

# PATENT SPECIFICATION

138,919

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## COMPLETE SPECIFICATION.

### Improvements in and relating to the Distribution Valves of Fluid Pressure Engines.

We, FÉLIX PAUL LÉO DOUTRE, of 16, rue des Ursulines, Saint-Denis (Seine), Engineer, and GEORGES CHARLES ENGEL IRAT, of 103, Avenue de Villiers, Paris, Manufacturer, both in the Republic of France, 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:—

This invention relates to a system of distribution of the working fluid with a conical plug and seat for explosion engines for example, the longitudinally adjustable plug being mounted in bearings and comprising special distributing conduits combined with ports formed in the seat as well as conduits for the circulation of water in communication with the cooling water of the engine. The mounting of the plug perfectly concentrically with the seat permits of this plug turning freely without any contact with the seat which is fixed. Moreover, the circulation of water passing through the plug, as well as through its trunnions causes the latter and the seat to be substantially at the same temperature, in such a manner that the clearance tends to remain the same.

Engines have already been devised wherein the distribution is effected by a conical rotary distributor or plug, with or without internal water circulation, turning in a shell or casing which has ports opening into conduits serving alternately for admission and exhaust. Vacuum pumps with solid plug distribution valves have also been suggested in which the plugs turn on radial thrust ball bearings, separate double ball lateral or axial thrust washers being provided

whereby the plug may be adjusted and positively fixed in an axial direction relative to its casing or shell. 45

Our invention is characterised in that the conical distributor or plug is supported by combined radial thrust and axial or lateral thrust ball bearings, whereby the conical distributor or plug can be moved longitudinally as a whole in the shell or casing, which also conical. 50

This arrangement enables the amount of clearance between the distributor and its shell or casing to be regulated in a very accurate manner, so as to avoid any prejudicial friction. 55

This invention will be hereinafter described by way of example with reference to the annexed drawing wherein:— 60

Figure 1 shows this system of distribution valves in vertical longitudinal section.

Figure 2 is a vertical transverse section on the line A—A, of Figure 1. 65

Figure 3 is a vertical longitudinal section showing cylinder No. 1 during the exhaust stroke and cylinder No. 2 during the expansion stroke after the explosion, that is to say, the driving stroke. 70

Figure 4 is a vertical longitudinal section showing cylinder No. 1 during the suction or admission stroke and cylinder No. 2 during the exhaust stroke.

Figure 5 is a vertical longitudinal section showing cylinder No. 1 during the compression stroke and cylinder No. 2 during the admission stroke. 75

Figure 6 is a vertical longitudinal section showing cylinder No. 1 during the expansion stroke after explosion, that is to say during the driving stroke and cylinder No. 2 during the compression stroke. 80

Figures 7 and 8 are two transverse sections showing two different positions of the exhaust passage, one in accordance with Figures 1 and 2 and the other in accordance with Figures 3 to 6.

As shown in this drawing, for the two cylinders 1 and 2, the conical seat *a* has five ports *a*<sup>1</sup>, *a*<sup>2</sup>, *a*<sup>3</sup>, *a*<sup>4</sup>, *a*<sup>5</sup>. The middle port *a*<sup>4</sup> always serves for admission to one or the other cylinder alternately, whilst ports *a*<sup>2</sup> and *a*<sup>5</sup>, serve respectively for the exhaust of cylinder No. 1 and the exhaust from cylinder No. 2.

For this purpose, the plug *b* comprises two passages *b*<sup>1</sup>, *b*<sup>2</sup> for admission and passages *c*<sup>1</sup>, *c*<sup>2</sup> for the exhaust.

All these passages are bounded by suitable vertical, horizontal and oblique partitions.

Furthermore passages *d* for the circulation of the cooling water extend through this plug.

In a four-stroke cycle motor the angular movements of the plug for the different phases of each cylinder are equal to 90°.

The plug *b*, which is perfectly centred in the seat, is provided with two trunnions *e* fitted with ball running and thrust bearings *f* which are mounted in plummer-blocks *g*.

By reason of these arrangements this plug can be adjusted in a longitudinal direction in the interior of the seat.

Moreover this method of suspension enables the plug to turn freely concentrically in the seat without any contact with the latter.

The cooling water passes through the trunnions *e* which are hollow, through the passages *d* and through a collector *h* con-

nected to the jacket of water *i* retained by the double casing *j* surrounding the engine.

The explosive mixture or working fluid is supplied to and exhausted from the distributing valve through the pipes *k*.

It is obvious that this system of distribution can be applied, not only to heat engines or to gas engines working under pressure, but also to steam engines or compressed air motors, *etc.*

The forms, details, accessories, materials and dimensions of this improved distribution system can obviously be varied without in any way departing from the nature of the invention.

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

A distributing device for fluid pressure engines, the distribution being effected by means of a conical rotary distributor or plug turning in a shell or casing having ports which open into the cylinder and serve alternately for admission and exhaust, this distributing device being characterised in that the conical distributor or plug is supported by combined radial and axial or lateral thrust bearings, substantially as hereinbefore described with reference to the accompanying drawings, and for the purposes specified.

Dated this 11th day of February, 1922

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Agents for the Applicants.

Fig.1.

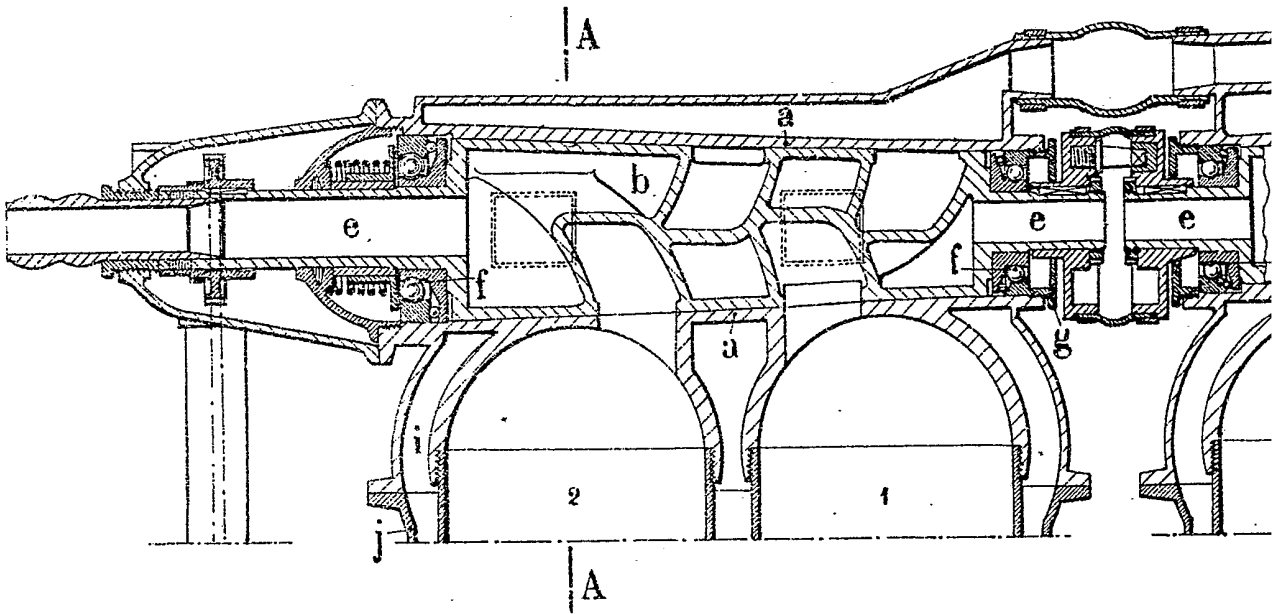


Fig.2.

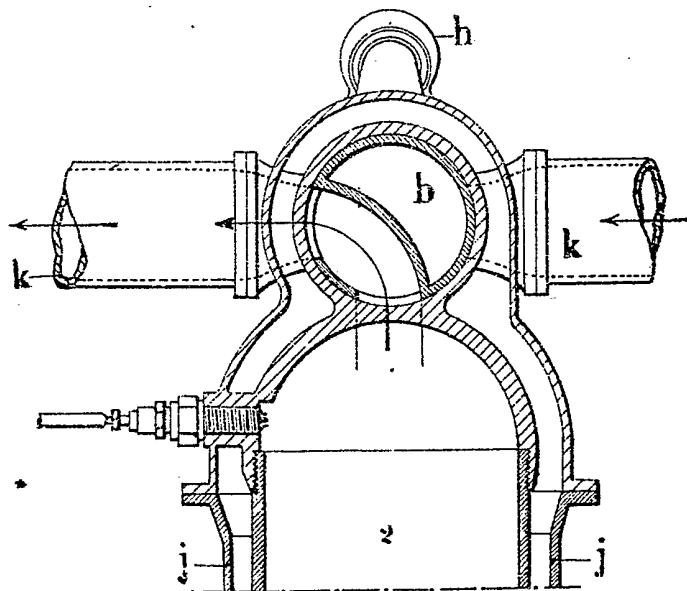


Fig. 1.

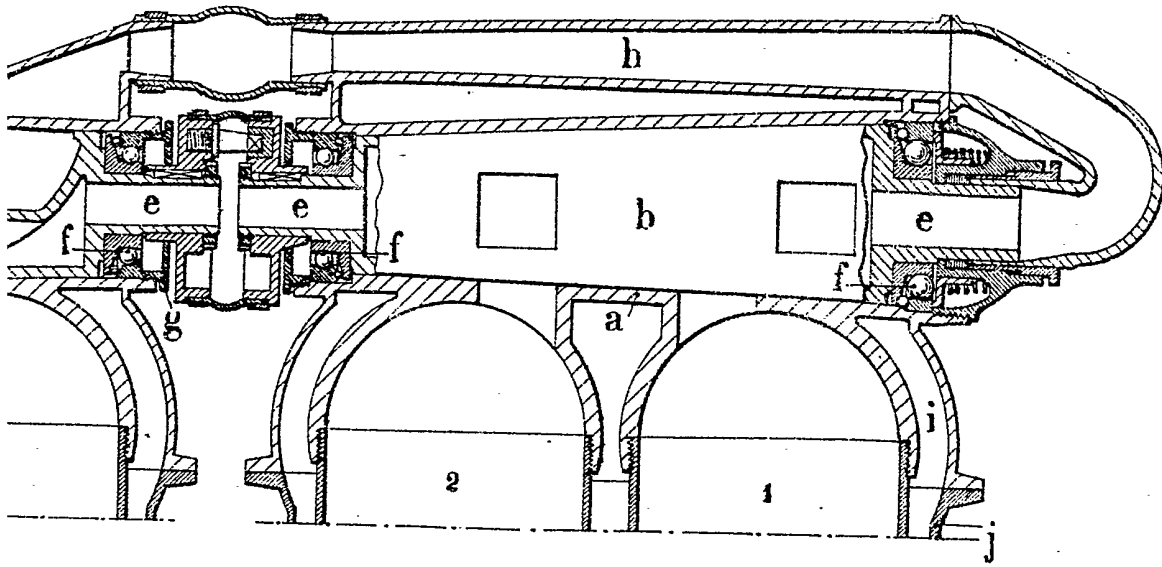


Fig. 7.

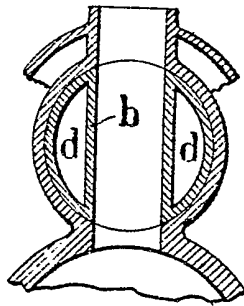
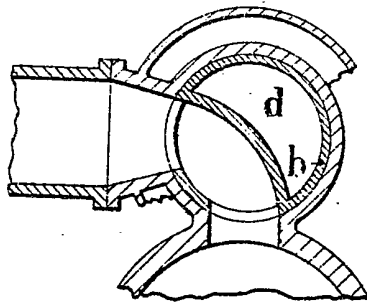


Fig. 8.



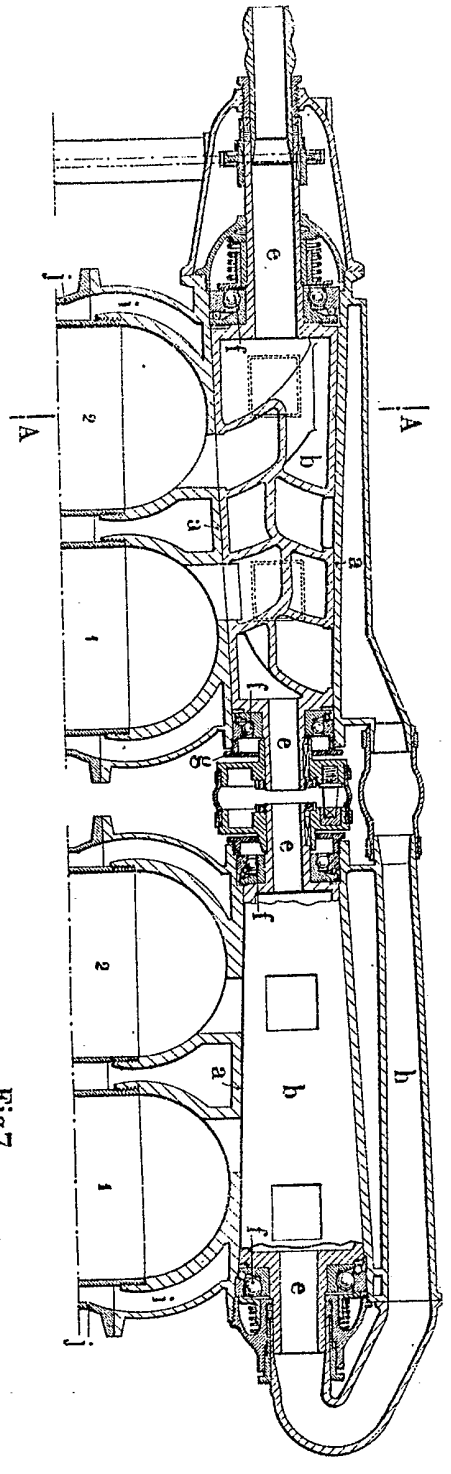


Fig. 1.

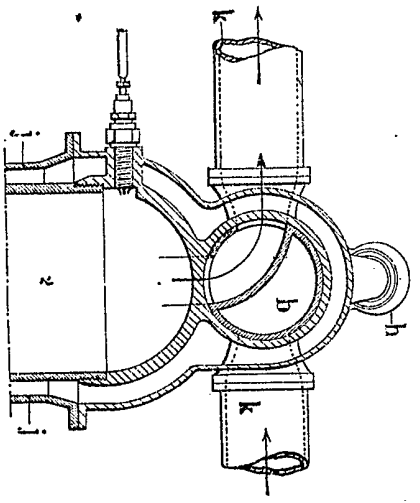


Fig. 2.

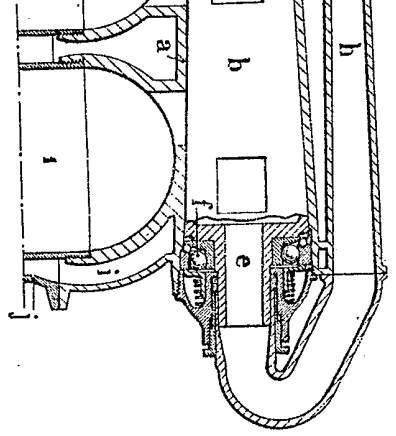


Fig. 7.

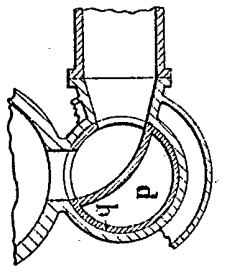


Fig. 8.

Fig 3.

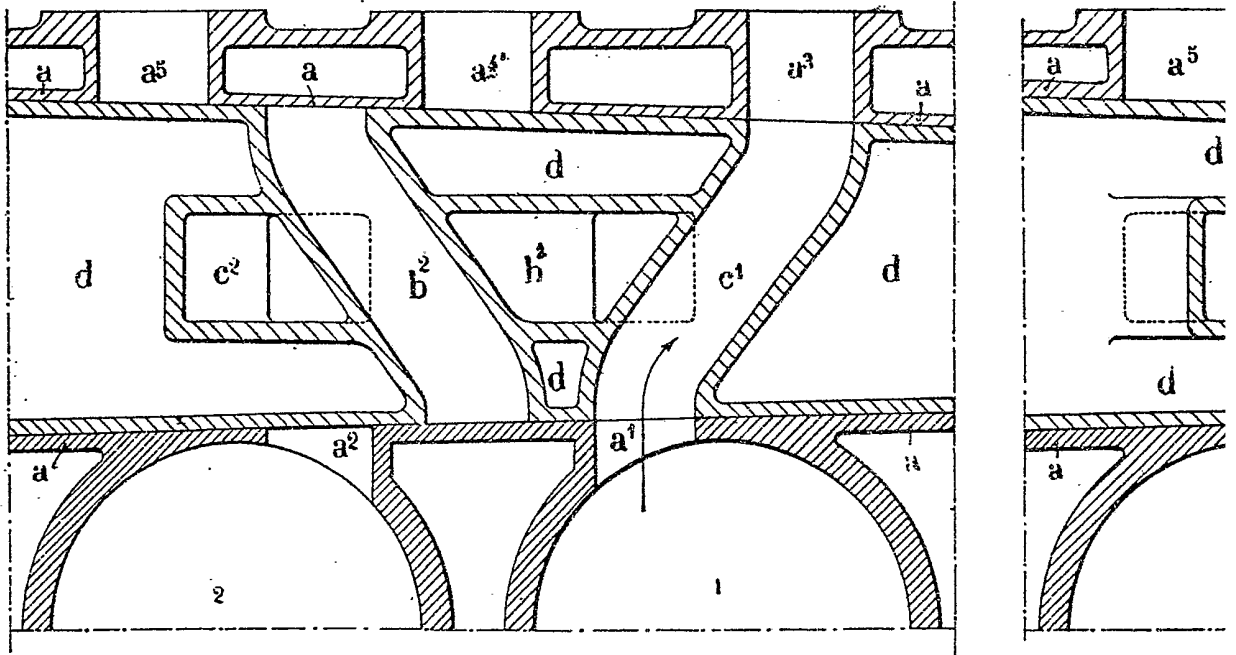


Fig 4.

