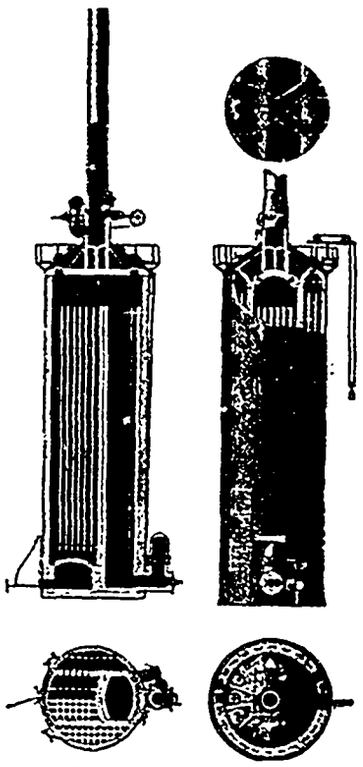
in Hamilton, Mr. Milne pulled the lever and the large fly-wheel began to revolve.



HOT BLAST STOVE—HAMILTON SMELTING WORKS.

In the evening a banquet was held, at which prosperity was predicted for Hamilton and Ontario by a number of prominent speakers, among whom were N. Clarke Wallace, A. McKay, M.P.; Hon J. M. Gibson, N. Awrey, M.L.A., Major McLaren, Ex-Mayor Stewart, Messrs Watkins, Carscallen, J. T. Middleton, M.L.A., Messrs. McKechnie, W. J. Copp, A. T. Freed, A. F. Pirie, Tuckett, Wanzer and H N. Kittson.

Our account of the opening ceremony is condensed from that of the *Hamilton Spectator*, to whom we are also indebted for the exterior view of the works

HEATING FEED WATER.

Editor CANADIAN ENGINEER.

SIR,—Let us consider briefly the percentage of saving of fuel effected by heating feed water by exhaust steam or waste gases, by the formula—

$$\frac{100\,(T-t)}{H-t} = \text{percentage of saving.}$$

Where H = the total heat in the steam boiler pressure, T = temperature of feed-water after heating, and t = temperature of feed-water before heating. Thus, suppose a boiler working at a pressure of 60 pounds per square inch above the atmosphere, fed with water at a temperature of 60° F., and driving a non-condensing engine, the exhaust steam from which is allowed to escape into the atmosphere. By utilizing this exhaust steam in a properly designed feed-water heater, to raise the temperature of the water to, say, 212° F., the percentage of saving of fuel would be—

$$\frac{100\,(212-60)}{1207.2-60} = 13.24 \text{ per cent. saving effected.}$$

Where H = 1207.2 (the total units of heat in steam at 60 pounds pressure above the atmosphere), T = 212° (the temperature of feed-water after heating); t = 60° (the temperature of feed-water before heating) If the feed is drawn from the hot well of a condensing engine, at say 100° F temperature, the result of heating it to 275° F in an economizer in the flue, would work out to—

$$\frac{100\,(275-100)}{1207.2-10} = 15.8 \text{ percentage of economy gained.}$$

With a coal consumption of only fifteen tons per week (the coal costing, say $2 per ton), the saving in the cost of coal alone, taking the lower figure of 13.24 per cent., would amount to no less than $195 in a single year of fifty weeks, which would more than cover the outlay of installing a suitable heater.

The subsequent economy being so much clear profit, the relative saving would, of course, be greater with coal costing more, or by raising the temperature of the feed-water higher.

In addition to the actual saving of fuel resulting from the heating of feed-water, there are incidental advantages accruing which, although not so strikingly apparent as a reduction in the coal bill, are none the less real, among which may be mentioned the obviating of expensive repairs and renewals due to wear and tear caused by unequal contraction when the hot plates are cooled by currents much below the normal temperature of the great bulk of the water in the boiler. More power can be obtained from boilers fed with hot water, as the heat from fuel performs its proper function of evaporating, instead of being partly dissipated in raising the temperature of the water to the boiling point. Priming and smoke emissions often result from having to force the fires to heat up large quantities of cold water in the boilers, when this has not been previously heated.

With limy waters a considerable proportion of the lime salts is precipitated by heating the water to boiling point, and this is especially the case where suitable reagentsare used, with the result that purer water is sent to the boilers, obviating to a great extent the evils of incrustation and internal corrosion.

YOUNGSTER.

Deseronto, 2nd Jan., 1896.

CALENDARS.

The Cleveland Twist Drill Co. of Cleveland, O., has sent us a combined diary, calendar and memorandum, which is exceedingly neat and convenient.

The Boiler Inspection and Insurance Co. of Canada has favored this office with a handsome wall calendar. The blank spaces are filled with good advice for owners of boilers. We would suggest, however, that the company at once inspect the boiler so graphically shown on the calendar, as the steam-gauge shows a pressure of about forty pounds, though the man-hole is open. If this is not done, we fear an explosion will result before the year is out and a policy be due on the artist's work when the fires are started again.

One of the most substantial and serviceable calendars which has reached us this season comes from the works of the B. Greening Co., Ltd., Hamilton, Ont., manufacturers of wire goods and metal perforators. The fact that our copy of the calendar was stolen from our office inside half an hour of its receipt testifies to its value.

DEFINITION OF "ENGINEER."

An appeal concerning an assessment of branch sewers was heard recently in Stratford, Ont. The city council had employed the assessor to prepare the assessment, basing their authority on the Ditches and Water Courses Act, 1894, in which the term "engineer" is stated to mean "civil engineer, Ontario land surveyor, or such person as any municipality may deem competent and appoint to carry out the provisions of this Act." Judge Woods, before whom the case was tried, held that a duly qualified civil engineer should have been employed.

C A CHANT, B A, Lecturer in Physics, University of Toronto, received his preparatory education at the High School, Markham, Ont., and at the Collegiate Institute, St. Catharines, Ont. He entered the University of Toronto in 1887 and took the degree of Bachelor of Arts in 1890, after an honor course in Mathematics After graduating with high honors, Mr Chant was appointed Fellow in his department in 1891 and Lecturer in 1892, which appointment he still holds.