All-Electric.—The all-electric interlocking was developed by J. D. Taylor about 1900. A switch is moved by a one horse-power electric motor fixed to the ties and worked by an electric current conveyed by wires from a dynamo or storage battery in the cabin; and a signal by a motor of 1/6 horse-power, fixed to the signal post. The storage battery is usually charged by a generator run by a gasoline engine; and the amount of electric power used is so small that a small engine need be run but a few hours daily.

The machine in the cabin consists of a frame supporting horizontal sliding bars or levers, each movement closing a circuit to a switch or signal. The levers are interlocked as in other machines, and as in other power machines the interlocking is controlled by an indication sent to the machine from a switch after it has actually completed its movement. This "indication" current is generated by the momentum of the switch motor, which is converted into a generator for a fraction of a second after it has completed its work of moving the switch. The movement of a switch requires a current of only seven amperes.

All-electric interlocking has been manufactured since its development by the General Railway Signal Company.

Among the large all-electric installations may be mentioned the new Grand Central Terminal at New York, and the Chicago & Northwestern Terminal at Chicago. The latter is one of the most recent and up-to-date installations, so that a short description of it may be interesting. The Lake Street or main plant controls the entrance to 16 station tracks, which converge into six main lines. The semaphore signals are all of the three-position upper quadrant types and the dwarf signals are also three-position. The signal blades when horizontal mean stop; when inclined at an angle of 45°, proceed, stop at next signal; and when vertical, proceed.

In place of mechanical detector bars, which are usually installed at all interlocked switches to prevent the throwing of the switch under a train, electric track circuit locking is substituted. Miniature lights are placed on switch levers to indicate the presence or absence of trains on the switches and illuminated track diagrams are employed to give information to levermen as to occupied or unoccupied condition of all tracks.

An elaborate system of route and release locking is installed at this point, which by means of track circuits, controlling lever locks in the interlocking machine, prevent the movement of switches in a given route after a clear signal has been given to and accepted by a train over such route, even though the governing signal has been restored to normal or stop position. An ingenious feature of this "Route and Release" locking system is that while it is impossible to change the position of switches ahead of a train moving over the route, it is possible to move switches immediately after it has passed, thus permitting a new route to be lined up for a following train. In the older methods of track circuit route locking, the train must pass over all the switches in the circuit before any of them can be moved. The former scheme greatly facilitates train movement, while retaining all of the safety features of the latter.

There has been in late years a good deal of discussion as to the proper signal aspects for both day and night. While practice is not uniform the consensus of opinion is that a semaphore signal at the right side of the track or above it, with the semaphore blade to the right of the mast and working through the upper quadrant is the best practice. In this type of signal the blade horizontal means stop; inclined upward at an angle of 45°, proceed cautiously; and inclined upward at an angle of 90°, proceed.

At night the stop signal is a red light, the caution a yellow and the proceed a green light. Formerly, a white light or an ordinary flame seen through an uncolored lens was the clear indication, but on account of the danger of confusing this light with others in the vicinity, and the fact that the breaking of a red lens might cause a light to appear white when it should be red, the green light was adopted for the clear indication.

At interlocked railroad crossings it is the general practice, and in most States the law requires the installation of derails and distant signals. The derail on high-speed tracks is placed about 500 feet from the crossing and will throw a train off the track if the stop signal is not obeyed by the engineman.

The distant signal is placed about 2,000 feet ahead of the derail and warns the engineman that he is approaching an interlocking plant. The distant signal gives two indications—one that the home signal is clear and that he may proceed over the crossing without stopping, and the other that he must approach the home signal prepared to stop.

It is customary in modern installations to have a track circuit route locking which will prevent the moving of any switch or signal on the route after a train has accepted and passed a clear distant signal and until it has passed the home signal or through the entire plant.

RAILWAY ELECTRIFICATION IN ENGLAND.

A brief description has recently been published on the electrification by the London and North Western Railway Company of some 80 miles of single track, the first section of which was placed in operation on May 1st, of the present year. In all, about 7½ miles of single track have been equipped to date. High tension cables will, as far as possible be carried on short posts along the railway. The low tension cables will be laid underground. The conductor rails are all of a special low carbon soft steel having a weight of 105 lb. per yard; and the electrical resistance is approximately 6½ times that of copper. The rails are supported on porcelain insulators attached to the sleepers by malleable iron clips.

Trains, such as it is proposed to operate on these lines, will consist each of three cars having a total length of 179 feet. End doors are used with through communication, and both cross and longitudinal seats are provided. The electrical control gear will be supplied by the Siemens companies. Every motor car will be fitted with four motors of 250 h.p. each.

The generating equipment will consist of 5 turbo-generators of 5,000 kw. each, three-phase, 11,000 volts, 25-cycles; and transformers and rotary converters will be used to reduce the current to 600 volts d.c. Storage batteries will also be installed for peak and emergency service.

The transformers are being manufactured by the British Electric Transformer Company; sub-station plants, by the British Thompson-Houston Company; and the electrical apparatus of the trains, by the Maschinenfabric Oerlikon. Owing to the war, however, it is almost certain that all contracts with the German company have been cancelled.

The state of Texas mined 2,429,144 short tons of coal in 1913, valued at $4,288,920, according to E. W. Parker, of the United States Geological Survey. This production was nearly evenly divided between lignite and bituminous coal, with the balance slightly in favor of the latter. Both classes of coal showed increases in production in 1913, and both made their record output. The total production in 1913 exceeded that of 1912 by 240,532 short tons, or 11 per cent. in quantity, and by $633,176, or 17 per cent., in value.