SWISS TURBINES.

BY FRANK C. PERKINS.

The Swiss turbine has come to be recognized in continental Europe as standard and is found in operation throughout the world. One firm alone in Switzerland has installed more than 3,000 turbines, aggregating more than 300,000 horse power. This firm, Escher, Wyss & Company, has its main works at Zurich, Switzerland, and others at Ravensburg, in Württemberg.

A very interesting turbine exhibit has been made by them at the Paris Exposition, as seen in illustrations, Figs. 1 and 2. The largest turbine shown by them is a 2,500 horse power horizontal Francis double turbine, seen in Fig. 1; this turbine has a diameter of 5·25 feet and operates at a speed of 160 revolutions per minute.

A 600 horse power simple Francis turbine is shown, which will be installed at the Electrical Works of Vezère (Correze) for the Société des Forces. This turbine will have a speed of 300 revolutions per minute under a head of 141·14 feet. The diameter is 3·6 feet and the turbine is equipped with an automatic hydraulic regulator.

The large turbine, dynamo and regulators seen in Fig. 2 are soon to be placed in the power house of the Enterprises des Forces Motrices du Rhone at St. Maurice (Valais) for lighting the village of Lausanne, Switzerland, by electricity. This turbine has an effective capacity of 1,000 horse power under a head of 104·96 to 111·52 feet and operating at a speed of 300 revolutions per minute.

The diameter is 3·28 feet, and the regulation is obtained by the automatic hydraulic regulating apparatus seen in the foreground of the illustration in connection with electrical regulating apparatus of Cie. l'Industrie Electrique of Geneva, Switzerland. The direct current generator, which is connected to the turbine by a flexible coupling, is of the type designed by M. Fleury, the engineer who has introduced so many high tension direct current power transmission plants. This machine is a six-pole continuous current generator, and it will be noticed that the base is especially insulated by being mounted in porcelain supports with iron pins.

Escher, Wyss & Company have recently constructed a vertical centrifugal double turbine for the electrical transmission plant between Chevre and the city of Geneva, Switzerland; the capacity, when used as a summer turbine with low water, is about 900 horse power with a head of 1410·4 feet and a water flow of 5,590 gallons per second. When the turbine operates in winter under high pressure, it has a capacity of 1,200 horse power under a head of 26·5 feet and a flow of water of 4.160 gallons per second, the speed in both cases being 120 revolutions per minute.

A high pressure double turbine with automatic hydraulic regulation has been built by this firm for the electrical plant of the Société Industria Electrica Barcelone. It has a capacity of 550 horse power and operates at a speed of 375 revolutions per minute under a water head of 301·76 feet. The diameter of this turbine is 3·608 feet.

A number of interesting models are exhibited of dynamos of the Compagnie de l'Industrie Electrique, of Geneva, and of Brown, Boveri & Company, of Baden, directly connected to turbines of Escher, Wyss & Company; also numerous turbine and pump models of existing plants in Switzerland.

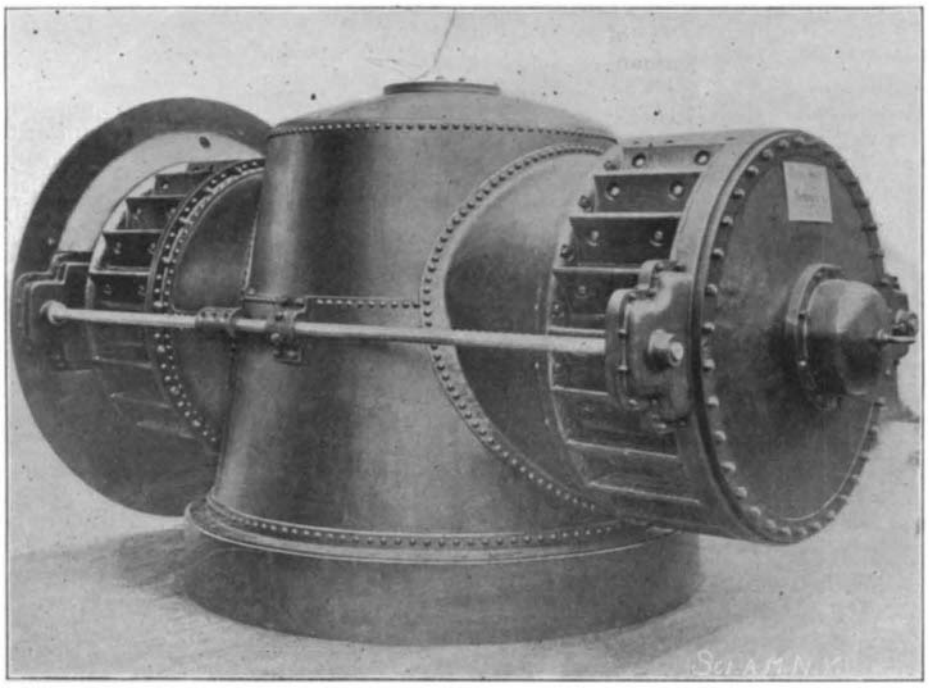

Fig. 1.—FRANCIS TURBINE—PARIS EXPOSITION.

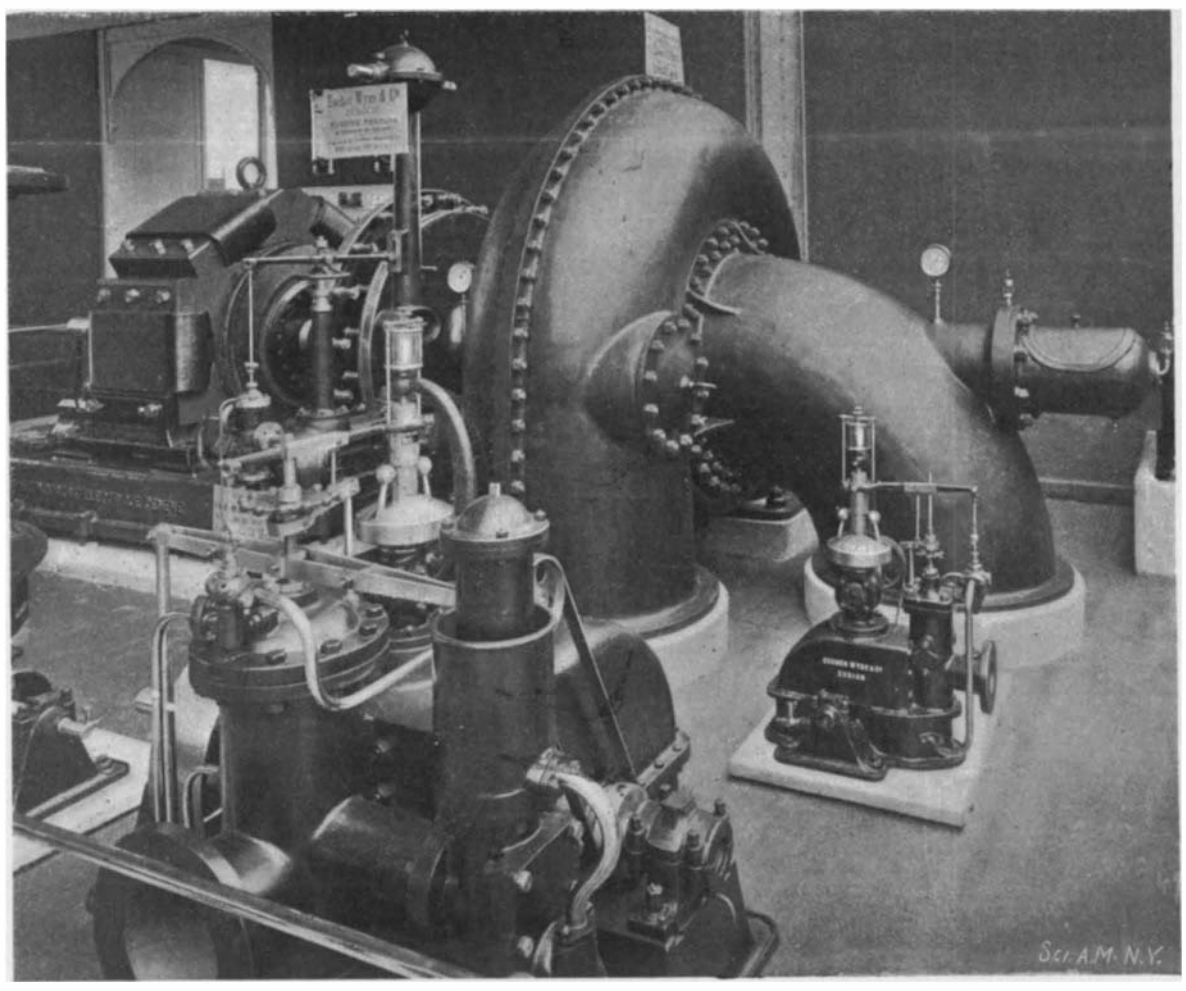

Fig. 2.—DIRECT CONNECTED TURBINES OF ESCHER, WYSS & COMPANY, OF ZURICH.

THE interchangeable system appears to have been invented by Eli Whitney, who in 1798 had a contract from the United States government to supply 10,000 muskets. He was obliged to employ the system by the scarcity of skilled labor.

Electric Printing.

A London photographer, Mr. Friese Greene, has succeeded in producing electrographic paper which promises to revolutionize the "art preservative of all arts." Using the new, patent paper, the Electrical Inkless Printing Syndicate has recently perfected a process of printing without ink. Instead of saturating the paper with the sensitizing materials, as has hitherto been done, it has been found best to mix them with the pulp in the process of manufacture; and so a radical departure has been made and a new machine-made paper has been invented that has rare properties.

As the chemicals used are abundant and cheap, the new medium can be produced as cheaply as common paper. The prepared paper is stable and colorless; is unaffected by any other agent than the electric current; may be kept indefinitely and sent to the press directly from the roll as manufactured, with no preliminary treatment whatever; yields instantly a dense black, permanent print; requires no subsequent "fixing" or developing; indeed, is ready for distribution immediately, as there is nothing like ink to smirch or require drying; in short, meets all the requirements of a perfect medium for electric printing.

Given such a suitable paper, and the mechanical problems incident to a practical system of electric printing are comparatively simple.

The London syndicate, having satisfactorily completed the experimental part of its undertaking, is now engaged in demonstrating the workings of the new process and overcoming the objections of printers.

The machine for electric printing is simply an ordinary press divested of all its inking mechanism and having the cylinder or paper-bearing surface covered with a suitable conducting metal. The work of "make ready" is the same as for ordinary printing; and line blocks, electrotypes, woodcuts, halftones, engravings, all kinds of designs in relief, may be used at will.

The "form" is connected with one pole of the dynamo or battery—for most purposes the current may be taken from an ordinary incandescent light wire; the paper-carrying cylinder or surface is connected with the opposite pole. Thus, the metal surfaces of both cylinders are the electrodes, while the paper is in reality a very thin cell in which the pulp is an inert medium and the contained chemicals are the electrolyte. As the cylinders approach each other to press the paper as it is fed between them, the current is switched on automatically and flows from one cylinder through the paper at the points of contact to the other cylinder, the impression being produced instantly by electrochemical action. A governor, or variable "resist," permits an operator to control the quantity and intensity of the current, which must be continuous. The paper possesses magnetic electric properties, and consequently the amount of current required is surprisingly small. The voltage used may be from 10 to 100, and 4 amperes are ample for the largest machines. All inking mechanism being dispensed with, the power necessary to drive the press is greatly diminished. For a given piece of work the cost of current for the actual printing is said to be only one-half that of ink, while a saving of at least one-third in the original cost of presses is assured.

The new process lends itself readily to all speeds, even to the fastest web presses. At an exhibition at Blackpool, England, witnessed by a large company of printers and scientists, a rotary press was run at the rate of 6,000 impressions per hour, and the work was declared perfect in every particular.

Thus far, the efforts of the syndicate have been almost exclusively given to black print, but incidentally there have been some promising developments in the line of color work.

Relative to the appearance of electric printing, The Journal of Printing and Kindred Industries of the British Empire says it greatly resembles lithographic work. The Inland Printer states that samples furnished that paper "are remarkable in their clearness of outline and solidity of color."

At last accounts several of the great London dailies had placed their plants at the disposal of the syndicate for an exhaustive test of the process.

So far as known there have been no attempts as yet to utilize this electrographic paper for any other purpose than presswork; but evidently its field is far wider than this, and not unlikely it will soon be made use of in other fields of graphic art.

H. B. WREN, M.A.

United States Weather Bureau, Washington, D. C.

THE coal-tar derivative fuchsine is generally supposed to owe its name to the fuchsia, as its tint certainly resembles the color of that flower; but this is not the case. The inventor of fuchsine, whose death was lately recorded, M. Francisque Renard, and his brother desired to identify their name with the new product; but, not liking to adopt the appellation of renardine, they translated their family name Renard (fox) into the German Fuchs, and thus arrived at fuchsine, says The Engineer. The same journal seizes the opportunity of making known that the rare metal gallium owes its name to a similar circumstance. Its discovery is due to the French chemist, Lecoq de Boisbaudran, who, by adopting the Latin form of gallium, identifies the name of Lecoq both with gallus, a cock, and Gallia, France.