

Hall Electro-Gas Automatic Block-Signals on the Union Pacific Between Archer and Buford, Wyoming.

four sides of the building, so that in warm weather they may be thrown open to catch the breeze from any direction. In the main gables, which are at each end of the main waiting room, there are two beautiful stained glass rose windows, the one in the north gable showing the medallion of the Sunset Route, and the one in the opposite, or south gable, the coat of arms of the State of Texas. Other windows are glazed with bevel plate and fancy glass. The skylight over the main waiting room is of Etruscan glass.

The waiting room has a high wainscot of cream white tile; above this the finish is ornamental plaster. The exterior arches and jambs of the building are red brick, natural color, while the exterior walls are covered with a yellow stucco. The roof trusses of the main waiting room are steel. The entire roof is covered with red clay Spanish tile. The exterior ornaments are manu stone, artistically modeled. The exterior woodwork is painted in greens, browns and reds. The general tone of the interior decorations is ecru, light brown and gold gilt, which, with the great number of incandescent electric lights distributed on arches, panels and other available points, give a brilliant effect. All the gas and electric fixtures were especially designed and made for this structure.

The building is provided with a low pressure steam heating plant. Umbrella sheds were adopted for shade and shelter along and between the tracks in preference to an inclosed shed, so as to avoid smoke and noises incident to a complete inclosure. The grounds are being fitted up and when completed will be covered with lawns, flowers, palms and ornamental shrubbery.

The depot was designed by J. D. Isaacs and Assistant Architect D. J. Patterson, assisted by W. E. Milwain, all of the Southern Pacific Company, San Francisco. The work was carried on under the supervision of E. B. Cushing, Engineer Maintenance of Way of the Galveston, Harrisburg and San Antonio, assisted by H. F. Jonas; W. B. Sheldon being superintendent of construction.

**Hall Electro-Gas Normal Danger Signals on the Union Pacific.**

The Union Pacific Railroad is installing upon its 34 miles of double track, lately placed in service between Archer and Buford, Wyoming, an automatic electro-gas semaphore track circuit system of normal danger block signals, comprising 56 home signals and 30 distant signals. About one mile of this territory, coming within Cheyenne yard, is not to be signaled because of the great amount of switching done there, as it was thought, to do so would greatly retard the switching and movement of trains through the yard. Nearly two miles of the single track at each end of double track are to be included in the installation. Westbound trains enter and leave the new second track through crossovers, the new second track being extended for a passing siding at each end.

The following description is a good example of thorough specification. The crossovers, worked manually, are electrically locked, and thus are fully protected. The specifications for the wiring, for the boxes, for track relays and for the ground connections for lightning arresters are particularly complete. The plans for switches require the signal circuits to be looped through normally closed springs in each switch instrument, and the track circuit to be shunted through normally open springs. The use of both the break and shunt might be criticized as being over-protection. The use of an overlap section for a home signal provided with a distant signal may be open to criticism by some as tending to produce lax discipline, but the officers of the Union Pacific find in the steep grades and other conditions at this locality what they deem adequate reasons justifying the practice.

It is proposed to connect each crossover at end of double track to a two-lever dwarf interlocking machine located in the telegraph office, and to so arrange the signal circuits that the signal for any route approaching the end of double track cannot indicate proceed until the crossover is properly set and locked. Electric locking is to be used on the interlocking machine so that it will be impossible to move the crossover while trains are passing over either switch, or to move it from its proper position for trains approaching from single track after the signals have indicated proceed.

Between Archer and Cheyenne there are both ascending and descending grades, the maximum being .7 of one per cent. From Cheyenne to Buford the grade is generally ascending, the maximum being 1.55 per cent. On the up grade, home signals only, with overlap, are used, except for those blocks in which are passing sidings where the overlap is discarded and a distant signal is provided to regulate the approach to the home signal. On the down grade, there is a home and a distant signal for each block, and each block overlaps into the next, excepting those in which there are passing sidings.

Each distant signal is located with the design of affording room for stopping the fastest trains between it and its home signal. A home signal is located about 500 ft. in the rear of the outbound switch of each passing siding so that should the switch be in use or set wrong, a train on the main line could proceed as far as the signal before getting a stop indication, but, in such a case, it would have received an indication from the distant signal in the rear as to the condition of the block. Visual indicators of the semaphore pattern, enclosed in iron boxes mounted upon iron posts, are to be used at all switches within the territory to be signaled.

In making the survey for the installation, the expedit-

ing and safe movement of traffic, grades, curves, switches, passing sidings, stations, etc., were carefully considered, so that each signal and piece of apparatus is located as nearly as possible where it properly belongs.

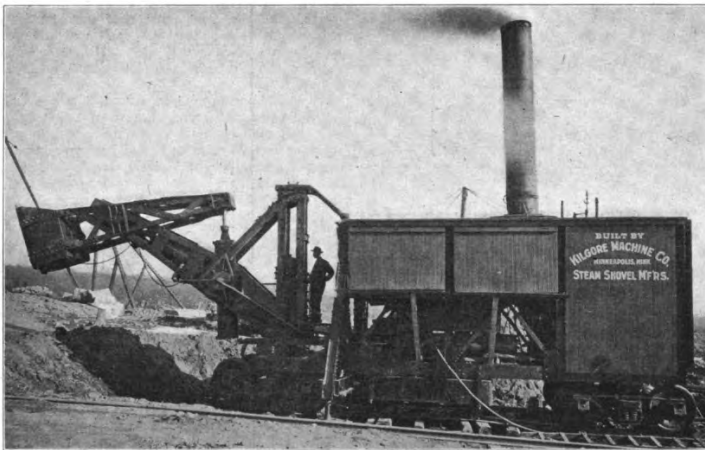
Besides the foregoing the specifications contain the following: The arrangement of circuits is such that a distant signal cannot indicate proceed until after its home signal has done so. The circuit of each home signal is carried through a circuit breaker on each switch within the block, and, in addition, the movement of each switch from its normal position shunts the track circuit. All sidings are to be bonded to the fouling point to form part of the block system and the outside rail is to be wired in series with the main track circuit.

Wires from tracks to poles are laid in fir trunking supported on stakes made from old boiler tubes. Signal and indicator wires carried in trunking are No. 14 B. & S. gage copper with  $\frac{3}{32}$  in. okonite insulation cov-

ground is made by burying in the earth in a suitable location a copper plate 1 ft. sq. embedded in charcoal and connected to the lightning arrester by a No. 8 copper wire.

#### The Kilgore Direct-Acting Steam Shovel.

The engraving shows a novel form of steam shovel in which each moving part is controlled by a direct-acting steam cylinder, eliminating chains, sheaves, etc. The mast, boom and dipper-arm are all of box-frame construction, the material being steel. The mast is built of heavy-section members and contains the main lifting cylinder, which is connected to the inner end of, and controls the movements of, the oscillating boom. This boom is fulcrumed near its middle and has within it the cylinder controlling the movement of the dipper-arm parallel to the longitudinal axis of the boom. The dipper-arm



1 1/4-Yard Kilgore Direct-Acting Railroad Shovel.

ered with one braid. Common wire in trunking is No. 12 B. & S. gage copper with  $\frac{3}{32}$  in. okonite insulation covered with one braid. Wire for track circuit connections is No. 8 B. & S. gage copper with  $\frac{3}{32}$  in. okonite insulation covered with one braid. The wire for pole line circuits is required to meet the following specifications: All overhead or pole line wires for signals and indicators must be No. 9 B. & S. gage bare hard drawn copper having the following diameter in mils: Required, 114; minimum, 112; maximum, 118. The weight per mile required is 208 lbs.; minimum, 203 lbs.; maximum, 218 lbs. The breaking weights must be: Per square inch, 60,200 lbs.; actual minimum, 590 lbs. Twists in six inches, 32. Conductivity required, 97; minimum, 96. Common wires on the pole line must be No. 8 B. & S. gage hard drawn copper with weather proof insulation two braids. Wire must be in long lengths with uniform insulation having a hard smooth finish, presenting the least possible chance for adhesion of snow and ice. Outside diameter over insulation must be at least  $\frac{3}{4}$  in. Weights per mile: Required, 349 lbs.; minimum, 330 lbs.; maximum, 360 lbs. The wire when bared of insulation must be as follows: Diameter, required, 128; minimum, 125; maximum, 131. Weights per mile: Required, 262; minimum, 256; maximum, 268. Breaking weights: Per square inch, 60,200 lbs.; actual minimum, 770 lbs. Conductivity: Required, 97; minimum, 96. Twists in six inches, 31. All joints in line wire are to be made with McIntyre connectors. Taps to line wire are to be fastened to dead ends specially arranged for that purpose. Signals are to be equipped with Union Pacific standard lamps and 75 deg. "continuous-light" spectacle castings.

Counters are to be provided in the mechanism cases and attached to the vertical rods of all signals, with a view to registering at all times the number of movements made by each signal so as to check not only the supply of gas, but the working of the signal as well.

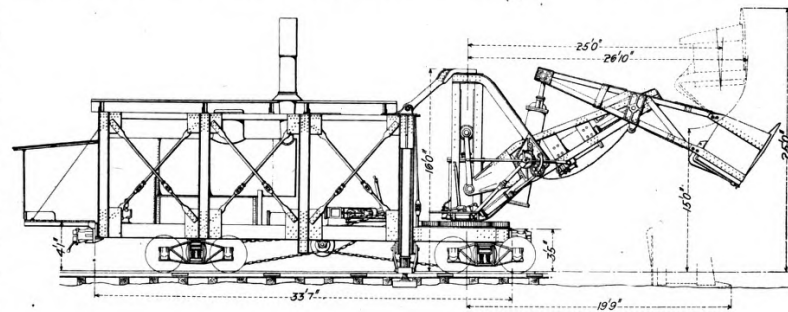
All batteries are of the gravity type. Signal and indicator batteries are to be housed in Union Pacific standard battery wells. These wells are similar to the ordinary wooden type with the exception that the mouth of the well has a long neck so that when set in the ground the top of the well is covered with 4 in. of earth. This is necessary because batteries placed in wells having an exposed top, will usually freeze if the temperature drops to 10 deg. below zero. As a preservative, the outside of the well is heavily coated with a mixture of roofing pitch, coal tar and ground asbestos.

Track relays are of the four-ohm glass-enclosed type. Those not housed in mechanism cases of signals are to be enclosed in moisture and dust proof double boxes, which consist of a wooden box built inside an iron box with an air space between the two, and mounted upon iron posts.

Choke coil lightning arresters with toothed ground plates are to be provided for all exposed circuits. The

spreads out at the dipper end to take hold of each corner of the latter, providing a rigid and substantial connection. The piston rod of an oscillating cylinder swung within the boom is connected to the opposite end of the arm. The boom is swung laterally by a cylinder on the floor of the car, the piston rod of which has on it a steel rack engaging a steel gear at the base of the mast.

All cylinders are cushioned at both ends, admitting them to be worked full stroke at high speed; they may be worked independently or together. The valves controlling the cylinders are light in pattern and are balanced, making them easy of operation. The levers are conveniently placed for the operator so that the machine may be worked with great rapidity and yet without fatigue to him. The movements of the controlling levers operated by hand are in the direction of the resulting motion of the dipper, simplifying the handling of the machine. Other controlling levers are moved by the foot of the operator. The machine is self-propelling.



Kilgore 2 1/2-Yard Direct-Acting Railroad Steam Shovel.

The car body of the 1 1/4-yd. shovel is 26 1/2 ft. long and 9 1/2 ft. wide, and is built of I-beams and channels. It is mounted on 70,000-lb. all-steel trucks. Steam is supplied at 150 lbs. pressure by a locomotive-type boiler 50 in. in diameter and 12 ft. long. The car is propelled by a 6 3/4-in. x 12-in. double-cylinder engine. All motions of the dipper can be reversed with equal power. It can be moved forward or back by the forcing cylinder, enabling the dipper to be withdrawn from the bank when full without going through to the top. If the front truck of the car should get off of the track, the dipper can be lowered to the ground and the lifting and forcing cylinders used to raise and swing the car back onto the rails.

For a dipper capacity of 1 1/4 cu. yds. the machine entire weighs 30 tons and the 2 1/2-yd. machine weighs 65 tons. These shovels give good results in ditching and irrigating. One was used in draining Hayward Marsh,

near Albert Lea, Minn., the soil of which is black loam to a depth of 4 ft., overlying a bed of gumbo clay, with an occasional strata of gravel. It is so soft that it will not support a horse and in order to carry coal to the shovel a road of hay was built. The sticky character of the soil causes it to adhere to hand shovels and to scrapers, so that they cannot be used; but as a consequence of the peculiar construction of this shovel by which the cylinders may be made to act with sufficient rapidity to shake the dipper violently, no difficulty was experienced in dumping the loads. The work in this marsh consisted of excavating a 13-ft. wide ditch, several miles long. It is claimed that one of these shovels ditching in dry soil will handle six to eight dipper loads a minute, dumping at 30 ft. The Kilgore Machine Company, Minneapolis, Minn., is the maker.

#### TECHNICAL.

##### Manufacturing and Business.

H. W. Toothe, for some time past manager of the railroad department of the Magnolia Metal Co., has resigned.

The Independent Railroad Supply Company, Chicago, has shipped a carload of Wohlhaupter rail joints to the Illinois Central.

The Missouri Steel & Iron Co., of Kansas City, Mo., has been incorporated with a capital of \$50,000. F. E. Wear, Francis C. Downey and others are incorporators.

The Carroll Oilless Bearing Co., of Worcester, Mass., has been incorporated with a capital of \$300,000 to make and sell all kinds of machinery. Wm. T. Carroll, John L. Truax and others, of Worcester, are incorporators.

The Fitz-Hugh, Luther Co. has bought the plant of the United States Locomotive Corporation at Hammond, Ind. New machinery will be put in and important improvements made. It is expected to have the shops in operation within a month.

The Samuel Smith & Son Company, of Paterson, has been incorporated in New Jersey with a capital of \$100,000 to make iron, steel, coke, manganese, copper, and deal in lumber. Samuel Smith, Henry F. Bell and others are incorporators.

Allan F. McIntyre, structural steel, railroad and contractors supplies, 510 Monadnock Block, Chicago, has been appointed Western Agent for the John Eichley, Jr., Company, Pittsburg, maker of structural steel and iron work for all purposes.

Mayer Brothers, Inc., is the name of a new company of Mankato, Minn., organized with a capital stock of \$100,000 to make trip hammers, boilers, gasoline, and steam engines and structural iron and steel. Louis Mayer is President, and Lorenz L. Mayer, Secretary and Treasurer.

John H. Pierce, President of the Western Tube Company, Kewanee, Ill., has been elected President of the Illinois Manufacturers' Association. From 1890 to 1895 Mr. Pierce was Manager of the National Tube Company at Pittsburg. He later started the Western Tube Company, which now employs 3,500 men.

The Railway & Electric Equipment Co., capital \$1,000,000, organized to sell cars and locomotives for steam and electric railroads, has filed articles of incorporation at Augusta, Me. Elwood C. Jackson, of Philadelphia; Charles C. Rolston, Chicago; Frank J. Lewis, Cleveland; Charles C. John and Robert W. Day, Buffalo, are the incorporators.

The Directors of the Illinois Bridge & Machine Co.,

of Jacksonville, Ill., appointed Nelson McMurphy, of Springfield, and Edgar E. Crabtree members of the Board, to fill vacancies caused by the resignation of John R. Robertson and Arthur H. Rankin. The company expects to add new machinery to increase its capacity next spring.

The One-Rail Traction Company of New York has been incorporated in New Jersey with a capital stock of \$125,000 by Louis J. Somerville, Brooklyn; Henry J. Stoesser, Jersey City, and Alfred H. Willmont, Brooklyn, to buy and sell patent rights for the auto-balancing system of one-rail railroads conceived by William H. Boyes and Erwin F. von Wilmsowsky.

The Henderson Car Works Company has organized with a capital of \$1,000,000. Shops will be built at Henderson, Ky. Chicago and Cincinnati capitalists, also a