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N. YOUNG.

EXPLOSIVE ENGINE GOVERNOR.

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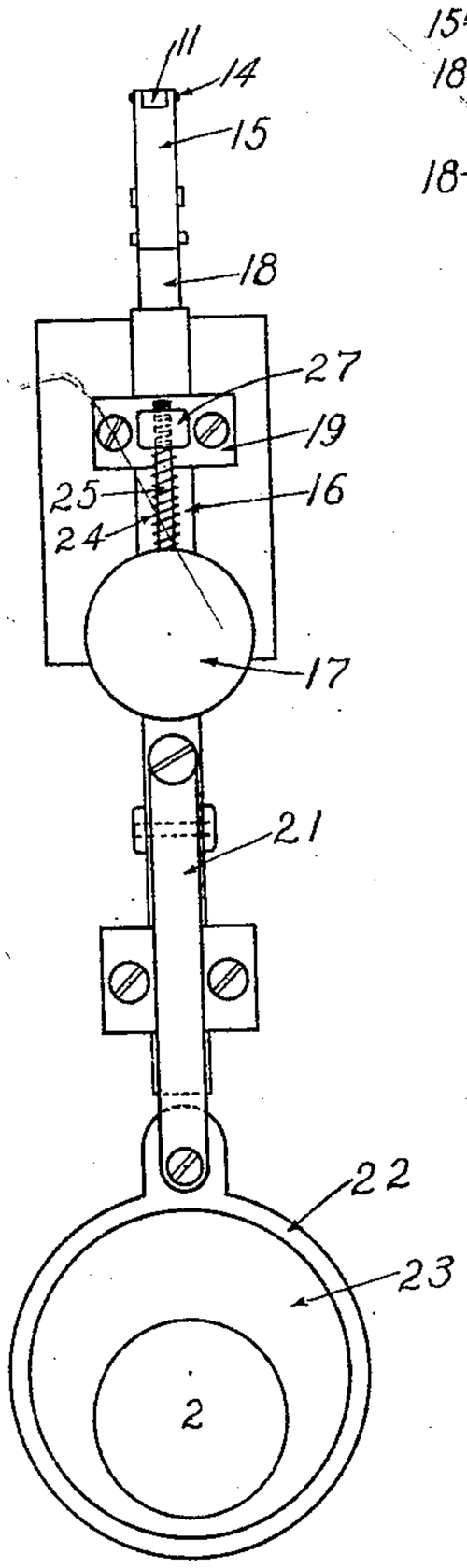

Fig. 1.

Fig. 3.

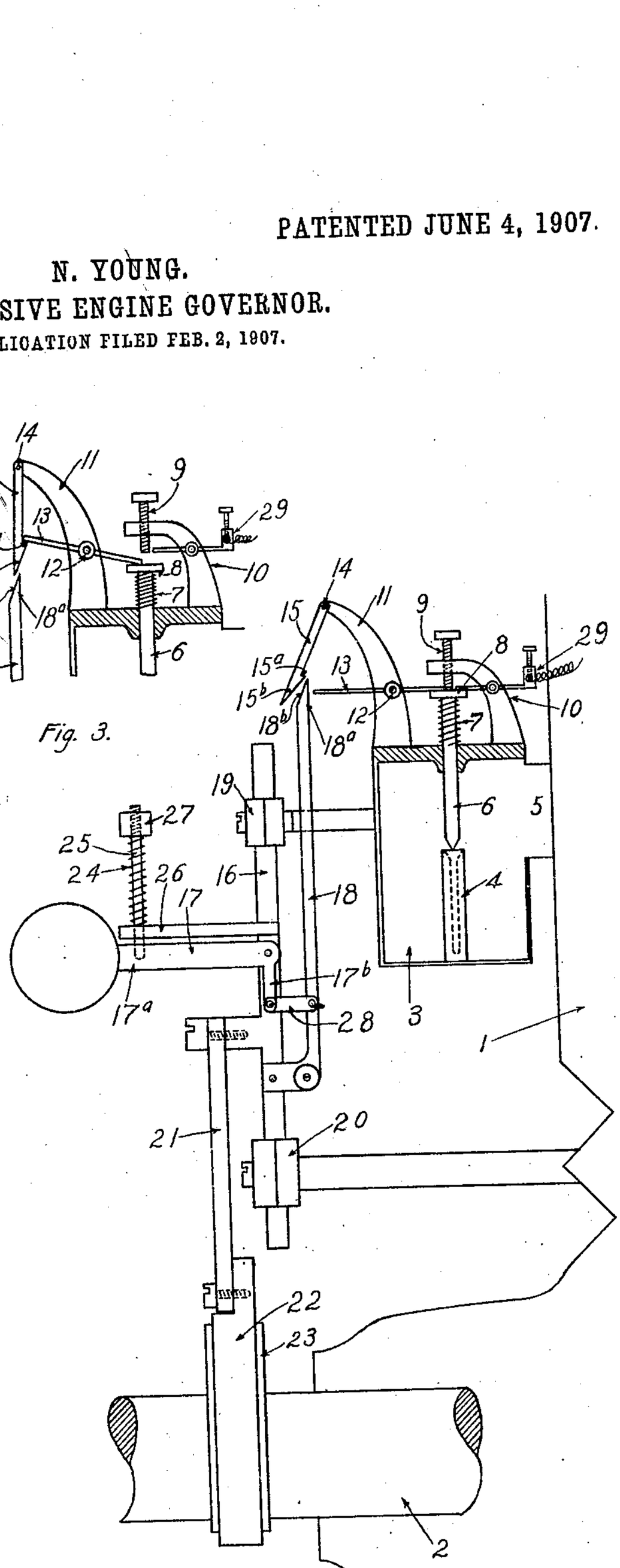

Fig. 2.

WITNESSES

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EXPLOSIVE-ENGINE GOVERNOR.

No. 855,490. Specification of Letters Patent. Patented June 4, 1907.

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To all whom it may concern:

Be it known that I, NATHANIEL YOUNG, of Portsmouth, in the county of Rockingham and State of New Hampshire, have invented certain new and useful Improvements in Explosive-Engine Governors, of which the following is a specification.

This invention relates to governors for internal combustion engines, being intended particularly for the two-cycle type of gasolene motor, and is designed to provide a simple and efficient device by which the inertia of a weight reciprocated by the engine will cause the supply of fuel to be shut off from the engine whenever the speed of the latter exceeds the determined safe amount, without, however, diminishing the supply of air.

The invention consists primarily in an improved governor mechanism adapted to actuate the valve upon each revolution of the engine shaft when the latter exceeds the desired rate of speed, so as to shut off the fuel, and secondly, in a latch for automatically acting to hold the fuel inlet valve closed during the period of recession of the governor and until the valve-operating member of the latter returns. The latch is so arranged that it is released when the speed is diminished, but continues to hold the valve closed as long as the speed is excessive.

In the drawings I have indicated in a fragmentary way, part of an engine, illustrating in detail the governor as it would be applied to such an engine.

Figure 1 represents an elevation of the governor, looking toward the engine endwise of the shaft. Fig. 2 represents a side elevation as seen from the right of Fig. 1, the mixing chamber being shown in section. Fig. 3 represents a fragmentary view of the position of the parts when the fuel inlet valve is locked in closed position.

The same reference characters indicate the same parts in all the figures.

Referring to the drawings, 1 represents the cylinder of a two-cycle internal combustion engine, and 2 represents the shaft thereof.

3 is the mixing chamber into which fuel is admitted through a nozzle 4, and from which it passes together with the air with which it becomes mixed in the chamber, through an outlet 5 into the engine cylinder.

6 represents a needle valve which controls the nozzle and is normally held open away from its seat in the mouth of the nozzle by an external spring 7 surrounding the valve stem and bearing externally against the head of the mixing chamber and against a collar 8 on the valve stem. The amount of separation of the valve from its seat is limited by a screw stop 9 threaded into a bracket 10 on the top of the mixing chamber. Another bracket on the mixing chamber is represented by 11, and has pivoted to it at 12 a two-armed lever 13, one arm of which bears against the top of the head 8. At the end of this bracket is the pivot 14 from which hangs an arm 15.

The governor consists of a carrier 16, a weighted bell-crank lever 17, and a striker 18. The carrier is mounted in guides 19 and 20 so as to be reciprocable vertically, and is connected with an eccentric rod 21 leading from a strap 22 which surrounds the eccentric 23 on the shaft 2. Thereby the carrier is reciprocated. Both the weighted bell-crank and the striker are pivoted to the carrier, and the former is normally retained in the position shown in the drawings by a spring 24 which surrounds a rod 25 and presses between an arm 26 on the carrier and a collar 27 adjustably mounted upon the rod 25. The latter is secured to the arm 17^a of the weighted bell-crank and passes through a hole in the rigid arm 26. The bell-crank has a second arm 17^b which is rigid with the arm 17^a and is connected by means of a link 28, to the pivoted striker rod.

The operation of the governor is as follows: As the shaft rotates, the eccentric causes a more or less rapid reciprocation to be given to the carrier 16, and the parts mounted thereon, depending on the speed of the engine. In the normal position of the parts, the end of the striker rod 18 moves in a path which is situated slightly beyond the end of the lever 13, and extends sufficiently far to pass by and just clear the lever at the end of each of its upward reciprocations. The spring 24 is of sufficient strength to retain the parts in the relation shown as long as the speed of the engine does not exceed a certain predetermined amount, but when the speed is increased beyond this degree, the inertia of the weight causes the bell-crank arm to lag somewhat behind the rigid arm 26 on the upward reciprocations of the latter. Thus the bell-crank turns about its pivot and moves its short arm 17^b toward the right, acting through the link 28 to swing the free end 18^a of the striker somewhat to the right, so that it will lie beneath the projecting end of

the lever 13, and will strike the latter and raise it. The lever being thus displaced, bears against the head of the inlet valve, and forces it against its seat so as to shut off the inflow of fuel. I prefer to make the lever 13 somewhat flexible so as to insure a close seating of the inlet valve without danger of breaking or permanently bending the lever.

As appears from the drawing, the latch 15 has a shoulder 15[a] which extends under the free end of the lever 13 when the latter is raised by the striker, and the latch is allowed to hang vertically from its pivotal support. Thus when the striker recedes, after having caused the valve to close, the shoulder of the latch retains the lever 13 in the position shown in Fig. 3, and holds the valve closed until the next return of the striker. If, during the recession and subsequent return of the striker, the engine speed has not diminished sufficiently to return the parts into normal position, the striker again engages the lever 13 without interfering with the latch. However, when the engine speed diminishes, the bevel surface 18[b] of the striker presses against a correspondingly beveled surface 15[b] on the end of the latch and forces the latter to the left, withdrawing its shoulder from engagement with the valve-operating lever and allowing the valve to be opened by spring 7. It will thus be seen that as long the engine speed remains below or at the desired point, the fuel inlet will be held open and the latch 15 kept in an inoperative position, but as soon as the speed becomes excessive, the valve will be closed and kept so until a decrease of speed occurs. The engine speed at which the governor acts may be regulated by means of the threaded collar 27. If the latter is screwed down on the rod 25 so as to increase the tension of the spring 24, the weighted arm will be held close to the fixed arm 26 until a comparatively high speed is attained, but if the collar is screwed in the other direction, the weight will lag behind the arm and cause the valve to be closed at a lower speed.

My governor acts only on the fuel inlet and it does not in any degree prevent or diminish inflow of air into the cylinder. Thus, although no explosion occurs while the governor is operative, still air is being drawn into the cylinder, which acts to force out all the exhaust incombustible vapors so that when the next charge of the explosive mixture is fired, a perfect explosion will be produced.

A binding post 29 is formed on an arm which is secured to the bracket 10 and receives one of the wires of an electric circuit for producing the igniting spark in the engine cylinder. The circuit is completed when the needle valve 6 is open, by the head 8 on the latter making contact with the arm, but whenever the valve is closed so that no explosion can occur, the circuit is broken, as shown in Fig. 3, so that production of a spark is prevented and waste of the energy of the batteries from useless sparking is avoided.

I claim:—

1. In combination with an internal combustion engine, an inlet for admitting fuel into the mixing chamber, a valve for the inlet, means normally holding said inlet valve open, an inertia governor reciprocated by the engine, and means operated by the lag of the governor when the speed of the engine exceeds a certain amount for closing said valve.

2. In combination with an internal combustion engine, an inlet for admitting fuel into the mixing chamber, a valve for the inlet, means normally holding said inlet valve open, a projecting member engaged with said valve, a striker reciprocated by the engine normally in a path out of line with said member, and a weight connected with said striker adapted to be displaced when the speed of the engine increases beyond a certain amount to shift the striker so as to engage said projecting member and close the valve.

3. In combination with an internal combustion engine, an inlet for admitting fuel into the mixing chamber, a valve for the inlet, means normally holding said inlet valve open, a governor consisting of a weight reciprocated by the engine and a striker controlled by said weight and also reciprocated by the engine; and a projection extending adjacent the normal path of the striker and engaged with the valve, said striker being shifted from its normal path by the lag of the weight so as to strike the projection and cause closing of the valve.

4. In combination with an internal combustion engine, an inlet for admitting fuel into the mixing chamber, a valve for the inlet, means normally holding said inlet valve open, a pivoted arm engaged with the valve; and a governor comprising a carrier reciprocated by the engine, a weighted arm pivoted to said carrier and yieldingly held in a predetermined relation thereto, and a striker movably attached to the carrier and controlled as to its position by the weighted arm; the latter being caused by its inertia to change its relation with the carrier upon attainment of an excessive speed, thereby moving the striker into position to engage the pivoted arm and cause closing of the valve.

5. In combination with an internal combustion engine, an inlet for admitting fuel into the mixing chamber, a valve for the inlet, means normally holding said inlet valve open, a carrier reciprocated by the engine, a weighted bell-crank pivoted to said carrier, a spring yieldingly holding the bell-crank in a predetermined position and permitting the same to shift upon attainment of excessive speed, a striker arm pivoted to the carrier

and connected with the bell-crank so as to be displaced by shifting of the latter, and a lever engaged with the valve arranged adjacent and out of the normal path of the striker but in position to be struck by the latter, when displaced, to close the valve.

6. In combination with an internal combustion engine, an inlet for admitting fuel into the mixing chamber, a valve for the inlet, means normally holding said inlet valve open, a flexible arm engaged with the valve, and an inertia-controlled striker reciprocated by the engine so as normally to clear the arm, but adapted to be displaced when the engine speed increases so as to strike the arm and thereby cause the valve to be closed.

7. In combination with an internal combustion engine, an inlet for admitting fuel into the mixing chamber, a valve for the inlet, means normally holding said inlet valve open, an inertia governor reciprocated by the engine, means operated by the lag of the governor when the speed of the engine exceeds a certain amount for closing said valve, and means for automatically retaining the valve in closed position until released by a subsequent reciprocation of said governor.

8. In combination with an internal combustion engine, an inlet for admitting fuel into the mixing chamber, a valve for the inlet, means normally holding said inlet valve open, an engine-reciprocated inertia-governed striker arranged to close the valve when the engine speed increases beyond a certain amount, and a latch automatically operative to keep the valve closed, arranged to be released by said striker upon a decrease of speed.

9. In combination with an internal combustion engine, an inlet for admitting fuel into the mixing chamber, a valve for the inlet, means normally holding said inlet valve open, an arm engaged with the valve, a striker reciprocated by the engine toward and from the arm in a path which normally clears the latter, inertia governing means operating when the engine speed becomes excessive to shift said striker so as to engage the arm and close the valve, and a latch adapted to hold the arm in valve-closing position during recession of the striker, said latch having an inclined surface to be engaged by the striker when moving in its normal path and thereby disconnected from the arm.

10. In combination with an internal combustion engine, a fuel inlet, a valve controlling the same, an inertia governor arranged to lag behind its carrier upon increase of the engine speed beyond a predetermined rate, connections operated by the governor when such lag occurs for closing the valve, to shut off the fuel supply, and an electric spark-producing circuit having contacts which are separated to break the circuit whenever the valve is closed.

In testimony whereof I have affixed my signature, in presence of two witnesses.

NATHANIEL YOUNG.

Witnesses:
Mrs. ALBERT H. ENTWISTLE,
ALBERT H. ENTWISTLE.