G. W. THEXTON.

GOVERNING DEVICE FOR TWO STROKE CYCLE INTERNAL COMBUSTION MOTORS.

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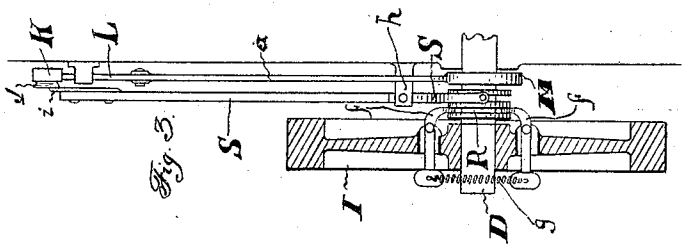



Fig. 3.

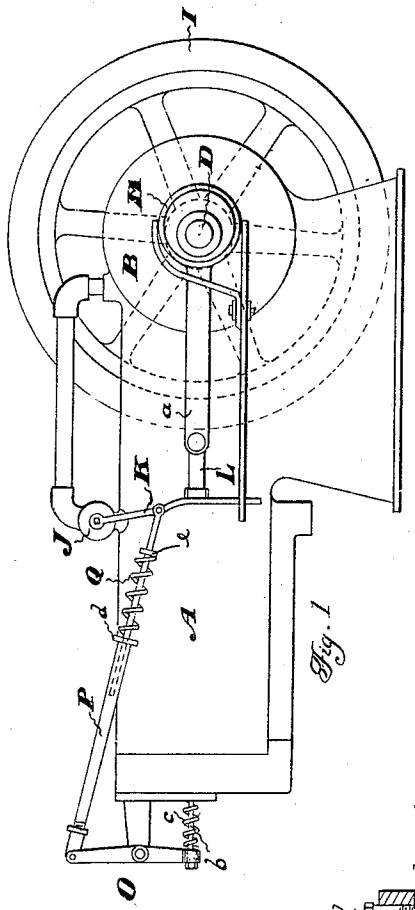



Fig. 1.

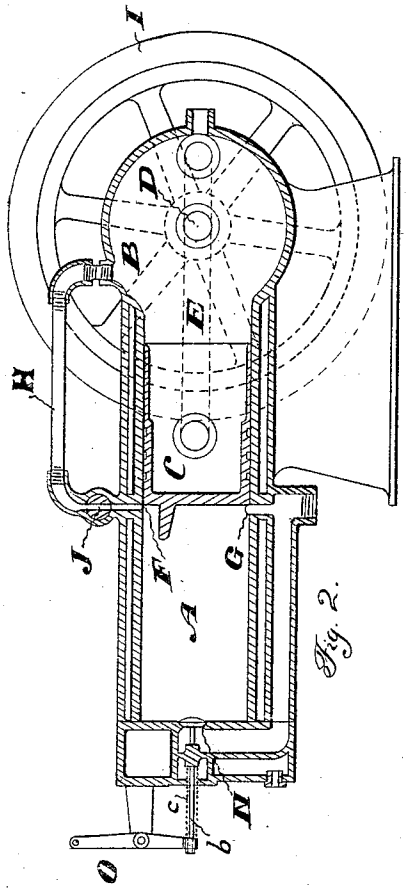



Fig. 2.

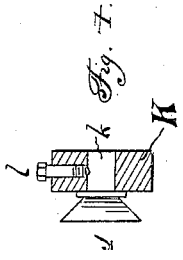



Fig. 4.

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## GOVERNING DEVICE FOR TWO-STROKE CYCLE INTERNAL-COMBUSTION MOTORS.

No 909,256. Specification of Letters Patent. Patented Jan. 12, 1909.

Application filed February 24, 1908. Serial No. 417,493.

*To all whom it may concern:*

Be it known that I, GEORGE W. THEXTON, of the town of Sarnia, in the Province of Ontario, Canada, have invented certain new and useful Improvements in Governing Devices for Two-Stroke Cycle Internal-Combustion Motors, of which the following is a specification.

My object is to devise means for governing two-stroke cycle internal combustion motors on the hit or miss principle in such a manner that when missing explosions the engine is not working against compression in the cylinder.

I attain my object by providing the combustion chamber of the engine with a relief valve which is automatically opened whenever the governing devices prevent the admission of a fresh charge to the cylinder, and remains open while the engine is missing.

The means employed for controlling the fuel admission and the operation of the relief valve are briefly as follows:—The inlet port for the explosive mixture is valve controlled and this valve is normally opened and shut by suitable connections with a cam or eccentric on the crank shaft. A governor is provided adapted to lock the mixture valve closed when the speed of the engine exceeds a given maximum. Connections are provided between the mixture valve and the relief valve, including a compressible member normally spring extended. The closing movement of the mixture valve tends to open the relief valve but cannot do so against the compression of the charge in the cylinder and the aforesaid member is compressed. If, however, the mixture valve is locked closed the compressible member will extend and open the relief valve as soon as the engine exhausts, and the relief valve remains open as long as the engine is missing.

Figure 1 is a side elevation of an engine constructed in accordance with my invention. Fig. 2 is a longitudinal sectional view of the same. Fig. 3 is a plan detail of the governing mechanism. Fig. 4 is an enlarged sectional detail of the catch on the arm of the mixture valve.

In the drawings like letters of reference indicate corresponding parts in the different figures.

The engine, as will be seen from the drawings, is of the two-stroke cycle type, A being the cylinder, B the crank case, C the piston, D the crank shaft and crank, E the pitman, F the inlet port, G the exhaust port, H the passage for the mixture leading from the crank chamber to the inlet port, and I the fly wheel.

As the engine is intended to be governed on the hit or miss principle I provide the inlet port with the valve J, hereinafter referred to as the mixture valve. By rocking this valve the supply of mixture to the cylinder may be cut off as hereinafter referred to. To the spindle of this valve is secured an arm K. With the rear side of this arm a bar L, sliding through a suitable support, is adapted to engage. This bar L is connected with the rod *a* of the eccentric M on the crank shaft D. The eccentric, it will be noted, is set with its throw in the same direction as the throw of the crank. From this construction it follows that the arm K is rocked to close the valve during the compression of the charge and, as will be seen later, the arm is left free to return to open the valve as the piston reaches the end of its power stroke. There is no positive connection between the bar L and the arm K and the arm is returned to its initial position in the manner hereinafter described.

In the end of the combustion chamber of the cylinder I provide an inwardly opening relief valve N. The stem *b* of this valve is suitably guided and is connected to one end of the lever O fulcrumed on the end of the cylinder. A coil spring *c* on the stem tends to retain the valve in its closed position. To the other end of this lever is pivotally connected one end of the telescopic rod P, the other end of which is pivotally connected with the arm K of the mixture valve. The method of telescoping the rod is clearly shown in Fig. 1 and the parts are normally held extended by the coil spring Q, which engages the collars *d* and *e* on the two parts of the rod. From this construction it follows that as long as the engine is taking a charge at every cycle the mixture valve J will be alternately closed and opened and that each time it is closed the rod P is operated to move the lever O and thus open the relief valve N. But, there being a charge within the cylinder, as the piston moves up this charge is compressed and produces a pressure on the relief valve N to resist its opening. This pressure is greater than the tension of the coil spring Q so that the movement of the arm K of the mixture valve instead of causing the rod P to open the relief valve merely causes the parts to telescope on one another,

compressing against the pressure of the coil spring Q. The relief valve thus remains closed as long as the engine is taking a charge during each cycle despite the constant opening and closing of the mixture valve. If, however, the mixture valve after being closed is held closed no mixture is taken into the cylinder at the end of the power stroke, and the pressure, owing to the exhaust of the burned gases, falls to atmospheric pressure.

As already described, when the valve is in the closed position the rod P is telescoped and the coil spring Q placed in a state of tension. As soon therefore as the pressure in the cylinder disappears, as just described, the tension of this spring Q overcomes the tension of the spring *c* of the relief valve N and the latter is opened. As long as the mixture valve is held closed the relief valve remains open, and the engine while missing simply pumps air back and forth through the relief valve. Thus the engine is relieved of the necessity of working against the compression in the cylinder when missing its explosions, resulting in a considerable increase in economy. As soon, however, as the mixture valve is again opened to supply mixture to the cylinder the spring *c* closes the relief valve as the tension on the spring Q is relieved.

For the purpose of holding the mixture valve closed when the engine is exceeding a predetermined speed limit I provide a suitable governor. In the drawings I show on the crank shaft a sleeve R suitably grooved for engagement by the inner ends of the weighted bent levers *f*, the weights as usual being connected by a coil spring *g*. With the second groove in the sleeve is engaged the forked inner end of a lever S suitably fulcrumed at *h* in the frame of the engine. The other end of this lever carries a blade *i* adapted to engage the catch *j* on the arm K. This catch is preferably square, as shown, and each side is grooved to engage the blade. The stem *k* of the catch is secured in the arm K by means of a set screw *l*. The catch may thus be set in the arm with any one of its sides in engagement with the blade. The life of the device is thus prolonged as the catch may be turned as soon as one side is worn to present a fresh side for engagement with the blade. As soon as the speed of the engine increases above a predetermined limit the governor will move the sleeve R to throw the blade *i* into the path of the catch *j*. The blade falling behind the catch engages the latter and prevents the arm K from moving to open the mixture valve J, and the engine consequently missing until the speed of the engine decreases to the predetermined limit.

I do not of course desire to limit myself to the precise constructions shown as the details may be varied considerably without departing from the spirit of my invention.

What I claim as my invention is:—

1. In a two-stroke cycle internal combustion motor the combination of governor-controlled means for cutting off the supply of combustible mixture; a relief valve normally closed; and means for automatically opening the relief valve and maintaining it open when the engine is missing explosions due to the cutting off of the supply of combustible mixture.

2. In a two-stroke cycle internal combustion motor the combination of governor-controlled means for cutting off the supply of combustible mixture; a relief valve normally closed by spring pressure; and connections between the aforesaid governor-controlled means and the relief valve whereby the cutting off of the supply of combustible mixture tends to open the relief valve, said connections including a compressible member normally spring extended.

3. In a two-stroke cycle internal combustion motor the combination of a valve controlling the admission of the combustible mixture to the cylinder; an eccentric operated by the crank shaft; connections between the eccentric and the mixture valve for opening and closing the latter; governor-controlled means for locking the mixture valve closed; a relief valve normally closed; and connections whereby the closing of the mixture valve tends to open the relief valve, said connections including a compressible member normally spring extended.

4. In a two-stroke cycle internal combustion motor the combination of a valve controlling the admission of the combustible mixture to the cylinder; an arm secured to the spindle of the valve; a rod reciprocated by the engine engaging the said arm; a catch on said arm; a governor-operated pick blade adapted to engage said catch; a normally spring-closed relief valve; a lever to which the valve spindle is pivotally connected; and a telescopic normally spring-extended rod connecting said lever with the arm of the mixture valve.

5. In a two-stroke cycle internal combustion motor the combination of a valve controlling the admission of the combustible mixture to the cylinder; an eccentric operated by the crank shaft; connections between the eccentric and the mixture valve for opening and closing the latter; a relief valve normally closed; and connections whereby the closing of the mixture valve tends to open the relief valve, said connections including a compressible member normally spring extended.

Sarnia, Ont., 12th February, 1908.

GEORGE WILLIAM THEXTON.

Signed in the presence of—
JOSEPH HUNTER,
ELIZABETH HUNTER.