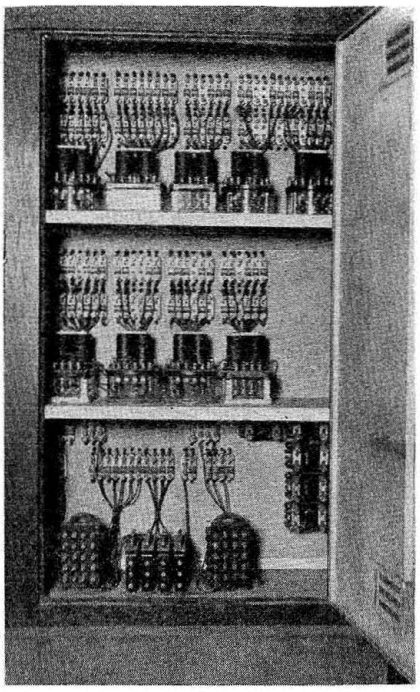
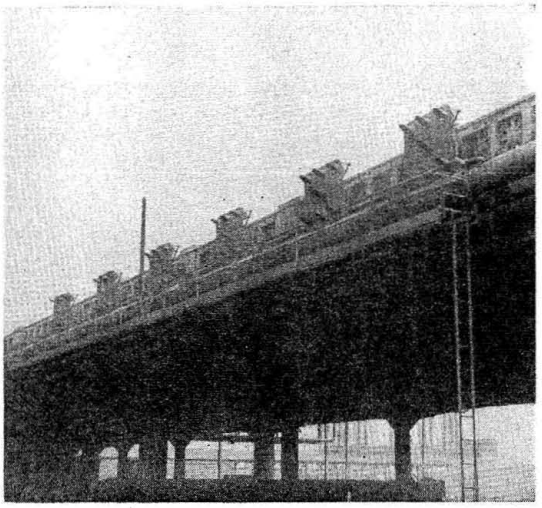
Reconstruction of an Interlocking*



New large-sized sheet-metal cases were used for relays



Left — As a part of the changes a large pipe line for steam supply was mounted on one of the viaducts, the result being that the signals had to be mounted on a new bracket arrangement including a walkway

Track changes on account of building post office over tracks of Chicago Union Station result in extensive reconstruction of interlocking facilities

THE new Chicago post office is being constructed over the station tracks of the Chicago Union Station Company in the block extending from Van Buren street south to Harrison street and from Canal street east to the river. There are 13 stub-end tracks starting at the station and one through track to the north end of the station. These tracks converge through various switches to a four-track throat just south of Harrison street, so that a large percentage of these double-slips, single switches and crossovers are in the southern one-third of the area to be covered by the post office. Therefore, it was within this area that many complications arose as to changing the track layout so as to permit the proper location of the columns supporting the new building. In brief, two No. 8 double-slip switches were eliminated and one new No. 9 installed. Five turnouts were added and changes were made in various other turnouts, seven signals being added. Turnout switches off the ladder were so located as to provide fouling clearance on the ladder. This arrangement permitted the utilization of the maximum length of trackage in the station. For example, a train can be pulled into station track No. 10 so as to clear signal RB 14 to the fouling point of the turnout, and then another train can be placed on track No. 8 with the rear end hanging out of the fouling point of the ladder at signal R16. Seven additional signals were required on account of these changes.

As a part of the change, a separate lever is used for each switch in the three crossovers in this area, whereas in the remainder of the plant one lever handles both ends of a crossover. This method of using two separate levers facilitates train movements because the towerman can throw the one switch as soon as the passing train clears the detector circuit for that switch, thus permitting him to line up some other route at once without waiting until the second switch in the crossover is cleared.

Schedule of Changes

As the track changes were being made, the switch machines were moved to the new location and connected up. However, on account of the nature of the track changes, it was not practicable to control these switches from the interlocking until all changes were completed. Electro-pneumatic operation was continued but each switch was controlled locally by means of an enclosed switch of the two-pole, double-throw type, operated by an external handle. The mechanism of the switch is so arranged that the blades cannot stop in a mid-position but snap from one position to the other quickly under spring action. Each enclosed switch was located on the ties near the switch in such a position that it would be impossible to operate it when a train was passing. Therefore, it was out of the question for a switchman to make a mistake by throwing a switch under a train.

In addition, a color-light switch-target signal, such as used in retarder yards, was provided at each switch to show green when the switch was in the normal position and yellow when reversed. These lights were controlled through the regular indication circuit controller. Therefore, the lamp would not be lighted unless the switch was over and locked in the corresponding position. These lights showed in both directions and were for the benefit of the ground switchmen and the assistant train director in charge of the operation of this special section under construction.

In order to protect this area against inbound train movements from the south, a signal was located temporarily at the right of each track leading into the sec-

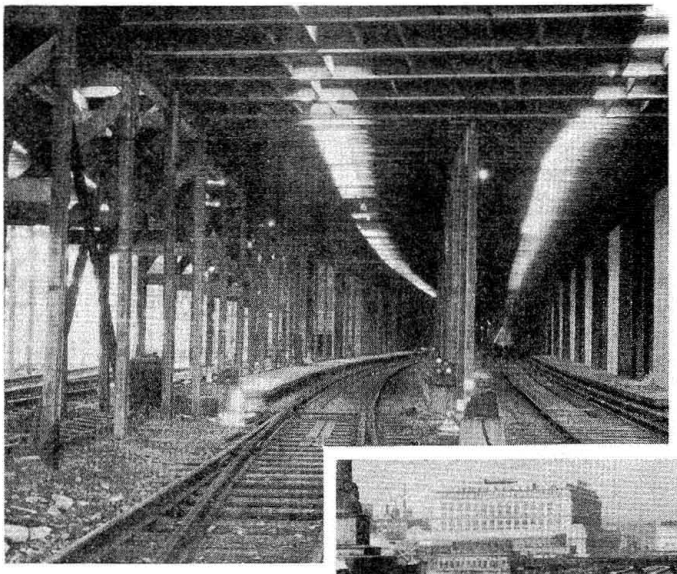
*The installation of the Union Switch & Signal Company's electro-pneumatic interlocking at the Chicago Union Station was described in an article in *Railway Signaling* for March, 1925.

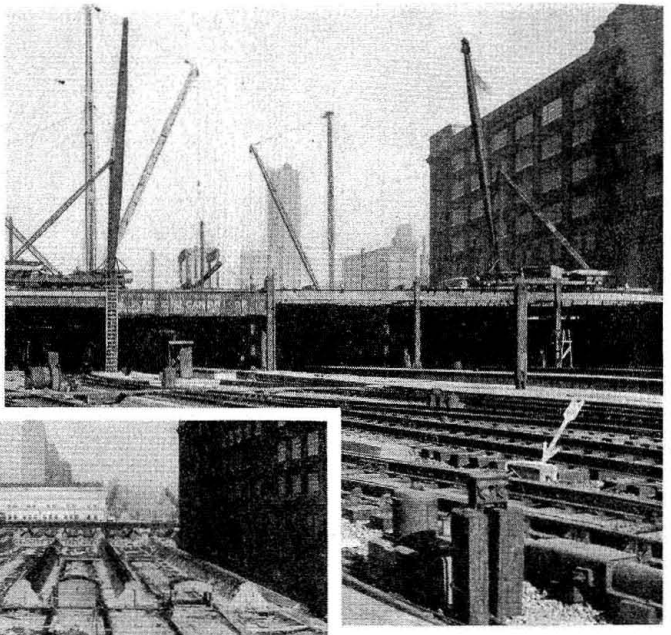
tion under construction. These signals were under the control of the assistant train director on the ground and would not be cleared until he could see that all the switches were properly lined and the route clear.

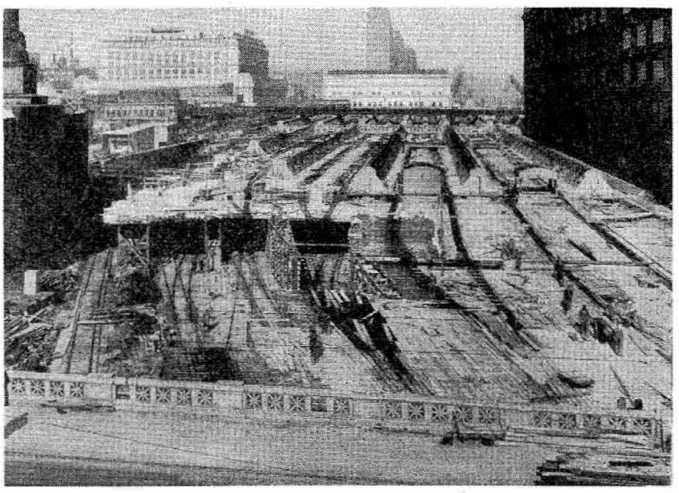
When an inbound train approached from the south, the train director in the tower notified the assistant director and instructed him as to the station track to be used. While the train was approaching through the plant, the assistant director lined the route through the in the proper places. After the face of the panel was painted and the track and signal symbols painted in place, the board looked the same as new.

Old Wiring System Destroyed

In the original construction of this plant in 1924, the wiring distribution in the station area was in underground conduit consisting of fiber duct laid in concrete







Above—Track level showing false-work covering entire area
Right—View looking down on false-work and forms over tracks

Enclosed-type double-pole snap switch in box marked by arrow was used to control switch operation

construction area and when ready he gave the signal to enter the area. These signals displayed either the stop or approach-slow-speed indication.

Likewise, to protect outbound trains leaving the temporary area and entering the regular interlocking which was continued in normal service, a signal was located at the west side of each track. These signals were regular interlocked signals controlled from the machine in the tower. When a train was ready to leave the station, the train director in the tower had control of starting the train by means of the train-starting system. He informed the assistant director, in the special area, of the intended train movement and waited until the route was lined up through the area, as well as through the entire plant, before allowing the train to start. The assistant director and ground switchmen controlled the train through the temporary area by means of hand signals, and when the engineman had passed through this area and had received the interlocking signal at the entrance to the regular interlocking, he was then authorized to proceed as usual.

The 63 additional relays were housed in cases in the tower. The spotlight illuminated track diagram was revised to conform to the new layout. Special plugs were used to block the old holes and new ones were drilled located under the tracks and platforms. Many of the manholes, as well as much of the duct line of this distribution system were destroyed when sinking the caissons for the foundation of the new post office. As a result, an entirely new system of wiring distribution for the interlocking had to be provided along with the track changes in the block north of Harrison street. As a heavy concrete slab extends under the entire track area, the only method available was to run parkway cables on top of this slab and under the stone ballast. This new wiring system embraced the entire interlocking in the station area, that which was left intact as well as that changed by the track rearrangement.

Small instrument cases each located near a signal or switch had been used in the original plant, but it was not practicable to utilize these boxes in the new layout. Therefore, five large sheet-metal cases, each located centrally, were used for relays, terminal boards, etc., separate cables extending from these cases to each signal, switch and track connection, while larger cables extended to the tower.

The cable which had to be thus abandoned, included 3,190 ft. of single-conductor No. 14; 8,380 conductor-feet of parkway cable, No. 9 and larger; 9,965 conductor-

feet of parkway, No. 10 and smaller; 277,308 conductor-feet of braided underground cable.

The new cable required is shown in the accompanying table. The parkway cable was constructed with a sheath of lead and a protection of two turns of steel tape, as well as coverings of jute. These cables were manufactured according to Pennsylvania railroad specification No. 112-B.

In the tower new bakelite-based A. R. A. terminals were used to replace the single-bolt terminals formerly set in ebonite asbestos board. Likewise, open cases were used instead of closed cases. Past experience had shown that moisture accumulated on the terminal boards in closed cases and furthermore that the ebonite board absorbed enough moisture to cause grounds.

New Cable Required

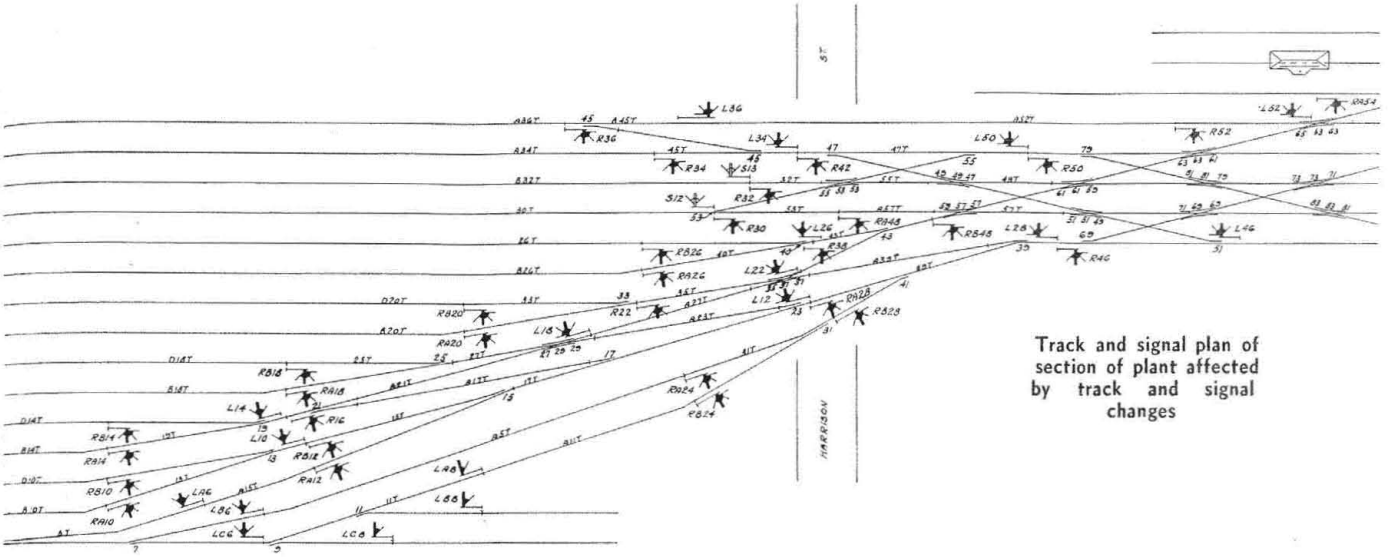
			Cable Feet	Conductor Feet
29	Conductor	No. 14	2,085	60,465
37	"	No. 14	2,920	108,040
9	"	No. 14	1,500	13.500
4	"	No. 1 and 2 Cond. No. 9	2,230	8.920
5	"	No. 9	2,600	13,000
4	"	No. 9	3,350*	13,400
2	"	No. 9	1,000*	2,000
29	"	No. 14	2,600†	75,400
29	"	No. 14	2,025	58,725
37	"	No. 14 Braided	2,650*	98,050
29	"	No. 14 "	1,925*	55,825
1	"	No. 6 Copperweld for track connections	4,000	4,000
		Total Cable Feet	28,885	
		Total Conductor Feet		511,325

*Cable with no lead sheath.
†Lead-covered cable in duct line from tower.

Locking Changes

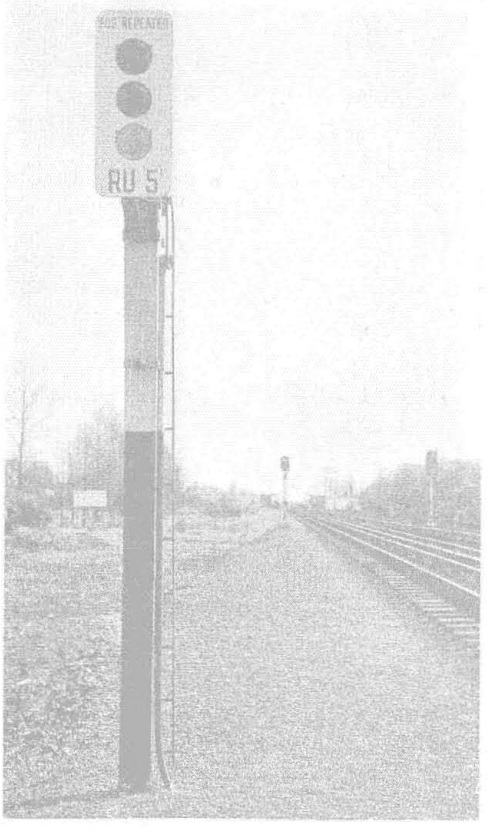
After the switches and signals were relocated and the new wiring distribution completed and tested, the next problem was to change the mechanical locking in the machine to meet the revised arrangement. A preliminary study showed that there would be so many changes that entirely new locking was provided. Starting at 7:00 a. m. on a Sunday morning, the entire plant was taken out of service, the locking replaced, the new switches and signals cut over, and the entire plant was back in service in a short time.

In conclusion, it may be said that all of these changes in the interlocking facilities were made under difficult conditions due to the simultaneous construction of the post office. As soon as the caissons were completed the steel was erected and the forms for concrete were placed.



Track and signal plan of section of plant affected by track and signal changes

At the same time, the smoke from the locomotives cut off the light and air. In spite of all these difficulties, the signal department kept up with the construction program and placed the signaling facilities in complete service in record time and with no interruption to traffic. All the engineering and construction for the interlocking changes was handled by signal department forces under the direction of Thos. Holt, signal engineer and A. T. Ferguson, signal supervisor of the Chicago Union Station Company.



Fog-repeater signal on the Metropolitan Railway of London