

# PATENT SPECIFICATION



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## COMPLETE SPECIFICATION.

### Improvements in and relating to Valves for Engines, Pumps and the like.

We, ROLAND CLAUDE CROSS, of 199, Wellsway, Bath, and REGINALD LUTHER MUNDAY, of Tyne Villa, Bloomfield Road, Bath, both British subjects, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

10 This invention, of improvements in and relating to rotary distributing valves for engines, pumps and the like, has particular reference to the kind of valve consisting of a cylinder or tube divided  
15 interiorly by a diagonally disposed web to form two chambers, said valve being rotatably mounted in a cylindrical valve chamber and provided with inlet and exhaust ports located respectively one  
20 each side of the web aforesaid for the inlet and exhaust gases or liquids. The valve is thus utilized as an exit and entrance passage for the cylinder or pump chamber, said valve being provided with one or more spring rings at  
25 each end to retain oil, and also gas or other pressure.

The present invention has for its essential feature the construction and  
30 arrangement of valve whereby leakage is reduced to a minimum and the wasting of oil prevented and the building up by pressure of the oil film of the valve is effected by one or more oil-retaining rings  
35 in the periphery of the valve, and resiliently supported longitudinally disposed pressure retaining vanes contacting with said valve and reverse oil-retaining threads located either on the  
40 exterior peripheral surface of the valve or in the inner wall of the valve chamber and at each end of said valve or valve chamber on each side of an intermediately located oil feed.

45 It is known that a rotary cylindrical valve has been provided with end rings

against which longitudinally disposed bars are resiliently pressed by longitudinally disposed waved springs, but such valve was not provided with a diagonally disposed web nor was it provided with oppositely disposed ports or with reversely disposed oil-retaining grooves as obtains in the present invention.

It is also known that a rotary tapered valve has been provided with oppositely disposed grooves at each end of the valve for feeding oil along the surface of the valve, the oil being fed in at the ends of the valve and conveyed to the centre thereof, whereas in the present invention the oil is fed in at the centre of the valve and the compression and explosion pressure spreads it over the surface of the valve between the oil-retaining rings, and any oil leaking past said rings is forced back by the grooves, said grooves serving to prevent the oil from wasting and to build up and maintain the area of the oil film without dry spots, moreover such previous rotary valve was not provided with oil-retaining rings or with pressure retaining vanes, and was not of the kind herein defined.

A further feature of the invention consists in that the wall of the valve is thickened on the inlet side thereof to reduce the diameter of the central or inlet orifice of the valve to effect the keeping up of the velocity of the inlet mixture at low rates of revolution and to assist the engine in running slowly by keeping the fuel in suspension.

A still further feature of the invention consists in that two or more valves of the kind set forth, fitted with rings, pressure retaining vanes and reverse oil-retaining grooves, are combined or formed in one and in co-axial alignment, and that such valve or valves is or are provided with additional openings or ports in the side communicating with the

inlet and exhaust manifold respectively, and that the inlet passages of the valve, or valves are joined together or formed in one, and that a single inlet port in said valve is common to both passages, instead of being duplicated.

In the above connection it is known that two or more valves have been combined or formed in one and in co-axial alignment, but such valve was not fitted with oil-retaining rings, pressure retaining vanes and reverse oil-retaining grooves as obtains in the present invention.

In order that the said invention may be the more readily understood, reference is to be had to the following description and accompanying sheets of drawings, wherein:—

Figure 1 is a longitudinal vertical sectional view of a valve in accordance with the invention.

Figure 2 is a vertical sectional view taken on line  $x-x_1$  of said Figure 1.

Figure 3 is a longitudinal sectional view of a pair of valves joined together or combined as one.

Figure 4 is a sectional plan view taken on line  $y, y_1$  of said Figure 3.

Figure 5 is a vertical sectional view taken on line  $z, z_1$  of said Figure 4.

Like numerals of reference indicate corresponding parts in the several figures.

In carrying out the invention, and referring first to Figures 1 and 2 of the drawings, there is provided a cylindrical valve chamber 1 disposed horizontally above and in direct communication by means of a port 2 with the cylinder or pump chamber 3, and rotatably mounted in said valve chamber 1 is a cylindrical valve 4 which is divided by a diagonally disposed web 5 into two chambers 14 and 16 respectively.

In the wall of the valve 4, which valve 4 is fixedly mounted on and rotated by a suitably driven shaft 6 are two openings or ports, respectively 7 and 8, one on either side of the web 5 of the valve 4, said opening or port 7 being for the exhaust, whilst the other opening or port 8 serves for the inlet, the inlet and exhaust gases or liquids utilizing the chambers 16 and 14 as passage whereby to enter or leave the cylinder or pump chamber 3 as said valve is rotated.

The size, shape and distance apart of the openings or ports 7 and 8 in the wall of the valve 4 are determined by the valve timing and by the width and length of the port 2 communicating between the cylinder or pump chamber 3 and the valve 4, and also by the external diameter of said valve 4.

To reduce leakage to the minimum, one or more spring rings 9 are provided at each end of the valve ports 7 and 8, and pressure retaining vanes are also provided. The rings 9 are both pressure and oil-retaining rings, but any oil leaking past the rings from the intermediate feed will be forced back by the threads 18.

These pressure retaining vanes consist of parallel strips 10 of metal cut longitudinally from a tube, the bore of which tube is the same as the external diameter of the valve 4. These vanes 10 are positioned with a close fit in slots 11 cut longitudinally in the wall of the valve chamber 1, and each vane 10 is held against the valve 4 by means of a spring 12 interposed between the bottom of the vane 10 and the bottom of the slot 11 in which said vane 10 takes, the said spring 12 consisting of a strip of metal slightly narrower than the width of the vane 10 and laterally corrugated to provide for deflection.

One, or it may be more, of these vanes 10 is or are suitably spaced either side of the port 2 which communicates between the cylinder or pump chamber 3 and the valve 4.

In the case of internal combustion engines which draw fuel mixture through the valve 4, it has been found advantageous to thicken the walls of the valve 4 on the inlet side as at 13, in order to reduce the diameter of the central or inlet orifice of the valve 4 to effect the keeping up of the velocity of the inlet mixture at low rates of revolution and to thereby assist the engine in running slowly by keeping the fuel mixture in suspension.

14 represents that port or chamber of the valve 4 which acts as a passage for the exhaust gases or liquids to travel to the exhaust pipe 15, whilst 16 represents a similar chamber or passage communicating with the inlet pipe 17, and 18 represent reverse oil-retaining threads positioned at the ends of the valve 4 and on the peripheral surface thereof. Alternatively, these oil-retaining threads may be cut in the valve chamber 1 instead of in the surface of the valve, and in either form serve the purpose hereinbefore set forth.

Further, two valves as above set forth may be joined or combined together in one line to form a single valve, and, if found necessary or desirable, two or more of such combined valves may be arranged in co-axial alignment and be operated by a single shaft driven in any suitable manner, and such an arrangement is shown in Figures 3 to 5 of the accompanying drawings, the valve or valves in

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such an arrangement being provided with additional openings or ports in the wall thereof communicating with the inlet and exhaust manifold respectively.

5 In said drawings, 19 represents the inlet port in the wall of the valve 4, and 20 the inlet port in the valve chamber 1 which communicates with said inlet port 19 and the inlet pipe 17, said valve 4  
10 being formed with a spider 21 to which the valve driving shaft 6 is affixed.

When more than one such combined valve 4 is employed, then the additional valve 4, only part of which is shown in  
15 Figure 3, is connected by a short shaft 22 to a spider 23 on the inner end of the first mentioned valve 4, said shaft 22 being rotatable in the web 24 of a distance piece 25 spacing apart said  
20 valves 4.

7, 7 represent the exhaust ports, and 8, 8 the inlet ports of the valve, 14, 14 the exhaust passages, 15 the exhausts, 16, 16 the inlet passages, and 17 the inlets; and, further, although not shown  
25 in the drawings, yet it is to be understood that these combined valves are fitted with reverse oil-retaining threads and pressure retaining vanes as in the first described  
30 arrangement.

Further, in the case of multi-cylinder engines wherein the induction period of one cylinder overlaps the induction period of the next cylinder, and wherein  
35 the valve is made or formed in pairs to control the supply to said cylinders, the inlet passages 16 in the valve 4 may be joined together or formed in one, and a single inlet port 19 would be common to  
40 both instead of being duplicated, as shown in Figures 4 and 5 of the drawings.

Although the invention has only been set forth and illustrated with reference  
45 to an horizontally disposed rotatable cylindrical valve, which valve may be made of any suitable material or combination of materials, yet the same may be applied to a rotatable cylindrical valve  
50 in any position to and in direct communication by means of a port with the cylinder or pump chamber as the case may be.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to  
55 be performed, we declare that what we claim is:—

1. In rotary distributing valves of the

kind set forth for engines, pumps and the like, the construction and arrange-  
60 ment of valve whereby leakage is reduced to a minimum and the wasting of oil prevented and the building up by pressure of the oil film is effected by the con-  
65 joint means of one or more oil-retaining rings in the periphery of the valve and resiliently supported longitudinally dis-  
70 posed pressure retaining vanes contacting with the surface of the valve, and reverse oil-retaining threads located  
75 either on the exterior peripheral surface of the valve or in the inner wall of the valve chamber and at each end of said valve or valve chamber on each side of an  
intermediate oil feed.

2. Valves of the kind set forth, and fitted with oil retaining rings, pressure retaining vanes and reverse oil-retaining threads, characterized in that the wall of  
80 the valve is thickened on the inlet side thereof to reduce the diameter of the central or inlet orifice of the valve, for the purpose set forth.

3. Valves as claimed by Claims 1 and 2, characterized in that two or more of  
85 such valves are combined or formed in one and in co-axial alignment, and that such valve or valves is or are provided with additional openings or ports in the  
90 side communicating with the inlet and exhaust manifold respectively, and that the inlet passages of the valve, or valves as the case may be, are joined together  
95 or formed in one, and that a single inlet port in said valve is common to both passages, as herein described.

4. The improvements in valves for engines, pumps and the like, as herein described and in accordance with Figures  
100 1 and 2 of the accompanying sheets of drawings.

5. The improvements in valves for engines, pumps and the like, as herein described and in accordance with Figures  
105 3, 4 and 5 of the accompanying sheets of drawings.

Dated the 9th day of March, 1925.

KINGS PATENT AGENCY LIMITED,

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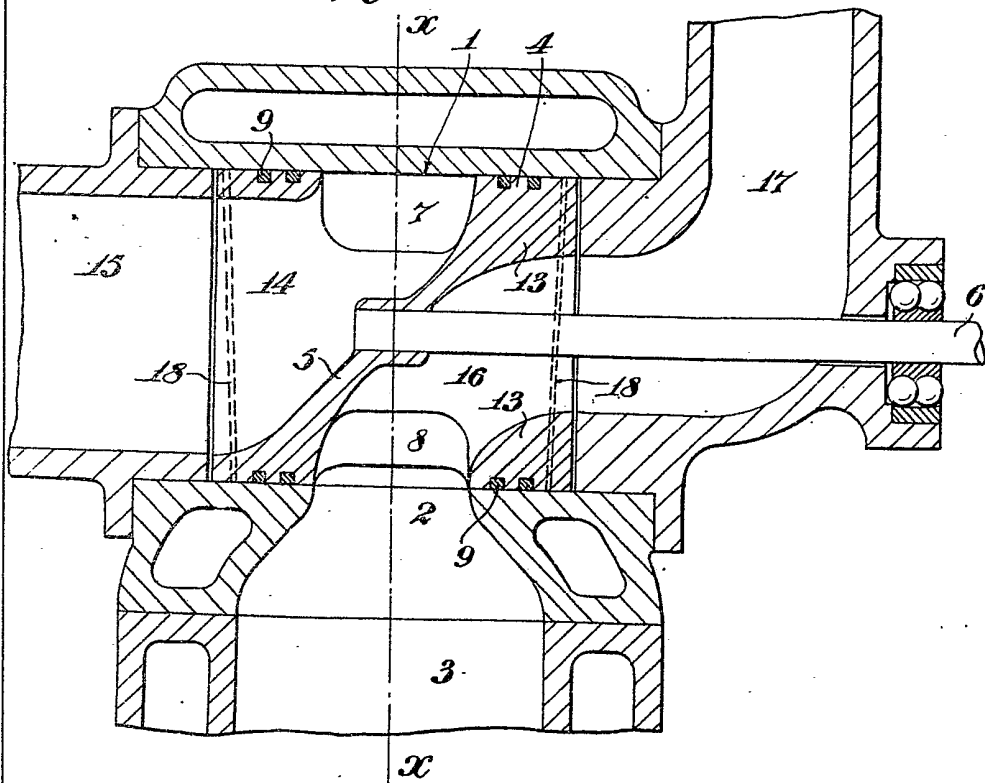
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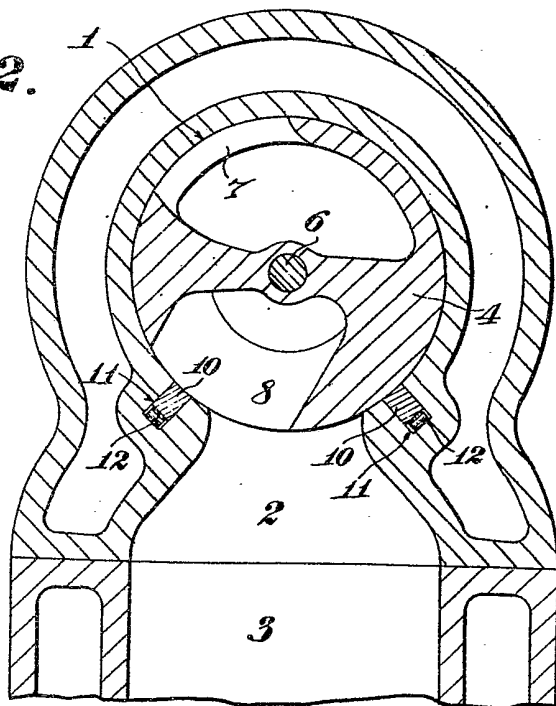
E.C. 4,

Agents for Applicants.

*Fig. 1.*

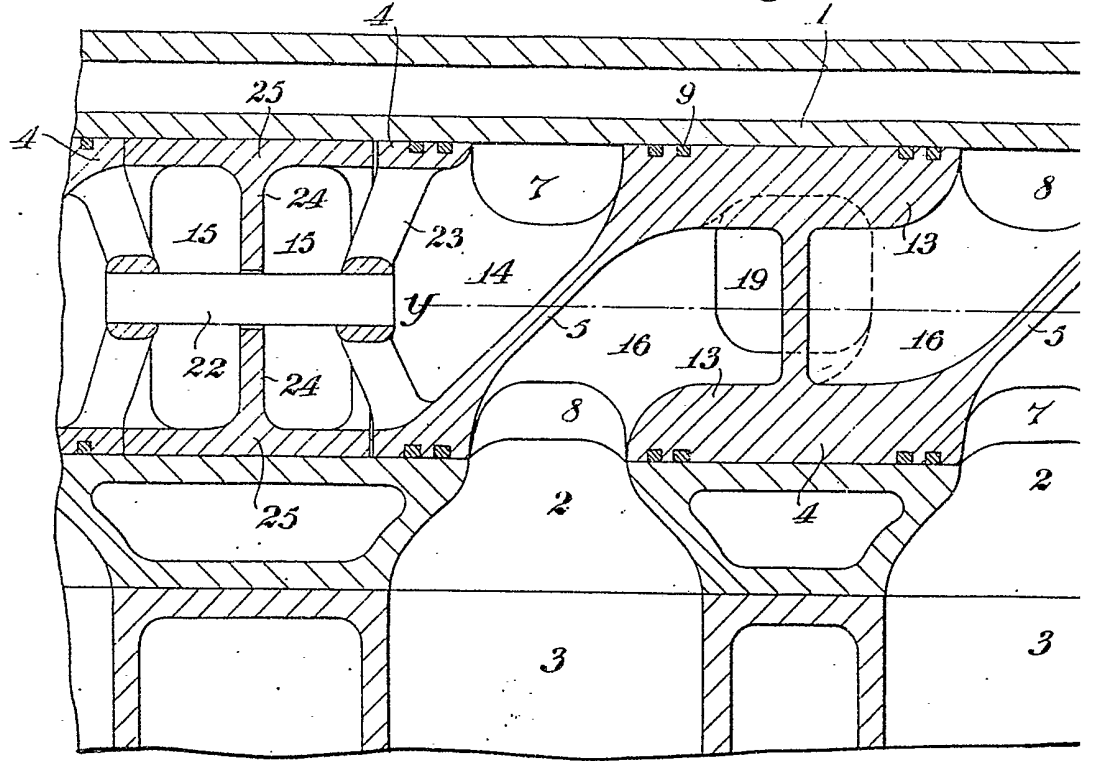


*Fig. 2.*

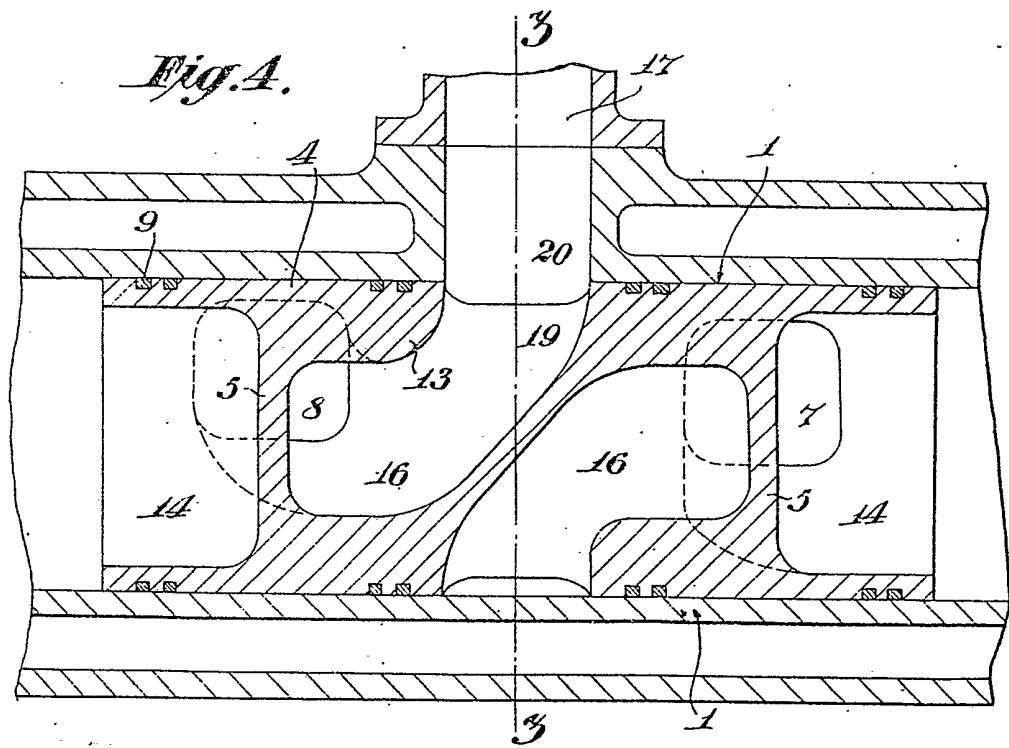


*[This Drawing is a reproduction of the Original on a reduced scale.]*

*Fig. 3.*

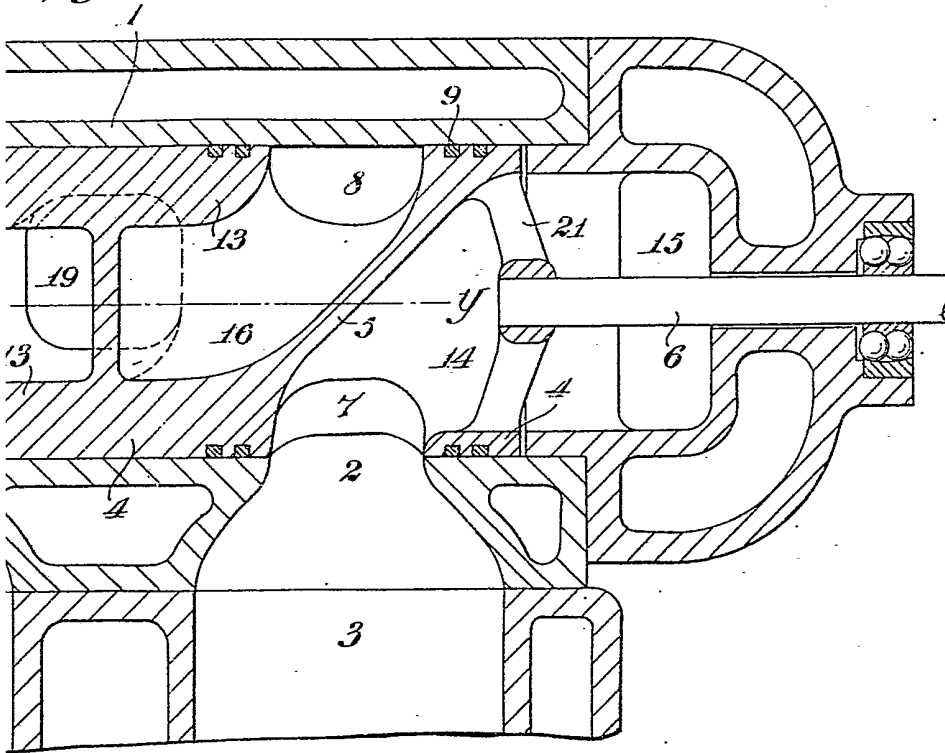


*Fig. 4.*



*[This Drawing is a reproduction of the Original on a reduced scale.]*

*Fig. 3.*



*Fig. 5.*

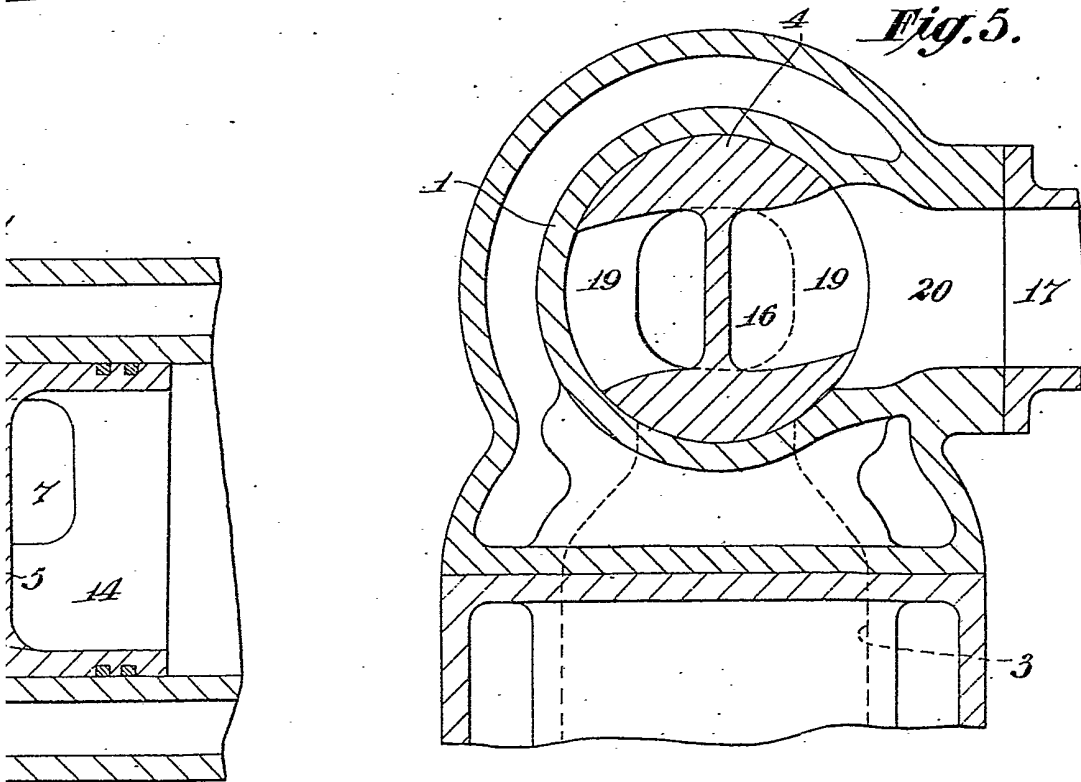


Fig. 3.

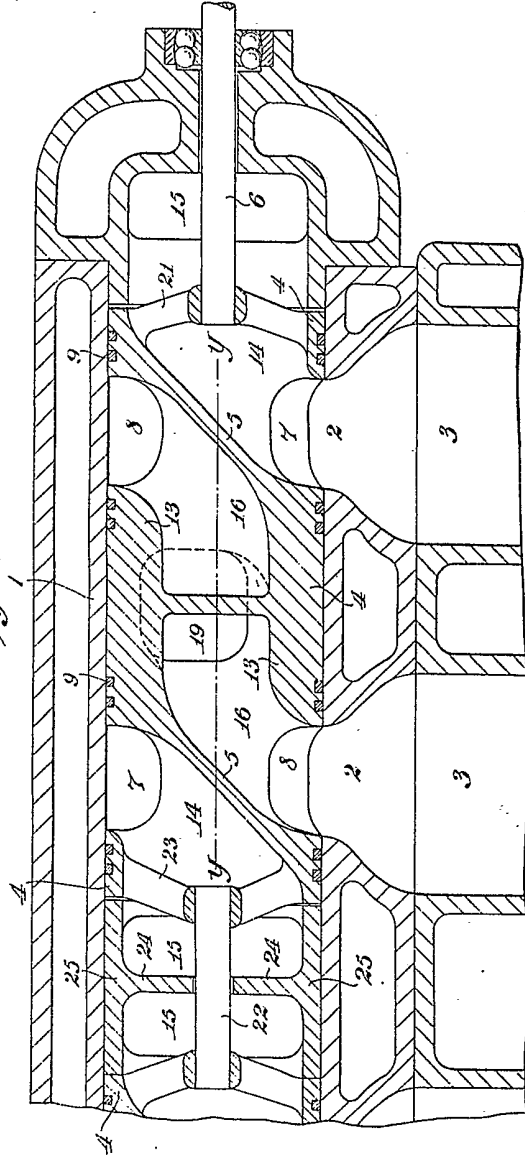


Fig. 5.

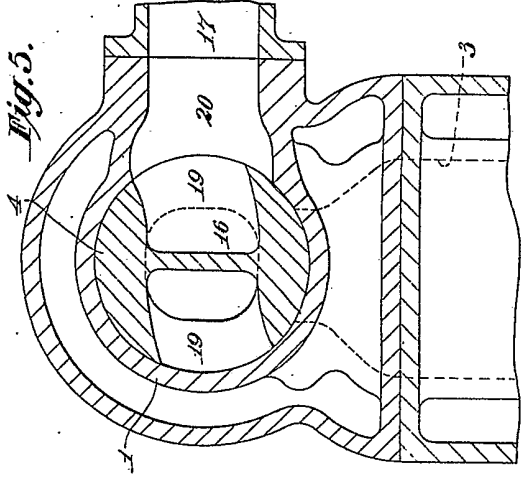
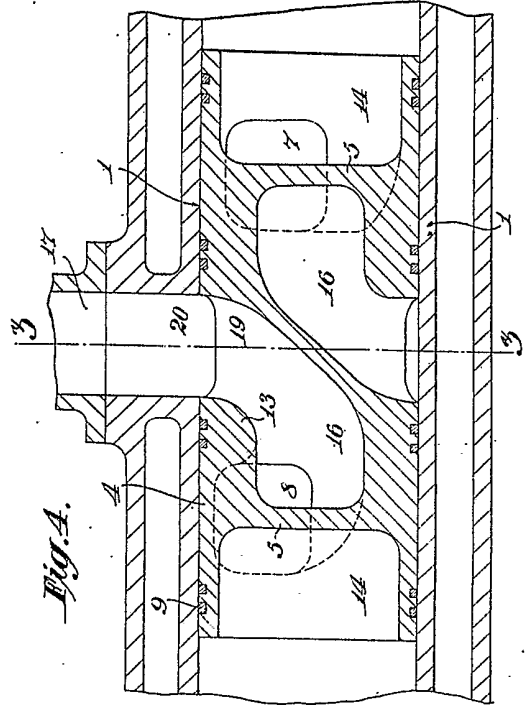


Fig. 4.



[This Drawing is a reproduction of the Original on a reduced scale]