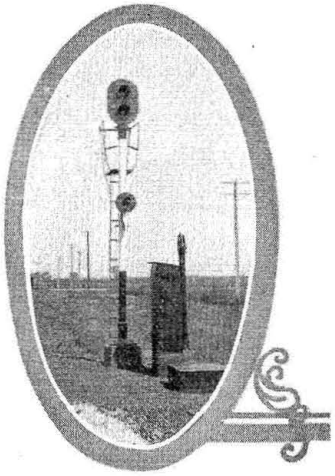
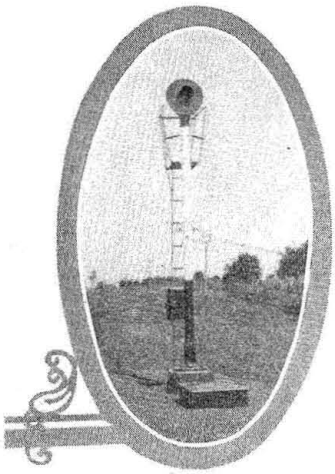
Automatic Interlocker Saves Over 8,000 Train Stops Annually



One of the home signals on the C. & A.

Simplified control system used at C.& A.–N.Y.C. crossing at Streator Junction, Ill. — Push-type release employed



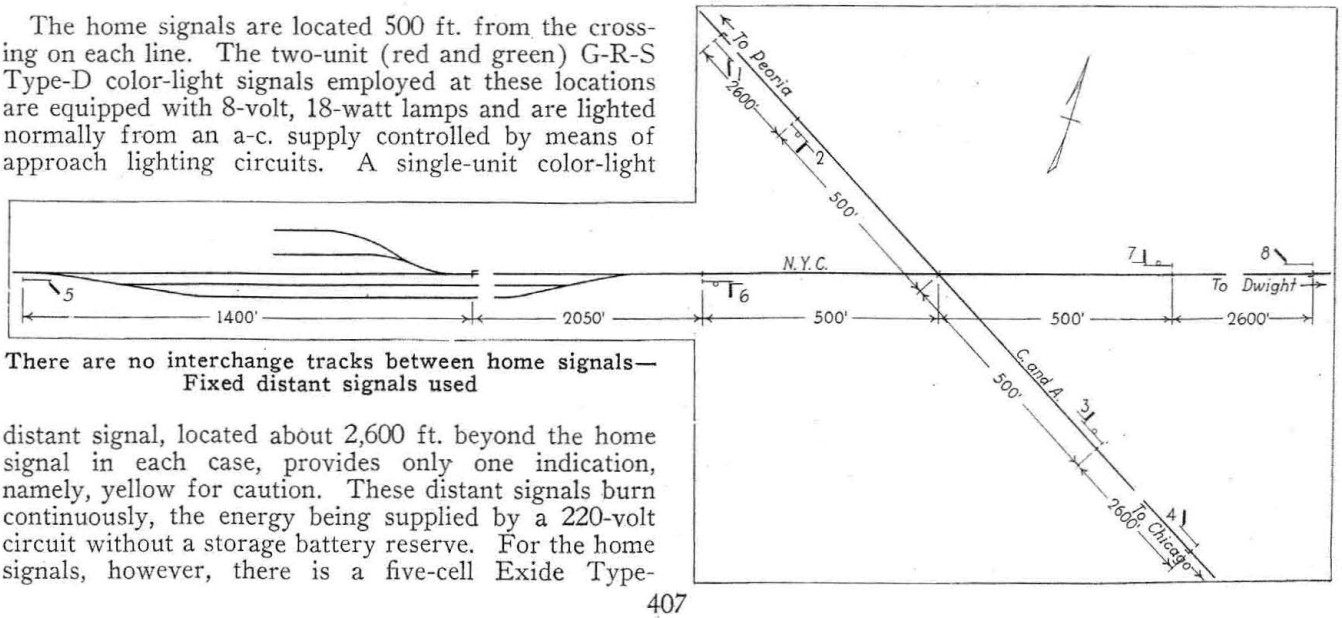
One of the distant signals on the C. & A.

AN annual saving in excess of $3,000 is anticipated as a result of an automatic interlocking plant just installed at Streator Junction, about 2½ miles east of Streator, Ill. At this point the branch line of the Chicago & Alton from Dwight to Peoria crosses the main line of the New York Central, which runs from South Bend, Ind., to Zearing, Ill. Prior to the recent installation, there was no protection at this crossing and all trains were required to make a stop. With the new facilities the trains do not stop, but are required to observe a 25 m.p.h. speed restriction over the crossing. No complications in control are necessary in this plant because there are no interchange tracks. A hand-operated switch leads to a station track at the west end of the plant on the New York Central line, but this switch falls within the approach section and standard automatic signal practice in respect to track circuit shunting is followed.

Traffic on the Chicago & Alton includes two passenger, four regular freight and two extra freight trains daily, while on the New York Central there are four passenger and 10 freight trains daily. It will, therefore, be possible to eliminate about 8,000 train stops annually.

Color-Light Signals

The home signals are located 500 ft. from the crossing on each line. The two-unit (red and green) G-R-S Type-D color-light signals employed at these locations are equipped with 8-volt, 18-watt lamps and are lighted normally from an a-c. supply controlled by means of approach lighting circuits. A single-unit color-light distant signal, located about 2,600 ft. beyond the home signal in each case, provides only one indication, namely, yellow for caution. These distant signals burn continuously, the energy being supplied by a 220-volt circuit without a storage battery reserve. For the home signals, however, there is a five-cell Exide Type-EMGO-7 120-a.h. storage battery at the crossing for emergency lighting. Each home signal is equipped with a red marker light to designate it as an absolute stop signal. As each marker light is equipped with an 8-volt, 10-watt lamp, it is not quite as brillant as the home signal which has an 8-volt, 18-watt lamp. In connection with the lighting of the home signals, two Type-H power-off relays are employed, one for each line, in order to reduce the current carried by each contact in the relay.



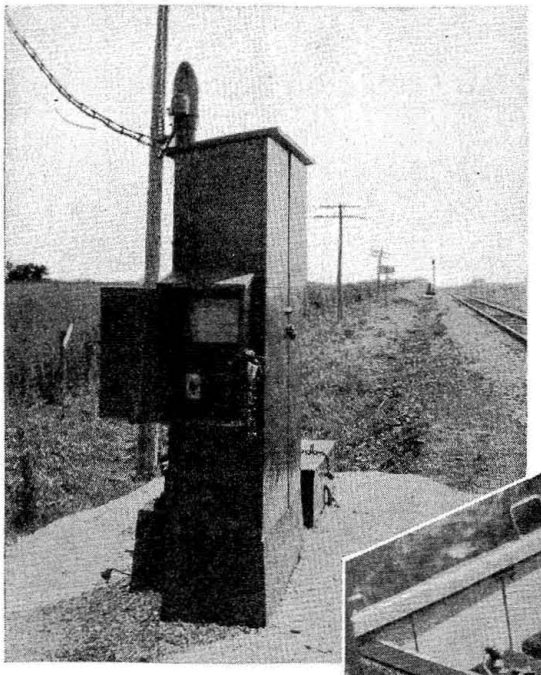
There are no interchange tracks between home signals—Fixed distant signals used

Emergency Release Switch

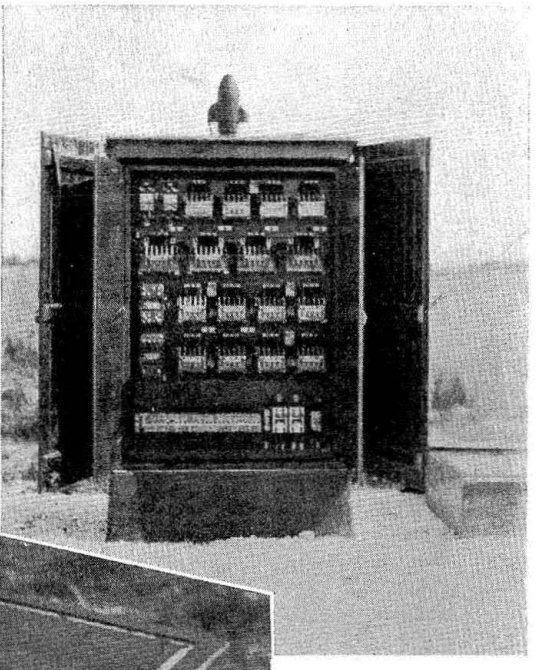
An emergency push-type release switch is provided in a separate box mounted on the end of the relay cabinet at the crossing. This box has a hinged hasp, equipped with two padlocks, one a C. & A. and the other a N. Y. C. standard switch padlock. The function of the emergency release is to insure that all home signals in the plant are at stop, before giving a train a signal to proceed over the crossing. If a train on the C. & A. finds its home signal at stop, either because of the plant being out of order, or because of a New York Central train standing on an approach section between a home and a distant signal on that line, a C. & A. trainman proceeds to the crossing to operate the emergency re-

lease. For the guidance of trainmen, the following instructions have been posted inside the box containing the release switch:

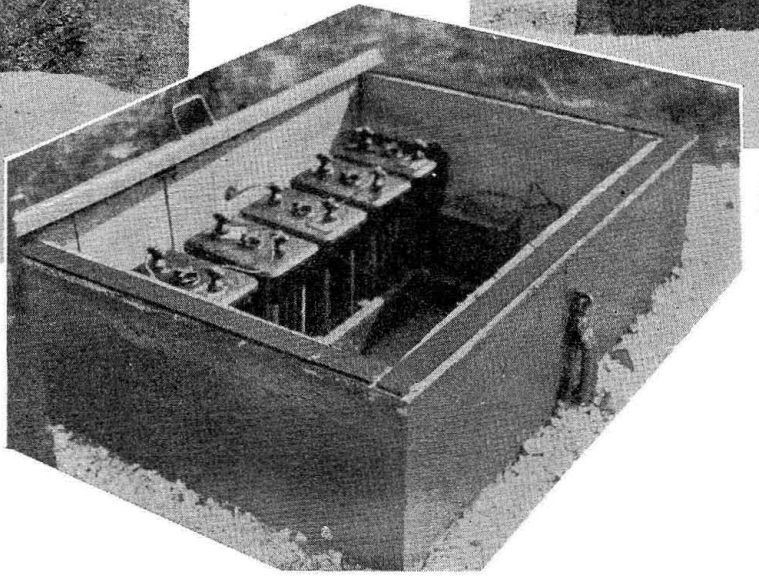
"(1) Trainmen, before operating emergency release, must observe that trains on the opposing track are standing and not moving toward crossing with the intention of passing through the plant.



Push-type release and red indicating lamp at relay case



Below — Storage battery and rectifier cell in concrete box —Note use of heavy felt weather-strip



Relays in main housing located at the crossing

"(2) To operate the emergency release, push down the handle until the red light illuminates, then let loose of handle.

"(3) Trainmen may now give proper hand signal to the train to proceed through the plant.

"(4) Door of release box must be closed and locked."

The red light referred to in the above instructions is a small indicating lamp mounted in a flush-type wall receptacle for the purpose of telling the trainmen that everything is safe to flag over the crossing. The release switch has two normally-closed contacts which are in series with the stick circuits of the directional-control relays (designated on the circuit plan as relays 1FS and 2FS). In the ordinary course of events, one of these two relays will open when a train approaches the crossing, or when one of the approach track circuits fails. However, by operating the emergency release switch, the other stick relay (1FS or 2FS) is immediately de-energized and, under these conditions, both relays are down and the home signals are all in the stop position. It should be noted that this is a closed circuit release scheme, in which respect it differs radically from the release scheme employed in the standard A. R. A. circuit for automatic interlocking.

A visual check on the position of the directional-stick relays, 1FS and 2FS, is obtained by providing a local lamp circuit through the back points of these two relays. Hence, when the trainman sees the red lamp in the release box, he knows that everything is safe to flag his train over the crossing. The Railroad Supply Company furnished the release switch.

Relay Box at Crossing

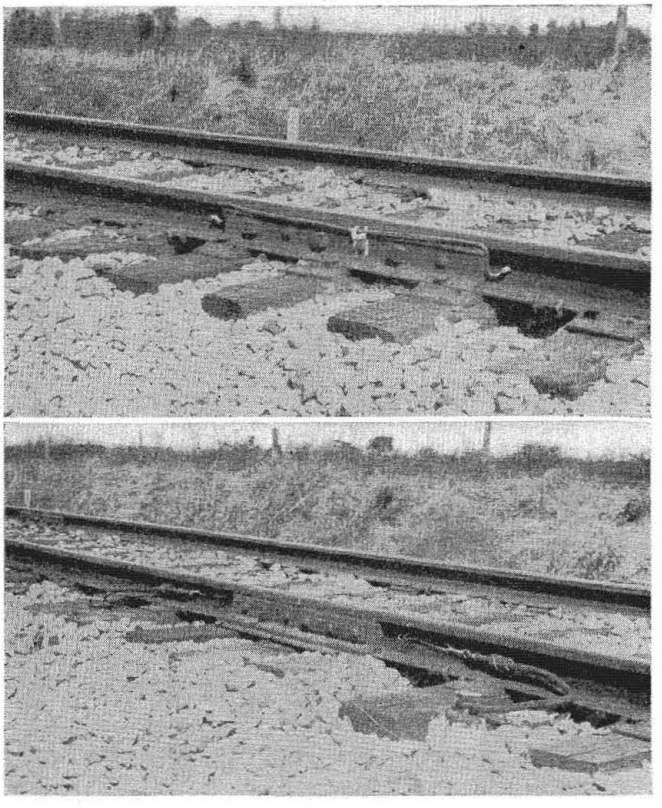
Most of the control relays are housed in a large wooden relay box located adjacent to the crossing. The construction of this box includes a number of refinements which are of special benefit to the maintainer when inspecting relays. It will be noted from one of the illustrations that the front panel of the box is hinged at the top and when raised forms a canopy which is supported by the two inner doors which are hinged at the side of the box. The shelter thus formed is of great benefit in cold weather, or when it is raining or snowing. The relay box is made of wood, but it is covered with sheet metal on the outside, and the metal is protected with two coats of black paint.

All of the control relays are G-R-S Type-K, both 4-point and 6-point relays being used. The Type-H power-off relays and also the Type-K lighting and charging transformer are mounted in the main relay box. A feature of the relay box wiring is the use of special test switches made by the National Railway Signal Company. By means of these small switches, which are applied to standard A. R. A. porcelain terminals, it is possible to open any of the track circuit controlled circuits and to carry out the same sequence of relay

operations as is effected by a train moving through the plant. In other words, there is one test switch for each approach section and one for each track section between home signals. A special test switch is also provided for the purpose of taking ammeter readings of the storage battery output to the control circuits. There is another special test switch for reading the charging current of the rectifier.

A 10-ohm fixed resistance is employed in series with the storage battery to limit the current flow when the line relays are shunted by the maintainer in making tests at the relay box. This current limiting resistance protects the flexible ribbons in the track relays and other relays controlling the line relays. Without this resistance, there would be a possibility of burning out relay contact ribbons when shunting line relays during the course of maintenance tests. A common storage battery is used for both the emergency signal lighting and for control circuits. This storage battery, to which reference has already been made, is located in a concrete battery housing adjacent to the relay box at the crossing. A Fansteel one-ampere electrolytic rectifier is used for charging this battery.

All of the track circuits are operated by means of Edison 500-a.h. primary battery connected four cells in multiple. The maximum dead section at the crossing diamond is 27 ft. The rails are bonded with stranded copperweld cable bonds, about 36 in. long. All rail connections to track circuits and all of the lighting and control circuits between the home signals and the cross-



Top—Stranded cable bond and protector
Bottom—Parkway rail connections at an insulated joint

ing are carried in Okonite parkway cable buried in sand alongside the ballast toe line. For the lighting circuits, No. 6 conductor parkway is employed, and for the relay control circuits No. 14 conductors are used. The parkway rail connections are made with No. 8 conductors.

At a rail connection, the parkway comes up out of the ground through a 2-in. pipe embedded in a concrete pedestal about 2 ft. long. The parkway passes out of this riser through a slot in the top of the pipe just below the pipe cap. The cable is then carried through a short length of rubber hose which is secured to the web of the rail by means of a short length of wire. A soldered connection is made between the end of the parkway conductor and the copperweld bond wire. The end of the parkway cable is taped and painted with P. & B. compound. At the main relay box the parkway cables enter through the foundation, there being a number of two-inch iron conduits for this purpose.

The only line wires in the plant are for the 220-volt lighting circuits running to the distant signals and for charging the main storage battery. These wires are No. 9 solid copper with weatherproof covering and are carried on the field side of the bottom crossarm of the Western Union pole line.

The regular signal department forces of the Chicago & Alton carried out all of the construction work in connection with this automatic interlocker, H. C. Sampson, superintendent of telegraph and signal engineer had general supervision of the work and W. L. Kies, general signal inspector, was in direct charge of the installation.

D. & H. Collision at Hudson Falls, N. Y.

FAILURE of the engineman to operate his train under proper control within yard limits, is given as the cause of the head-end collision between a passenger train and freight train on the Delaware & Hudson, near Hudson Falls, N. Y., on July 4, 1929, according to the report of the Bureau of Safety, I. C. C., just issued. This railroad is a single-track line over which trains are operated by time-table, train orders, and an automatic block-signal system. The point of accident is 3,368.5 ft. north of the station at Hudson Falls, and within yard limits.

Southbound passenger extra 507 departed from Lake George at 9:16 a. m. and after taking water at Glen Falls, 3.1 miles north of Hudson Falls, left that point at 9:45 a. m., stopped at signal 59.2, which was displaying a stop indication, and then proceeded at a speed estimated to have been between 6 to 8 m. p. h. and had practically come to a stop when it was struck by the opposing freight train. The northbound freight train, operated as a yard movement, departed from Fort Edward at 9:25 a. m. and arrived at an industrial siding known as Allen's Siding, near Hudson Falls, at about 9:35 a. m., where it met southbound passenger train No. 152, which passed at about 9:42 a. m. It then moved out of the siding, passed signal 57.3 in the caution position, and had attained a speed estimated to have been from 12 to 20 m. p. h. when it collided with passenger extra 507.

Conclusions of Report

"This accident was caused by the failure of Engineman Wagstaff, of engine 751, to operate his train under proper control within yard limits. Engineman Wagstaff was thoroughly familiar with the territory in which the accident occurred and the movement of trains over the branch. Thinking that he knew the location of all the engines assigned to the branch, he did not fully obey the yard-limit rule, as well as signal 57.3 in caution position, which should have been a warning that there was something ahead, and operated his train at a rate of speed which was excessive in view of the very restricted range of vision in the vicinity of the point of accident."