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FUEL GOVERNING MECHANISM FOR INTERNAL COMBUSTION ENGINES.

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Fig. 1.

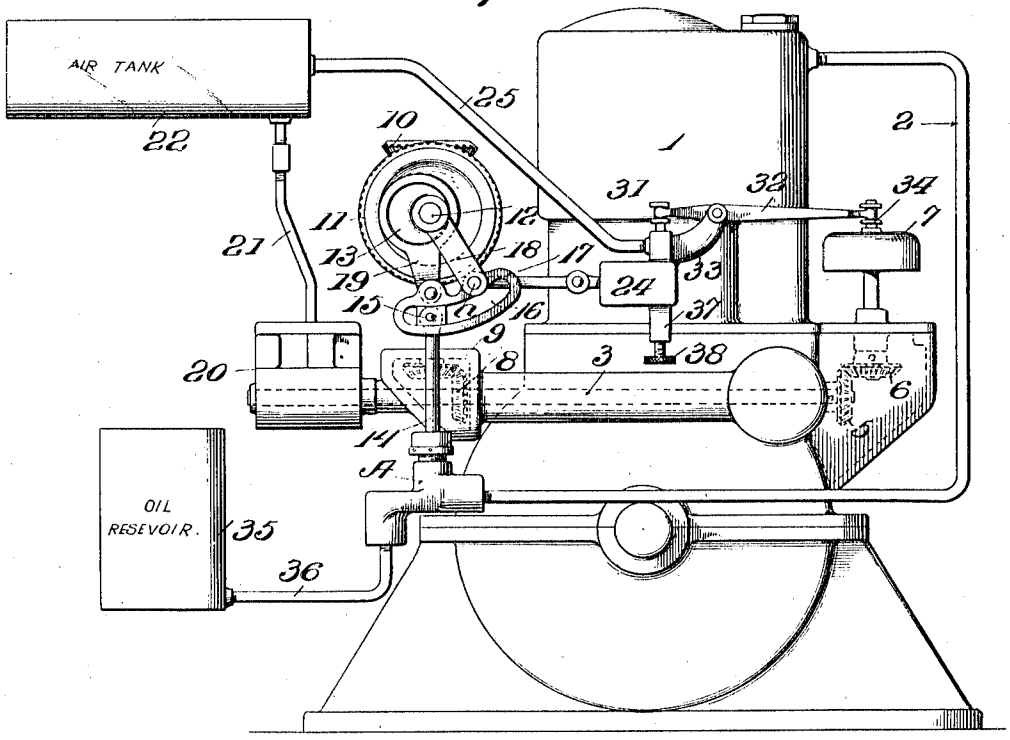
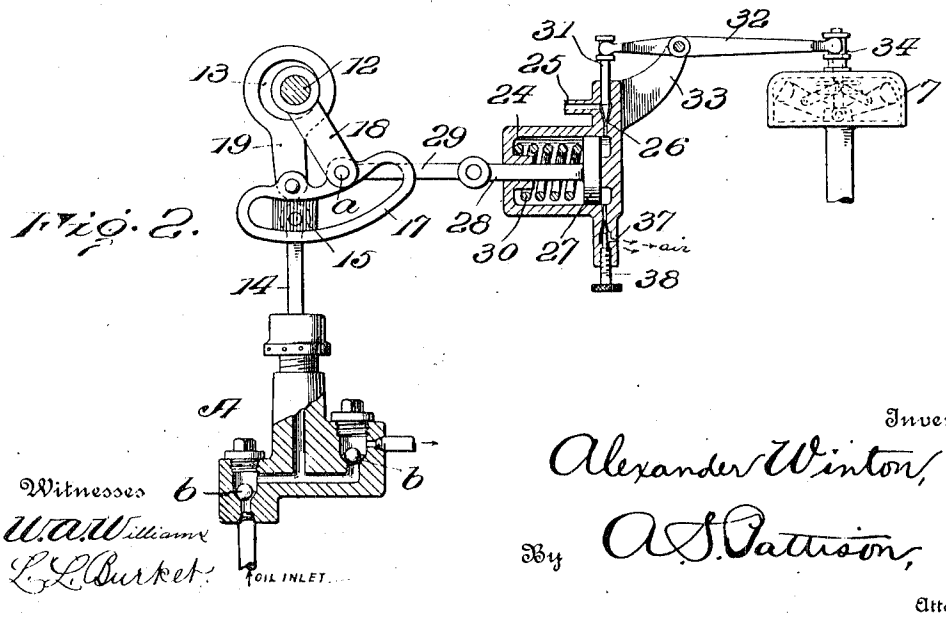


Fig. 2.



Witnesses

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FUEL-GOVERNING MECHANISM FOR INTERNAL-COMBUSTION ENGINES.

1,106,326. Specification of Letters Patent. Patented Aug. 4, 1914.

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To all whom it may concern:

Be it known that I, ALEXANDER WINTON, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Fuel-Governing Mechanism for Internal-Combustion Engines, of which the following is a specification, reference being had therein to the accompanying drawing.

My invention relates to improvements in fuel governing mechanism for internal combustion engines, and has relation particularly to controlling the feed of oil fuel to that type of combustion engine using heavy oil, and wherein the fuel is fed to the combustion cylinder by means of a variable stroke pump.

The primary object of the present invention is to produce a mechanism to vary the stroke of the fuel pump which is not called upon to provide power for controlling the stroke of the pump, whereby the governing mechanism may be made extremely sensitive, the power necessary to control the stroke of the pump being furnished by air-pressure, the governor only acting to operate a needle-valve which controls the passage of air to the operating mechanism.

In carrying out the present invention, I utilize the principle disclosed in my U. S. Patents Nos. 582,108, dated May 4th, 1897, and 626,122, dated May 30th, 1899, wherein air is employed as a motive power for controlling a throttle or explosive inlet valve for internal combustion engines, but in other respects the present invention is different from that disclosed in said patents, as will appear from the description and disclosure herein.

In the accompanying drawings—Figure 1 is an end view of an internal combustion engine showing my improved governing mechanism applied thereto. Fig. 2 is an enlarged detached view in which the governing mechanism is shown partly in section.

Referring now to the drawings, 1 indicates the cylinder of an internal combustion engine constructed to utilize heavy oil as its combustible fuel. This heavy oil is conveyed to the engine through a pipe or conduit 2, by means of a pump A, with which one end of the pipe 2 is connected, the other end of the pipe connected with the engine as shown.

The rotating shaft 3 is operatively connected in any suitable manner with the engine. The manner of connecting the shaft 3 with the motor is immaterial so far as the present invention is concerned, it only being necessary that the shaft 3 be driven by the engine. One end of this shaft 3 carries a beveled gear 5, which meshes with a similar gear 6 attached to the shaft of a governor 7. The form of governor here shown is of the centrifugal type, and the operation of this is so well understood that it is unnecessary to specifically describe it. The shaft 3 also carries a beveled gear 8, which meshes with a similar gear 9, which drives a beveled gear 10, the latter meshing with and driving a gear 11, attached to a shaft 12. This shaft also carries an eccentric 13, that is rotated with the shaft.

The plunger 14 of the pump A has its outer end provided with a suitable head or block 15, fitting in the slot 16, of a link 17. One end of this link is connected to the outer end of an arm 18, the other end of said arm being freely movable on the shaft, while the other end of the link 17 is connected with the eccentric strap 19 of the eccentric 13. A suitable air-pump 20 is also operatively connected with or directly attached to the shaft 3, and this pump forces air through a pipe 21 to an air tank 22.

When the slotted link 17 is in the position shown in Figs. 1 and 2, the stroke of the pump plunger 14 will be equal to the extreme eccentric movement imparted to the eccentric strap, but the stroke of the said pump plunger will be gradually shortened or decreased as the slotted link is moved and carries the eccentric strap 19 out of line or to one side of the pump plunger, and when the slotted link is moved so that the head 15 of the pump plunger is at the opposite end of the slot 16 of the link 17, there will be no movement of the eccentric imparted to the pump plunger. When the slotted link 17 is in this position the pivotal point of the arm or lever 18 will be in line with the pump plunger and the link 17 will simply oscillate on its pivotal point a, and without imparting any movement to the pump plunger. To permit the link 17 to so oscillate, the head 15 is pivoted to the outer end of the pump plunger 14, as more clearly shown in Fig. 2.

From the foregoing it will be understood

that the movement of the pump plunger may be varied from the extreme to zero by the movement of the slotted link 17, and in this way the amount of fuel supplied to the engine is regulated and thereby the speed and power of the engine controlled. There will, of course, be a suitable mixing device (not here shown) for providing the proper air mixture with the fuel, irrespective of the variation in the amount of fuel fed to the engine cylinder, in order to provide an explosive mixture. Since this forms no part of the present invention, it is not shown and not described.

The power for working the pump is provided by the eccentric 13 and the power for shifting the slotted link 17 is furnished by the pressure from the tank 22, and this is controlled by the speed of the engine through the governor 7, in a manner which will now be described. This air driven power device comprises a cylinder 24, and it is connected with the air tank 22, through a suitable pipe 25, there being a connecting air-passage 26 to one end of the cylinder 24. Placed in this cylinder is a piston 27 and the stem 28 of this piston is connected with the slotted link 17 by a link 29. A suitable spring 30 serves to normally hold the piston 27, in position to hold the link 17 so that normally the extreme movement of the eccentric 13 is imparted to the pump plunger. The flow of air from the tank 22 to the cylinder 24 and behind the piston 27 is controlled by a suitable needle valve 31, and this valve in turn is controlled by the governor 7, through a lever 32 intermediately pivotally connected to a suitable support 33. One end of this lever 32 is suitably operatively connected with the centrifugal governor 7 by a shaft or member 34, while the opposite end of the lever 32 is similarly connected with the needle valve 31.

The oil reservoir 35 is connected with the pump A by a pipe 36 and the pump A comprises the usual check valves *b*, the operation of which is so well understood that description thereof is unnecessary.

An air escape opening 37 is provided for that end of the cylinder 24 with which the air inlet 26 communicates, and this escape opening is adjustably controlled by a hand operated valve 38, the function of which will be presently described.

With the parts in the position here shown, the pump plunger 14 is given its extreme movement and the extreme amount of fuel is supplied to the motor and hence the motor is operating under full power. Suppose the maximum speed of the engine to be 600 R. P. M. the governor is so adjusted that the centrifugal action thereof will cause the lever 32 to close the air-inlet valve 31 and the parts will remain in the position shown, as long as the engine is rotating the predetermined R. P. M. Ordinarily when so rotating the engine is under load, but if the load is removed, or if for other reasons the speed increases, the speed of the governor is correspondingly increased and by the centrifugal action of the governor the valve 31 is lifted and air admitted behind the piston 27. This moves the piston and removes the slotted link 17 to position to either reduce the stroke of the oil pump or if the increased speed is sufficient, the slotted link 17 will be removed to the position where the pump plunger 14 is idle and no fuel is fed to the engine. As soon as the engine slows down to the predetermined speed the valve 31 is closed and the air pressure in the cylinder 24 immediately escapes through the opening 37 and the fuel pump is instantly put in operation. In this way the engine is held at its predetermined adjusted speed. This mechanism is especially effective in marine motors where they have a tendency to race when the vessel is in a sea-way and oftentimes the propeller is lifted almost or entirely free of the water. By this mechanism the engine is prevented from racing and the mechanism for the same reason is useful in any relation where the engine is suddenly relieved of its load, and this may be in the manner just described or by disconnecting the engine from the propeller, as when making landings or anchorage, or for any reason the speed of the boat is being controlled. At the same time the engine will be running at its governed speed so that there is always ample power if the load is suddenly thrown on the engine by connecting the propeller for either backing or going forward, or if the engine is used in any other connection where the load is suddenly taken off or put upon the engine. At the same time it will be understood that a throttle (not shown) may be provided of any well-known type by means of which the speed of the engine may be reduced, or any well-known means (not shown) may be provided for changing the adjustment of the governor 7, so that it will control the speed of the engine from its minimum to its maximum.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:

1. The combination with an internal combustion engine, of an engine operated fuel pump, an adjustable variable mechanism for varying the stroke of the pump, a power actuated member controlling the adjustable variable mechanism, means operated by the engine for supplying power for the said power device, and an engine operated governor controlling the power supplied to the power device.

2. The combination with an internal combustion engine, of an engine operated fuel supply, a variable mechanism for the said

fuel supply, an engine provided power for moving the variable mechanism, and an engine operated governor controlling the power supply for moving the variable mechanism.

3. The combination with an engine of the type described, of a fuel supply pump operated by the engine, a variable mechanism for controlling the movement of the pump, power actuating mechanism for the variable mechanism, engine provided power for the said power mechanism, and an engine operated governor controlling the power supply according to the speed of the engine and thereby controlling the movement of the fuel pump by the speed of the engine.

4. The combination with an internal combustion engine, of a fuel supply pump therefor, a variable mechanism operated by the engine and connected with the pump to vary the movement thereof, a power actuated mechanism adapted to control the said variable mechanism, an engine power supply for the power actuated mechanism, and an engine operated governor controlling the said engine power supply according to the speed of the engine for the purpose described.

5. The combination with an internal combustion engine, of a fuel supply pump, a variable link mechanism connecting the engine with the pump to vary the movement of the latter, a power actuated mechanism connected with and operating the variable link mechanism, an engine power supply for the power actuated mechanism, and an engine operated governor controlling the said engine power supply for the purpose described.

6. The combination with an internal combustion engine, of a fuel supply pump, a reciprocated slotted link variable mechanism connecting the engine with the supply pump to vary the movement of the latter, a power actuated mechanism connected with and adapted to move the slotted link, an engine power supply for the said power actuated mechanism, and an engine operated governor controlling the said engine power supply for the purpose described.

7. The combination with an internal combustion engine, of a fuel supply pump therefor, a rotating eccentric operatively connected with the engine, a slotted link connected with and movable with respect to the pump, an eccentric strap connected with one end of the slotted link and a swinging arm connected with the other end of the link, a power actuated mechanism connected with and adapted to move the link, an engine power supply for the power actuated mechanism, and an engine operated governor controlling the said engine power supply for the purpose described.

8. The combination with an internal combustion engine, of an engine operated fuel supply, a variable mechanism for controlling the movement of the said supply, an air-actuated mechanism connected with the said variable mechanism, an engine operated air-supply for the air-actuated device, and an engine operated governor controlling the air-supply to the air-actuated device according to the speed of the engine.

In testimony whereof I hereunto affix my signature in the presence of two witnesses.

ALEXANDER WINTON.

Witnesses:

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