March 20, 1928. 1,662,908

H. P. STEVENS

INTERNAL COMBUSTION ENGINE

Filed April 8, 1927 2 Sheets-Sheet 1

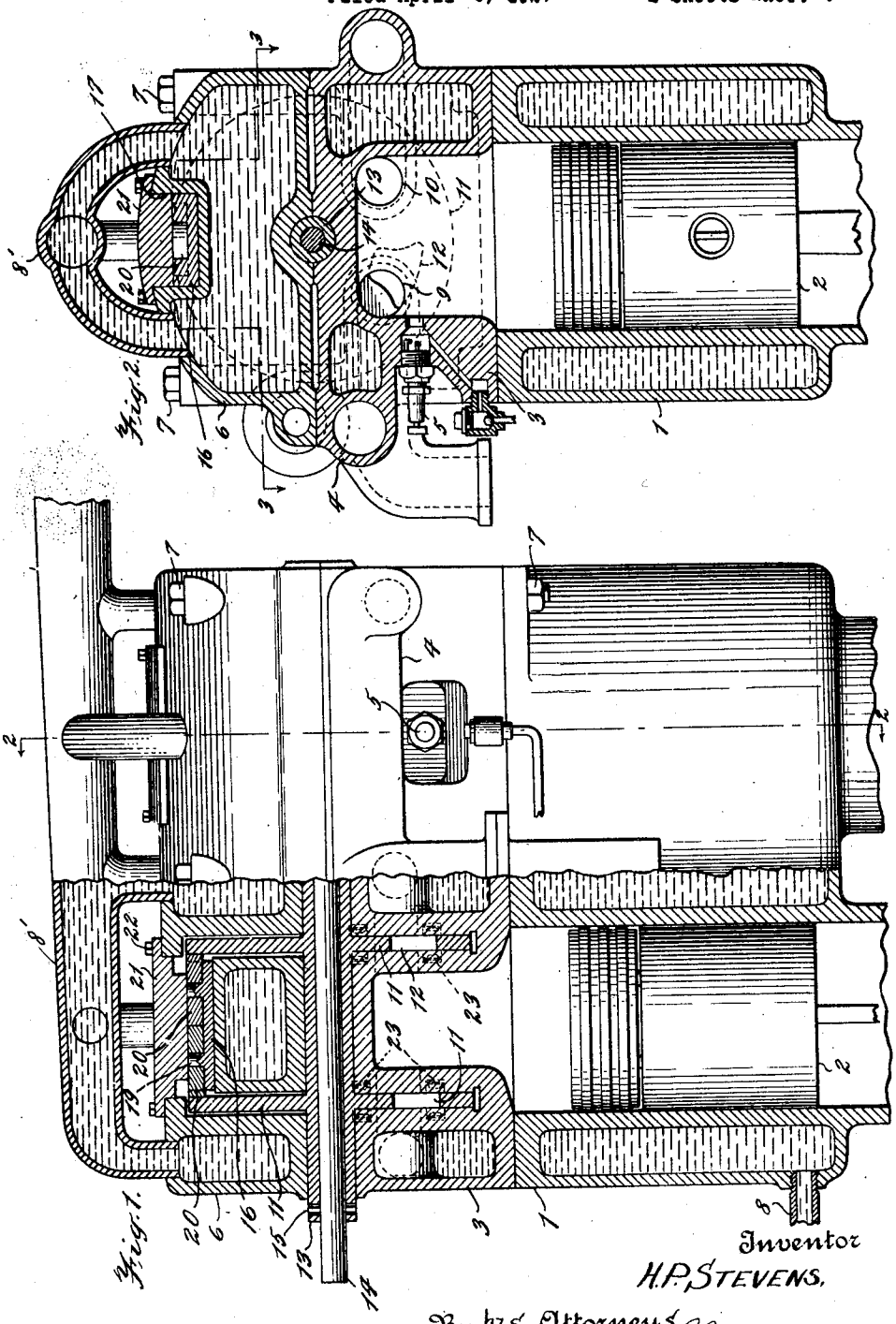


Fig. 2.

Fig. 1.

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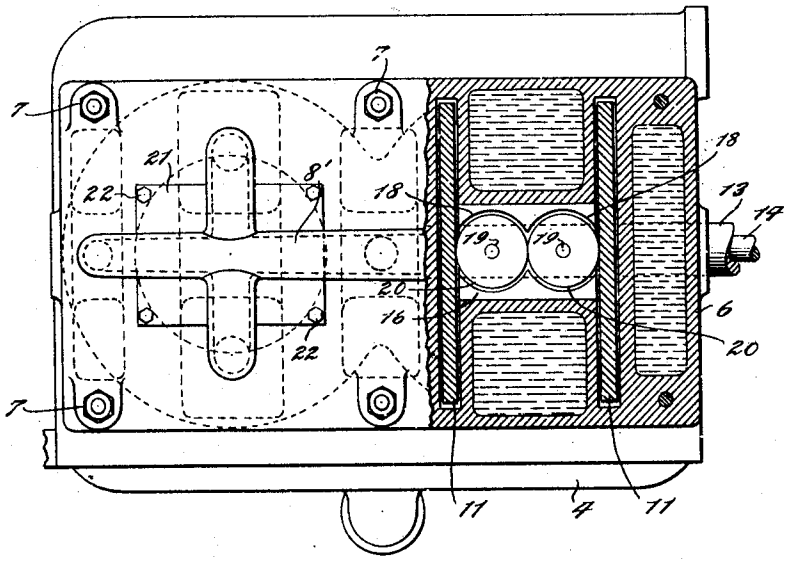
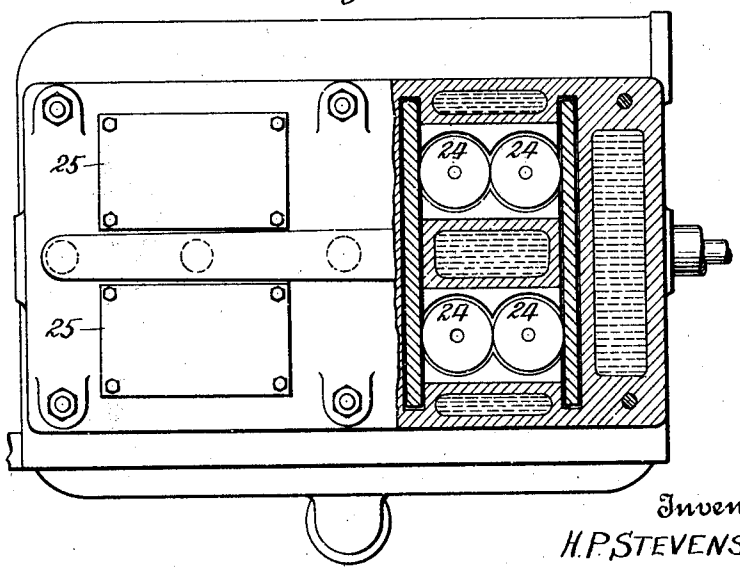


Fig. 3.

Fig. 4.



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UNITED STATES PATENT OFFICE.

HARRY P. STEVENS, OF NEW YORK, N. Y.

INTERNAL-COMBUSTION ENGINE.

Application filed April 8, 1927. Serial No. 182,044.

This invention relates to internal combustion engines and more particularly to the construction of such engines having rotary disk valves for controlling the opening and closing of the intake and the exhaust ports. Two types of construction for such engines are disclosed in my prior Patents Nos. 1,249,235 and 1,385,099.

In engines of greater power than the usual automobile engines or those up to several hundred horse power, it is possible that the disk valves may be displaced and the shaft connecting the valves may be distorted by the forces exerted by the compression and explosion of the gases in the cylinders, owing to the high pressures acting upon those portions of the valves exposed at at the intake and exhaust ports. The pressure of the gas in the cylinder tends to force the lower portions of the valves outward from the cylinder and to bring the upper portions of the valves toward each other, thus causing the connecting shaft to be distorted.

If the upper portions of the valves are held positively at a fixed distance from each other, the valves will remain parallel to each other and the tendency to distort the valve shaft will be prevented.

The principal object of the present invention, therefore, is to provide means for maintaining the upper portions of the rotary disk valves at a fixed distance from each other.

Further objects of the invention will be apparent to those skilled in the art from the following description.

My invention will be more fully understood from the following description taken in connection with the accompanying drawings which illustrate a preferred form of my invention.

Fig. 1 is a side elevation of two cylinders of an internal combustion engine showing one of the cylinders broken away and partly in cross-section;

Fig. 2 is a cross-sectional view taken substantially on the line 2—2 of Fig. 1, and

Fig. 3 is a plan view of the engine with a portion of the engine being broken away and a cross-section being taken substantially on the line 3—3 of Fig. 2.

Fig. 4 is a similar view of a modification.

In the drawings the numeral 1 indicates the cylinder section or portion of an engine, provided at its upper end with the usual chambers for water cooling and adapted to have the pistons 2 reciprocate therein. The numeral 3 indicates the compression or combustion chamber section or portion of the engine upon which is mounted the intake manifold 4, and in which the spark plugs 5 are carried. This section 3 is likewise provided with water cooling chambers as illustrated. The numeral 6 indicates the upper section or portion of the valve housing which is also water cooled as indicated.

These three sections of the engine are preferably cast as separate integral pieces and are connected together by means of the bolts 7. All of the chambers for the cooling water are connected together so that the water may enter at one point as through the pipe 8 and may be withdrawn from the upper portions of the water chambers by means of the outlet pipe 8′ connected with the water jackets as shown.

The combustion chamber section 3 is formed with inlet ports 9 and exhaust ports 10 located as is best illustrated in Fig. 2. Section 3 is also provided on each side of the combustion chamber with narrow recesses in which the rotary disk valves 11 revolve. These recesses are of such width that they contain the valves with several thousandths of an inch clearance so that they do not retard the rotation thereof. As described in my prior patents, these disk valves have an opening 12 through which the gases flowing into and out of the cylinder may pass when the opening is in alignment with the ports. The two disk valves associated with any cylinder are preferably connected together as shown in Fig. 1, by means of a hollow shaft 13 which is preferably integral therewith. A solid shaft 14 is positioned within the hollow shaft 13 and is connected thereto by means of a pin 15. The hollow shaft 13 may extend substantially the entire length of the engine or, if desired, it may extend for only the length of one cylinder in which case the several shafts may be connected together by means well known in the art, as, for example, by means of a lug and a correspondingly shaped recess as shown in my prior Patent No. 1,385,099. The solid shaft 14 may be caused to rotate in any suitable way such as being geared or otherwise connected with the main crank shaft of the engine.

In order to conduct heat away from the valves the walls of the upper valve housing 6 are preferably in close proximity to, but do not touch the valves 11.

The upper ends of the rotary disk valves 11 are held at a fixed distance from each other by means of the following construction: A block 16 is slidably mounted in a suitable recess 17 in the upper portion of the water chamber between the valves 11 located on either side of the cylinder. The upper surface of this block 16 has cut therein two connected circular recesses 18. Pins 19 are located in the center of each of these interconnected recesses and may be, and preferably are, formed integral with the block 16. Rollers or disk wheels 20 are placed upon the pins 19 and are free to rotate thereon. The rollers 20 are preferably made of steel or of the same material as the valves 11, and are of such size that they contact with the inner faces of the valves 11 and with each other as shown in the drawings. The position of these rollers 20 is such that they contact with the valves 11 along circular lines located outside of the opening 12 in the valves. By placing the rollers 20 in this position they do not pass over the edges of the opening 12 in the valves and consequently do not injure these edges which would result in leakage of the gases. The recess 17 is covered by a plate 21 fastened to the upper valve section 6 by means of the bolts 22. The cover plate 21 is of sufficient thickness to keep the disk rollers in position on their bearing studs 19.

My invention also contemplates the use of a plurality of sets of spacing rollers 24 slightly separated from each other to give additional bearing points on the valves, as shown in Fig. 4.

In order to prevent leakage of the high pressure gases from the combustion chamber, metallic packing rings 23 are employed. These packing rings may be of any suitable design but, preferably, they are of the construction described in my prior Patent No. 1,489,857.

While I have described my invention as adapted to be used in connection with the type of engine construction illustrated in the drawings and described therein, I wish it to be understood that my invention may be readily used in engines of other constructions, such as, for example, the engine described in my prior Patent No. 1,385,099.

Having thus described this form of my invention, I wish it to be understood that various changes may be made by those skilled in the art without departing from the spirt and scope of my invention.

What I claim and desire to protect by Letters Patent is:

1. In an internal combustion engine, the combination with rotary disk valves, of devices for preventing displacement of said valves comprising, rotary means in contact with said valves at points opposite the intake and exhaust ports relative to the axes of rotation of said valves.

2. In an internal combustion engine, the combination with rotary disk valves, of devices for preventing displacement of said valves comprising, antifriction bearing means in contact with the inner surfaces of said valves at points opposite the intake and exhaust ports relative to the axes of rotation of said valves.

3. In an internal combustion engine, the combination with rotary disk valves having openings therein, of devices for preventing displacement of said valves comprising, antifriction means in contact with said valves beyond the outer edge of said openings.

4. In an internal combustion engine, the combination with rotary disk valves having openings therein, of means for preventing displacement of said valves comprising, rotary disks in contact with each other and in contact with said valves beyond the outer edge of said openings.

5. In an internal combustion engine, the combination with rotary disk valves on each side of the cylinders, of means for preventing displacement of said valves comprising, a slidable member, disks rotatably mounted on said member and adapted to contact with said valves.

6. In an internal combustion engine, the combination with rotary disk valves on each side of the cylinders, of means for preventing displacement of said valves, comprising, a slidable member positioned above the cylinder and between said valves, disks rotatably mounted on said member and adapted to contact with each other and with said valves.

7. In an internal combustion engine, the combination with rotary disk valves on either side of the cylinders, said valves having openings therein, of means for preventing displacement of said valves, comprising, a slidable member positioned above the cylinder and between said valves, disks rotatably mounted on said member and adapted to contact with each other and with said valves beyond the outer edge of said opening.

Signed at New York, this 6th day of April, 1927.

HARRY P. STEVENS.