July 12, 1949. G. A. JONES 2,475,844

AXIALLY SLIDING VANE ROTARY PUMP

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Fig. 1.

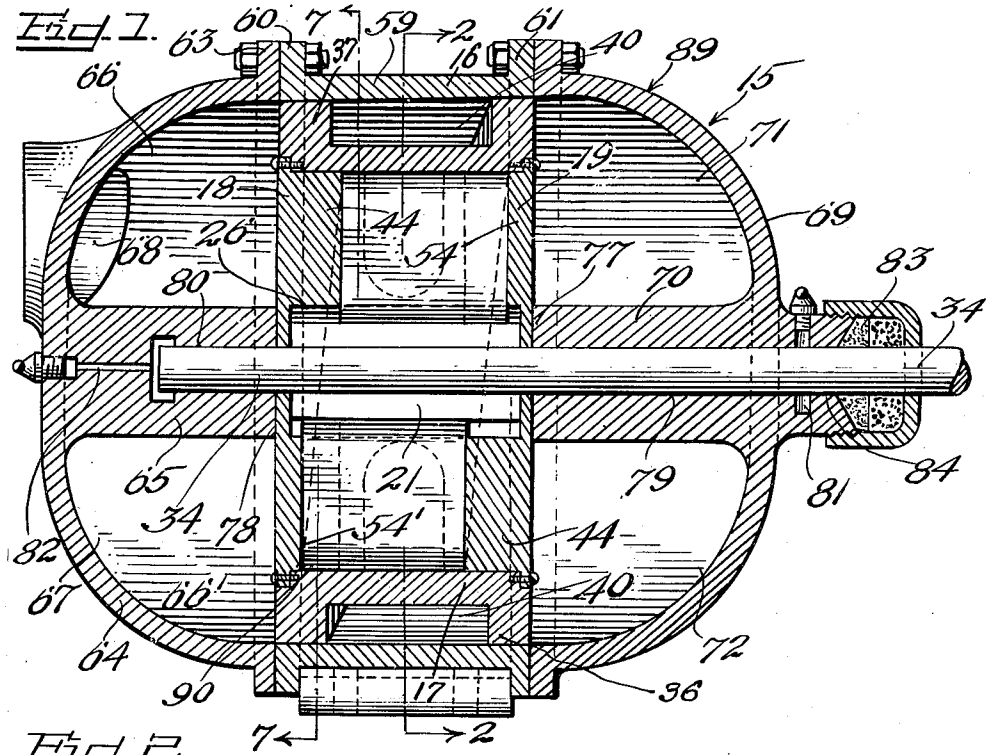
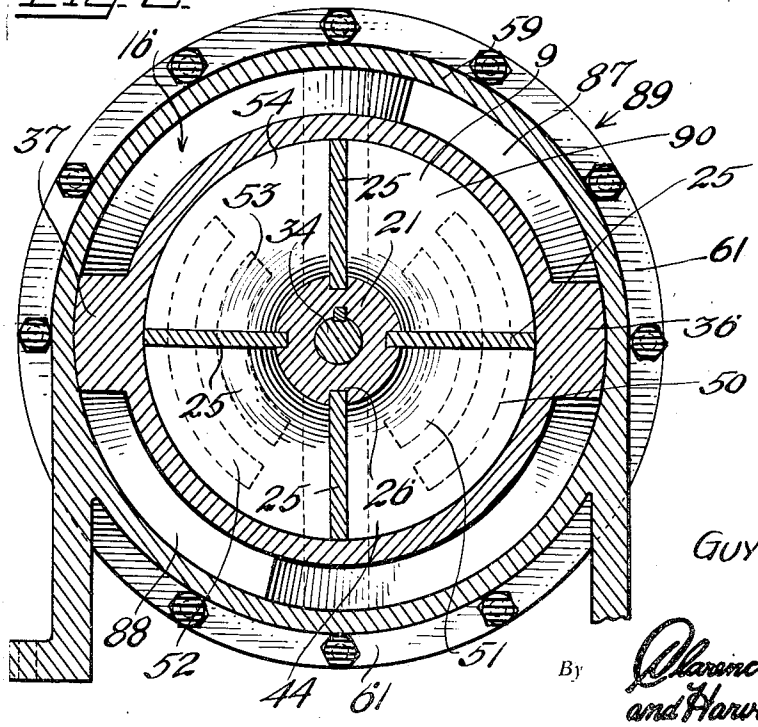


Fig. 2.



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Fig. 3

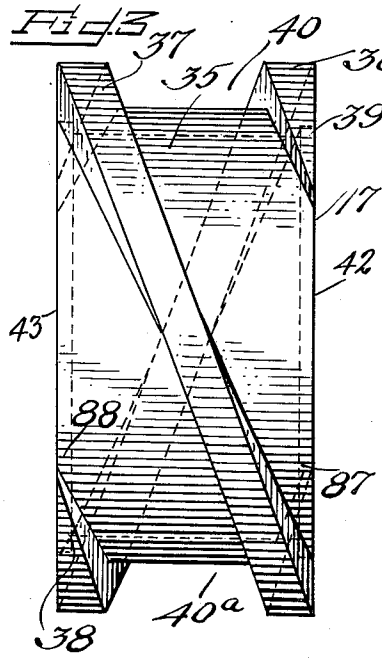


Fig. 4

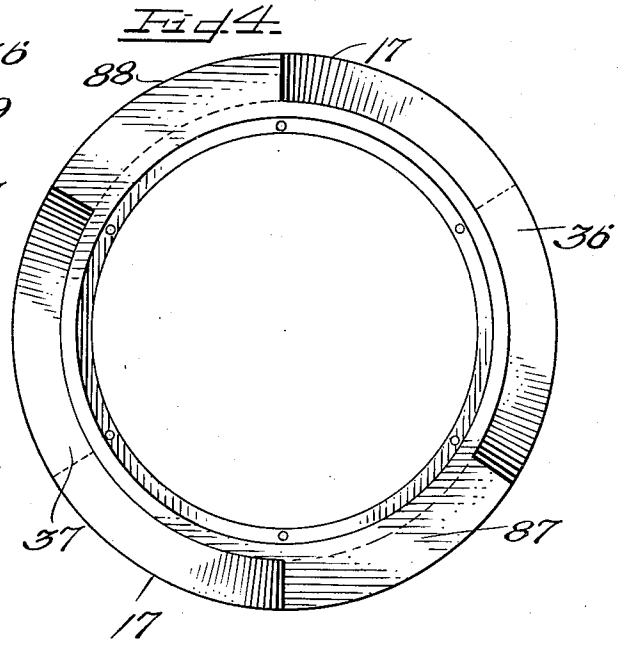


Fig. 5

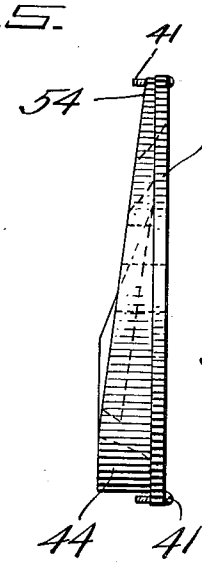
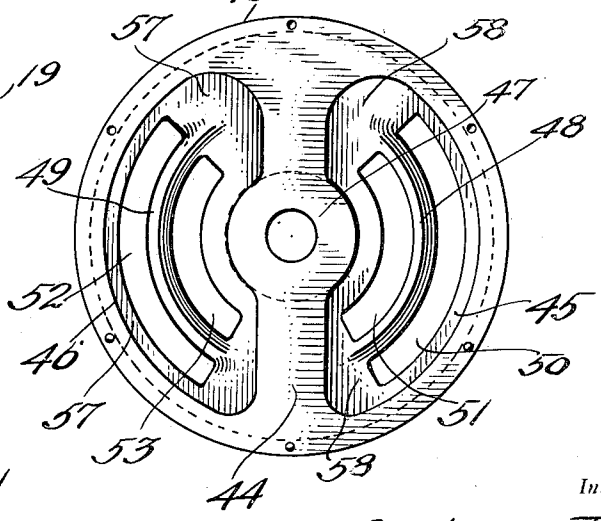


Fig. 6



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Fig. 7.

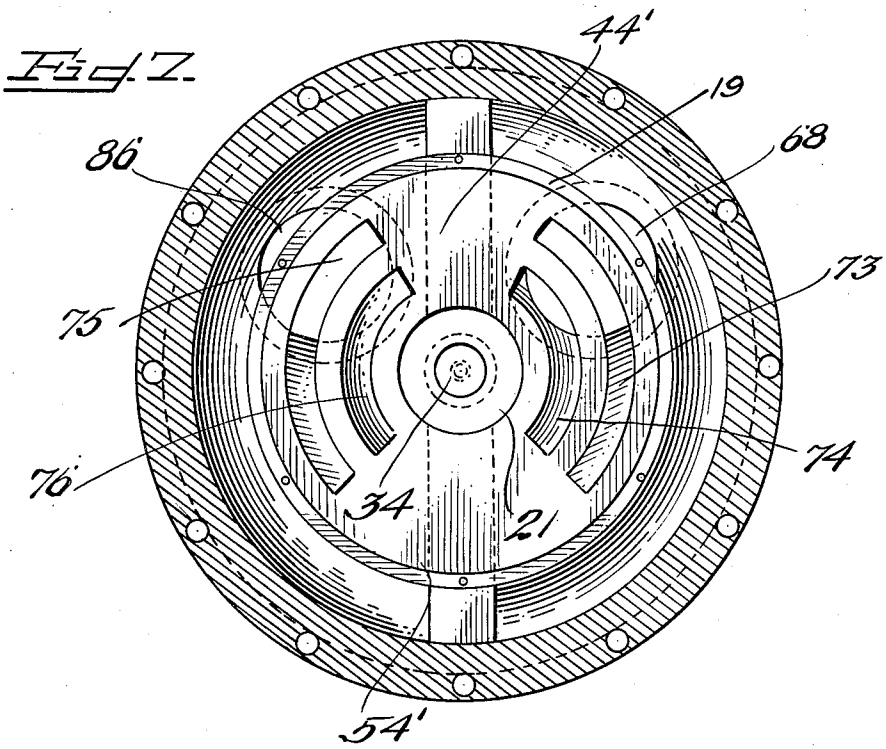


Fig. 8.

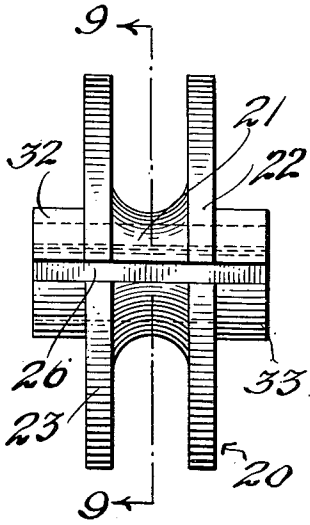
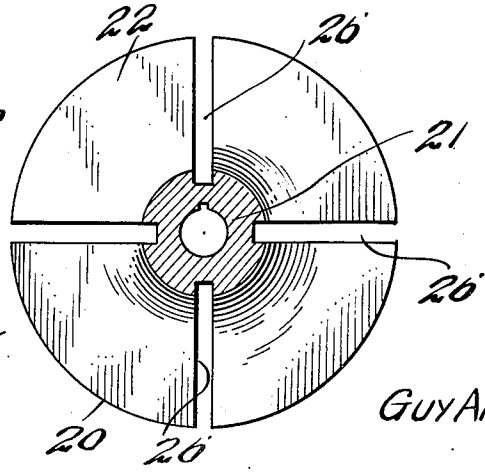


Fig. 9.



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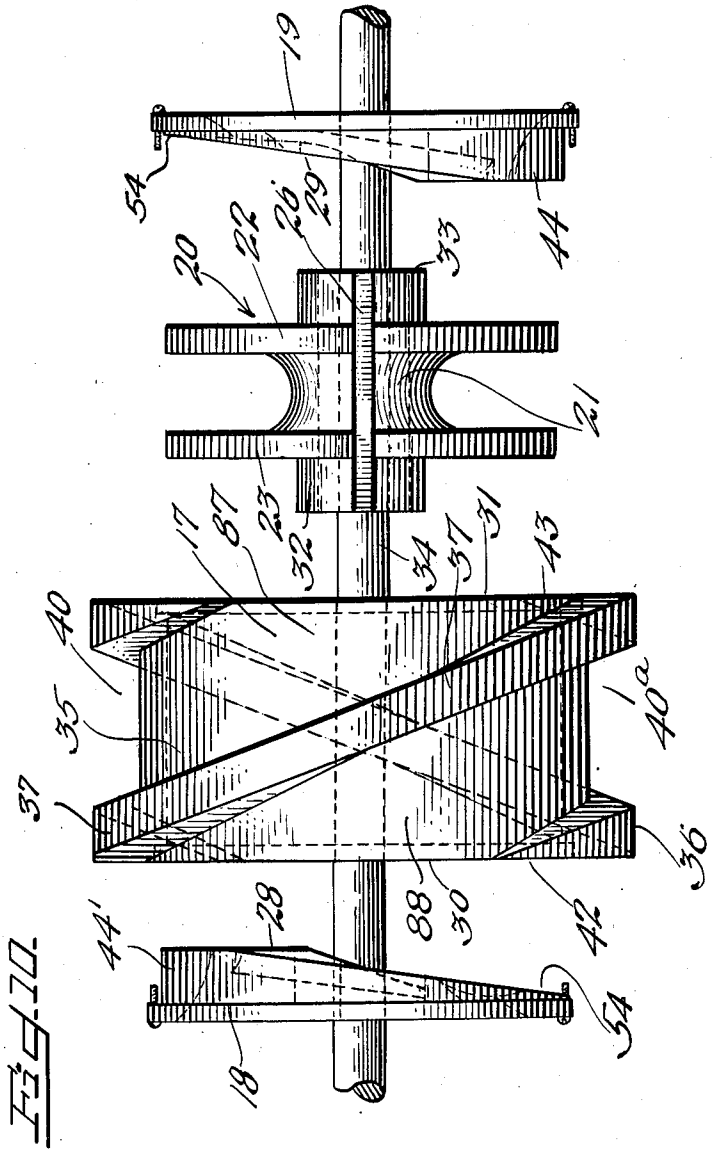


FIG. 10

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2,475,844

UNITED STATES PATENT OFFICE

2,475,844

AXIALLY SLIDING VANE ROTARY PUMP

Guy Arnold Jones, Long Beach, Calif., assignor to Eaton Pump Manufacturing Company, Inc., a corporation of California

Application May 9, 1945, Serial No. 592,866

1 Claim. (Cl. 103—139)

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This invention relates to pumps and has for its object to provide a pump for any liquid and which may be used for large or small quantity pumping at high or low speed and at a minimum cost of operation.

A principal object of the invention is to provide a double action rotary pump embracing oscillating fins actuated by means of turbinated harmonious helix cams.

Another object of the invention is to provide in a pump means whereby liquid may be moved by rotor and by suction.

A further object of the invention is to provide a liquid sealed pump casing.

Another object of the invention is to provide in a pump a rotor and having cam faced side walls having apertures through which liquid is drawn and discharged through means of oscillating vanes.

A still further object of my invention is to provide a self priming rotary pump.

Other features and advantages will become more readily apparent from the following description and the accompanying illustrative drawings in which:

Figure 1 is a longitudinal sectional view of my pump,

Figure 2 is a sectional view taken on line 2—2 thereof,

Figure 3 is an enlarged detail elevational view of a pump casing cylinder,

Figure 4 is a side elevational view thereof,

Figure 5 is a detail side elevational view of a turbinated harmonious helix,

Figure 6 is a face elevation thereof,

Figure 7 is a sectional view taken on line 7—7 of Figure 1,

Figure 8 is an elevational view of a rotor,

Figure 9 is another elevational view thereof, and

Figure 10 is a diagrammatic assembly view of the pump parts.

In the following specification of this invention I use like reference characters to designate like parts as well as in the various views in the accompanying drawings and 15, indicates my pump and its combined elements.

The principal members of my invention are a pump, which includes a casing 16, a cylinder 17, a pair of end plates 18 and 19, and a rotor 20. The rotor comprises an elongated hub 21, a pair of spaced apart disk walls 22 and 23, and a series of two (or a multiple thereof) or (as shown) four vanes 25, of the same length as the said hub and which are slidably seated in slots 26, formed in the

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hub and walls 22 and 23. This rotor is mounted within the cylinder 17, and said vanes are of a depth to not quite engage the inner wall 27, of said cylinder 17, in order that they may be oscillated freely by their movement against the oppositely arranged inner cam faces 28 and 29, of the plates 18 and 19, which seat within the ends 30 and 31, of the cylinder 17, and against the projecting ends 32 and 33, of the hub 21, which is keyed to a driver shaft 34. Around the outer surface 35, of the cylinder 17, are provided (preferably integral) helical extensions 36, and 37, which are oppositely inclined and the terminals 38 and 39, of each of which come short of encircling the cylinder and which have a very small working clearance from the wall of the opposing cylinder 16, whereby a spiral passageway 40, is formed therebetween, which will be again referred to later on.

Again referring to the members 18 and 19, it may be stated that the cam faces 28 and 29, thereof form a very important feature of the invention; however, as they are identically formed it will be necessary to describe only one in detail. Take member 19, for instance, it is provided with an annular rim, which is secured by bolts 41, to the cylinder edges 42 and 43, and its cam face 29, is of sufficiently lesser diameter to fit tightly into said cylinder. The thick end 44, of this cam, including its rims 45 and 46, and also its center or hub abutting portion 47, and the ribs 48 and 49, which separate the segmentally formed ports 50 and 51, and 52 and 53, respectively, gradually and uniformly decreases in thickness down to the thinnest part 54, of the cam. These cams are placed in diametrically opposite positions in the cylinder 17, and are engaged by the ends 55 and 56, of each of the vanes 25, whereby as the rotor revolves all of said vanes will be harmoniously oscillated in conformity with the opposingly arranged position of said cams. It is to be noted (see Figure 6) that the walls 57 and 58, surrounding the ports 50 and 53, are dished out or inclined, the purpose of which is to permit a freer passage of liquid therethrough.

Mounted over the member 17, is a drum 16, provided with outwardly projecting annular flanges 60 and 61. The inner wall 62, of the drum seats upon the spiral members 36 and 37, and forms the top wall of the channel or passages 40 and 40a. Bolted to flange 60, is a similar flange 63, of a bell casing 64, in the center of which is provided a bearing 65. The chamber 66, is provided with an outlet port 68. Bolted to flange

61, is a similarly formed bell casing 69, having a bearing 70, aligning with hub 21, and bearing 65, which bearings support the said shaft 34. The casing 69, forms the chamber 71, which opens into the ports 50 to 53, of plate 19. The chamber 66, opens into ports 73 to 76, of plate 18.

The plates 18 and 19, are seated tightly between the inner ends 77 and 78, of the bearings 65 and 70. These bearings are provided with lubricating passages 81 and 82. A packing gland 83, is provided at the inlet 84, of the shaft 34. It is obvious that the function of ports 68 and 86 may be reversed upon reversal of the pump. The channels 40 and 40a also connect the chambers 66 and 71, through the ports 87 and 88, liquid passing through this channel is actuated through suction caused in the body of liquid in the inlet side of the bell casing through the action of the pump. As the pump 15, is kept immersed in liquid with which the bell casing tank, which I designate as an entirety by character 89, is kept full there will be no further priming necessary after the first starting of the pump, said casing 89, being airtight and if necessary check or cut off valves may be provided in the outlet pipes in order to avoid syphoning of the liquid from said casing.

The operation of the above described pump is very simple. As the shaft and rotor 20, turns the vanes 25, carry the liquid (with which this pump casing is filled) to outlet ports 52 and 53, through which the liquid is forced by the vanes and as water is taken from the inlet side of the pump a fresh supply is sucked in through ports 50 and 51. The drawing of liquid into inlet port 86 (the tank being already full) drives it out through outlet port 68.

Attention is called to the fact that as the large part of the cam 44, is at the lower end of plate 19, liquid being pushed by the vanes 25, will be forced toward the outlet ports in plate 18, and as the large end of cam 44', in plate 18, is above said ports the space above the ports is reduced thereby forcing the large volume of this liquid through the ports.

The course of fluid through the pump is as follows: Pump turning counterclockwise fluid enters port 86, in the lower part 67, of chamber 66, and a part of the fluid is drawn through ports 75 and 76, into the pumping chamber 90, through the action of the vanes 25, and is pushed by them through ports 73 and 74, of plate 18, into the upper part of chamber 66, and out through discharge port 68. The balance of said fluid is sucked into port 88, of passage 40, by the same action of the vanes and passes out through port 87, into chamber 71, and then passes through ports 50 and 51, of plate 19, into the pumping chamber and thence through ports 52 and 53, entering the lower part 72, of chamber 71, and then through the other spiral passageway 40a into chamber 66, and out through port 68.

It is thought that persons skilled in the art to which the invention relates will be able to obtain a clear understanding of the invention after considering the description in connection with the drawings. Therefore, a more lengthy description is regarded as unnecessary.

Minor changes in shape, size and rearrangement of details and parts such as come within the purview of the invention claimed may be resorted to, in actual practice, if desired.

Having now described my invention that which I claim as new and desire to procure by Letters Patent is:

A rotary pump including a rotor having spaced disc walls and an intervening annular recess, a cylinder within which said rotor is mounted, double apertured cam-faced plates closing the ends of said cylinder, a plurality of vanes frictionally engaging said cylinder and radially and slidably mounted in said rotor and adapted to be reciprocated axially of said rotor by the cams on said cam-faced plates, a second cylinder on the outside of said first-mentioned cylinder, two bell-shaped casings enclosing the ends of both cylinders and said rotor, each casing being divided into two chambers, oppositely inclined helical partitions each partially encircling and dividing said second cylinder into channels communicating diametrically opposed chambers in said casings on opposite sides of said cylinders, inlet and outlet ports each communicating with one of said chambers in one of said bell-shaped casings, a drive shaft rotatably mounted in said casings and secured to said rotor the said rotor and cam plates and vanes being completely immersed in fluid drawn into the pump through said inlet port, whereby rotation of said drive shaft rotates said axially reciprocatively mounted vanes impelling said fluid in part through a channel generated on one side of one of said disc walls on the rotor and through one of said double apertured plates to the outlet port, and in part through a fixed helical channel bounded by one of said oppositely inclined helical partitions to the opposite side of one of said disc walls and thence through the other double apertured plate, to return through another fixed channel bounded by the other one of said helical partitions to the said outlet port.

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