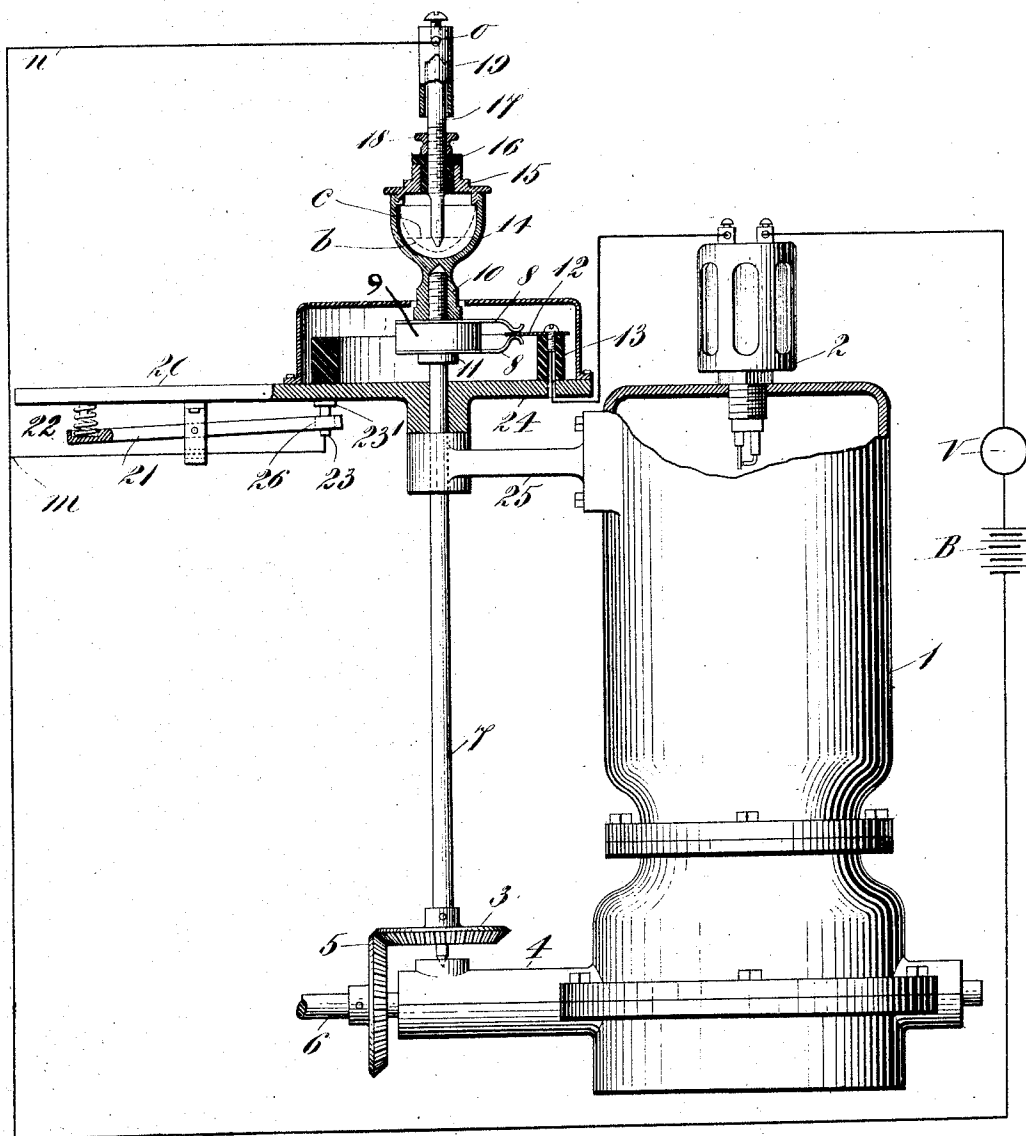


949,859.

Patented Feb. 22, 1910.



WITNESSES=

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UNITED STATES PATENT OFFICE.

JOHN P. SWIFT, OF PAWTUCKET, RHODE ISLAND.

REVERSING-GOVERNOR FOR EXPLOSIVE-ENGINES.

949,859.

Specification of Letters Patent.

Patented Feb. 22, 1910.

Application filed December 1, 1908. Serial No. 465,517.

To all whom it may concern:

Be it known that I, JOHN P. SWIFT, a citizen of the United States, and a resident of Pawtucket, in the county of Providence and State of Rhode Island, have invented a new and useful Improvement in Reversing-Governors for Explosive-Engines, of which the following is a specification.

My invention relates to reversing-governors for explosive-engines, and more particularly to such engines employed in motor-boats.

The object of my invention is to provide a simple apparatus whereby the speed of an explosive-engine may first be automatically reduced to such speed as will permit reversing without changing the position of the timer and then the direction of rotation of the engine reversed by shifting the timer, or whereby such reduction of speed may be effected simultaneously with the shifting of the timer.

In carrying out my invention I may employ any suitable sparking apparatus and system of wiring, and may actuate the moving or rotating contact member of the timer, which may be of any desired construction, in any suitable or convenient manner. It will be understood of course that by increasing the number of stationary contact members I may apply my invention to a multi-cylinder engine although I have illustrated it in connection with a single cylinder engine. To limit the speed of the engine to that speed which will permit reversing and to maintain the same at such reversing speed, I prefer to employ a centrifugal governor consisting of a cup containing a conducting fluid, preferably mercury, making contact at the reversing speed of the engine with a pin and thereby closing a shunt circuit around a switch, which when opened breaks the circuit through the sparking apparatus and thereby reduces the engine speed. The switch preferably is located on the shifting lever of the timer so that the operator may with one hand open the switch, thereby bringing the engine to reversing speed, and then shift the position of the timer, thereby reversing the engine.

In the drawing which accompanies and forms a part of this specification, the figure represents, partly in elevation and partly in section, an explosive-engine provided with one of the several embodiments of my in-

vention whereby the foregoing object has been effected in practice.

In the figure, 1 represents the engine cylinder provided with a spark plug 2 which contains the usual primary and secondary coils and spark electrodes.

3 is a bevel gear secured to the shaft 7 which has bearings on the journal 4 and in the outer end of the arm 25 extending from the cylinder.

5 is a bevel gear secured to the main shaft 6 of the engine and meshing with the gear 3.

For the purpose of more clearly explaining my invention and simplifying the drawings, I have shown a very simple form of timer consisting of a plate 24 adapted to be turned by the shifting lever 20 about the shaft 7 and carrying a ring 13 of fiber or other suitable insulating material, to the rim of which the stationary contact member 12 is attached in any suitable manner. The moving contact member of the timer consists of the spring clips 8 8 which may be of suitable shape and which are secured to and caused to rotate with the shaft 7 by clamping them between the collar 11 and the screw-threaded nut 10 of the cup 14, the collar 9 being interposed between said clips. The cup 14 is provided with a screw-threaded cap 15 carrying a screw-threaded bushing 16 of insulating material. The cup 14 contains a quantity of mercury or other suitable conducting fluid, the level of which when the cup is at rest is indicated by the dotted line *c*. A pin 17 is threaded into the bushing 16 and its position adjusted to project into the mercury a distance depending upon what I call the "critical" speed of the engine upon which the governor is used, this being the speed at which such engine may be reversed. When once adjusted, the position of the pin may be fixed by the locknut 18. A stationary cap 19 loosely fitting over the top of the pin 17 or any other suitable means may be employed for connecting the shunt circuit *m n o* with the pin 17. The switch 21 is mounted preferably on the under side of the shifting lever 20 of the timer and is provided at its inner end with a contact piece 23 which passes through the insulating bushing 26 and which is maintained against the contact piece 23 on the plate of the timer by means of the spring 22.

B is a battery or other suitable source of

electrical energy and *V* represents a vibrator which may be employed if desired.

The operation is as follows: By centrifugal force during the rotation of the engine at any speed higher than the above mentioned critical speed, the mercury in the cup spreads out along the walls of the cup and takes a position such as that shown by the dotted line *b* thereby breaking the connection of the shunt circuit *m n o* with the spring contacts 8 8, so that the spark-plug receives current from the battery by way of the point *m*, contacts 23 23', timer-plate 24, shaft 7, spring-clips 8 8, contact member 12, thence through the primary of the spark-coil and the vibrator back to the battery. When it is desired to reverse the engine, the operator grasps the lever 20 and presses the outer end of the switch 21 thereby opening the circuit above traced at the points 23 23' and thus deenergizing the spark-plug. Sparking now ceases and the speed of the engine falls until the level of the mercury in the cup 14 rises sufficiently to contact with the plug 17, whereupon the shunt circuit bridges the gap between the contacts 23 23' and sparking is resumed. The spark-plug now receives current by way of the shunt circuit *m n o*, pin 17, the mercury in the cup 14, spring-clips 8 8, contact member 12, thence through the primary of the spark-coil and vibrator back to the battery. So long as the switch 21 is opened and the current energizes the spark-plug by way of the shunt circuit *m n o*, the speed of the engine will be limited to, and maintained at or below, the critical speed, this being due to the intermittent making and breaking of the contact between the pin 17 and the mercury in the cup 14 due to continual variations in the level of said mercury. As soon as this critical speed is reached the engine may be reversed, if desired, in the usual manner by turning the timer about the shaft 7 to retard the time of sparking. It will be noted that by opening the circuit at the points 23, 23' by the switch 21 which is distinct from the timer, the speed may be reduced to the critical speed without shifting the position of the timer. However, the position of the timer may be shifted, if desired, simultaneously with the opening of the switch 21.

I am aware that it is old to reduce the speed of an explosive engine by a centrifugally operated governor, but so far as I am aware I am the first to produce a reversing governor whereby the critical speed may be obtained without at the same time advancing or retarding the time of the spark. This manifestly is an advantage in many situations, especially where the engine provided with the reversing governor is employed in a motor-boat.

It will be obvious that the conducting fluid or mercury governor herein disclosed pre-

sents many points of advantage over the ball governors heretofore employed in centrifugally operated reversing devices on account of simplicity of construction and the facility with which such fluid governor may be adjusted to meet the requirements of the engine on which it is employed.

I claim:

1. A reversing governor for explosive-engines comprising a timer, a spark-producing apparatus connected in series therewith, a switch for breaking the circuit through the spark-producing apparatus without shifting the position of said timer, a shunt circuit around said switch, and a centrifugal governor containing a conducting fluid and connected to close said shunt circuit when the engine reaches a predetermined speed.

2. A reversing governor for explosive-engines comprising a timer, a shifting lever therefor, a spark-producing apparatus connected in series with said timer, a switch mounted on said shifting lever for breaking the circuit through the spark-producing apparatus without shifting the position of said timer, a shunt circuit connected around said switch, and a centrifugal governor containing a conducting fluid and connected to close said shunt circuit when the engine reaches a predetermined speed.

3. A reversing governor for explosive-engines comprising a timer, a spark-producing apparatus connected in series therewith, a switch for breaking the circuit through said spark-producing apparatus without shifting the position of said timer, a shunt circuit connected around said switch, and a centrifugal governor containing a conducting fluid rotating with the moving contact member of said timer and connected to close said shunt circuit when the engine reaches a predetermined speed.

4. A reversing governor for explosive-engines comprising a timer, a shifting lever therefor, a spark-producing apparatus connected in series with said timer, a switch mounted on said shifting lever for breaking the circuit through the spark-producing apparatus without shifting the position of said timer, a shunt circuit connected around said switch, and a centrifugal governor containing a conducting fluid rotating with the moving contact member of said timer and connected to close said shunt circuit when the engine reaches a predetermined speed.

5. A reversing-governor for explosive-engines comprising a timer, a spark-producing apparatus connected in series therewith a switch independent of the timer for breaking the circuit through the spark-producing apparatus, a centrifugal governor containing a conducting fluid, a contact member carried by and insulated from said governor said contact member being connected in shunt with said switch, whereby the speed

of the engine may be limited to the speed at which the engine may be reversed without shifting the position of the timer, and means for shifting the position of the timer to reverse said engine when the latter has reached said speed.

6. A reversing-governor for explosive-engines comprising a timer, a spark-producing apparatus connected in series therewith a switch independent of the timer for breaking the circuit through the spark-producing apparatus, a centrifugal governor containing mercury, a contact member carried by and insulated from said governor said contact member being connected in shunt with said switch, whereby the speed of the engine may be limited to the speed at which the engine may be reversed without shifting the position of the timer, and means for shifting the position of the timer to reverse said engine when the latter has reached said speed.

7. A reversing governor for explosive-engines comprising a cup containing a conducting-fluid, a contact-member carried by and insulated from said cup, a stationary cap in electrical contact with said contact-member, means for rotating said cup, a spark-producing apparatus, an energizing circuit therefor, and a circuit in series with said fluid and contact-member connected in shunt to said energizing circuit and having one terminal connected to said cap.

8. A reversing governor for explosive-engines comprising a cup containing mercury, a contact-member carried by and insulated from said cup, a stationary cap in electrical contact with said contact-member, means for rotating said cup, a spark-producing appa-

ratus, an energizing circuit therefor, and a circuit in series with said mercury and contact-member connected in shunt to said energizing circuit and having one terminal connected to said cap.

9. A reversing governor for explosive-engines comprising a cup containing a conducting-fluid, a contact-member carried by and insulated from said cup, a stationary cap in electrical contact with said contact-member, means for adjusting said member with respect to the normal level of said fluid, means for rotating said cup, a spark-producing apparatus, an energizing circuit therefor, and a circuit in series with said fluid and contact-member connected in shunt to said energizing circuit and having one terminal connected to said cap.

10. A reversing governor for explosive-engines comprising a cup containing mercury, a contact-member carried by and insulated from said cup, a stationary cap in electrical contact with said contact-member, means for adjusting said member with respect to the normal level of said mercury, means for rotating said cup, a spark-producing apparatus, an energizing circuit therefor, and a circuit in series with said mercury and contact-member connected in shunt to said energizing circuit and having one terminal connected to said cap.

In testimony whereof, I have hereunto subscribed my name this 28th day of Nov., 1908.

JOHN I. SWIFT.

Witnesses:

ARTHUR W. CALVER.

GEO. K. WOODWORTH.