was hull down. Another demonstration was given, when those on board the Whitney were notified of the proximity of a sister ship on her way from Boston to New York by the ringing of the bell, although some miles distant.

A novel vessel for the United States navy was launched recently from the yards of the Gas Engine and Power Company, and Charles L. Seabury & Co., Consolidated, at Morris Heights. Length, 80 feet; beam, 18 feet, and draught, 3 feet 6 inches. When loaded she will displace 72 tons. It is for use on transports, and is built in five sections, each watertight and box-like in form. The plating of all is 1/4-inch ship steel, with lap points. In putting the vessel into commission, the boiler section will be floated first, establishing the water line, and the others will follow in order, working either fore or aft. They are fitted with sea valves, and sea water is admitted into their bottoms until they reach the common water line. When the sections have been fastened together the water ballast will be removed, and the boat will be ready for service.

The two new vessels being built for the fisheries protection service will be cruisers, for their size equal to anything in the British navy. Their speed will be seventeen and sixteen knots respectively. The largest vessel is for the Atlantic coast service, and will be built by the Vickers-Maxim Company. She will be a twin-screw steamer of 700 tons, 200 feet long and 25 foot beam, and will carry sixty bluejackets. She will have armoured decks and a searchlight of 4,000 candle power. Her armament will consist of several pom-poms and Maxim-Nordenfelt quick-firing guns. The second cruiser will be built by the Polson Iron Works, Toronto. She will also be a twin-screw, 176 feet long, 22 feet beam and 540 tons. Her crew will number 45 men and her armament will be pom-poms and Nordenfelts. She will outvie in speed and armament anything on the Great Lakes. These cruisers are to be ready in six months, and they will have the unique distinction of being the first two vessels of the Canadian navy.

## 26

## GOLDSTREAM-VICTORIA WATER POWER AND ELECTRICAL TRANSMISSION.

## BY E. JACOBS, IN THE B.C. MINING RECORD.

The British Columbia Electric Railway Company operates its system in Victoria by electricity generated by water power obtained from the head of Goldstream where, at a distance of 17 miles from the city, there are three lakes.

lons and is at an altitude of 655 feet above that of the power house. The supply pipe-line, which is 7,920 feet in length, is of rivetted sheet steel, and for the first part of its length is 33 inches in diameter, afterwards being 30 inches. The water is delivered at the generating station at a pressure of 285 lbs. per square inch.

The power house is a fire-proof structure, with walls of brick and concrete and roof of tar and gravel. Its dimensions are, length, 56 feet; width, 42 feet, and height, 24 feet, and it is sub-divided into three compartments, viz., a water. wheel room, a generator room and a transformer room. The plant installed in it consists of two 38-inch Pelton ironmounted type impulse water wheels, each developing 600-h.p., and one 54-inch fitted with Dodd buckets and developing 900-h.p. Lombard automatic hydraulic governors are used in connection with all these wheels. The speed of the large wheel is controlled by a needle valve and deflecting nozzle, that of one of the smaller wheels by a deflecting hood, and that of the other by a cut-off hood.

The water-wheels are direct-connected to Canadian machines, and the larger to a 500-kilowatt revolving field alternator. The 121/2 kilowatt exciters for the General Electric 60-cycle three-phase generators, the two smaller to two 360-kilowatt rotating-armature smaller generators are belt-driven, whilst a 20-kilowatt exciter is directconnected to the larger generator. The capacity of each exciter is sufficient to admit of its operating the whole plant and the switching arrangements are such as to provide for its doing so in case of need. The current, after being generated at 700 volts' pressure, is led to a switchboard having five marble panels-three for the generators, one synchronizing, and one total output-and thence to three sets of step-up transformers, which raise the voltage to 17,300 volts, at which pressure it is delivered to the transmission lines. The high-pressure side of these transformers is connected with the neutral point grounded at the generating station only. An air blast is supplied to the transformers by two Buffalo blowers, one 50-inch and one 80-inch, driven by direct current motors of 4-h.p. and 8-h.pl, respectively.

The transmission line is thirteen miles in length. It consists of two three-phase circuits of No. 4 B. & S. copper wires mounted on 22,000-volt insulators. Both are strung on the same pole line. For the first mile the line passes through a rough timbered country to the Esquimalt and Nanaimo Railway, along the right of way of which it runs

eight miles, and thence four miles to Victoria. Owing to there being many high trees along the route of the line, the right of way has been cleared, where necessary, to a width of 600 feet, to guard against interruptions to the service from falling trees. The difference in elevation between th generating station and the city is about 475 feet.

The sub-station in Victoria is a commodious brick building, formerly the power house when steam was used for generating the electric current. The steam-power plant, consisting of six horizontal return tubular boilers, a cross-compound Corliss engine and a high-speed Ball automatic engine, together with an electric equipment including alternating generators with a total capacity of 400 kilowatts, for lighting, and 360-kilowatt 500-volt direct current machines, for railway purposes, switchboard and other requisite electrical appliances, is kept here in reserve in case of accident to the water power. The conductors are led into the sub-station from the front of the building through 12-inch glazed tile pipes,

set at an angle of forty-five degrees as a protection against bad weather. They are taken thence through a separate wire well to lightning arresters and re-actance coils, situate in the basement, where there are high potential switches so arranged that any set of transformers may be



The Esquimalt Water-works Company, which holds the water right, some years ago built substantial dams for water storage purposes. From these dams the water flows. along the bed of Goldstream two and a half miles to the balancing reservoir, which has a capacity of 220,000,000 gal-

