NEW RESEARCH LABORATORY IN CONNECTION WITH SCHOOL OF MINES, KINGSTON.

Under the directorship of H. T. Kalmus, S.B., Ph.D., there has been recently opened in the city of Kingston, Ont., a new research laboratory to be devoted to researches along the lines of the practical application of electro-chemistry and electro-metallurgy. This laboratory is the property of the mines branch of the Canadian Department of Mines.

The first investigation, which is now well under way in this department, and which is being done for the mines branch, Department of Mines, Ottawa, has to do with the utilization of the element cobalt. (Canada has produced and is producing millions of dollars worth of cobalt, estimating it at a fair market value, of which only about one-third finds its way into the industries). Although this metal is in many respects similar to nickel, yet, no important alloys of it with other metals are in use. An exhaustive series of researches is therefore being undertaken on "The Metal Cobalt and Its Alloys," for the purpose of increasing its usefulness in the industries.

This research, among others which this new department is conducting, requires an electrical equipment of the most modern type. The laboratory is supplied with electrical power from the power plant of the School of Mining, which is being enlarged for the purpose, and has suitable transformers, bus-bars, switch-boards, etc., to operate its furnaces at any current up to 3,000 amperes, and at varying voltages up to 120 volts. This power equipment, situated as it is in the splendid new Nicol Hall, and with the most modern auxiliary apparatus is probably the most complete electro-metallurgical laboratory in the world.

A 28,000 H.P. ZOELLY STEAM TURBINE.

The firm of Escher Wyss & Co., in Zurich, Switzerland, Canadian office in Montreal, has recently delivered to the Rheinisch-Westfelischen Electric Generating Station In Essen the most powerful steam turbine ever built. When running at a speed of 1,000 revolutions per minute it develops 22,500 h.p. eff. under normal continuous working, with a pressure of 150 lbs. per square inch gauge and a steam temperature of 572 deg. Fahr. at the stop valve and a vacuum of 27.5 inch. (A higher vacuum cannot be obtained owing to the fact that only re-cooled water is available for the condenser). The turbine is also capable of developing 28,000 h.p. continuously and 30,000 h.p. for short periods.

This turbine is of the well-known standard "Zoelly" type, of which the Escher Wyss Company have turned out over 225 in number up to the present, aggregating a total output of about 500,000 h.p. The machine has 14 runner wheels, mounted on a strong steel shaft, the total weight of the rotor being 26 tons. The total weight of the generator rotor (Siemens Company's make) approximates 60 tons.

The two rotors coupled together are supported by four bearings being supplied with about 130 gallons per minute of oil for lubrication. This oil is under pressure produced by a pump driven from the main shaft. During the period of starting the main unit the pressure oil is produced by a small centrifugal pump connected directly to a separate tiny steam turbine. When the main unit has attained full speed, this auxiliary turbine is shut down. The oil is conducted from the bearings to an oil tank, where it is cooled down in solenoids of copper, and is then pumped back to the bearings. The oil is consequently used over and over again, and only from time to time a small quantity is needed to replenish the supply.

The exhaust steam is led through a branch of 8 feet diameter to the surface condensing plant, located beneath the turbine, the cooling water being supplied from a cooling tower. A separate turbo-pump then delivers the condensed steam into a hot well, from which the water is in turn delivered to the boiler feed pump.

The attendance of this gigantic turbine-driven alternating unit with its condensing plant is overcome with ease by only three men on each shaft.

LOSSES OF EXPOSED STEAM PIPES.

In a paper read before the British Association it was stated that the effect of the density of the surrounding air greatly enhanced the loss of heat from exposed steam pipes, and that under experimetal pressures of 2,000 lbs. per square inch the heat loss became enormous. Other experiments under normal conditions demonstrated that 1-in. uncovered steam pipe lost in free air 3 b. t. u. per square foot per hour per degree of temperature difference. Out of this total only 15 per cent. was due to radiation and 4 per cent. to conduction. The remaining 81 per cent. was found to be wholly due to convection. In experiments with insulating material it was found that the best of such materials had some thirty times the conductivity of air, so that, were it not for reducing the convection, pipe covering would actually increase the loss of heat instead of diminishing it. This was borne out by the discovery that the heat loss from pipes depended very largely upon the closeness of the packing. If the insulation was very tightly packed, the efficiency was low owing to the increase in conductivity, while, on the other hand, if packed too loosely a large proportion of the convection would still continue. For this reason it appeared that for each class of insulation a certain density of packing was best. In the case of slag wool, this was found to be one-fourteenth the actual density of the individual fibres. In that case the loss by conduction through the insulation to the air would be raised from 0.1 b. t. u. to 0.4 b. t. u. per square foot per degree per hour; loss by convection would be reduced from 3.2 b. t. u. to 0.1 b. t. u. per square foot per hour, the net loss being thus one-seventh of what it would be with bare piping. With bare pipes the character of the service had a distinct influence, but this affected only the loss by radiation. With a good machined surface this loss was reduced from 15 per cent. of the total to about 7 per cent., and if the piping were polished to a mirror-like surface this loss was still further reduced to about 3 per cent. of the total. The loss by convection was not, however, affected in any way, and, as this was the main factor constituting as aforesaid 81 per cent. of the total loss, there was very little to be gained by polishing in the case of ordinary steam pipe temperature. Another factor which was considered was the diameter of the piping. With a small radius the conduction loss was found to become more important, so that the total loss varied with the diameter of the pipe. It was, however, found that this increased loss by conduction only became important with pipes less than ½-in. in diameter, although, as had been previously shown, the loss in the case of fire wires becomes enormous. For pipes above 4 in. in diameter the loss was found to become nearly constant at 2 b. t. u. per square foot per degree per hour irrespective of the diameter.

In connection with the extension of the waterworks of Glasgow, the tunnel which is being made in Rob Roy's country at Inversnaid to connect Loch Arklet with Loch Katrine has just been bored through. The length of the tunnel is 3,900 ft., and the inside dimensions are 12 ft. by 10 ft. The boring operations were commenced over two years ago, but owing to the hardness of the rock the progress has been slow. At each end of the tunnel large basins are to be built.