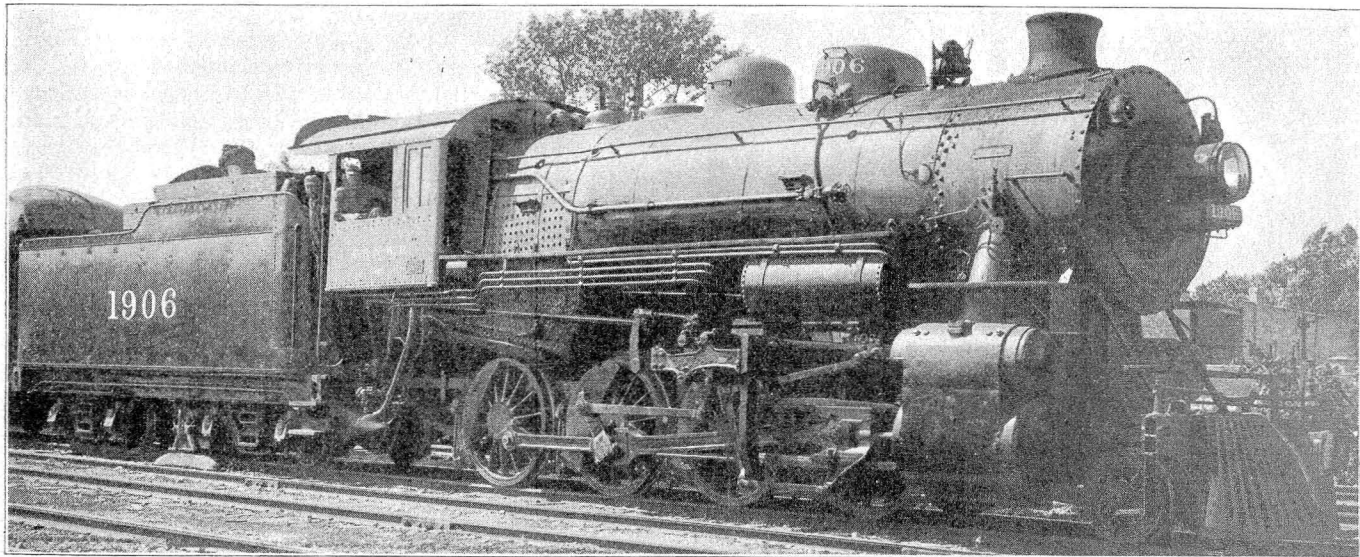


C. & N.W. Tests G. R. S. Train Control

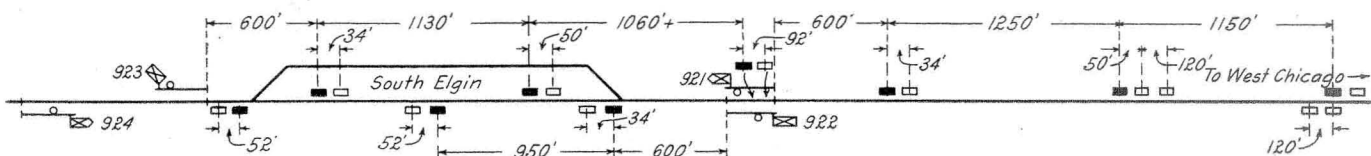
Practicability of Intermittent Inductive, Tapered Speed Control Demonstrated in Actual Train Operation



C. & N. W. Freight Locomotive Equipped With G. R. S. Co.'s Train Control.

THE Chicago & North Western demonstrated the General Railway Signal Company's system of intermittent inductive tapered train control on October 13, between West Chicago, Ill., and Forris (Elgin). A special train consisting of an Atlantic type locomotive, a business car and a parlor observation car left Chicago at 9:00 a. m., the test being completed at 3:00 p. m.

over it. Fixed limited speed is imposed at certain locations, as approaching the end of double track and interlocking plants, i. e., certain fixed speed limitations are in effect which are enforced through the use of pairs of inductors constructed without windings. The speed control scheme generally uses three pairs of inductors governing the approach to stop signals which force the de-



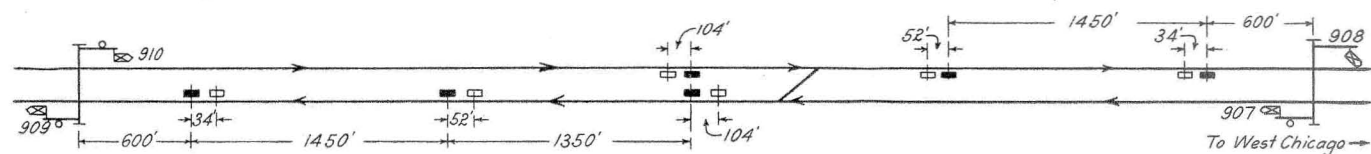
Layout on Single Track. Black Rectangles Represent Energized Inductors; Open Rectangles, Unwound Inductors

Fifteen railroads were represented by signal, mechanical and general officers, there being a total of 41 present.

The territory on which this device is installed is not a portion of the line designated in the Interstate Commerce Commission's order and this installation was made primarily for test purposes. From West Chicago to Wayne, there is five miles of double track, the balance

celeration of a train to insure a safe stop. Speed is so tapered as to handle the trains as they would be handled manually, automatic braking being used only when speed limits are exceeded.

There is an interlocking plant a short distance from the West Chicago station from which it has been customary, under certain traffic conditions, to advance trains to the



Track and Signal Plan Showing Location of Track Inductors on Typical Double Track Layout

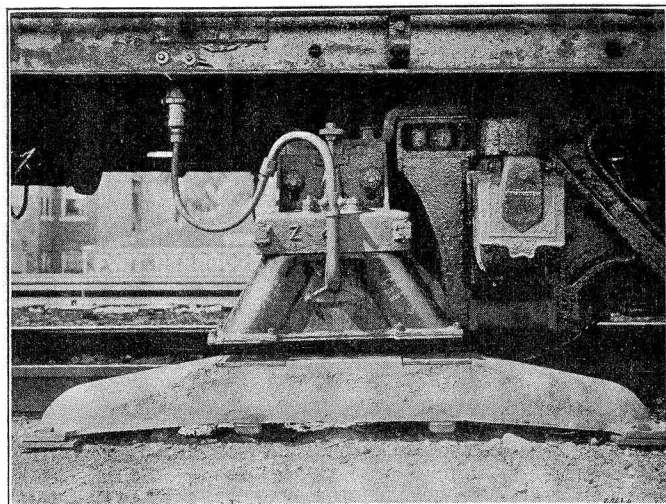
being single track. The double track is equipped with Model 2A, direct-current signals located on bridges and the single track is equipped with the absolute permissive block system, Model 2A, direct-current signals being mounted on the masts in the usual manner.

The installation is of special interest due to the nature of the track and the varied classes of traffic which operate

station on "Call-on" signals. The limited speed indicated by the "Call-on" signals is now enforced by the application of pairs of inductors suitably placed between the interlocking plant and West Chicago station.

The speed control and receiving apparatus for freight and passenger locomotives is identical except for the timing of the time element contactor. Locomotives that

are, under certain circumstances, used in both passenger and freight service are equipped with time element contactors that may be automatically adjusted for either class of service. At present two passenger and two freight locomotives are equipped with receiver apparatus and mechanism for operating engineer's brake valve. A number of tests were made to demonstrate the operation of

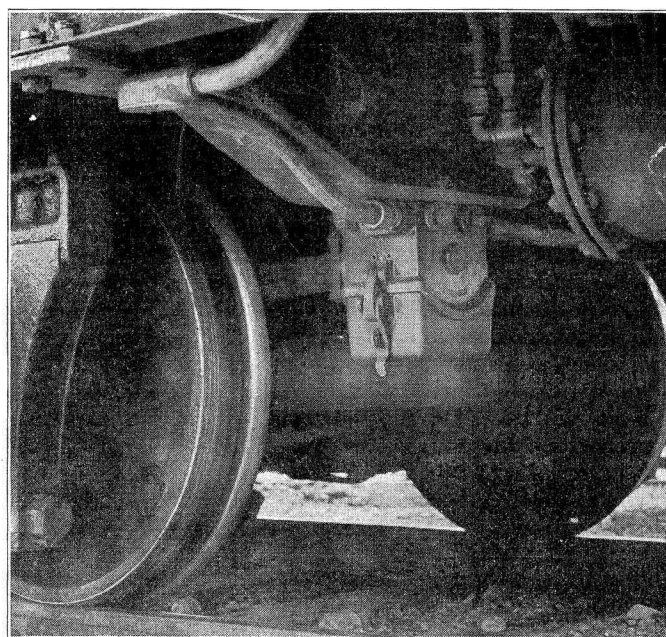


Receiving Element on Tender Truck Standing Over a Track Inductor

the system for both speed control and train stop features. Detailed description of the General Railway Signal Company's train control system was published on page 113. of the March, 1923, issue of the *Railway Signal Engineer*.

Actual Train Operation Tests Made

On leaving West Chicago, the special test train followed a scheduled milk train, the enginemen of the special



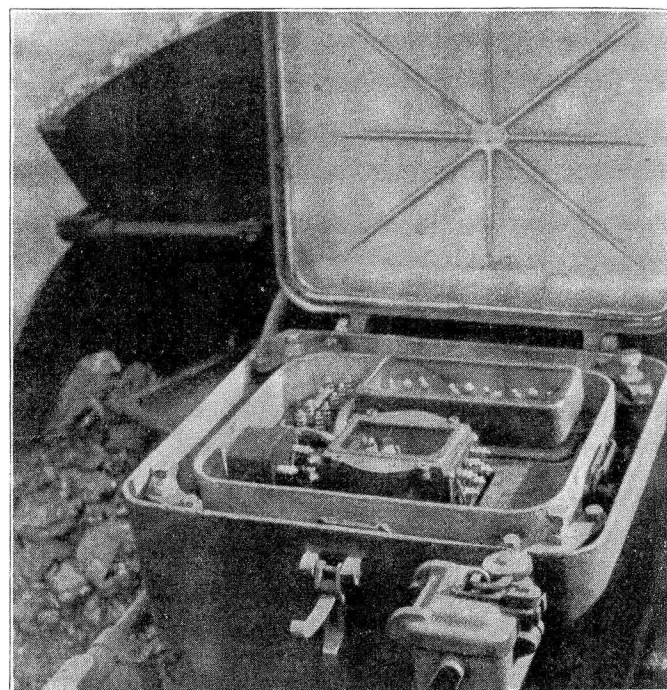
The Reversing Switch Is Mounted Beneath the Tender and Geared to Axle

train being instructed to pass signals at "caution" or "danger" in an attempt to close up on the milk train. While the milk train was in the block of signal 913 i. e., at the station at Wayne, signal 913 was at "stop," and signal 911, at "caution." Under these conditions the special

train, in approaching signal 913 at a speed of 55 m.p.h., received a brake application at the first pair of inductors after passing signal 911. This automatic application of the brakes brought the train to a stop in approximately 3,300 ft., with the locomotive and one-half the length of the first car past the signal.

The special train then followed the milk train west from Wayne on the single track. Signal 919, in the caution position, was passed at a speed of 40 m.p.h., and an automatic brake application was received at the second pair of inductors bringing the train to a stop at a point about 500 ft. before the signal was reached.

The train was then backed to West Chicago and turned. It then backed to Wayne where it was crossed over and headed east on the eastbound track. While a gravel train was in the block the special train attempted to pass signal 910 at 45 m.p.h., but was stopped automatically.



Interior of Relay and Timing Element Case

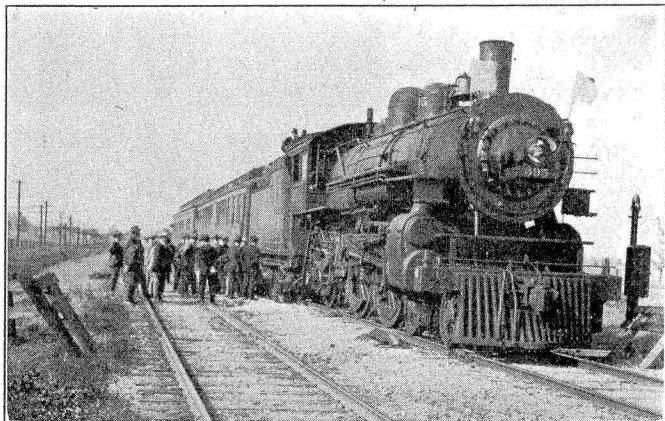
On the next test, signal 908 was disconnected and placed at stop purposely, thus causing signal 913 to assume the "caution" position. The train was again backed to Wayne and an effort was made, on again proceeding eastbound, to pass signal 910 in the caution position at maximum speed to see if the speed restriction would be enforced automatically. In this test, a brake application was received at the intermediate speed inductors and the train was stopped within 1,400 ft.

With signal 908 at "stop" and 910 at "caution" an attempt was next made to operate the train at a low speed over the first two sets of speed control inductors and to pass the third set near signal 908 at a low speed so as to disregard the signal indication. However, the apparatus functioned as intended, the train being stopped automatically within 600 ft. when traveling at 23 m.p.h. although working steam until actually stopped. In repetition of this test at 25 m.p.h. the train was stopped at the signal. All of the foregoing tests were made with a brake pipe pressure of 70 lbs. instead of 90 lbs., which accounted for the engine and part of one car overrunning the signal in one test.

The system was not installed with the idea of stopping light trains with low brake pipe pressure and with throttle

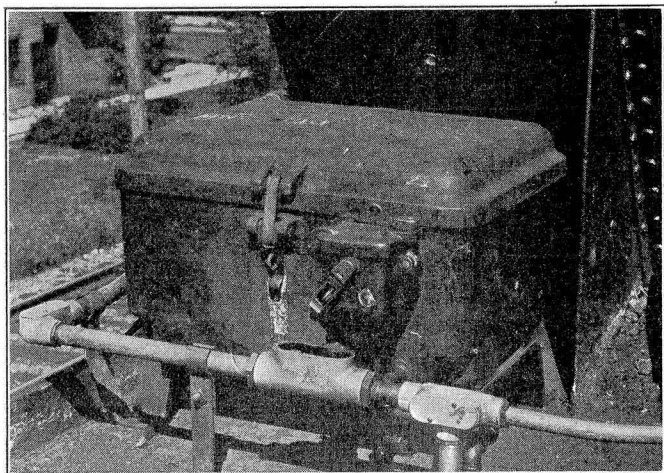
open short of the signal in case of an automatic application of the brakes. Should a railroad require an installation to give protection under such conditions it is provided by installing the control points further in the rear.

Tests were made next to determine the minimum speed at which an effective impulse could be received by the equipment from a track inductor. The low-speed pair of track inductors used for this test were 34 ft. apart, and the following results were obtained from timing the passing of the engine over the inductor with a stop watch.



Making Low Speed Tests Over Pair of Track Inductors

It will be noted in the table below that no impulse was received at a speed of approximately 2.4 miles an hour. The engine used in this test, however, was one of the first ones equipped in which the receiver was placed between the journal box and springs. Later engines are now being equipped having the receiver overhung and outside of the journal box which, it is claimed, results in more powerful impulse, and had the receiver been



Relays and Timing Element Are Housed in a Cast-Iron Box on the Tender

mounted in this way an impulse would have been received at speeds lower than those shown in the table.

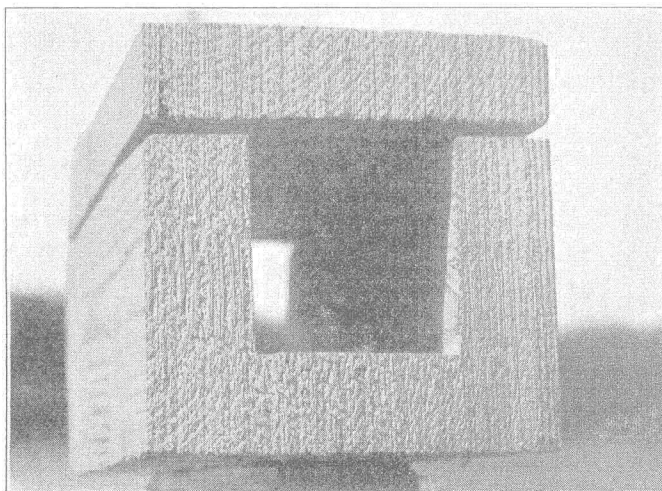
1.	2.41	No impulse received from either inductors
2.	2.79	Impulse received from first inductor only
3.	2.88	Impulse received from first inductor only
4.	3.22	Impulse received from first inductor only
5.	3.86	Impulse received from both inductors
6.	4.28	Impulse received from both inductors

On the final test with signal 908 at stop and 910 at caution and the train running past signal 910 at 57 m.p.h., the brake application was received at the high speed inductors, stopping the train just short of signal 908.

Preservative Treatment of Poles, Trunking and Timbers*

TIMBERS and switch ties for interlocking plants should be framed to the exact size and dimensions before treating with wood preservatives. A person would not try to make up an interlocking job from rail, etc., sent out to the site, therefore, there is no more reason for sending timbers unframed to such jobs than it is for sending out fabricated steel to bridge locations. It all comes from the fact that one can work timber with an axe and a saw and this habit is a wonderful money loser if the habit is overdone, and it is certainly bad practice to treat timber and then hack it to pieces afterwards.

With reference to the lumber used in connection with interlocking plants, particularly for housing the relays or



Cross-Section of Trunking Ready for Preservative Treatment

for conduit and trunking, it has been considered that one could not use creosoted conduit without using lead covered cable. Although it is not good practice to put rubber insulated wires into freshly creosoted conduits; however, all that is necessary is to allow the creosoted conduit to air-dry a few months after it is treated, so as to allow the light creosoting oils to evaporate from the surface, after which it will be perfectly safe to use this creosoted conduit anywhere. If laid out in the open, it is perfectly feasible to paint this conduit with black paint. This same thought applies to treating all of the wood used about any interlocking plant, such as the planks, supports, etc. Signal officers say that the decay of timber in connection with their work is very great and the creosoting and subsequent air-seasoning thereof will enable them to cut their timber bills in half and labor bills proportionately.

Concerning pole line materials there is keen rivalry between the western cedar pole, butt-treated, and the full creosoted southern pine pole. The former has as its chief advantage the fact that it can be painted any color desired, but beyond that point, so far as strength through the life of respective poles is concerned, the creosoted pole has the advantage. The strength of the full creosoted pine pole continues the same and where color has no bearing its use is recommended. Treated poles and cross-arms are in the same category as the signal conduit in that it is better if they can be air-seasoned a little subsequent to treatment.

*Abstracted from an article by C. M. Taylor, Superintendent of Treating Plants, Philadelphia & Reading, as presented before the Maintenance of Way Club, Chicago, September 17, 1923.