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No. 771,511. PATENTED OCT. 4, 1904.

W. C. TOMPSETT.

SPEED REGULATOR FOR EXPLOSION ENGINES.

APPLICATION FILED OCT. 6, 1903.

NO MODEL. 2 SHEETS—SHEET 1.

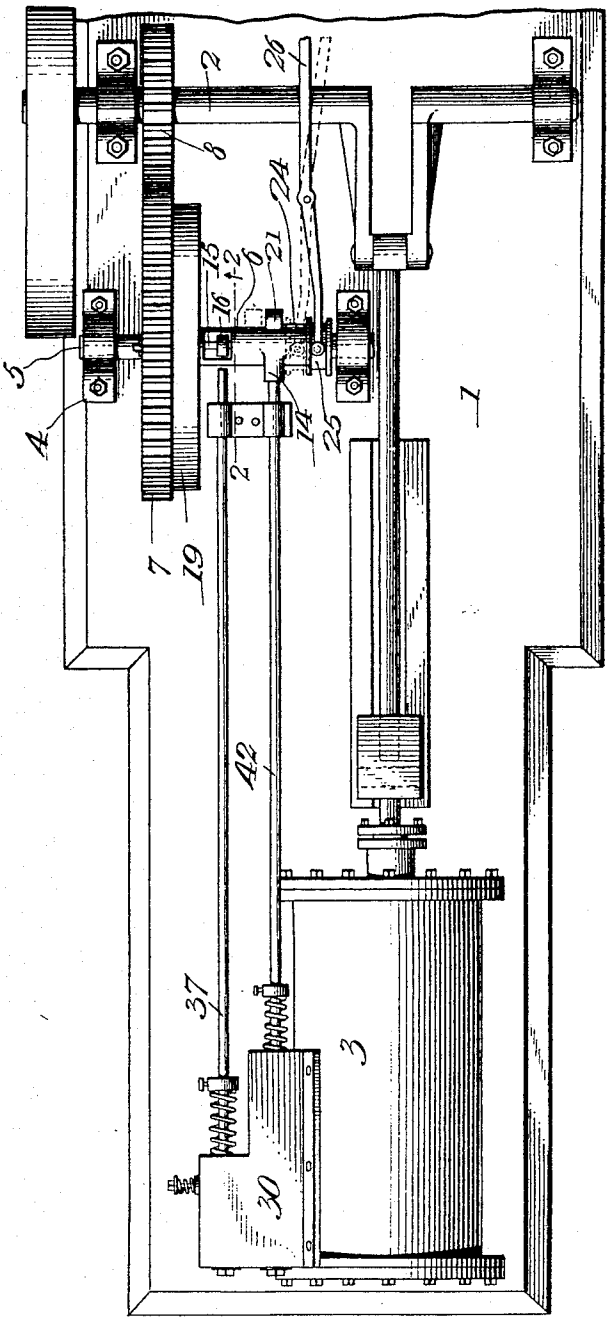


Fig. 1.

Hamilton, 456,095, July 14, 1891; Hartley, 539,478, May 21, 1895; (Explo. Eng., Speed Reg.): Prouty, #570,500, Nov. 3, 1896 (Explo. Eng., 4 Cycle. Murray, 619,776, Feb. 21, 1899; (2 Cycle): Marrder, #233,268, Oct. 12, 1880; (Steam Explo.).

Witnesses
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NO MODEL. 2 SHEETS—SHEET 2.

Fig. 2.

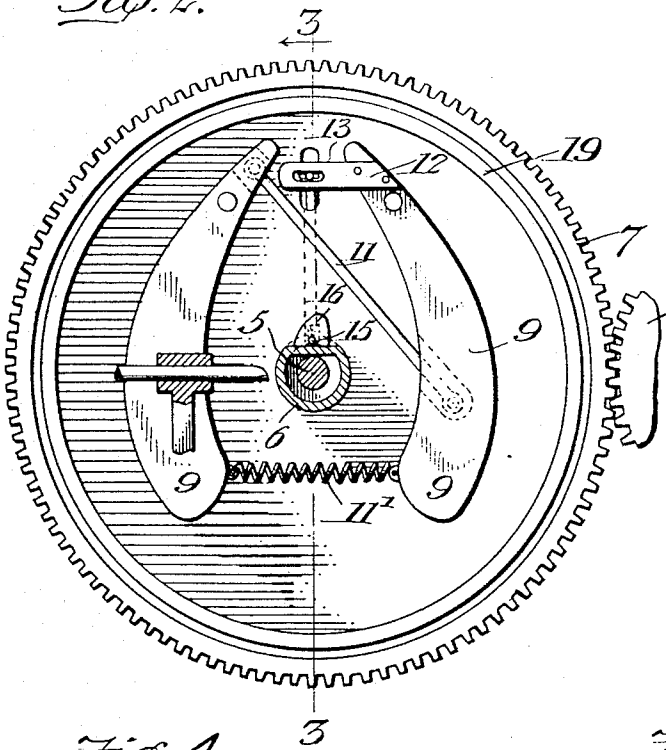


Fig. 3.

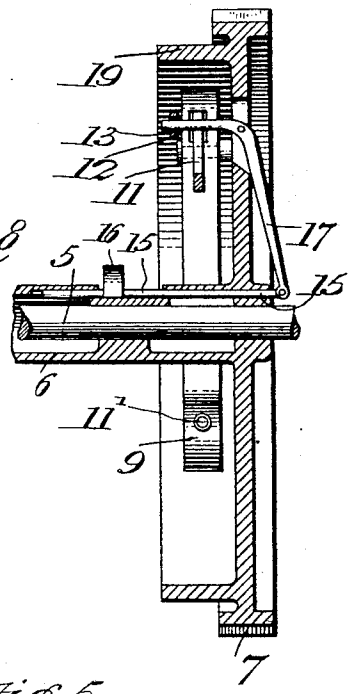


Fig. 4.

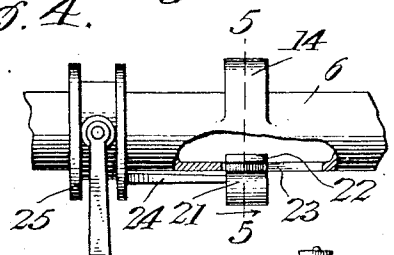


Fig. 5.

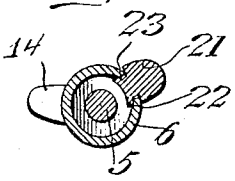
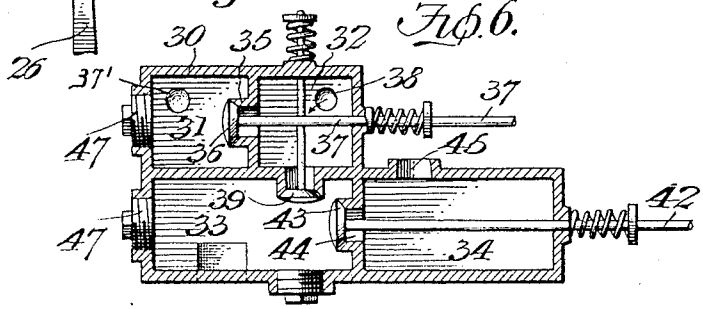


Fig. 6.



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No. 771,511. Patented October 4, 1904.

UNITED STATES PATENT OFFICE.

WILLIAM C. TOMPSETT, OF WARREN, PENNSYLVANIA.

SPEED-REGULATOR FOR EXPLOSION-ENGINES.

SPECIFICATION forming part of Letters Patent No. 771,511, dated October 4, 1904.

Application filed October 6, 1903. Serial No. 176,925. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM C. TOMPSETT, a citizen of the United States, residing at Warren, in the county of Warren and State of Pennsylvania, have invented a new and useful Speed-Regulator for Explosion-Engines, of which the following is a specification.

This invention relates to certain improvements in gas-engines, and has for its principal object to provide an improved means for controlling the speed of the engine by cutting off or reducing the quantity of explosive compound admitted to the explosion-chamber when the speed of the engine increases above the normal.

A further object of the invention is to provide a novel means for retaining the exhaust-valve open during the starting of the engine in order to reduce the compression, and thus permit the engine to be readily started by hand.

With these and other objects in view, as will hereinafter more fully appear, the invention consists in the novel construction and arrangement of parts hereinafter described, illustrated in the accompanying drawings, and particularly pointed out in the appended claims, it being understood that various changes in the form, proportions, size, and minor details of the structure may be made without departing from the spirit or sacrificing any of the advantages of the invention.

In the accompanying drawings, Figure 1 is a plan view of a gas-engine constructed in accordance with the invention. Fig. 2 is a transverse sectional elevation of a portion of the same on the line 2 2 of Fig. 1. Fig. 3 is a sectional view on the line 3 3 of Fig. 2, illustrating the construction of the governor. Fig. 4 is a detail plan view of a portion of the cam-shaft, showing the adjustable cam employed during the starting of the engine. Fig. 5 is a transverse sectional view of the same on the line 5 5 of Fig. 4. Fig. 6 is a sectional plan view showing the arrangement of the valves and chest of the engine.

Similar numerals of reference are employed to indicate corresponding parts throughout the several figures of the drawings.

In the drawings, 1 represents a portion of the frame of a gas-engine, 2 the main shaft, and 3 the cylinder, these parts being constructed, arranged, and connected in the usual manner.

Secured to the bed or frame of the engine is a standard 4, carrying at its upper end a stud or spindle 5, on which is mounted a hollow shaft 6, the latter being disposed parallel with the main shaft 2. The hollow shaft 6 carries a gear-wheel 7, that intermeshes with a pinion 8 on the main shaft, the proportion of the gears being about two to one, so that for each two revolutions of the main shaft the hollow shaft will be revolved once, as ordinarily practiced in four-cycle engines.

To the inner face of the gear 7 are pivoted two weighted governor-arms 9, that are connected together by a rod 11, attached to the shorter end of one of the weighted levers and to the longer and weighted end of the other, and these arms are normally drawn toward each other by a tension-spring 11, which yields as the arms move outward under the influence of centrifugal force. One of the levers is provided with an overhanging arm 12, having an elongated slot 13 for the reception of one end of a lever or arm that is operatively connected to the cam controlling the inlet of gas to the explosion-chamber of the engine.

The hollow shaft carries an exhaust-valve-operating cam 14 and is provided with suitable guides for the reception of a rod 15, to which is secured an inlet-valve-operating cam 16, the base of the cam being slidably mounted on a flattened portion of the hollow shaft in order to relieve the rod 15 from any strain during the working of the engine. The rod 15 extends outward through the end of the hollow shaft and through a suitable opening formed in the gear-wheel 7 and is connected at a point outside the gear-wheel to one arm of a bell-crank lever 17, the opposite arm of which extends through a radial slot formed in the gear-wheel and engages in the slot 13 of the arm 12, so that when the weighted governor-levers move outward under the influence of centrifugal force and the arm 12 receives a corresponding inward movement the rod 15 will be shifted endwise in a direction parallel with the hollow shaft and will alter

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the position of the inlet-valve-operating cam 16. This operation takes place when the speed of the engine increases above the normal and results in cutting off the supply of gas to the engine, so that for one or more strokes the engine will receive air only and its working force will be decreased, so that when the speed is lowered to the proper point the governor-arms will again move inward and the inlet-valve will be shifted to working position. The several parts of the governor are protected by an annular flange 19, projecting from the face of the gear-wheel, as shown.

The cam 14 is non-adjustable and at the proper time comes into contact with the exhaust-valve rod and moves the latter to open position in order to allow the exhaust-gases to pass from the cylinder; but in starting the engine by hand, as usually practiced, it becomes necessary to reduce the extent of compression in order that the starting operation may be facilitated. This may be accomplished by retaining the exhaust-valve open for a longer period of time than usual, and for this purpose I employ an auxiliary exhaust-valve-operating cam 21, having a flanged base portion 22, seated partly within a slot 23, formed in the hollow shaft and guided by the walls of said slot. This cam is normally out of alinement with the main cam 14; but when it is desired to start the engine the cam is shifted until it is in alinement with the exhaust-valve cam and the exhaust-valve stem, so that the latter will be operated upon twice and a portion of the contents of the cylinder exhausted in order that the engine may be readily started by hand. The auxiliary valve is connected by a rod or strip 24 to a grooved collar 25, that is keyed or feathered on the hollow shaft in such manner as to permit of longitudinal adjustment thereon. This grooved collar is engaged by one or more pins or antifriction-rollers projecting from a lever 26, that is fulcrumed to the bed or frame of the machine and has an operating-handle arranged within convenient reach of the engineer, so that when the engine is to be started the position of the auxiliary cam may be readily adjusted. After the engine is properly working the lever is moved in the opposite direction in order to return the auxiliary valve to its initial inoperative position.

On the left-hand side of the cylinder 3 is secured a valve-casing 30 and is divided by partitions into a plurality of chambers 31, 32, 33, and 34. Between the chambers 31 and 32 is a passage 35, normally closed by a gas-inlet valve 36, having a rod 37 that is operated upon by the inlet-cam 21, and to said chamber 31 is connected a gas-supply pipe 37′, so that when the valve is opened gas may be admitted to the chamber 32 and there in part intermingled with air entering through an inlet-pipe 38. Between the chambers 32 and 33 is a port or passage normally closed by an air and gas valve 39, that is maintained in closed position by means of a compression-spring. The chamber 33 constitutes a mixing-chamber and is in communication with the explosion-chamber of the engine, so that on the suction-stroke of the piston the valve 39 will be opened by the pressure in the chamber 32 and the mixed volume of air and gas will be drawn into the chamber 33 and allowed to intermingle before passing to the explosion-chamber. At the completion of the suction-stroke the explosive compound is compressed and then ignited, resulting in the outward or working stroke of the piston, and at the completion of the working stroke the cam 14 operates on the rod 42, connected to exhaust-valve 43, and permit the contents of the cylinder to pass through the port or passage 44 to the exhaust-chamber 34, from whence it may escape through a suitable discharge 45. All of the valves are provided with compression-springs arranged in the usual manner for holding the same in closed position, and while the gas and exhaust valves are positively opened by their respective cams the gas and air valve 39 is opened automatically on the suction-stroke of the engine. The wall of the valve-chamber is provided with a plurality of removable plugs 47, arranged in alinement with the several valves, so that access may be had thereto or the valves removed for convenience in making repairs.

Having thus described the invention, what is claimed is—

1. In an explosive-engine, a hollow shaft having a flattened peripheral portion, a valve-operating cam mounted upon such flattened portion and supported thereby, a rod arranged parallel with the shaft and connected to the cam, and a governor connected to said rod.

2. In an explosive-engine, a shaft having a flattened peripheral portion, a valve-operating cam mounted on such flattened portion, a rod secured to the cam and adapted to guiding-openings formed in the shaft, and a governor connected to the rod.

3. In an explosive-engine, a hollow shaft having a flattened peripheral portion, a shaft-supporting spindle, a valve-operating cam mounted on the flattened portion of the shaft and adjustable longitudinally with respect to said shaft, a gear secured to the shaft, a pinion secured to the crank-shaft of the engine and intermeshing with said gear, a centrifugal governor supported by the gear, and means for connecting the governor to the cam.

4. In an explosive-engine, a shaft, a cam adjustable longitudinally with respect to said shaft, a gear carried by the shaft, a pinion on the crank-shaft of the engine and intermeshing with the gear, a pair of weighted governor-arms pivotally mounted on the gear, one of said arms having an overhanging portion provided with an elongated slot, a bell-crank

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lever pivotally mounted on the gear and having one arm extending through an opening in the gear and entering the elongated slot, and a rod connecting the cam to the opposite arm of said lever.

5. In an explosive-engine, a stationary stud or spindle, a hollow shaft mounted thereon and provided with a flattened peripheral portion, a valve-operating cam the base of which is mounted on such flattened portion, a rod extending through a portion of the length of the shaft and guided thereby, said rod being secured to the cam, a gear-wheel carried by the shaft, a pinion arranged on the crank-shaft of the engine and intermeshing with said gear, a pair of weighted levers or lever-arms and pivotally mounted on the gear, one of said levers having an overhanging arm provided with an elongated slot, a bell-crank lever carried by the gear and having one of its arms extending through the slot, and means for connecting the opposite arm of said lever to the rod.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

WILLIAM C. TOMPSETT.

Witnesses:

J. W. DUNKLE,

CLINTON GIBSON.