NEW SIGNALING AT WASHINGTON, D. C.

One of the most complete and modern signal installations in the country was recently put in service by the Pennsylvania (Philadelphia, Baltimore & Washington), between the south portal of the Capitol Hill tunnel and the Potomac River bridge, Washington, D. C. The installation consists of two electro-pneumatic interlockings and 13 electro-pneumatic automatic signals. The interlocking machine at Second street and Virginia avenue has 18 working levers operating 49 functions; the machine at Fourteenth street has eight working levers operating 35 functions.

Speed signaling, as recommended by the committee on signal practice of the Railway Signal Association, was installed throughout. The interlocking home signals have three arms with vertical lights, the distant signals two arms with staggered lights, the automatic signals one arm and two staggered lights, the dwarf signals one arm and one light. All signals governing in the direction of traffic indicate the position of the next high signal in advance, and all signals operate in the upper right-hand quadrant.

Fig. 1 is a plan of the tracks embraced in this installation. It is broken into three parts, the west end (Potomac River) being at the upper left hand. The different parts of the engraving are to be connected as indicated by the letters A and A^1, B and B^1. Fig 3 is a view at the Fourteenth street interlocking, looking west, and Fig. 2 shows signal cabin "VU" and the signals near it. Electric detector approach and advance locking are provided for all switches, and there are no detector bars. Alternating current is used for operating the track circuits and for controlling the automatic signals.

The electrical energy and the compressed air are obtained from the power house of the Washington Terminal Co., situated about two miles north of the tunnel portal. Emergency electrical energy taps in the local electric company's lines are provided for use in case of failure of the main supply.

The electrical energy is transmitted at 2,200 volts, 60 cycles, over a No. 6 B & S flexible twin conductor cable. A lead-sheathed cable is used from the power house to the first interlocking, and from this point a cloth-covered, jute-filled rubber-insulated cable is used. The lead cable is run in terra cotta conduits from the power house to the south portal of the tunnel and in galvanized iron pipe from that point to the first interlocking. The cloth-covered cable is laid in wood trunking about two feet below surface. The trunking was treated with creosote. About one-half inch of pitch was placed in the bottom of the trunking groove. The cable was then laid in and the groove filled with pitch.

The 2,200-volt current is stepped down to 10 and 110 volts at eight different transformer locations. A sectionalizing switchboard panel is placed in the 2,200-volt mains at each transformer location. The switches on these panels are so arranged that with power at both ends of the line any section of the cable between transformer locations may be cut out of service with-

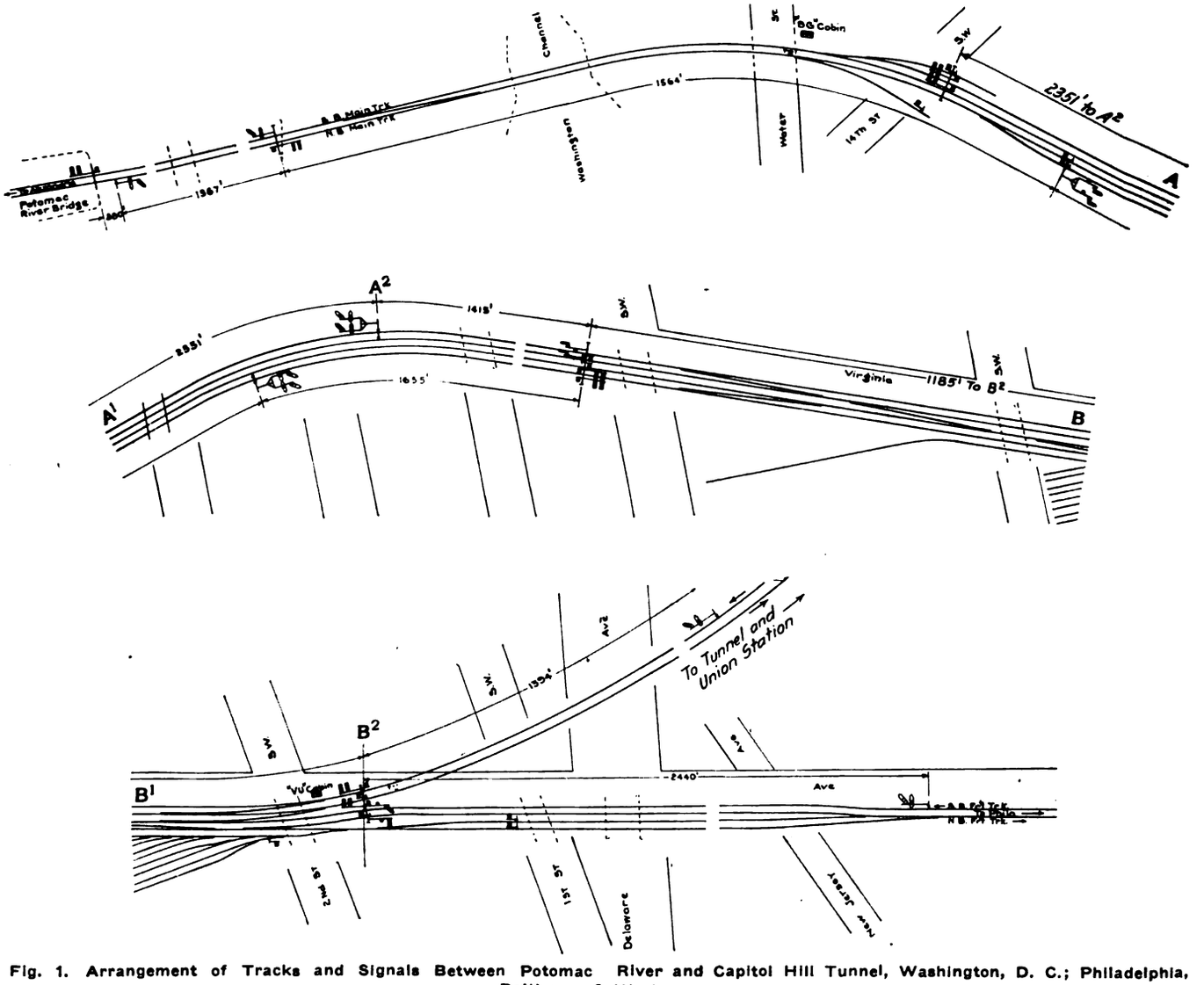

Fig. 1. Arrangement of Tracks and Signals Between Potomac River and Capitol Hill Tunnel, Washington, D. C.; Philadelphia, Baltimore & Western.

Note.—The upper portion of drawing at A joins the second portion at A^1. The second portion at B joins the third portion at B^1.

out affecting the operation of any signal. The sectionalizing panels and transformers are placed in cases made of reinforced concrete, which are divided into two parts, the upper part being used for panels and the lower for the transformer. There are

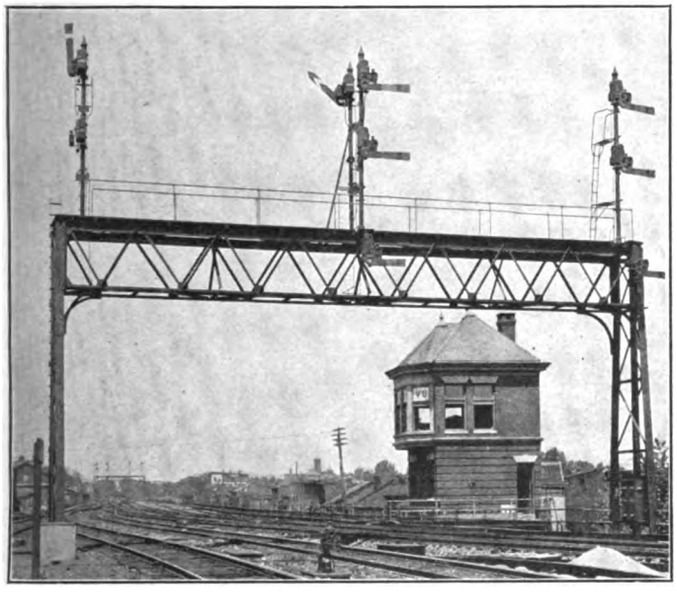

Fig. 2. Signals and Cabin at Second Street and Virginia Avenue.

44 track-circuit sections in the installation, averaging 775 ft. in length. The longest is 2,400 ft. long and the shortest 93 ft. The sections are fed from the 10-volt taps of the transformers. Leads of No. 6 wire are run from the transformers to bus bars

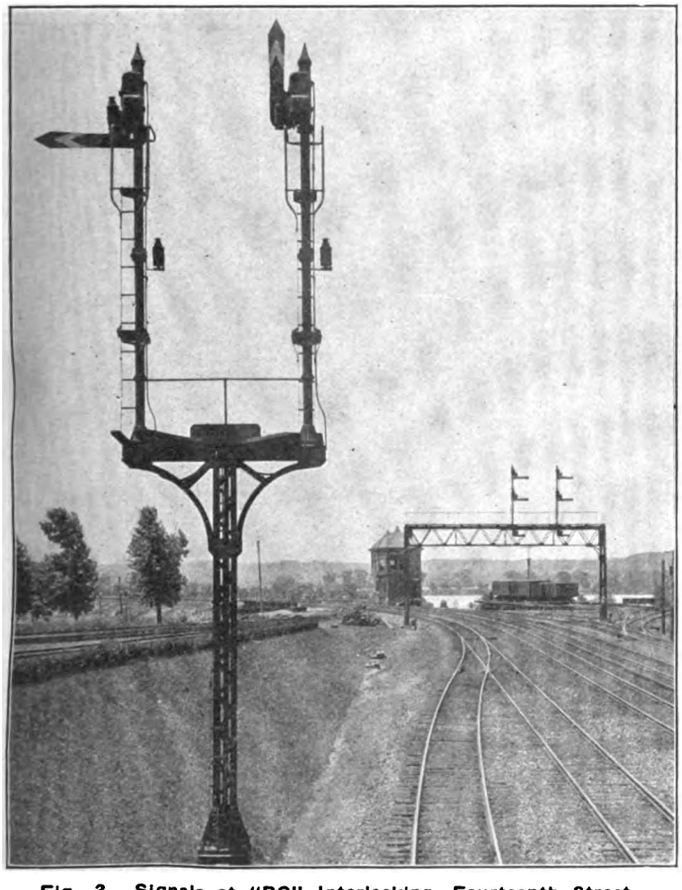

Fig. 3. Signals at "BG" Interlocking, Fourteenth Street, Washington.

in the distributing boxes. The track feeds are tapped to the bus bars through a resistance tube. These tubes have three units of resistance, 0.5 ohms, 0.75 ohms, and 1.25 ohms. Fig. 4 shows a view of the distributing boxes.

The track relays are of the galvanometer type. The fields of these relays are connected to the 110-volt bus bars with a non-inductive resistance of 140 ohms in one of the leads. The voltage across the rails at the feed end averages 2.4 volts and at the relay end 1.85 volts.

The signals are of the top-post mechanism type. The home and dwarf signals are controlled by direct-current magnets operating from a 14-volt storage battery. The distant and automatic signals are controlled by alternating-current magnets operating on 110 volts. The stick circuit for the semi-automatic signals is controlled by slow-acting relays to prevent the signals being thrown to stop by a momentary interruption of the power supply. Each signal is lighted by one lamp of two-candle power, which burns continuously.

Directly over each lever of the interlocking machines there is a small electric light which indicates to the signalman when the block or the track circuit section over which signal indications are given by means of that lever is clear.

The interlocking and signal material for the installation was furnished by the Union Switch & Signal Co. and the wire by the Kerite Insulated Wire & Cable Co. The work was installed by the railway company's force, under the supervision of W. L. Smith, supervisor of signals of the Maryland division. The cost

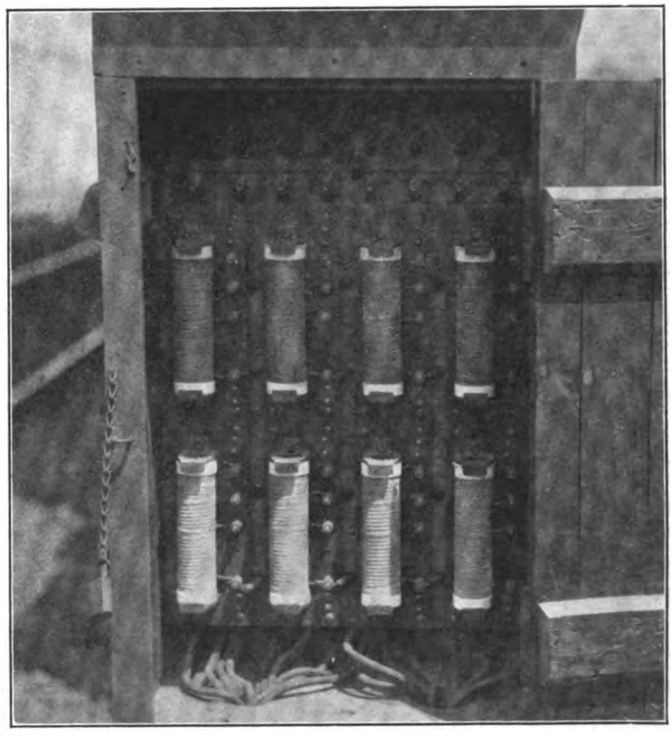

Fig. 4. Distributing Box.

of the whole was $60,791, including the cabins, which are of brick, costing about $4,731 each. The four-arm bracket posts cost in place about $773 each. The average cost of the four-track signal bridges complete with four two-arm signals in place is $2,111.

In the original plans for this installation signal bridges were provided for in all cases. One of the new bridges was put up south of Seventh street, at which point there is a parkway alongside of the tracks. People residing in the vicinity objected to this bridge as unsightly and as obstructing their view, and at their request the railway company substituted the bracket post in place of the bridge.

Putting the power line (south of "VU") in trunking was to some extent experimental, with the view of obtaining the cost, life and efficiency of this method of installation. The cost of this line, including the cloth-covered cable with No. 6 B & S gage copper wires, was about $435 per 1,000 ft., which, it is estimated, is much cheaper than lead-covered cable in either galvanized iron pipe or any other method of conduit construction.