to occur, as they have occurred throughout the entire industrial development of America. TVA is interested in the coal industry partly because it is one of the larger resources of the region and partly because the development of electrical power of necessity will, to some extent, affect consumption of coal," and believes that a research program to benefit the coal industry should cover the following points:

1. Actual displacement of labor in the coal industry in the region due to the development of electric power.
2. The extent to which, in such unified development of the resources of the Tennessee River, water-power development should be supplemented by electric power from coal.
3. Possibility of relocating the large present unemployed population in the coal region.
4. Low-temperature carbonization to provide a smokeless fuel.
5. Methods of using coal for heating business and residential buildings through improved stoking devices and the use of powdered coal.
6. Investigation of both old and new industries to find new uses for coal. TVA already has begun such investigations in connection with certain products.
7. Study of the characteristics of specific types of coal with reference to special individual industries.
8. Possibilities in the use of ash, cinders, exhaust materials and other waste materials in coal, already the subject of studies by government departments and TVA.
9. Electrification of coal mines to cut production cost.
10. Study of the possibility of storage reservoirs near large coal deposits to furnish condensing water and thus make large power developments from coal at or near the mines feasible.
11. Study of the freight-rate structure in the Tennessee Valley region which bears on the cost of coal transportation.

TVA, Mr. Morgan declared, would be pleased to associate itself with any general research program part of which would relate to the coal industry as a whole and part to the special coals and special industrial demands of the Tennessee Valley region. A general program with a central governing and coordinating body is essential to reduce waste and duplication of effort, and TVA would be glad to cooperate substantially in such an integrated program, in addition to its own work, which would be coordinated with the general program. TVA representatives, he concluded, would be glad to meet with representatives of the industry in the development of the program, and invite any suggestions.

Presaging the filing of a number of similar actions to forestall the use of PWA money in the construction of municipal electric lighting plants, according to reports, the suit of the Consumers Power Co., of Portland, Me., against the City of Allegan, Mich., reached the U. S. Supreme Court Aug. 4. The utility, a taxpayer in Allegan, started action against a grant of $410,000 to the city in the federal District Court for Western Michigan last January.

On the oil front, higher prices were requested by the National Coal Association at a hearing before the Petroleum Administrative Board, Washington, D. C., July 30. Advancing fuel oil prices, declared Allan H. Willett, director of the association's bureau of coal economics, will tend to lessen the unfair advantage which petroleum refiners have secured by selling this product below the cost of production. Witnesses against an increase included Dr. Ruth W. Ayres, NRA Consumers' Advisory Board and representatives of the Navy, fuel-oil dealers, oil-burner manufacturers, steamship operators and railroads. Oil companies were not represented at the hearing, but announced that they would file an extensive brief later on.

Political Fight Threatened Over Bureau of Mines

Seasoned observers of national public affairs predict that the appointment of John W. Finch as director of the U. S. Bureau of Mines, which was actively supported by Senator Pope (Dem.) of Idaho, will have sharp political repercussions. Republican propaganda agencies already have seized upon it as a rare morsel and it is not unlikely that they will charge President Roosevelt with violation of his own promise to keep technical bureaus out of politics. When the Republicans again control the administration, the change will be offered as justification for removing whoever may then be director of the U. S. Bureau of Mines by virtue of a Democratic

appointment and for retransferring the Bureal to the Department of Commerce.

The attacks, it is said, will not be leveled against Mr. Finch, whose qualifications for the post he has assumed are generally admitted, but against Secretary of Commerce Roper and Secretary of the Interior Ickes for the manner in which the Bureau has fared under their régime and for what critics of the present administration characterize as "the needlessly offensive and arbitrary way" in which the change in directorship was effected. According to stories current in Washington, Scott Turner, retiring director, had no advance notice of the fact that his successor had been selected until plans for swearing in Mr. Finch on July 2 went awry because of the last-minute discovery that the President had held up the signing of his commission because of political objections of the Postmaster General. Furthermore, it is charged that Mr. Turner was given no opportunity to discuss the work and plans of the Bureau with Secretary Ickes during the past year.

When it became evident early in 1933 that the Bureau was in for sad days because it was an agency in which Herbert Hoover had taken a great deal of interest, Mr. Turner—whose original appointment by President Coolidge in 1925 had been made on the unanimous recommendation of a non-partisan committee of eight which had included representatives of the A.I. M.E., National Coal Association, American Mining Congress, American Petroleum Institute and the United Mine Workers—determined to resign but was dissuaded by a number of leaders in the mining industry who pointed out that his resignation would only play into the hands of those who wanted to get the Bureau in the patronage class and would mean the removal of various key men in the organization. Later, smarting under what appeared to him the studied hostility of his immediate superiors, Mr. Turner sought to arouse interest in the appointment of his successor on the same basis that he had been chosen. This plan, however, did not seem to meet with the approval of Mr. Ickes. A subcommittee of the committee of scientists and educators named by the President to advise the White House on technical matters did make a report on the Bureau and submitted recommendations for the directorship; Mr. Finch was included in this list.

After the July 2 fiasco, Mr. Turner sent his resignation to the White House, subject to acceptance at the President's pleasure. Friends of Postmaster-General Farley, whose part in the matter was caustically criticized, assert that his action was influenced by requests from representatives of the mining industry that the appointment should be handled in a non-political way.

West End Leases Mine

The Mineral Springs colliery of the Lehigh Valley Coal Co., Parsons, Pa., which has been closed down for the past five years, has been leased by the West End Coal Co., Scranton, Pa. Operations are expected to begin above the flooded levels within the next two months, and approximately 150 men will be employed, it is reported.

August Code Developments Turn on Statistics, Correlation and Market Practices

A PROPOSED amendment to Sec. 3, Art. VII of the bituminous code, concentrating power to collect and compile statistics and other information which might be required under NIRA in the hands of Presidential members of code authorities encountered growing opposition in August. The amendment in question was an outgrowth of a suggestion made at a meeting of representatives of Divisions I and II early in June that the code be amended to require each subdivision to set up a statistical bureau with which the producers would file reports on spot orders, contracts, credit data and any other information which the subdivisional code authority, with the approval of the Presidential member, might demand, and also giving to the Presidential member of a code authority power to require reports from and examine the records of any producer to determine the validity of any complaint of unfair practices on the part of the producer.

Following hearings in Washington, D. C., Aug. 11, the amendment was revised to take the collection of statistics and information out of the hands of the code authorities and place it under the jurisdiction of the Presidential members, who would function through statistical bureaus set up and operated by code authorities, directors of the bureaus to operate under direction of the Presidential members. Information required from producers would be filed with Presidential members, who would be charged with the duty of holding it confidential, except that composite tabulations would be furnished to code authorities upon request and also specific reports and other information necessary to enable the authority to determine the merits of any violation discovered in examination of the reports and information submitted. Further, all producers would be required to furnish to any government agency or agencies designated by the administrator such statistical information as he might deem necessary for the purposes of Sec. 3(a) of NIRA. As in the original proposal, Presidential members would be given power to examine the books and records of producers in case of complaints.

The rising tide of dissatisfaction with the amendment among a number of operators was reflected in the unanimous ratification of a resolution opposing adoption and refusing assent in the present form by the Southern Subdivisional Code Authority No. 2, Division I, Aug. 20. Divisional and subdivisional code authorities, said the resolution, should be left free to determine for themselves just what information they need for administrative purposes, as well as the kind and character, and should not be forced to conform to a uniform plan. The functions to be conferred on Presidential members, it is contended, properly belong to the respective code authorities; all information should be held strictly confidential and remain the property of the person submitting it; each code authority should have the right to collect and classify the information covered by the amendment either through its own staff or an agent designated for that purpose to hold the cost to a minimum. The present code provides sufficient power for the collection of any statistical data which the administrator may desire under Sec. 3(a) of NIRA. Such information, however, should be collected at the expense of the government. Southern Subdivision No. 1 leaders also went on record in opposition to the revised amendment on Aug. 21, and were followed by the Illinois Subdivision of Division II on Aug. 23. The Southwestern Subdivision of Division IV also declared its intention of submitting a formal protest.

Meanwhile, the controversy over Form "C," proposed by the NRA for the collection of data on employment and earnings of miners, continued into August with a series of conferences designed to iron out differences between the operators and the NRA. Production by months at individual mines was called for by NRA in Form "X," a new report covering coal loaded into railroad cars, into boats and barges, trucked from the mines and sold locally, made into coke and used at the mines.

With the major steps in its program for ending price controversies in the bituminous industry, including a plan allowing each subdivision to challenge the price schedules of any other subdivision before they become effective (*Coal Age*, July, 1934, p. 291) and allocation of tonnage between subdivisions of Division I (August *Coal Age*, p. 325), out of the way, except for refusals to approve the District I plan by the Ohio and Southern No. 2 subdivisions, NRA took a hand in the long-standing correlation squabble between Indiana, Illinois and western Kentucky. At a meeting in Terre Haute, Ind., Aug. 8, attended by Wayne P. Ellis, deputy administrator for coal, representatives of the three districts arrived at a temporary correlation scheme for the Evansville (Ind.) market region and territory north. The agreement was referred to the respective code authorities for confirmation. Correlation of prices between Rocky Mountain and Southwestern fields was the subject of a conference in Colorado Springs, Colo., Aug. 13-14, which ended without arriving at a decision.

Whether the Presidential member of a code authority has the right to withdraw his approval of a price schedule was answered in the negative by the legal division of the NRA last month. The opinion, contained in a statement from Mr. Ellis on Aug. 4 said:

> The question arose during the meetings which were held in Washington last week as to whether or not a Presidential member, after having given his approval to a price established under the Bituminous Coal Code, could withdraw his approval at any time. This specific question was referred to our legal division for an opinion and we are quoting below the opinion:
>
> "It is the opinion of this Division that the language of Sec. 4, Art. VI, Code of Fair Competition for the Bituminous Coal Industry, which is the only matter of the Code referring to the approval of fair market prices by a Presidential member, requires that such approval when given be final in so far as the Presidential member acting as such is concerned. It is not to be assumed, however, that the prices so approved by such a Presidential member cannot be disapproved by the Administrator acting through the Presidential member.

nor should it be assumed that the Presidential member is stopped from withdrawing his approval of prices when such approval has been given not in accordance with the provisions of the Code. It is the opinion of this Division that this question should specifically be answered in the negative."

Another ruling by the NRA in August declared that guaranteeing analyses and B.t.u. values beyond the true analysis and B.t.u. content of the coal, with the result that the penalties assessed reduce the price to the producer or sales below the fair minimum code price, is a violation of the bituminous code. In reply to a request for a determination of the question from Jonas Waffle, managing director, Indiana Subdivisional Code Authority, Division Administrator C. E. Adams, on Aug. 4, ruled that "sales of coal made in that manner and having the result indicated would be a violation of the code."

Colorado Injunction Denied

Enforcement of the bituminous code received a setback in Colorado on Aug. 8 when Federal Judge J. Foster Symes refused to grant an injunction restraining Ballard Gearhart, operating a mine at Palisades, from violating the price provisions of the code. "The actions of the defendant in assertedly underselling price provisions of the coal code do not restrain or hinder interstate commerce and are not subject to federal regulation," Judge Symes held in dismissing the suit. The case was based on sales of coal in Utah by Gearhart.

The controversy over fixing minimum "floor level" prices under the emergency provisions of the code for the retail solid-fuel industry was carried over into August in a number of territories throughout the country. Following its disapproval of the basis on which minimum prices had been established by the St. Louis Divisional Code Authority in July, the NRA announced on July 28 that all future declarations of emergencies and determinations of lowest reasonable costs must be approved by the administration before they become effective. Divisional code authorities for the retail industry also were directed to transmit to Washington for immediate review the complete records in all cases where emergencies have been declared or in which applications for declaration of an emergency and determination of lowest reasonable cost were pending.

Undiscouraged by the failure to secure approval of its earlier prices, the St. Louis code authority held another series of hearings early in August, and again declared an emergency to exist requiring the determination of minimum reasonable cost, forwarding a report of the hearings to Washington in accordance with the new order. In the New York metropolitan area, the Newtown Creek Coal & Coke Co., which announced in July that it would adhere to the wage and hour provisions of the retail code but would not observe the prices fixed by the divisional code authority, had a change of heart on July 30. A decline in business, however, moved the company to embark upon another reduction program, which brought it into the Commercial Frauds Court on Aug. 9, which in turn held the company for trial in Special Sessions. In another action initiated by the code authority, Supreme Court Justice Black issued a show-cause order against the company on Aug. 7 requiring the organization to demonstrate why an injunction should not be issued to stop price violations. In the Scranton & Lackawanna Coal Co. case, the Supreme Court early in August refused the company's application for an injunction restraining the code authority from fixing prices.

After a bitter fight in the Common Pleas Court on July 30, five Cleveland (Ohio) retailers agreed to submit their objections to price-fixing to the NRA and consented to the issuance of an injunction prohibiting interim price violations. Massachusetts became another battle ground last month, the Connell Coal Co., of Haverhill, on Aug. 7, applying to the federal court at Boston for an injunction to protect it from prosecution by the government for sales of anthracite egg and nut at $1 under code prices. Decision was reserved by the court. A similar action in Seattle, Wash., resulted in a victory for the NRA when the federal court dismissed a suit brought to enjoin enforcement of retail price provisions. The court held that the plaintiffs had failed to exhaust the remedies in the retail code.

In addition to budgets for bituminous code administration expenses reported in previous issues of *Coal Age* (July, 1934, pp. 291-92, and August, p. 326), proposed budgets have since been submitted by twelve other code authorities, as shown in the following table:

Code Authority Budgets Submitted in August

	Amount	Year ended
Division I—Southern Subdivision No. 1	$210,000	June 30, 1935
Division II—Iowa Subdivision	26,810	Oct. 1, 1935
Division IV—Southwestern Subdivision	43,030	March 31, 1935*
Division V	58,800	April 30, 1935
So. Colo.; Colfax Co., New Mexico	14,270	May 31, 1935
Northern Colorado	15,000	March 31, 1935
North and South Dakota	12,361	March 31, 1935
Montana	7,184	March 31, 1935
Central New Mexico	3,060	March 31, 1935
Washington, Oregon and California	9,000	April 30, 1935
Northern Wyoming	2,850	Dec. 31, 1934
Southern Wyoming	3,097	March 31, 1935

*Nine months ended March 31, 1935.

Permissible Plates Issued

Two approvals of permissible equipment were issued by the U. S. Bureau of Mines in July, as follows:

Goodman Mfg. Co., Type 824-BJ slabbing machine; 50-hp. motor, 500 volts, d.c.; Approval 268A; July 25.

Jeffrey Mfg. Co., Type B.D.M. 25, Form H locomotive; Approval 1525; July 25.

Changes in code authority personnel in August included the appointment of Gilbert W. Gambill, Terre Haute, Ind., as Presidential member of the Illinois and Iowa subdivisional code authorities in Division II, as well as Presidential member of the Western Kentucky Subdivisional Code Authority of Division I. Mr. Gambill, already Presidential member of the Indiana Subdivisional Code Authority, succeeds Joseph Harrington on the Illinois and Iowa authorities and Frank D. Cain on the Western Kentucky authority.

Ralph Jamison, Jamison Coal & Coke Co., Greensburg, Pa., has been elected chairman of the Western Pennsylvania Subdivisional Code Authority. Mr. Jamison succeeds J. D. A. Morrow, president, Pittsburgh Coal Co., who presented his resignation July 27, but has since consented to remain a member. Ross Davis, Hillman Coal & Coke Co., has been appointed chairman of the marketing committee, succeeding W. L. Sheppard, Pittsburgh Coal Co., resigned.

A controversy between the Arkansas-Oklahoma Coal Bureau and Subdivisional Code Authority and the Midland Coal Mining Co., Midland, Ark., over the refusal of the latter to file reports on orders received and shipments made or to allow the Presidential member of the code authority to examine the records of the company regarding alleged unfair practices, resulted in the resignation of B. H. Bedwell, general manager of the company, from the code authority in August. He was succeeded by W. J. Pendergrass, president, Fort Smith Spadra Coal & Mining Co., Fort Smith, Ark.

With coordination of administration as the objective, it has been suggested that the wholesale coal and dock codes be consolidated with the bituminous code. NRA and representatives of the wholesale and dock interests are now considering the proposal, it is reported. Prospects for codification of the byproduct coke industry grew brighter in August with the announcement that the NRA plans to release the principal points in the measure, which is being consolidated with the chemical code. No progress was made in the development of an anthracite code.

Develop Briquetting Process

A process for briquetting Illinois screenings without the use of an artificial binder has been developed by R. J. Piersol, staff physicist for the Illinois Geological Survey, and will be patented for the benefit of the producers in the State, according to M. M. Leighton, chief of the Survey. Two Illinois groups, it is reported, have signified their intention of employing the process as soon as proper equipment can be manufactured.

C. F. & I. Asks Reorganization

Reorganization under the provisions of the federal bankruptcy act was requested in the federal court at Denver, Colo., Aug. 2, by the Colorado Fuel & Iron Co., in receivership. Arthur Roeder, receiver and president, was named temporary trustee by Federal Judge Symes, who set a hearing on the reorganization plans for Aug. 31.

Labor Board Decisions Hold the Spotlight In August Labor Developments

LABOR BOARD decisions continued to hold the center of the stage in bituminous labor developments last month. Strikes and kindred labor disturbances continued at a low ebb.

Two hundred men employed at the Brier Hill (Pa.) mine of the Deep Vein Connellsville Coal Co. walked out early in August in a controversy over certain rates of pay, while later in the month 500 miners returned to work at the Clyde No. 1 mine of W. J. Rainey, Inc., Fredericktown, Pa. Springdale mine, Allegheny-Pittsburgh Coal Co., Parnassus, Pa., also resumed operations after a strike of several months, during which the employees attempted to enlist support among other operations in the district. The Stonewall Jackson Coal Co., a strip mine at Wellston, Ohio, was another operation which started up last month after a strike of several weeks. A clash between employees and strikers at the Louisville mine of the Winding Gulf Collieries, Goodwill, W. Va., Aug. 21, resulted in the death of a deputy sheriff, it is reported. Approximately 700 men returned to work at the Moss & McCormack mines in Alabama in August after a stoppage of six weeks. The miners were reported to have been assured an increase in pay and changed working conditions. Picketing was resumed at a number of western Kentucky mines operated with independent miners in August.

Three Alabama companies figured in decisions of Division II Labor Board announced early in August. In a case of the United Mine Workers against DeBardeleben Coal Corporation, in which the union contended that a number of men had been discharged because of organization activities, the board held that the alleged incidents occurred before the coal code went into effect, and that the board therefore had no jurisdiction. In a case against the Alabama By-Products Corporation, the board ruled in a complaint involving overtime in hauling coal, which varied from 15 minutes to 1½ hours, that "in transit" means from the starting point to arrival at destination and therefore the necessary overtime is exempted from the provision of the code. In another complaint dealing with deductions for washer loss, the board interpreted the term "merchantable coal" included in the checkweighmen section of the code to mean coal after the washer loss has been deducted, but expressed the hope that joint agreements governing deductions for such loss would be made.

A. B. Aldridge, Stith Coal Co., and operator representative on the board, dissented from the majority opinion in the Porter Coal Co. case, involving discharge of certain miners due to their participation in a strike, on the ground that the strike had been declared illegal by the board and, therefore, the company was justified in discharging the men. An appeal was taken from the board's decision to the National Bituminous Coal Labor Board, but the latter was not assembled, due to the time and expense involved. The division board has rescinded previous rulings preventing the company from regaining the houses in which the discharged men live.

In Division I, Charles B. Barnes, Presidential member of the Division I—South Labor Board, also took over the corresponding position on the Division I—North board, formerly held by John M. Carmody, appointed a member of the National Railway Mediation Board.

Acting as umpire under the arbitration provisions of the wage contract prevailing in the district, E. S. McCullough, upheld the Algoma Block Coal Co., Lothair, Ky., in its discharge of miners as a result of a local strike. Citing the provisions relating to "discipline," Umpire McCullough interpreted them to mean that a local strike constituted a scale violation, as adequate means had been provided for amicable settlements of disputes.

The long-standing war between the rival Illinois unions was reflected in the dynamiting of bridges on the Burlington and Chicago & Illinois Midland railroads early in August, and in a mass demonstration of members of the Progressive Miners of America at the Freeburg No. 13 mine of the United Electric Coal Cos. on Aug. 13. Preparations to reopen the operation, which employed Progressives prior to a shutdown in April, 1933, with members of the United Mine Workers, in accordance with permission granted by the Division II Labor Board, was the cause of the demonstration.

Two decisions were handed down by the Division II Labor Board early in August. The board rejected the contention of the Leo Girton Coal Co., Brazil, Ind., alleged to have worked employees 10 hours or more daily in stripping, that the organization to which the steam-shovel work had been let was employing the partners of the firm and therefore they were not subject to the code provisions, and declared that the coal company had broken its contract with the union. Contracts for such work, ruled the board, cannot be made without the consent of the United Mine Workers. In Illinois, the Progressive Miners of America alleged that the Dorthel Coal Co. had refused to deal with the organization at its No. 3 mine, Middle Grove, although the majority of the miners were members. The board replied that the company had a contract with the United Mine Workers which cannot be changed by the mutual consent of the parties thereto until its expiration, March 31, 1935.

As an aftermath of the adverse decision handed down by the Division IV Labor Board (August *Coal Age*, p. 327), the Central Coal & Coke Co. began dismantling its No. 68 mine, Bevier, Mo., in August. The board held that collective bargaining rights had been refused employees and that the company had violated the coal code by fostering a company union and intimidating the miners to prevent their joining the United Mine Workers.

In the Pennsylvania anthracite region, a strike growing out of a rate dispute at the Wanamie colliery of the Glen Alden Coal Co. was called off on Aug. 1, the men voting to submit their grievance to company officials for settlement. The stoppage lasted a week and involved 1,400 men. A two-weeks' strike at the Lattimer colliery of Pardee Bros. & Co., involving 1,000 men, was called off Aug. 7 after settlement of a dispute growing out of the miners' demand that the entire breaker, instead of only part, be operated in running bank coal. Differences between the East Boston Coal Co., Luzerne, and its employees over the company's refusal to advance a pay day from July 16 to July 14 kept the colliery closed during August, although the dispute was finally referred to district officials of the United Mine Workers by the East Boston local.

Pending a final decision in the hearings on grievances preferred by the insurgent United Anthracite Miners of Pennsylvania in District 1, James A. Gorman, as representative of the old National Labor Board, named Robert G. Love, mining engineer, Kingston, and James Musco, of the insurgents, to investigate actual working conditions to supplement the evidence in certain cases presented during the hearings.

Personal Notes

A. F. FINNERAN, for a number of years electrical engineer for the Elk Horn Coal Corporation, Wayland, Ky., resigned Aug. 1 to take a similar position with the Pond Creek Pocahontas Corporation, Bartley, W. Va.

EDWARD GRIFFITH, Kingston, Pa., general superintendent of the Glen Alden Coal Co., since it absorbed the Lehigh & Wilkes-Barre Coal Co. three years ago, has been elected vice-president and general manager effective Sept. 1. Mr. Griffith, who succeeds the late S. D. Dimmick, started his mining career in the mines in 1901, transferring to the Lehigh & Wilkes-Barre clerical staff in 1902. He was made chief clerk in 1912, assistant general manager in 1928 and a director of the company in 1931. After the merger with the Glen Alden, he assumed the position of general superintendent.

W. Y. WILDMAN, traffic manager, Illinois Coal Traffic Bureau, has been appointed managing director of the Illinois Coal Bureau, Chicago, succeeding B. R. Gebhart, now assistant to the president, Appalachian Coals, Inc. Mr. Wildman retains his position with the Traffic Bureau.

T. J. O'BRIEN, Salt Lake City, Utah, president, Kemmerer Coal Co., was elected president of the Southern Wyoming Coal Operators' Association at the annual meeting in Rock Springs early in August. Other officers were chosen as follows: vice-president, FORREST RICHARDSON, president, Sheridan Coal Co., Omaha, Neb.; treasurer, V. J. FACINELLI, Rock Springs Fuel Co., Rock Springs; and secretary, L. W. MITCHELL, Rock Springs (re-elected).

L. C. ILSLEY, Pittsburgh Experiment Station, U. S. Bureau of Mines, has been named chairman of the Committee on Applications to Mining Work of the American Institute of Electrical Engineers. Coal-mining members newly or reappointed

are: J. H. EDWARDS, associate editor, *Coal Age,* Huntington, W. Va.; L. H. JAMES, electrical engineer, Hudson Coal Co., Scranton, Pa.; CARL LEE, electrical engineer, Peabody Coal Co., Chicago; C. H. MATTHEWS, electrical engineer, Susquehanna Collieries Co., Nanticoke, Pa.; C. W. PARKHURST, consulting electrical engineer, Berwind-White Coal Mining Co., Philadelphia, Pa.; and E. B. WAGNER, electrical engineer, Lehigh Valley Coal Co., Wilkes-Barre, Pa.

H. T. DEBARDELEBEN, president, DeBardeleben Coal Corporation; HERBERT TUTWILER, president, Black Creek Coal & Coke Co.; D. A. THOMAS, president, Montevallo Coal Mining Co.; A. B. ALDRIDGE, president Southeastern Fuel Co.; G. F. PETER, president, Southern Coal & Coke Co.; A. R. LONG, president, Brookside-Pratt Mining Co.; HAROLD MCDERMOTT, vice-president, New Castle Coal Co.; HUGH MORROW, president, Sloss-Sheffield Steel & Iron Co.; and WADE H. OLDHAM, vice-president, Republic Steel Corporation, were elected to the board of directors of the Alabama Mining Institute at the annual meeting on Aug. 15.

Study Kentucky Bumps

A study of coal seams in Harlan County, Kentucky, to develop data on the cause and prevention of mountain bumps, which have caused the loss of several lives in the State in the past five years, was begun on Aug. 1 by the Kentucky State Department of Mines and Minerals, under the general direction of John F. Daniel, chief. D. J. Jones, field geologist of the department, is in charge of the study, assisted by N. M. Wilder, geologist; John F. Maurice, mining engineer; Roy H. Gonia, district mine inspector; and officials of various mining companies.

Industrial Advertisers to Meet

Industrial marketing problems, with particular attention to distribution methods, will be the theme of a conference of the Industrial Advertisers' Association, Netherlands-Plaza Hotel, Cincinnati, Ohio, Sept. 20-22. Topics scheduled include: NRA and the capital goods industry; industrial advancement under the NRA; prospects for the capital goods industry; profits from market analysis; advertising and sales promotion applicable in the sale of capital goods; and advertising results. The conference will be accompanied by an exhibit and prize contest for industrial advertising.

Power and Fuel From Lignite

Utilization of the exhaust heat of internal-combustion engines driving electric generators and operating on gas derived from the coal being treated is a major feature of a continuous carbonizing process for subbituminous, lignite and free-burning bituminous coals developed by the Heliopore Engineering Laboratories, Colorado Springs, Colo. This feature, according to the laboratories, makes the process applicable to the needs of smaller communities in the lignite districts, as it is possible to produce a char suitable for domestic and industrial purposes and, as a byproduct, to generate low-cost electricity, in addition to the production of benzol and other byproducts. For domestic use, the coarse char would be bagged in its natural state or briquetted, while the fines would be suitable for pulverized-fuel firing. By using a part of the char to furnish heat for carbonization, it also would be possible to adapt the process, its sponsors point out, to the production of gas for domestic and industrial purposes.

Representatives of the laboratories also are taking an active part in the movement for an extension of research to foster the utilization of lignite resources in the West, and advocate the establishment of a western division of the U. S. Bureau of Mines to afford research men from the various lignite States an opportunity to collaborate with the bureau in the solution of the problems incident to the use of lignites.

Utah and Wyoming Coal Men Map Market Fight

Plans for regaining tonnage lost to competitive fuels and Canadian coal were canvassed at a meeting of representatives of Utah and Wyoming producers; the Portland, Inland Empire and Idaho retail coal merchants' associations; and the Union Pacific and other railroads at the offices of the Utah Coal Producers' Association, Salt Lake City, early in August. Sentiment at the meeting was reported to favor a three-way sacrifice in realization, the operators to reduce prices, the retailers to confine gross margins to certain figures and the carriers to attempt to secure an emergency blanket rate reduction. Definite action awaits the results of efforts by the railroads.

Mine Disasters Kill 23

Seventeen men were killed in an explosion at the Derby (Va.) mine of the Stonega Coke & Coal Co., Aug. 6. Between 70 and 80 other men at work escaped. The dead included Ralph Burchill, general mine foreman.

Six men were killed and a number of others were injured in an explosion in a powder house at the Harrison wagon mine, Sand Gap, Ky., July 28. The blast, according to John F. Daniel, chief, Kentucky State Department of Mines and Minerals, was caused by a pistol bullet fired into one of the fifteen powder kegs in the building at the time during an argument between the two men operating the mine under lease.

Safety Congress in October

The 23d Annual Safety Congress and Exposition of the National Safety Council, Inc., will be held in Cleveland, Ohio, Oct. 1-5. Mining-section sessions will be held on Oct. 2, 3 and 4, and the following speakers have been scheduled: Daniel Harrington, U. S. Bureau of Mines; John Knox, general manager, Hillinger Consolidated Mines, Ltd., Timmins, Ontario; H. C. Marchant, chairman, Division V Code Authority, Denver, Colo.; Charles Dorrance, president, Penn Anthracite Mining Co., Scranton, Pa.; Clinton H. Crane, president, St. Joseph Lead Co., New York; J. D. Battle, executive secretary, National Coal Association; and G. C. Bateman, secretary, Ontario Mining Association, Toronto.

Obituary

R. M. PERRY, 50, general manager of the Moffat Coal Co., Denver, Colo., died July 27 at the Mayo Clinic, Rochester, Minn., following an operation. In addition to his coal connection, Mr. Perry was president of the Northwestern Terminal R.R. and a director of the Employers' Insurance Co.

JOSHUA SEATON, 55, long prominent in the Utah coal industry and general superintendent of the Sweet Coal Co. of Utah since 1927, died at his home in Price, Aug. 7, of a cerebral hemorrhage.

C. A. GRIFFITH, vice-president and general manager, Pruden Coal & Coke Co., Pruden, Tenn., and inventor of the Griffith drop-bottom car, died Aug. 13 of injuries incurred when struck by a falling beam at the new preparation plant now under construction at the Pruden mines.

Industrial Notes

ALLIS-CHALMERS MFG. CO., Milwaukee, Wis., has removed its Chicago office to the Field Building, 135 South LaSalle St.

CHASE FOUNDRY & MFG. CO., Columbus, Ohio, announces the appointment of N. D. VETH, formerly with the Watt Car & Wheel Co. as car designer, as chief engineer.

LINK-BELT CO. announces the following appointments in its positive drive division: Western sales manager, with headquarters at the Dodge plant, Indianapolis, Ind., G. H. BURKHOLDER, formerly of Philadelphia, Pa.; manager of sales of speed reducers, W. H. KINKEAD, succeeding Mr. Burkholder at Philadelphia; Philadelphia office sales, positive drive division, G. L. GANSZ, succeeding Mr. Kinkead.

MCNALLY-PITTSBURG MFG. CORPORATION has removed its Chicago general sales offices to the Bell Building, 307 North Michigan Ave.

TO EFFECT closer coordination of activities, the businesses of the following companies in the American Cyanamid group will be merged with, consolidated into and operated as divisions of the AMERICAN CYANAMID & CHEMICAL CORPORATION, New York: American Cyanamid Sales Co.; American Powder Co.; Catalytic Process Corporation; Fumigation Service, Inc.; Fumigators' Supply Co., Inc.; General Explosives Corporation; Gypsteel Construction Co., Inc.; Maryland Chemical Co., Inc.; Owl Fumigating Corporation; Selden Co.; Selden Research & Engineering Corporation; and the Structural Gypsum Corporation.

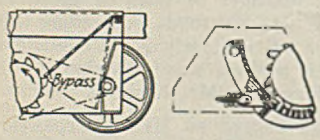
J. J. RICHARDS has been named manager of the vibrating screen department of the Link-Belt Co., Philadelphia, Pa., succeeding HARRY L. STRUBE, who has been promoted to assistant chief engineer for the company's Philadelphia plants.

WHAT'S NEW
IN COAL-MINING EQUIPMENT

Steelbuilt Crushers

Suspension mounting, internal bypass and breaker-plate cage extension for finer and secondary crushing are features of the new "Pennweld Steelbuilt" single-roll crushers offered by the Pennsylvania Crusher Co., Philadelphia, Pa. Made of welded rolled-steel plates for strength, rigidity and permanence, the interior of the frame is fitted with rolled-steel liners which may be renewed through the hopper. The unusual hopper length, it is asserted, insures quick initial breakage of the larger pieces through contact with the upcoming major roll teeth and thus facilitates final reduction in the tapered crushing zone, while breaker-plate contour and location relative to the roll insure maximum reduction with minimum slippage and resultant degradation.

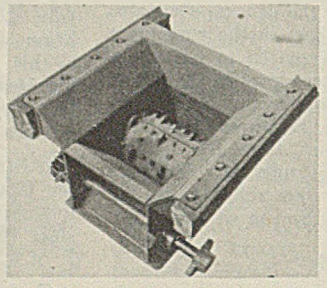
Slow-speed operation also helps in reducing degradation, it is pointed out, and convenient adjustment of the hinged breaker plate toward and away from the roll at the "pinch point" permits the production of a wide range of sizes. This adjustment device also transmits

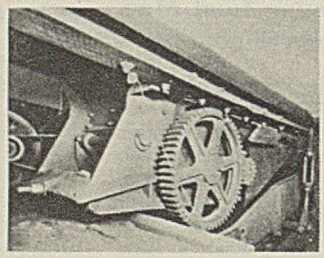


Left—Showing Extended Frame for Internal Bypass; Right—Breaker-Plate Cage Extension for Finer and Secondary Crushing.

crushing strains directly to the reinforced frame and avoids their imposition on threaded adjustment members and safety mechanisms.

Pennweld crusher design, according to the company, makes it possible to integrate with the frame a combination receiving hopper and supporting structure for suspending the crusher from overhead beams, thus saving headroom and foundation cost and permitting the crusher to be installed over shaker screens, conveyors and other machinery without interfering with the support and functioning of such equipment. The suspension-type frame also is provided with





Above — Shop View of Suspension-Type Crusher; Below—Crusher Suspended Over Shaker Screen.

foundation flanges for base-mounting, and regular base-mounting models are available.

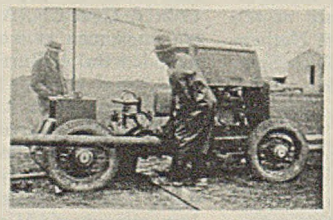
The hopper feed plate may be perforated for bypassing the finer sizes of coal, and, when handling small mine-run and lump, the feed plate may be hinged for the same purpose. When it is desired to bypass large lump or mine-run containing large pieces, the crushers can be furnished with extended frames to allow the coal to drop between the roll and the front diaphragm.

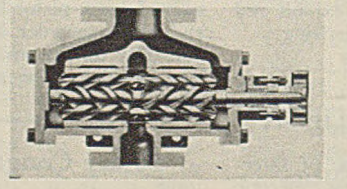
When the crusher is equipped for making the smaller sizes, or a variety of sizes, says the manufacturer, the wear tip on the breaker plate is slotted to allow the high teeth to pass. If still finer crushing (down to 1 in. on medium and softer coals) is desired, an extension bar cage is combined with the wear tip, which extends the crushing zone and regulates the sizing by the spacing of the cage bars. This cage, being a part of the breaker plate, shares in the protection provided by the spring mounting.

In addition to the spring mounting of the breaker plate, further protection against tramp iron, timber and other uncrushable refuse is provided by a single steel shear bolt which transmits power from the flywheel to the crusher countershaft. Resumption of operation after a stoppage, the company points out, requires only the removal of the obstruction and the insertion of a new bolt. Other features include a segmental type roll, each segment being fastened to the steel-roll spider by an easily removable horizontal throughbolt and renewable alloy-steel breaker-plate wear tips.

Rotary Pumping Unit

Operation at turbine or motor speeds and high efficiency when delivering even small quantities at high pressures are features noted for the De Laval-IMO rotary displacement pump by the De Laval Steam Turbine Co., Trenton, N. J. These characteristics, it is pointed out, make possible compact and comparatively light trailer-mounted units with gasoline-engine drives, such as illustrated. Driven at a speed of 1,675 r.p.m. by a 60-hp. gasoline engine, the pump delivers 90 g.p.m. against a pressure of 495 lb. per square inch and with a suction lift equivalent to 14 in. of mercury. Weight of the pump is 398 lb.; weight of the complete unit, with engine, is approximately 2,000 lb.

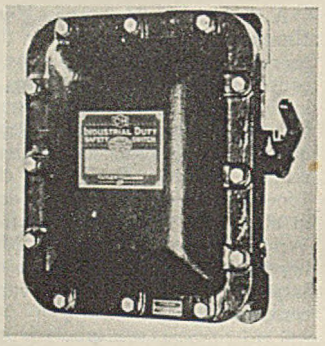




Features of the pump design, as pointed out by the maker, are: three working parts (central power rotor and two sealing rotors, which mesh in such manner that the liquid is carried through, as by a continuously acting piston, without shock or pulsation); no timing gears or separate stuffing bearings and but one stuffing box, subject to suction pressure only; complete rotational balance, except for suction pressure against the area of the driving spindle at the stuffing box; and complete hydraulic balance axially.

Safety Switches

A new line of explosion-proof safety switches for use in Class 1, Group D hazardous locations has been announced by Cutler-Hammer, Inc., Milwaukee, Wis. Both single- and double-throw types in standard sizes up to 200 amp. are available. Design



includes a heavy, industrial-duty, Type A construction, with outside operating handle, mounted in a heavy weatherproof semi-steel cast inclosure; precision-machined flange with proper width to insure cooling of flames resulting from an internal explosion of gas; corrosion-resisting bolts to hold cover in place; two pipe-threaded conduit holes in the bottom of the case and pads at the side and top for drilling additional holes, if desired; and provision for padlocking the handle in either position.

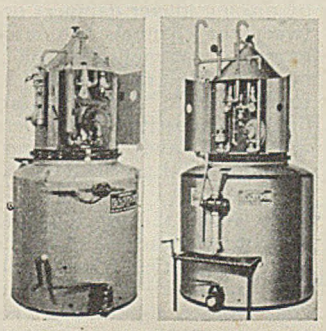
Flexible Coupling

Poole Foundry & Machine Co., Baltimore, Md., now offers Poole flexible couplings with an improved one-piece sleeve construction, which replaces the welded sleeve or end plate and is said to eliminate warping due to welding heat; afford much closer tolerance at bearing points, as the sleeve remains true and round; and provide lighter yet stronger construction.

Acetylene Generators

Two new "Oxweld" acetylene generators have been announced by the Linde Air Products Co., 30 East 42d St., New York. One is the Type MP-4 portable generator with a carbide capacity of 150 lb. for large-scale welding in the field. It is rated at 300 cu.ft. of acetylene per hour, weighs 750 lb. empty and 2,250 lb. fully charged and is 87 in. high and 42¾ in. in diameter.

The new Type MP-5 stationary generator, according to the company, is identical in principle to the Type MP-4 machine, except for size and slight changes to make it adaptable to



Left, Type MP-4 Portable Generator; Right, MP-5 Stationary Generator.

stationary use. It is rated to deliver 1,000 cu.ft. of acetylene per hour.

Other new Linde products include: "Prestolite 4-in-1" outfit with four stems for soldering, heating and brazing, particularly in places where space is limited; the Oxweld Type C-24 cutting blowpipe for general-duty cutting, but capable of heavier work if necessary; an improved screen filter for Oxweld oxygen regulators; and an improved ball-seat needle valve for most Oxweld blowpipes, which is interchangeable on all blowpipes now in service.

Fireless Locomotive

H. K. Porter Co., Pittsburgh, Pa., offers the Porter geared fireless locomotive, in which the boiler is replaced by a welded steel tank four-fifths filled with water, which is heated by steam from a suitable stationary boiler. As steam is used, pressure in the tank is reduced, with the result that additional steam is given off by the water. The locomotive illustrated is said by the company to be the first and only geared fireless built in the United States and also the first and only fireless with piston valves. Weight is 103,000 lb. and it is equipped with two cylinders

with a 16-in. bore and a 16-in. stroke, four 41-in. drivers and a fusion-welded tank with a capacity of 600 cu.ft. and a working pressure of 200 lb. per square inch. Normal drawbar pull is 18,000 lb.; maximum, 26,000 lb. This geared fireless, according to the company, can do more work on one tank charge and pull a 20 per cent greater load than any other fireless its size.

Advantages of this type of locomotive in industrial switching work are given by the company as follows: steam can be generated cheaper in stationary boilers; explosions are unknown, either from burnt crown sheets, broken staybolts, flue failures or excessive pressures; burning of fuel and its attendant smoke and hazards are eliminated; the engineer's attention is not diverted to watch water level or fire and the locomotive needs no attention while idle, as it is not necessary to watch the water level; less labor required to keep locomotive clean; little time is required to get it in service; no steam is wasted through pop valves and no time or water is wasted in boiler washing; no investment or provision is necessary for handling fuel and water and removing ashes; and the locomotive has a steady torque and does not spin the wheels like other types. One charge, it is said, will permit the locomotive to do ordinary switching work one-half day, and the time required to charge it is less than that required for taking on coal and water and cleaning the fire and ash pan on the ordinary steam locomotive.

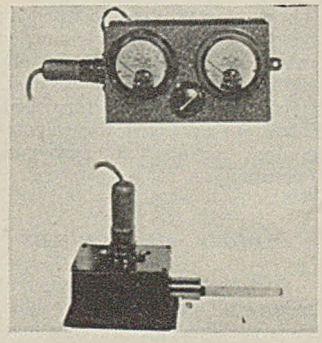
Air Hose

"Electric" portable compressor hose and rock-drill hose are two new products developed by the Electric Hose & Rubber Co., Wilmington, Del. The compressor hose, according to the company, is designed especially for direct connection to air compressors or for other service where excessive quantities of oil may be blown into the hose, and is featured by a lining made of a compound which is resistant to internal heat and will not disintegrate or peel off after long contact with oil.

The rock-drill hose, it is pointed out, has been developed especially for service in mines, quarries, construction work, etc., where the hose constantly is dragged over sharp rocks and rough surfaces which tend to shear or cut it. It is covered with an extra heavy layer of rubber, said to be especially compounded and cured to resist abrasive and cutting action; the tube is composed of a special compound to resist oil and heat.

Vacuum Gage

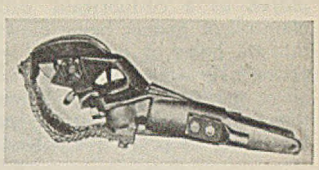
Continental Electric Co., St. Charles, Ill., offers an improved Model No. 6 "Tru-Vac" vacuum gage which it declares has a number of advantages over the mercury type of gage, where a dependable, accurate knowledge of vacuum conditions is required. Features noted by the company include: instantaneous and continuous reading; vacuum changes indicated the instant they occur; continuous day-by-day record when used with a recording device; positive indi-



cation of the presence of water and other vapors; adaptability to any vacuum pump or system and also to quick installation in rubber or sealing in glass; and suitability to filling equipment with gas. The gage consists of a unit box and a meter box, and measurements are based on electrical resistance. Dials are calibrated in microns and fractions. There are no moving parts, and life is unlimited, the company asserts.

Polehead

A new polehead for mining locomotives for use on long and heavy hauls where currents are beyond the range of wheel-type collectors is offered by the Westinghouse Electric & Mfg. Co., Nuttall Works, Pittsburgh, Pa. Features cited by the company include: low contact resistance of sliding shoe (3¼ in. in length), eliminating arcing and flashing; easy replacement of shoe; heavy, long-lived shunt; polehead casting designed to allow the pole to take any position from horizontal to 50 deg.; light weight, reducing

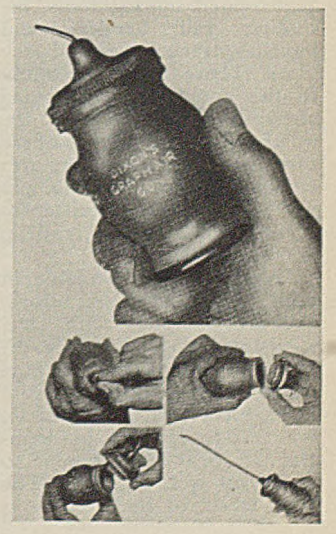


trolley pressures and making swinging of the pole easier; large, lubricated swivel bearing, facilitating alignment and reducing dewirements; and lubricated rocker. Specifications are: current-carrying capacity—starting, 2,500 amp.; continuous, 1,000 amp.; pressure on wire, 25 lb.; weight, complete, 8¼ lb. The polehead bears the designation Type MS-600.

Graphite Gun

Joseph Dixon Crucible Co., Jersey City, N. J., offers the "Graph-Air" gun to facilitate the use of "Microfyne" flake graphite—described as a pure, lustrous silky lubricating powder—for all-purpose lubricating. Being made of rubber, the gun, when squeezed, deposits the graphite where needed in measured quantities, the volume being controlled by the position of the nozzle in relation to the dial on the top of the gun. The nozzle may be turned to complete shut-off position to facilitate carrying the device in tool kits. A snap-in, snap-out plug fitted to the bottom carries a disk of chamois for use as a burnisher. To refill, the gun head is unscrewed. A 2-in. nozzle is standard, but an 8-in. nozzle may be secured at a slight additional cost.

Microfyne graphite used by itself, says the company, provides oil-less, greaseless, temperature- and combustion-proof, dripless and odorless lubrication on metal, wood, rubber, leather, paper, fiber, composition, varnished, lacquered or painted surfaces, and also may be em-



ployed as a co-lubricant with plain oil or grease, being blown into oil holes or upon oiled or greased surfaces or mixed with oil or grease before application, thus adding to lubricant life and increasing its protective powers.

Wall Seal

A new patching material bearing the trade name Stonhard "Wallseal" has been developed by the Stonhard Co., 401 North Broad St., Philadelphia, Pa., for repairing broken or spalled wall surfaces, caulking, filling cracks and joints, pointing stone and brick, repairing floors and similar applications. The material, according to the company, contains an expanding chemical which compensates for the evaporation of water, thus causing it to lock securely and adhere permanently to any surface. It comes in powder form and is mixed with water to form a stiff paste.

Portable Instruments

Roller-Smith Co., 233 Broadway, New York, offers a new line of moderate-priced portable measuring instruments, known as Types NPD and NPA, for general testing purposes and for use as secondary standards where sturdiness and reliability are required. The NPD line includes d.c. ammeters, voltmeters, millivoltmeters and milliammeters in all ranges. The companion NPA line includes a.c. instruments with the same size and style of case.

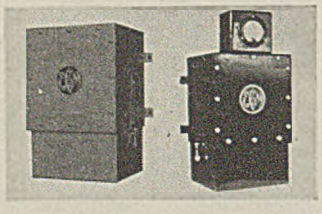
Light Tools

Utility Conveyor & Mine Equipment Co., 620 Tower Grove Ave., St. Louis, Mo., offers a line of light-weight heat-treated mining tools, including rail benders and punches, track gages and jack pipes. These tools, according to the company, have equal strength with one-third the weight of steel. Weights of the three sizes of rail benders are: No. 20, rail up to 25 lb. per yard, 17 lb.; No. 30, rail up to 40 lb., 23 lb.; No. 40, rail up to 60 lb., 36 lb.

Jack pipes are available in both 17St and 51St alloys, and are equipped with steel wings and tips. For 2-in.-diameter jack pipes, weights range with either alloy from 11 lb. for a 4-ft. pipe to 35 lb. for a 12-ft. pipe; 2½-in.-diameter, 15 lb. for a 4-ft. pipe to 35 lb. for a 12-ft. pipe. The yield point of both alloys is 35,000 lb. per square inch in both tension and compression; ultimate strength is 58,000 lb. for the 17St and 48,000 lb. for the 51St alloy; shearing strength is 35,000 lb. for the 17St and 30,000 lb. for the 51St alloy.

Motor Starter

For motors up to 15 hp., 220 volts, and 30 hp., 440-550 volts, Electric Controller & Mfg. Co., East 79th St. and Woodland Ave., Cleveland, Ohio, offers the EC&M, Type ZO, weatherproof and dust-tight, across-the-line, oil-immersed motor starter.



Type ZO Starter With and Without Ammeter.

These starters are inclosed in bonderized and black-enameled cases, and when desired a self-contained ammeter in a dust-tight case also can be furnished. They are arranged for remote-control pushbutton automatic operation.

Motors and Controls

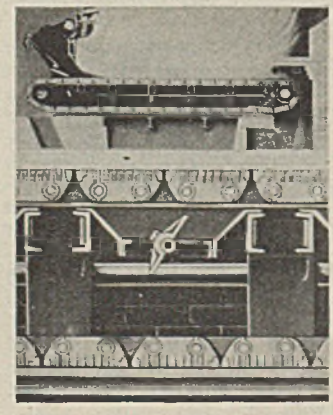
A new line of direct-current motors for use where dust, dirt, moisture and other foreign matter is present in large quantities has been developed by the General Electric Co., Schenectady, N. Y. The new motors, according to the company, utilize a dual-ventilation system which, in connection with water-tight conduit boxes and labyrinth seals at the cartridge-type bearing housings, effectively protects the working parts. They are available in a wide variety of electrical and mechanical modifications in sizes of from ½ to 200 hp. and, according to the company, offer the additional advantages of a saving in space, greater output per pound of material, economy of operation and interchangeability with most open motors of corresponding ratings.

To protect insulation of direct-current magnetic circuits against excessive discharge voltages when the circuits are open, General Electric offers a new type discharge resistor acting on the same principle as the "Thyrite" lightning arrester. Because this material, which conducts about 16 times more current each time the voltage is doubled, is practically an insulator at line voltages, it reduces the continuous watts loss for the new Thyrite units to approximately 2 per cent of that for equivalent permanently connected fixed resistors, the company says. Designated as Type CR-9196 Thyrite discharge resistors, the new units are available in two ratings: 110 to 275 volts and 500 to 650 volts. Mounting dimensions and space requirements are the same for both. Recommended applications include protection of d.c. motor fields, lifting magnets, shunt fields of a.c. and d.c. generators, etc.

General Electric's Switchgear Sales Division, Philadelphia, Pa., offers a new line of indoor disconnecting switches with ratings as high as 1,200 amp. at 5,000 volts, featuring silver-to-silver line-pressure contacts for unusual wearing qualities and elimination of troublesome oxidation with its inherent disadvantages. The complete line includes hook-operated, single- and double-throw and double-throw double-blade transfer switches with half- or full-capacity blades; single-throw tandem transfer switches with full-capacity blades; and group-operated switches controlled manually or electrically. Single- and multi-pole switches are mounted on compound insulators and metal bases. The insulators are made of non-inflammable, arc-resisting "Cetec" cold-molded material and have a dry flashover of 25 kv.

Stokers

To provide for fixed attachment of controls, a frame capable of withstanding expansion and for simple conversion to forced draft, if desired, Combustion Engineering Co., Inc., 200 Madison Ave., New York, has substantially modified the design of its Green natural-draft chain-grate stoker. The new "KS" design, instead of a cast-iron frame supported on wheels, employs a stationary structure fixed in the setting.



Above, Sectional View of Green Natural-Draft Stoker; Below, Available Damper Arrangement.

This structure consists of transverse channels supported on posts at either side, to which in turn are fastened angles parallel to the side walls; skids supported on I-beams carry the weight of the chain at the bottom. A pipe flush with the side wall and extending nearly the full length of the stoker carries the adjusting rod and takes the tension off the frame. While the chain tension take-up is at the rear, actual adjustment always is accessible at the front. With natural draft, zone control may be applied, if desired, by placing louver dampers between the channels in one or more compartments. When it is desirable to change to forced draft, forced-draft links are substituted, dampers are added and an internal seal and hood are installed at the front.

To adapt the Coxe stoker to wider furnaces and hence larger capacities when burning small-sized anthracite, coke breeze, lignite and certain non-caking bituminous coals under forced draft, Combustion Engineering Co. has brought out the Coxe "CD Design" traveling-grate stoker. The new stoker employs two or more carrier bars, against one in the older stoker, and these bars are fitted with cast-iron keeps whose overlapping construction prevents ash being carried back to the front of the stoker.

The stoker body is built up of structural steel members which support the skids and grate surface. Skids in the smaller Coxe stokers are supported on the box structure comprising the several air compartments. These compartments are formed by plates attached to cross members to form a trough, and steam or air jet blowers are placed at the sides to blow the siftings into the longitudinal trough. Air is distributed to the compartments from air chambers beneath the side walls, avoiding the use of ducts. Hand wheels at one or both sides of the setting permit control of air by compartments. Preheated air may be employed.

As in the smaller design, the stoker is driven from the rear shaft with the take-up for the driving chains located at the front. The new design applies to furnace widths of 12 to 24 ft., against a maximum of 11 ft. 8⅜ in. with the old.