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Helical Gears Solve Cornwall's Pumping Problem

High Speed Single-Stage Centrifugal Pumps are Driven by Low Speed Hydraulic Turbines, with Pumping Efficiency of 73% including Gear Loss—Direct Drive Would Have Required Fourteen Stages, Causing Sacrifice of Present Efficiency

By R. N. AUSTIN

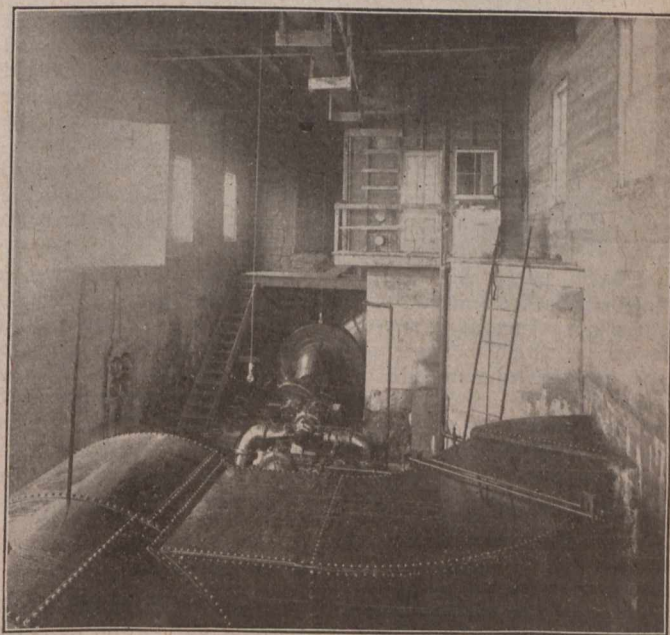
General Manager, Turbine Equipment Co., Ltd., Toronto

CORNWALL, Ont., has the distinction of being the first municipality on the American continent (and most probably in the world) to install centrifugal pumps driven by horizontal hydraulic turbines through the medium of double helical gears, the low speed turbines driving high speed single-stage pumps.

Reciprocating pumps have generally been used where hydraulic turbine drive was available, as many engineers are not yet conversant with the state of perfection that the high speed double helical gear has attained. In addition to the very much higher cost of reciprocating pumps, at least four times as much floor space and much more massive and expensive foundations are required for reciprocating pumps than for centrifugal pumps. In the opinion of the writer, installations similar to the Cornwall one are bound to supplant reciprocating pumps where hydraulic turbine drive is available (especially as a similar arrangement can

be devised for vertical water wheels), just as surely as centrifugal pumps driven by steam turbines through the medium of double helical gears have supplanted triple-expansion high duty steam pumps during the last six years.

In order to keep pace with the rapidly increasing water consumption, the Cornwall town council, toward the latter

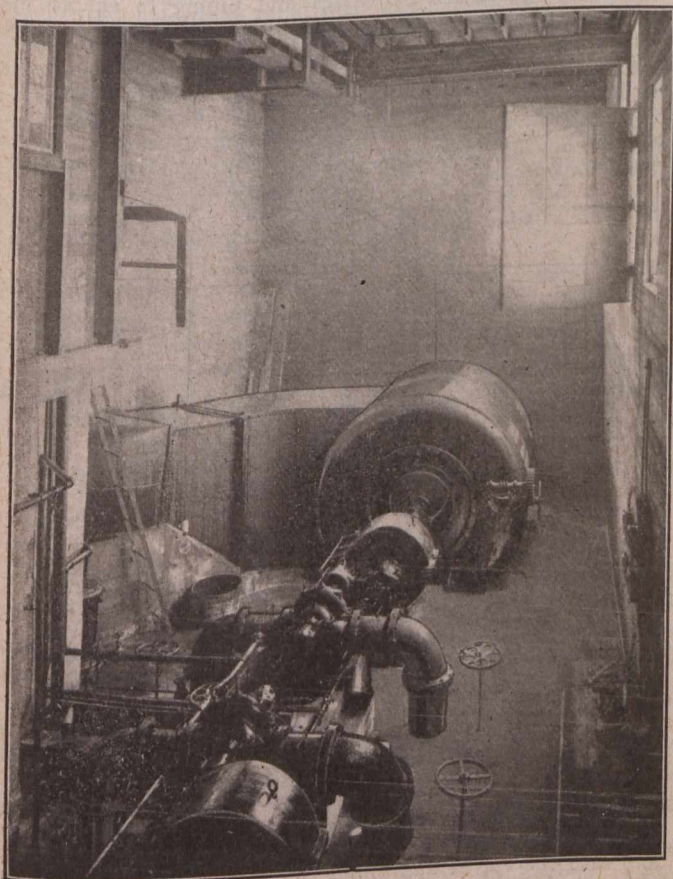


ANOTHER VIEW OF CORNWALL'S PUMPING PLANT

part of 1916, decided to purchase an additional pumping unit capable of supplying three million gallons in twenty-four hours.

The existing pumping machinery at the waterworks plant at that time consisted of a triplex 12 by 14 in. pump and two duplex pumps, one 8 by 12 ins. and the other 10 by 12 ins. All these units were driven by a horizontal hydraulic turbine of the single enclosed type, with inlet at the side and discharge through an elbow at the end. This water wheel and the triplex pump had been installed seventeen years previously, but the wheel had been rebuilt by the William Kennedy Co., of Owen Sound, Ont., and developed 170 h.p. at 200 r.p.m. under a head of 18 ft.

Spur gearing and friction clutches had been used to drive the pumps referred to above and can still be used in case of emergency. There are also three duplex steam pumps, two of which have 10-in. diameter by 12-in. stroke cylinders and were built by the Worthington Pump Co., the other being 12 by 12 ins., built by the John Inglis Co.,



WATER-TURBINE-DRIVEN PUMPING UNITS