

lays, and transformer are mounted so as to be accessible from the field side, and the battery from the track side. The line relays are Union Model-13 with 670-ohm coils, while the track relays are 4-ohm. Leich Electric Company cut-over relays are used. The line control circuits are carried into each relay case to permit breaking the circuit when testing.

The circuits from the terminals in the relay case to the rails are in single-conductor, No. 9 solid-copper, park-way cable, using a special riser and outlet as shown in the plan. Okonite cable and insulated wires were used.

A special feature of this installation is the type of signal number plates which are made of No. 18 gage steel, 5½ by 8 in. in size, with white figures on a black background, finished with three coats of baked-on enamel and mounted on galvanized channel iron and fittings for horizontal mounting. These plates were made by the Western Stamping & Manufacturing Company, St. Paul, Minn.

Santa Fe A. T. C. Approved

DIVISION 6 of the Interstate Commerce Commission, on March 23, 1928, approved without exceptions the installation of Union continuous inductive automatic train control on part of the Illinois division of the Atchison, Topeka & Santa Fe as made in compliance with the commission's second order of January 14, 1924. This installation extends from Pequot, Ill., to Chillicothe, 72.9 miles, of which 68.1 miles is double track and 0.33 mile over the Illinois River bridge near Chillicothe, single track. Between Streator, Ill., and Kernan, there is 4.47 miles of third track equipped with train control operative in both directions. The installation adjoins that of the first order at Chillicothe. There are 88 locomotives, 87 of which were equipped with this device under the first order. These engines comprise the locomotives of both installations.

There are several sections of track protected by automatic signals, but no complete or uniform automatic signal system is employed in train control territory. The automatic signals, where installed, are controlled through the track relays of the train control system, but the train control system operates independently of the automatic signals. It is understood that all automatic signals are to be removed later. Double-arm mechanical manual block signals are used, but these are not connected with the train control system. At the time of the inspection, trains throughout this territory were operated by time table, train orders, manual block signals, and a code of operating rules.

As a result of this inspection and test, it was found that the installation meets the requirements of the I. C. C. specifications and was approved.

Requirements and Recommendations

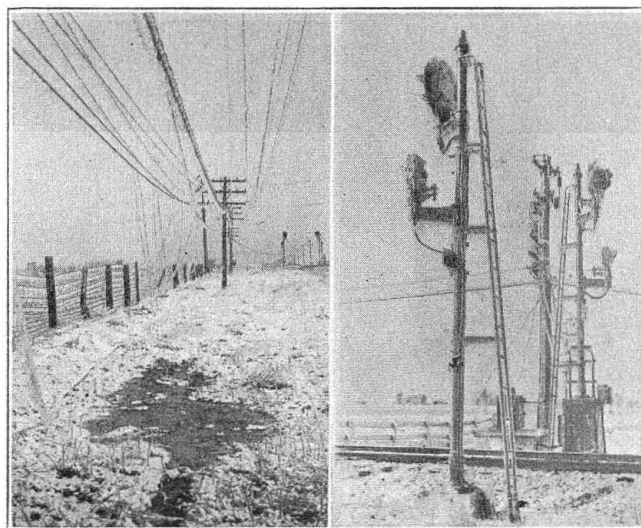
The Atchison, Topeka & Santa Fe is expected to comply with the following:

"(1). In order to guard against the possibility of false-clear failures due to track circuit leakage on account of bad ballast conditions or defective insulated joints at cross-overs, constant care should be exercised to see that the track and loop phases are not over-energized. Conditions found in blocks 881 and 902 during the inspection are cases in point.

"(2). It is suggested that the carrier consider the desirability of providing circuits in connection with color-light interlocking home signals for the purpose of imposing restrictive train-control indications in cases of failures of the signal lights."

Dispatcher Signaling System Operates Through Sleet Storm

A HEAVY sleet storm in northwestern Ohio on March 29 and 30, broke down hundreds of telegraph poles along the railways in that area, including over 600 poles on the New York Central's 40-mile installation of the centralized dispatching system extending from Berwick to Stanley. In spite of the loss of these poles no delays to trains resulted on this line because of any shortcomings of the dispatching system, notwithstanding the fact that all other communication and facilities for directing train movements were out of commission. This storm subjected the dispatcher signaling system, installed



Ice-covered cables, line wires and signals

last summer by the General Railway Signal Company, to an operating test beyond anything anticipated at the time of its installation. All control wires are carried in Hazard steel-armored cable which did not break the circuit continuity at any point, despite the pole line failure.*

The storm extended over an area from Toledo, Ohio, south to Sycamore, about 55 miles, and from Ft. Wayne, Ind., east to Lima, Ohio, about 59 miles. Ice began to form on the wires about 9 p. m. on March 29 and at 11 p. m. the regular telephone and telegraph wires began to break, so that all communication was lost. About 3 a. m. the ice became so heavy that poles were broken down and by morning over 200 poles were down on the Ohio Central Lines between Toledo and Berwick. A total of 600 poles were destroyed in this dispatching area before the storm subsided. At 4 a. m. a high-tension pole of a power company fell across the tracks at Norris, Ohio, and railroad poles fell across the tracks just north of Fostoria. Trains were, of course, delayed until these poles were removed, following which operation continued as usual.

Method of Operation

Although the dispatcher lost his regular telephone dispatching and other communication circuits at 11 p. m., he continued to line up the levers for trains

*A description of this system of centralized dispatching was published in the *Railway Signaling* for September, 1927, page 325.

which were due to enter the dispatching territory. He had no means of knowing when a train would enter his territory until he received the automatic "OS" at the entering section.

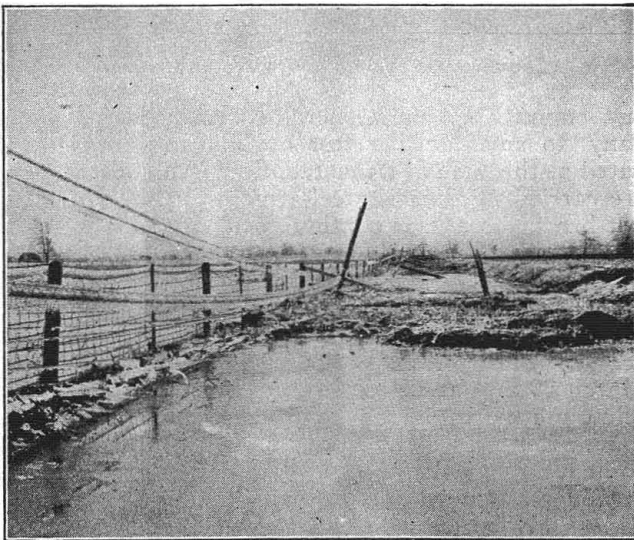
He then directed the train by signal indication in the normal manner. No unusual trouble was occasioned by ice preventing the operation of the remote power switches.

Two trains, No. 45 and No. 46, of the Big Four (the Flamingo) were handled over the territory without delay and, in fact, made a non-stop meet at Wayne, Ohio. The dispatcher's report included a statement that the trains could not have been handled in this sleet storm with the old method of train orders and that the new dispatcher's signal system kept the road in operation in spite of the sleet storm.

The average daily traffic on this division includes 12 passenger trains, 11 freight trains and 1 local train, or a total of 24 trains. The Western sub-division of the New York Central from Toledo, Ohio, to Columbus was also affected by the sleet storm, the pole line being torn down and communication lost between Bowling Green, Ohio, and Dunkirk. This line was not restored until 6 p. m., April 1, and in the meantime, several of the trains ordinarily run on this line, were detoured over the Eastern sub-division via Berwick and Toledo, which increased the movements over the centralized dispatching territory about three or four trains a day.

Why the Dispatching System Continued in Operation

With the centralized dispatching system, train movements are directed by signal indication without written train orders; therefore, communication to



Five-inch icicles formed on the wires, causing over 600 poles to go down

intermediate stations is not required for through movements. Although over 600 poles went down under the ice load between Toledo and Berwick, the control wires of the dispatching system, which are in cable, were not broken. The cable was especially designed with steel-tape covering to make it bullet-proof and was installed with 7/16-in. messenger to withstand any sleet storm. Although this storm was more severe than anything anticipated, the strength of the messenger wire emphasized the merits of this type of construction. The alternating-current power supply is fed to this system at four points. Although

the sleet storm tore down the power company's lines to three of these substations, the dispatching system was automatically cut over to the storage battery reserve provided for such an emergency.

Telephone service was not restored on the section from Berwick to Sycamore until 3:50 p. m., March 31. The dispatcher's telephone circuit was not re-



The pole in foreground was guyed four ways and held while all the others in the view went down

stored between Fostoria and Toledo until 6 p. m., April 1, and it will be several weeks before the pole line is rebuilt.

The storm extended south of the centralized dispatcher's territory from Berwick to Sycamore about nine miles. This territory is operated normally by time table, train orders, and manual block. In this area, train wires were lost about 11 p. m. on March 29. Trains were then operated on time-table rights when running on schedule but otherwise a flagman preceded each train through the dead section. Serious delays, of course, occurred which indicated what would have happened if the centralized dispatching system had not been in service throughout the major portion of the sleet area.

Minnesota Commission Refuses

Permission for Swinging Gates

A RECENT order issued by the Railroad & Warehouse Commission of the state of Minnesota denies an application made on behalf of the Chicago, St. Paul, Minneapolis & Omaha for permission to install swinging gates for grade crossing protection at Winnebago, Minn., where a branch line of this road crosses the main line of the Chicago, Milwaukee, St. Paul & Pacific. It was stated in the application that the Milwaukee road operates by far the greater number of trains over the crossing. At the present time all trains on both lines make the full stop required by state law before passing over the crossing. In denying the application of the railroad the commission stated:

"While it is true that an accident may occur at railroad junctions or crossings with any form of protection, through occasional failures of the apparatus or more often through so-called man failure, it is imperative that every precaution for safety be exercised. The statute requires the installation of an interlocking plant or other device approved by the commission before the full stop is waived, and after fully considering the petition herein and the evidence in support thereof, it is found the swinging gate system and the partial stop plan as proposed by the railroads in the instant case, will not provide sufficiently adequate safety to warrant its approval."