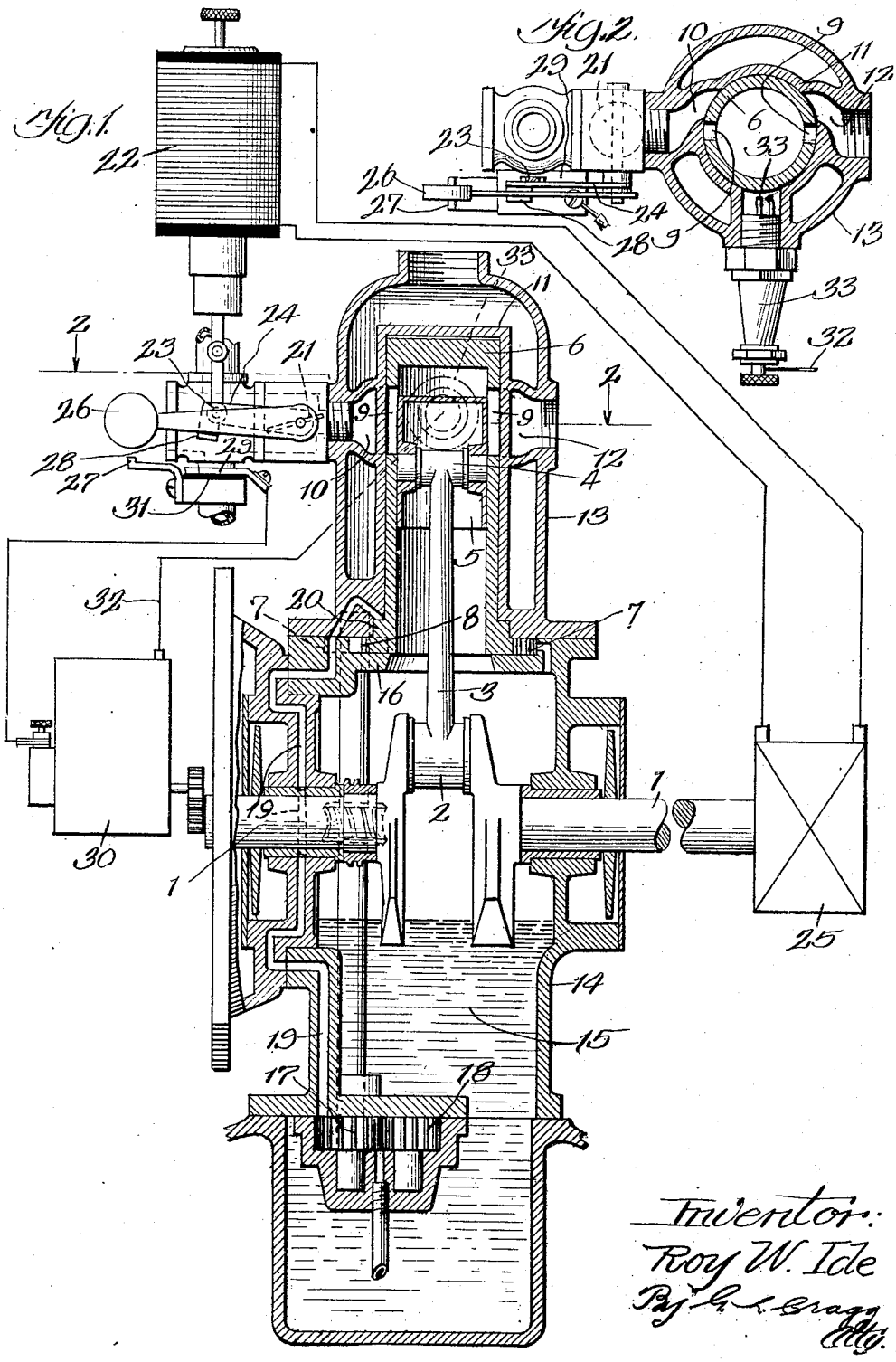
R. W. IDE.

INTERNAL COMBUSTION ENGINE.

APPLICATION FILED JULY 21, 1916.

1,246,743. Patented Nov. 13, 1917.



Inventor:
Roy W. Ide
By [illegible]
Atty.

UNITED STATES PATENT OFFICE.

ROY W. IDE, OF SPRINGFIELD, ILLINOIS, ASSIGNOR TO IDE PATENTS CORPORATION, OF SPRINGFIELD, ILLINOIS, A CORPORATION OF ILLINOIS.

INTERNAL-COMBUSTION ENGINE.

1,246,743. Specification of Letters Patent. **Patented Nov. 13, 1917.**

Application filed July 21, 1916. Serial No. 110,437.

To all whom it may concern:

Be it known that I, ROY W. IDE, citizen of the United States, residing at Springfield, in the county of Sangamon and State of Illinois, have invented a certain new and useful Improvement in Internal-Combustion Engines, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to internal combustion engines and has a number of objects and advantages in view. One feature of my invention relates to that type of engines employing rotating valving cylinders and has for its object the provision of cushioning means for preventing this cylinder from rattling and making noise. In practising this feature of my invention the cushioning means employed is desirably liquid, being preferably lubricating oil which may be contained in the crank pit of the engine and which may be fed from the crank pit for this purpose and for the purpose of lubricating all of the engine bearings.

The other features of my invention, which are herein shown as being embodied in connection with an engine having a rotating valving cylinder, form the subject matter of a division of the present application Serial No. 125,934, filed October 16, 1916. One of these additional features of my invention resides in the provision of means for rendering the throttle valve highly responsive to the action of the engine during cranking speed, the engine operating upon the valve through an electro-magnetic responsive device whose responsiveness is increased during cranking speed as compared with its responsiveness when the engine is running above cranking speed.

The third object of my invention resides in the provision of means for cutting the engine out of action when the responsive device ceases its control over the throttle valve by reason of a short circuit of the responsive device, or the opening of the responsive device circuit, or the breaking of the mechanical connection between said responsive device and the throttle valve, etc.

I will explain my invention more fully by reference to the accompanying drawing showing the preferred embodiment thereof and in which Figure 1 is a view of an engine in longitudinal section constructed in accordance with the invention, some adjuncts being diagrammatically illustrated; and Fig. 2 is a view on line 2—2 of Fig. 1.

Like parts are indicated by similar characters of reference throughout both figures.

The engine illustrated is a single cylinder engine. The crank shaft 1 has its crank 2 in connection with one end of the pitman 3, the other end of the pitman being pivotally connected at 4 with the piston 5. A valve cylinder 6 is rotated in some suitable way as by means of a pinion 7 operated at suitable speed by some engine driven portion, this pinion engaging a spur gear 8 upon the lower end of the cylinder 6. The valving cylinder may be provided with ports 9 to control the admission of carbureted air or other gas through the intake port 10 in the cylinder 11 in which the valving cylinder rotates and also to control the passage of gas through the exhaust port 12 in the cylinder 11. The cylinder 11 is desirably provided with a jacket 13 for the reception of cooling fluid. This jacket is carried upon the upper end of the crank case 14 that contains lubricating oil 15 and which has an annular step 16 at its upper end upon which the lower end of the valving cylinder turns. An oil pump is shown which includes two meshing pinions 17, 18 that operate to withdraw oil from the oil pit and force it upwardly through the passage 19 that discharges at and preferably upon the top of the shoulder 20 which is upon the lower end of the valving cylinder but is above the peripheral gear 8. The top and periphery of this shoulder and the adjacent body portion of the gear 8 have snug fit with the correspondingly shaped adjacent portion of the jacket 13 so that the oil which is pumped through the passage 19 into the space in the jacket 13 that accommodates the shoulder 20 may not have ready exit from said space, the oil being sufficiently trapped in such space to enable it to act as a cushion to receive and lessen upward thrusts of the shoulder 20 which accompany corresponding rotating valving cylinder 6 carrying this shoulder and having a closed head receiving the force of the explosions and which enable the explosions violently to thrust the valving cylinder upwardly, it being these thrusts that are principally to be guarded against. By this arrangement rattling and noise of the rotating cylinder 6 is guarded against

while at the same time the oil which is fed through the passage 19 serves to lubricate the shoulder 20 and adjacent parts. The oil ultimately finds passage through the space in which the gearing 7 and 8 operate. This oil may pass between the lower end of the valving cylinder 6 and the step 16 of the crank case from whence it is returned through the passage 19 for the purpose stated, oil from the pit being also directed to other bearing portions of the engine if desired. The pump operates to feed oil through the passage 19 at a pressure that will bear down upon the shoulder 20 to promote the cushioning effect of the oil thus supplied to the spacing in which said shoulder operates.

The carbureted air or other explosive gas is regulated in its flow to the admission port 10 by means of a throttle valve such as a butterfly valve 21. This valve is governed in its position by means of some electromagnetic responsive device such, for example, as a solenoid 22 whose core may be pivotally connected at 23 with a lever 24 having the same axis of rotation as the valve and with respect to which lever the valve is fixed. The winding of the electromagnetic responsive device, the solenoid, is in circuit with a source of current that is regulated by the speed of the engine. This source of current, in the embodiment of the invention illustrated, is in the form of a generator 25 which is driven by the engine. As illustrated, the solenoid 22 or other responsive device responds to the voltage output of the generator. As the voltage decreases in response to lowered engine speed the valve 21 opens to supply additional gas to the engine to increase the engine speed and vice versa. When the engine is being cranked to start it, the response of the solenoid to the voltage then generated should be quicker relatively to the response of the solenoid to changes in voltage that arises when the engine is in operation. On this account I increase the responsiveness of the solenoid during cranking speed (usually variable) as compared with its responsiveness on running speed. In the embodiment of the invention illustrated I accomplish this result by removing a part of the load upon the solenoid when the engine is operable at cranking speed and restore the load to normal when the engine exceeds cranking speed. The changeable portion of the solenoid load is shown in the form of a weighted lever 26 which, for the sake of convenience, may have an axis co-incident with the axis of the valve 21, the lever 26, however, being rotatable independently of the lever 24 and said valve. When the engine is not running or is being turned at cranking speed the lever 26 will rest upon a stop 27. The core of the solenoid carries a finger 28 that underlies the lever 26 and which desirably forms a continuation of the lever 24. When the engine is at running speed or above cranking speed the finger 28 will be constantly in lifting engagement with the weighted lever 26 so that this weighted lever will then constitute a part of the normal load of the solenoid, the weight of this lever being added to the weight of the solenoid core. When the engine is not operating above cranking speed or when it is at rest the solenoid will drop its core sufficiently to lower the finger 28 out of lifting engagement with the lever 26 so that the solenoid core is then relieved of the weight of this lever. The solenoid 22, under the conditions last mentioned, is more responsive to the voltage emanating from the generator 25 during the cranking operation whereby the valve 21 will more readily respond to changes in such voltage to enable the engine more readily to be brought to running speed.

Another independent feature of my invention resides in the provision of means for cutting the engine out of action if the solenoid 22 or other responsive device should release the lever 24, a condition which might arise, for example, by the breaking of the solenoid core, a short circuiting of the solenoid, or the opening of the solenoid circuit. When the lever 24 is released under such circumstances it will drop to a point (never reached while the solenoid is in working order) at which the finger 28 will engage the contact 29 which is connected with the primary side of the magneto generator 30, this contact being normally disconnected from the ground by the insulation 31. When the finger 28 engages the contact 29 the finger will ground the primary side of the generator and short circuit it so that current may not be supplied from the secondary side of the generator through the conductor 32 to the spark plug 33. The finger 28, being in grounded connection with the engine and being attached to the solenoid core, constitutes a switch which operates to throw the engine out of action or to render it inoperative when the solenoid releases its hold upon its core or upon the valve controlling lever 24, this switch, when released, serving to alter the condition of some circuit from that condition which is required of such circuit to maintain the engine in action, for the purpose of stopping the engine.

The drawings illustrating my present invention are inclusive of a structure set forth in my co-pending application Serial No. 149,572, filed February 19, 1917, and the division of said application Serial No. 175,988, filed June 21, 1917.

While I have herein shown and particularly described the preferred embodiment of my invention I do not wish to be limited to the precise details of construction shown

as changes may readily be made within the scope of the appended claims without departing from the spirit of my invention, but having thus described my invention I claim as new and desire to secure by Letters Patent the following:—

1. An internal combustion engine including an engine cylinder; a rotating valving cylinder provided with a closed head receiving force of the explosions and located within the engine cylinder, said valving cylinder having a shoulder while the other cylinder has a formation fitting the valving cylinder at the shoulder thereof; a piston operating in the valving cylinder; a liquid cushion operating upon the shoulder upon the valving cylinder and within the space in the other cylinder that receives this shoulder; and means for pumping said liquid cushion against said shoulder.

2. An internal combustion engine including an engine cylinder; a rotating valving cylinder provided with a closed head receiving force of the explosions and located within the engine cylinder, said valving cylinder having a shoulder while the other cylinder has a formation fitting the valving cylinder at the shoulder thereof; a piston operating in the valving cylinder; and a liquid cushion operating upon the shoulder upon the valving cylinder and within the space in the other cylinder that receives this shoulder.

3. An internal combustion engine including an engine cylinder; a rotating valving cylinder provided with a closed head receiving force of the explosions and located within the engine cylinder; a piston operating in the valving cylinder; a liquid cushion for receiving the thrusts imposed upon the valving cylinder; and means for pumping said liquid cushion against said valving cylinder.

4. An internal combustion engine including an engine cylinder; a rotating valving cylinder provided with a closed head receiving force of the explosions and located within the engine cylinder; a piston operating in the valving cylinder; and a liquid cushion for receiving the thrusts imposed upon the valving cylinder.

5. An internal combustion engine including an engine cylinder; a rotating valving cylinder provided with a closed head receiving force of the explosions and located within the engine cylinder; a piston operating in the valving cylinder; and a cushion for receiving the thrusts imposed upon the valving cylinder.

In witness whereof, I hereunto subscribe my name this 18th day of July, A. D. 1916.

ROY W. IDE.

Witnesses:
REUBEN H. BRAND,
MABEL L. MEREDITH.