

Above—Panel of the new interlocking on the bridge
Right—View of the bridge showing three-story tower on the first of the piers



New interlocking at yard and a new draw-bridge with interlocking are included in new line about 4.5 miles long

ON 4.5 miles between Birmingham, Mo., and Air Line Junction in Kansas City, Mo., the Chicago, Milwaukee, St. Paul & Pacific and the Chicago, Rock Island & Pacific have built a new double-track line for the joint use of these two railroads. Between Air Line Junction and Kansas City Southern Junction, 4,500 ft., the passenger trains of the Milwaukee and the Rock Island are operated over the Kansas City Southern. Kansas City Southern Junction is included in interlocking No. 8 (Sheffield), where connections are made with tracks of the Kansas City Terminal Company, which extend to the Kansas City Union Station.

Train Movements Authorized by Signal Indication

On this territory train movements are authorized by signal indications which supersede timetables and train orders. For 38 miles eastward from

Birmingham to Polo the Rock Island and the Milwaukee operate jointly on tracks equipped with centralized traffic control. From Polo eastward to Allerton, Iowa, via Trenton, 143 miles, the Rock Island has C.T.C. Also the Milwaukee has C.T.C. eastward from Polo to Laredo, 51 miles. A summary is that the Rock Island has train operation by signal indication continuously on 147 miles between Allerton and Kansas City; and the Milwaukee on 94 miles between Laredo and Kansas City.

Separate Lines Formerly

The Milwaukee formerly had its own single-track line from Birmingham to Sheffield, including a high-level bridge over the Missouri river. This bridge was of too light construction for the heavier classes of modern locomotives, and the restrictions caused by this bridge constituted one of the reasons for constructing the new line. This old line was built on an indirect location in order to keep on high ground and thereby avoid high fills approaching the river bridge.

In addition to excess mileage, the Milwaukee trains were seriously delayed when crossing the Missouri Pacific freight yards at East Bottoms interlocking. As a part of the 1945 program, the old Milwaukee track between Birmingham and Sheffield was abandoned except for a portion of the line south of the Missouri river which has been retained as yard trackage.

The Rock Island formerly used the Burlington and the Wabash tracks between Birmingham and Broadway Town, where connections were made with the Kansas City Terminal. This was a round-about routing which necessitated the turning of through passenger trains, thus losing nearly one hour.

Nearly all of the new route between Birmingham and Air Line Junction is across low lying bottom lands, thus requiring high fills most all of the distance. The new bridge (named the Harry S. Truman bridge) across the Missouri river includes a 427-ft. lift span.

At the previously existing mechanical interlocking at Birmingham, the old Milwaukee track was abandoned

The New

Connections at Kansas City

For Milwaukee and Rock Island

and the plant was simplified accordingly. The joint Milwaukee-Rock Island double track from the east was extended across the double-track Wabash line and west from there on the new alignment across the new bridge to Air Line Junction.

Starting June 1, the passenger trains of both the Milwaukee and the Rock Island use the new line between Birmingham and Air Line Junction. The freight trains of the Milwaukee also use this new line, but until further changes are complete, the freight trains of the Rock Island continue to use the Burlington-Wabash joint line between Birmingham and Kansas City. For this reason there is a crossover No. 3 and a single switch No. 1 east of the crossing at Birmingham. This crossover and single switch, as well as the interlocking protection for the crossing, are included in a new all-relay electric interlocking which is controlled from a miniature lever panel-type machine adjacent to the operator's desk in the tower of the previously existing mechanical interlocking at Birmingham.

At Freight Line Junction, which is 2,300 ft. east of Air Line Junction, there are connecting tracks extending from the new Milwaukee-Rock Island line to freight yards. Some of these yards which were formerly owned by the Kansas City Southern have been enlarged and are now owned and op-

erated jointly by the Kansas City Southern and the Milwaukee. A part of the project also includes a double-track freight line extending west to other yards and connections with other railroads.

The West Wye Interlocking

The switches and signals at Freight Line Junction, Air Line Junction and West Wye are all controlled by a new all-relay electric interlocking with the miniature lever type machine in a new concrete and brick tower located at West Wye.

As shown in the accompanying plan, there is a double-track line connection extending from Freight Line Junction to West Wye, where it connects with a double-track joint line of the Kansas City Southern and Milwaukee, extending west to other yards and connections with other railroads. This line will also be used by Rock Island freight trains later. There is also a single-track connection extending from Freight Line Junction to the south end of the yards at West Wye.

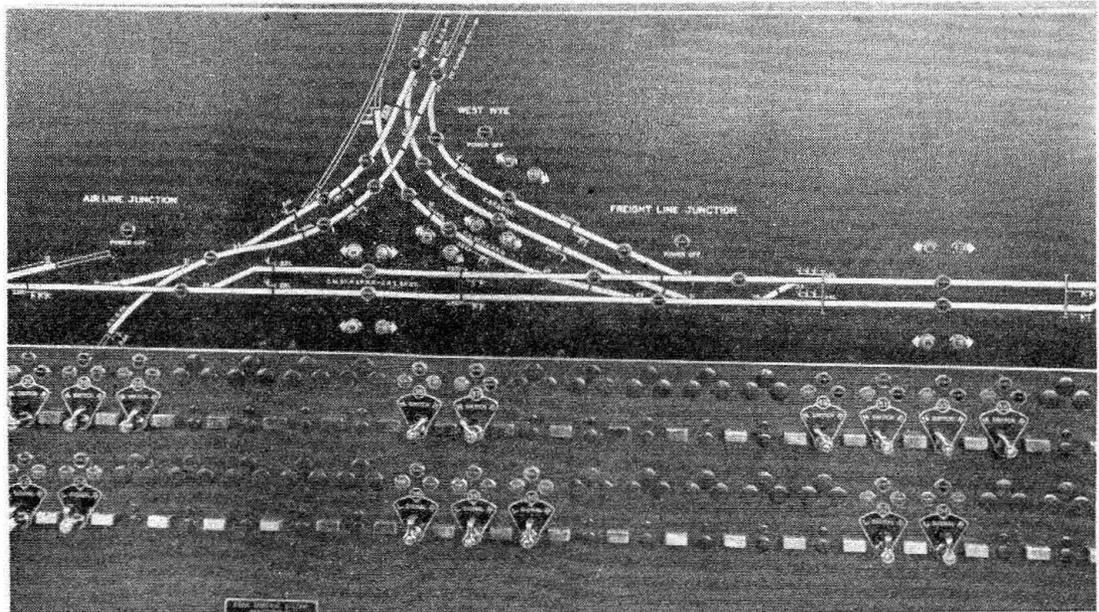
The track layout at Freight Line Junction includes one crossover, one single switch and two single switches, each of which is controlled in conjunction with a movable-point frog.

This requires four switch levers. Seven home signals are controlled by two levers.

At West Wye the single track crosses the K.C.S.-Milwaukee double-track freight line with solid frogs, and the switches connecting to yard tracks are beyond home signal limits. Therefore, only signals are involved on this track. The double track from Freight Line Junction connects with the double track at West Wye, the junction including one single switch and a second switch operated in conjunction with a movable-point frog. With this arrangement there are two switch levers and three signal levers for the West Wye layout.

The Milwaukee-Rock Island double-track main line ends at an end-of-double track switch just east of Air Line Junction, and the single track extends west to cross a single-track branch line of the K.C.S. and to connect with the single-track main line of the K.C.S. going on west to Sheffield where connection is made with the tracks of the Kansas City Terminal Company. The layout at Air Line Junction includes a single switch at the end of double track, one single switch at the end of the joint K.C.S.-Milwaukee double-track freight line, and two single switches

Diagram and panel of the interlocking at West Wye



(controlled as a crossover) at the ends of the connection between the K.C.S. and the joint Milwaukee-Rock Island line. Thus the Air Line Junction layout is controlled by three switch levers and two signal levers. The two switch levers at the left end of the machine are for the control of electric locks on hand-throw switches.

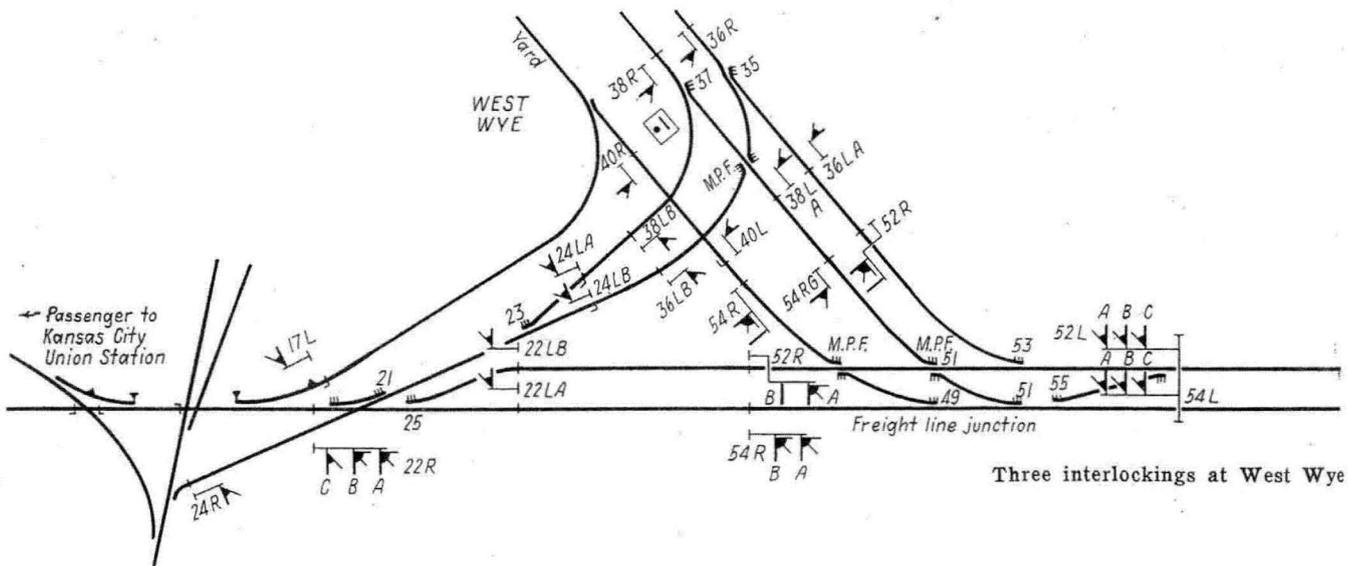
In all these layouts the signaling is arranged for train movements in both directions on each track. The illuminated track diagram on the control machine indication includes lamps with arrows to show the direction of traffic which is in effect on each track.

The Interlocking on the Drawbridge

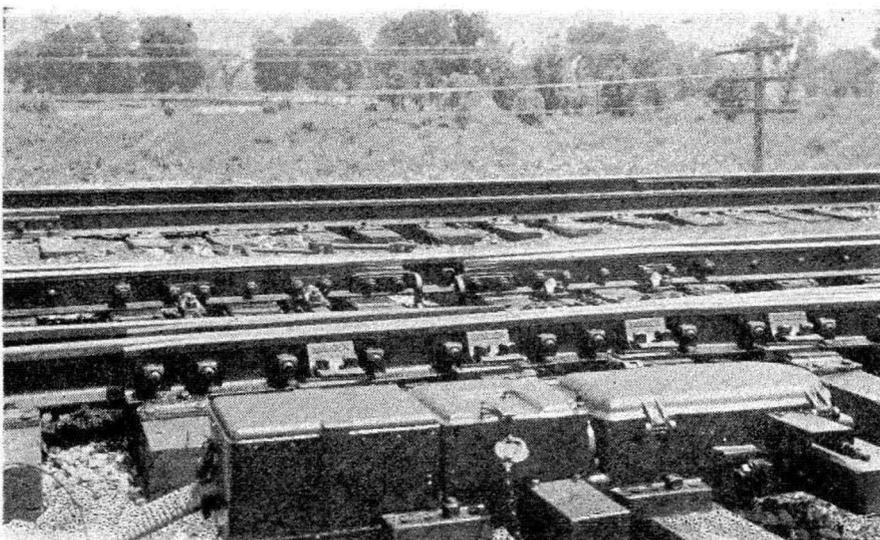
The new section of railroad between Birmingham and Air Line Junction is double track except for 2,700 ft. of single track on the bridge over the Missouri river which necessitates



View looking south toward tower at the West Wye interlocking



Three interlockings at West Wye



Switch machine at movable-point frogs

end-of-double track switches at each end of the bridge. These power switches and signals for directing train movements over these switches and the bridge are controlled by a miniature lever panel type interlocking machine in the operating room, which is on the south side of the pier on the east side of the river. This interlocking machine has two levers to control the two switches and one lever to control the signals for either eastbound or westbound trains on the route established by the position of the switches.

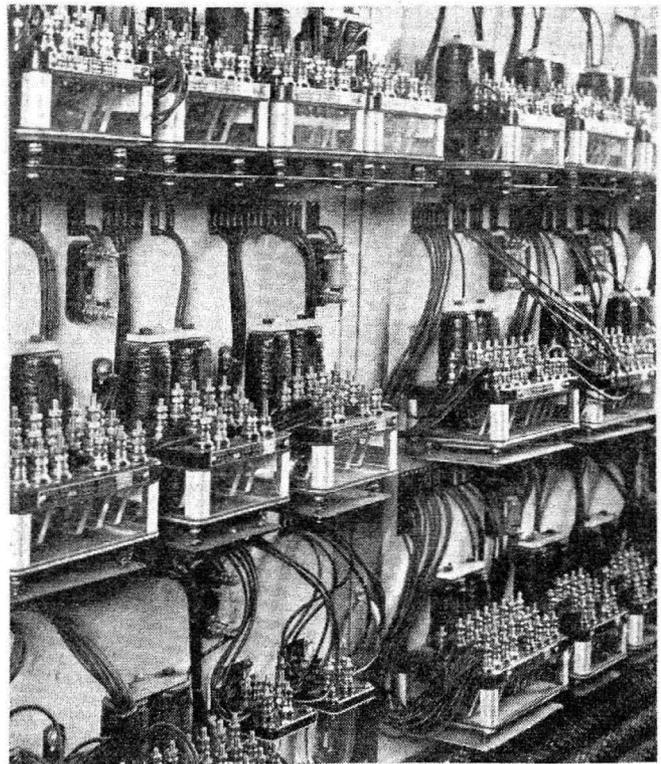
The interlocking home signals, as well as the automatic block signals, are all high signals on bridges and are arranged for train movements in both directions on both tracks. Above the diagram there is a set of lamps with arrows which indicate the established

direction of traffic on the "upper" track between this bridge and Birmingham, and below the diagram there is another set of lamps with arrows which indicate the established direction of traffic on the "lower" track between the bridge and Birmingham. Similar lamps and arrows near the left end of the diagram indicate the direction of traffic on each of the two tracks between the bridge and Air Line Junction.

Above that portion of the machine diagram representing the lift bridge, there are two indication lamps, the one to the left being lighted when the bridge is open, and the one to the right when the bridge is closed and locked. Below the symbol for the bridge there are two indication lamps, the one to the left being lighted when electric locking is in effect due to a route having been established. The lamp to the right is lighted only as a warning that a-c. power is cut off.

Above each switch lever there are three indication lamps, the one to the left, above the normal position of the lever, is lighted when the switch is in the normal position. The lamp to the right, above the reverse position of the lever, is lighted when the switch is in the reverse position. The lamp in the center is lighted red when the switch is in transit.

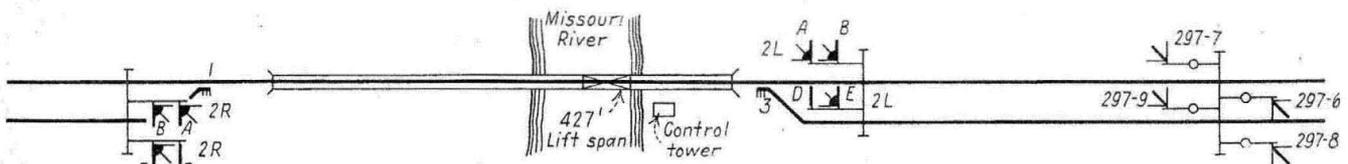
In the new tower at West Wye the relays are mounted on 1 in. asbestos boards bolted to angle-iron posts



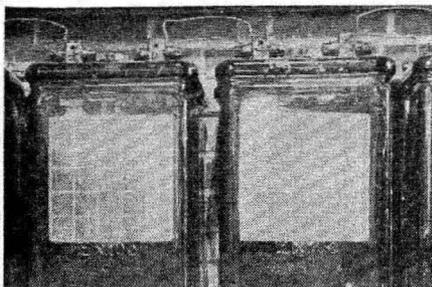
Above the signal lever there are three lamps, the one to the left being lighted when a westward signal is cleared by the lever, and the lamp to the right is lighted when an eastward

the span in case of a power failure.

The rail ends extend beyond the end of the lift span and fit down into chairs on the "shore" ends of the bridge. The normal position of the



at the new drawbridge and at Birmingham showing new connections used at both ends by the Milwaukee (Continued next page)



Battery in the tower at West Wye

signal is cleared. The lamp in the center above this signal lever is lighted when all signals controlled by the lever are displaying the Stop aspect.

Operation of the Bridge

The lift span of the bridge is raised and lowered by 100-hp. 440-volt a-c. motors which are located in a house in the middle of the span above the tracks. These motors are controlled by relays actuated by a controller in the same room with the interlocking machine.

When in the lowered position, the bridge is locked by two 2-in. by 8-in. plungers, one at each end of the bridge. These plungers are operated by pipe connections from a geared machine operated by a motor in the house over the tracks on the lift span. If the power supply fails, the locks can be operated by turning a geared wheel crank. A gasoline engine is also provided for raising or lowering

the rail ends are checked by plungers which operate conventional switch circuit controllers. Circuit locking is arranged so that the bridge must be down and locked, and the rails must be seated in their chairs before a signal can be operated or a signal cleared. Conversely, if a signal has been cleared, the bridge locks or the rail locks cannot be withdrawn or the bridge raised.

Cables to Movable Span

An interesting feature of this project is that the cables for the bridge track circuit, as well as the cables for power circuits to operate the bridge motors, are extended from the "shore" towers to the lift span as continuous connected wires without the use of bridge circuit controllers or connectors. The cables extend up the fixed towers to junction boxes, and from there the cables on messengers extend to short steel masts on top the

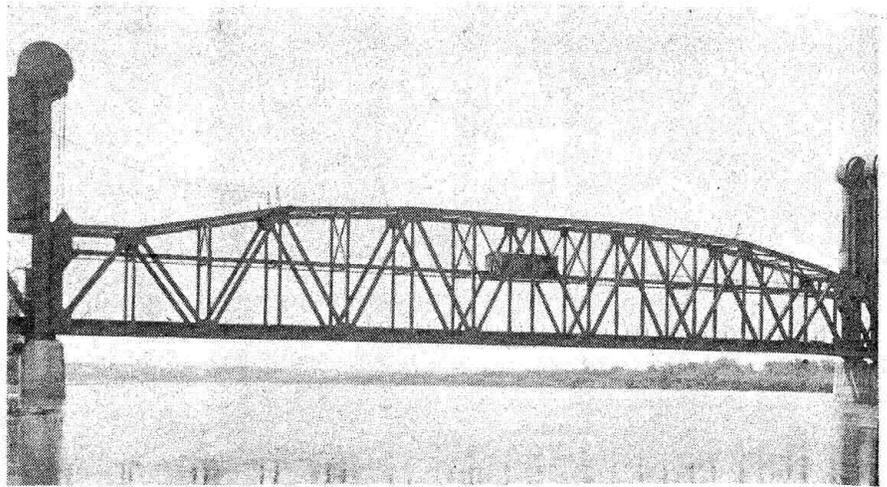
lift span. In this normal position the "shore" end of the cable is higher than the lift span end, as shown in the view of the side of the bridge. During the raising of the span, the cables slack off at the sides of the lift span, and then, as the bridge nears its maximum raised position, the cables are pulled up again, but with the movable end higher than the shore end. Control and indication circuits for signal facilities west of the lift span are carried in a 37-conductor aerial cable supported on a double catenary from tower to tower.

Signals and Switch Machines

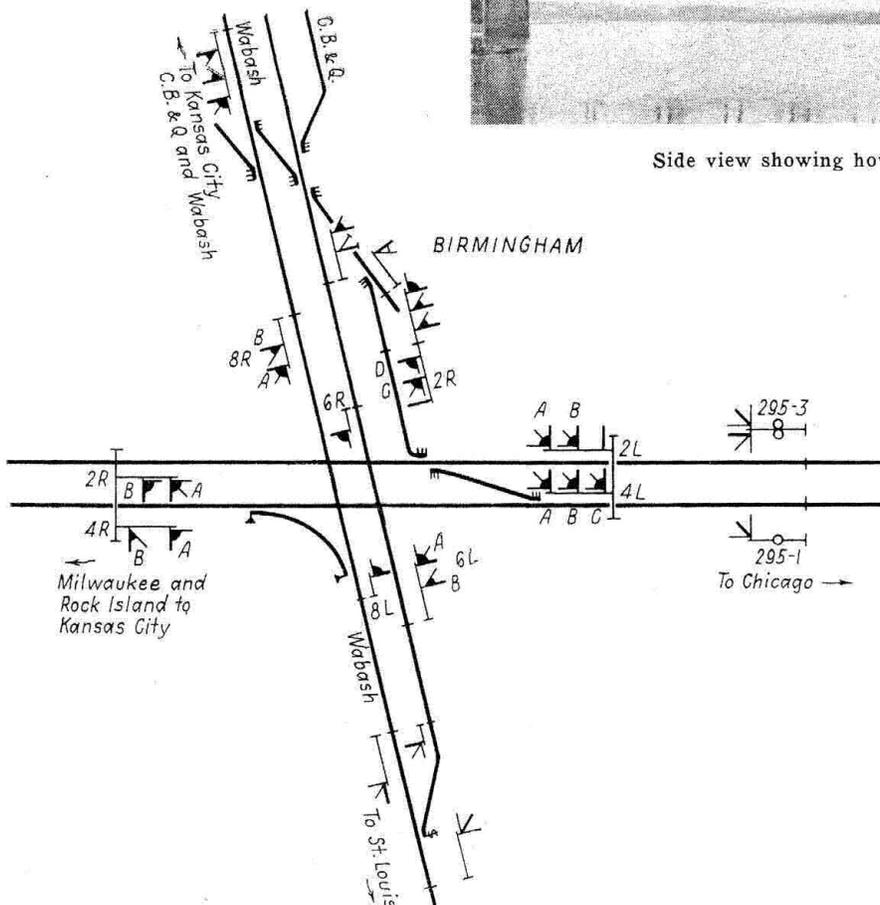
On these new interlockings the signals are the H-2 searchlight type. The switch machines are the Type

M-2 for operation on 24 volts d-c. from local sets of 160-a.h. EM9 Exide storage battery. The track circuit on the lift bridge is fed by one cell of storage battery, and the other track circuits on the entire project are each fed from two cells of 500 a.h. Edison primary battery.

Within the various home signal limits the wiring is in cable. The feeds to the switch machines are No. 6 wire, the track connections are No. 9 and the various control and indication circuits are No. 14. Circuits on pole lines are No. 10 Copperweld with weatherproof covering. The rail



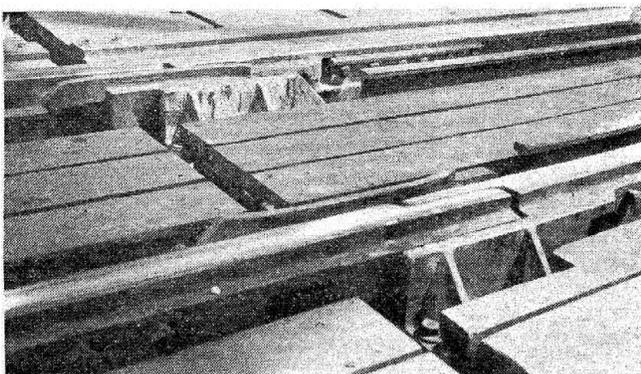
Side view showing how cables extend to lift span



and the Rock Island to save train time at Kansas City

bonds are the rail-head plug type furnished by the American Steel & Wire Company.

In the tower at the West Wye interlocking the relays are mounted on racks made of transite board 3/4 in. thick bolted to angle-iron uprights, to form independent sections. The angle-irons are bolted to bases set in the concrete floor. The relays are the shelf type, set on individual sheet-metal shelves which are bolted to the asbestos boards. Each wire from a relay terminal extends through an individual hole in the board, and then runs behind the board and out through another hole to a terminal on the lower panel of the board. These boards were wired complete with the relays in place at the factory, each section being packed and shipped as a unit. These relay racks were installed in a separate room on the ground floor which is kept closed to exclude dust and dirt as much as possible. Local relays at Freight Line Junction and Air Line Junction are mounted on special factory-wired shelving mounted in precast concrete relay houses. At the new interlocking on the Missouri river bridge the relays are in sheet-metal cabinets with hinged doors.



Rail ends from lift span fit into the chairs on shore spans

The new interlockings and automatic signaling on this project were planned and installed by the signal forces of the Milwaukee Railroad, under the direction of L. B. Porter, superintendent telegraph and signals. The major items of interlocking equipment were furnished by the Union Switch & Signal Company.