

## SINGLE TRACK AUTOMATIC SIGNALS, T. H. & B. RAILWAY.

**D**URING the summer of 1911 the Toronto, Hamilton and Buffalo Railway, which forms a connection between the New York Central Lines and the Canadian Pacific Railway, began its first automatic block signal installation on a short stretch of track, nine miles in length, from Kinnear to Vinemount. In 1913 the automatic signaling was extended from Vinemount eastward to Welland, a distance of 26 miles, and in 1914 signals were installed on the west end from Hamilton to Brantford, a distance of 25 miles. There remains approximately 16 miles of single track between Hamilton and Brantford which is not equipped with automatic block signals.

Traffic is heavy, the average being 32 trains per day, and the maximum 52 trains per day, as follows:

Freight, westward .....	average	6	maximum	10
Passenger, westward ....	"	10	"	16
Freight, eastward .....	"	6	"	10
Passenger, eastward ....	"	10	"	16

Formerly, trains were operated by the telegraph block or time interval system in connection with train-order boards, and in some cases by standard semaphore train-

The track battery consists of two cells of Columbia 600 ampere-hour, high internal resistance type, housed in 8-ft. cast-iron battery chutes. Track relays have a resistance of four ohms; front contacts are platinum to graphite, and back contacts platinum to platinum. These relays are housed in a cast-iron relay box which is mounted on the signal mast or on a cable post, depending upon the particular location. Wire used for track-circuit connections is No. 9 B. & S. gauge, rubber-covered. All connections may be identified by means of fibre tags on which appear the proper letters and figures.

The signal control wires are No. 9 B. & S. gauge, weatherproof, copper-clad and are supported on a separate cross-arm below the telegraph line which was practically reconstructed before the signal wires were strung. Wires extending from line to function are No. 14 rubber-covered, and are formed into a cable held together with marline and supported by messenger wire. Line circuits are operated under the polarized line control system which requires one less line wire than a similar neutral control system. Ordinarily there are three line wires extending from sidings, and five line wires extending through sidings.

Line and local relays have a resistance of 670 ohms; front contacts are platinum to graphite, and back con-



The Line of the Toronto, Hamilton and Buffalo Railway.

order signals. Trains following a passenger train were held at train-order stations until passenger train was clear of the block, and a time interval of five minutes was maintained at train-order stations between following freight trains.

Train orders and instructions regarding train movements are transmitted by telephone, and there is a telephone at each passing siding so that trainmen can communicate direct with the dispatcher when occasion requires.

The system of signaling is the General Railway Signal Company's absolute permissive block system, in which the block for opposing trains is from siding to siding, and for following trains the block is from signal to signal, as in double-track signaling.

Ballast is rock and gravel, affording good drainage; ties are untreated oak and cedar; rail is A.S.C.E. 80-lb. and 100-lb.; all rail joints, including insulated joints, are of the continuous type; two 44-inch E.B.B. bond wires connect adjoining rails at each joint. The length of track circuits varies considerably according to the distance between successive signals; the average length is approximately 2,000 feet and the maximum length about 4,000 feet.

contacts platinum to platinum. These relays are ordinarily housed in a cast-iron relay box mounted on the signal mast. All relays and other mechanisms likely to be affected are protected by G. R. S. lightning arresters to which are attached suitable connections to ground.

The railway company furnished and installed in place all insulated joints, insulated switch rods and connections, also all line-wire supports. The General Railway Signal Company manufactured and installed in place all signals and signal appliances. Most of the material was delivered by work train. Signals were erected by means of a derrick which was also used in setting the concrete battery wells. Mr. R. L. Latham, chief engineer of the T. H. & B. Railway, had general charge of the installation, which was performed under the immediate supervision of Mr. A. A. Hurst, supervisor of signals. Mr. A. C. Holden was engineer in charge for the signal company.

The results obtained by the automatic signals may be briefly summarized as follows:

(1) Under proper observance of the indications, the signals provide, for opposing as well as following movements, a definite space interval which practically eliminates the liability of collisions.