L. LE PONTOIS.

DEVICE FOR REVERSING THE DIRECTION OF ROTATION OF INTERNAL COMBUSTION ENGINES.

APPLICATION FILED AUG. 2, 1907.

904,624.

Patented Nov. 24, 1908.

2 SHEETS—SHEET 1.

Fig. 1.

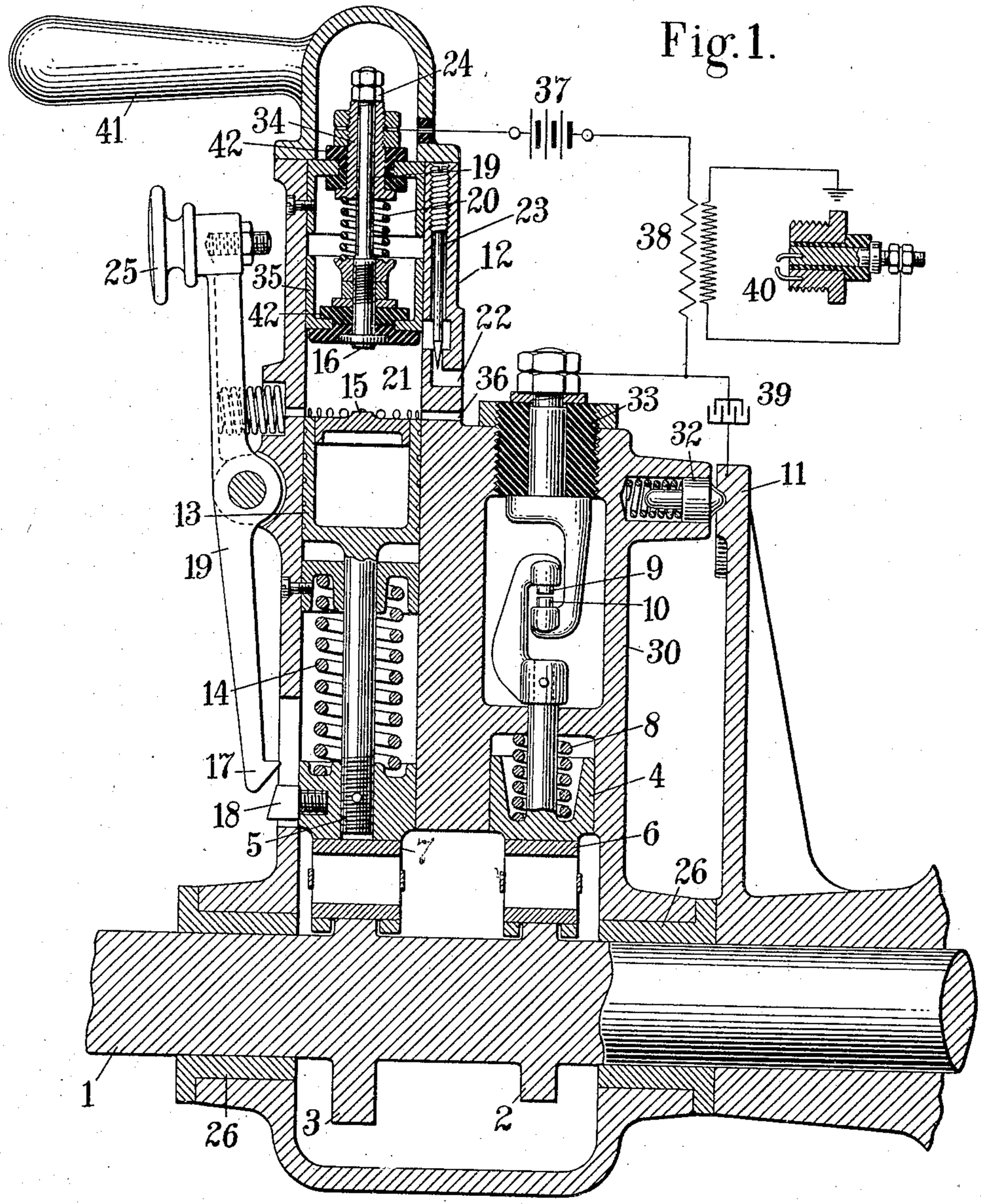

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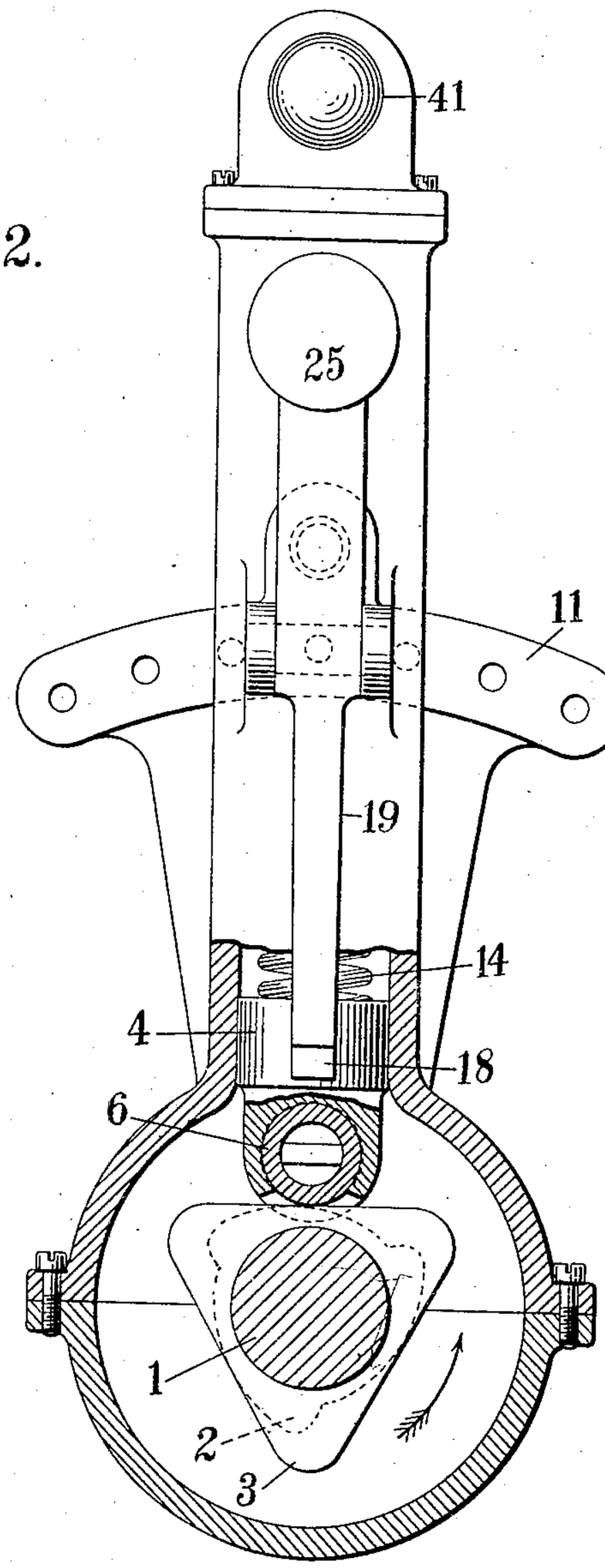
Fig. 2.



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UNITED STATES PATENT OFFICE.

LEON LE PONTOIS, OF NEW ROCHELLE, NEW YORK.

DEVICE FOR REVERSING THE DIRECTION OF ROTATION OF INTERNAL-COMBUSTION ENGINES.

No. 904,624. Specification of Letters Patent. Patented Nov. 24, 1908.

Application filed August 2, 1907. Serial No. 386,695.

To all whom it may concern:

Be it known that I, LEON LE PONTOIS, a citizen of the Republic of France, residing at New Rochelle, in the county of Westchester and State of New York, have invented a new and useful Device for Reversing the Direction of Rotation of Internal-Combustion Engines, of which the following is a specification, reference being had to the accompanying drawings.

This invention relates to means for accomplishing such reversal of direction of rotation by control of the time of ignition of the fuel gases employed in such engines, and it consists in a new device for automatic selection of the most advantageous time for such ignition and automatic establishment of ignition at such time.

The mechanism shown and described herein is a typical one which will operate automatically to effect this result.

Internal combustion engines may be constructed so as to be adapted to rotate in either direction, and in starting them it often happens that the ignition of the fuel gases is accomplished by the source of heat employed for this purpose at so early a time in the revolution of the engine that the impulse from expansion of the ignited gases is exerted too early to be effective to drive the engine forward and results in an unexpected and undesirable reversal of the direction of rotation known as "back kick". This result is due to the fact that at the time of ignition and development of the energy of the burning gases in the cylinder the crank is still so far ahead of the dead center, that the energy of inertia in the fly wheel is insufficient to carry the crank shaft forward to the dead center and slightly past that point. As the speed of revolution of the engine decreases this result is more apt to occur by reason of the reduced energy of inertia of the fly wheel.

By my invention I make use of the "back kick" and make this hitherto undesirable result a useful means to accomplish the reversal of the engine.

This specification shows it as applied to the control of a sparking circuit adapted to furnish three ignition sparks at each revolution of the engine, which would be the case if employed upon a six cylinder four cycle engine, or a three cylinder two cycle engine, and actuated from or in register with the main engine shaft.

Figures 1 and 2 are side and end views of my invention partly in section.

Referring to the drawings, 1 is a shaft driven by the engine; 2 is a cam which operates the usual spark circuit breaker. This cam is shown by dotted lines in Fig. 2. The break is made between the contacts 9 and 10. 9 is movable and is operated by the cam 2 through its piston 4 and roller 6 bearing upon the cam. A spring—8—presses this contact downwards to meet the fixed contact—10—supported in the frame 30, and insulated therefrom by the insulation 33. This frame is mounted in bearings 26, 26, on the shaft and may be turned thereupon to time the spark. It is locked to a sector 11, placed in the frame of the engine and is secured in its adjusted position by a lock 32.

The cam 3 operates a pump piston—13—through its stem 5, and roller bearing 7. This piston is pressed downwards by its spring —14. The cams 2 and 3 are in such angular relation that the lift of 2 to break the contact at 9, 10, occurs just after the cam 3 has raised the piston to its highest position, the break at 9, 10, closely following the closure of the circuit at 15, 16. When not in use this governor piston is caught and held in its raised position by engagement of a lug 18, with the hook 17, carried upon the releasing lever 19. In this position the electrodes 15 and 16 are held in contact closing the spark circuit at this point. The governor is put in operation by pressure upon the lever handle 25, and release of the lug 18. The piston 13, will then be reciprocated so long as the handle 25 is depressed. The frame 30 is then adjusted by means of its handle 41 so as to advance the spark to the latter part of the compression stroke. As the engine slows down to the proper speed for reversal the spark circuit is closed at 15, 16, permitting a spark to ensue upon breaking at 9, 10, which causes reversal. The spark is then advanced as the engine speed increases in the new direction by further adjustment of the frame 30.

Above the piston is an inclosed air chamber 21, and in this chamber is an elastically supported and electrically insulated electrode 16, which may meet another electrode 15 carried by the piston 13.

The contact 16, is pressed downwards by its spring 20, and its movement is limited by the nuts 24 on its supporting stem 19, which slides in a supporting bracket 34, provided with insulating rings 42, 42. A piston 35, forms a hermetically sealed end for the air chamber 21 and the space behind this piston is open to the atmospheric pressure.

The air chamber 21, is provided with one or more openings outwardly, as at 36, so placed as to be opened when the piston 13 is in its lowest position as shown in the drawing and closed by this piston at the beginning of its upward movement. An air escape or port 22, is also provided which is furnished with a needle valve 23, and by means of this valve the speed at which air may escape from the chamber 21 may be regulated.

In operation the upward movement of the piston 13 compresses the air in the chamber 21, and this if not allowed to escape, presses the elastically supported contact 16, upward against the pressure of its spring 20, so that no contact is made between the points 15 and 16.

The valve 23 is set so as to permit the air in 21 to escape slowly. The rate of escape of the air should be such that at all speeds of revolution above that at which it is desirable to make the reversal ignition the pressure of the air in the chamber 21, will hold the contacts 15 and 16 apart. As the engine speed decreases the longer time of escape of the air in the chamber 21 so reduces its pressure upon the face of the piston 35 as to permit the contact 16 to be advanced by its spring 20 towards the contact 15, and to reach it when the engine speed is at the right point for the reversal ignition. At such time the contact between 15 and 16 being established, the sparking circuit is closed and a break now occuring between the electrodes 9 and 10 in said circuit (9 and 15 being grounded on the engine frame) and a suitable source of electrical energy being supplied, as by the battery 37, induction coil 38, and condenser 39, a spark will be made at the spark plug 40 igniting the gases in the cylinder.

The spark plug shown at 40 represents one of the plugs which are employed in the respective cylinders. This being properly timed in the stroke by the setting of the governor, by means of the handle 41, and locking sector 11, the reversal of the engine is accomplished with certainty and without undue strains.

I claim,

1. An ignition governor for internal combustion engines comprising an air pump having a chamber connected to the engine so as to be driven at a rate proportional to the speed of the latter to compress the air within its chamber, an air escape passage from said pump chamber, and an electric ignition circuit for igniting the fuel gases having a break therein between two electrodes, one of which is operatively connected to the air pump piston so as to be reciprocated therewith and the other being mounted upon an elastic support operatively arranged adjacent to said pump chamber so as to be positioned by the pressure therein.

2. An ignition governor for internal combustion engines comprising an air pump having a chamber connected to the engine so as to be driven at a rate proportional to the speed of the latter to compress the air within its chamber, an air escape passage from said pump chamber, provided with means for regulating the rate of escape of said air, and an electric ignition circuit for igniting the fuel gases having a break therein between two electrodes, one of which is operatively connected to the air pump piston so as to be reciprocated therewith and the other being mounted upon an elastic support operatively arranged adjacent to said pump chamber so as to be positioned by the pressure therein.

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