Four Recent Train Control Studies

Progress to Date, Possibilities From a Signal View and the Effect on the Mechanical and Transportation Departments

A MEETING on Automatic Train Control was held in Chicago, on October 23, under the auspices of the railroad section of the Western Society of Engineers. The papers presented at this meeting covered the development of automatic train control with a brief description of the systems in service or under test at present; train control as it affects the mechanical department; its relation to signaling and the results to be expected from the transportation standpoint. W. J. Eck, signal and electrical superintendent, Southern railway, presented a paper on "Developments to Date and Installations." C. F. Giles, superintendent of machinery, Louisville and Nashville, talked on "Train Control from the Mechanical Standpoint." T. S. Stevens, signal engineer, Atchison, Topeka & Santa Fe System, discussed "Train Control from the Signal Engineer's Standpoint," and A. W. Towsley, assistant to the vice president and general manager, Chicago, Rock Island & Pacific, treated "Train Control from the Transportation Standpoint." Abstracts of these papers are presented below.

THE DEVELOPMENT OF AUTOMATIC TRAIN CONTROL

By W. J. Eck,
Signal and Electrical Superintendent, Southern Railway, Washington, D. C.

THE desirability of some form of control to safely bring a train to a stop independently of the driver in case of conditions endangering the train, was recognized in the very beginning of railroading. No feasible method of accomplishing this result seemed possible however, before the general adoption of the power brake. The knowledge that the opening of the brake pipe line and the escape of the compressed air to the atmosphere, would cause an application of the brakes was immediately recognized as affording a means for automatically stopping a train independently of the action of the engineer. All train control devices have been based on this feature of the air brake system.

The majority of the inventors have considered that the opening of a valve in the brake pipe line was all that is necessary for a successful train control. It involves much more however, particularly in the case of heavy freight trains. There are more than 5,000 patents on file in the U. S. Patent Office on the subject of train control and only about a score have been considered worthy of service tests and development under actual railroad operating conditions.

In 1888, Axel S. Vogt, of the motive power department of the Pennsylvania Railroad devised the first automatic stop used in this country. It was of the plain mechanical trip overhead contact type, consisting of an arm so mounted upon the signal mast that when the signal was in the "STOP" position the arm would intersect the path of a glass tube mounted on the locomotive cab. This tube was connected into the air brake system so that any attempt to pass the signal improperly would cause a fracture of the tube and the application of the brakes. With the signal in the proceed position the arm was removed from the path of the tube.

Shortly after it was placed in service a tube was broken by icicles hanging from the roof of a tunnel and a passenger train was brought to a stop within the tunnel. The passengers were rescued only after some difficulty and no further installation of this device has been made upon steam operated lines.

In 1891 the Rowell-Potter System, a mechanical trip contact, ground type, train stop was installed on the Boston Revere Beach & Lyan. It was entirely mechanical in construction and operation, power being obtained by means of levers operated by the moving train and stored in coil springs. The same system was installed in 1893 on the Intramural Railway at the World's Fair at Chicago, and upon various other railroads, notably the Chicago, Milwaukee and St. Paul in 1902 and on the Chicago, Burlington and Quincy in 1908. The installations on the two steam roads just mentioned were of limited extent for test purposes and no extensions of the system were ever made.

Early Permanent Installations

The first permanent installation of automatic stops so far as known was made on the Boston Elevated Railway in 1899. It is still in use and consists of a controlled mechanical trip ground contact worked in conjunction with electro-pneumatic block signals. A similar installation was made on the Interborough Rapid Transit New York in 1903, also upon the Philadelphia Rapid Transit and the Hudson and Manhattan in 1908.

This device consists of a lever arm operated by compressed air in conjunction with the signal system so that the arm is raised above the track when the block is obstructed. This arm engages the handle of a valve in the brake pipe should a train attempt to pass a signal indicating STOP. The opening of this valve causes the brakes to be applied. A speed control feature devised by J. M. Waldron was added to the Interborough installation in 1912 which has materially increased the capacity of the road over that formerly existing with the plain automatic stop.

In 1910 the Washington Water Power Co. installed, on 29 miles of a single track electric interurban line, an automatic block signal system with automatic stops. The device was similar to that originally used on the Pennsylvania Railroad, viz., a glass tube mounted upon the top of the cars and positioned so as to be broken by an arm attached to the block signal in case the signal is passed improperly when in the stop position. As there are no tunnels or overhead structures on this line its use here was not objectionable.

The Pennsylvania Railroad in 1911, in connection with the terminal improvements undertaken by it upon entering the City of New York installed a system of automatic stops to protect trains using the tunnels under the Hudson river and throughout the electrified zone extending to Manhattan Transfer, N. J. This automatic stop is of the mechanical trip type electrically controlled. The valve in the brake pipe and the trip upon the ground are of special