D. RONCONI.

SELF GRINDING ROTARY VALVE.

APPLICATION FILED FEB. 21, 1917.

1,241,663.

Patented Oct. 2, 1917.

2 SHEETS—SHEET 1.

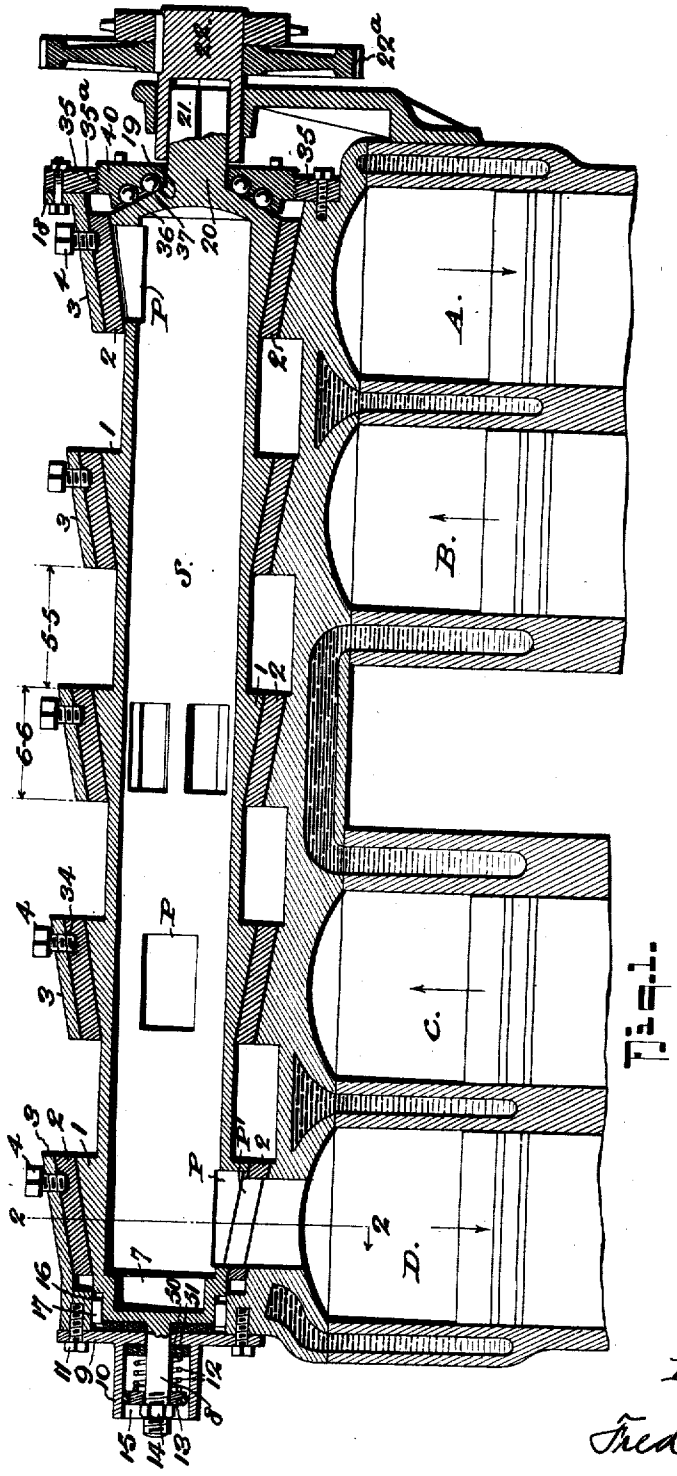

Fig. 1.

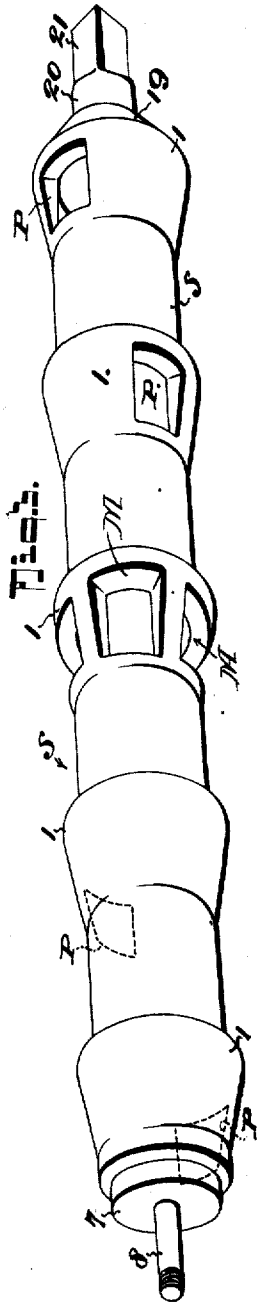

Fig. 2.

INVENTOR

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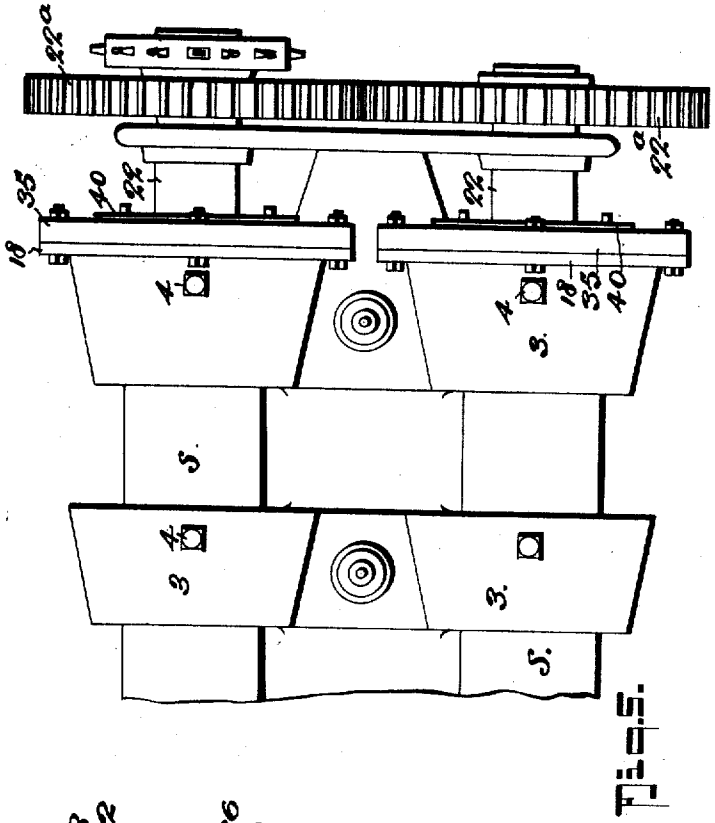


Fig. 5.

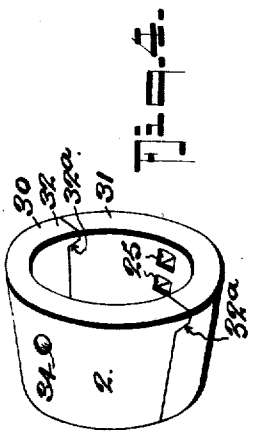
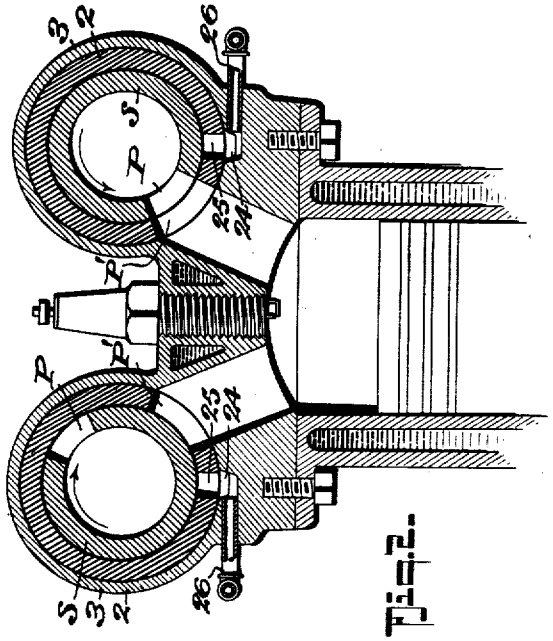


Fig. 4.



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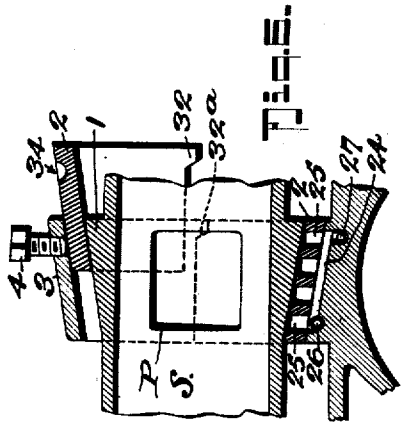

Fig. 6.

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UNITED STATES PATENT OFFICE.

DOMENICO RONCONI, OF CHICAGO, ILLINOIS.

SELF-GRINDING ROTARY VALVE.

1,241,663 Specification of Letters Patent. Patented Oct. 2, 1917.

Application filed February 21, 1917. Serial No. 150,135.

To all whom it may concern:

Be it known that I, DOMENICO RONCONI, a subject of the King of Italy, at present residing in the city of Chicago, in the county of Cook and State of Illinois, have invented a new and Improved Self-Grinding Rotary Valve, of which the following is a specification.

This invention, which has reference to improvements in internal combustion engines, more particularly seeks to provide an improved rotary valve construction, practically noiseless in operation, that can be economically manufactured, in which the operating parts are especially designed for increasing the efficiency or power of motors and in such manner whereby to economize in the use of the working agent.

More specifically my present invention has for its purpose to provide certain improvements on the self grinding valve construction disclosed in my copending application, Serial No. 131,921, allowed January 8, 1917.

In the practical application of rotary valves of the tapered or cone shaped type, by reason of different diameters of the valve at points in line with the progressively arranged cylinders, some special formation of the successively operating intake and exhaust in the valve for their respective cylinders, or some special formation of the cylinders and their pistons must be provided to secure uniformity in compression and passage of the explosive mixture.

In using tapered rotary valves, a small tapered valve tends to stick on the surface of the valve incasing sleeve or chamber, and in the use of large tapered valve, the difference in diameters at the larger and the smaller ends is so great, that different lengths of cylinders or connecting rods of different lengths are necessary to provide for the desired timing of the explosive mixtures in the several successively operating cylinders.

My invention primarily has for its purpose, to provide an improved self grinding and adjustable valve mechanism that has all of the advantages of the tapered valve features and in which special provision is included so that all of the ports may be of equal size or depth to secure uniformity in compression and the passage of the exploded mixture and effect the same displacement and clearance in all of the cylinders.

With other objects in view that will be hereinafter explained, my present invention embodies in a rotary valve, the peculiar features of construction and coöperative arrangement of the parts to be first explained in detail, specifically set out in the appended claims and illustrated in the accompanying drawings, in which:

Figure 1 is a longitudinal section of my improved rotary valve, so much of a cylinder head with four cylinders being shown to illustrate the practical application of my invention.

Fig. 2 is a transverse section thereof on the line 2—2 on Fig. 1.

Fig. 3 is a perspective view of the valve proper.

Fig. 4 is a perspective view of one of the sleeve members hereinafter referred to.

Fig. 5 is a top plan view of the front end of a pair of valve mechanisms, with the driving gear devices attached.

Fig. 6 is a detail section showing the manner in which the tapered sleeves are slid in place after the valve has been inserted.

In the drawings, I have shown a portion of a motor engine that includes four cylinders, designated A, B, C and D, it being understood that while I have shown four cylinders, my improved valve mechanism is applicable for use with engines having a greater or lesser number of cylinders.

In my present form of valve mechanism, the valve S is a hollow body, the bore of which is cylindrical throughout its length and at predetermined points, corresponding to the number of cylinders, the said valve is annularly thickened to form cone-like bearings 1, the smaller ends of which are of substantially the diameter of the cylindrical valve body (may be more), the larger end being of any diameter desired that will not readily stick, and at this point, it should be stated, the larger ends of the conical or tapered portions 1 are of about or a little smaller diameter than that of the smaller ends of the external housings 3, such relative proportions of the parts being provided, to facilitate the shoving of the valve body into the operative position, within the several housings 3, as will hereinafter more fully appear.

The several housings 3, of which there is one for each cone shaped or tapering bearing 1—1, are cast *en bloc* with the cylinder head, as is best shown in Fig. 2, by reference to which and to Fig. 1, it will be noticed a tapering sleeve 2 is located between each housing 3 and cone bearing 1, to overcome the wearing of the parts and to make it easy for installing new bearing surfaces for the cone portions 1 of the valve, when conditions make it necessary to do so.

It should be mentioned that the distance space between the adjacent ends of the cones, as indicated by 5—5 on Fig. 1, is a little more than the length of the space 6—6 of the cones, such spacing of the parts, the purpose of which is to provide for placing the sleeves 2 in position when putting the valve in operative position, it being understood from the drawings, each sleeve 2 is made of two half sections 30—31, one of which, at the larger end has retaining lugs 32 that engage corresponding recesses 32^a in the opposing section, and the upper member 30 has a socket 34 for receiving the lower end of a retaining screw 4 that passes through a threaded aperture in the housing 3, which holds the sleeve sections from endwise slipping out of proper position.

The valve S, which as before stated, is a cylindrical cone 1, has one end that terminates in a cone shaped bearing 19 which is prolonged to form a sleeve 20, that has a square shaped end 21 for fitting in a correspondingly shaped socket of a shaft 22 that carries the driving gear 22^a, to which power is transmitted by suitable means, for example like the means disclosed in my copending application.

The external housing 3, at the cone shaped end of the valve, extends a short distance over the said end and terminates in a right-angled flange 18, to which is bolted a thrust collar 35 having an internal thread 35^a for receiving a ball bearing holder 40 that screws into the collar 35 and which has a plurality of ball races or grooves that receive the bearing balls 36—37, that provide for the easy and smooth movement of the valve.

Centrally between the cylinders B and C, the valve body has an additional cone or taper bearing 1 which coöperates with a housing 3, a sleeve 2 and the intake or exhaust manifolds, as will presently more fully appear.

That end of the valve over the cylinder D has a portion 7 of reduced diameter to form an annular space or seat 16 for receiving the roller bearings 17, and the said reduced portion 7, terminates in a stem 8 having a threaded end, as shown.

The external tapering housing 3, at the reduced end of the valve cast with the cylinder or motor head, is formed with a cylindrical portion that extends a little beyond the adjacent end of the valve to provide a space 15 between the ends of the valve and a disk 9 attached by screws 11 to the outer edge of the cylindrical extension of the said housing member, the said space 15 being provided to give room for the valve to automatically move rearwardly as it wears or grinds down.

The disk 9 just referred to, has an integral hollow cylinder extension 10 that constitutes a housing for a coiled spring 12 held at one end against a disk 50 on the stem 8 that bears against the disk 9 and provided with ball bearings 51 on its inner face that rotates on the said disk 9. The other end of the spring 12 bears against a disk 13 on the stem 8 and is held up in proper place by nuts 14 that engage the outer threaded end of the stem 8, as shown.

By arranging the ball bearing elements for the valve, as stated and shown, the rotation of the valve will at all times be smooth, practically noiseless, and under a pulling action of the spring 12 that tends at all times to hold the cone bearings 1 of the valve up under grinding action against the conical housing 3.

Under the bottom of each external housing the cylinder or motor head is provided with a longitudinal oil groove 24 that extends nearly the full length of the housing and the coöperating lower part of each valve sleeve 2 is provided with lubricant passages 25. In the smaller end of each sleeve is a pipe 26 through which the lubricant is introduced to the said passages 25 and the corresponding valve bearings and at the larger end another pipe 27 is connected with the passages 25 for draining off the lubricant.

In practice, the several oil feed pipes 26 connect with a common feed pipe, and the several drain pipes 27 with a common off-take pipe. The valve S, at points along the cone bearings that correspond to the respective cylinders A, B, C and D, is provided with a proportionate port P, with the several ports disposed relatively to each other in the firing order of the motor.

Ports P are longer toward the larger end of the cone bearings, in proportion to length of the ports P′ in the sleeves 2 and the external housings 3, to compensate for the endwise automatic shifting of the valve, due to wearing, and thereby overcome any tendency of change in the displacement and clearance in all of the cylinders.

The middle cone bearing is provided with a number of ports M to constantly maintain the passage of the explosive mixture into or out of the hollow valve.

From the foregoing taken in connection with the accompanying drawings, the complete construction, the manner of operation

and the advantages of my present invention will be readily apparent to those skilled in the art to which it appertains.

What I claim is:

1. In an explosive engine having one or more explosion cylinders, each having induction and eduction ports; a tapering valve casing for each cylinder, each having an induction and an eduction port alining for communicating with their respective engine cylinders; of a hollow cylindrical valve having ports for controlling the ports in the tapering valve casing, said valve including tapering portions for seating in the tapering valve casings for the engine cylinders, means for holding the valve constantly against its seats and means for rotating the valve.

2. A hollow cylindrical valve having induction and eduction ports, a tapering casing section having induction and eduction ports communicating with the valve, other tapering casing sections, one for each of the engine cylinders, said valve having tapering bearings for coengaging with the tapering casing sections and a single means for constantly holding the tapered valve bearings in tight engagement with their respective tapered casing sections and means for rotating the valve.

3. In an internal combustion engine, the combination with the cylinder head having a central tapered hollow casing section provided with diametrically oppositely disposed induction and eduction ports and other tapered hollow casing sections, one for each cylinder, each of the sections having induction and eduction ports for controlling the induction and eduction of the explosive agent to and from their respective cylinders; of a hollow cylindrical rotary valve having transversely disposed ports for controlling the induction and eduction ports of the central tapered hollow casing section and having other ports for communicating with the ports in the other tapered valve casing section, said hollow cylindrical valve being endwise slidable into the several tapered valve casing sections and provided with tapered bearings for engaging the several tapered casing bearings, means for holding the valve in tight engagement with their respective tapered valve casing seats, and means for rotating the valve.

4. In combination with the cylinder head and at least two explosive cylinders, said head having an annular tapered hollow casing section located midway the cylinders and other tapered casing sections, one for each of the cylinders, a tapered sleeve for each tapered casing section, the sleeve for the middle section having engine manifold induction and eduction ports, the other sleeve sections having induction and eduction ports; of a hollow cylindrical valve common to all of the tapered casing sections, said valve being endwise slidable in the tapered sections and have tapered bearing portions, one for each of the tapered casing sections, the said bearing sections having ports arranged one for each cylinder, and means constantly holding the tapering valve bearings in tight engagement with their respective tapered casing sections and means for rotating the valve.

5. In an internal combustion engine, the combination with the cylinder head having a central tapered hollow casing section, having diametrically oppositely disposed induction and eduction ports and other tapered hollow casing sections, one for each cylinder and each having induction and eduction ports for controlling the induction and eduction of the explosive agent to and from their respective cylinders; of a hollow cylindrical rotary valve having transversely disposed ports for controlling the induction and eduction ports of the central tapered hollow casing section and other ports for communicating with the ports in the other tapered valve casing sections, the said hollow cylindrical valve being endwise slidable into the several tapered valve casing sections and provided with tapered bearings for engaging the several tapered casing bearings, means for holding the valve in tight engagement with their respective tapered valve casing seats and other means for rotating the valve.

6. In combination with the cylinder head and at least two explosive cylinders, the said head having annular tapered hollow casing sections, one of which is located midway the cylinders and one for each of the cylinders and a two part tapered sleeve for each tapered casing section, the sleeve for the middle section having engine manifold induction and eduction ports, the other sleeve sections having induction and eduction ports; of a hollow cylindrical valve common to all of the tapered casing sleeves, said valve being endwise slidable into the said tapered sleeves and having tapered bearing portions for each of the tapered sleeves, said bearing portions having ports arranged for successively alining with their respective engine cylinder ports, means for holding the valve bearings in a grinding engagement with their coengaging tapered sleeve bearings, and other means for rotating the valves, each of the tapered sleeves having a lubricant pocket that opens through the valve seat and an infeed and a drain connection for the said lubricant pocket.

7. In combination with the cylinder head and at least two explosive cylinders, the said head having annular tapered hollow casing sections, one of which is located midway the cylinders and one for each of the

cylinders and a two part tapered sleeve for each tapered casing section, the sleeve for the middle section having engine manifold induction and eduction ports, the other sleeve sections having induction and eduction ports; of a hollow cylindrical valve common to all of the tapered casing sleeves, said valve being endwise slidable into the said tapered sleeves and having tapered bearing portions for each of the tapered sleeves, said bearing portions having ports arranged for successively alining with their respective engine cylinder ports, means for holding the valve bearings in a grinding engagement with their coengaging tapered sleeve bearings, and other means for rotating the valves, each of the tapered sleeves having a lubricant pocket that opens through the valve seat and an infeed and a drain connection for the said lubricant pocket, the aforesaid two part sleeve members having interlocking portions and means for fixedly holding the sleeves in their respective annular casing sections.

8. As an improvement in internal combustion engines, the combination with a plurality of explosive cylinders, each having a port for the induction and eduction of the working agent, a valve casing consisting of a tapering valve seat located midway a pair of the cylinders, other tapering valve seats, one for each of the cylinders, each of the other valve seats having ports alining the ports to their respective cylinders; of a rotary valve common to all of the valve seats and the several cylinders, the said valve having ports for successively alining the ports to the cylinders and for communication with the induction and eduction ports in the tapering valve seat midway the pair of cylinders, the said valve being a hollow cylindrical body of uniform diameter its length and having external tapering bearing sections for coengaging the several tapering valve casings, and means for holding the valve with its tapering sections in grinding contact with their respective valve casings and other means for rotating the valve.

DOMENICO RONCONI.