

controlling the machinery and electrical apparatus must be worked out.

The original arrangement of the generators, water-wheels, switch-board, exciters, etc., is shown in Fig. 1, which is a plan representing the original arrangement of generators, water-wheels, switch-boards, etc., from which it will be seen that exciters are belted direct to the main shafts, and a switch-board for each of the four generators, located near the generators and a distance of 350 feet apart. The transmission lines enter the tower and from this point the lines connected with the generator switch-boards by passing overhead on ordinary glass insulators, supported by cross-arms fastened to the roof truss.

The disadvantages of this general lay-out were the poor regulation obtained, because of the exciters being driven direct from the main shaft, the speed of the exciters changing with changes in load, which multiplied the voltage regulation, and made it impossible to obtain good regulation.

The switch-board arrangement, consisting of a separate switch-board located with each of the four generators and marked "S" on the plan Fig. 1, could be operated only at a great disadvantage, especially during an emergency, and at a large operating expense for switch-board attendants, at all times. This plan called for three men on each shift, and three shifts would require nine switch-board attendants. It can be seen at a glance that in case of an emergency it would be impossible for the switch-board attendants to know what was best to do, as the distance between the three switch-boards was such that the three men could not communicate with each other, and a great loss of time would be experienced in the event of an emergency before the switch-board men could communicate with each other.

The position of the switch-board was such that the operator could not see the water wheel attendants, who, in starting and stopping the generators, would be stationed at water wheel governor represented by the letter "R" on the plan Fig. 1.

Owing to the considerable noise made by the gears, etc., it was found necessary to establish a means of signalling the water wheel attendants, so that the water wheels could be regulated and this frequently required a lapse of time, amounting to twenty minutes. In connection with Fig. 1, we will refer to a section view of the power house, Fig. 2, as originally laid out, showing the wires connecting the generators with the transmission line, to be located up in the roof trusses, a wooden floor throughout the entire power house, and a twelve ton hand crane for handling the machinery. Considerable difficulty was experienced in operating the plant so as

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