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THE ADAPTABILITY OF AN EDISON THREE WIRE PLANT.

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THE electrical plant of the Incandescent Light Co., of Toronto, Ont., consists of two 200 K. W., driven direct, four 100 K. W. and six 60 K. W. belt driven generators of the ordinary Edison type, shunt wound for 140 volts. The Company at present are supplying light and power on the three wire system, and also power for street railway purposes at from 500 to 650 volts. It is not necessary to describe in detail the working of the three wire plant, as that system is fairly well understood by the electrical

representing two pairs, are to be cut in on the street railway system. All main and auxiliary switches on these machines, together with those leading to the \pm bus, are opened. This cuts out these generators from the three wire system entirely. All machines are now brought up to the same potential as indicated by the galvanometers, then close S₁ S₂ (shown between ammeters and \pm bus). This has simply the same effect as closing the \pm switches, but being disconnected from the neutral bus. Close switch 4 + on No. 1 dynamo, and 4 - on No. 3. The special bus has now connected the four machines in series,

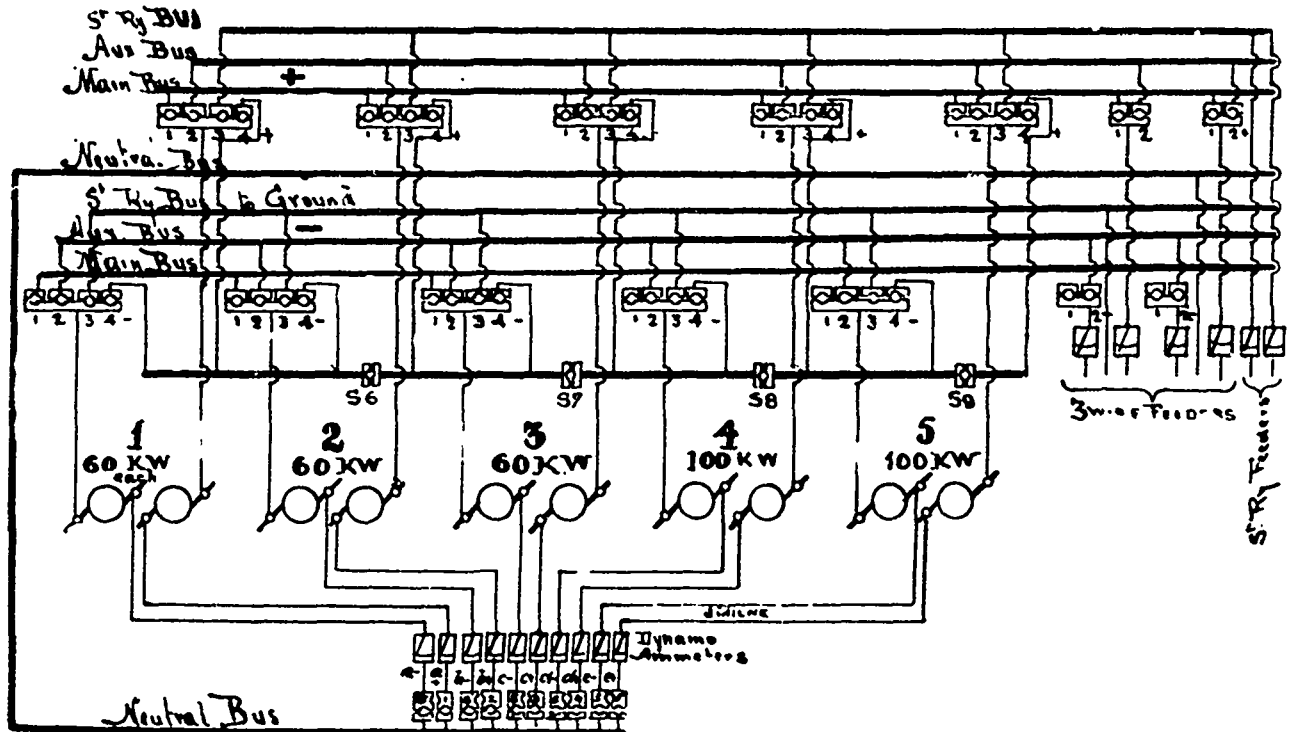


FIG. 1.—MILNE'S ARRANGEMENT FOR SUPPLYING LIGHT AND POWER AT 125, 250, 500, 1,000 AND 1,500 VOLTS.

fraternity; but a short description of the switch-board as it is arranged at present, together with the manipulation of same, will not be out of place.

The switch-board is arranged for running on two pressures, and by dividing the auxiliary bus three different pressures are run—this being found necessary owing to the distribution of the load and the losses on certain feeders at certain times. In re-arranging the switch-board for the supplying of the 500 volt current, it had to be taken into consideration that this power could not be supplied by any particular set of dynamos, for various reasons, and also that the present three wire system had not to be interfered with; so that the generators could be switched in on the three wire or on the street railway system with the least possible delay. The accompanying sketches show very clearly how this was done.

As seen on Fig. 1, there are 4 switches on the + and - poles of each pair of dynamos. These are marked 1, 2, 3 and 4 + and -, and are for main, auxiliary, street railway and special bus bars respectively. The object of this special bus, as it has been termed for convenience, will be seen later on. The reader will please bear in mind that the three wire plant is in operation 24 hours per day, and it will easily be seen that should any error be made in the manipulation of the switches, it simply means disaster to some of the armatures. As no mistakes have occurred so far, we may safely assume that same will not happen.

We will now suppose that the dynamos marked 1 - 3 on Fig. 1,

switch 3 - on No. 1 generator is now closed, i. e. the - pole of the series is connected to ground, and all that now remains to do is to close the final switch 3+ on the No. 3 machine. Before this is done, however, care is taken to have the pressure the same as that of the bus bar. This is seen by galvanometer or voltmeter as in common practice. The arrangement is shown very clearly in Fig. 2, omitting the lower parts of the diagram. All switches are marked so as to agree with Fig. 1.

When two pairs of machines are running and it is necessary to cut in one and out another pair, Fig. 2 illustrates the method adopted. The diagram so clearly shows the arrangement that it is unnecessary to describe it. Two 100 K. W. generators can quite easily be switched in and the load transferred from two 60 K. W. with no trouble whatever; the only precaution to be taken is to have all machines doing precisely the same amount of work.

In figure 3 there are shown four pairs of generators in series multiple, supplying current at 500 volts, and also part of the current generated by one pair being supplied to the three wire system. One pair of the 100 K. W. is running at 400 amperes at 250 volts, while the other pair is generating 700 amperes at 250 volts. Therefore it will be seen that 300 amperes at 125 volts are being supplied by each of these 100 K. W. generators to the three wire system, and still in connection with the 500 volt system. This, of course is simply a modification of a 5 wire system, and has given excellent results.

The writer was a little dubious as to the successful operation