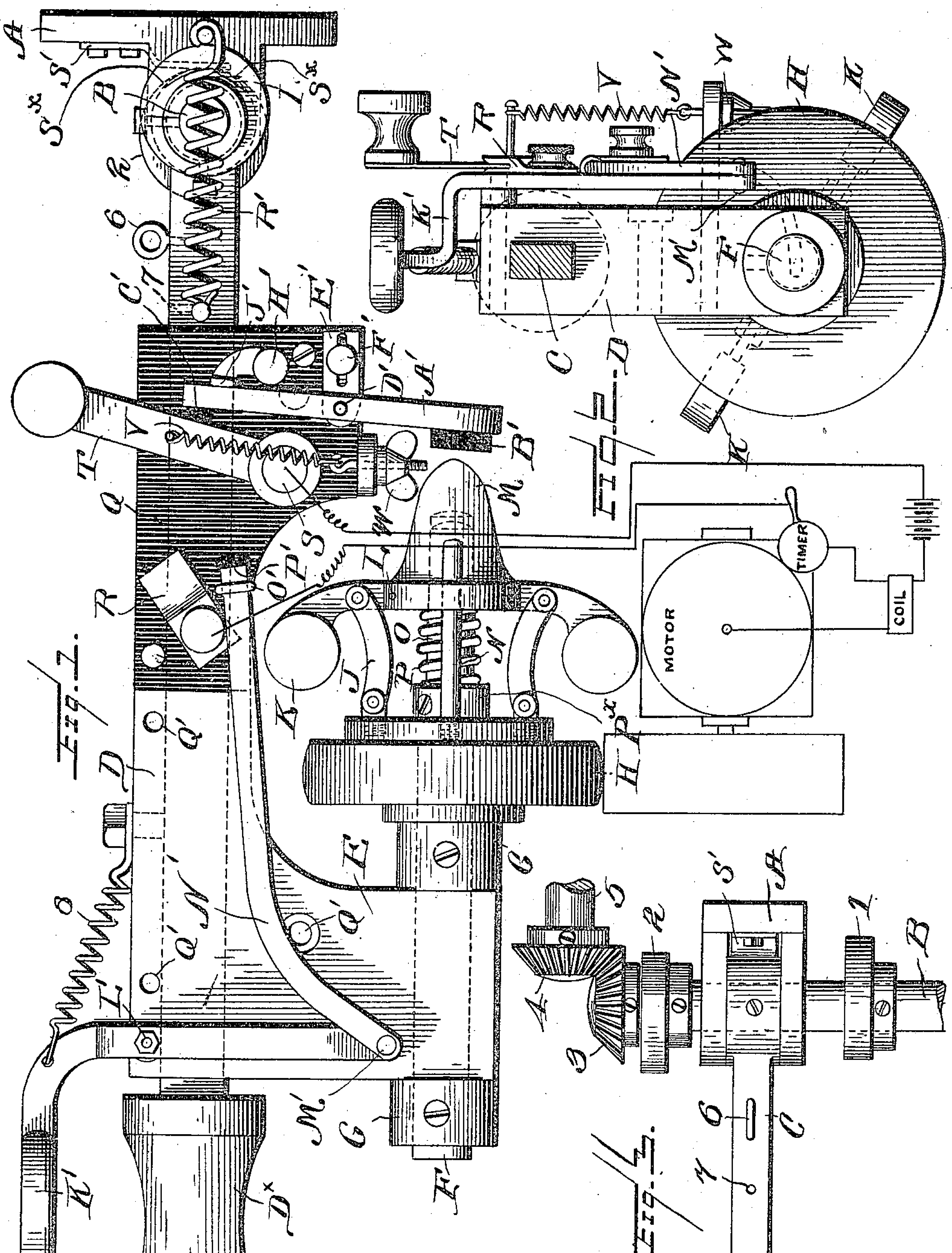
J. M. RHETT.

AUTOMATIC SWITCH.

APPLICATION FILED OCT. 3, 1907.

962,388. Patented June 21, 1910.



WITNESSES

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AUTOMATIC SWITCH.

962,388. Specification of Letters Patent. Patented June 21, 1910.

Application filed October 3, 1907. Serial No. 395,788.

To all whom it may concern:

Be it known that I, JAMES M. RHETT, a citizen of the United States, residing at Beaufort, in the county of Beaufort, South Carolina, have invented certain new and useful Improvements in Automatic Switches; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to automatic switches for reversing gas and other internal combustion engines, and the object of my invention is to improve the device heretofore disclosed in my application, Serial No. 392,168, filed Sept. 10, 1907, and to produce such a switch which shall be certain in action, simple to construct, not liable to get out of order, cheap to manufacture, and which shall be easy to connect and disconnect from the engine.

One of the chief advantages of this device over that disclosed in my former application resides in the construction by which, when the pivoted lever is swung out of operative position, the wearing parts, including the governor, are at rest and not subject to wear.

Another advantage resides in the construction, by which the device is capable of an easy connection with the sparking mechanism of any engine; and a still further advantage resides in the construction by which this device may be mounted on a handled lever, or on a wall or other support, at pleasure. Furthermore, it can be connected to the engine, either by contacting the friction wheel of the governor mechanism with the fly wheel of the engine, or the said friction wheel may be driven by any suitable connection from the engine, as a belt, for instance.

To these ends my invention consists in the combination of parts hereinafter more fully disclosed and particularly pointed out in the claims.

Referring to the accompanying drawings forming a part of this specification, and wherein like letters and numerals indicate like parts in all the views; Figure 1 is a side elevational view of my device; Fig. 2, an end elevational view of the same showing certain parts in section; and Fig. 3, a detail view of one end of the operating lever and its connections.

It is well known to those operating gas or other internal combustion engines that the same may be readily reversed, and consequently the propeller driven thereby likewise reversed without the employment of any clutch or similar device on the said propeller or on the main shaft of the engine. This reversing of the engine and consequent reversing of the propeller, in motors of this type, may be accomplished, as is well known, by the proper adjustment of the sparking points, and by a skilful manipulation of the switch controlling the ignition circuit at the proper time. But to successfully reverse the engine in this manner, requires a cool head and a skilful manipulation. In cases of emergency, the operator is not liable to have either of these qualities, and therefore this method is exceedingly dangerous to depend upon. That is to say, it is common in internal combustion engines, to so arrange the sparking apparatus that the ignition of the gas will automatically occur at a predetermined point in the rotary travel of the fly wheel. Means are, also, commonly provided, by which this point of ignition may be adjusted either forward or back, within certain limits; and it is generally conceded that the best time for the ignition, is that occurring just before the crank reaches the upper center; the momentum of the fly wheel being relied upon to carry the crank past the dead center while the force of explosion is being developed. Therefore, if the circuit be opened, the engine and fly wheel will slow down; and if the circuit be reclosed at just the moment when the fly wheel has lost just enough of its momentum, and is therefore moving slowly enough, to allow sufficient time after the spark has been made, for the combustion of the gas, and development of the explosive force, before the piston has reached the top of the cylinder, the force of the explosion will drive the piston back, downward, and reverse the engine; but such a skilful operation of the switch cannot be depended on in emergencies.

By my device, I cause an engine to be re-

versed with ease, with certainty, and automatically, as will appear more fully hereinafter.

In the drawings, A represents any suitable support, or portion of the engine, B a shaft passing through suitable bearings secured thereto, C a lever mounted on said shaft, and $D^{\times}$ a handle for said lever.

D represents a suitable frame or casting provided with the extension E, as shown. This extension constitutes a bearing for the shaft F, on which is secured the collar G, which carries the friction wheel H. Secured to this collar G are the links J, pivoted to the weighted disks K, which in turn are pivoted at L to the reciprocating nose M, as best shown in Fig. 1. Also secured to this collar G are rods N sliding through the flanges of said nose M, and projecting from said collar is the guide shaft O, surrounded by the spring P, the tension of which may be controlled by adjusting the small collar $P^{\times}$ along the shaft O, all as fully disclosed in my said application above.

Attached to the frame or casting D is an insulating plate Q, preferably of hard rubber or wood fiber, and secured to this plate are the terminals R and S of the ignition circuit. Pivoting upon the terminal S is the lever T controlled by the spring V, which in turn is secured to and controlled by the fastening W.

A′ represents a lever provided with the insulating portions B′ and C′ and pivoted at D′ to the slidingly adjustable piece E′ secured by the fastening F′ to the said insulating plate Q.

H′ represents a stop provided with the contact J′ for the lever A′, as shown.

Pivoted at L′ to the said frame or casting D is also the lever K′, provided with the link N′ joined at M′ to said lever K′. The link N′ passes through the screw eye O′ and is provided at its end with the insulating button P′, adapted to contact with the lever T, as more fully hereinafter disclosed.

Q′ represents holes through the frame or casting D, by which the same may be securely fastened to the wall or a suitable support, when it is not desired to swing the same upon the shaft B as a pivot. In such case the automatic governor and switch device, is placed in such a position as to bring the friction wheel H, of the governor, in contact with the rim of the fly wheel; or the said friction wheel, may be used as a pulley wheel to be operated by a belt from the fly wheel to the engine.

1 and 2 represent cams upon the said shaft B, which may be conveniently employed to operate the levers, shafts, or other devices that are now commonly employed to adjust the time, or the points of ignition of the sparks in gas engines. 3 and 4 represent gears for turning the shaft 5, which may be used for the same purpose.

6 represents a screw eye in the lever C, which affords a means for attaching said lever to a lever or shaft that controls the points of ignition in engines, and 7 represents a hole in said lever to which the screw eye 6 may be moved, in order to give a greater leverage.

The operation of my device is as follows:—The switch lever T is normally in its closed position in contact with the terminal R, and when it is desired to reverse the engine the handle $D^{\times}$ is grasped, and the frame D carrying the friction wheel H is turned with the shaft B as a center, until the said friction wheel comes in contact with the fly wheel or other moving part of the engine. This action sets the governor in motion, and, of course, causes the weighted disk or balls K to be thrown outward by centrifugal force. When the lever C is thus turned on its pivot, the operator also presses on the lever K′, which forces the link N′ forward and causes its insulating nose P′ to turn the lever T on its pivot, and thereby open the circuit. The spring V is so placed that its tension when the circuit is closed will serve to keep the lever T in its closed position, but when the circuit is open this tension will cause the lever T to be held in its open position, as shown in Fig. 1.

When the pressure has been removed from the lever K′, the spring 8 will cause the link N′ and the insulating button P′ to be withdrawn to its normal position. The circuit having been thus opened, the engine will slow down, and as the fly wheel slows down in consequence thereof, the rotation of the governor will likewise slow down and the balls or weighted disks K will lose their centrifugal force and come inward. This will cause the nose M of the governor to be thrust outward and to contact with the insulated portion B′ on the lever A′. The contact of the nose M on the insulated portion B′ will cause the lever A′ to swing on its pivot D′, and its insulated portion C′ at its other end to force the lever T past the dead center, when the spring V will force the lever T into contact with the terminal R, thus reëstablishing the circuit. As the parts are all adjustable, as above described, this reëstablishing of the circuit can be readily caused to take place at exactly the right moment in order to reëstablish the sparking at such a time as will insure the engine to be reversed. That is to say the circuit can be closed with certainty at just the moment when the fly wheel has lost sufficient momentum, and is moving sufficiently slowly, to allow sufficient time for the combustion of the gas and the development of the explosive force, before the piston has

reached the top of the cylinder; so that the piston will receive this force before the up-stroke has been quite completed, and be forced back downward, thereby reversing the engine.

When the lever C is turned on its pivot, the tension of the spring R′ is such that it tends to hold the friction wheel H against the fly wheel of the engine. Now, when it is desired to disengage the said friction wheel H from the fly wheel of the engine, the lever C is thrown in the opposite direction, and the connection of the spring R′ is such, that when the said lever C passes its dead center, the tension of said spring will tend to hold the friction wheel H away from said fly wheel. If the cams 1 and 2, or the shaft 5, or the screw eye 6 be attached to the particular means that the engine may have for advancing the time of sparking, the movement of this lever C may be used to advance the time of sparking whenever it is thrown. These parts 1, 2, 5 and 6, can be connected by suitable means to the ignition control levers; thus timing the spark when the governor is thrown into operation. And therefore I may be sure that the sparking will be advanced to the proper point to insure the reversing of my engine, when I throw the lever C. This lever is slightly flattened at its bottom portion S^x, and a flat spring S′, see Fig. 1, is provided which takes against the same and further tends to hold the lever in its normal position. Of course, either the spring R′ or S′ may be used alone, or both springs may be used together, as desired.

By thus providing a switch device which can be readily, and at will, brought into, and thrown out of operation, I prevent any wear of the parts, when such device is not in use. And by mounting such device upon a pivoted lever adjustably along its length, I can easily attach it in operative position to almost any type of engine with the greatest economy of space. Above all, however, I, also, provide a means by which the time of sparking, or point of ignition, may be advanced to the proper point to allow for the development of the force of the explosion before the piston has reached the top of the cylinder thus insuring the reversing of the engine, and thereby leave nothing to chance.

Having now described my invention, what I claim is:—

1. In a motor, the combination of an electric circuit controlling the rotation of the same, a switch for controlling said motor, a governor mechanism for controlling said switch, and means comprising a pivoted lever by which said governor mechanism may be swung into and out of contact with a moving part of said motor, substantially as described.

2. In a motor, the combination of an electric circuit controlling the rotation of the same, a switch for controlling said motor, a governor mechanism provided with reciprocating means for controlling said switch, and means comprising a pivoted lever by which said governor mechanism may be swung into and out of contact with a moving part of said motor, substantially as described.

3. In a motor provided with a fly wheel, the combination of an electric circuit for controlling the rotations of the same, a pivoted switch for controlling said circuit, a governor mechanism provided with a reciprocating part for controlling said switch, and with a part adapted to contact with said fly wheel, and a pivoted lever on which said governor mechanism is mounted, substantially as described.

4. In a motor provided with a fly wheel, the combination of an electric circuit for controlling the rotations of the same, a pivoted switch for controlling said circuit, a governor mechanism provided with a reciprocating part for controlling said switch, and with a part adapted to contact with said fly wheel, a pivoted lever on which said governor mechanism is mounted, and means on said lever adapted to be connected to means on the engine for advancing the points of ignition in said engine, substantially as described.

5. In a motor provided with a fly wheel, the combination of an electric circuit for controlling the rotations of the same, a pivoted switch for controlling said circuit, a lever for opening said switch, a governor mechanism provided with a reciprocating part for controlling said switch, and with a part adapted to contact with said fly wheel, and a pivoted lever on which said governor mechanism is mounted, substantially as described.

6. In a motor provided with a fly wheel, the combination of an electric circuit for controlling the rotations of the same, a pivoted switch for controlling said circuit, a lever, and link for opening said switch, a governor mechanism provided with a reciprocating part for controlling said switch, and with a part adapted to contact with said fly wheel, and a pivoted lever on which said governor mechanism is mounted, substantially as described.

7. In a motor provided with a fly wheel, the combination of an electric circuit controlling the rotations of the same, a pivoted switch for controlling said circuit, a lever and link for opening said switch, a governor mechanism having a reciprocating part adapted to contact with said switch, and a rotating part adapted to contact with said fly wheel, a pivoted lever on which said

governor and switch are mounted, and a spring for holding said last mentioned lever either in contact with said fly wheel or out of contact therewith as desired, substantially as described.

8. In an internal combustion engine provided with a fly wheel, the combination of an electric circuit controlling the rotations of the same, a governor mechanism adapted to be operated by said fly wheel, a switch for controlling said circuit, a lever on which said governor and switch are mounted, and means on the lever for advancing the times at which the ignition of the gas in the engine takes place, substantially as described.

9. In an internal combustion engine the combination of an electric circuit for controlling the ignition, a lever, a centrifugal governor mechanism and a switch for controlling said circuit both mounted on said lever, and means on said lever for advancing the times at which said ignition takes place, substantially as described.

10. In a motor, provided with a fly wheel, the combination of an electric circuit for controlling the rotations of the same, a switch T for controlling said circuit, a spring for holding said switch in either of two positions, a lever A′ for controlling said switch, an adjustable plate E′ on which said lever A′ is mounted, a stop J′ against which said lever is adapted to rest, a governor mechanism for controlling said lever and switch, and a pivoted lever C on which the said parts are mounted and by which said governor mechanism may be made to contact with said fly wheel, substantially as described.

11. In a motor provided with a fly wheel, the combination of an electric circuit for controlling the rotations of the same, a switch T for controlling said circuit, a spring for holding said switch in either of two positions, a lever A′ for controlling said switch, an adjustable plate E′ on which said lever A′ is mounted, a stop J′ against which said lever is adapted to rest, a governor mechanism for controlling said lever and switch, a lever K′ having a link N′ jointed thereto for controlling said switch, a spring 8 for controlling said lever K′, and a pivoted lever C on which the said parts are mounted and by which said governor mechanism may be made to contact with said fly wheel, substantially as described.

12. In a motor provided with a fly wheel, the combination of an electric circuit for controlling the rotations of the same, a switch T for controlling said circuit, a spring for holding said switch in either of two positions, a lever A′ for controlling said switch, an adjustable plate E′ on which said lever A′ is mounted, a stop J′ against which said lever is adapted to rest, a governor mechanism provided with a friction wheel H, a lever K′ having a link N′ jointed thereto for controlling said switch, a spring 8 for controlling said lever K′, a pivoted lever C on which the said pivots are mounted and by which said governor mechanism may be made to contact with said fly wheel, and an insulating plate Q on said lever C, adapted to receive the terminals of the circuit, substantially as described.

13. In an internal combustion engine provided with the usual fly wheel, ignition terminals and means to advance the times at which the ignition takes place, the combination of an electric circuit for controlling the rotations of said fly wheel, a switch lever T for controlling said circuit, a spring V, a lever A′, an adjustable plate E′ on which the same is mounted, a stop J′, an insulating plate Q, a governor mechanism provided with the friction wheel H and reciprocating nose M, a frame D on which the same is mounted, a lever K′ mounted on said part D, and provided with a link N′ adapted to open said switch, a lever C, springs R′ and S′ for holding said lever in two positions, a shaft B on which said lever is mounted, and means on said shaft adapted to be connected with the said means on the engine for advancing the times at which the ignition takes place, substantially as described.

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

JAMES M. RHETT.

Witnesses:
M. S. ELLIOTT,
GEORGE WATERHOUSE.