

No. 664,689.

Patented Dec. 25, 1900.

H. SUTTON.

SPEED REGULATOR FOR EXPLOSIVE ENGINES.

(Application filed Jan. 22, 1900.)

(No Model.)

2 Sheets—Sheet 1.

Fig. 1.

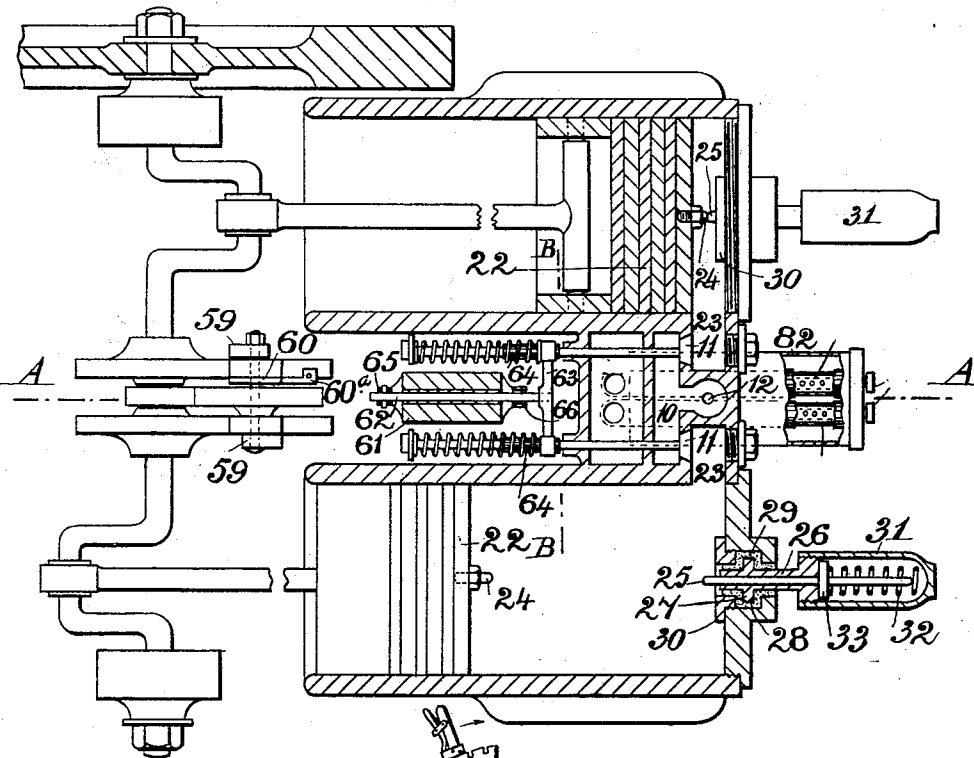
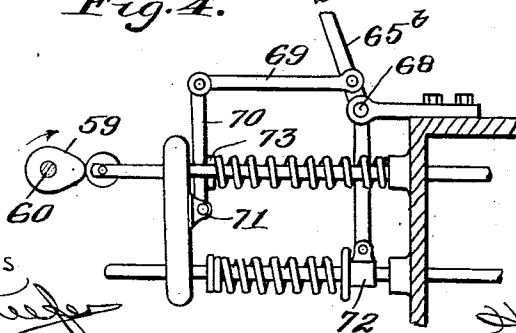


Fig. 4.



Witnesses

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Fig. 2.

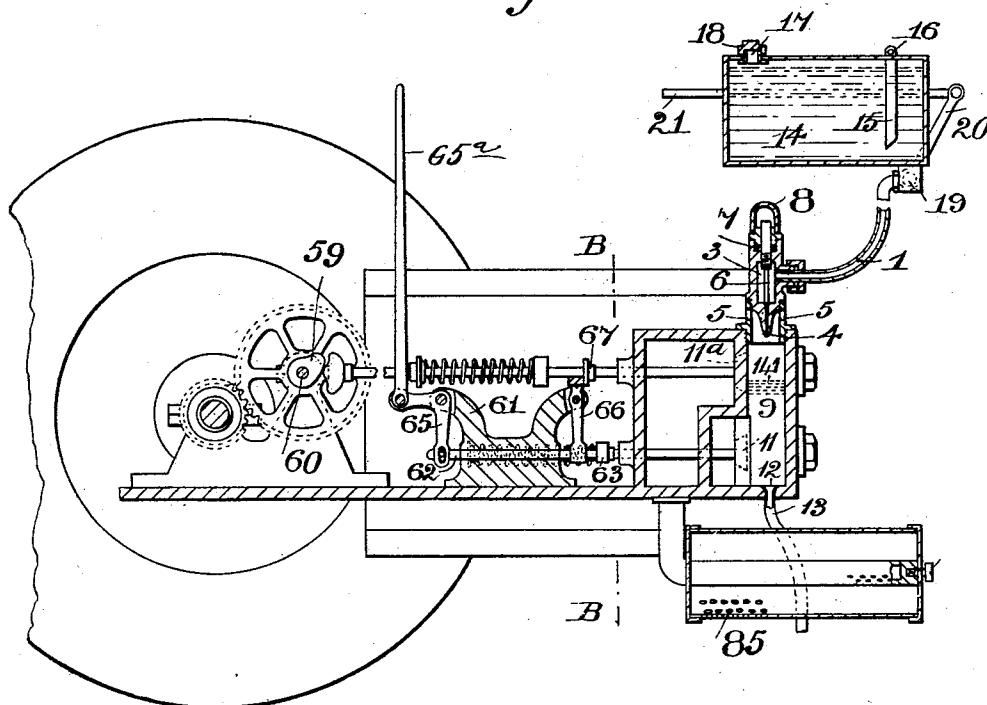
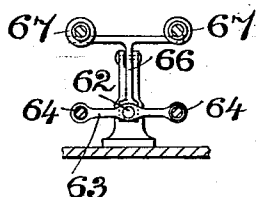


Fig. 3.



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UNITED STATES PATENT OFFICE.

HENRY SUTTON, OF MELBOURNE, VICTORIA.

SPEED-REGULATOR FOR EXPLOSIVE-ENGINES.

SPECIFICATION forming part of Letters Patent No. 664,689, dated December 25, 1900.

Original application filed July 10, 1899, Serial No. 723,379. Divided and this application filed January 22, 1900. Serial No. 2,352. (No model.)

To all whom it may concern:

Be it known that I, HENRY SUTTON, musician, a subject of the Queen of Great Britain, residing at No. 292 Bourke street, Melbourne, in the British Colony of Victoria, have invented Improved Apparatus for Regulating the Supply of the Combustible Mixture in Internal-Combustion Engines, (which is a division of my application filed July 10, 1899, Serial No. 723,379,) of which the following is a specification.

This invention has been devised in order to provide means for regulating the power of the engine in a simple and efficient manner by varying the quantity of the charge without varying its quality.

In order that my invention may be readily understood, I will describe it by reference to the accompanying drawings, in which—

Figure 1 is a part sectional plan of an oil-engine embodying my improvements. Fig. 2 is a longitudinal central section on line A A, Fig. 1. Fig. 3 is a vertical section on line B B, Fig. 1. Fig. 4 is a diagrammatic view illustrating my improved mechanism for regulating the charge admitted into the cylinders.

The same reference-numerals are used to as far as practicable indicate the same or corresponding parts throughout the drawings.

1, Fig. 2, represents an oil or spirit supply pipe leading from a reservoir and attached either permanently or by a coupling to a hollow metal casing or cylinder 3, fitted with a dependent nipple 4 and formed with air-inlet openings or holes 5 around its lower end about on a level with the upper end of the nipple. This dependent nipple 4 is formed with a small hole, the aperture or inlet to which is regulated by a screw-threaded needle-valve 6, passing through a stuffing-box 7 in the upper end of the chamber 3 and projecting up into a protecting cap or cover 8, which is screwed onto the gland of said stuffing-box and serves to prevent any injudicious alteration of the needle-valve after it has been set. The dependent nipple 4 projects into a cylindrical or other-shaped tube or compartment 9, communicating through a passage or vapor-chamber 10 with the inlet-valves 11. The lower end of the compart-

ment 9 is provided with a small hole 12, communicating with a waste-pipe 13, leading direct into the atmosphere or into any suitable vessel provided to receive any surplus oil or spirit which might not be vaporized within the compartment 9. The waste-pipe 13 should be provided with a check-valve to prevent air being drawn through said pipe into the engine-cylinder on the suction-stroke.

Across the compartment 9 are fixed the mixing contrivances 141, consisting of a number of perforated plates arranged horizontally one above another.

In order that the oil or spirit may be delivered evenly and regularly by the dependent nipple 4, it is necessary that the supply shall be maintained at a fixed uniform head or pressure. I accomplish this result by means of a reservoir formed of a tank 14, of any preferred shape, but entirely inclosed in a perfectly air-tight manner, except for a small air-supply pipe 15, extending down nearly to the bottom of the reservoir and having its upper end projecting outside it. The lower end of this pipe is entirely open, but its upper end communicates with the atmosphere only through a hole 16. The inlet 17 whereby the reservoir 14 can be charged, is closed by an air-tight cap or cover 18, the result being that the only means of communication whereby air can enter the reservoir is through the minute opening 16 and down the pipe 15. 19 represents any suitable valve which is fitted in the upper end of the oil-supply pipe 1 and is regulated by a lever 20 and rod 21 or other convenient means. The gravity-supply having been limited by the needle-valve 6, the regulation of the ultimate delivery from said nipple will be effected automatically by the rapid or slow production of a partial vacuum in and around said nipple caused by the increased or decreased piston speed of the engine.

The contrivances which I use for firing the explosive charge electrically consist, as described in my former application, Serial No. 723,379, filed July 10, 1899, of two contact-pieces 24 and 25, the former being mounted upon the piston 22 within the explosion-chamber, as shown in Fig. 1, and the latter projecting through a metal sleeve 26, having a

flange 27 at about its center. The cylinder-cover is bored out, as illustrated at 28, to receive a packing 29 of asbestos or other fire-proof or heat-resisting material which is also a non-conductor of electricity. A screw-plug 30 is fitted into the recess 28, in which the packing is placed, so as to jam same tightly around the metal sleeve 26 and its flange 27 in order to hold same rigidly in position and at the same time insulate it from the metal cylinder. The contact-piece 25 projects into a metal cap 31, which is screwed onto the upper end of the sleeve 26 and contains a spiral spring 32, adapted to bear upon a shoulder 33 on said contact-piece, so as to normally hold it in its projected position. This metal cap 31 also serves to prevent the escape of explosive mixture around the contact-piece.

When the inlet and exhaust valves are arranged as illustrated in Figs. 1 and 2, the gear shown in said Figs. 1 and 2 may be used for regulating them, the spindles of the exhaust-valves being acted upon directly by cams 59 on a spindle 60, driven by a two-to-one gear from the main shaft.

60^a, Fig. 1, represents an ordinary commutator which is inserted in the circuits of the electric firing devices for cutting out the current during the charging stroke and for switching it onto the firing appliances during the firing stroke of each cylinder.

In order to adjust the quantity of the charge fed into the cylinder without affecting its quality, I use the means illustrated in Figs. 1, 2, and 3, comprising a bracket or support 61 between the two cylinders, and arrange a rod 62 so that it can slide longitudinally through it. A cross-bar or T-piece 63 is secured upon the end of this sliding rod 62, as illustrated in Fig. 1. The ends of this T-piece are fitted with tubes 64, which slide freely upon the spindles of the inlet or suction valves 11 11. On moving the rod 62 outwardly by means of a bell-crank lever 65 the springs of the inlet-valves, which springs are located on the spindles of said valves, will be compressed and therefore their tension increased. A hand-lever 65^a is provided for operating the bell-crank 65 as required. The cross-bar 63 on the end of the rod 62 is so arranged that when said rod is pulled back to near its farthest extremity said cross-bar contacts with the lower end of a lever 66, pivotally supported upon the bracket 61 and acting upon a collar 67 on each of the exhaust-valve spindles, thereby holding said exhaust-valves 11^a open and preventing any charge from being drawn into the cylinder. By means of this mechanism it will be obvious that a movement in one direction of a single lever or its equivalent increases the tension on the springs of the inlet-valves, thereby gradually diminish-

ing the suction, while the continued movement will entirely stop the suction by opening the exhaust-valves. This simple, yet effective, mechanism insures the regulation of the quantity of the charge without varying the quality, thus providing a means of regulating which is similar to that of a steam-engine, in that the explosions vary in strength, but do not entirely cease unless it is required to stop the engine by opening the exhaust-valve.

A modification of the above-described arrangement is shown in Fig. 4, in which 65^b represents a comparatively long lever mounted upon any convenient support, as illustrated at 68, and connected by means of a link 69 with a shorter lever 70, fulcrumed, as indicated at 71. The lower end of the lever 65^b is connected with and operates a sliding block 72, acting upon the spring of the inlet-valve. The lever 70 is arranged to act upon a stop-piece 73 on the rod or spindle of the exhaust-valve. By moving the lever 65^b in the direction of the arrow the spring of the inlet-valve will be compressed, and therefore the charge drawn into the cylinder will be diminished in quantity without being affected in quality. The continued movement of the lever 65^b will move the lever 70 into contact with the stop-piece 73 on the spindle of the exhaust-valve, which will therefore be opened, the effect, of course, being to open the exhaust-valve and thereby stop the working of the engine. In this way the power of the engine can be regulated to a nicety in a simple way without cutting out the complete charge intermittently, such a method being exceedingly faulty because of its jerky and irregular action.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is—

In an internal-combustion engine, the combination with the inlet and exhaust valves, of a sliding rod 62 having a cross-bar 63 thereon, tubes 64 carried by said cross-bar and sliding freely upon the spindles of the inlet-valves, springs located on the spindles of the inlet-valves in position to be compressed by outward movement of said cross-bar, a lever 65 for actuating the sliding rod and attached cross-bar, collars 67 on the spindles of the exhaust-valves, a pivotally-supported lever 66 having one end arranged to be acted on by the cross-bar 63 to cause the other end of said lever to act upon the collars 67 for holding the exhaust-valves open, and cam mechanism acting on the spindles of the exhaust-valves, substantially as described.

HENRY SUTTON.

Witnesses:

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