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AUTOMATIC SWITCH FOR REVERSING GAS ENGINES.

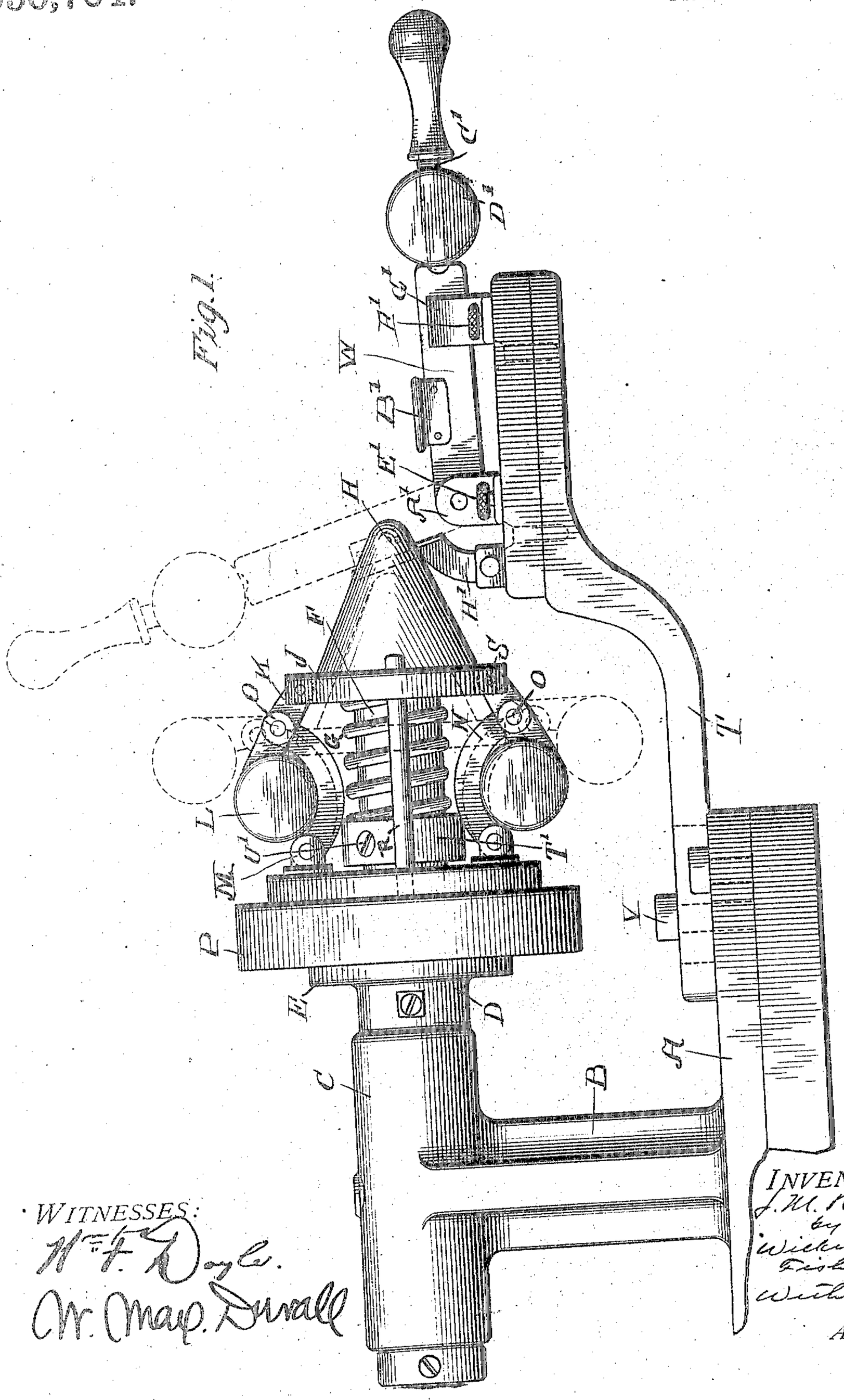
APPLICATION FILED SEPT. 10, 1907. RENEWED JULY 21, 1909.

950,704.

Patented Mar. 1, 1910.

2 SHEETS—SHEET 1.

Fig. 1.



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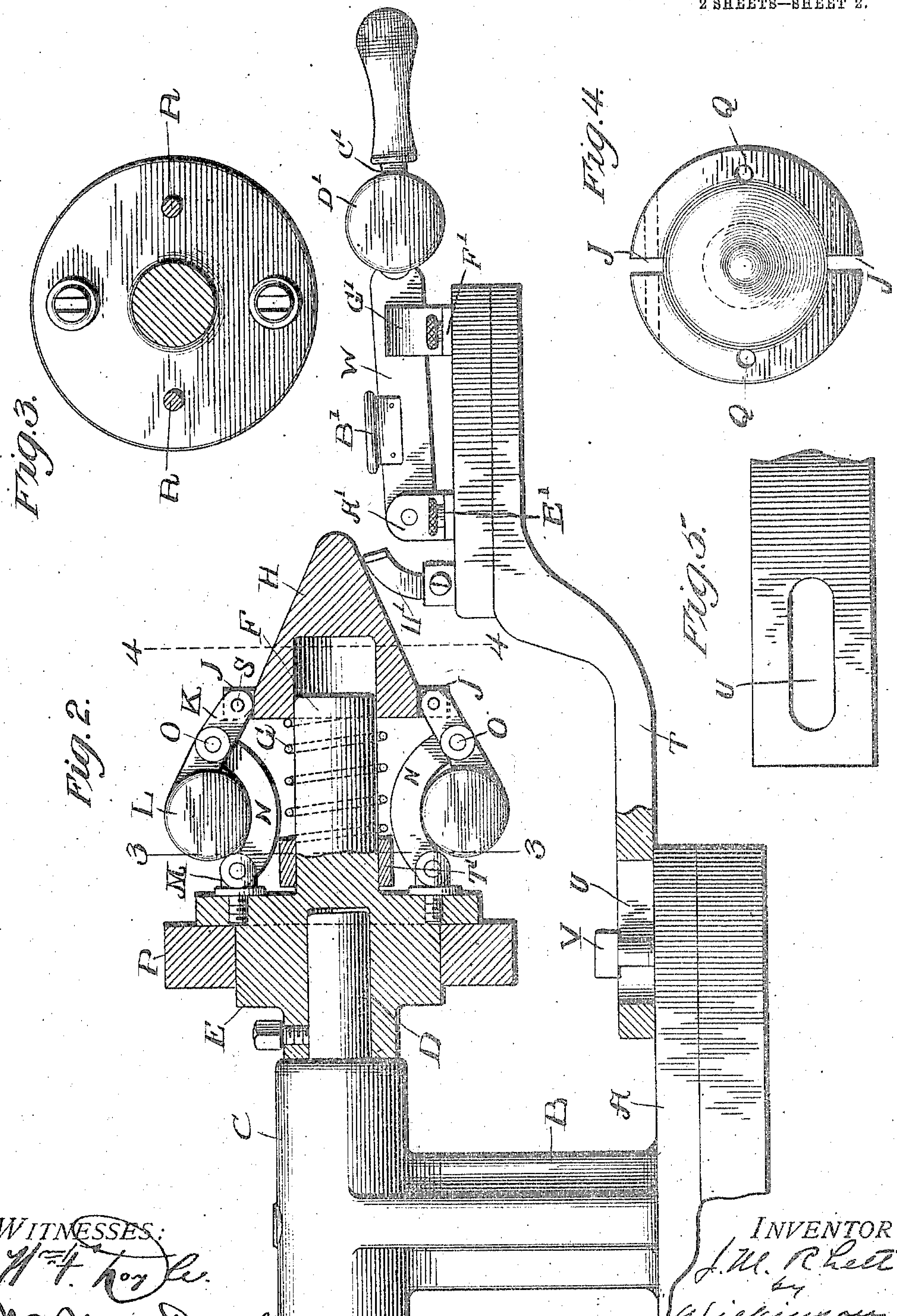

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UNITED STATES PATENT OFFICE.

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AUTOMATIC SWITCH FOR REVERSING GAS-ENGINES.

950,704. Specification of Letters Patent. Patented Mar. 1, 1910.

Application filed September 10, 1907, Serial No. 392,168. Renewed July 21, 1909. Serial No. 508,773.

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 and State of South Carolina, have invented certain new and useful Improvements in Automatic Switches for Reversing Gas-Engines; 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 engines, and the object of my invention is to produce such a device which shall be certain in action, simple to construct, and not liable to get out of order and cheap to manufacture.

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—Figure 1 shows in side view an ordinary ball governor for a gas engine provided with means adapted to operate the switch controlling the igniting circuit and showing said switch in opened and closed positions. Fig. 2 is a like view, showing the governor in section, and the switch closed. Fig. 3 is a sectional view taken along the line 3—3 of Fig. 2. Fig. 4 is a detached view of the nose of the governor. Fig. 5 is a detailed view of the end of the bracket carrying the switch, and showing the slot by which it is fastened to the base of the stand supporting the governor.

Like letters refer to like parts in all the views.

It is well known to those operating gas or other internal explosion engines that the same may be readily reversed, and consequently the propeller driven thereby, 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 proper adjustment of the sparking points and by a skilful throwing of the switch, controlling the ignition circuit, at the proper time. But to successively reverse engines in this manner requires a cool head and a skilful manipulation. In cases of emergency both of these qualities are almost sure to leave the operator, and, therefore, this method is exceedingly objectionable and uncertain. By my device I cause this reversing of the engine to take place with certainty and automatically. 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 on to carry the crank past the dead center, while the force of the explosion is being developed. By thus igniting the gas immediately before the piston reaches its upward stroke, the increased force due to the compression of the gas by the piston while completing its stroke, is added to the force of the explosion which is delivered to the piston after the stroke has been completed and after it has begun its return stroke, all as is well known.

My invention provides a device which operates in unison with the ignition means already on the engine, and is placed in the same electric circuit. It provides means for opening the circuit at will, and such opening causes the engine to slow down, owing to the sparking being stopped, and therefore causes the fly wheel to likewise slow down. When the fly wheel, however, slows down to such a degree that it does not have sufficient momentum to carry the crank past the dead center, before the force of the explosion has been developed, then my invention causes the circuit to be automatically reclosed, thus reestablishing the ignition sparks, and insuring the delivery of the force of the explosion on the piston while it is yet completing its up stroke. The result is, the piston and crank are forced back and the engine reversed.

In the drawings A represents any suitable support, B any suitable standard rising therefrom, C a bearing adapted to receive the shaft D. To this shaft D is secured the collar E of the governor by any suitable means. The said collar E is provided with the projection F surrounded by the spring G. Over the projection fits the nose H of the

governor, which is provided with the lugs J to which are pivoted the levers K carrying the balls or disk weights L. The collar E is provided with holes into which are secured the lugs M to which are pivoted the links N, said links being thereby connected to the collar P which is secured to the said collar E by any suitable means. This collar P receives motion from any suitable moving part of the engine. For example, it may be driven as a friction wheel in contact with the fly wheel of the engine, or it may be driven from the fly wheel by a belt. However it is driven, it serves to transmit motion from the engine to the governor. The nose H of the governor is provided with the holes Q shown in Fig. 4, and the collar E is provided with the guide rods R shown in Fig. 3, which rods are adapted to pass through said holes Q and serve as guides for the nose H as it reciprocates upon the projection F under the control of the spring G. The said nose H is conveniently cut away in its rim as shown in Fig. 4 to provide the lugs J above described, and pins S pass through the same. A collar T′ encircles the projection F where it joins the collar E and is secured to said projection by a set screw U′. This collar is useful in adjusting the tension of the spring G.

T represents a bracket slotted at U and secured by any suitable means V to the support A, and this bracket carries the switch lever W pivoted to the lug A′ and provided with the insulating disk B′. This switch lever has a screw threaded portion C′ along which the weight D′ is capable of adjustment.

E′ and F′ are switch terminals, and G′ represents the ordinary spring cleft of this type of knife switches.

H′ represents an adjustable stop on the base of the switch, against which the switch lever bears when in open position, as shown in Fig. 1.

The operation of my device is as follows:—The switch lever W is normally in its closed position as shown in Figs. 1 and 2, and when it is desired to reverse the engine the same is slowed down by throwing the switch lever to its dotted line position shown in Fig. 1, with its body portion resting against the stop H′, in which position the center of gravity of the weight D′ on the switch lever, lies in a plane passing beyond said stop, and, therefore, said weight tends to hold the lever against the said stop, and consequently tends to hold the switch open. As the engine slows down, however, the governor balls L, of course, will close in, as is well known, and the nose H of the governor under the influence of the spring G, will be thrust outward. As soon as the tip of the nose H strikes the insulating plate B′ on the lever W, however, it will turn said lever on its pivot, and as soon as the center of gravity of the weight D′ occupies a plane on the other side of the pivot of said lever W it will cause said switch lever to fall and close the igniting circuit.

In practice the supporting bracket T is adjusted along the base A and secured by the fastening V in such a position that this tipping of the lever W will take place just at the moment when the balls L have closed in to that distance, which marks the proper loss of momentum in the fly wheel. When this adjustment has been secured through the means just described then a final adjustment, if necessary, can be made by moving the collar T′ and thus regulating the tension of the spring G. In case any further adjustment is found desirable the stop H′ may be moved around its pivot screw, and the screw then set up to hold the said stop in its newly adjusted position. If the stop H should then be turned to the left, as seen in Fig. 1, the weighted lever would rest against the same in a position farther to the left than that shown in dotted lines in said figure, and since its center of gravity, including that of the weight D′, would be lower, it would require a greater compression of the spring G to throw said lever over and close the circuit, than it would, were the stop H′ left in its full line position. In other words, the adjustment of the stop H′ may be used to supplement the adjustment of the spring G. A few trials readily show the operator just what adjustments the various parts should have. But owing to the fact that the fly wheel slows down very suddenly in each revolution, just before the piston reaches the top of the cylinder, the nose H always trips the lever W just at the right moment. It results from this action that even a rough adjustment of the parts insures the sure and certain operation of this automatic reversing switch, and the same need be given no attention after a few trials have demonstrated that the parts are properly adjusted.

It will thus be seen that I have produced an exceedingly simple, cheap and certain device which can readily accomplish the reversing of engines in motor boats, electric motor machinery, and in any other place or places where such reversing is desired to take place automatically and with certainty.

It will be seen that the only operation necessary upon the part of the engineer, who wishes to reverse his engine, by means of my device, is simply to open the switch, rest it against the adjustable lug, and leave it there. And that the engine when it slows down will, through the governor mechanism, cause the said switch to be automatically re-closed and the propeller reversed. Of course the switch will remain closed until it is again opened for a like purpose.

Especial attention is called to the use of this device in automobiles, as well as in motor boats, because it requires such a simple and small change in the parts that are now used on such machines.

I do not wish to be understood as limiting myself to the details of construction shown, nor to operating my switch by the regular governor of the engine, dynamo, or motor it is desired to reverse. For it is evident that the governor illustrated may be in addition to the regular governor employed on such machines and merely suitably connected to any moving part of the same, in which case its sole function would likewise be to close the switch at the proper moment. In either of these latter cases the collar P is useful to impart motion to the governor mechanism by means of a belt suitably applied to the machine to be reversed, or the shaft D may be rigidly attached to any suitable revolving parts.

In all cases it will be observed that the essence of my invention is a governor mechanism, capable of automatically throwing a switch, and closing a circuit, without reversing the same, and at the proper moment to reverse a revolving mechanism.

What I claim is:—

1. In a revolving mechanism, having an electric circuit for controlling the revolution of the same, a governor mechanism operated by said revolving mechanism, a switch provided with a weight, and an insulating part for controlling said circuit, a stop against which said switch contacts, and means whereby said switch is automatically closed, and said revolving mechanism reversed when the engine slows down to a predetermined degree, substantially as described.

2. In a motor, having an electric circuit controlling the revolutions of the same, a switch provided with an adjustable weight, and an insulating part, controlling said circuit, a pivoted stop against which said switch contacts, a governor mechanism operated by said motor, and reciprocating means carried by said governor mechanism controlling said switch, said means adapted to close said circuit when the motor is slowed down to a predetermined degree and to thereby reverse the said motor, substantially as described.

3. In a gas engine, having an electric circuit controlling the ignition of the gas operating said engine, a switch provided with an adjustable weight, and an insulating part controlling said circuit, a stop against which said switch contacts, a governor mechanism operated by said engine and carrying reciprocating means adapted to control said switch, and an adjustable supporting means for said switch whereby when the motor is slowed down to a predetermined degree said switch will be automatically closed and the engine reversed, substantially as described.

4. In an internal combustion engine, having an electric ignition circuit controlling the revolutions of said engine, a switch W provided with a weight D′ and with an insulating part B′ controlling said ignition circuit, a centrifugal governor mechanism operated by said engine, and provided with a reciprocating part H, adapted to contact with said part B′, and a stop H′ against which said switch rests when open, whereby when the engine is slowed down to a predetermined degree the said part H will automatically cause the said circuit to be closed and the engine reversed, substantially as described.

5. In an internal combustion engine provided with an electric ignition circuit, the combination of a governor mechanism provided with centrifugal weights, a reciprocating nose, and a spring G, with a switch provided with a threaded portion, a weight adapted to be adjusted along said threaded portion, and an insulating disk adapted to contact with said nose, and a stop against which said switch is adapted to rest, whereby when the said switch is opened and the engine slowed down to a predetermined degree, the said nose may automatically close said switch and cause the said engines to be reversed, substantially as described.

6. In an internal combustion engine provided with an ignition circuit and a governor mechanism having centrifugal weights, a reciprocating nose, a spring, and an adjustable collar, the combination of a switch adapted to control said ignition circuit with an adjustable bracket and a stop supported by said bracket, said switch having an insulating disk, a threaded portion, and a weight, adapted to be adjusted along said threaded portion, the said stop being so located that when the said switch contacts therewith the center of gravity of the said weight will occupy a plane beyond said stop and thereby cause said switch to be held open, and the parts being so arranged that when the engine is slowed down to a predetermined degree, the said center of gravity of the said weight will be thrown on the opposite side of said stop, and the ignition circuit thereby automatically closed and the engine reversed, substantially as described.

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

JAMES M. RHETT.

Witnesses:
HENRY C. POLLITZER,
ELDRED G. HAY.