March 4, 1958 F. OSTWALD 2,825,287

ROTARY VANE-TYPE PUMP

Filed Dec. 14, 1954 2 Sheets-Sheet 1

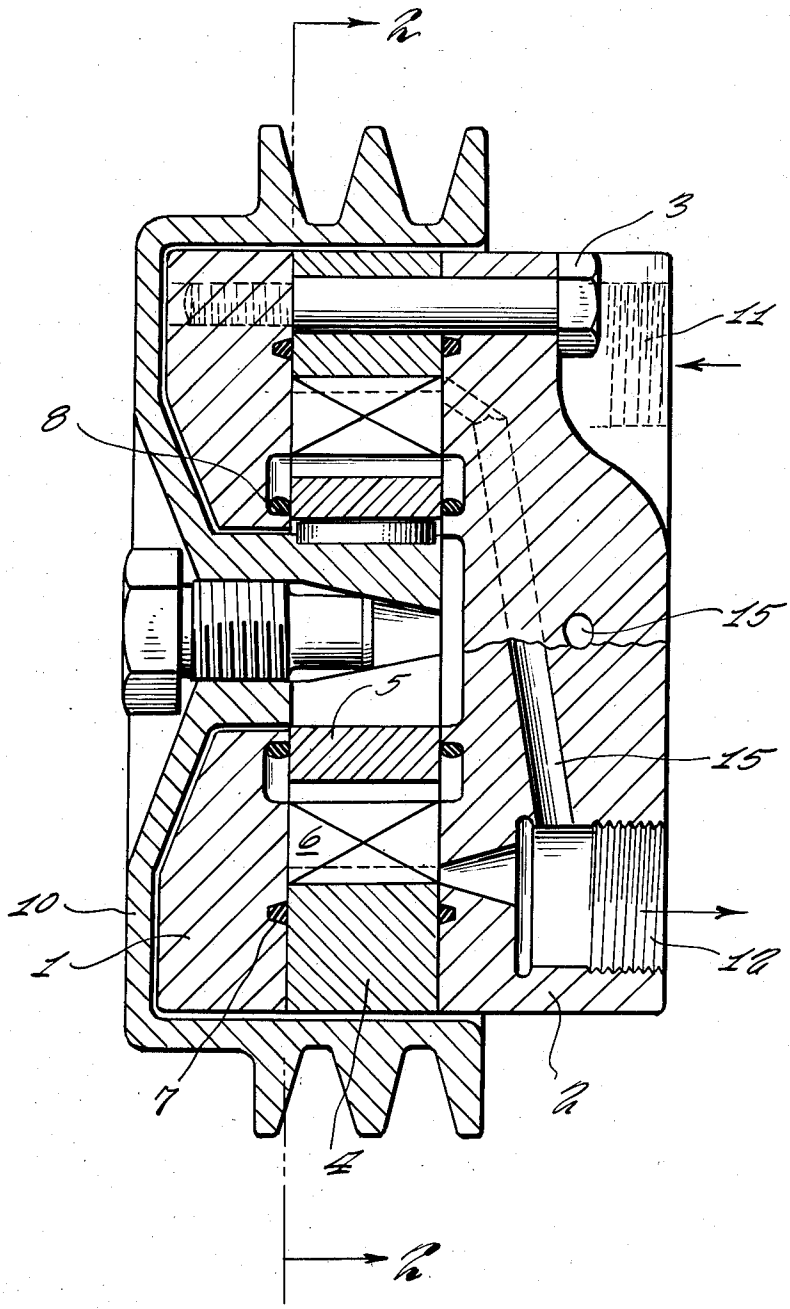


Fig. 1

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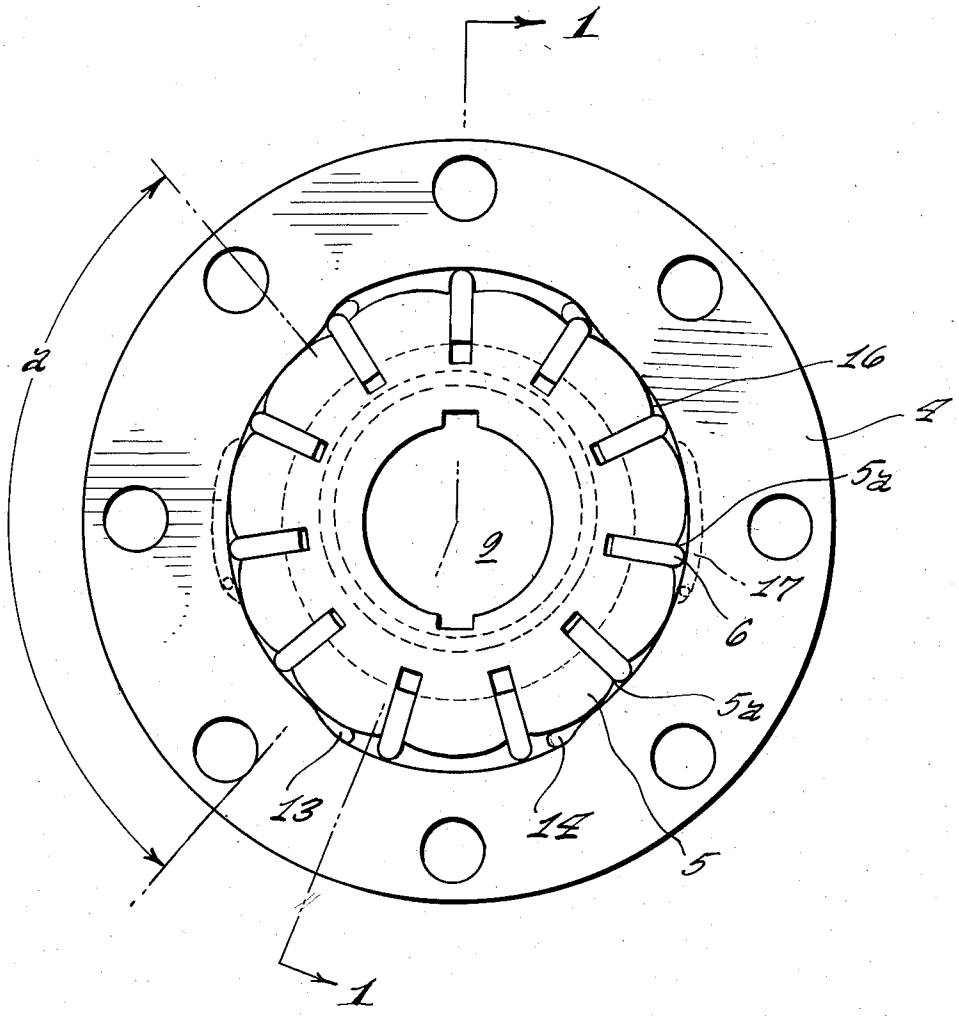


Fig. 2

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United States Patent Office 2,825,287 Patented Mar. 4, 1958

2,825,287

ROTARY VANE-TYPE PUMP

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Application December 14, 1954, Serial No. 475,090

Claims priority, application Germany December 17, 1953

5 Claims. (Cl. 103—136)

The present invention relates to bearings for the rotors of rotary vane-type pumps. Such rotors normally have pivot pins at both sides which are supported by the pump casing. These arrangements are known, as well as the arrangement of a disc-shaped rotor on a driving shaft separately journaled in the pump casing. Both arrangements have the difficulty of providing, with the accuracy attainable during production, the adequate tolerance in their closely arranged supporting means. Also, production costs are high due to the large number of bearing parts.

It is the object of the present invention to eliminate the above mentioned drawback.

This is achieved, according to the invention, by providing a disc-shaped rotor for rotary vane-type pumps, said rotor being supported in the cylindrical opening of a cam. The drive can be accomplished, according to the invention, by driving means acting directly on the disc-shaped rotor.

In the accompanying drawings one embodiment of the invention will be described by way of example, but it should be understood, that this is given only by way of illustration and not of limitation.

Fig. 1 of the drawing shows the pump in cross section and Fig. 2 in top plan view, with belt pulley and one cover plate removed.

The pump comprises two cover plates **1** and **2** enclosing therebetween a cam disc **4** fastened by means of nuts **3**. In the central opening of the cam **4**, a disc-shaped rotor **5** is mounted, said rotor having slots **5***a* for receiving vanes **6**. Packing rings **7** and **8** of rubber serve for sealing the rotor and the cam, respectively, against plates **1** and **2**, rings **8** being eccentrically arranged with respect to the axis of rotation of the rotor.

The drive means for the rotor comprises a cylindrical structure **10** which passes through a central opening **9** in the cover plate **1**. The structure **10** has a central portion which may be provided with wedged grooves keying to the rotor **5**. The driving structure **10** preferably has its outer cylindrical surface formed as a belt pulley so that rotary power can be directly applied to the rotor **5** through one or more drive belts.

The pump intake **11** and the pump discharge **12** are diagonally connected in a manner known per se with two intake slots **13** and two discharge slots **14**, the diagonal connection in the interior of plate **2** being accomplished by ducts or bores **15**. The angular path of the stroke on the cylinder is indicated by *a* between arrows in Fig. 2. The segment-shaped parts of the rotor are provided with chamferings **16**. Pocket-shaped recesses **17** are connected to the compressed oil pipe-line of the pump.

By the eccentric arrangement of the rubber rings **8** with respect to the axis of rotation, an oil film is formed between rotor and rubber packing. In order to take up radial forces of the driving element acting on the cam, the cylindrical part of the latter is made to form a slide bearing which moves along the cylindrical range of the cam designated by *a*. Furthermore, in order to make the radial forces occurring during the drive act on the slide bearing and not on the part of the cam causing the stroke, it is preferable to position the driving element, e. g. the belt, in such a manner that it will travel in radial direction at right angles to the non-bearing areas of said cam. It is desirable to have as large a bearing area as possible since the pressure exerted on the bearing during the drive is the larger, the smaller is its area, and the high pressures involved result in rapid wear. The size of the *a*-ranges is in proportion to the number of vanes, since the magnitude of the cam areas is directly proportional to the spacing of the vanes and inversely proportional to the length of the *a*-ranges. The chamferings **16** are provided to improve the bearing capacity of the slide bearing, since they enhance the formation of hydraulic lubricating wedges. Additionally, the pocket-shaped recesses **17** are provided for the same purpose within the range *a* of the cam, said recesses being connected with the compressed oil pipe-line or some lubricating pipe system.

As compared to known devices, the rotary vane-type pump according to the present invention has the advantage of dispensing with a centering of the discs **1**, **2**, and **4**, as well as some machining operations, since only the cylindrical part of the rotor and of the cam have to be specially machined. Other parts only need fine mechanical manufacture.

In case that the pump has to be provided, for reasons of construction, with a drive shaft for receiving a pinion or the like, the plate **1** can be replaced by another plate which contains a drive shaft with bearing.

What I claim is:

1. A rotary pump comprising a pump casing consisting of two cover plates and a cam disc therebetween, said cam disc having a central opening, said central opening defining a first pair of diametrically opposed cylindrical surface portions, and a second pair of diametrically opposed cylindrical surface portions of greater diameter than said first surface portions and concentric therewith, a cylindrical rotor coaxially positioned in said central opening and journalled by and between said first pair of opposed cylindrical portions, driving means secured to said rotor, said driving means being supported solely by said rotor, whereby said first pair of opposed cylindrical surface portions are bearings providing the sole support for said rotor, and means including a plurality of vane members in said rotor movable outwardly to the surface defined by said second pair of surface portions upon rotation of said rotor to force liquid through said pump.

2. A rotary vane-type pump according to claim 1, wherein packing rings are provided between the rotor and said cover plates.

3. A rotary vane-type pump according to claim 2, wherein said packing rings are O-shaped.

4. A rotary vane-type pump according to claim 1, wherein the cylindrical opening of the cam is provided with lubricating pockets, said pockets being connected to a compressed oil pipe-line.

5. A rotary vane-type pump comprising a pump casing consisting of two cover plates and a cam disc therebetween, said cam disc having a central opening, said central opening defining a first pair of diametrically opposed cylindrical surface portions and a second pair of diametrically opposed cylindrical surface portions of greater diameter than said first surface portions and concentric therewith, a cylindrical rotor coaxially positioned in said central opening and journalled by and between said first pair of opposed cylindrical surface portions, driving means secured to said rotor, said driving means being supported solely by said rotor, whereby said first

pair of opposed cylindrical surface portions are bearings providing the sole support for said rotor, and means including a plurality of vane members equidistantly spaced about the periphery of said rotor and movable outwardly to the surface defined by said second pair of surface portions upon rotation of said rotor to force liquid through said pump, said vane members defining a plurality of arcuate zones about said rotor, said rotor being chamfered at each end of said arcuate zones.

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