

June 12, 1951

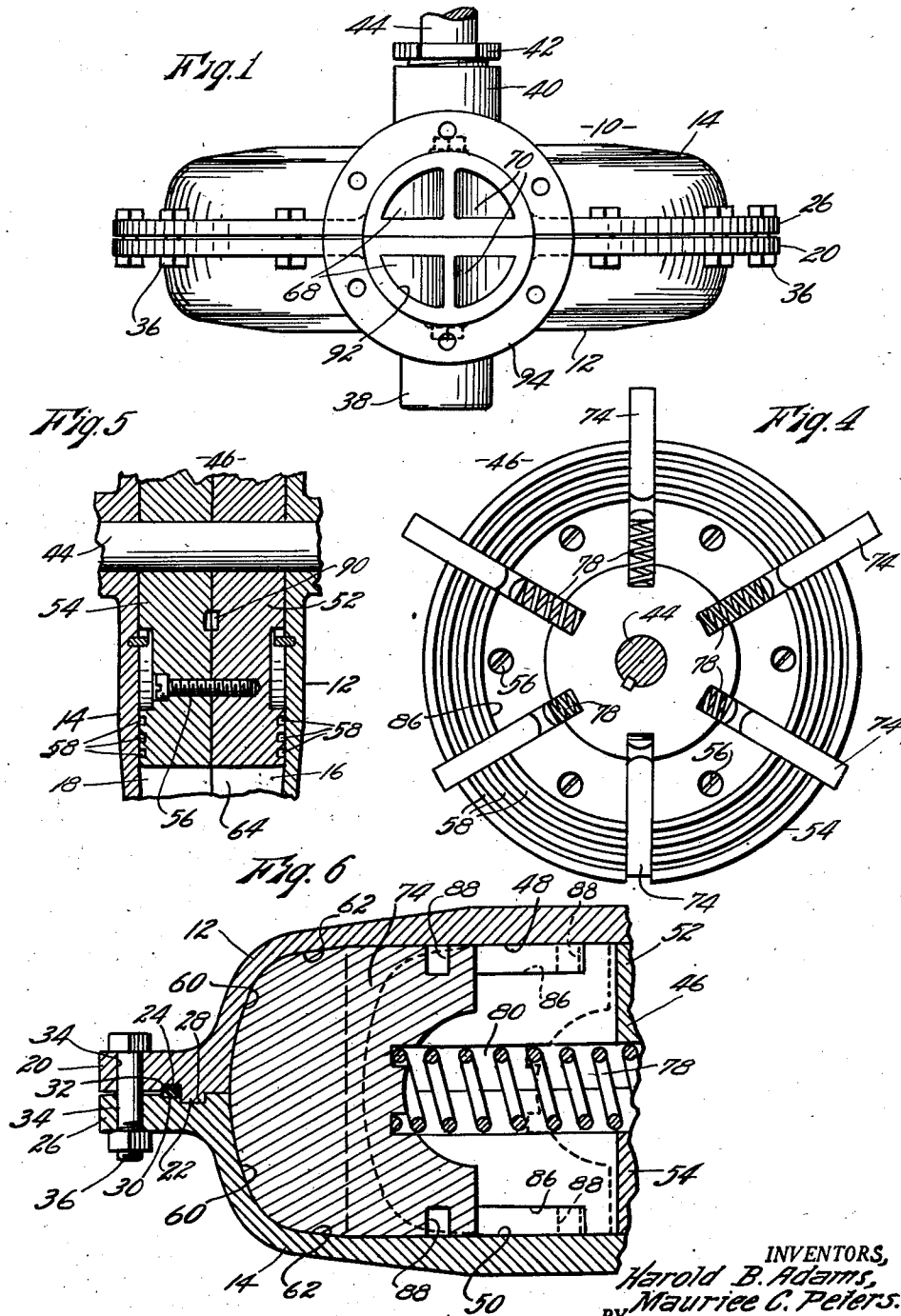
H. B. ADAMS ET AL

2,556,313

ROTARY PUMP

Filed Sept. 8, 1947

2 Sheets-Sheet 1



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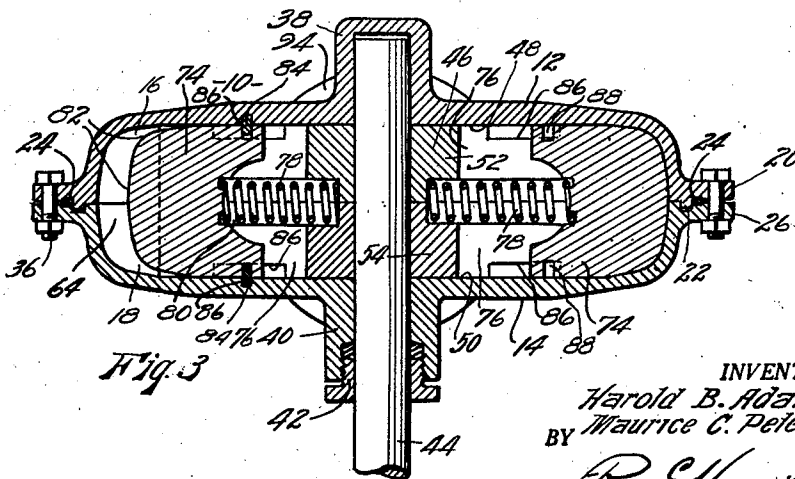
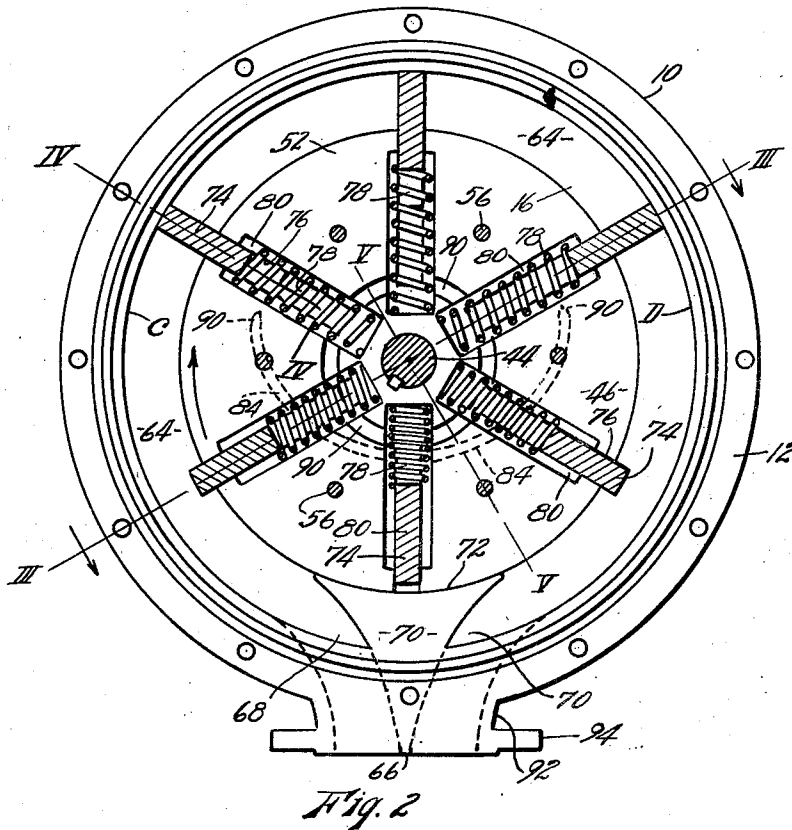
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UNITED STATES PATENT OFFICE

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ROTARY PUMP

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Application September 8, 1947, Serial No. 772,784

3 Claims. (Cl. 103—136)

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This invention relates to improvements in rotary pumps and has particular reference to rotary pumps having reciprocating abutments.

The principal object of the present invention is the provision of a rotary pump having reciprocating, radially disposed abutments provided with contact edge portions adapted to work against outwardly converging arcuate bearing surfaces of uniform radial distance from the axis of rotation of said abutments.

Another object of the invention is the provision of rotary pump having radially disposed abutments or vanes normally urged to the operating position by a resilient member and adapted to be moved to the inoperative position by a segmental cam against the action of said resilient member.

A further object is the provision of a rotary pump having operating abutments so mounted and operated in a rotor housing as to eliminate most of the objectional leakage of liquid between the relatively movable parts.

Other objects are sturdiness and simplicity of construction, efficiency and ease of operation and adaptability for reversal of direction of rotation and for use as a reversible motor.

With these objects in view, as well as other objects which will appear during the course of the specification, reference will be had to the drawings wherein:

Figure 1 is an inverted view of a rotary pump embodying this invention.

Fig. 2 is a side elevation of the pump with one of the casing members removed and certain parts in section.

Fig. 3 is a sectional view taken on line III—III of Fig. 2.

Fig. 4 is a detached elevational view of the rotor and associated parts.

Fig. 5 is a fragmentary sectional view taken on line V—V of Fig. 2.

Fig. 6 is an enlarged sectional view taken on line VI—VI of Fig. 2.

Throughout the several views like reference characters refer to similar parts and the numeral 10 designates a pump comprising two similar housing members 12 and 14. Housing members 12 and 14 have like chamber recesses 16 and 18 respectively which when members 12 and 14 are properly fitted together form a symmetrical chamber for the operation of a rotor and associated parts. Housing member 12 is provided with an annular, radial flange 20, faced on its inner side to present an annular flange 22 and a groove 24. Housing member 14 is provided with an annular,

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radial flange 26 faced to present a groove 28 adapted to receive the flange 20 of member 12, and provided with another annular groove 30 which registers with groove 24 of member 12, to receive a suitable packing ring 32 therebetween. Each member 12 and 14 is provided with a series of transverse holes 34 to receive bolts 36 by means of which the members are secured together. Housing member 12 has an axially disposed blind bearing member 38 and member 14 has a bearing member 40 provided with a stuffing box 42. A shaft 44 is axially mounted in housing 10 in bearings 38 and 40 and extends outwardly therefrom to receive any suitable driving means, not shown. Rigidly mounted on shaft 44 is cylindrical rotor 46 which fits snugly against the side walls 48 and 50, respectively of members 12 and 14. Walls 48 and 50 are parallel and disposed at right angles to shaft 44.

For convenience of manufacture and assembly rotor 46 comprises two circular disc-like sections 52 and 54 joined together by means of machine screws 56. Each of the sections 52 and 54 are provided with a series of oil grooves 58 concentric with the shaft 44 and disposed adjacent their respective peripheries.

That portion of the housing chamber beyond the rotor 46 is symmetrically formed by members 12 and 14 by transversely curved end walls 60 and outwardly converging substantially frusto-conical wall sections 62 tangent therewith. The rotor 46 mounted as described in housing 10 forms a substantially annular working chamber 64 having a double port 66 at its one side provided with passageways 68 and 70 which are of a cross-sectional area substantially equal to that of working chamber 64. A partition 70 separating passageways 66 and 68 extends into working chamber 64 and is provided with an arcuate bearing section 72 positioned to contact the periphery of rotor 46 with which it is concentric. This structure is such that fluid delivered through one of the passageways 68 or 70 will be delivered to annular chamber 64 and out through the other passageway. Since this pump mechanism is symmetrical in form it is quite apparent that it will work in substantially any manner regardless of the direction shaft 44 is rotated, furthermore, if fluid under pressure is delivered to the device, it may be used as a reversible motor.

Radially disposed blades or vanes 74 are slidably mounted in radial slots 76 formed in rotor 46 which are adapted to be moved to and in a position in the path of fluid delivered to the annular working chamber 64, whereby fluid is

pumped therefrom. Each vane is provided with a compression spring 78 mounted in a pocket 80 formed in the rotor, which normally urges the vane outwardly to contact the inner wall of the engine housing. It will be noted that the edge 82 of the vane 74 conforms to the inner circular wall of the housing 10.

The movement of vanes 74 are controlled by a cam 84 which are inset in the inside walls of housing 10 and extend into the housing chamber, as shown. It will be noted that an annular groove 86 is formed in each side of the rotor 46 to receive the cam member 84. Each vane 74 has a side slot 88 formed in each of its edges adjacent its inner end to cooperate with said cam whereby the vane is forced inwardly against the action of spring 78 to miss the arcuate bearing section 72 at each revolution of the rotor in the housing. The end portions 90 of the cam are positioned in the path of travel of the slots 76 in vanes 74 and are so tapered that they will freely enter said slots and cause the vanes to be gradually drawn inwardly in such a manner that the edge 82 of the vane will never contact any surface except the uniform inner wall of the housing 10. The vanes 74 do not abut the inner wall of the housing, when the rotor is moving in the direction indicated by the arrow in Fig. 2, until the vane has reached substantially the point C, and leaves the wall at point D.

Referring to Fig. 6, it will be apparent that that portion of the vane 74 which contacts the inner working surface of the housing 10, is inclined outwardly toward the center of the vane at all points outside the peripheral edge of the rotor 46 so that as the vane is forced outwardly by spring 78 all portions of the extended parts of the vane will be forced against the inner wall of the housing whereby it will be constantly urged to a working fit in the housing. Naturally the outer central portion of the vane will be forced more firmly against the working wall and will be worn down more rapidly than the inclined side edges of the vane. However, this structure of the vane and the working wall will be such that a substantially perfect fit will be obtained between the vane and the inner working wall of the housing to preclude objectionable leakage of liquid therebetween. It will be noted in the present invention that the cam 84 extends only a portion of the distance about the shaft 44 and does not interfere in any manner with the free action of the spring 78 to seat the vanes during the power stroke of the pump. During the operation of the pump and as the vanes are reciprocated there will be some movement of the liquid to and from the center portion of the rotor and to better equalize the pressure in the various spring pockets, an annular groove 90 is provided in the central portion of the roller which interconnects all of said pockets, as shown. The double port 66 extends through a neck 92 having an annular flange 94 by means of which the pump may be attached to any suitable connector for carrying liquid to and from the pump.

What we claim as new and desire to protect by Letters Patent is:

1. A rotary engine comprising a housing having two concentric wall sections of different radii and having side walls, a cylindrical rotor rotatably mounted in said housing in concentric relation with said wall sections of different radii and in contact with the wall section of lesser radius, whereby is formed in said housing a substantially annular working chamber between said rotor and

said concentric wall of greater radius, said working chamber having inlet and outlet ports respectively at opposite sides of said wall section of lesser radius, said working chamber having its side walls outwardly converging in substantially frusto-conical shape, vanes having side slots mounted for reciprocation in radial slots formed in said rotor and the outer ends of said vanes being shaped to conform to the contour of the side walls of said working chamber, resilient means to constantly urge said vanes outwardly to close said working chamber, and means for engaging said slots during a portion of the rotation of said rotor to force said vanes inwardly against the action of said resilient means to clear said concentric wall of lesser radius as said rotor is rotated.

2. A rotary engine comprising a housing having two concentric walls of different radii and having side walls, a cylindrical rotor rotatably mounted in said housing in concentric relation with said concentric walls of different radii, in working contact with said wall of lesser radius and in spaced apart relation to the concentric wall of greater radius to form a substantially annular working chamber having outwardly converging side walls of substantially frusto-conical shape extending from the outer periphery of said rotor, said working chamber having inlet and outlet ports respectively at opposite sides of said wall section of lesser radius, vanes having side slots and being mounted for reciprocation in radial slots formed in said rotor, resilient members to constantly urge said vanes outwardly to contact the side walls of and to close said annular working chamber, and segmented cams carried by said housing adapted to engage in the slots in said vanes to move the vanes inwardly against the action of said resilient members to clear said concentric wall of lesser radius at each complete rotation of the rotor.

3. A rotary engine comprising a housing having two concentric walls of different radii and having side walls, a cylindrical rotor rotatably mounted in said housing in concentric relation with said concentric walls of different radii, in working contact with said wall of lesser radius and in spaced apart relation to the concentric wall of greater radius to form a substantially annular working chamber having outwardly converging side walls of substantially frusto-conical shape extending from the outer periphery of said rotor, said working chamber having inlet and outlet ports respectively at opposite sides of said wall section of lesser radius, vanes having side slots and being mounted for reciprocation in radial slots formed in said rotor, resilient members to constantly urge said vanes outwardly to contact the side walls of and to close said annular working chamber, and segmented cams carried by said housing adapted to engage in the slots in said vanes to move the vanes inwardly against the action of said resilient members to clear said concentric wall of lesser radius as said rotor is caused to rotate in said housing, and a passageway formed in said rotor to interconnect the various slots formed therein, the angular distance between the ends of each of said cams being greater than the angular distance between two successive vanes.

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