Dec. 27, 1932. C. HUGHES 1,892,345

PUMP, COMPRESSOR, ENGINE, AND THE LIKE

Filed Nov. 8, 1929

Fig. 1.

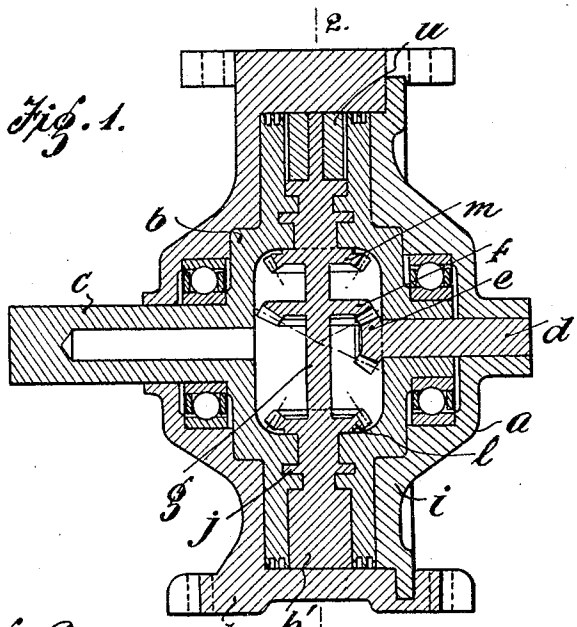


Fig. 3.

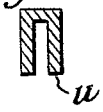


Fig. 4.

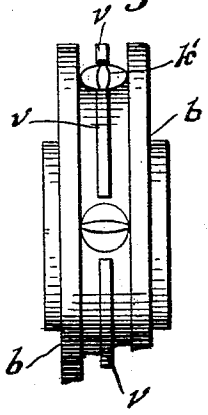
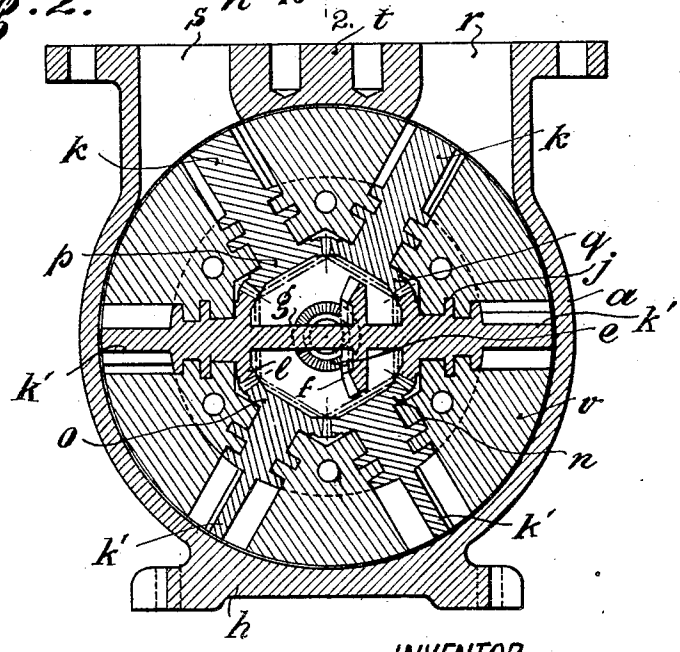


Fig. 2.



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UNITED STATES PATENT OFFICE

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PUMP, COMPRESSOR, ENGINE, AND THE LIKE

Application filed November 8, 1929, Serial No. 405,779, and in Great Britain July 5, 1929.

This invention comprehends certain improvements in or relating to pumps, compressors, engines and the like for elastic or non-elastic fluids. The present improvements appertain particularly to purposes of this character which are of the vane type.

According to the present invention I employ a rotor incorporating a plurality of vanes or driving members which are adapted to be subjected to a continuous action in rotation as contrasted with a reciprocating or intermittent action. For this purpose the vanes or driving members may be located radially or substantially radially of the axis of the rotor or alternatively the said vanes may have their axes in parallelism with the main axis of the rotor.

In order that this invention may be clearly understood and readily carried into practice, reference may be had to the appended explanatory sheet of drawing on which:—

Figure 1 is a side sectional elevation of a rotary pump, embodying the present invention.

Figure 2 is an axial sectional elevation of the pump shown in Figure 1 the plane of section being at the figure last mentioned.

Figure 3 is a detail transverse sectional view of the abutment element.

Figure 4 is a detail edge elevation of the motor and disclosing some of the vanes.

In a convenient embodiment of the present invention I provide a stationary casing *a* in which a hollow rotor *b* is incorporated which is driven from any suitable source of power received from an axial extension *c* with which said rotor is furnished. On the other side of the rotor coaxial with the said extension a fixed shaft *d* is incorporated and adapted to project in to the interior of the rotor. This fixed shaft carries at its inner extremity a bevelled wheel *e* adapted to mesh with a bevelled wheel *f* mounted upon another shaft *g* incorporated diametrically in the rotor. For purposes of assemblage the casing may be in two parts *h i* divided in a plane at right angles to its axes, the parts being secured together in any suitable manner as for instance by bolting. The diametric shaft *g* may be flanged to form an end thrust bearing *j* and at each extremity said shaft takes the form of a shaft vane *k* which may be of oval cross section, the vane at one end being located in a plane at right angles to that of the other end of the diametric shaft. This diametric shaft carries two more bevelled wheels *l m* which are in mesh with four other bevelled wheels *n o p q* having their axes located in a common plane containing the axis of the diametric shaft, the axes of these bevelled wheels being at 60 degrees with each other. All of the bevelled wheels are in mesh in intervals of 60 degrees so that when the drive is imparted to the rotor *b* the diametric shaft receives movement by virtue of the resistance offered by the stationary shaft *d* and this movement is imparted to the four other bevelled wheels *n o p q* each of which carries a vane *k'* similar to that at the extremity of the diametric shaft *g*. Each of the several vanes is adapted for each revolution of the rotor to make half a revolution. The main ingress and egress ports *r s* are spaced from each other by a division partition *t* of width substantially corresponding with the circumferential dimension between two successive vanes and in this region between the main ingress and egress ports I provide a divided abutment portion *u* between the spaced portions of which the vanes are adapted to pass at times at which their major dimension corresponds with the direction of movement of the periphery of the rotor. The abutment provision between the ingress and egress ports is here shown as comprising two segmental plates *k* secured firmly to the parts *t* and arranged in spaced relation to each other to form a passage therethrough for the vanes and the segmental carriers hereinafter described. As the vanes progress in their movement around the pump chamber before reaching the abutment *u* they assume a position in which their major dimension approximately corresponds with the axis of the rotor as a result of which they serve to propel the fluid, the motion of the vanes being a continuous one from their end-wise position in passing the ingress and egress ports to their lateral position on the remote side of the

axis of movement of the rotor as each vane presents its minor dimension to the space between the portions of the abutment. The rotor *b* carries segmental portions *v* which rotate therewith and are located between the successive vanes to fill the space between the stationary parts of the abutment *u* between the ingress and egress ports at times at which these spaces are not occupied by the vanes. At their extremities these portions may be of concave form to conform with the curve of movement of the sides of the vanes. The vanes are arranged and operate between the side flanges of the rotor and when at right angles thereto force the fluid ahead of them through the space between the flanges, as will be understood. Just before each vane finishes its work by its interruption of the passage formed by the circumferential peripheral channel in the rotor, another vane comes into operation to also interrupt the said passage, so that the operation of the apparatus is positive and continuous. The spaces between the segmental portions *v* form pockets in which the vanes rotate. At each point at which a vane occupies the side flanges the latter may be formed with concavities conforming with the circle of movement of the edges of the vanes so that the blade is enabled to form a substantial fluid seal, during the portion of this period of rotation. The central space within the rotor may conveniently be utilized as an oil bath.

While in the embodiment of the present invention hereinbefore particularly described I have referred to an arrangement incorporating six vanes. I wish it to be understood that the invention is not limited to any specific number of vanes the invention may in fact employ only a single vane adapted to fulfill the desired function.

In addition, while it has been proposed that each vane is adapted for each revolution of the rotor to make half a revolution other gear ratios may be utilized in connection with the vane or vanes and the vane or each vane may for instance rotate at a speed corresponding with that of the rotor.

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

1. A rotary pump or the like comprising a stator casing having a circular chamber, inlet and outlet ports communicating with said chamber at spaced points and an abutment between said ports, a rotor mounted for rotation in said chamber and having spaced peripheral flanges, a shaft arranged diametrically in the rotor and having vanes at its ends terminating at the periphery of the rotor and arranged in the space between the flanges, said vanes being of greater width in one dimension than in the dimension at right angles to the first and means to cause said vane shaft to rotate when the rotor is in rotation, said abutment having a channel therein extending from one of said ports to the other and corresponding in width with the least dimension of the vanes to enable the vanes to pass therethrough from one port to the other.

2. A pump as claimed in claim 1, in which the rotor is provided with a central chamber through which the vane shaft extends and also including a gear wheel on the vane shaft and a fixed gear coaxial with the rotor so that rotation is imparted to the vane shaft when the rotor is in rotation.

In witness whereof I affix my signature.

CECIL HUGHES.