IMPROVEMENT IN SMALL GAS ENGINES.

The greatest difficulty experienced by the manufacturer of machinery to be used by everybody is generally with the user. The majority of people are to a great extent unmechanical, at least they have little practical knowledge of the use of machinery, therefore the machinery must suffer. Every wise manufacturer of machinery for general use will be governed by this fact, and, rather than try to educate his patrons, will simplify his machinery, and, so far as possible, will adapt it to existing conditions.

What we have said with regard to machinery in general applies with peculiar force to gas engines, especially

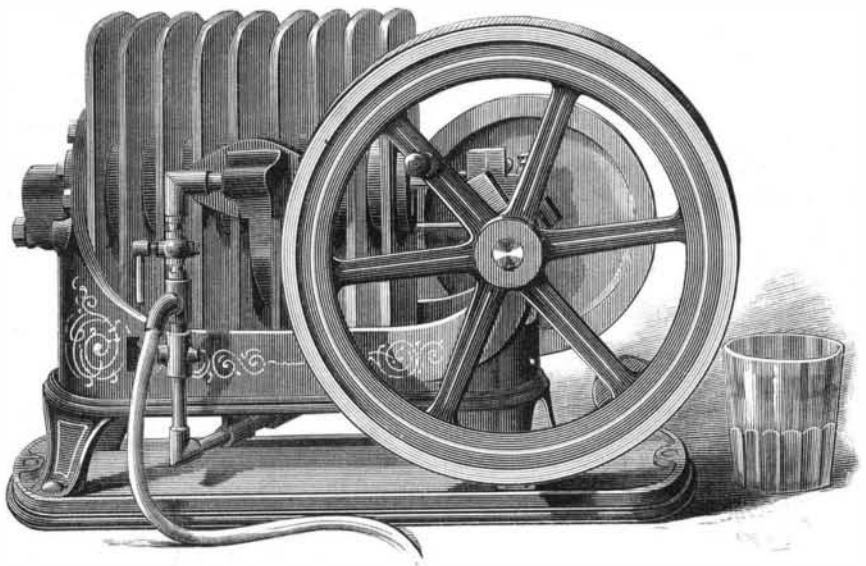

Fig. 1.—GAS ENGINE FOR SMALL USES.

of the smaller sizes, which, with scarcely an exception, have been quite complex, so much so as to render a considerable amount of instruction of great importance to the user.

We believe, however, the makers of the engines shown in the accompanying cuts have duly considered the necessity of great simplicity in small motors designed to be universally used.

These engines consist practically of but three moving parts—the piston, the crankshaft, and the exhaust valve. The piston does treble duty: first, that of transmitting the pressure generated by the explosion of gas in the cylinder; second, as a valve for controlling the admission of gas and air to the cylinder; and third, as an ignition valve for admitting the igniting flame to the cylinder.

Figs. 1 and 2 show two forms of this engine, which differ mainly in appearance, the working parts being substantially the same in both. The smallest engine made by the Economic Motor Company is that shown in Fig. 1. It is adapted to such small uses as driving sewing machines, dental engines, mechanical signs, small ventilating fans, etc. It is perfectly portable, requiring no water for cooling the cylinder.

The one horse power engine, shown in Fig. 2, is used for a large variety of purposes, including the driving of small shops for metal and woodworking, coffee mills, water pumping, etc. Two smaller sizes of this type of engine are made, which are respectively one-half horse power and one-eighth horse power.

The construction of the engine will be understood by reference to Figs. 3 and 4.

The cylinder, A, contains a piston, D, having a hollow cylindrical prolongation, D′, whose length is a little greater than the stroke of the engine. The forward end of the piston is connected with the crank, C, in the usual way. In one side of the cylinder there is an air and gas port, *c*, communicating with the air pipe, F; and below the port, *c*, there is an auxiliary air port, *d*, communicating with a division, G, of the air pipe, F. In the side of the cylinder, A, opposite the port, *c*, there is an ignition port, *a*, opposite which is continually maintained the igniting flame by the Bunsen burner, *o*.

The hollow cylindrical prolongation of the piston, D, has ports, *a′ c′ d′*, which coincide with the corresponding ports, *a c d*, in the cylinder during both the outstroke and in-stroke of the piston. Within the ignition port, *a′*, in the piston is supported a deflector, *b*, which directs the igniting flame toward the open end of the piston.

An exhaust passage, *f*, in the cylinder head leads to an exhaust valve, consisting of a valve casing, *e′*, and a cylindrical valve, *g′*, sliding therein. The valve, *g′*, is moved by an eccentric or cam on the main shaft, through the rod, *j′*. The operation of the engine is as follows: The igniting flame being lit, and gas being allowed to flow continuously through the pipe, *l*, into the compartment, *h*, of the air pipe, F, the flywheel is turned, moving the piston, D, outward, forming a partial vacuum in the cylinder, A, into which a mixture of air and gas passes through the ports in the cylinder and piston into the prolongation of the piston, air only entering through the ports, *d d′*. When the piston has made something less than one-half of its out-stroke, the air and gas port is closed by the piston in its forward movement, and the ignition ports, *a′ a*, coincide when the igniting flame is drawn in and the charge contained by the cylinder is exploded; but before the full force of the explosion is reached, the port, *a*, in the cylinder is closed by the forward motion of the piston, so that there is very little escape through the ignition ports.

The explosion propels the piston forward and turns the shaft, storing in the flywheel sufficient power to do the work required during the remainder of the revolution, to return the piston to the point of starting, and to draw in a new charge of gas and air. While the piston is making its return stroke the exhaust valve is open, allowing the products of combustion to escape. One turn of the flywheel is sufficient to start the engine.

These engines make from 150 to 300 revolutions per minute, and as the crank receives an impulse for every revolution, the motion is uniform. No gas bag is used or needed with this engine, and the manner of introducing the gas renders the engine to a great extent self-regulating. Either coal gas, water gas, or gasolene gas may be used in these engines.

The gas supply valve in the larger engine is kept open by the pressure generated in the cylinder, and when the pressure ceases the gas is automatically shut off.

We are informed these engines are largely in use, and are giving general satisfaction.

The offices of the Economic Motor Company are at 9 Cortlandt Street, New York city.

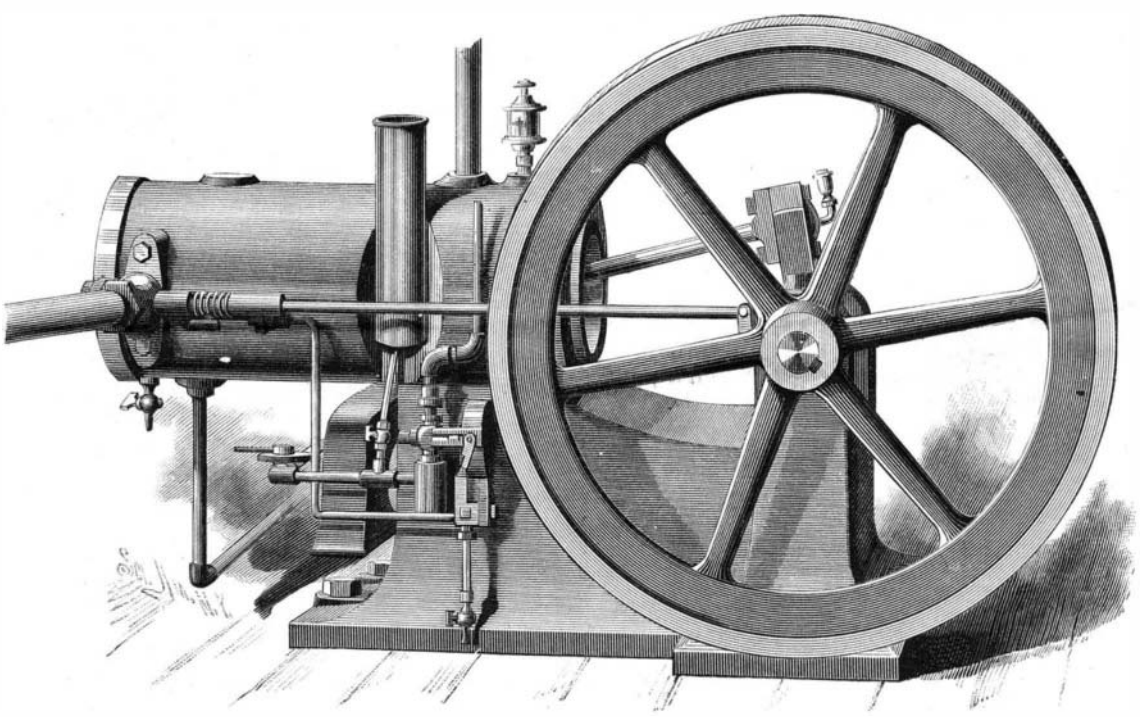

Fig. 2.—SIMPLIFIED GAS ENGINE MADE BY THE ECONOMIC MOTOR CO.

Aerial Navigation.

The Paris correspondent of the *Herald* cables the result of a fresh attempt on the part of Captain Renard and his brother to make the much desired art of ballooning a practical success. Ascents were made from the Camp of Chalais on two different occasions, and though the aerial voyage was short, it was sufficiently successful to satisfy the War Office authorities that the problem had apparently been solved. It is, however, stated that the cost of working Captain Renard's balloon is still prohibitive, and that it cannot be controlled for a long interval of time. On each occasion the balloon rose suddenly in midair, and, after remaining motionless for a short time, pursued a comparatively steady course toward the Point du Jour, about three miles from the starting point. Here a short pause and slight descent were made by the balloon, but it obeyed the steersman wonderfully, and sailed back to the Camp of Chalais, allowing a comfortable descent. It is too much to say that the problem has been solved, for the same premature announcement has often been made before; but it is at least encouraging to learn that the aeronauts accomplished a definite journey in place of the aimless wanderings which are the usual records of journeys in the air. It has ceased to be much of a

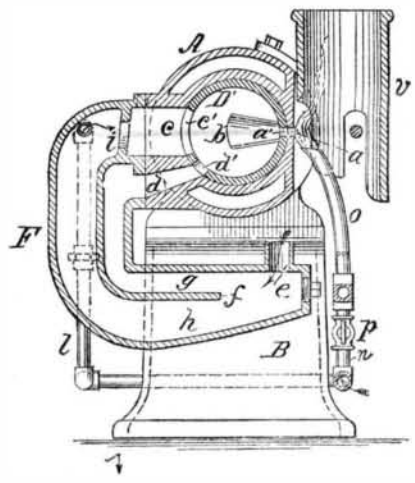

Fig. 3.—TRANSVERSE SECTION OF GAS ENGINE CYLINDER.

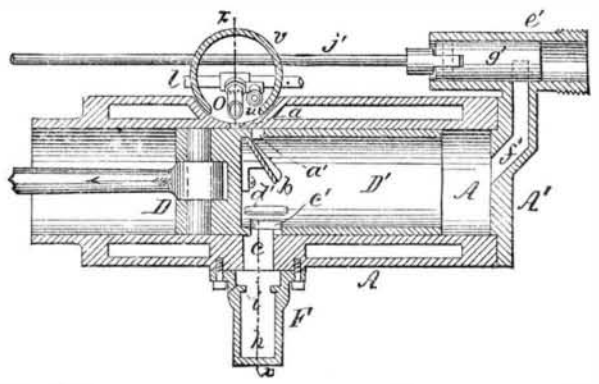

Fig. 4.—LONGITUDINAL SECTION OF GAS ENGINE CYLINDER.

feat to make a simple ascension, but it is still rather novel to have the balloon return to its starting point.

In company with Captain Krebs, Captain Renard, it will be remembered, made quite a celebrated voyage from Meudon to Bellancourt and return in the fall of 1884, in which he demonstrated the complete success of his steering apparatus. His balloon was cigar-shaped, and pointed at each extremity instead of simply underneath, as is usually the case. The car was provided with seats for two aeronauts, and the balloon had a directing apparatus and rudder. The power was furnished by a series of storage batteries of a total capacity of ten horse power, and the balloon could be operated for four hours at a time. If persistence be a virtue worthy of reward, we may certainly expect the construction of an entirely successful balloon, for there are few problems which have secured more careful and persistent efforts in the face of great difficulties than that of aerial navigation. The progress has been slow of necessity, from our ignorance of the requisite conditions, but a marked advance has been accomplished during the past two years, and warrants a belief in ultimate success.

A CORRESPONDENT, describing himself as "a country mechanic," writes us of having spliced a wire cable in 1872, which has been in use ever since, so that at the time of splicing not one in one hundred mechanics who examined the cable could tell where the ends were joined. The job took about eight hours.