

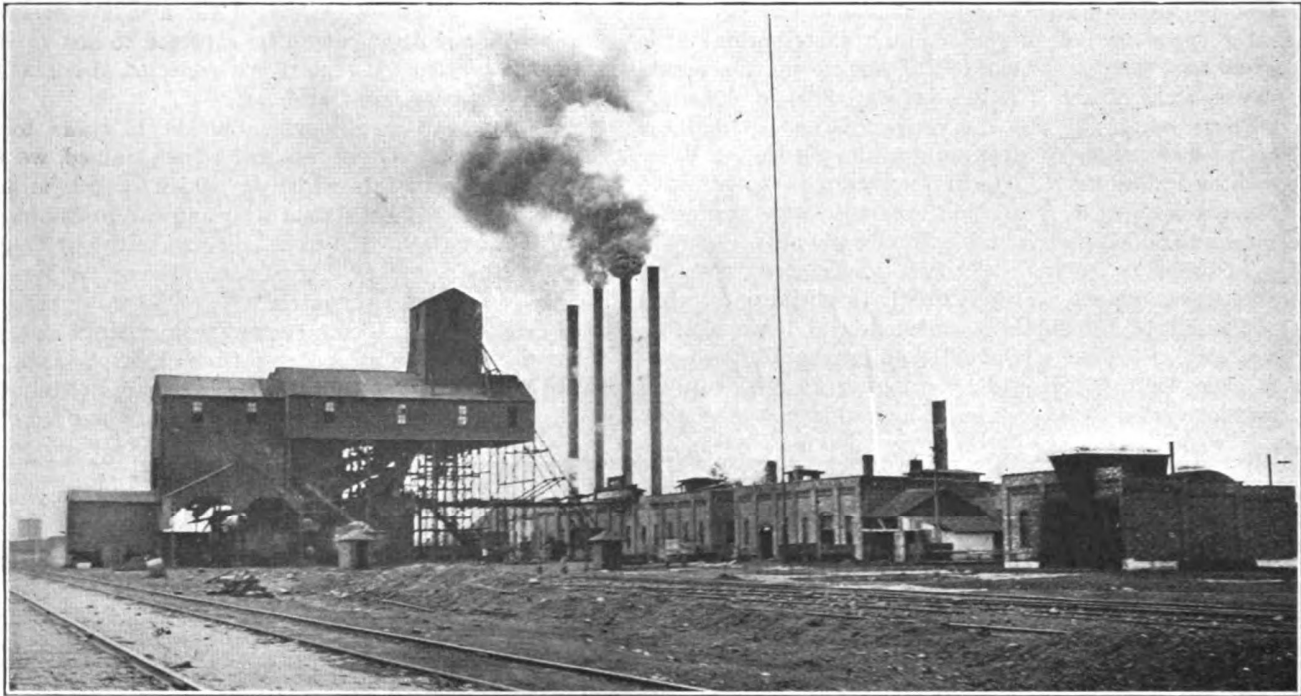


FIG. 1. NO. 6 PLANT OF THE MADISON COAL CORPORATION AT DIVERNON, ILLINOIS

Model Safety-First Coal Mine in Central Illinois

THE president of the Madison Coal Corporation of Illinois, A. J. Moorshead, has made a most careful analysis of the dangers attending those engaged in the mining and handling of coal preparatory to shipment. He also ascertained the percentage of the

accidents in each class to the total number of accidents. This interesting information produced results, as it incited the official in question to action looking to the practical betterment of conditions in and around the mines of his company. Among others the No. 6 mine of the Madison Coal Corporation is literally bristling with safety devices—it is nearly as foolproof a plant as is met with in the coal fields.

Mine No. 6 of the Madison Coal Corporation is on the outskirts of the town of Divernon, Ill. It is in the Springfield district of Sangamon County, on the line of the Illinois Central R.R. In going about the plant and the town adjacent one is impressed with the neat and orderly appearance of the premises. This is in line with all well-regulated business; waste is avoided, workmen are apt to be more careful and efficient, and the appearance of a plant certainly counts for something—generally in dollars and cents.

A general view of the surface plant of the operation in question is shown in Fig. 1. A detail plat of mine and yard buildings is given in Fig. 2; the material of each building is concrete, brick or steel—fireproof construction throughout being employed in the main. The north side of the tippie is shown in Fig. 3 and the south view in Fig. 4. In Fig. 5 the longitudinal elevation of the tippie is given, on which are located the chutes, screens and other coal-handling machinery. The tippie steelwork was erected some time ago (in 1900) by the Kenwood Bridge Co., of Chicago, Ill. A straight three-track screening outfit was installed. A self-dumping cage, made by the Dunkin Foundry and Machine Co., of Alton, Ill., dumps the run-of-mine coal into a

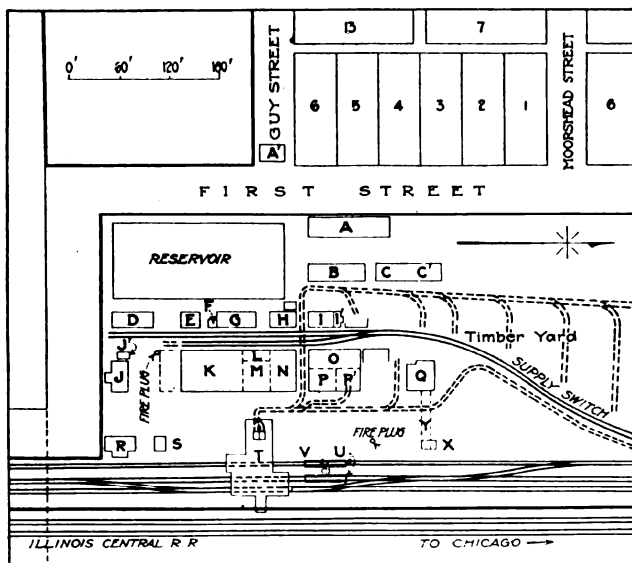


FIG. 2. PLAT OF SURFACE FEATURES OF NO. 6 PLANT OF MADISON COAL CORPORATION

The following buildings are noted: A, Washhouse; B, Lumber Warehouse; C, Cap-piece house; C', Masonry storehouse; D, Forage house; E, Oilhouse; F, Supply clerk's office; G, Supply house; H, Coke house; I, Lumber supply; I', Bosses' washhouse; J, Office; J', Wagon scale; K, Boiler house; L, Pump room; M, Hoisting-engine room; N, Generator room; O, Machine shop; P and P', Blacksmith shop; Q, Fan; R, Rescue station; S, Haulage-engine house; T, Tippie; U, Scales; V, Scale house; Y, Tunnel fan to air shaft; X, Air shaft.

weigh basket, or hopper, from which it goes to the shaking screens. Ordinarily, run-of-mine coal is shipped from this mine; but six sizes can be made with the combination of the shakers and the circular screen. The latter screen is over the bin shown at the south side of the tippie in Fig. 4. Near the dump an opening can be utilized in the main screen when wagon and boiler coal are desired. The wagon dump is shown at the base of the bin in Fig. 4, and the screenings from this dump go to the boilers. In the scale room at the tippie coal is weighed as each car is dumped, and coal is weighed again when loaded on railroad cars for shipment. These scales were made by the St. Louis Scale Co., of St. Louis, Mo. The Illinois Central R.R. uses run-of-mine coal from this plant and sometimes screenings are taken out for a pumping station in connection with the plant. If coal is to be re-screened it is elevated and run through the circular screen which makes the smaller sizes— $1\frac{1}{4}$ in. down.

On the plat of the surface features, Fig. 2, is shown a reservoir which has been found entirely inadequate for the requirements of dry spells. Its capacity does not permit of the storage of sufficient water to carry the plant over seasons of drought. A large, new reservoir is being made just west of the old one to hold 12,000,000 gal. of water, at a depth of 11 to 12 ft. The creek nearby will supply water for the new reservoir, which will be filled and kept as a reserve supply.

West of the tippie is the boiler, engine and generator house. Steam is generated in eight 72-in. by 22-ft. boilers; six of these were furnished by Rhone & Sons, of St. Louis, Mo., and two by the Brownell Boiler

Co., of Dayton, Ohio. The boilers are hand-fired. The 26 x 36-in. first-motion hoisting engine was made by the Litchfield Foundry and Machine Co., of Litchfield, Ill. The hoisting rope is $1\frac{1}{2}$ -in. steel and is stowed on two 8-ft. drums. The engine is equipped with a steam brake and steam reverse; also a Nicholson engine stop, manufactured by the Vulcan Iron Works, of Wilkes-Barre, Pennsylvania.

In connection with hoisting, mention should be made of the "humble hooks," an English device, of which the Macomber & White Rope Co., Kenosha, Wis., is the American agent. These hooks are locally termed "Johnny Bulls." One is kept as a reserve, and there has not been an overwind with serious consequences since they have been installed. However, the cage has been hung up several times, on which occasions the only practical damage done was a hole in the tippie roof, made by the end of the hoisting rope when it pulled over the sheave. The hooks consist of heavy steel plates and the device is about 2 ft. long and 8 in. or so wide. It is the connection between the rope socket and the

cage chains, to which it is attached, by clevises. In case of an overwind, the humble hooks pass through a hole in a $1\frac{1}{4}$ -in. horizontal steel plate; just enough clearance is allowed to pass the upper end of the hook; at the lower end a lug projects out at each side. The lugs are pivoted, so that as the lower ends are forced in by the plate the upper ends fly out, releasing the rope socket clevis. As the cage drops, the upper ends of the lugs settle on the horizontal plate and stop further downward movement of the cage. Back of the engine room are two 12 x 8 x 12-in. steam pumps made by the Hooker Steam Pump Co. of St.

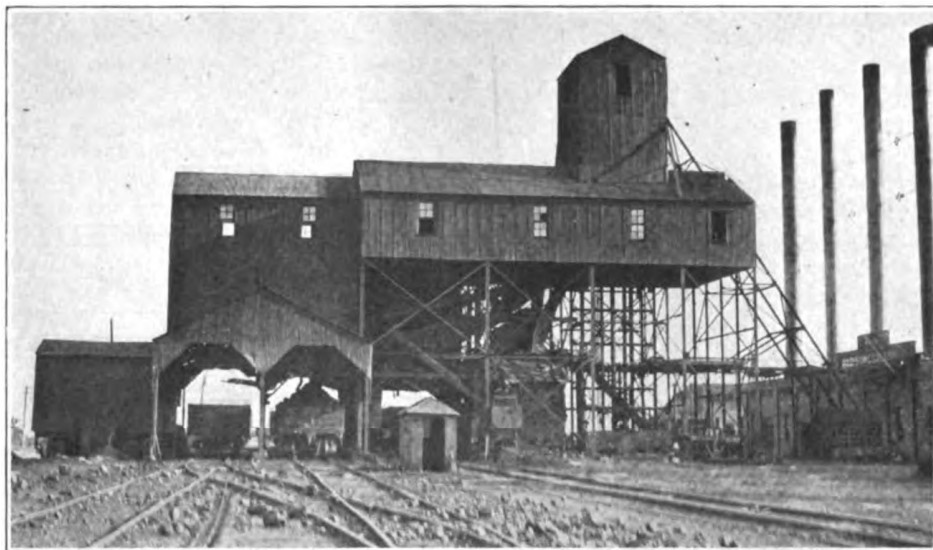


FIG. 3. NORTH VIEW OF NO. 6 TIPPLE AT DIVERNON

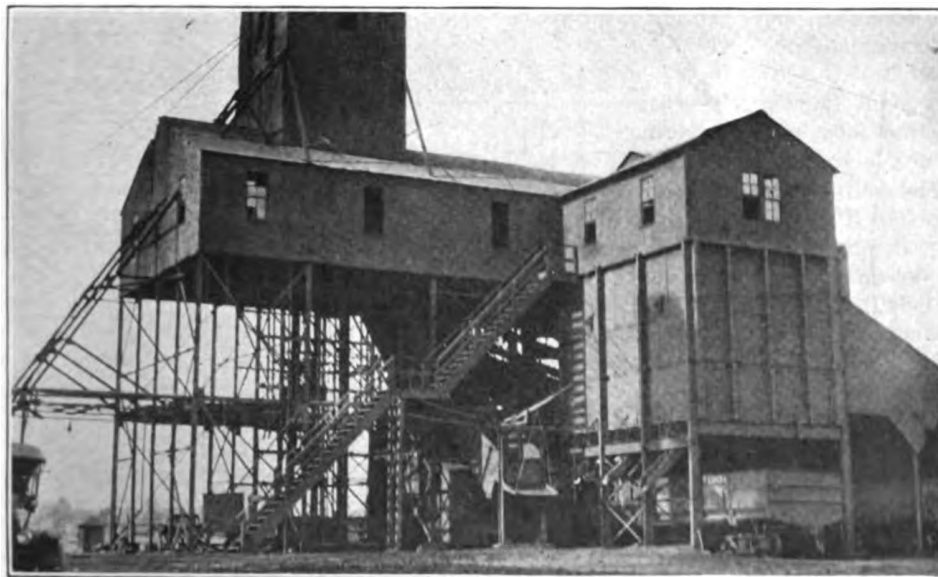
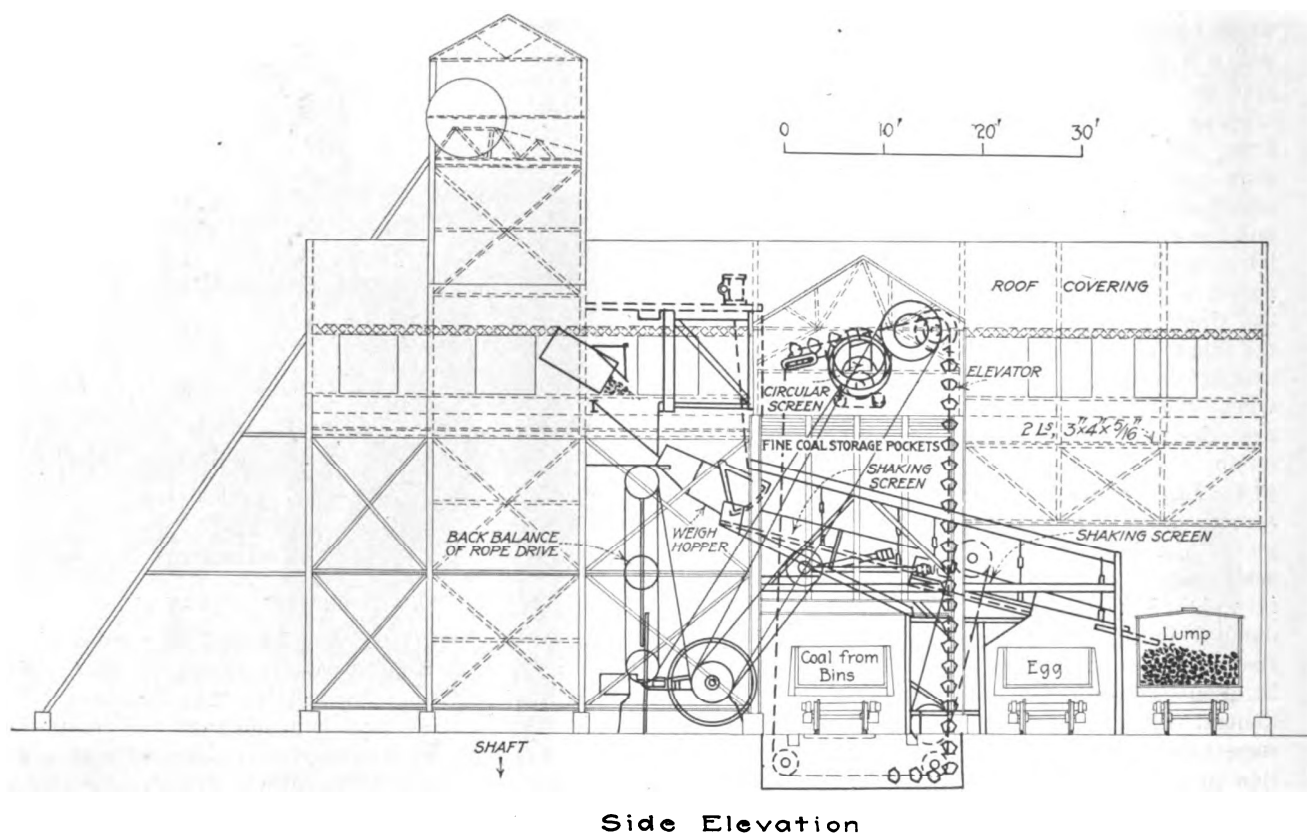


FIG. 4. SOUTH VIEW OF NO. 6 TIPPLE AT DIVERNON



Side Elevation

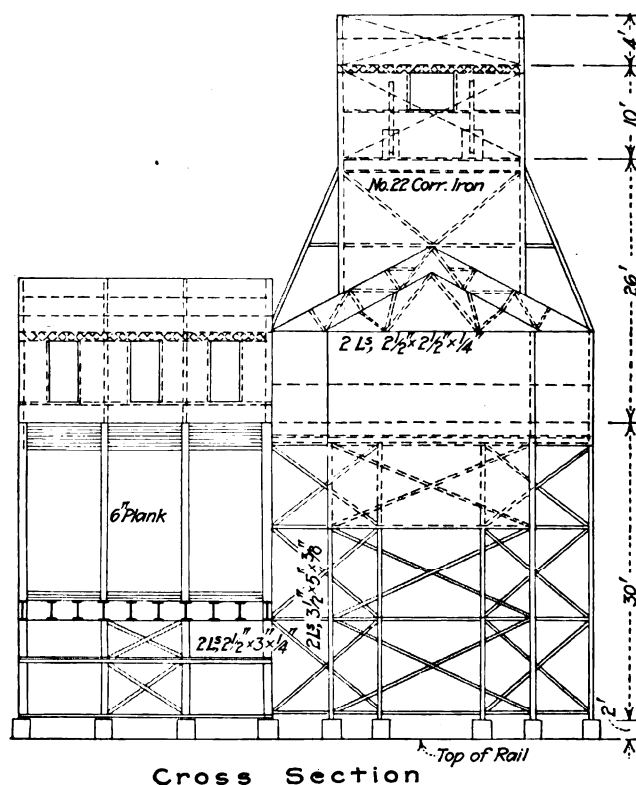
FIG. 5. SIDE ELEVATION OF NO. 6 TIPPLE OF MADISON COAL CORPORATION, SHOWING LOCATION OF MACHINERY

Louis, Mo. In this room there is also a Cochrane feed-water heater and purifier, made by the Harrison Safety Boiler Works, Philadelphia, Penn. One pump forces cold water into the heater and the other pumps from the heater to the boilers.

Adjoining the engine room on the north is the generator room, in which are three electrical units for furnishing current for power and lights. There is one 100-kw., 250-volt Western Electric Co. generator, one 175-kw., 250-volt General Electric Co. generator and one 100-kw., 220-volt General Electric Co. generator. All are direct-current machines and run by Skinner automatic engines. There is a four-panel switchboard in this room, one panel for each generator, and the fourth panel for the main circuit breaker and the switch for the main line down the shaft.

The machine shop at this plant handles all repair work at the mine, and some other jobs, such as making a lathe for turning wheels and a drill press for the local mine shop. The shop is equipped with a large lathe from J. W. Wright & Co., St. Louis, Mo., and one of medium size made by the Springfield Foundry Co.; a planer from W. C. Johnson & Sons Machinery Co., St. Louis, Mo., a radial drill, Niles Tool Works, Hamilton, Ohio, shear and punch, by New Doly Manufacturing Co., Jeanesville, Wis., shaper, from Smith & Mills Co., Cincinnati, Ohio, and a pipe die machine from Curtis & Curtis, Bridgeport, Conn. A pipe-threading and bolt-cutting machine has been ordered. At the forge in the blacksmith shop adjoining are three steam hammers which are useful in repointing bits for mining machines, among other purposes. A Jeffrey centrifugal 5 x 16-ft. fan ventilates the mine; it is run by a 22 x 24-in. engine made by the Ridgway Dynamo and

Engine Co., of Ridgway, Penn. It is run at a normal speed of 90 r.p.m. The fan can be reversed and run exhaust if desired. In the haulage engine house near the tipple is the mechanism for operating the rope system which parallels the empty and loaded railroad tracks



Cross Section

FIG. 5A. CROSS-SECTION OF NO. 6 TIPPLE

and which moves the empty and loaded railroad cars. Each end of the $\frac{3}{4}$ -in. rope is attached to two drums respectively, which are driven by one shaft through friction. There are links on the haulage rope every 250 ft. which permit connection with cars by a short rope. The system is reversible; as the rope winds up on one drum it feeds out from the other.

The employees and their families are well taken care of by the Madison Coal Corporation, which believes that they should have homes and not shacks. A new town adjacent to the plant contains 100 houses which were built by the company at a cost of \$1500 each, including a summer kitchen, outbuildings, fences, cistern and

to some city suburbs. When the trees fill out in the yards, the village will be still more attractive.

All are four-room houses of the bungalow style and of the dimension and general arrangement shown in Fig. 6. The inside details are about the same for all four types. In the rear of each house is a 10 x 14-ft. summer kitchen and a cistern 6 ft. in diameter and 8 ft. deep. Each house has a lot 150 ft. deep by 50 ft. in width with a 20-ft. lawn in front. Running water is brought close to each house at the division fence, every other side fence having a hydrant which supplies the house on either side. The house occupied by J. H. Miller, the mine manager, is shown in Fig. 8. It is a

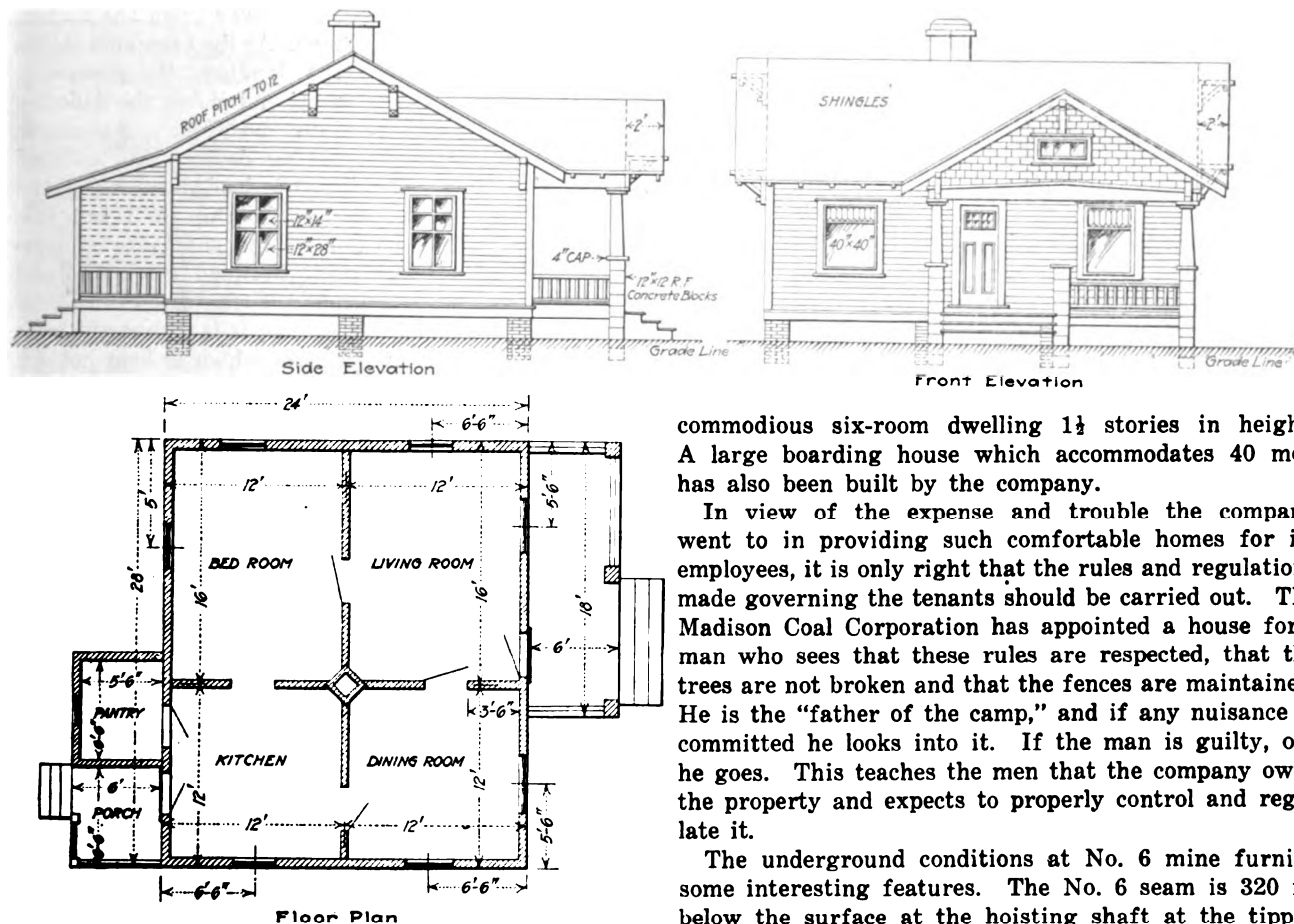


FIG. 6. ELEVATIONS AND PLAN OF ONE TYPE OF EMPLOYEES' HOUSES OF MADISON COAL CORPORATION'S NO. 6 PLANT

other improvements which add to the attractiveness of the town and act as an incentive to the men to keep their places in good shape. The camp at Glen Carbon, another plant of this company, is 30 years old, but the same conditions prevail as to neatness and order. The houses are kept in good repair, attractively painted, and probably are highly appreciated by their occupants.

The mine town at Divernon avoids monotony by having four different types of houses, no two of the same style being adjacent. This feature and the variety in the colors of the paint used on them lend attractiveness to the village. The houses are arranged in four rows, one of which is shown in Fig. 7. Note the neat division fences, the absence of a front fence, the row of shade trees along the street, other trees in the yards and the lawns at each home. Such a scene would do credit

commodious six-room dwelling $1\frac{1}{2}$ stories in height. A large boarding house which accommodates 40 men has also been built by the company.

In view of the expense and trouble the company went to in providing such comfortable homes for its employees, it is only right that the rules and regulations made governing the tenants should be carried out. The Madison Coal Corporation has appointed a house foreman who sees that these rules are respected, that the trees are not broken and that the fences are maintained. He is the "father of the camp," and if any nuisance is committed he looks into it. If the man is guilty, out he goes. This teaches the men that the company owns the property and expects to properly control and regulate it.

The underground conditions at No. 6 mine furnish some interesting features. The No. 6 seam is 320 ft. below the surface at the hoisting shaft at the tippie, and averages 8 ft. in thickness. This is the bed which produces the greatest tonnage and is the one worked all through the central and southern coal-mining portions of Illinois. The method of mining employed here is the room-and-pillar combined with the panel system. The impurities in the seam include a blue band $2\frac{1}{2}$ ft. from the bottom which runs about 1 in. in thickness. Sulphur bands and balls are also found throughout the coal. The top is generally a clod and black slate occurring from nothing to 8 ft. in thickness. It is full of seams. Above the slate is a solid limestone.

The slate weathers badly at certain times of the year and it is the custom here wherever practicable to leave up about 1 ft. of top coal as protection against this spalling of the top. Props are set with a coal top and crossbars are placed where the coal comes down, especially on entries. On haulageways, if the clod is not more than 2 ft. thick, it is taken down to the inside parting and the entry is timbered from here to the face. At



FIG. 7. EMPLOYEES HOUSES AT DIVERNON

this mine one prop is used for every 10 to 12 tons of coal mined.

No pillars are drawn and rooms are turned off on 60-ft. centers—30-ft. room and 30-ft. pillar. A barrier pillar of 20 ft. is left between the ends of rooms, and there is an entry barrier of 75 to 100 ft. At present one pair of main entries is being driven and eight pair of cross-entries. From the cross-entries, stub entries are driven of an average width of 15 ft.; the main and cross-entries are each about 12 ft. wide. The entries are run on centers, and the assistant mine manager runs the rooms with a compass. Two surveys of the workings are made during the year.

The method of mining employed at the No. 6 mine, in the main, is the one in vogue at a large number of Illinois operations. No attempt is made to extract more coal than can safely be removed without causing subsidence of surface. Also, all coal is taken out on the advance; when all the rooms in a panel are worked to the required distance, then the panel is finished. While it is expected that pillars have been correctly proportioned to opening, and will not fail in the service for which they were left, nevertheless the wisdom of the panel system has been abundantly justified in Illinois. In many instances barrier pillars have limited squeezes to the panel in which the trouble started. A force fan furnishing 130,000 cu.ft. of air per minute ventilates the mine, in which there are eight splits. The overcasts are of concrete and the stoppings are made of slate and old ties plastered with cement and sand. Three mine examiners cover the workings. They find gas occasionally, and the miners stay out of the places in question until the face bosses either brush out the gas or put up

a curtain to deflect the air current which removes it. The main or hoisting shaft has two compartments. The air shaft is equipped with a stairway which is partitioned off from the portion used for ventilation. At the bottom of the main shaft is an automatic deflector arranged to be operated by the cage; this device tends to throw coal falling down the shaft away from the bottom men. As the cage approaches the landing, it engages a pawl and moves the deflector into position. Automatic caging devices are installed on the loaded tracks at the shaft bottom. Within a few

hundred feet of the bottom of the shaft are a number of interesting features. Between the main and air shafts is an underground room fitted up as a rescue station to give first aid; in it is a first-aid cabinet. In the rear is a small room which is kept hot for special cases requiring such treatment. Nearby, at the air shaft, is a 35-hp. pump of General Electric Co. manufacture; it is figured for a head of 600 feet.

The main entries run east and west from the main shaft, and the tracks are graded so that the loaded cars run to the shaft and the empty ones away from it. At a short distance from the shaft, on the east side, one track is considerably lower than the other one paralleling it. As a safety precaution a pipe hand rail is in position between the two tracks, suspended from the top by brackets. Concrete has not been spared where needed on entries, traveling ways and rooms around and near the hoisting-shaft bottom. Conveniently accessible to the shaft is a waiting room for miners. Seats have been placed on both sides of a traveling way, the sides of which have concrete walls. Whitewash and electric lights contribute to the cheerfulness of the place.



FIG. 8. TYPE OF HOUSE OCCUPIED BY MINE MANAGER