Batching Plant for Whakamaru Dam

Winget Limited have completed a high-capacity fully automatic concrete batching and mixing station for this important New Zealand development. As an urgent export order the plant has been built to an extremely close delivery schedule

We recently inspected at the works of Winget Limited, Rochester, England, a high-capacity fully automatic concrete weigh-batching and mixing station destined for the construction of the Whakamaru dam on the Waikato river, North Island, New Zealand. Whakamaru is the fourth of a chain of ten stations planned by the State Hydro-Electric Department, and will ultimately have a capacity of 100,000 kW.

The concrete plant is noteworthy not only because of its size and advanced design but because it has been built to an extremely close time schedule. The rapidly increasing demand for power in New Zealand gives the utmost urgency to these hydro-electric developments, and the original Winget quotation for 15 months delivery for the plant was met with an emphatic request for closer timing. In response to this, Winget Limited accepted liability for delivery ex works within eight months, and the plant was completed in advance of schedule. The event was signalised by a visit to the Winget works of His Excellency F. W. Doidge, the High Commissioner for New Zealand.

The general layout of the plant is shown in the perspective sketch, Fig. 1. A multi-compartment storage bin surmounts the structure and supplies a nest of automatic weigh batchers on a staging immediately below. These batchers can feed either of two mixers on a reinforced-concrete platform forming the first storey of the station, and these mixers discharge to a system of radial belt conveyors at ground level. When finally erected the plant will stand 75 ft. high and will occupy a ground area of 40 ft. by 50 ft.

The storage bin (Fig. 2) has a capacity of 400 cu. yards, and has six aggregate compartments arranged round a central cylindrical storage tank divided into two compartments, one for cement and the other for pozzolan. All compartments have steep sides to prevent hang-up and to avoid dead storage space. Aggregates are fed to the bin by a bulk conveyor and thence through a battery of vibrating screening units located above the bin into the various compartments by means of chutes. Cement and pozzolan are fed by screw conveyor to the central compartments. The discharge from the various compartments is controlled by pneumatically operated gates.

On the batcher level there are five aggregate batchers, one cobble batcher, one cement batcher, one pozzolan batcher and one water weigh batcher. All these batchers are scale mounted, and the weighing is carried out automatically in two stages—a rapid fill until the required weight is nearly attained, followed by the intermittent addition of small quantities to get accurate final weight. In Fig. 2 some of the batching hoppers will be seen arranged round the main storage bin; they have been inverted to clear the pneumatically operated discharge gates.

A view of the mixers is given in Fig. 4. They are of the Winget-Koehring type, each of 3 cu. yard capacity, and are tilted pneumatically. A two-way retractable feed chute receives the charges via a collecting cone from the batchers above. It is mechanically operated by the mixers themselves, and a dust-tight seal between the charging chute and the mixer mouth is made by a rubber sealing ring.

The entire station is operated by one man from a central control board, depicted in Fig. 3. The scale arm of each batcher is extended to this board to indicate the weight on a dial and to record it on a paper chart. A single chart accepts the records from all the nine batchers and is also marked with the date and time, so that a permanent record is made of every mix passed through the plant. Setscrew turrets above the dials enable any desired mix to be preset, and a selector knob allows any of 12 mixes to be selected instantaneously. Compensating gear is also provided to allow for variations in the moisture content in the sand.

On the desk of the control board is a series of

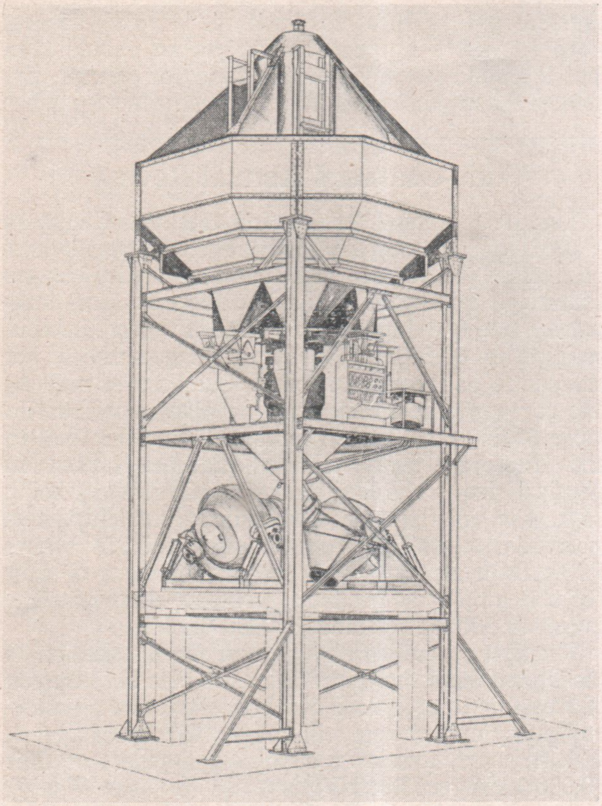


Fig. 1. Perspective sketch of the Whakamaru batching plant

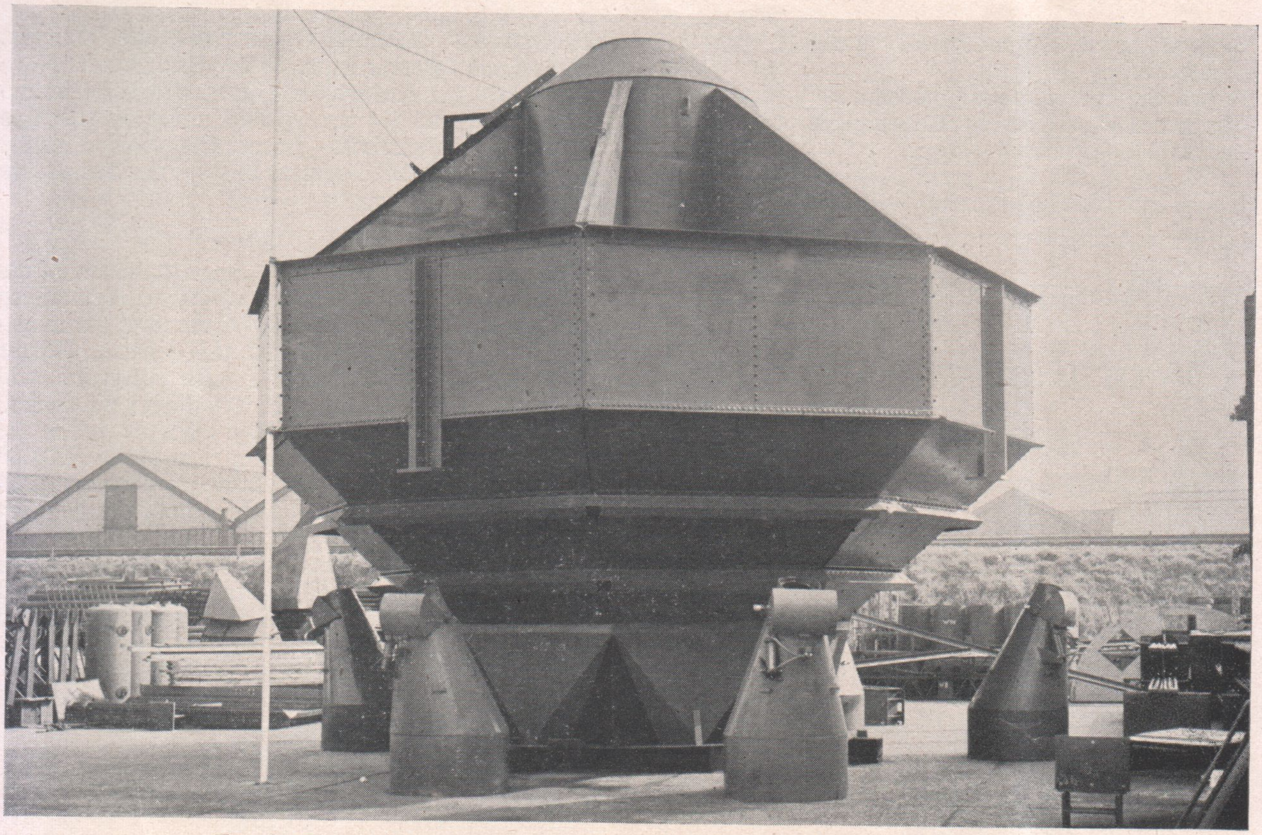


Fig. 2. The multi-compartment 400 cu. yard storage bin and weigh batchers

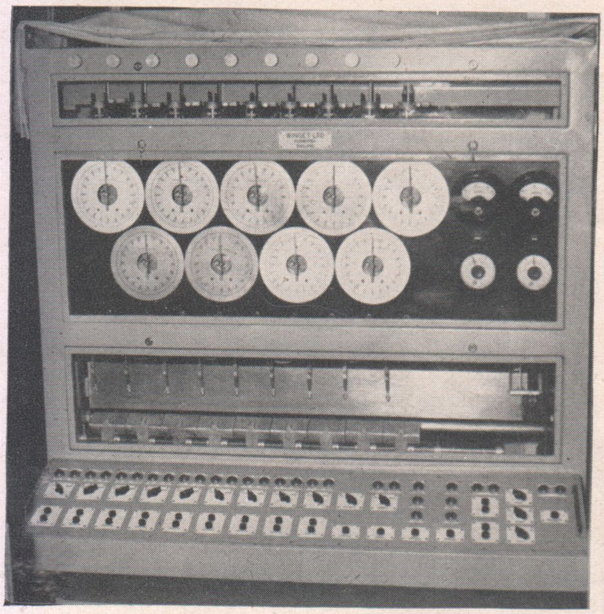


Fig. 3. Central control board, incorporating dials and recorder pens for the weigh batchers and control switches for the entire plant

pushbuttons and indicator lights whereby each batcher can be charged and discharged. Further pushbuttons select the mixer it is desired to use and control the operations of charging, running and discharging it. All operations are checked by indicator lights, and a timer ensures that the mixer runs for a predetermined time before it can be discharged. An ammeter in each mixer-motor circuit indicates whether the mixer is operating full or empty.

Each set of pushbuttons has associated with it a changeover switch for hand or automatic operation. In the "hand" position the operation concerned has to be controlled by pushbutton; when all the switches are set to "automatic" the entire batching, mixing and discharging cycle proceeds automatically under the

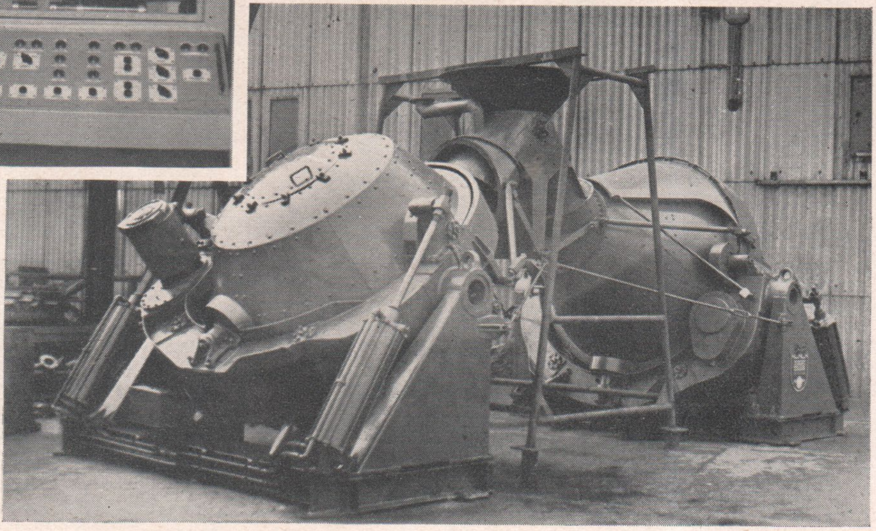


Fig. 4. The two 3 cu. yard Winget - Koehring mixers assembled with their feed chute

control of a motor-driven camshaft-type cycle controller.

All the control-board mechanism is housed in a dustproof glass-fronted case which is pressurised by a small motor-driven blower.

Plants of this type have been supplied for dam construction on many other important hydro-electric developments, including Owen Falls dam, Uganda; Grimsel and Oberaar dams, Switzerland; Venda Nova dam, Portugal; Barrage les Tignes, France; Hirakud dam, India; and for a new dam under construction by the Tasmanian Hydro-Electric Commission for the Trevallyn power development to serve the Tasmanian aluminium industry.

Abstracts from the World Technical Press

Tiber Valley Development

The following abstract is restricted to points not covered by the article printed in the February issue of WATER POWER, p. 44, and deals mainly with the civil engineering aspects of this project. The present Tiber Development Scheme is the logical outcome of investigations, initiated many years ago, which, at the outset, were carried out with a view to regularising the lower and middle stretches of the river for irrigation purposes. Once completed, this scheme, with its 15 power stations and eight storage reservoirs, will ensure a production of about 950 million kWh backed by a reserve of about 900 million kWh, as well as the irrigation of an area of no less than about 200,000 acres. In addition the river will become navigable as far as its confluence with the Nera, about three miles south-east of Orte.

The first construction stage comprises the Baschi reservoir and station, and the three low-head plants on the Tiber proper: Castel Giubileao, already in

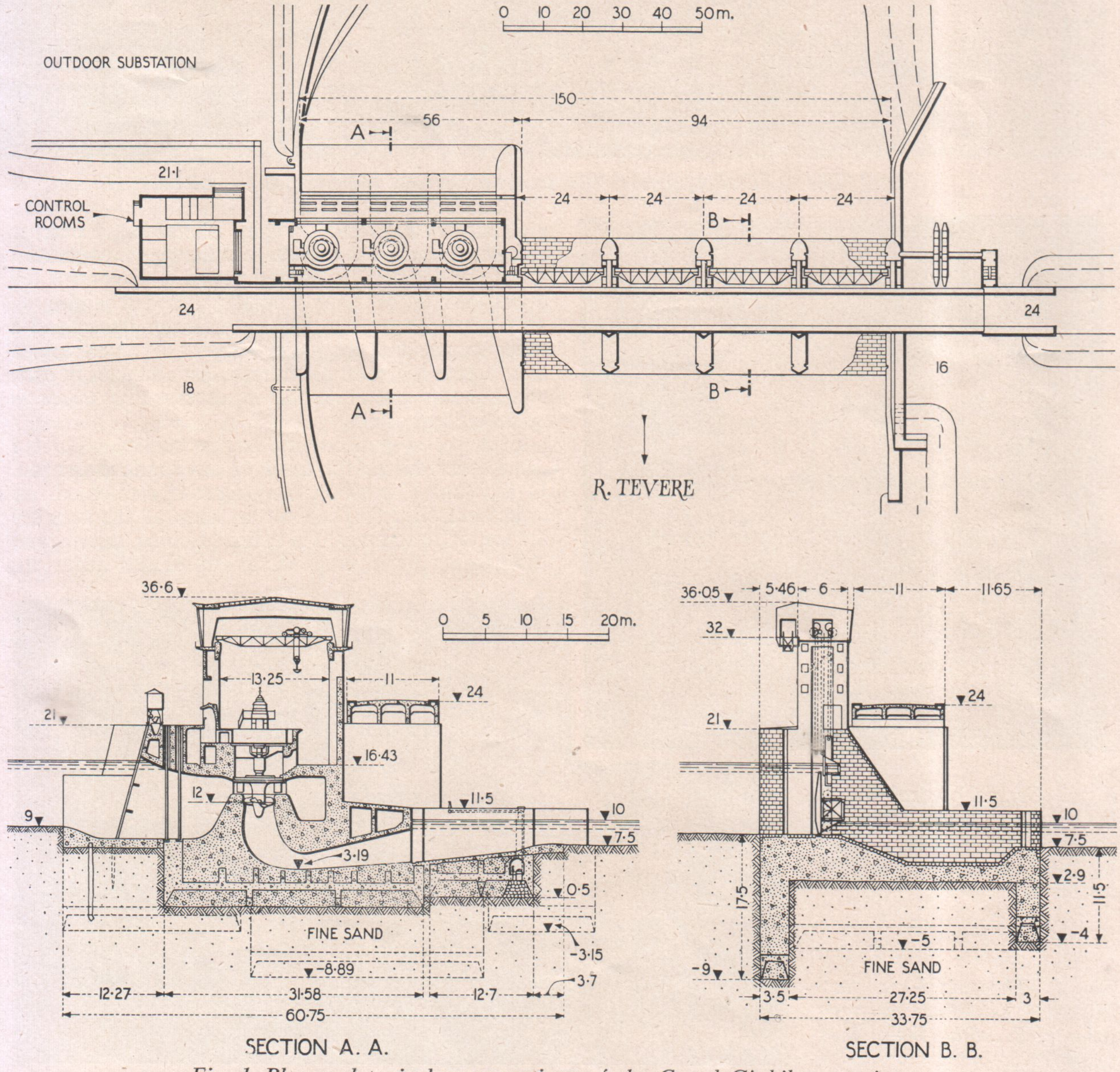
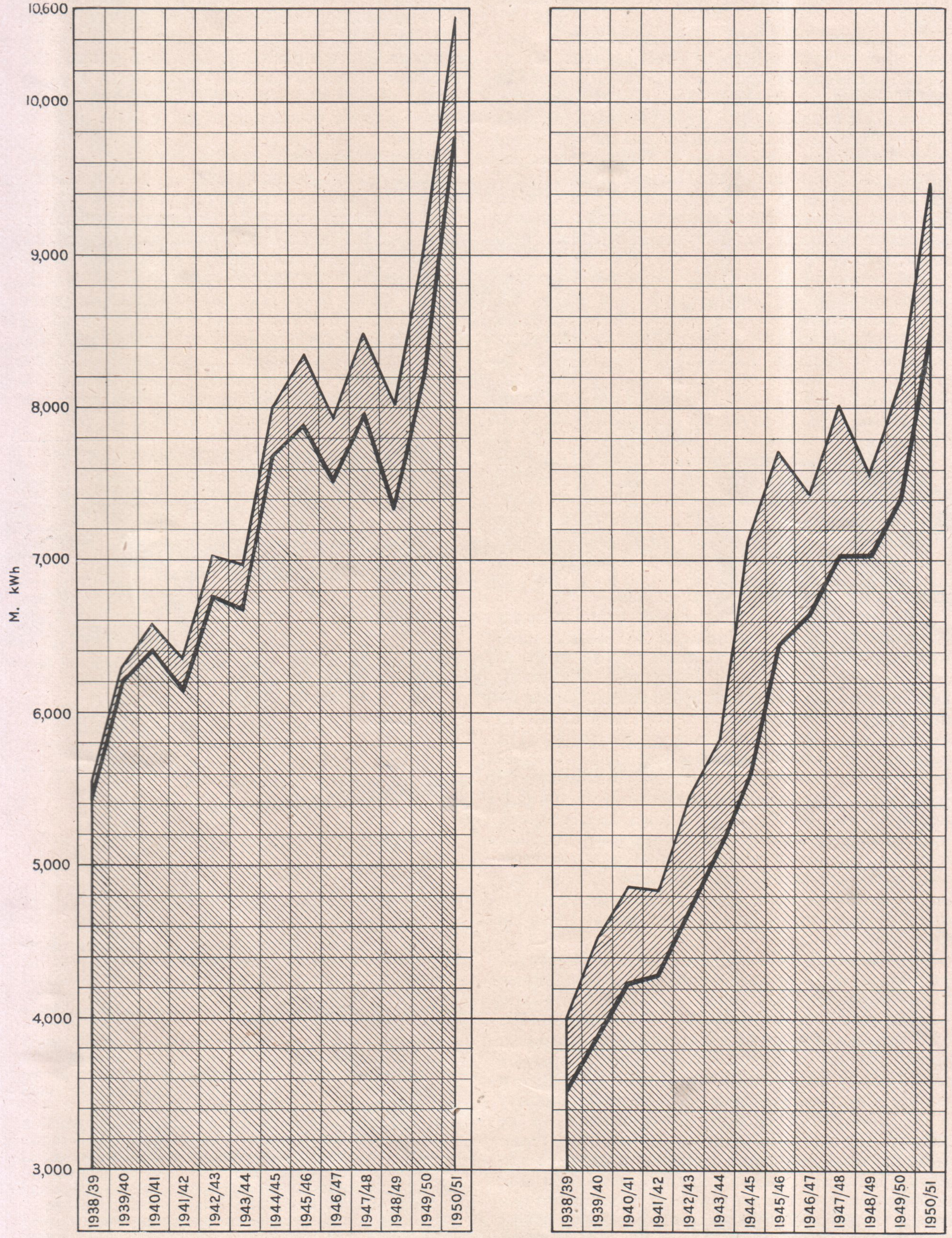


Fig. 1. Plan and typical cross-sections of the Castel Giubileao station



Electricity Supply in Switzerland

Fig. 1. Electric energy produced and supplied by public-utility concerns. Upper curve: *Total production inclusive of railway and industrial power plants, as well as imports.* Lower curve: *Hydro-electric production*

Fig. 2. Swiss consumption of energy. Upper curve: *Home consumption, including electric boilers and storage pumps.* Lower curve: *Home consumption, exclusive of electric boilers and storage pumps*

operation, Nazzano, now in course of completion, and Foglia.

Fig. 1 shows the Castel Giubileao station in plan, and also reproduces typical cross-sections of the power-house proper and the dam respectively. The use of cofferdams sunk into the bed of the river was unavoidable to ensure perfectly safe foundations, since the river bed at the dam site consists mostly of fine sand. Excavation work began in January 1948; the lifting gear of the sluice gates, housed in the piers of the dam, was fitted in February 1950, the internal equipment of the power house and the outdoor substation followed in May and September 1950 respectively.

The setting up of the Castel Giubileao Station involved the following work:—

Open excavations	219,470 cu. yards
Compressed-air excavation	61,800 cu. yards
Volume of concrete, foundations included	106,500 cu. yards
Reinforcing steel	1,667 tons
Number of working days	350,000
Aggregate consumption of electric energy with work in progress	2,450,000 kWh

The Castel Giubileo station feeds three high-tension transmission lines connecting with the Nazzano plant, the State Railway system, and the distribution system of the Romana concern. (*L'Energia Elettrica,* Milano, Vol. 28, No. 12, December 1951, p. 714, 7 pp., 9 ff.)

Electricity Supply in Switzerland

The introduction to this survey contains sharp criticisms of the policy followed by some leading hydro-electric concerns in Switzerland with regard to public requirements. Owing to lack of understanding and co-operation, the Swiss hydro-electric power industry appears to have failed to avail itself to the full of the obvious goodwill shown by the public. The position was made worse by wrong anticipations as to the future development of energy consumption. It seems that during the period of industrial standardisation which preceded the Korea conflict, certain experts took a rather pessimistic view about constructing new hydro-electric plants while, in other quarters, fears were expressed that energy requirements could not be met during the winter months. The author attempts to refute these views by means of graphs based on the official statistics.

Fig. 1 displays the evolution of Swiss hydro-electric production, taken as a whole, during the last thirteen hydro-graphical years, each covering the twelve months' period from October 1 to September 30. The total increase of 4,400 M kWh represents an average yearly increase of about 330 M. This comparison shows clearly the gigantic effort made during the last ten years by the Swiss hydro-electric power industry in the utilisation of the water-power resources of the country. The curve above the production curve represents the total production inclusive of railways and private industrial concerns, thermal production, and imported energy. The narrow strip between the two curves corresponds to a supply of energy, varying between three and at most ten per cent., which public utility concerns could not draw from their own hydro-electric plants.

The consumption curves are shown in Fig. 2. Compared with the last pre-war year 1938-39, consumption during the 13 years instanced, exclusive of electric boilers and storage pumps, expressed in round figures, increased by 5,000 M kWh, while the hydro-electric power production of home plants did not exceed 4,300 M kWh. Taking the requirements of electric boilers and storage pumping plants into account, this increase amounts to about 5,450 kWh, *i.e.* a yearly average of 420 M kWh, which corresponds to the average possible production of the Verbois plant on the Rhone.

Further graphs show consumptions for the most important groups of consumers, *viz.* households and small trades, railways, industry, exports, etc.

As to the period following 1952, there is no reason whatsoever for anxiety. Not to mention several important projects either under consideration or approaching the construction stage, work is now in progress on no fewer than twelve large-scale plants with an aggregate production of 900,000 kW, ensuring about 1,800 M kWh in the winter, and about 1,400 kWh in the summer months. At the same time, these plants will raise the total storage capacity from 1,100 to 2,300 M kWh. (*Technische Rundschau,* Bern, No. 50, Vol. 43, 14.9.51, Section V, p. 33, 3 pp., 9 ff.)