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DEVOTED TO COAL MINING AND
COKE MANUFACTURE

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Central Washer of the Ala. F. & I. Co.—I

BY EDW. H. COXE*

SYNOPSIS—The first of a series of two articles on this interesting plant. A description of the extensive holdings of the company are given here and some preliminary remarks on the methods of washing.

This company was organized in 1906 by the late Henry C. DeBardalaben, one of the pioneers of mining and furnace building in the Birmingham district. Their coal holdings consist of 24,660 acres in the Cahaba field, lying about 20 miles south of Birmingham, Ala.; 12,660 acres of this is in what is known as the Henry Ellen Basin, 10,000 acres of which surround their Margaret opera-

the middle of the Cahaba measures, and produces about 1800 tons per day. At their Acton mines, opened in 1907, they have 6000 acres. The Helena seam, one of the highest grade coals in the state, is mined; it is next to the top seam in the Cahaba measures, and production at the two mines is 1000 tons a day. Large holdings in the Water-Works and the Scottsville basins are, as yet, undeveloped.

In addition they own 2500 acres of red-ore land in Shade's Valley, across Red Mountain from Birmingham, which are also undeveloped, but which test borings show to be underlaid with 8½ to 9 ft. of self-fluxing ore, carry-

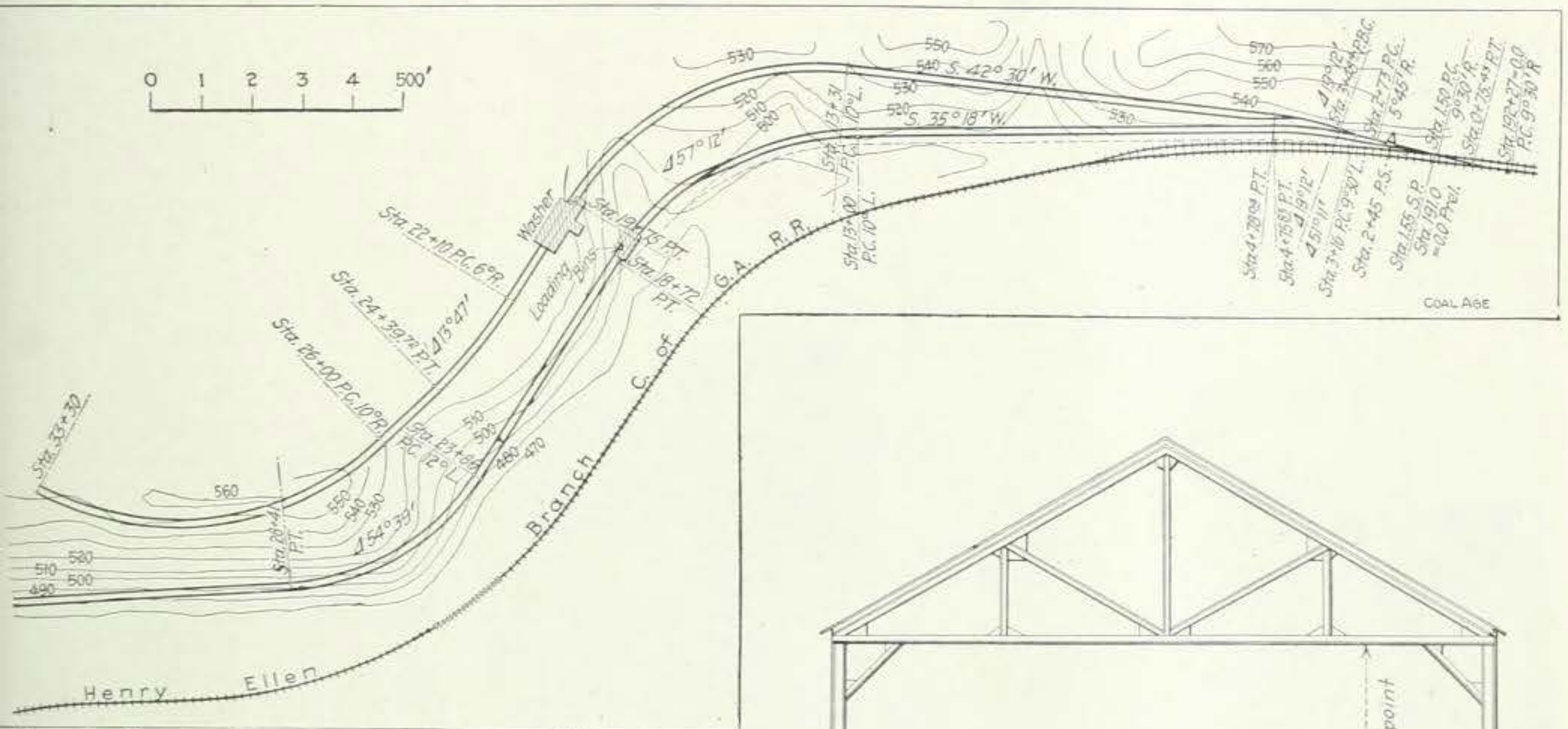


FIG. 1. TRACK ARRANGEMENT AT THE WASHER, AT COLGATE

ions, which are mining the Harkness seam, the bottom workable coal of the Cahaba measures. These mines, three in number, opened in 1906, produce 2500 tons per day. Their Acmar mine has about 2600 acres and was opened in 1911; it is working the Mammoth seam, which is about

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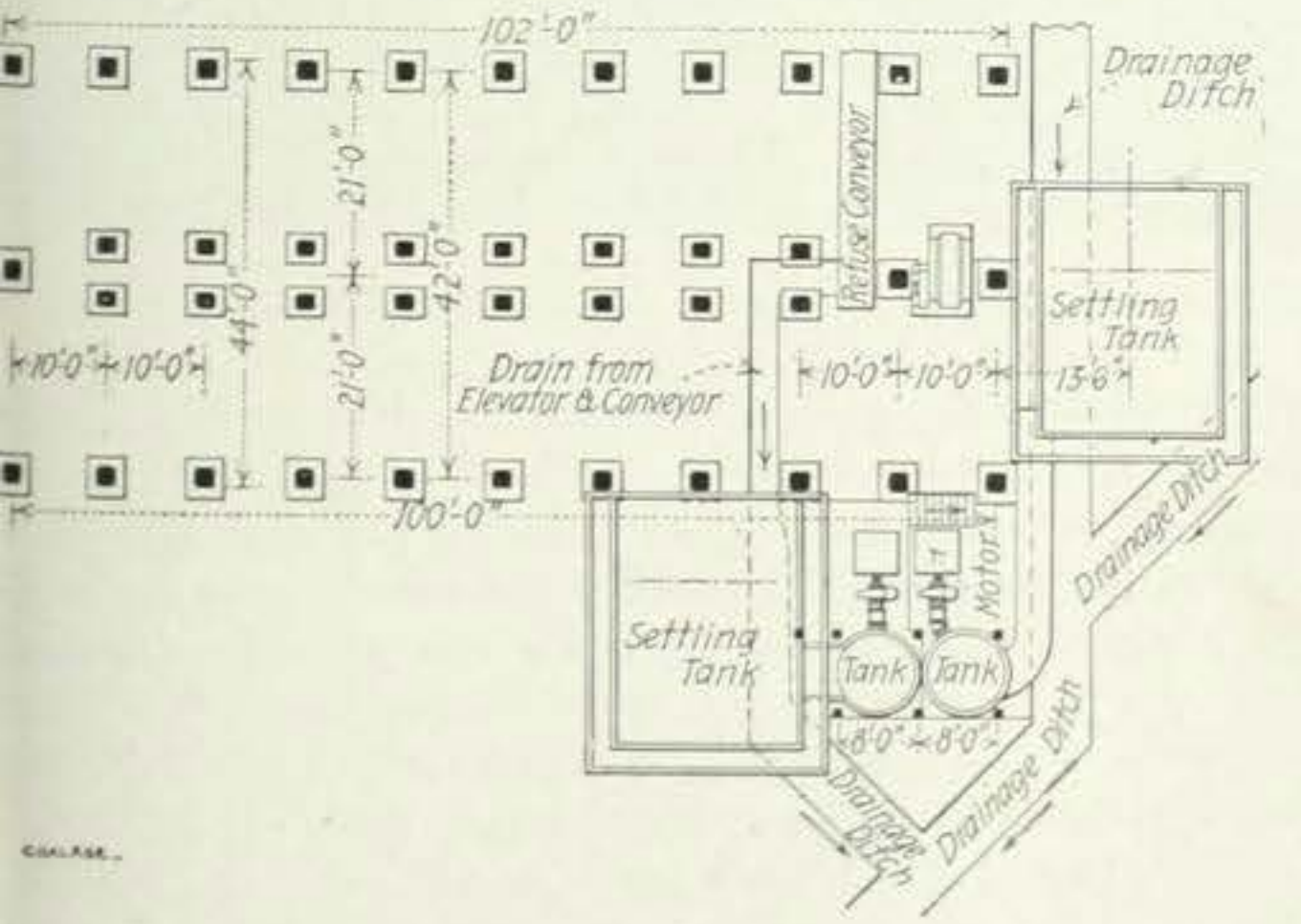


FIG. 2. GENERAL FOUNDATION PLAN OF WASHER

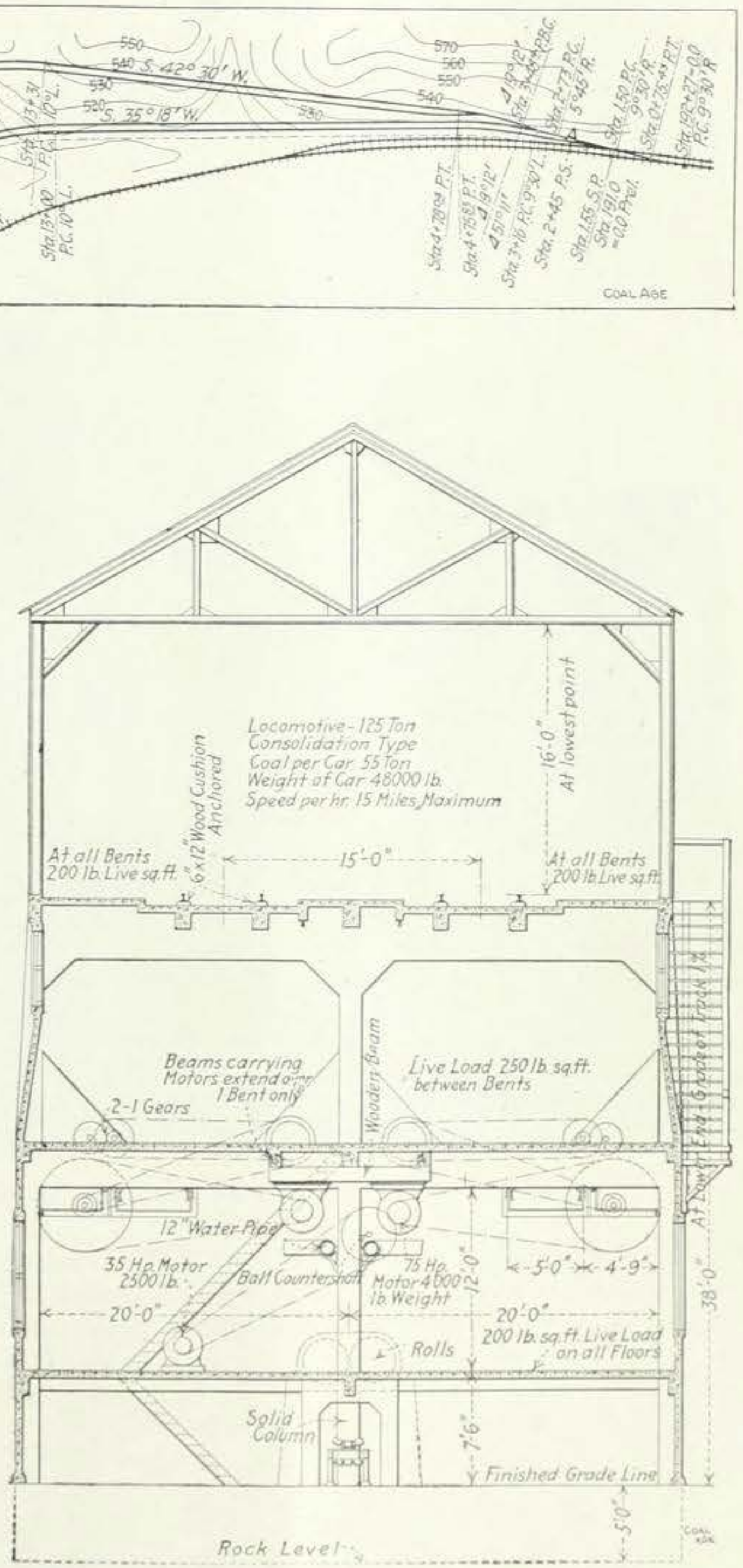


FIG. 3. IDEAL CROSS-SECTION OF WASHER

ing 36 to 38 per cent. metallic iron, and 2500 acres of brown-ore land in Franklin County.

All the operations, including the central washer, are on the Central of Georgia Ry., except the Acton mines, which are on the Louisville & Nashville R.R. The officers of the company are J. M. Overton, president, Nashville, Tenn.; Charles F. DeBardelaben, vice-president and general manager; Overton Fullton, secretary and treasurer, Birmingham, Ala., and I. C. Delony, general superintendent, Margaret, Alabama.

The coal at all the operations is screened over shaking screens with 4-in. perforations, the lump being hand-

ing. It was built in 1911 by the American Concentrator Co. The main washer building, bins and tanks are of reinforced concrete, except the shed over the unloading platform, which is a steel frame covered with corrugated iron, and the belt galleries and shed over the washed-coal bins which are frame.

The map, Fig. 1, shows the general track arrangement at the washer, all cars being handled altogether by gravity. The loaded cars from the mines are placed at the south end of the tracks, the coal from the Margaret mines on one track and that from Acmar mine on the other. The loads are dropped over the bins and unloaded,

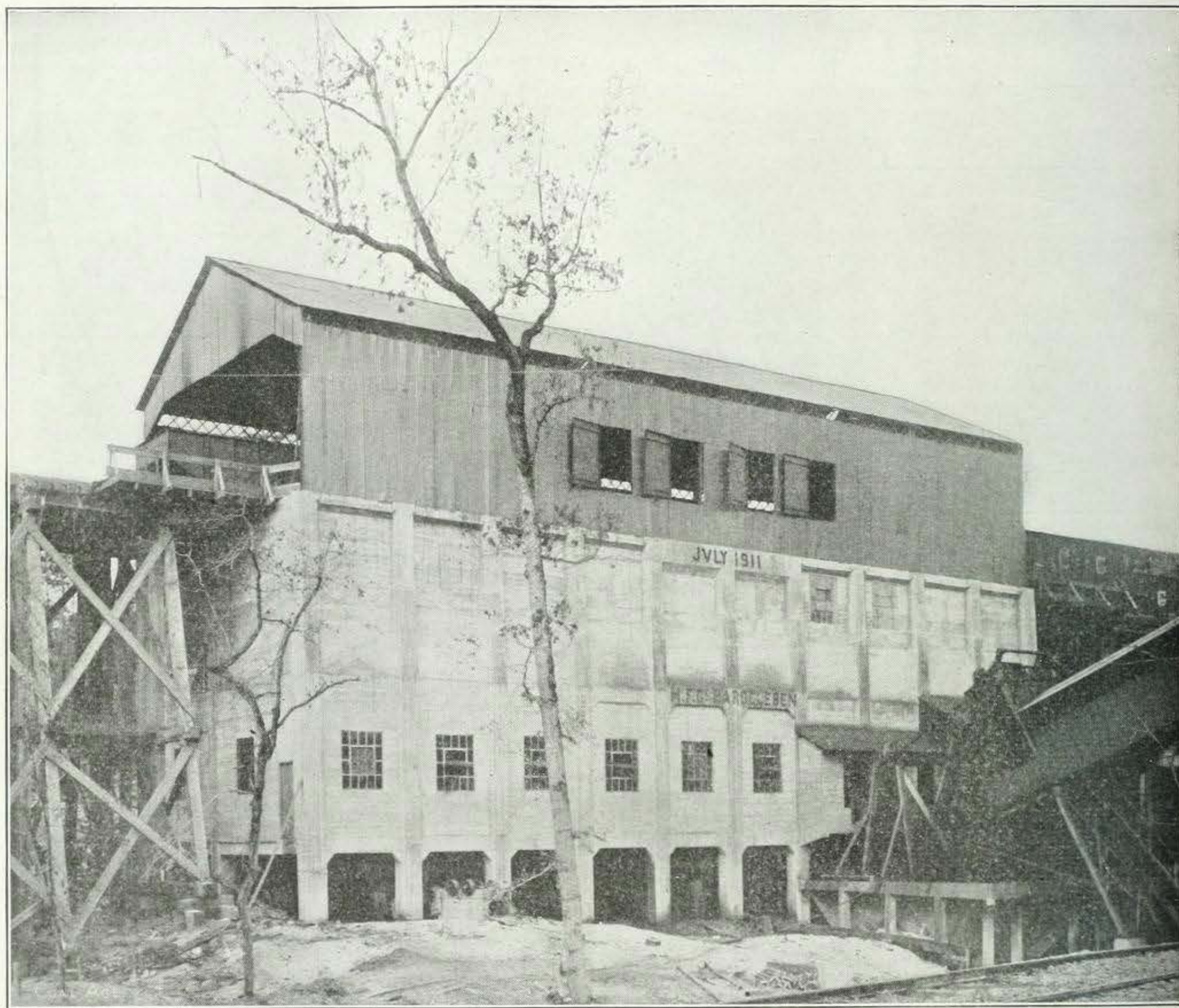


FIG. 4. COMPLETE VIEW OF THE WASHER, LOOKING NORTH, SHOWING TRESTLE

picked after passing over the screens. What passes through the 4-in. screen is carried over a 2-in. screen, the nut and slack being loaded and washed separately, after which they are again mixed; that at Acton is washed at a small local washer, and that from the Margaret and Acmar mines is sent to the central washer for treatment.

THE CENTRAL COAL WASHER

This washer is located at Colgate station, 2½ miles from the Acmar mine and 7 miles from the Margaret mines, from which points coal is shipped to it for wash-

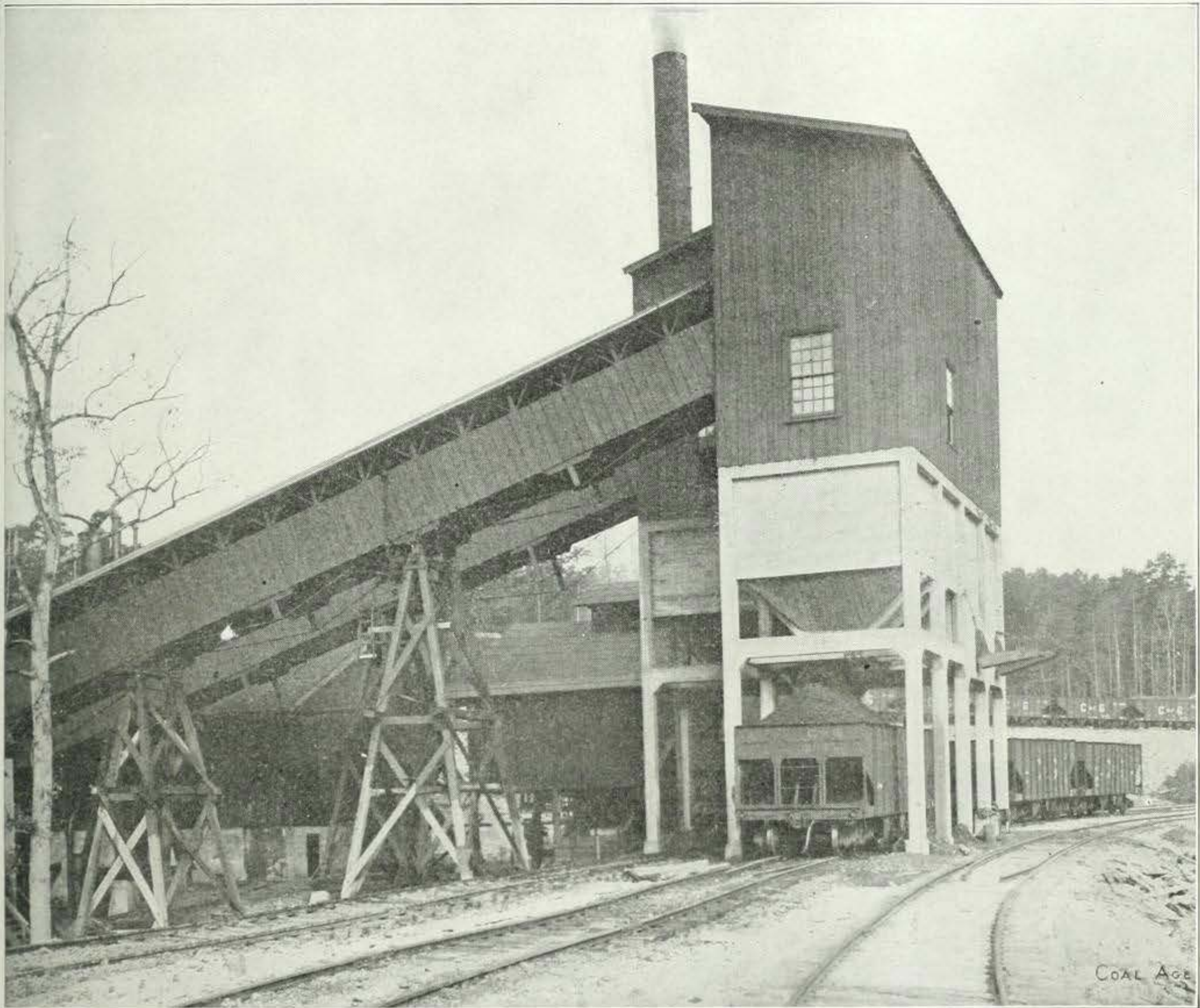
ing. The empties run to the switchback at the point marked A on the map, and thence under the washed-coal loading bins; after being loaded there, they run to the storage yard ready to be removed by the railroad company. The coal from the two operations is kept separate throughout. The photograph, Fig. 4, of the complete plant, looking north, shows on the left the loaded-car trestle approach to the washer. On the extreme right is shown the empty cars leaving the washer, below which are other empties which, having passed through the switchback, are approaching the washed-coal bin, the building on the right. Between it and the washer

building are shown the two washed-coal inclined belt conveyors.

A foundation plan of the washer is given in Fig. 2. This shows the supports for the columns carrying the jigs and bins, also the location of the refuse conveyor, settling tanks, water tanks and circulating pumps. The refuse is carried to the conveyor by another cross belt conveyor between the two center rows of supports. These two rows of supports are arched together just below the jig floor line supporting one row of pillars from there up. A cross-section of the washer is given in Fig. 3, and Fig. 5 is a view of the jig floor taken before the curtain

four under each track, three for slack and one for nut; these were figured for 100 tons capacity each, but will actually hold 150 tons. Directly under the bins is the jig floor, and under this are the washed-coal sluiceways and refuse cross-conveyor belt. On the jig floor are the two rows of jigs, 10 on each side, six for slack 2-in. and under, and four for nut from 2 in. to 4 in. in size, the capacity of the whole being intended for 250 tons per hour, though they have washed 3500 tons in a 10-hour day.

The coal is dropped directly to the top of the jigs through round pipes or feeders. From the jigs it is



APPROACH ON LEFT AND TWO ELEVATORS TO WASHED-COAL STORAGE BIN ON RIGHT

walls were put in, showing jigs, line shaft and sprocket drives for refuse elevators. It will be seen from these that there are two sets of tracks, jigs, settling tanks and washed-coal elevators, so that the treatment and loading of the coal from each of the two operations is kept entirely separate.

By referring again to Fig. 4, it will be seen that the main washer building consists of four floors, the top or corrugated-iron section being the raw-coal dumping floor, where eight cars (three of each kind of slack and two of each kind of nut) can be dumped at one time, four cars on each track. Under this are the bins, eight in number,

sluiced, nut and slack together, to the two settling tanks from which it is lifted by short perforated bucket elevators and discharged onto two 24-in. inclined-belt conveyors, 190 and 220 ft. long, respectively, which discharge into the washed-coal bins.

The jigs are arranged in pairs and the refuse discharged by automatic slate gates which drop it into bins or tanks under each pair of jigs. From there it is lifted by short bucket elevators, one for each pair of jigs, and discharged onto the cross-horizontal belt conveyor running under the floor and from which it is discharged onto the final refuse 22-in. belt conveyor 1050 ft. run-

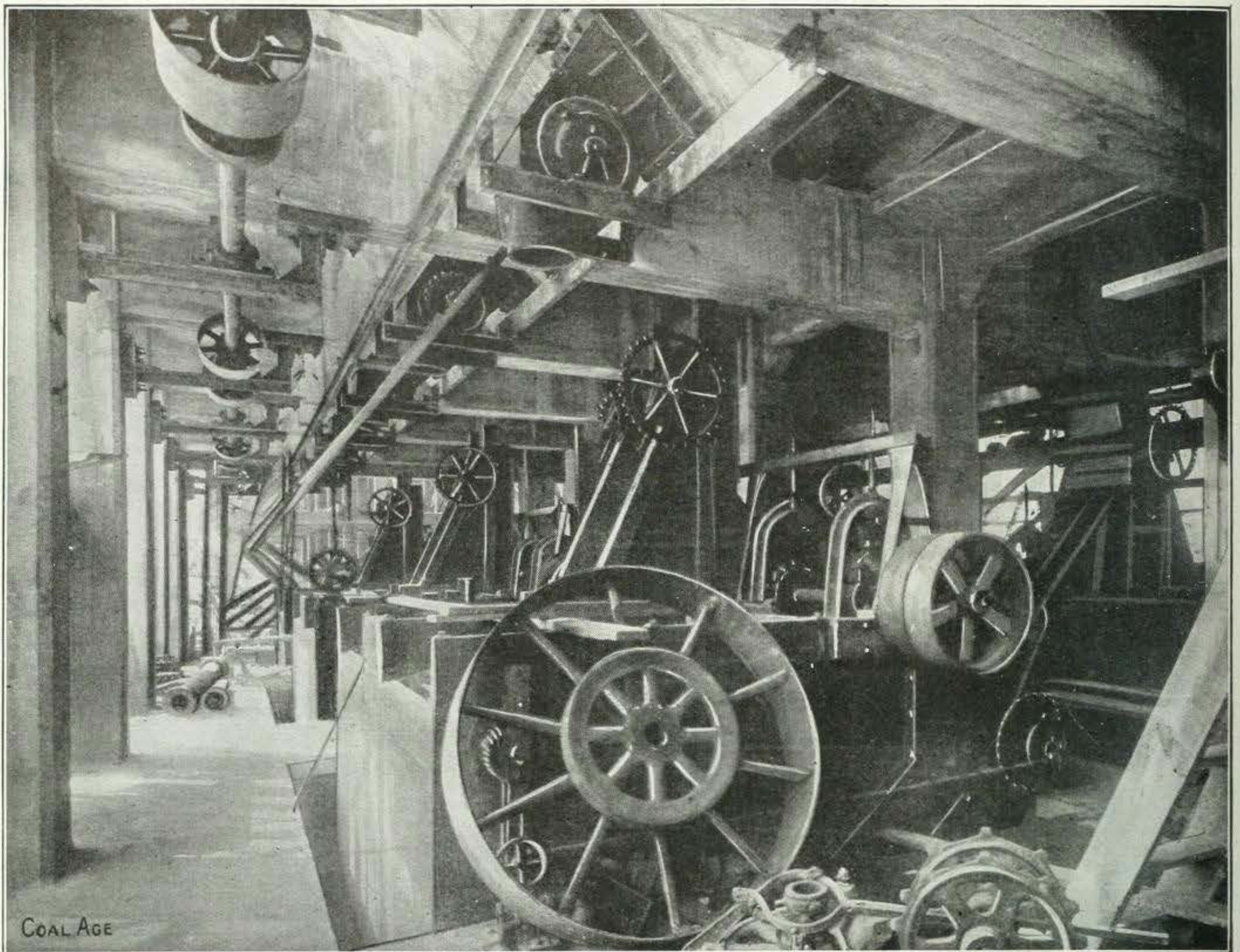


FIG. 5. JIG FLOOR, SHOWING JIGS, LINE SHAFT AND SPROCKET DRIVES FOR REFUSE ELEVATORS.—NOTE THE SUBSTANTIAL CONCRETE AND STEEL CONSTRUCTION OF THE MAIN BUILDING

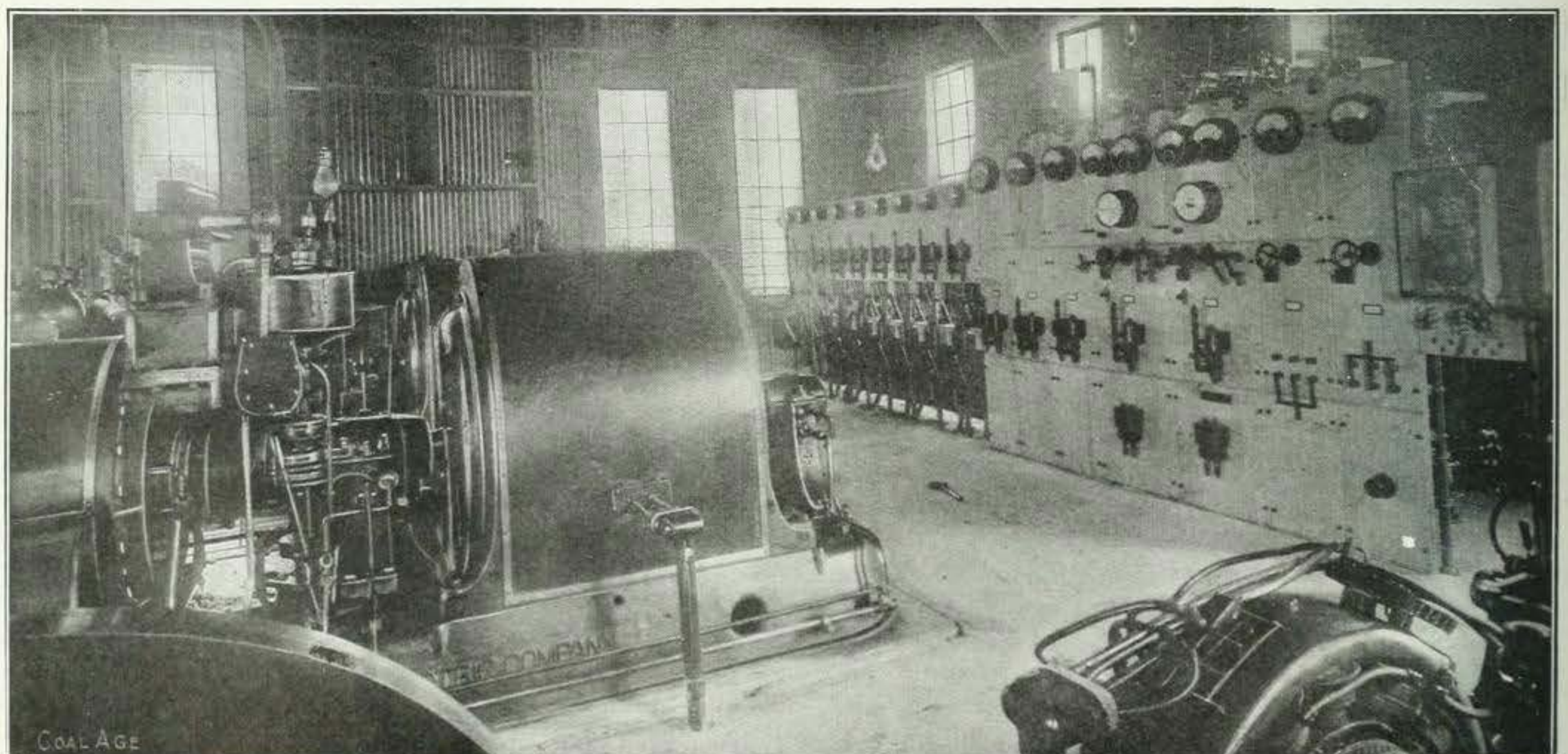


FIG. 6. INTERIOR OF POWER HOUSE, SHOWING SWITCHBOARD, ONE GENERATOR AND EXCITER. THE BUILDING IS WELL LIGHTED AND HAS CONCRETE FLOOR

ning at a slight elevation, which discharges over a ridge west of the washer where it is washed down the hill. A photograph of this last mentioned conveyor is shown in Fig. 7.

The water is pumped from Black Creek by an Alberger, single-stage, centrifugal pump through the condenser to a well or cistern. From here it is picked up by two De Laval single-stage centrifugal pumps, running at 1800 r.p.m., driven by 35-hp. General Electric induction motors, and having a capacity of 2300 gal. per minute.

The boiler plant consists of two batteries, each of two Sterling water-tube boilers, the total rated horsepower being 1000. These run two General Electric, turbine-driven, horizontal, 500-kw., 3-phase, 60-cycle, 2300-volt A.C. generators, which supply power for the whole washing plant, as well as the pumping and ventilating at the

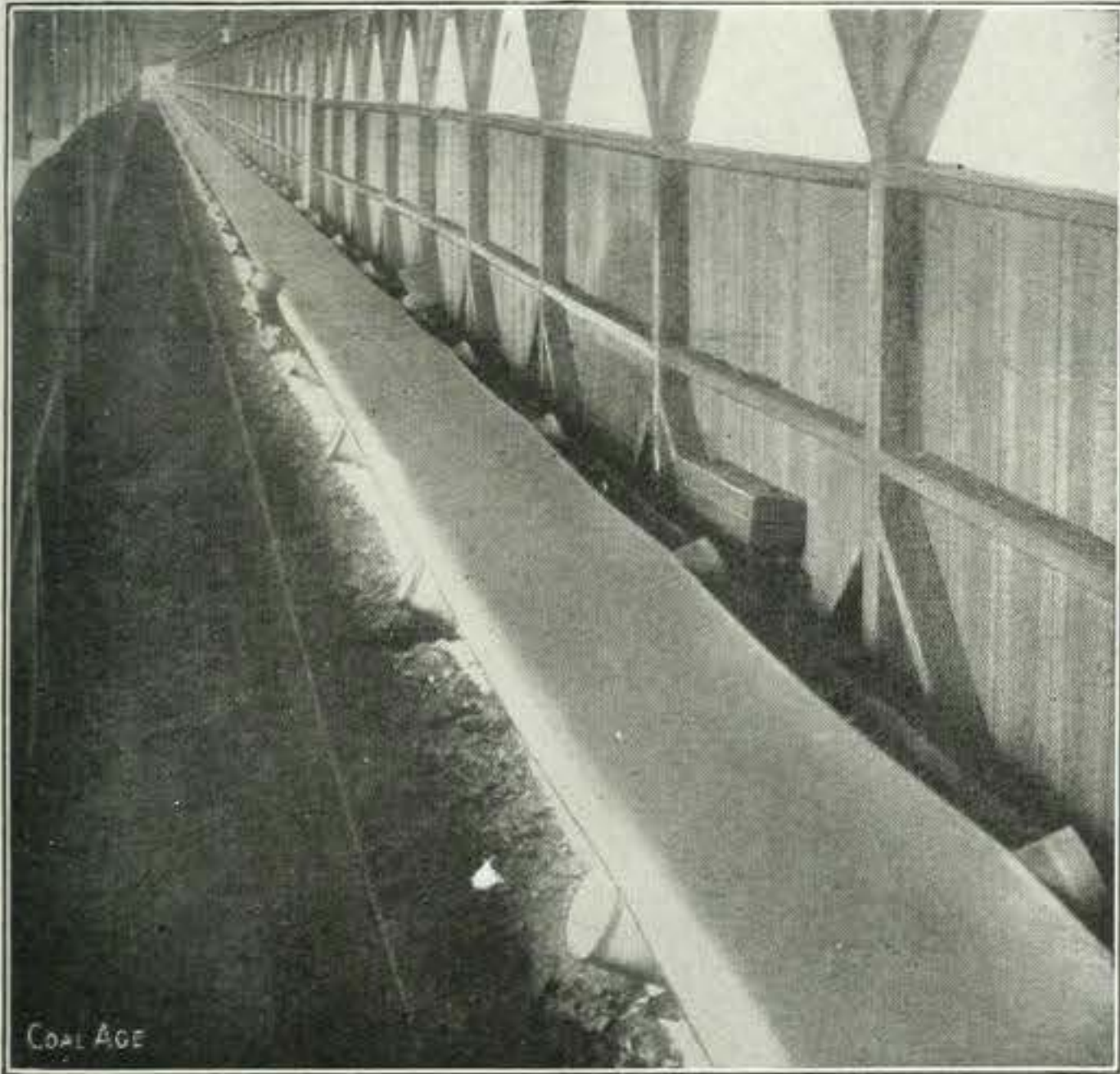


FIG. 7. A 22-IN. BELT CONVEYOR 1050 FT. LONG

Aemar and Margaret mines; they will also furnish power for hoisting at the Margaret mines, where they are now installing a General Electric, 350-hp., 2300-volt, water rheostat, induction-motor gear, connected to the drum-shaft by cut-steel herring-bone gears.

An interior of the power house, showing switchboard, one generator and one exciter is shown in Fig. 6. The power for operating the jigs is furnished by two General Electric, 75-hp., 900-r.p.m., 2300-volt, induction motors, belt-connected, by toggle-clutch pulleys to the two line shafts. Each jig is belted through tight and loose pulleys to the line shaft, so that any one jig can be cut out at any time without disturbing any other operations. The washed-coal elevators are driven by cut-steel sprockets from the line shafts. The refuse conveyor is driven 400 ft. per minute by a General Electric, 25-hp. induction motor. The speed of the washed-coal conveyor is 450 ft. per minute.

The American concentrator type of jig consists of a fine mesh, stationary screen over the front half of the jig tank with a square wooden plunger which acts as a valve, the water being introduced on the upper side and drawn into the tank on the up stroke. This type of plunger was unsatisfactory, being difficult to keep in re-

pair and the maintenance cost was also high. Hence a cast-iron circular plunger was designed especially for the work, with eccentrics running in oil, the oil casing being of cast iron bolted to the top of the plunger. Detail of this plunger is shown in Fig. 8. This plunger is giving excellent results, the wear being almost entirely eliminated.

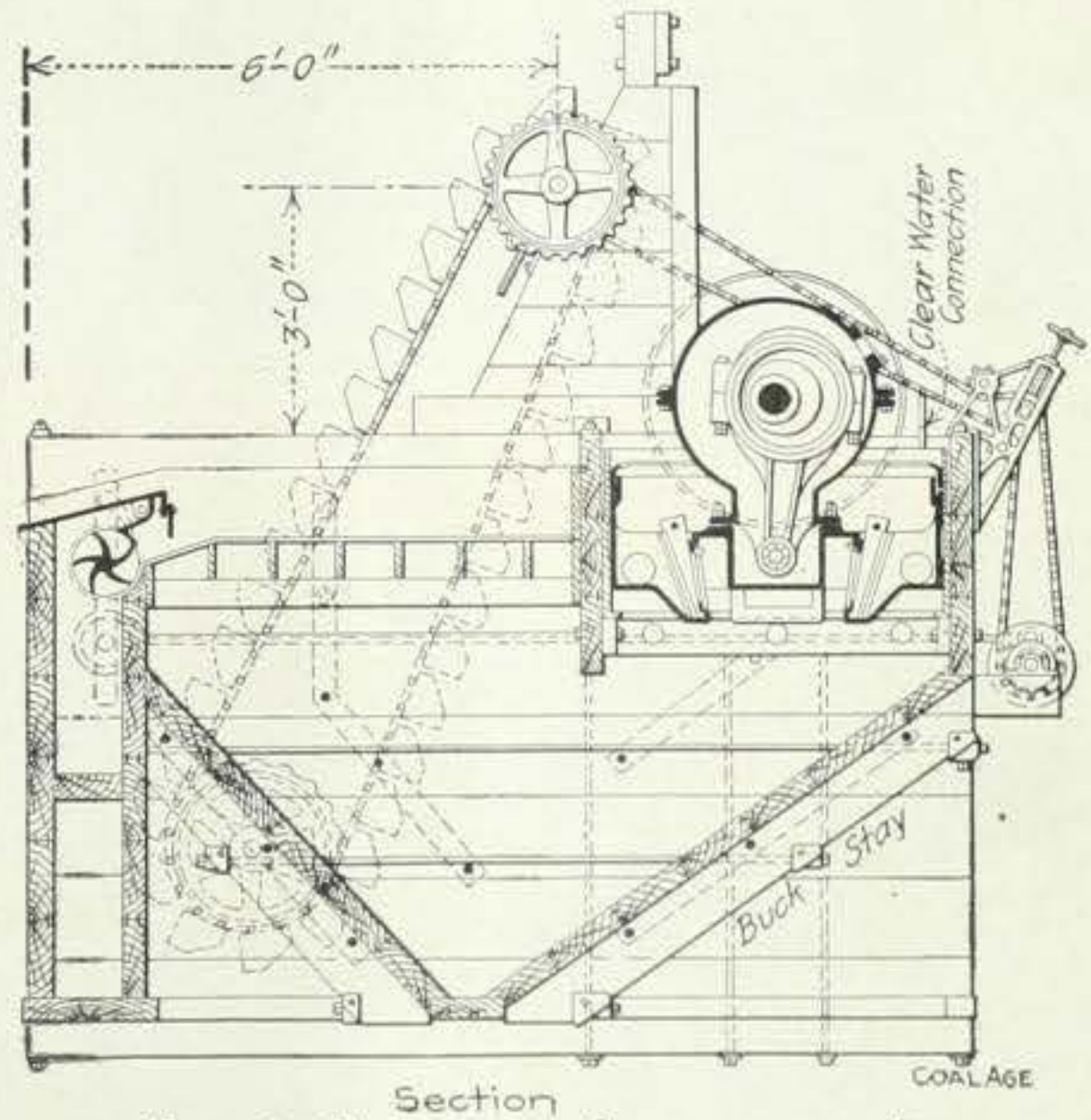
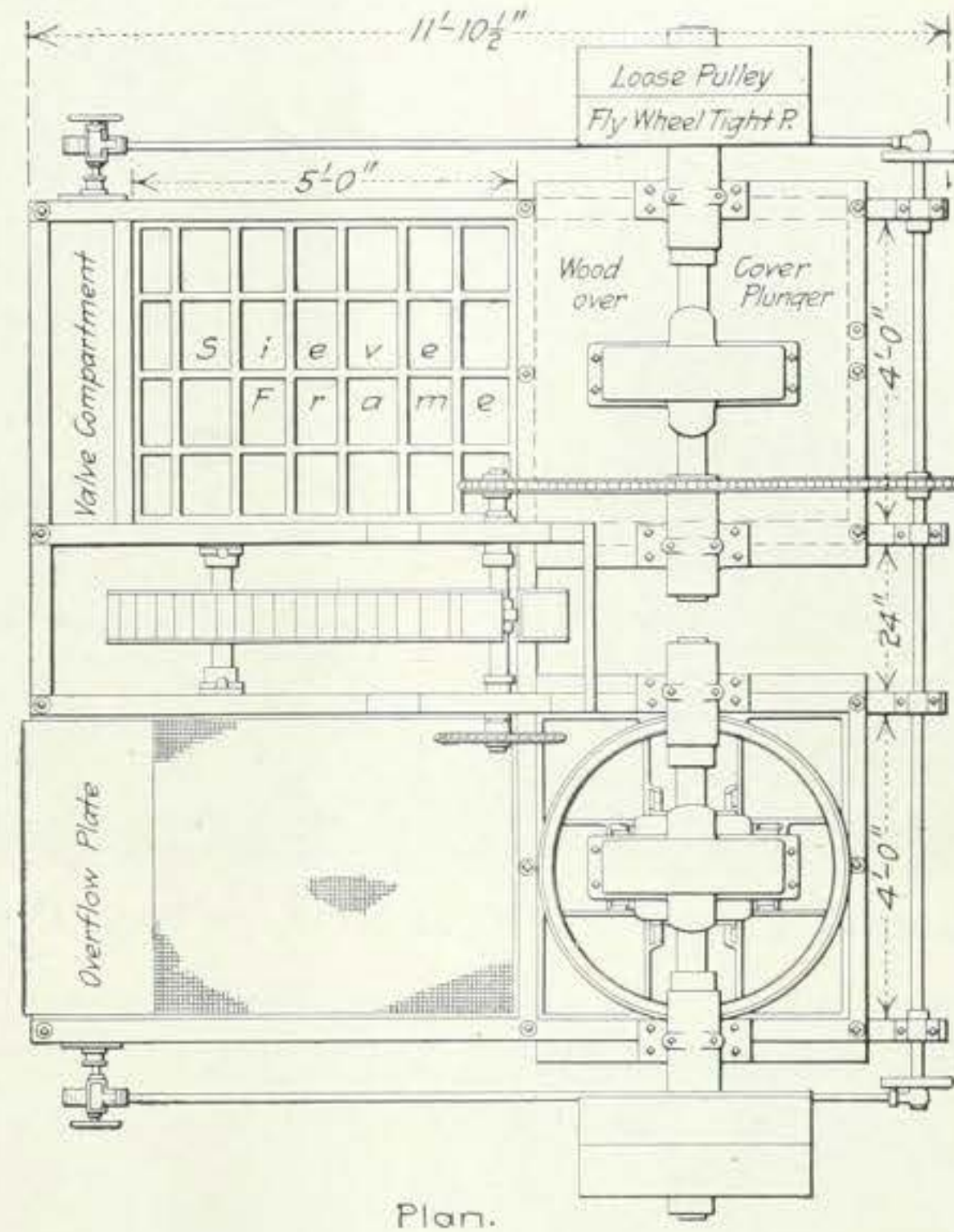


FIG. 8. PLAN AND SECTION OF JIGS

A crusher and rewashing jig with independent motor drive were provided for rewashing the refuse to save the fine coal lost in the primary washing, but the refuse is only 5 per cent. good coal and the rewashing of the refuse was abandoned, not being considered worth the cost and annoyance it entailed.

The custom of whitewashing the surface of loaded coal wagons has been inaugurated in Germany as a security against coal pilfering during transportation. Where the experiment has been tried it is said to have been successful.

Central Washer of the Ala. F. & I. Co.—II

By EDW. H. COXE*

SYNOPSIS—The second and concluding installment on this subject, in which a description of the mines and methods of working are given. Considerable water is encountered and a comparatively large drainage equipment is in use.



The main washer building, in the early stages of construction, is shown in Fig. 1, and the washed-coal bins in Fig. 3.

The separation in washing is made on a 1.37 specific gravity. The average analysis of the Margaret raw coal as brought to the washer shows 25 per cent. ash, which

trician, engineer, etc., is thirty. These are housed in thirteen 4-room and one 6-room house, weather boarded and ceiled, with 16-ft. square rooms. The houses are fenced and each one has ample ground surrounding it for a good garden.

THE ACMAR MINE

As stated before, this mine is on the Mammoth seam and it has an average daily output of 1800 tons. The slate roof is about 30 ft. thick and is one of the best mine roofs I have ever seen.

The upper bench, which separates readily from both

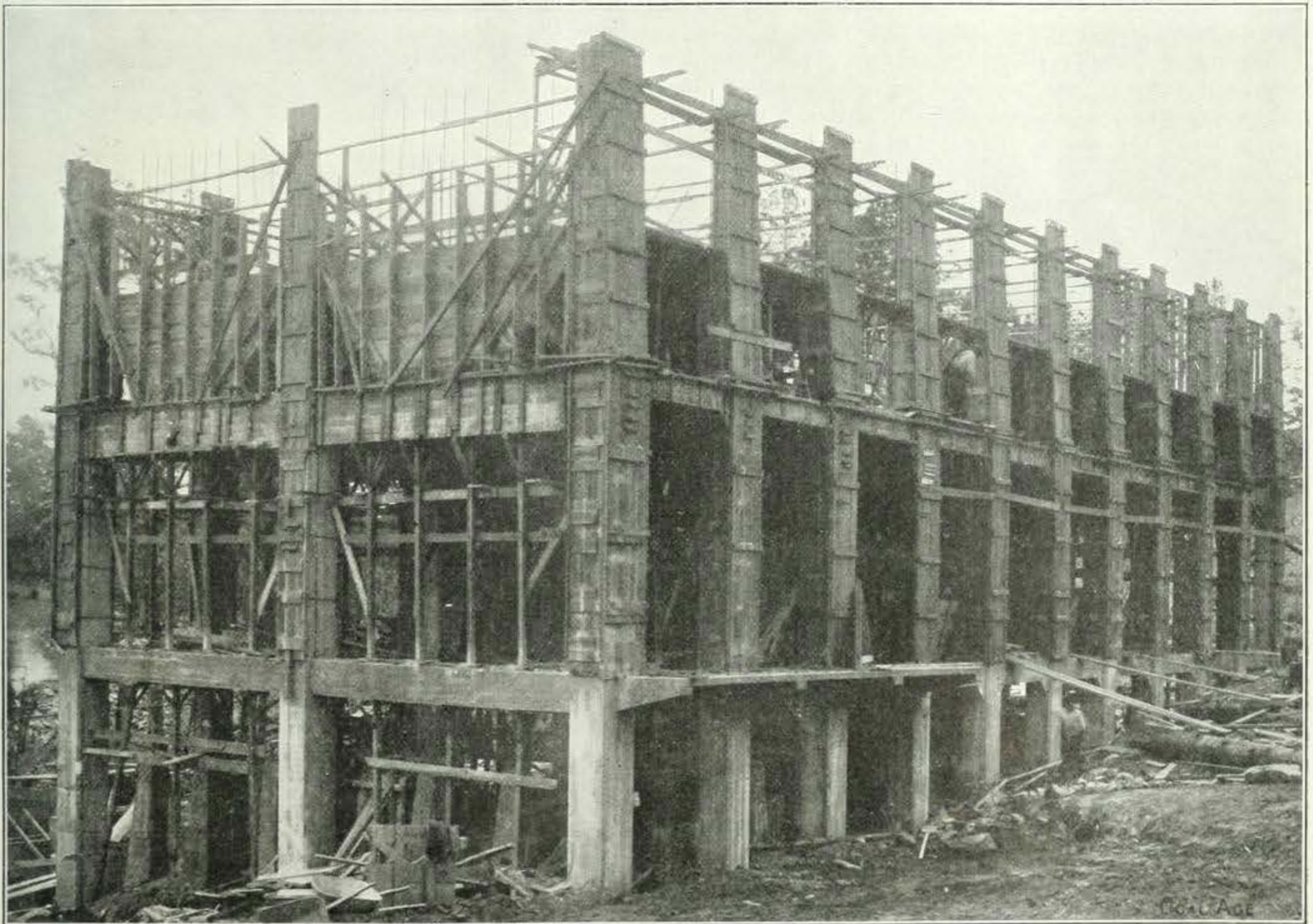


FIG. 1. THE MAIN WASHER BUILDING OF THE ALABAMA FUEL & IRON CO., IN PROCESS OF CONSTRUCTION

is reduced by washing to 7 per cent., as compared with 13 and 10½ per cent. for the Acmar coal. The washed coal contains 3 per cent. of sink heavier than 1.37 sp.gr., the balance of the ash being in chemical combination with the coal.

There is, in connection with the washer, a small machine shop, equipped with a lathe having a 24-in. swing, a sharpener, drill press and forge. In this shop all the light repair work for all the mines, as well as the washer, is done, that can be handled. The total number of men employed at this washer, including superintendent, elec-

the rash parting and the roof, is shot out on the solid by shearing ahead of the cutting shots, advancing about 12 ft.; then the parting, which is soft, is shoveled off into the gob, and the bottom bench of coal is shot up. Monobel, manufactured by the du Pont Co., is used exclusively for blasting. The mine was opened on the outcrop, the slope following the seam at right angles to the strike; the pitch at the outcrop is about 29 per cent., which decreases gradually, till near the face it is only a trifle over 4 per cent.

Near the face of the slope is a fault. This is not a regular displacement, but is in the nature of a wave or wrinkle, the coal rising abruptly about 6 ft., without de-

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creasing in thickness; then rising gradually for about 80 ft., and at the present face indications are that it will again assume the slight normal dip. The headings are driven on a slight up-grade to be self-draining. On the right of the slope the pitch steepens, causing the headings to come closer together, and on the left the reverse obtains. Every eighth room an 80-ft. solid block of coal is left in.

MINE IS VENTILATED BY A SIROCCO FAN

The mine is ventilated by a 6x3-ft. single-inlet, steel-incased, Sirocco exhaust fan, running 218 r.p.m., belt-connected to a General Electric 50-hp. induction motor, running 895 r.p.m.. The main slope is the main intake and the manway the return. Each heading is furnished with a separate split of air, the return from the right side being overcasted over the slope, and the manway being undercasted across the left-hand headings.

The main pump station in the mine is between the third and fourth right headings and all the water made above this point is drained directly to this sump. The pump here is an electric-driven Alberger, two-stage centrifugal, working against a head of 270 ft., and having a capacity of 500 gal. per min. Below this and pumping to it, is another Alberger electric driven, single-stage, 500 gal. per min. capacity pump, rated for 125-ft. head. The sinking pump is an electric-driven Aldrich, triplex, portable, 120 gal. per min. capacity pump, rated for a 270-ft. head.

Considerable firedamp is given off, but it is carried out and rendered harmless by ample ventilation. This is naturally a damp mine, water dripping over the coal everywhere, so that there is absolutely no dry dust and

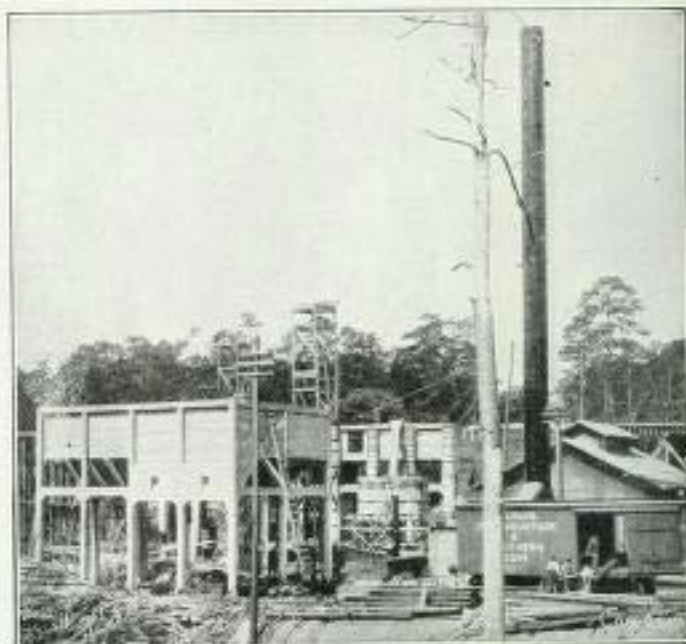


FIG. 3. VIEW SHOWING THE WASHED-COAL BINS

humidifying is entirely unnecessary, even in winter. The slope is single track and laid with 60-lb. rails. In the rooms are laid 16-lb. steel rails on one side and 3x4-in. wood rails on the other, the latter being used to help hold the loaded cars coming out of the rooms.

Iron-frame, wood mine cars of 4800 lb. capacity, having side bumpers and swinging end gates, are used, the couplings consisting of a link and two elevises. Eight cars to the trip are hauled out of the slope by a Hardie-



FIG. 2. THE 28x48-IN. FIRST-MOTION HARDIE-TYNES HOIST BEING ERECTED

Tynes duplex, 28x48-in., first motion hoisting engine, having a single 8-ft. drum; steam for this is furnished by two 200-hp. Walton, Chattanooga, Tenn., boilers, having one stack 60 in. in diameter 120 ft. high. Fig. 2 is a photograph of the hoisting engines being erected, the end of the tippie showing on the right. In this picture will be seen a large pile of coal stored across the tracks, which was obtained while driving the slope before the railroad was built. There is an electric-driven auxiliary hoist, consisting of a 75-hp. General Electric induction motor, geared to a 4-ft. drum, for driving the slope and turning new headings in the mine.

SCREENING THE COAL

The tippie is on a direct line with the slope track, and when a trip is landed, the cars are handled by gravity over a Phillips crossover dump, then over a switchback to the empty track, where they are attached to the rope and dropped down the slope. Fig. 4 is a photograph of the tippie and yard under construction, the former being of frame. The screens were built by the Montgomery

Signal Lights for Single Track

By C. J. FUETTER*

A number of mines are using electric haulage motors which, for some reasons, must pass over the same track for a certain distance. In such mines it is almost necessary to provide some arrangement so that only one motor at a time will have the right-of-way on this portion of track. Some mines have telephone systems, but these are not effective for the purpose.

The safest and most economical arrangement is to have an electric-lamp signal as shown in the accompanying figure. This consists of two lights of the proper voltage, connected in series, two single-pole double-throw switches, two fuses and enough of No. 14 B. & S. rubber-covered copper wire to be strung the full length of that particular place in the track. Suppose both switches to be in the upward position, giving a live wire but no return, and consequently no light. Then, the motorman to arrive at the signal light first, will throw the switch downward and light up the system, giving him the right-

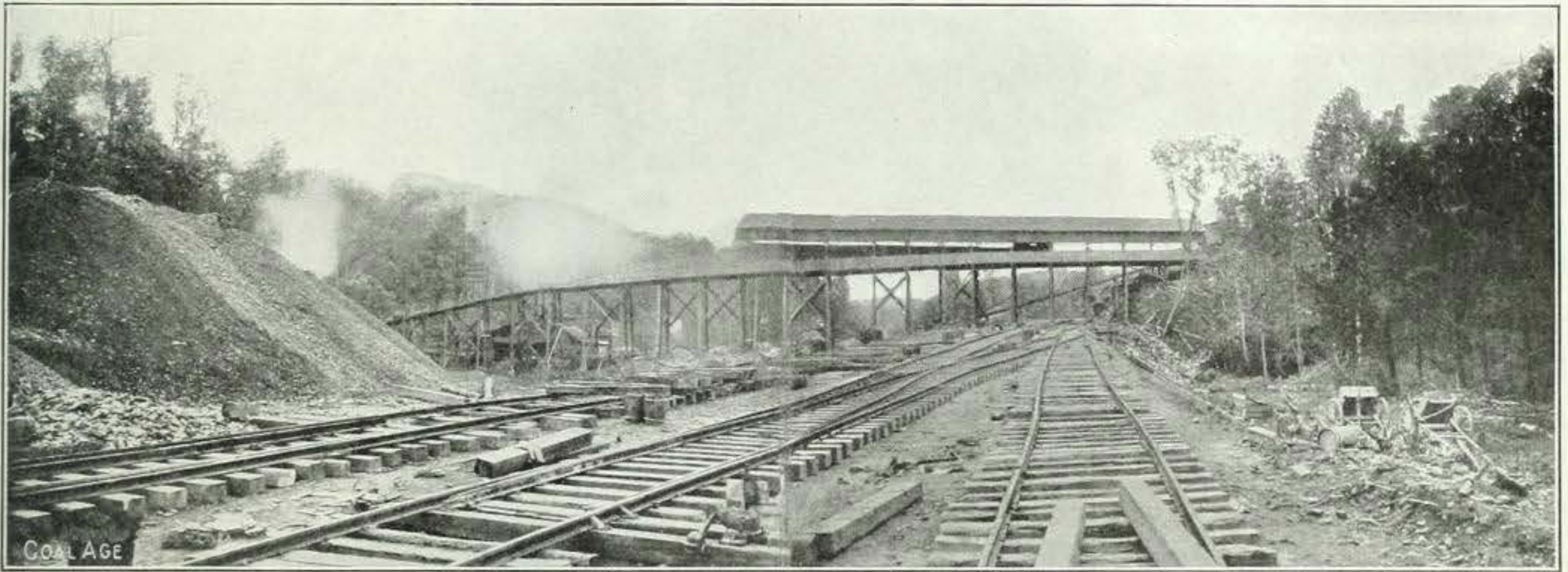


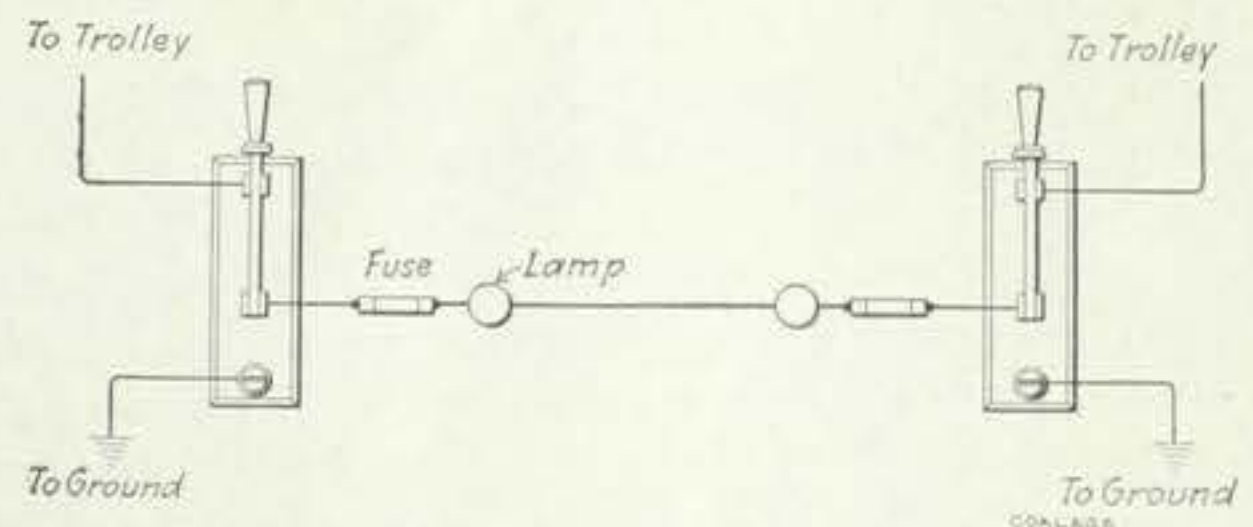
FIG. 4. GENERAL VIEW OF YARD TRACKS AND TIPPLE DURING CONSTRUCTION

Washer Co., of Birmingham, and consist of two parts, working in opposite directions, to equalize vibration. The upper section has 6x16 ft. of screening surface, with 4-in. perforations, and the lower one is the same size with 2-in. perforations. The lump coal from the upper screen passes over a 36x16-ft. traveling picking belt, where it is hand picked before dropping into the railroad car for shipment. The other two sizes over and through the 2-in. perforations are loaded separately and shipped to the washer. All the machinery at this plant is electrically operated, except the main hoist, by power from the washer generating plant.

William J. Hand is superintendent of this mine, and W. J. Lovejoy, mine foreman; 150 miners and 50 day hands are employed. All the employees are housed in company houses, 150 in number, mostly 4-room, and of the same construction and dimensions as those at the washer, except a few larger ones for the mine and office officials. There is also a commodious company commissary, operated for the convenience of the employees, where they can buy all the necessities as cheap or cheaper than can be done elsewhere. The inside of this building measures 100x40 ft., in addition to which is an ice house and well equipped meat market.

of-way. When he reaches the other end, he throws the switch downward, darkening the lights, showing that the section is clear.

The next motorman will repeat the same operation to get his right-of-way, with this difference, that instead of throwing the switches downward, he will throw them up-



WIRING DIAGRAM FOR BLOCK SIGNAL

ward. Under no conditions must a motorman change the switches in any way when the lights are bright, as somebody else has right-of-way. Should the signal get out of order, no light can be obtained. In that case no motorman should enter the single track before signal is again in working condition.

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