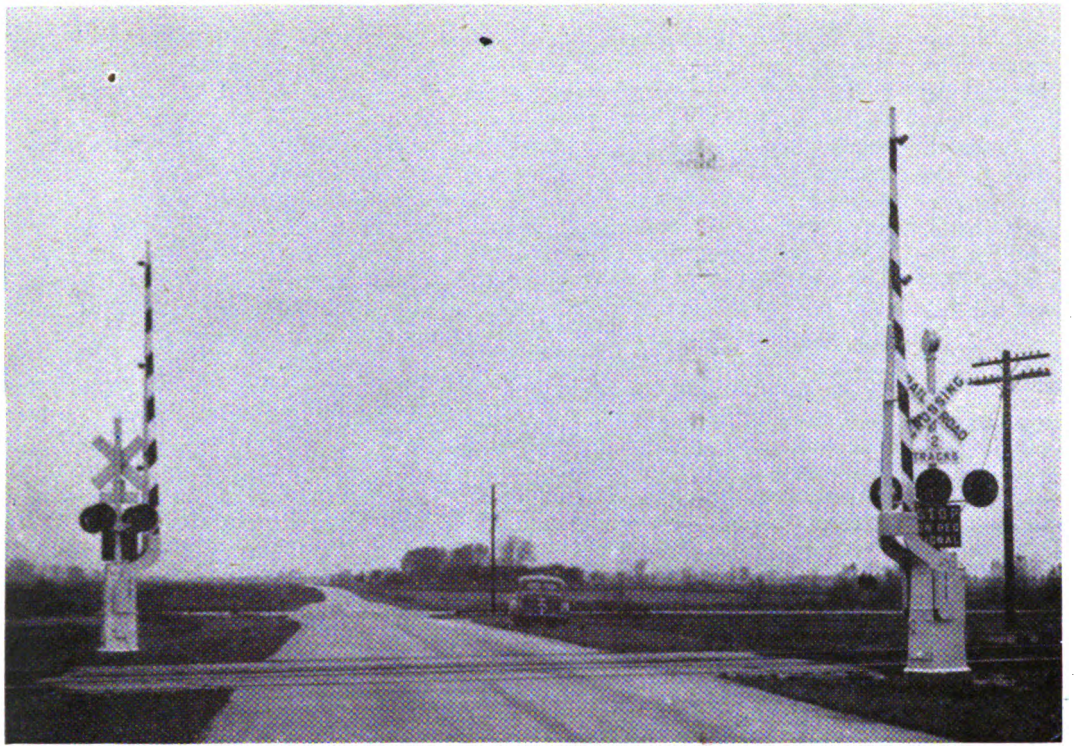


New gates and flashing-light signals at the Euclid Lake road crossing near M.P. 25

Gates at Three Crossings on Soo Line

Automatic track circuit controls include time-distance controls with special feature to prevent a false set up of cut out

THE Wisconsin Central, operated by the Soo Line, has installed automatically-controlled gates, with flashing-light signals, at two crossings in the vicinity of Franklin Park, Ill., and Des Plaines, suburbs of Chicago. These installations are at First avenue, near milepost 13.1; at River road, near M.P. 13.4; and at Euclid Lake road, near M.P. 25. Two main tracks extend through this territory. The traffic includes 6 passenger trains and about 12 freight trains daily, in addition to numerous switching moves. The three highways handle heavy automobile and truck traffic.

Each crossing is protected by two gates, one on each side of the track at the right of the pavement as viewed when approaching the tracks. Each gate arm is long enough to reach to the center of the pavement. Thus, when the arms are down, they obstruct approach to the track in the right-hand lane but do not obstruct a vehicle on the track from departing. Each gate mechanism case is located 11 ft. from the nearest rail and 6 ft. from the edge of the pavement. The gates operate in a plane parallel with the track. At River road and First avenue the pavements cross the track at an angle of about 45 deg., therefore, the arms are 36 ft. to 38 ft. long to reach the center of the pavement. At Euclid Lake road, crossing at right angles, the arms are 20 ft. long.

The operations of these gates are controlled automatically by track circuits in the conventional manner, with the addition of several special timing cut outs and restarts, as will be discussed later. Ordinarily when a train enters an approach section, the flashing-light signals, lamps on the gate arms and the bells start operation for 5 sec. as a prewarning period, after which the gates are released. The gates are lowered by gravity with the addition of a power drive during the first 45 deg., this power operation being provided to insure prompt operation during adverse winds. The gate arms are lowered in about 11 sec. Thus the total time is about 16 sec., including the prewarning period, and the gates are always down for a period of at least 5 sec. before the arrival of even the fastest train. When the rear of a train passes the crossing, the gates are raised. The 20-ft. arms go up in 5 sec., and the 38-ft. arms in 9 sec.

The maximum permissible train speed through this territory is 50 m.p.h. As shown in Fig. 1, there are three track circuits on the westward track in approach to First avenue. When a westbound train enters track circuit 01T-1, a time-element relay is set in operation. If the train stops or travels so slowly that more than 29 sec. expires before the front wheels enter track circuit 01T, then this track circuit 01T is excluded from the approach section, and the crossing protection will not be set in operation until the front wheels enter track circuit 1T, which is 900 ft. long.

Referring to Fig. 2, there are five track circuits on the eastward track in approach to River road. When an eastbound train enters track circuit 10T, a time-element relay is set in operation. If less than 42 sec. expires before the front wheels enter track circuit 8T, the crossing protection at River road is set in operation. On the other hand, if the speed is slower so that more than 42 sec. expires in track circuit 10T, the track circuit 8T is

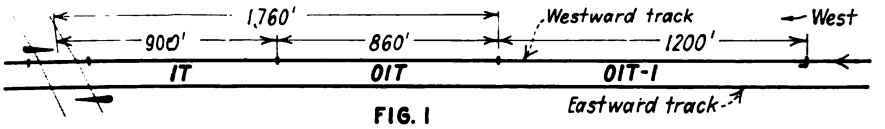


FIG. 1

Arrangement of track circuits on westward track approaching Fifth avenue

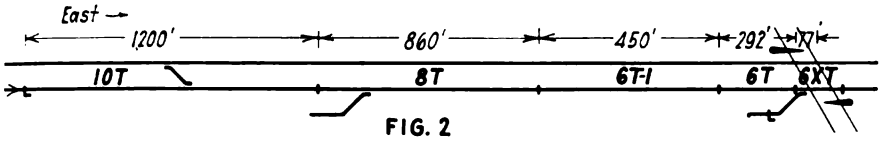
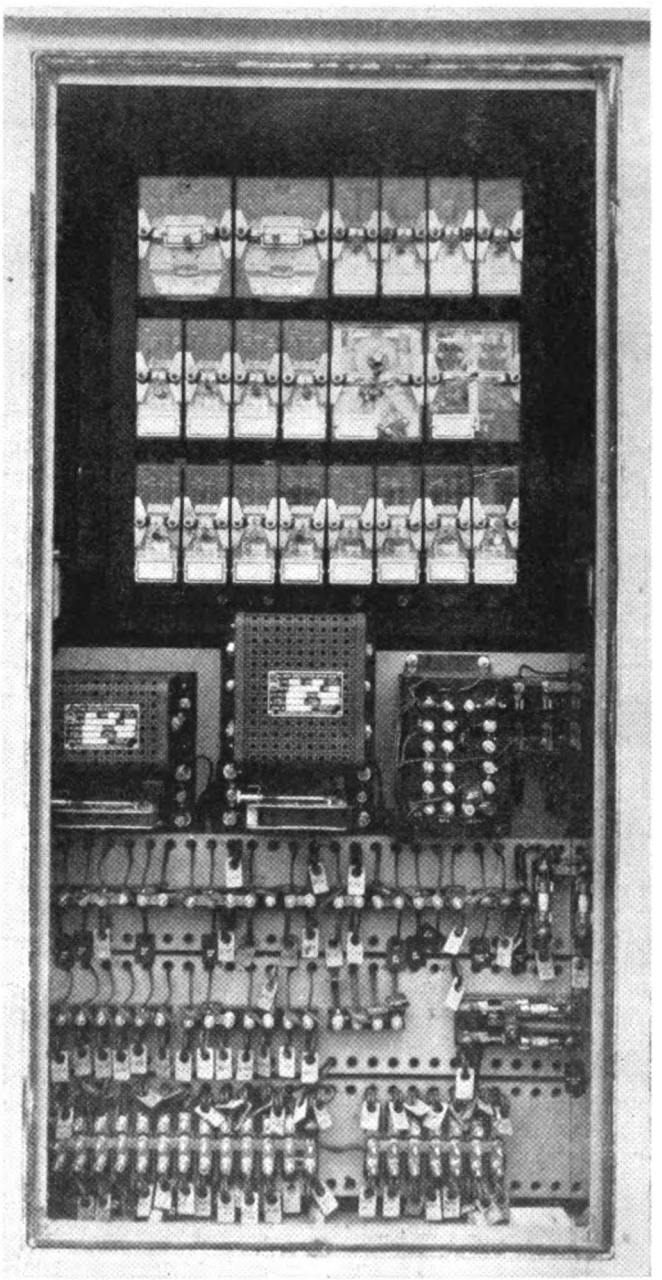


FIG. 2

There are five track circuits on the eastward track approaching River road

excluded from the approach section and the crossing protection is not set in operation until later. Another time-element relay measures the time required by the front wheels to traverse track circuit 8T, and if this is less than 35 sec., the crossing protection is set in operation. On the other hand, if this time is more than 35 sec., the protection is not set in operation until later. Another time-element relay measures the time in track circuit 6T-1, and if less than 28 sec., the protection is started when the front wheels shunt track circuit 6T. If the time is more than 28 sec., the crossing protection is not set in operation until the train enters 6T. In terms of speed, the 1,760-ft. approach section is in effect for train speeds over 25 m.p.h.; the 900 ft. for speeds over 15 m.p.h.; and the 450 ft. for speeds over 10 m.p.h. These timing controls, however, are not all merely for speeds, but also to accommodate switching moves when operating over the crossover in 10T and when setting out or picking up cars on the spur in 8T, as well as when leaving cars on the main track while switching in the spur in 6XT.



Plug-in type relays, rectifiers, transformers and terminals in case at River road

Special Manual Control

If a train has stopped and is to be held for an extended time on any of the approach sections, the gates should be raised to permit highway traffic to proceed over the crossing. This special control is accomplished by push-buttons in a box on the relay case. This box is normally locked with a switch padlock. To raise the gates, a trainman must open the box and push the button for the track being occupied. Then the gates are raised but the lamps continue to be lighted and the bells to ring. The man must hold the button to keep the gates up. If a train approaches on the other track, the gates go down automatically, regardless of the fact that the button for the first track is being pushed.

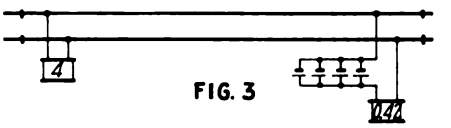


FIG. 3

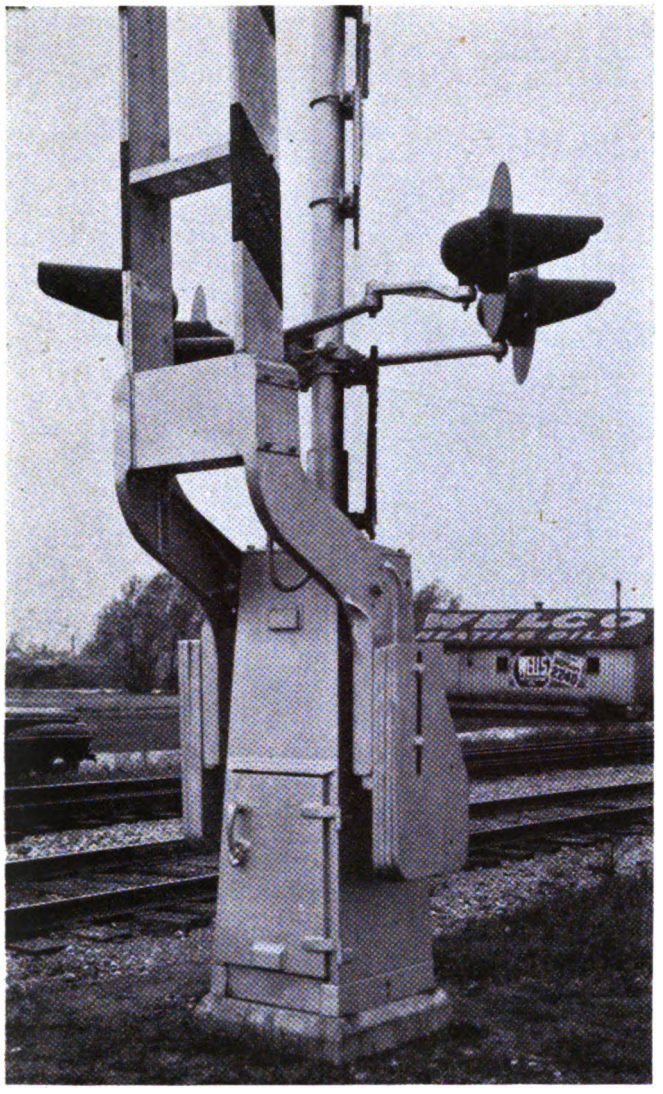
Fig. 3—Relay in series with battery

In order that the maintainer or track foreman can conveniently check the lamps in the flashing-light signals and on the gate arms, a special knife switch is located in a small box on the relay case, this box being locked with a standard switch padlock. By closing this switch, a circuit is closed to feed all the lamps and to operate the flasher relay.

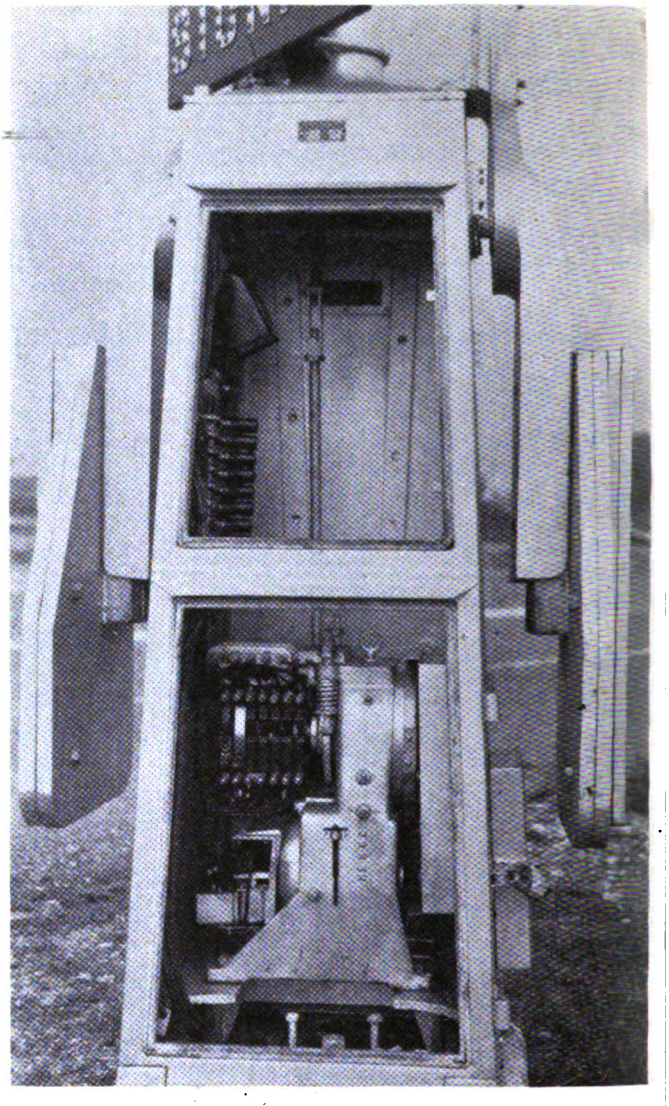
Relays on Both Ends

The track circuits are the d.c. type using 4-ohm relays. Each track circuit is fed by four 500-a.h. primary cells in multiple, with a 0.42-ohm relay in series with the battery, as shown in Fig. 3. These 0.42-ohm relays are normally deenergized, being energized when a train shunts the track and thereby increases the current from the battery to that required to pick up the relay.

Referring to Fig. 3, the 0.42-ohm



Lights are on jointed arms



Case open to show mechanism

relay must be picked up and the 4-ohm relay dropped away to complete the control circuit to start the time-element relay. This arrangement insures that if the 4-ohm relay is released by a track circuit failure, such as a broken bond wire, the time-element relay will not be operated to establish timed cut out prior to the approach of a train.

New Type Gates

The gates on this project are a new type, developed by the Griswold Signal Company. A reinforced sheet-steel housing, as shown in the accompanying pictures, includes the operating mechanism in the lower section and gate-arm shaft and terminal board in the upper section. This housing is 5 ft. high and 22.5 in. square at the base. The top of the housing consists of a casting which includes a base for a 4-in pipe mast on which the flashing-light signals and signs are mounted. The flashing-light units are each mounted on separate jointed arms which were designed to accomplish two results: (1) To place the center of the lamps 30 in. apart as viewed when approaching on the highway; and (2) to allow space for the gate arms when raised, as shown in one of the pictures. All wires terminate in plug couplings attached to A.A.R. terminals.

Plug-In Relays

A novel feature of this project is that the relays at the crossings are the plug-in, quick-detachable type. Twenty such relays are mounted in the upper portion of the case at River road, as shown in a picture. The lower portion of the case includes the low-voltage transformers, rectifiers, terminals, fuses and arresters. The relays, rectifiers and transformers on this project were furnished by the General Railway Signal Company. As a means of preventing frost and condensation of moisture in this case, the base is raised 3 in. above the concrete foundation to allow free circulation of air under the case. This result is accomplished by using anchor bolts which are long enough to place a 3-in. piece of pipe on each bolt before setting the case.

Each track circuit is operated by four 500-a.h. primary cells, these being either Edison or National Carbon. At each crossing, the gates are fed from a set of eight 116-a.h. Exide storage cells. Five cells of the same type feed the various control circuits and relays.

The line wires in this project are on insulators made of plastic which not only have good insulating qualities but cannot be broken easily by stones thrown by boys. The case wiring is No. 16 flexible and the track connections are No. 8 solid. Manufactured cable of No. 12 solid copper wires are used for drops from the pole line to cases. This cable is self-supporting without the use of messengers. These wires were made by Okonite with Okoprene covering.

This crossing protection project was planned and installed by the railroad forces under the direction of J. R. Smith, superintendent of telegraph and signals.