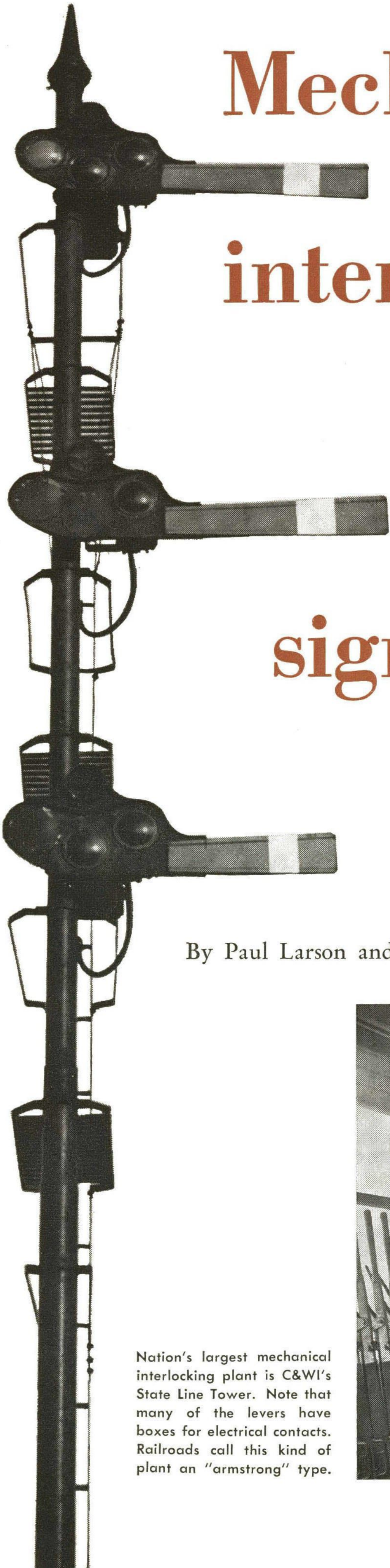


Mechanical interlocking and signaling

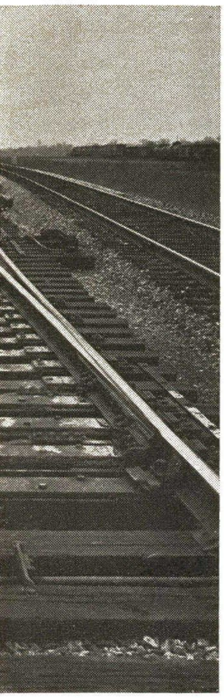
Part 1

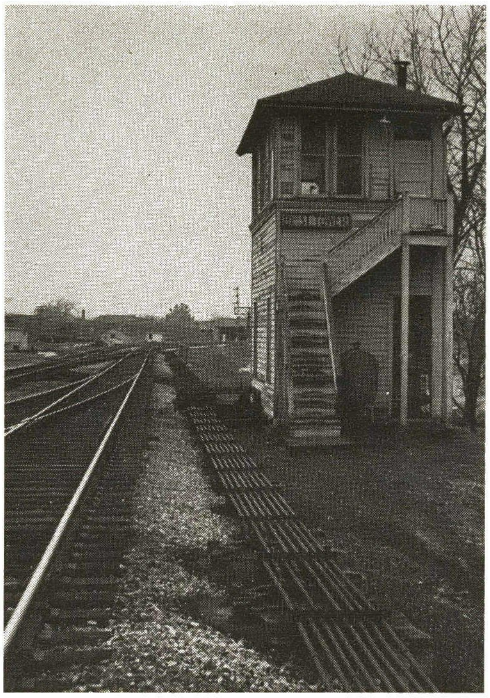
MR's staff begins a series that will show you what a mechanical "plant" is, what it does, and how you can build one — with accurately scaled signals — for your railroad

By Paul Larson and Gordon Odegard

Nation's largest mechanical interlocking plant is C&WI's State Line Tower. Note that many of the levers have boxes for electrical contacts. Railroads call this kind of plant an "armstrong" type.

Trains — Wallace W. Abbey





All C&WI photos: MR staff — Gordon Odegard

Chicago & Western Indiana's 81st St. Tower on Chicago's south side is a good example of a small, mechanically interlocked junction. Upper left: View toward the south past the single slip and the crossover. In the distance is the signal bridge with the automatic block signals on the southbound tracks (both clear) and the "home" interlocking signals on the northbound tracks. Center: The tower, with rodding extending in both directions to turnouts, locks, dwarf signals and derail. Upper right: The north end of the plant, with Belt Ry. connection at the left.

AT EVERY important junction where traffic warrants the expense, the movement of trains is controlled by a system of signals and signal-control levers called an interlocking. The term "interlocking" is derived from the arrangement of the controls that prevents the towerman from setting up conflicting routes that would permit a collision of two or more trains. The system also prevents him from throwing turnouts while a train is passing over them. The grouping of control levers and interlocking devices (whether mechanical or electrical) is called the interlocking machine.

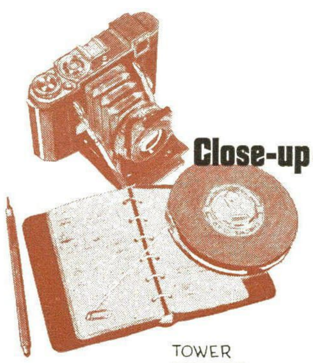
From the modeler's point of view, every type of interlocking is fascinating because it is a focal point of activity that can be developed into a practical, interesting feature for almost any model railroad. Sometimes an interlocking controls a junction with diverging routes. At some points an interlocking controls a series of crossovers on double or multiple tracks. At other installations a simple crossing or drawbridge may be the reason for the interlocking. In any case, a model interlocking is in itself fascinating because, first, it is a challenge to design and build and, second, it is intriguing to operate. An interlocking applied to one focal point of even a small layout can occupy one operator full-time. In addition, a model interlocking gives its operator a strong feeling of full-size activity and participation. In short, an interlocking is fun to operate because it is rather like a mechanical puzzle.

There are, of course, a variety of types of interlockings. The first were all mechanical with large levers that moved sliding bars within the "frame" of the interlocking machine. Turnouts and signals were moved by rodding connected to the machine. To England's John Saxby goes the credit for the first true mechanical interlocking. The year: 1856. Then in 1870 the first interlocking (English-built) was installed at the Trenton station of the United New Jersey Canal & Railroad Companies. After that, interlockings appeared at many congested points of U. S. railroading.

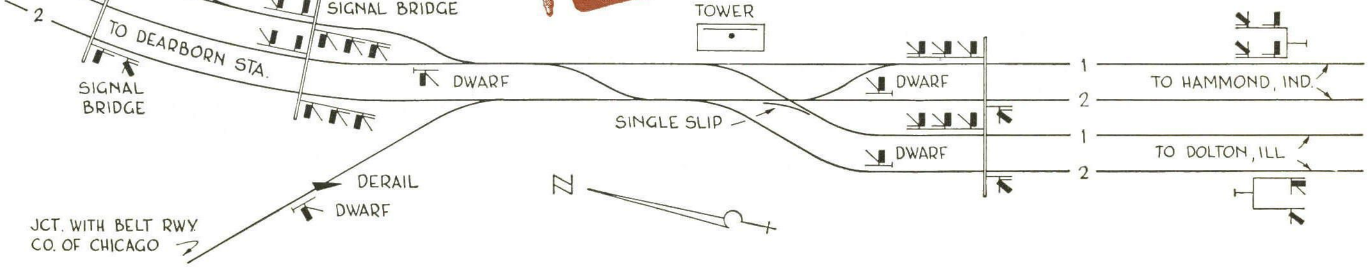
Subsequent electrical developments brought about new types of interlockings. Electro-mechanical, electro-pneumatic, and finally, all-electric.

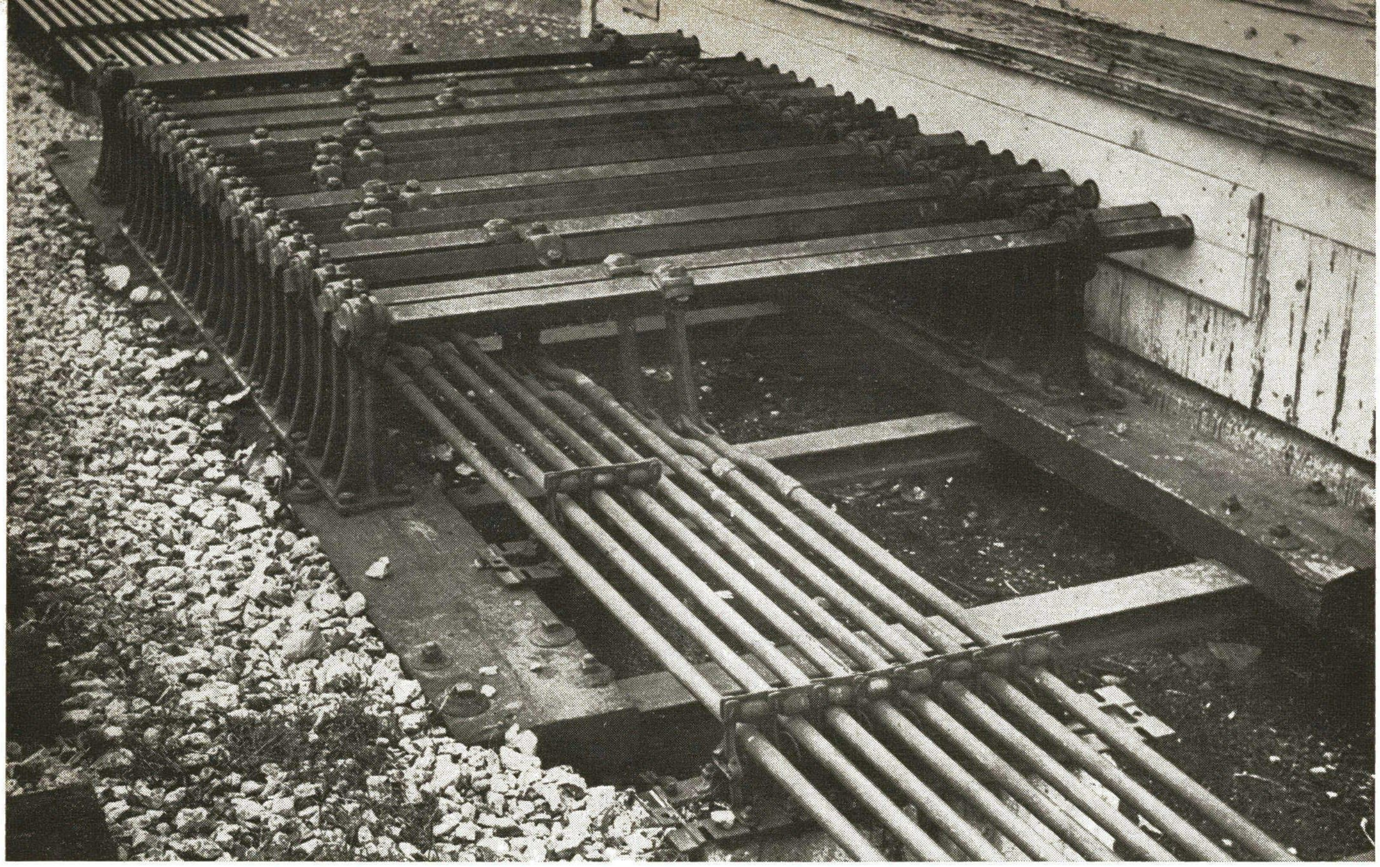
Interestingly enough, though, mechanical interlockings continued to be built for many years after the introduction of more modern types — and many are still in use, though most have been modified with contacts that provide electrical actuation of the signals rather than mechanical actuation with rodding.

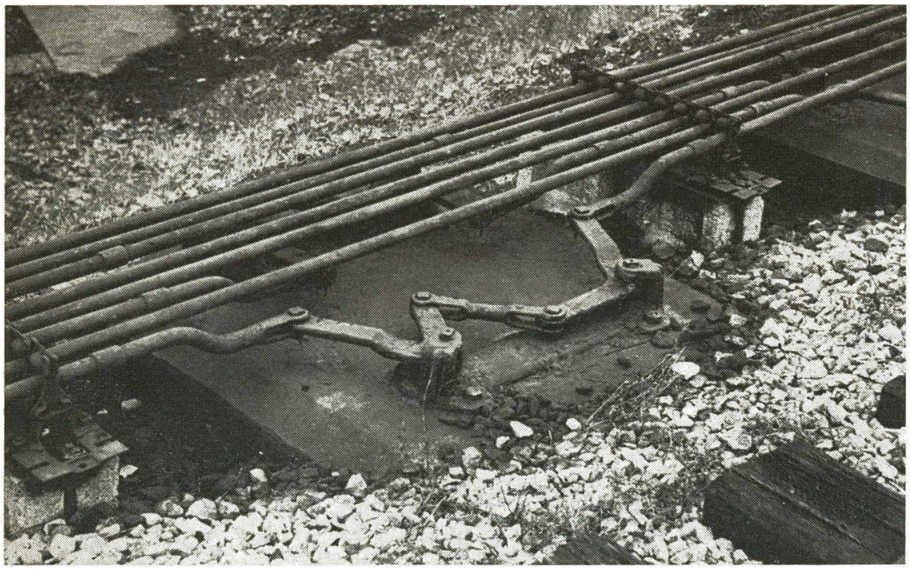
Because a mechanical interlocking is the original prototype design, and because the actual interlocking of turnout



Close-up — prototype ideas for your railroad

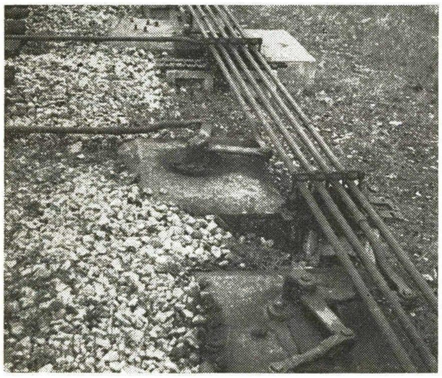




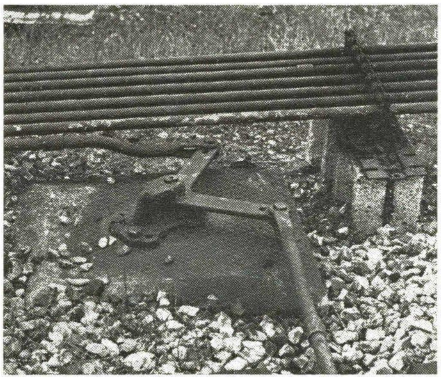


The rocker shaft leadout, situated on the track side of the tower, transmits the lever motion to the rodding and thence to the switches and signals. The rocker shafts are 2" sq. and are spaced on 5½" centers. The shaft center line is 19" above the base. The mounting base consists of two 4" x 12" beams bolted at right angles to several old rail sections placed on 2'-1" centers.

A 100' length of 1¼" pipe may expand as much as 1" during two years' temperature change. This would foul normal operation of the components, so a device called a compensator is fitted in the rodding. It is placed halfway between the plant and the operated device and reverses the direction of motion. Total rod length remains constant. Cranks are on 22" centers.



Angle cranks are used to carry the rod motion from the rodding to the turnout or signal. They are mounted on 18" sq. concrete blocks imbedded in the ground. Arm length is about 10".

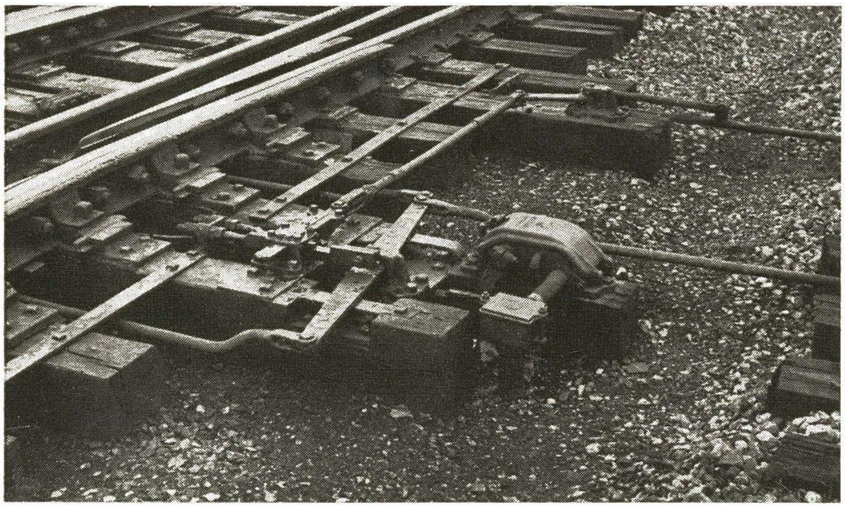


Note the offset jaw on the rod end which moves the works below the rodding. Also visible are the carriers spaced 6'-10" apart. Rods are on 2¾" centers. 3¼" dia. wheels support the pipe.

and signal levers can be "seen" in the machine, MR's staff was determined to design and build such a plant for a typical model railroad junction — and include diagrams that would help the modeler fit a mechanical interlocking to a variety of junctions and situations. This series of articles will lead you through the entire project — from this introduction to interlocking right through construction of the machine to the erection of *scale* lower-quadrant signals.

The first step, of course, was to visit a prototype tower where the controls are mechanically interlocked. We chose the 81st St. Tower of the Chicago & Western Indiana, a Chicago terminal railroad that operates, among other things, Dearborn station.

We selected the 81st St. Tower as a starting point because it is a relatively small installation. A larger tower with a great number of levers is overwhelming to the viewer. A small tower like the one at 81st St. can be studied in detail



Upper left: Rodding at a turnout showing the connections to several components. From top to bottom: Dwarf signal for Hammond line, dwarf for Dolton line, turnout lock and turnout points. Above: Situation at a movable point frog showing lock and crank arrangement. Box shaped device is a Universal switch-circuit controller. Upper right: Method of supporting rodding under tracks. Carrier wheels are mounted on tie ends.

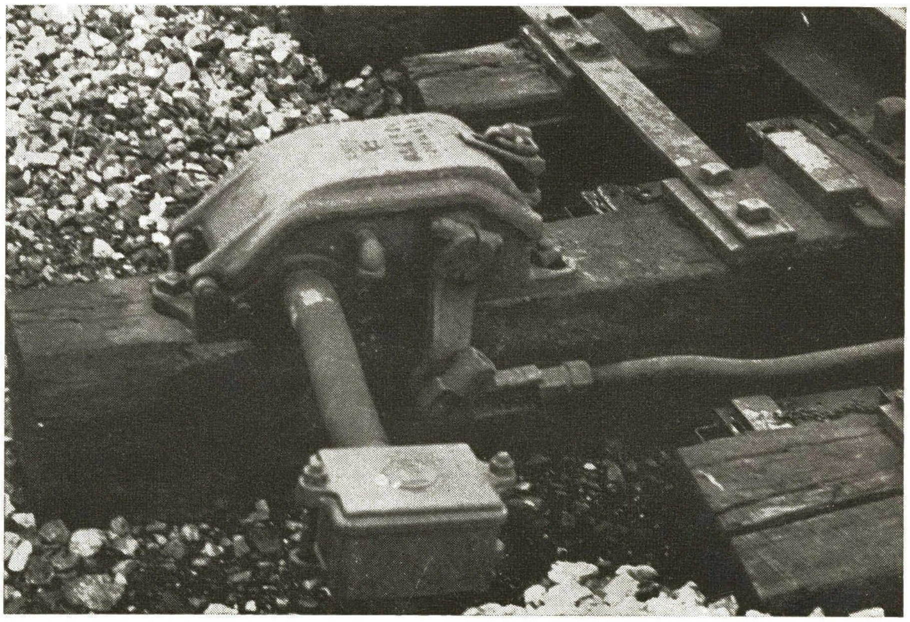
MORE PHOTOS ON NEXT PAGE

quite easily — for the principles of mechanical interlocking are the same regardless of the size of the installation.

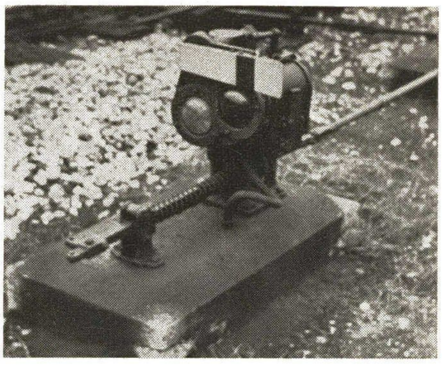
The interlocking at 81st St. was installed in 1928. It has upper-quadrant semaphores operated by electric motors actuated by contacts on the 25 levers of the tower's mechanical frame. Turnouts, turnout locks (more about these later), dwarf signals and a derail are operated by rods.

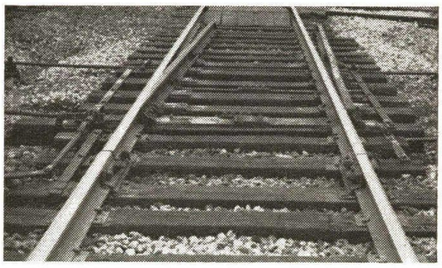
Trackage at the 81st St. Tower is used by transfer runs of the C&WI and by trains of the Chicago & Eastern Illinois, the Erie-Lackawanna, the Wabash and the Monon. The C&WI's commuter trains also pass through 81st St.

(Continued next month)

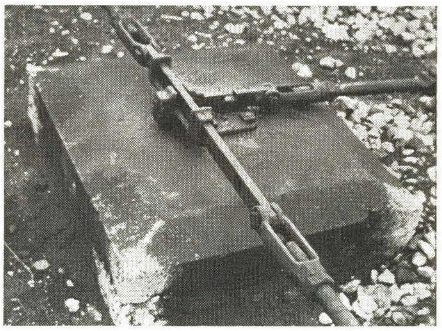


Union Switch and Signal Co., universal switch circuit controller or electric selector. This is connected to turnout point rodding and is mechanically actuated. Position of the switch determines which electrical distant signal will function.





Upper: Close-up of a 22″ high mechanical dwarf signal with red and yellow indications. Lower: Point type derail used to keep unauthorized trains from moving onto main line. The short lengths of rail lift the car wheels and dump the car off the track away from the mainline tracks.



Upper: Looking northwesterly to the junction with the Belt Railway Co. of Chicago, showing the rod connections with the dwarf signal. Lower: Locking device of a type used with signals and switches. The unit is thus locked both at signal and up at the interlocking machine.