# Interlocking at St. Louis Union Station Expanded 30 Per Cent

***Ten new station tracks necessitated addition of a 59-lever machine — Color-light dwarf signals used to advantage —Unique train-starting signal system developed***

ALTHOUGH the trainshed serving the Union Station at St. Louis is one of the two largest in the country, the facilities in this station had become so crowded by 1928, owing to the fact that most of the roads entering this station are operating longer trains than formerly, that the Terminal Railroad Association found it necessary to increase the capacity of the station tracks and platforms by approximately 60 per cent. Eight of the new tracks will accommodate trains of 20 cars, as compared with a maximum of 12 cars on the old tracks. The new facilities including rearrangement and enlargement of the Union Station interlocking were placed in service in November, 1929, after an expenditure of $4,000,000.

This station handles 136 inbound and 136 outbound scheduled trains daily. All empty trains from and to the station tracks are pulled to and from the various coach yards by switch engines. Likewise, there are numerous switching movements in the station transferring cars from one train to another and to and from the mail and express buildings. It is estimated that approximately 2,000 movements are made over the station plant daily in addition to the freight trains moving over the outer tracks.

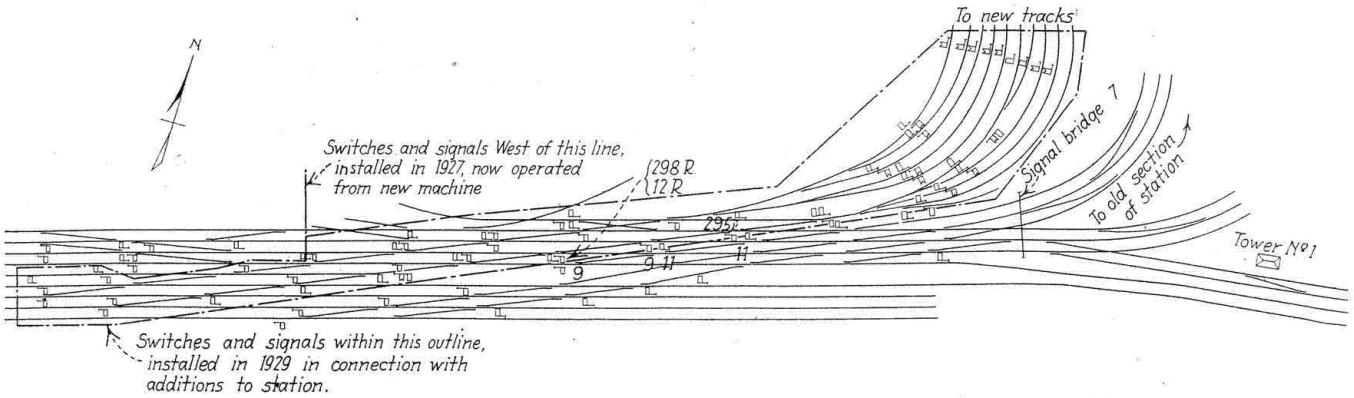
### New Interlocking Machine Separate from Old One

The Union Switch & Signal Company's electro-pneumatic interlocking installed at the station in 1902 included a 215-lever machine for the control and operation of 222 signals, 71 single switches, 47 double slips, 3 single slips, and 29 movable point frogs. The addition of the 10 new station tracks together with the necessary switches, etc., require 59 more levers for 59 signals, 18 single switches and 13 complete double slip switches. It is interesting to note that no movable point frogs were used in the new track layout, as rigid frogs are now considered satisfactory where the angle does not exceed 8 deg. 10 min.

*A. P. Hix, Signal Engineer, inspecting a signal*

The addition of 59 levers to the old machine was not practicable, and furthermore in view of the fact that the old machine, in spite of its 28 years of service was still giving good service and apparently good for years to come, it was not deemed advisable to discard it and install an entirely new machine for the entire layout. Even if a new machine had been desirable, the cut-over would, of necessity, have had to be made without interrupting the operation of the terminal, which would have introduced complications because there was no space in the tower to set up a second machine. Therefore, the only solution was to install a new machine to control the additional functions. The problem of accomplishing this result was somewhat simplified on account of the fact that the switches and signals involved in the new track facilities are grouped at the west end of the layout, as indicated by the track plan.

The new machine is the latest Union Model-14 and although it stands end to end with the old one in the tower, there are no mechanical locking connections; but electric locking is provided between levers in the




**Track and signal plan showing only the layout controlled from the new machine**

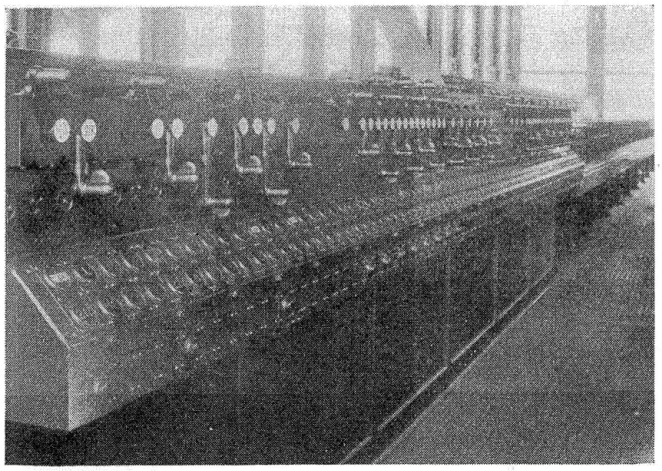
two machines where necessary. For example, if a certain route using signal No. 298-R-12-R leads to switch No. 295, which is in the leads to switch No. 9-11, in the old layout, both levers 298 and 12 are operated, both locking the switches in their respective layouts. The entire plant is, however, considered as a unit, the levers being numbered from 1 to 302 including 264 working levers controlling 281 signals, 89 single switches, 60 double slips, 3 single slips and 29 movable point frogs. The tower building was extended to the west to afford space for the new machine. The relay cabinet for the additional tower relays was constructed on the first floor directly under the new machine.

The main tower battery for control circuits was adequate to handle also the new additional functions. This battery consists of a duplicate set of 14 cells each of Edison A-10 storage cells. Two additional sets of 4 cells each of the same type of battery are used for the operation of all other than signal control relays.

### Color-Light Dwarfs Used to Advantage

The old signals are of the electro-pneumatic semaphore type, operating to two positions in the lower quadrant, the majority of which are located on overhead signal bridges. In order that the full length of each of the new station tracks might be utilized, it was desirable to locate each new signal at or near the clearance point in each case, and this requisite made it impracticable to locate the signals on bridges. Therefore, it was decided to use dwarf signals, of the color-light type, which made it possible to locate each signal to the best advantage.

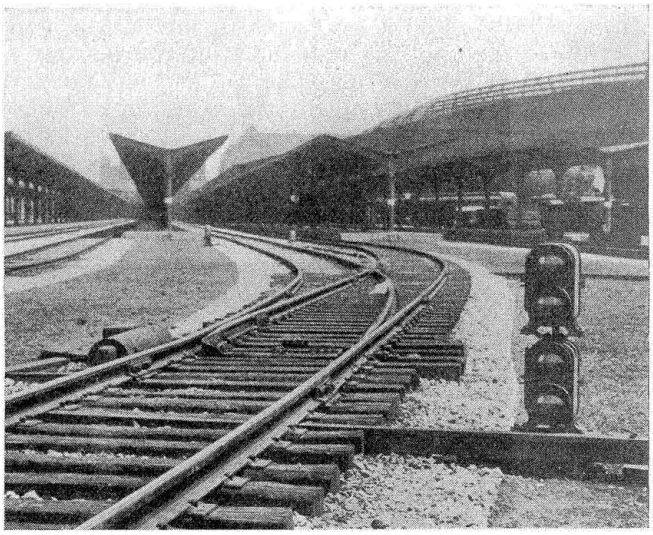
A home dwarf, i. e., one located at the clearance point or at a switch, indicates either red or green. In one case where it is necessary to indicate a certain



The new machine stands at the end of the old one

diverging route, two signal units, one on top of the other, are used. As many of these signals are on curves, and the adjacent tracks are frequently occupied by moving trains, the view of the home signal may be obscured from the engineman for whom an indication is being displayed. In order to meet this situation, a repeater, or caution signal, indicating either green or yellow, is located on the approach to the home dwarf where conditions warrant.

The signals were furnished by the Union Switch & Signal Company and, as will be noted, the signal case is of special construction with an extra compartment at the rear to house the transformer and signal control relay. This feature is an original design, developed especially for the St. Louis Terminal, the principal advantage being the concentration of all equipment pertaining to the signal in one housing, which simplifies maintenance, eliminates relay cases, and reduces the amount of cable runs. The signal relays are controlled on the customary SS principle through the levers and the repeater relays in the tower. The signal case is mounted on a treated-wood block which in turn is attached by hook bolts



A switch and a two-unit dwarf signal

to a concrete foundation, of a size that can readily be raised or lowered to meet changes in ballast. Each signal lamp unit has a 6½ in. lens, using an ordinary automobile head-light lamp rated at 12-16 volts and either 21 or 32 candle power.

All signals are lighted by alternating current, a 110-volt circuit extending from the tower to all signals. A small 110-12 volt transformer is located in each signal to reduce the voltage to feed the lamp circuit. A General Electric theatre-type, manually-operated rheostat is provided, at the tower, in the 110-volt a-c. circuit, to reduce the voltage at night to prevent too much brilliancy.

### Electro-Pneumatic Switch Movements

The new switches are operated by Union Model-14 E.P. switch and lock movements with 6-in. cylinders and Style C cut-off valves.

As will be noted in the picture, no rail braces are used, the rails being held in place by special tie plates. Each tie plate has a notch that fits up over the edge of the base of the inside of the rail. On the outside of the rail a wedge with a notch to fit over the edge of the base of the rail is driven to a tight fit in a slot between a block on the end of the tie plate and the base of the rail, and is then spiked in place. This construction, known as the Betts Switch, has been used for several years on the St. Louis Terminal.

### Wire Distribution

The circuits are run from the terminals on the interlocking machine and tower relays directly to porcelain-based terminals in a cabinet in the northwest corner of the tower. Cables from this cabinet run to various functions on the plant. The posts on the terminals in this cabinet are protected against accidental shorts by Brach post insulators and in addition the connecting straps between posts are each covered with a piece of varnished-cambric motor-insulating tubing.

The outdoor circuits are distributed in taped and