The main turbines are shown in the illustration. They are Francis turbines of the twin spiral type with horizontal shaft running at 375 r.p.m., and are coupled direct to the alternators, the coupling flanges being forged on to the shaft. Each unit is mounted on a solid cast iron base plate grouted into the engine room floor. This arrangement ensures a very accurate and simple lining up on site, easy dismantling and remounting for repairs, and equal pressure on the foundations. The shaft runs in two ring lubricated bearings of ample dimensions mounted on pedestals. The bearing on the free end is fitted with thrust collars. The lower bushings of both bearings are hollow and water cooled. The runners are made in special bronze and screwed on to flanges forged on to the shaft. The spiral casings are made in cast iron reinforced by steel bolts and guide ribs cast in. The guide apparatus is arranged outside the turbine casing, thus making all links and bolts accessible. The guide rings and covers in contact with the water have cast steel linings, which are easily interchangeable in case of wear. To reduce the distance between the bearings the draft chest has an elliptical form on the bottom. An intermediate pipe connects this draft chest to the wrought iron draft tubes.

The turbines are regulated automatically by oil pressure governors of Escher Wyss and Co.'s patent, mounted on the same bedplate as the turbine. The governor is the largest size of Escher Wyss and Co.'s standard type, fitted with speed changing device from the switchboard, further with quick closing device in case of falling off of belt, thus preventing the running away of the set. The servo-motor can be operated by hand instead of automatically, by means of a hand wheel regulating the access of the oil pressure to the one or the other side of the cylinder. The necessary pressure oil for the governors is supplied by an oil pressure plant.

To prevent dangerous pressure shocks in the pipeline under sudden throwing off of load of the turbines a relief valve is provided for operated direct from the governing gearing of the turbine. The relief valve works in such a way that when the governor closes the guide vanes to a certain amount, the corresponding area is opened in the relief valve. To prevent losses in water the relief valve closes automatically after a certain time.

The exciter turbines of 460 H.P. are coupled by means of flexible couplings to the exciters running at 600 r.p.m. The turbines are impulse wheels with two nozzles, each regulated by an oil pressure governor mounted on top of the casing.

The oil pressure plant consists of three pump groups, each group of sufficient size to feed four generator turbines and governors. Each pump is driven by a small impulse wheel of about 25 H.P. running at 80-100 r.p.m. Regulation is done by hand by throttling the pressure in the needle nozzle. All parts exposed to water pressure were tested to a test pressure of 350 lbs. per square inch.

The installation is working since October, 1912 and has been a great success in every respect.

George S. Rice, chief mining engineer of the United States Bureau of Mines has dedicated to public use a patent just issued by the Government for a hoisting cage which is primarily for use in rescue work, but can be used for other purposes. In describing his invention, he states that it has for its object the provision of a novel cage which shall have peculiar advantages in regard to portability and ease of assembling and disassembling. He adds that although not limited to such use it is of especial utility in mine rescue work as an emergency cage.

COAST TO COAST.

New Westminster, B.C.—Under an arrangement which the Provincial Government and the C.P.R. are upon the eve of entering, it is now proposed to have the new government highway bridge across the Pitt River finished many months ahead of the time originally set for its completion. The Provincial Government authorities are at present conferring with the railway officials with a view of securing the steel superstructure of the present railway bridge across the Pitt and placing it upon the concrete substructure of the new Government bridge, which will be located several hundred yards above the railway bridge and about where the ferry landings now are.

Vancouver, B.C.—In order to facilitate the work of protecting the forests from fire, the Provincial Government is building a number of trails through the danger spots, to aid in concentrating the forest guards in emergency. Work is going on at present on a trail from Gordon Pasha Lake to Powell Lake; a trail from Campbell Lake to Salmon River Valley, and a trail from Bond Sound to Kingcom Inlet. Cabins are being built along the trails at intervals to form resthouses for the firewardens, and supplies are being packed in over the trails, in order to prepare for emergencies. Superintendent George D. McKay has ready a supplementary list of fire guards who will be set to work as soon as the weather gives any indication of proving conducive to forest fires.

Toronto, Ont.—Toronto is to have the proposed auxiliary service to the waterworks pumping station, filtration plants and sewage disposal plant, in order to insure the necessary supply in case of interruption in the electrical transmission lines to the city. Chairman Ellis, Mayor Hocken and General Manager Couzens of the Toronto Commission had a conference with Hon. Col. Hendrie, Mr. W. K. McNaught, M.P.P., and Chief Engineer Gaby, of the Hydro-Electric Commission, and after a full and careful discussion of the joint report of the Provincial and city commission engineers regarding the proposed auxiliary plant it was approved. The report, which is signed by Messrs. Gaby and Couzens, does not assume to be comprehensive in character, and suggests two plans, part of which reads as follows:—"The power required for the civic requirements as outlined is over 14,000 H.P., and there are two broad lines on which a permanent auxiliary electric service to operate the plant can be dealt with:—(a) By the installation of generating plant within the city, to be given by steam, gas or oil engines; (b) connection with the system of the allied electric companies. A comparison of these two methods shows, in our opinion, the following among other advantages, in favor of the former under present conditions:—Greater rapidity in picking up the load; less delay in transferring the load after resumption of supply; greater reliability; the whole Toronto system would remain under the direct control of the Toronto Commission, and, therefore, under the general Hydro scheme; lower capital cost; economy due to utilizing the steam plant for the reduction of peak loads; ability to use the plant in cases of emergency in accordance with the terms of the agreement between the Provincial Commission and the city of Toronto; greater possibility of expansion in accordance with the requirements of the system and service. We, therefore, beg to recommend the adoption of scheme (a) in general principle, when the details can be carefully worked out and a report submitted to the Toronto Commissioners with a view to considering the vari-