The bearings (*h*,*h*, Fig. 2) are of brass with a $\frac{1}{8}$-inch gas pipe thread to receive small oil cups. They are bored for $\frac{3}{8}$-inch shaft and turned to fit into base (*m*, 2).

The field coils (*d*,*d*, Fig. 1) are wound on brass or zinc spools (*i*,*i*, Fig. 1), No. 16 gauge, soldered flanges, insulated with press board (*p*,*p*, Fig. 1) ends and six layers of paper, centre (*i*,*i*, Fig. 1). The wire is evenly wound and consists of 2,000 turns, 1,100 feet to each coil of No. 30 double or single cotton-covered magnet wire. The beginning and end of coils ("leading in" wires) should be heavier and well insulated, say No. 24 wire, doubled. The outside of coil to be covered with two layers of paper and one layer of muslin or tape on top, shellacked to make a finish. The coils are connected in series, that is, the beginning of one coil is connected to the line wire, the end of the same coil is connected to the beginning of the other coil, and the end of that coil connects with the line. Be sure that both coils are placed on yokes, *y*,*y*, in the same direction.

The brush holder (Figs. 4 and 6) is composed of yoke *y*, which is sawed out of red fibre, and drilled as shown; holders *L*, regulators *D*, and springs *C*, all of brass. The carbon brushes are $\frac{1}{4}$ inch thick, $\frac{1}{2}$ inch wide, and $\frac{3}{4}$ inch long. The springs are of No. 19 wire. The pulley *j*, for driving, is for 1-inch belt, 3-inch diameter, fastened to shaft by a set screw. Upon completion of the machine, the commutator should be turned true in the lathe with a sharp tool and a fine cut, so that no burrs cross the mica insulation. The brushes are fitted to the commutator's surface with OO sand paper.

To connect up as a dynamo, join field wires to line *Y* on either side, and run line *Y* to work (*i.e.*, lamps). To run as a motor, run lead wires through switch, connect field coils by branches to mains at switch; insert in one side of armature connections from switch, a starting box or rheostat, in which, when starting motor, the resistance may be gradually cut out. The speed is about 2,000 revolutions per minute, voltage 100, and output (as a dynamo) 1 ampere.

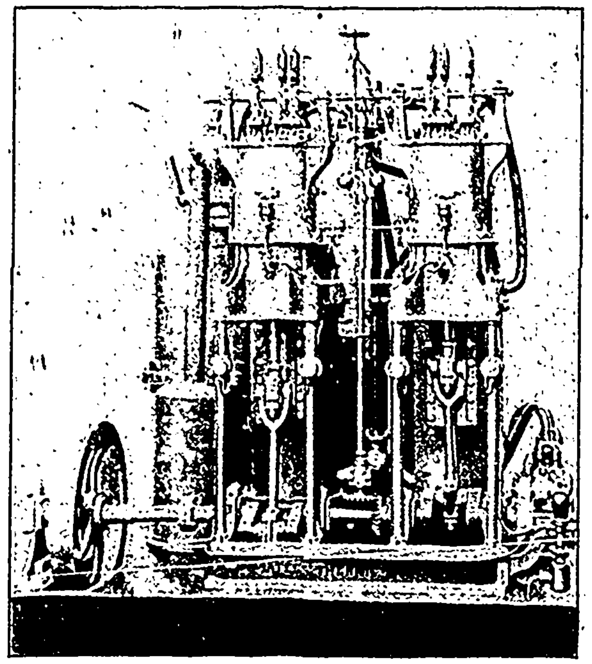
For The Canadian Engineer.

A NEW SELF-CONTAINED MOTOR.

J. H. KILLEY, HAMILTON.

The motive power acting in this machine is different in most particulars to any previously constructed, and bids fair, in an economical sense, to rival the best gas engines. The machine is put into motion by a fixed gas under pressure, which is generated from coal, the generator having no smoke stack. It is a combustion of coal with super-heated steam at high temperature by a flame under the fire grate in a current of compressed air. This is an anomaly, but it is claimed to be an accomplished fact. Engines of this kind are now running in France up to 150 horse-power, with an unusually small quantity of coal for power developed. This motor is found capable in an engine of 150 h.p. of running with $\frac{3}{4}$ of one pound of coal per h.p. per hour. Engines are now being built of 1,000 h.p. that are expected to reduce this very materially. This, if successful, will be without doubt the best economical result that has ever been got out of coal firing.

This machine was invented by a man named Gardie, since dead, but has been improved by an American engineer named Bates. A company is being formed to construct the machines, and a precise scientific test will soon be made to demonstrate its capacity to the public. The machine consists of, first, a combustion chamber, at the top of which, on the left hand, a hopper is shown into which the coal is fed; the hopper is then closed securely against pressure. The lever above the balance wheel opens a valve, which allows the coal to fall on the grate. In the rear of the machine are the generators, which are heated by the gas from the furnace, and through the generator a small amount of water is pumped by a small pump on the right hand side of the machine. The water first enters the lower part of the cylinder jacket, from which it flows to the upper part,



which is at a temperature of 1,000° F.; it comes then in contact with a current of compressed air; then through the generator, going up under the grate of the fire chamber, where the gases of the coal are mingled with the superheated steam, making a chemically fixed gas under a pressure of from 160 to 170 lbs. per square inch. This is passed from the chamber into the cylinders of the engine, where it is cut off and expanded, the diagrams being equal to that of a first-class Corliss engine with a small amount of clearance, totally unlike the ordinary caloric or gas engine, both of which show from $\frac{1}{8}$th to $\frac{3}{10}$ths of the theoretical efficiency of the product of combustion. Even this is much in excess of the theoretical efficiency of the best steam engines. In this engine there is no explosion, and only three per cent. of clearance in the cylinders, it is claimed.

The engine, as built at present, is working single action, requiring two cylinders for a complete engine. This is necessary to work the gas properly, and to procure the factor of expansion as well as the combustion, and the full utilization of the products of combustion is shown by the result. These engines are apparently adapted for marine work; no boilers are required, and no condensers. Any amount of power required could be placed in much less room and weight than engines, boilers and their accessories, as now in use. There is the question of its adaptation to the locomotive, which, in due time, will be realized if the claims of the inventors are well founded. An engraving of the motor is shown in the course of this article; it will be seen that it is not unlike an ordinary marine propeller engine.

OF MUCH INTEREST—TO US.

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