Aug. 29, 1944. S. C. RAYBON 2,357,022

VALVE

Filed April 14, 1942 2 Sheets-Sheet 1

Fig. 1.

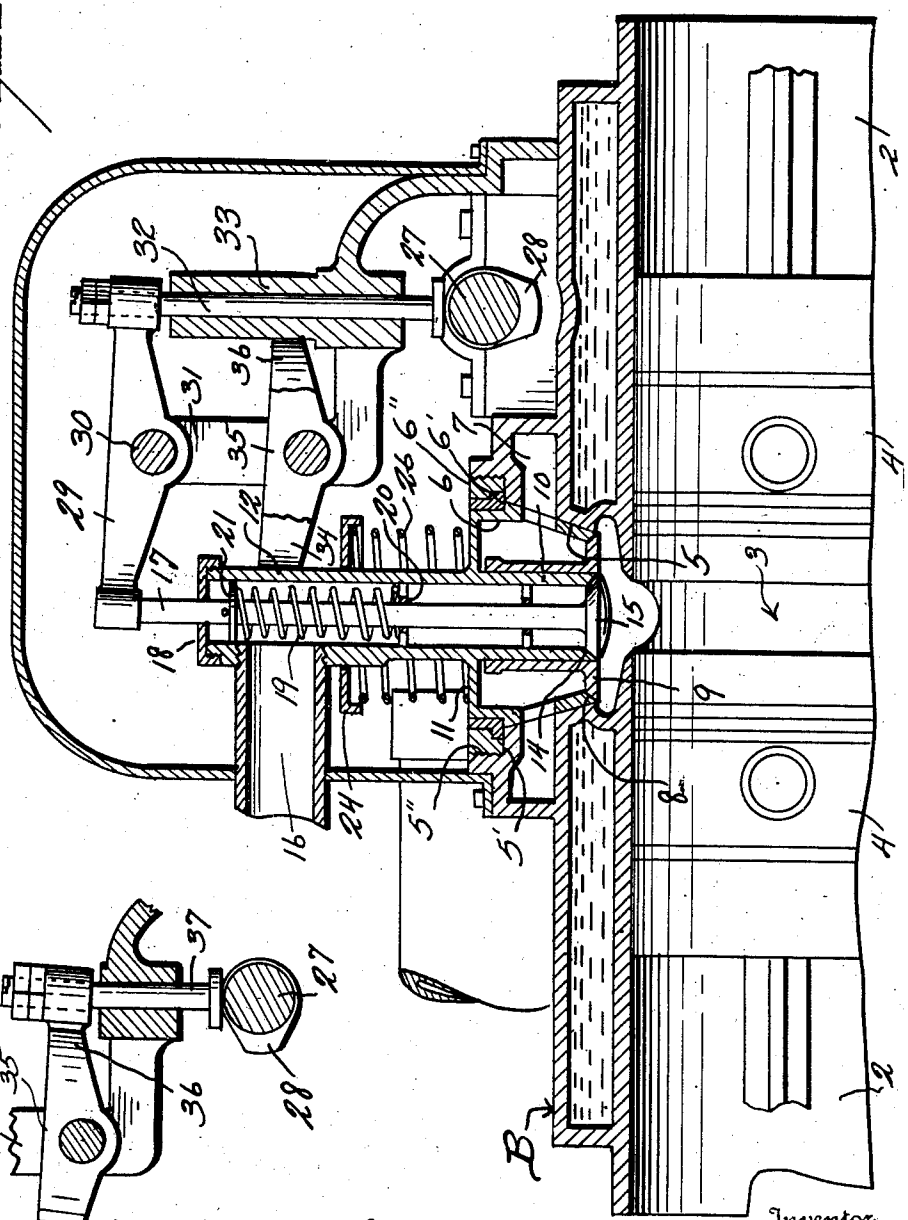
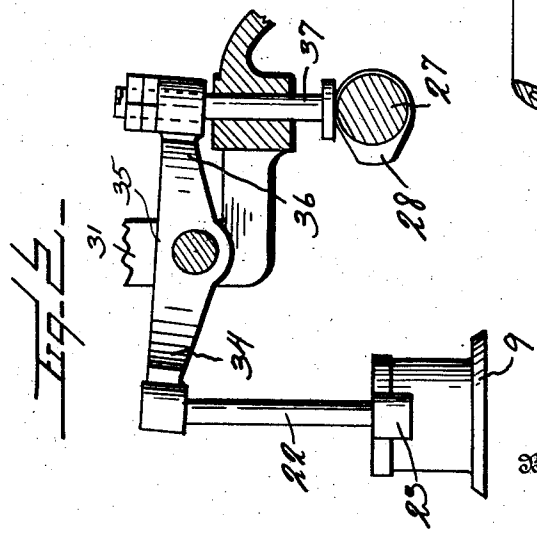


Fig. 2.



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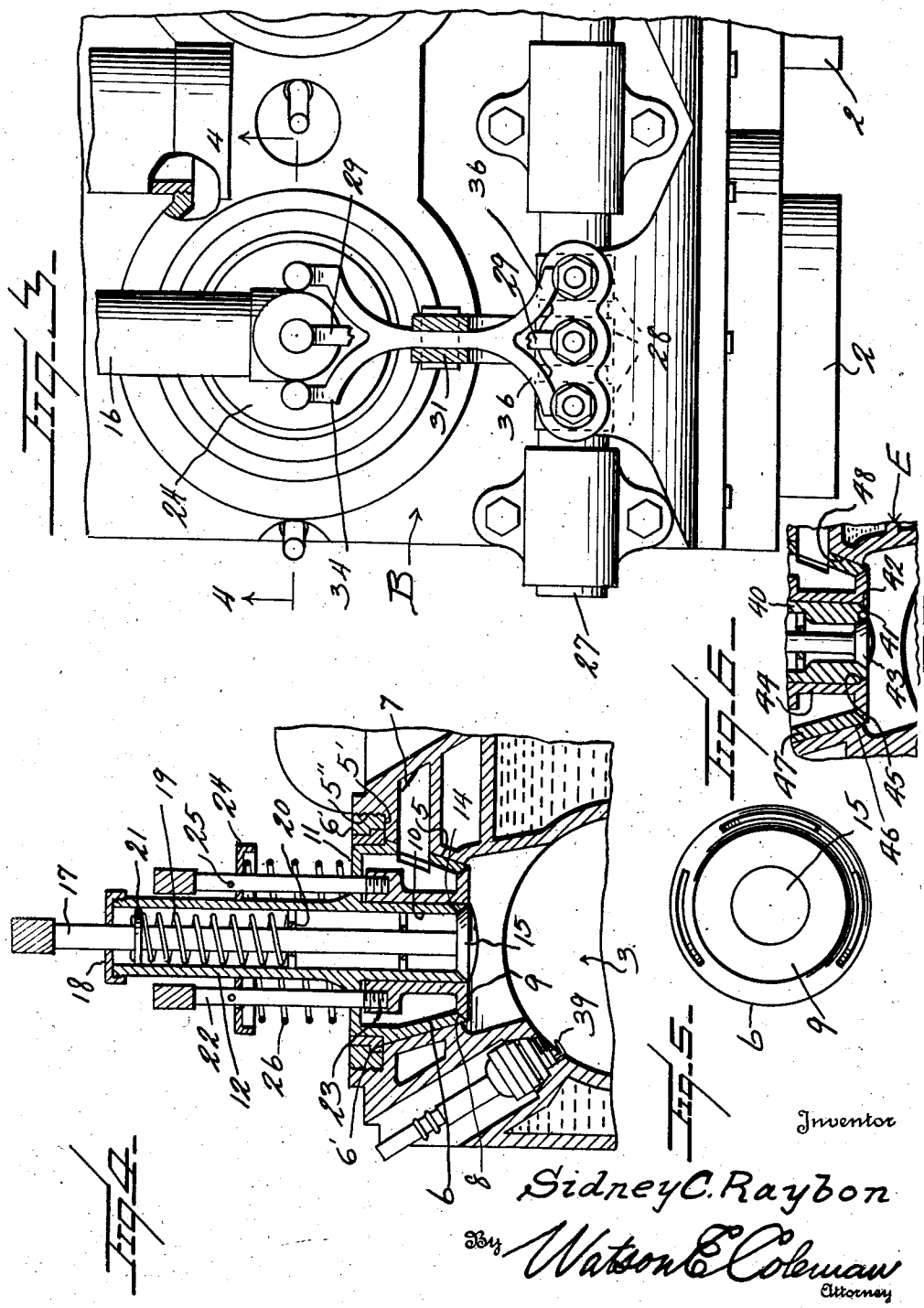
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VALVE

Filed April 14, 1942 2 Sheets-Sheet 2



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VALVE

Sidney C. Raybon, Pensacola, Fla.

Application April 14, 1942, Serial No. 438,941

6 Claims. (Cl. 123—188)

This invention relates to a valve particularly designed for use in connection with an internal combustion engine, and it is primarily an object of the invention to provide a valve so constructed and assembled as to allow for the control of both the inlet and exhaust through a common port.

Another object of the invention is to provide a valve so constructed as to provide means whereby the heat from the exhaust serves to preheat the explosive mixture as it enters the explosion chamber of the engine.

The invention consists in the details of construction and in the combination and arrangement of the several parts of my improved valve whereby certain important advantages are attained, as will be hereinafter more fully set forth.

In order that my invention may be better understood, I will now proceed to describe the same with reference to the accompanying drawings, in which:

Figure 1 is a view partly in section and partly in elevation illustrating a valve constructed in accordance with an embodiment of my invention and in applied position.

Figure 2 is a fragmentary view partly in section and partly in elevation illustrating in detail the mounting and operation of the tappet arm for controlling the exhaust.

Figure 3 is a fragmentary view partly in top plan and partly in section of the structure illustrated in Figure 1.

Figure 4 is a fragmentary sectional view taken substantially on the line 4—4 of Figure 3.

Figure 5 is a view in bottom plan of the valve unapplied, and

Figure 6 is a fragmentary sectional view illustrating another embodiment of the invention.

As disclosed in the accompanying drawings, B denotes an engine block formed to provide opposed cylinders 2 provided with a space therebetween constituting an explosion chamber 3. Working in each of the cylinders 2 are the pistons 4. The particular mechanism associated with the pistons 4 for converting the movement of such pistons into rotary movement or to carry off the power may be as preferred, although the valve as herein disclosed is particularly designed for use with an engine structure as comprised in my co-pending application Serial No. 438,942, filed April 14, 1942.

The firing chamber 3 has in communication therewith and preferably through the upper portion of the block B a relatively large port 5 in which is snugly and fixedly mounted a valve casing 6 through which the products of combustion pass to the exhaust 7. This casing 6 has its lower or open end formed to provide a valve seat 8 with which coacts from below a valve member 9. This valve member 9 is carried by the lower portion of a tubular member 10 depending from the top head 11 of the casing 6.

As is clearly shown in Figure 1 the port opening 5 in the engine block is tapered inwardly and at its outer or wider end it merges with the lateral surrounding ledge 5'. Encircling this ledge and spaced from the edge or corner where the ledge and bore proper meet, is a threaded wall 5''.

Adjacent the outer end or top of the tapered valve casing 6 there is formed an encircling shoulder 6'. When the valve casing is fixedly positioned in the port opening this shoulder is flush with the ledge 5'. There is then placed around the outer end of the casing, in threaded engagement with the threaded wall 5'', the lock ring 6'' which when threaded into position engages upon the ledge and upon the shoulder so as to firmly secure the casing in working position.

The bore of this member 10 is continued through the head 11 of the casing 6 and through an upstanding tubular member 12. The members 10 and 12 coact to provide a fuel feed and the lower or discharge end of the member 10 is formed to provide a seat 14 with which contacts from below a valve 15. The upper portion of the member 12 has in communication therewith a supply line 16 leading from the required source of fuel supply.

The valve 15 is carried by the lower end of a rod or stem 17 extending axially through the members 10 and 12 and up through and above a cap 18 closing the upper end of the member 12. The valve 15 is constantly urged towards its seat 14 by an expansible coil spring 19 surrounding the stem 17 within the member 12 and interposed between a spider 20 intersecting the member 12 and a suitable stop 21 carried by the stem 17 at a desired distance above the spider 20.

Extending through the head 11 of the casing 6 at opposite sides of the member 12 are the lower end portions of the upstanding rods 22. The lower end portions of these rods are firmly engaged, as at 23, with the valve member 9. The upper portions of these rods 22 are freely disposed through an annular plate 24 surrounding the member 12, and which plate 24 has contact from below with the stop pins 25 or the like carried by the rods 22.

Surrounding the member 12 and the rods 22 is an expansible coil member 26 interposed between the head 11 of the valve casing 6 and the plate

24, whereby the valve member 9 is constantly urged towards its seat 8.

Rotatably carried by the top portion of the block B is a cam shaft 27 which is rotated at a required speed and which carries the properly positioned cams 28.

Contacting from above with the stem or rod 17 is the end portion of a rocker tappet 29 suitably supported, as at 30, by a bracket 31 comprised in the structure of the block B. The opposite end portion of the tappet 29 is operatively engaged from below by the upper end portion of a push rod 32 freely disposed through a guide sleeve 33 carried by the bracket 31. The lower end portion of this push rod 32 is engaged by a cam 28 whereby the valve 15 is opened in desired timed sequence.

The upper ends of the rods 22 have in contact therewith the forked tappet arms 34 carried by a rocker arm 35 also operatively supported by the bracket 31. The opposite end portion of this arm 35 is provided with the forked arms 36 with each of which is engaged from below a suitably supported pusher rod 37 operated in desired timed sequence by one of the cams 28 of the shaft 27, so that the valve member 9 will move into open position as required to allow for the exhaust of the exploded gases from within the explosion chamber 3.

Extending within the explosion chamber 3 are the points of an ignition plug 39 comprised in the required ignition system.

It will be apparent from the foregoing that my valve is constructed in a manner whereby the desired control of the fuel feed into the explosion chamber 3 or the exhaust therefrom is through a single part and it is further pointed out that the construction of the valve is such that the fuel mixture before entering the explosion chamber 3 will be effectively warmed or heated up by the exhaust and thereby increase the efficiency of the engine.

In the embodiment of the invention as illustrated in Figure 6 there is provided what may be termed a double sealed valve structure. In this form of the invention, the lower end of the tubular member 40 is formed to provide an internal valve seat 41 and an external valve seat 42. Coacting with the internal valve seat 41 is the valve 43 which is operated in the same manner and for the same purpose as the valve 15 embodied in the first embodiment of the invention.

The valve member 44 which is mounted upon the lower portion of the member 40 is provided with the internal seat 45 which coacts with the internal seat 41 of the member 40. This valve member 44 also coacts with the valve seat 46 at the lower or open end of the casing 47 fitting within the port 48 of the engine block E. The valve 44 is for the same purpose as the valve 9 hereinbefore referred to and is operated in the same way.

In this embodiment of the invention as illustrated in Figure 6, it will be noted that the valve 44 has a double seal, one with the casing 47 and the other with the adjacent or lower end of the member 40.

From the foregoing description it is thought to be obvious that a valve constructed in accordance with my invention is particularly well adapted for use by reason of the convenience and facility with which it may be assembled and operated.

I claim:

1. A valve structure for controlling the inlet and exhaust of the explosion chamber of an internal combustion engine, comprising a casing fixedly mounted within an opening of the engine, said casing having its inserted end open for communication with the explosion chamber and its opposite end closed, said casing having an exhaust opening, a tubular member extending within the casing and depending from the closed end of the casing, a valve member surrounding said tubular member and normally bearing against the edges of and closing the lower open end of the casing around the tubular member against admission of exhaust gases from the explosion chamber, and a valve member closing the lower end of the tubular member for cutting off the inlet to the explosion chamber.

2. A valve structure for controlling the inlet and exhaust of the explosion chamber of an internal combustion engine, comprising a casing fixedly mounted within an opening of the engine, said casing having its inserted end open for communication with the explosion chamber and its opposite end closed, said casing having an exhaust opening, a tubular member extending within the casing and depending from the closed end of the casing, a valve member surrounding said tubular member and normally bearing against the edges of and closing the lower open end of the casing around the tubular member against admission of exhaust gases from the explosion chamber, and a valve member closing the lower end of the tubular member for cutting off the inlet to the explosion chamber, said first-named valve having movement axially along the tubular member.

3. A valve structure for controlling the inlet and exhaust of the explosion chamber of an internal combustion engine, comprising a casing fixedly mounted within an opening of the engine, said casing having its inserted end open for communication with the explosion chamber and its opposite end closed, said casing having an exhaust opening, a tubular member extending within the casing and depending from the closed end of the casing, a poppet type valve member surrounding said tubular member and normally closing the lower open end of the casing around the tubular member to cut off exhaust from the explosion chamber, a valve member for closing the lower end of the tubular member for cutting off the inlet to the explosion chamber, outstanding posts carried by the first valve and slidably disposed through a wall of the casing, a tappet for engaging said posts to move the valve into open position, and means coacting with said posts for urging the valve into closed position.

4. A valve structure for controlling the inlet and exhaust of the explosion chamber of an internal combustion engine, comprising a casing fixedly mounted within an opening of the engine, said casing having its inserted end open for communication with the explosion chamber and its opposite end closed, said casing having an exhaust opening, a tubular member extending from within the casing and depending from the closed end of the casing, a valve member surrounding said tubular member and normally closing the lower open end of the casing around the tubular member to cut off exhaust from the explosion chamber, a poppet valve bearing against the end closing the lower end of the tubular member for cutting off the inlet to the explosion chamber, the stem of the poppet valve extending axially of the tubular member and

out therebeyond, expansible means within the tubular member operatively coupled between the tubular member and the stem for urging said second valve into closed position against the said end of the tubular member, and a tappet coacting with the outer end portion of the stem for moving said second valve into open position.

5. A valve structure for controlling the inlet and exhaust of an internal combustion engine, comprising a casing fixed in a wall opening having communication with the interior of a cylinder, said casing having a side wall and a closed top wall and being open at its bottom, one of the walls of the casing having an exhaust opening therein, said side wall at its lower edge forming a valve seat, a tubular member depending within the casing from and fixed to said top wall and open at its lower end, the tubular member forming a fuel inlet, a valve disc surrounding the tubular member and slidable axially thereon and having its periphery engaging said valve seat to close the bottom of the casing, a poppet valve seating against the edge of and closing the said lower end of the tubular member, means normally urging said valves to their seats, and a mechanism operatively coupled with said valves for moving the valves in timed sequence off of their seats.

6. A valve unit for controlling the inlet and exhaust of an internal combustion engine having a cylinder wall with an opening leading into the cylinder, comprising a circular casing having a side wall fitting into said opening and a closed top wall, one of the said casing walls having an exhaust opening therein, said side wall at its bottom edge forming a valve seat, a tubular member integral with and extending through the center of the top wall and terminating at its lower end in the plane of said valve seat, said tubular member being open at its lower end and forming a fuel inlet passage, the lower edge of the tubular member being formed to provide a valve seat, a disc valve encircling the lower end of the tubular member and seating on the first valve seat, a sleeve carried by said valve and slidable on the adjacent end of the tubular member, a poppet valve engaging on the second mentioned valve seat and having a stem extending through the upper end of the tubular member, springs operatively coupled with the two valves and constantly urging the valves to closed position, and a mechanism for opening the valves in timed sequence.

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