to stay by them for fifteen minutes and then throw them up again. When he has received favorable answers, he so notifies the head reader, who immediately throws down the corresponding twelve switches on the special board. Then, calling his eleven assistant readers to order and with watch in hand, he waits until the second hand reaches the minute, when in a clear, loud voice he says "Now," repeating the word every ten seconds for two or three minutes. Every time he says "Now," each assistant notes the deflection of his meter needle and jots such down consecutively on the sheet provided, which is ruled with spaced columns, ten spaces to each column. At each minute, the head reader says immediately after the word "Now" the word "Minute," by which the assistants know that the reading which they are entering must come in a space at the head of one of the columns. This, in case an assistant has skipped the entering of one reading; and so that all his readings thereby may not become valueless.

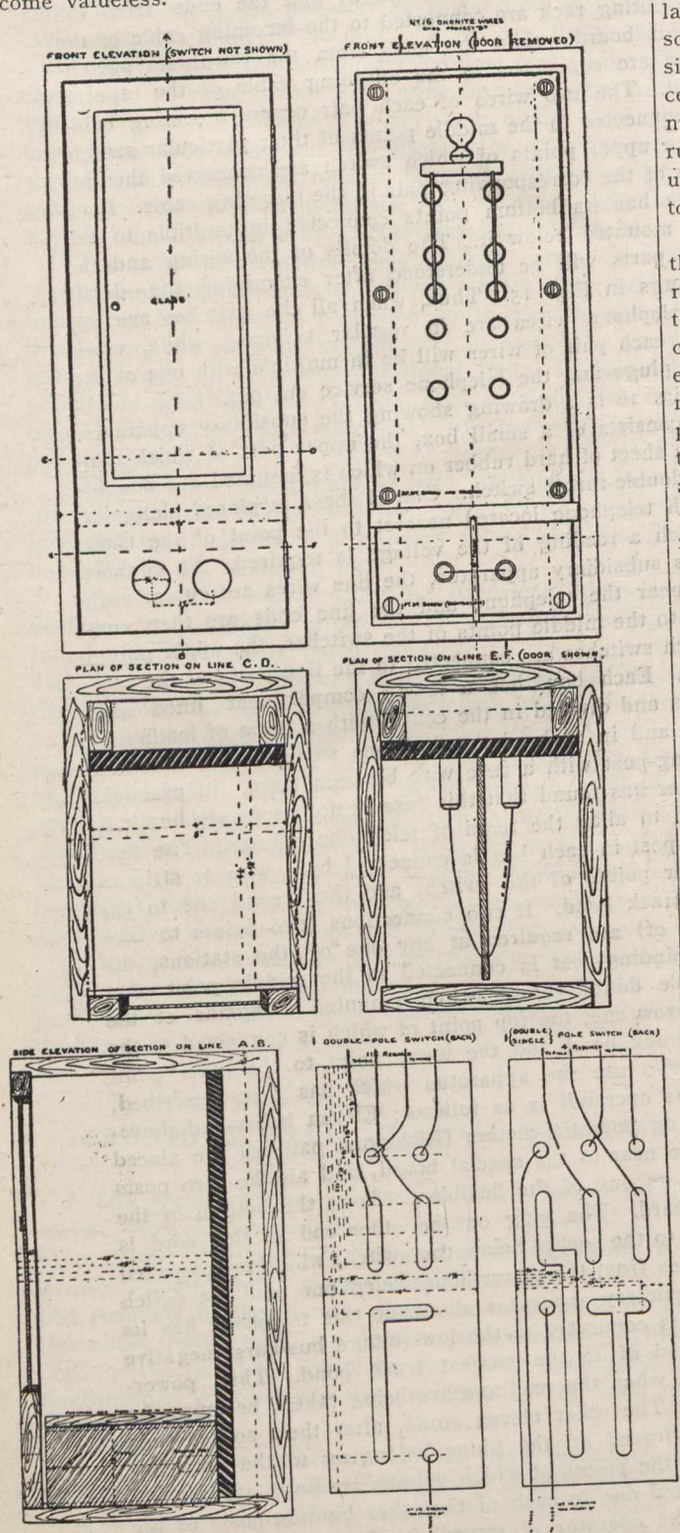

Fig. 16.—Station Switch and Fuse Boxes, Testing System.

After the readings have been all taken, the head reader immediately throws up the twelve switches on the special board and notifies the operator at central that he has finished. The operator at central, after the fifteen minutes have elapsed, takes the trouble to call up the twelve points and find out whether the attendants at these points have or have not thrown up their switches as requested. In case of any special emergency, any one of the attendants at any one of the twelve points can obtain telephonic communication while the readings are being taken by throwing up his switch. This stops the deflection of the needle of the potential meter on his line, the assistant reader in charge of which instrument immediately throws up his switch, whereby central is called in the regular manner.

This class of testing can be easily carried out by any company having a central exchange either of their own or rented from some local telephone company, provided that the instruments operated from it are located at suitable points of their system. Suitable outside telephone points having been chosen, a small doublepole, double-throw porcelain switch (obtainable from any dealer in electrical accessories) is installed near each telephone, and connected up similar to the method before described. At the telephone central the telephone cable is cut and a box with the desired number of similar porcelain switches (about twelve, as a rule), installed in some convenient near-by position, is wired up similar to the manner which has been explained in regard to the special board.

Fig. 16 (A) is a sketch diagrammatically illustrating this simpler method of making simultaneous drop tests in regard to eight outlying points. A is a formed and sewn telephone cable running to the office branch telephone exchange from the top terminals of C C, which consist of eight double-pole, double-throw porcelain knife switches mounted in a box. B is the incoming formed and sewn telephone cable, eight pairs of which are led to the middle terminals of C C. The two bottom terminals of each switch are connected together and wired by a flexible cord to the + side of its voltmeter D. The zero (—) side of each voltmeter is connected to arbitrary zero (lowest voltage point of the rail system). E is a double-pole, double-throw porcelain switch to the middle points of which are attached the two incoming telephone wires. The two top points of this switch are connected up to the local telephone and the two bottom points to the nearest rail-bond.

Such simple and economical apparatus forms a means whereby these tests, which in the present state of electrical engineering are an absolute necessity, can be easily made at a minimum expenditure.

Referring to the matter contained in the article, "Negative Boosters," which appeared in the "Electrical Review," October 8th and 15th, 1904, it may not be out of place to say, in the event of there being much insulated cable between the rails and the low-voltage bus-bars, that the lowest voltage point of the rails ought, as a rule, to be connected to one of the lines, and that such line must then be used as the zero wire instead of the one running to the low-voltage bus-bars ("negative bus").

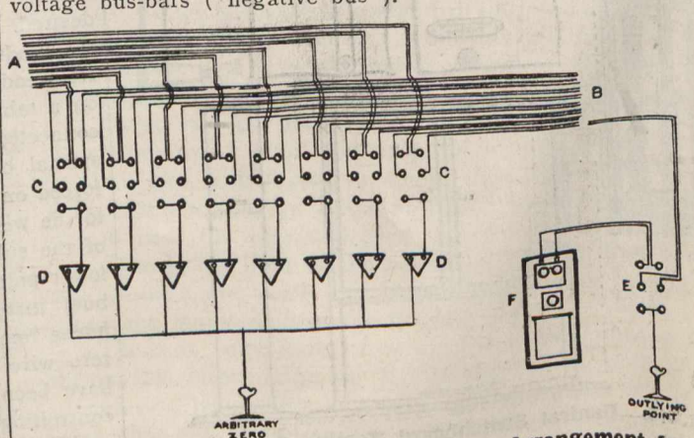

Fig. 16 (A).—Diagrammatic Illustration of Arrangement for making Eight or Less Simultaneous "Drop" Tests.

Once the apparatus is installed, tests should be made at frequent intervals, care being taken that the readings are