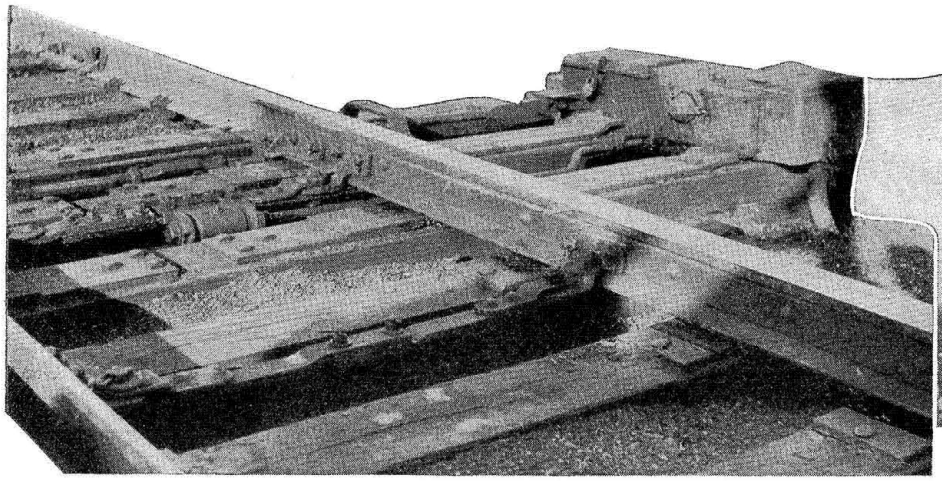
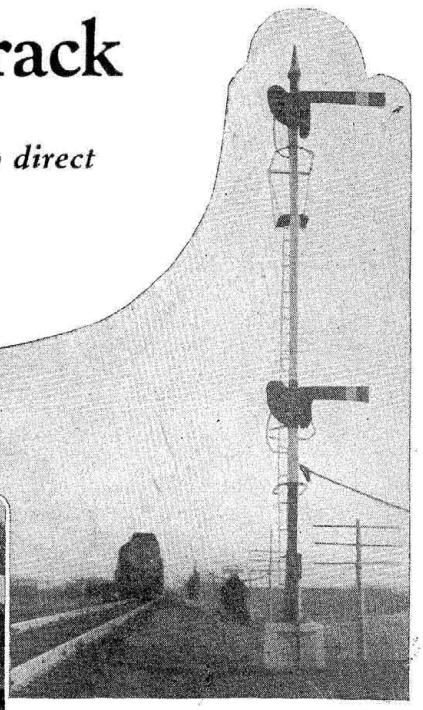
Centralized Control Used for Ends of Double Track

Burlington installation including two switches and signals to direct train movements without orders, saves wages of six operators



The switches are remotely controlled with electric switch machines



A northbound train leaving double track

THE Chicago, Burlington & Quincy has installed the centralized control system for the control and operation of the switches and derails at the two ends of double track and signaling on the two miles of single track between switches located at Gibbs, Ill., and Arenzville. The control system is that of the Union Switch & Signal Company, using only two control wires throughout the territory and extending two miles farther south to Concord, Ill., where the control board is located in the telegraph office. By means of this new installation, train movements are now directed over the single track by signal indication without written orders, and this change together with the operation of the switches has permitted the elimination of one operator on each trick at each end of double track, or a total of six men.

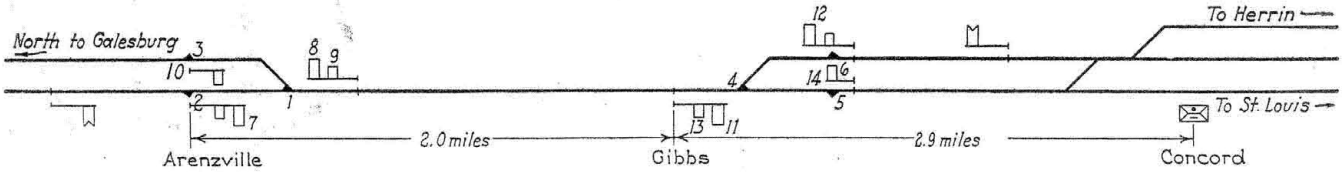
This section from Gibbs to Arenzville is a part of the Beardstown division of the Burlington, which extends from Galesburg, Ill., to East St. Louis, with a branch from Concord through Herrin, Ill., to Metropolis, Ill., and Paducah, Ky. The traffic includes three passenger trains and about four freight trains each way daily. During the winter season there are in addition about 10 extra freight trains each way daily. The major portion of the northbound freight traffic consists of coal. At the time the second track was built on this line about 20 years ago, the second track was not added to the two-mile section from Arenzville to Gibbs because a complete and expensive revision of grades would have been required to secure a good line and for another reason the grade is descending northbound, which is the direction of heavy tonnage. The Class M4 locomotive, which hauls about 100 cars of coal totaling 5,000 tons northbound down the grade, can handle the maximum operating limit of empty cars up the hill.

Train Movements Are Directed by Signal Indication

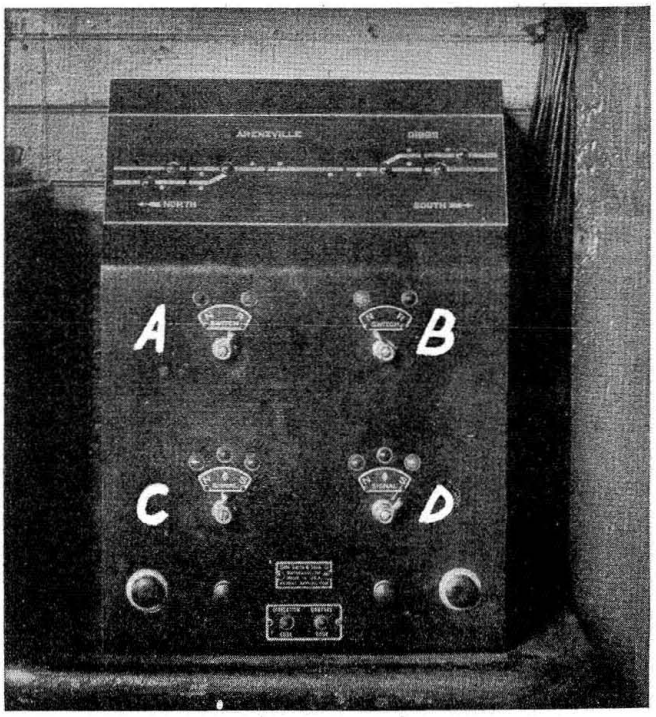
The functions controlled include the two switches, the four derails, the four two-arm high signals and the two dwarf signals. The distant signals are automatic, being controlled from the home signal and by the intervening track circuits.

Under the former method of operation, trains were required to pick up train orders directing movements over the single track between Gibbs and Arenzville. Under the new system, the dispatcher keeps the operator at Concord informed as to the approach of trains, and issues instructions as to which shall be given preference. Track circuits are provided so that trains on double track approaching the single track are announced automatically by an annunciator bell and by a light on the board in the operator's office at Concord. The machine has four small levers, two at the top for the control of the switches and the two below for the signals.

For example, when the operator sees the light on



Remote control facilities which are operated from telegraph office at Concord, Ill.



The control machine has an illuminated track diagram and miniature levers

the track diagram, and hears the bell indicating that a southbound train is approaching Arenzville, he throws the upper left lever marked *A* from the central position to the right *R*, the indication light above the central position is extinguished and after switch *1* has completed its movement and is locked, and derail *2* has been lined for a through movement, and derail *3* set for derailing, then an indication is sent in to the operator's machine, which lights the indication lamp above the *R* position of the switch lever *A*. The upper right lever marked *B* is then turned from *R* to *N*, which results in switch *4* at Gibbs moving to a position for a southbound movement from the single track to the southbound main, the derail *5* is moved to the clear position and derail *6* moved to the derailing position. After all these functions have operated and have been locked, an indication is sent in, which lights the indication lamp above the *R* position of lever *B*.

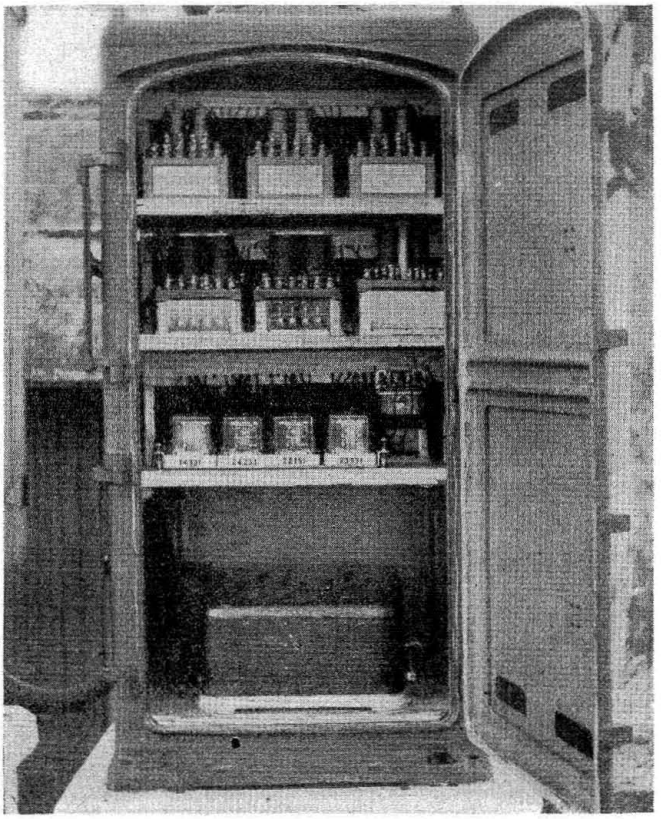
The operator is now ready to clear signal *7* to give the train authority to proceed from Arenzville to Gibbs. He moves the lower left lever marked *C* to the right to position *S*, which causes signal *7* to move to the clear position, which is indicated on the operator's machine by the light above the *S* position being illuminated. Signals *8*, *9* and *10* remain at the stop position. As soon as the locomotive passes signal *7*, entering the track circuit including the switch *1*, an indication is sent in to the machine, which lights a lamp at this switch as shown on the track diagram. The operator then knows that the train has accepted signal *7*. The signal is track circuit controlled and automatically goes to the stop position as soon as the locomotive passes. However, the operator moves the signal lever from the *S* position to the vertical position at the center, which holds all of the signals at Arenzville at the stop position, and this fact is checked and indicated to the operator by the center light above the central position of the lever.

The next action on the part of the operator is to move the lower right-hand lever marked *D*, controlling the signals at Gibbs, to the *S* position, which causes signal *11* to move to the proceed position, thus authorizing the train to proceed through Gibbs toward Concord. The lower arm, signal *13*, is provided in case it is desired that a southbound train run on the left-hand main from Gibbs to Concord, and in case switch *4* is lined to divert a southbound train to the northbound track, then signal *13* will move to the proceed position instead of signal *11*, when the signal lever *D* is moved.

Complete Indications Facilitate Operation

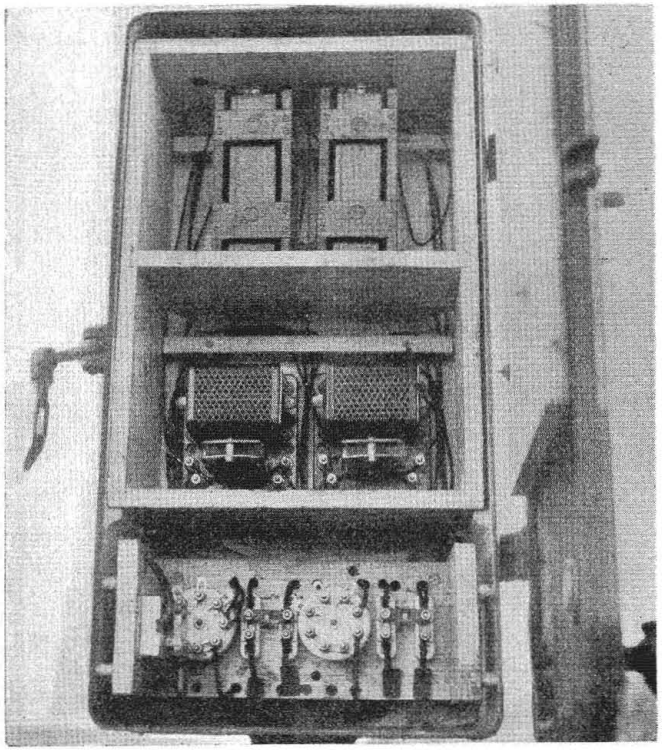
The indications provided on the board for the information of the operator on this installation are of special interest because of giving complete indication of all train movements and the position of switches and signals. An indication is given of the approach of a train on either track from either direction, and an indication is given of a train passing over either switch. On the switch levers, an indication is provided to show that the derails and switches have operated and are locked in each position. Three indications are provided on the signal levers, one for each direction, and a center light to show that all signals are at stop. As an additional feature, two lights are mounted as shown at the center of the operator's machine near the bottom. One of these lights flashes to repeat the code of indications coming into the office, while the other flashes to repeat the code going out, to control the operation of the switches and signals. These indications inform the operator of the action taking place in the system. The annunciator bell in connection with the board is provided to call the operator's attention to the arrival of a train at certain points, and he can acknowledge the condition by pushing one of the large buttons at the right or left of the machine, which will cut out the bell, but make no change in the operation of the indication lights.

For the control of the two switches, the four derails and eight signals only two wires extend from Concord through Gibbs to Arenzville. The indications of the positions of the trains on the track circuits and also the



The relays, selectors and code senders at Gibbs, are housed in a large case

positions of the switches and signals are also sent in to the office over these same two wires. This circuit is carried in a manufactured line cable containing three No. 16 solid copper wires, one of which is spare. These wires are insulated with 1/64-in. rubber, taped and braided with an impregnated braid covering on the entire cable. This cable is carried in 1½-in. cable rings attached to a 5/16-in. stranded galvanized messenger



The rectifiers and storage battery for track circuits are located in metal cases

supported by single bolt messenger clamps to the poles just beneath the lower crossarm.

The a-c. floating system is used as the power supply. A 220-volt alternating current supply circuit extends from Arenzville southward to the last track feed south of Gibbs. The line wire for this circuit is No. 6 solid copper weatherproof, and it is run on the two pins on the field side of the lower crossarm.

At each switch a set of 16 cells of lead-type storage cells of 75 a.h. capacity is provided to furnish 32-volts direct current for the operation of the switch machines to operate the switch and the two derails. Connections from this battery are taken to provide 10-volts direct current for the relays, the line control circuit, the code transmitters, etc. One of Edison storage cell of 80 a.h. capacity is provided for each track circuit. All storage batteries are charged by Union electronic rectifiers.

The centralizing control system of the Union Switch & Signal Company is of the selector type. The levers in the operator's machine are in no way mechanically interlocked but the signals are track circuit controlled and electric route, detector and approach locking is in effect for the control of the switches and derails so that no switch or derail can be thrown under a train.

The selectors are an improved Gill type, which has been used extensively for years in telephone train dispatching systems. The code sending mechanism has been developed particularly for the centralized control system. One code sending machine is located in the office at Concord to send out the codes to pick up selectors at the switch and signal locations, and one code sending machine is located at each switch location to send in the codes to the central office to cause indications to be given on the machine as to the location of trains or the position of the switches, derails and signals.

On the track chart and above the levers of the machine in the operator's office are a total of 18 different indication lamps and, for the operation of each indication, one selector is required to receive the code sent in from the field when the particular operation is completed. Likewise, at each switch location one selector is required for the control of each operation of each function such as a switch, derail or signal.

In order that a minimum number of instruments shall be connected to the control line circuit, only one relay is connected to the line at Concord, one at Gibbs and one at Arenzville. The selectors at each location are connected through the contacts of these line relays. The line relays and also all of the selectors operate when any code is sent on the line. However, on account of the features of a selector, only one selector operates to close its contact when a particular code is received.

A Magneto "Tune Tester" for Train Control

By P. X. Rice

Electrical Engineer, Miller Train Control Corporation, Staunton, Va.

THE electrical industry has not generally had testing means capable of disclosing slight leakage paths of current within the coils of electrical systems. For example, a d-c. instrument for the direct reading of resistance of the usual range, cannot detect short circuits in ordinary coils, much less leakage paths, the conductance of which may be as low as one per cent of the coil resistance. Nor has there been a simple means for measuring reactances and effective resistances of electro-magnetic and electro-static apparatus. The "tune tester" described herein is intended to fill this need.

The particular model of tester described here, was

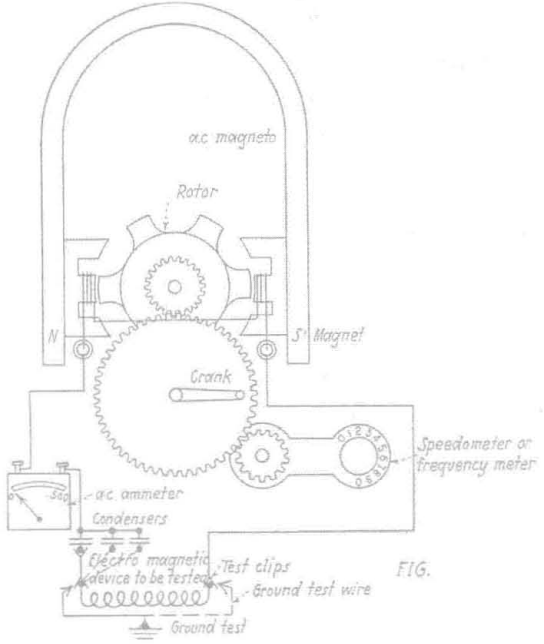


Fig. 1—Mechanical and electrical connections of the tune tester