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MOVABLE VANE ROTARY PUMP OR FLUID MOTOR

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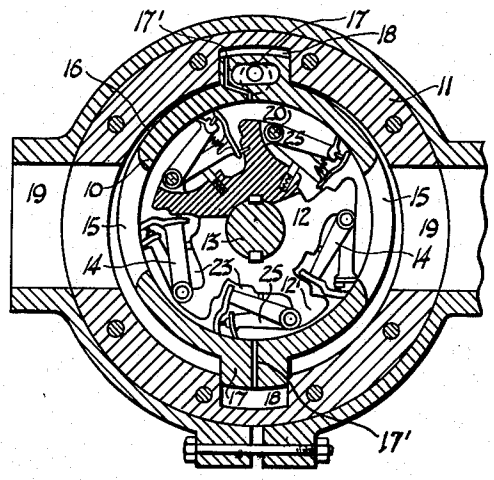


FIG. 1.

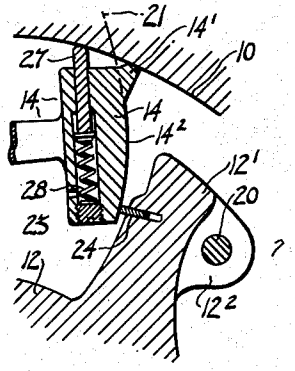


FIG. 5.

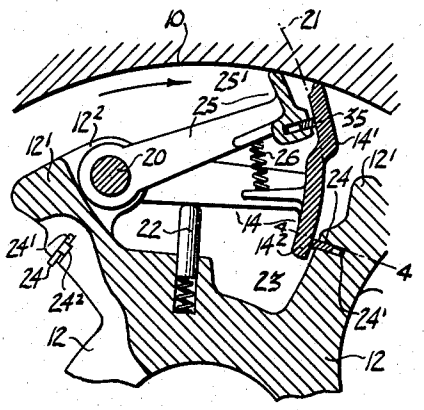


FIG. 2.

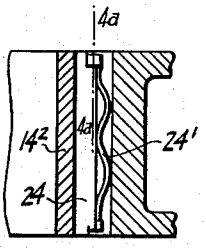


FIG. 4.

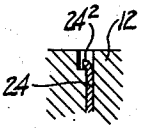


FIG. 4a.

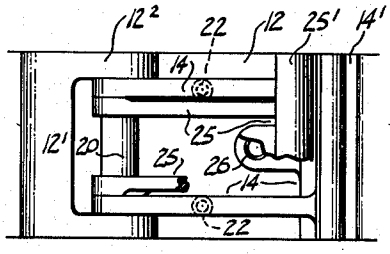


FIG. 3.

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MOVABLE VANE ROTARY PUMP OR FLUID MOTOR

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18 Claims. (Cl. 103—140)

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This invention relates to improvements in rotary engines, pumps and the like of the so called crescent chamber type and refers more particularly to improvements in engines and pumps of the kind disclosed in the specifications of my Patent No. 2,135,760, granted November 8, 1938.

Certain forms of the engines and pumps disclosed in the aforesaid prior specifications incorporate a rotor which is arranged within a cylinder capable of being bodily displaced in its own plane so that the direction of flow of the liquid may be reversed without changing the direction of rotation of the rotor.

In each case the rotor is provided with one or more pivoted blades, the free ends or heads of which are formed with cylinder sealing surfaces and with rotor sealing surfaces which sealingly engage the inner periphery of the cylinder and the adjacent portion of the rotor body respectively, contact between such blades and the cylinders being maintained or assisted by the pressure of the fluid.

In one of the said prior constructions the various pivoted blades on the rotor all extend in the same direction, and their cylinder sealing surfaces are of substantial width in the peripheral direction of the cylinder, and arcs produced from the rotor sealing surfaces pass through the corresponding cylinder sealing surfaces. This construction however has the disadvantage that the direction of rotation of the rotor is non-reversible unless the cylinder is displaced so that its axis is moved to the opposite side of the rotor axis, because if the direction of rotation of the rotor is reversed without so displacing the cylinder the fluid pressure will not tend to maintain sealing contact between the blade heads and the cylinder.

In another construction disclosed in my aforesaid specifications, the said pivoted blades are arranged in opposed pairs, and in this case the rotor is reversible irrespective of the position of the cylinder, but this construction has the disadvantage that only one blade of each pair is effective at any one time and the distance between each effective pair of blades is necessarily relatively great.

Now the object of the present invention is to provide improvements in engines, pumps and the like of the abovementioned type whereby reversibility of the rotor is obtainable without arranging the pivoted blades in opposed pairs.

Accordingly the invention broadly resides in a rotary pump or fluid motor comprising a cylinder, a rotor therein, at least one depressible main impeller member on the rotor, means forming a

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fluid seal between said main impeller member and the rotor, a transverse surface at the outer end of said impeller member for sealing engagement with the inner periphery of the cylinder, a depressible auxiliary impeller member movable relatively to and arranged at one side of said main impeller member, a transverse cylinder sealing surface at the outer end of said auxiliary impeller member, and means forming a fluid seal between said main and auxiliary impeller members, and constructed and arranged whereby the fluid pressure will tend to maintain said main impeller member in sealing engagement with the inner periphery of the cylinder when the rotor is turned in one direction and whereby the fluid pressure will tend to maintain the auxiliary impeller member in sealing engagement with the cylinder when the rotor is turned in the opposite direction.

More particularly the said main impeller member preferably constitutes a blade pivotally connected to the rotor about a transverse axis spaced from said blade in the peripheral direction of the rotor.

The said auxiliary impeller member may constitute an auxiliary pivoted blade mounted about the axis of the pivoted main blade and provided at its outer end with a cylinder sealing surface and with a surface for sealingly engaging the main blade. Alternatively, the auxiliary impeller member may constitute a blade slidably received in and projecting outwardly from the pivoted main blade.

In either case, the auxiliary impeller member is preferably urged outwardly into contact with the cylinder by means of one or more springs.

For a more particular description of exemplary embodiments of the invention, reference will be made to the accompanying drawings in which:

Figure 1 is a view in sectional elevation of a rotary pump or motor incorporating improved blades and associated sealing means in accordance with the invention.

Figure 2 is a view in sectional elevation to a larger scale of a portion of the apparatus shown in Figure 1.

Figure 3 is a view in plan of the pivoted blades and associated parts shown in Figure 2.

Figure 4 is a sectional view showing a sealing strip and is taken on the line 4—4 of Figure 2.

Figure 4a is a sectional view on the line 4a—4a of Figure 4, and

Figure 5 is a sectional view similar to Figure 2 and shows a modified construction of auxiliary blade.

The pump or motor shown in Figure 1 comprises a cylinder 10 arranged slidably within an outer casing 11, said cylinder accommodating a rotor body 12 secured to a spindle 13 and provided at its periphery with a plurality of pivoted main impeller blades 14 accommodated partly within corresponding pockets 23 in the rotor between integral arms 12' on the latter.

The cylinder is provided with a diametrically opposed pair of ports 15 which communicate freely with corresponding spaces 16 between the cylinder and the casing, such spaces being closed at their upper and lower ends by guide elements 17 which project radially outwards from the cylinder and are received in guide sockets 18 in the outer casing. The casing is provided with inlet and outlet passages 19 which communicate freely with the respective cylinder ports 15 and the rotor spindle is mounted in bearings in the end plates of the outer casing.

The said pivoted main blades 14 all extend in the same direction from corresponding pivot pins 20 secured to lugs 12^2 on the corresponding arm 12' of the rotor and each blade is provided at its outer end with a head which is of arcuate form and is concentric with the respective pivotal axis. The outer portion 14' of each head is offset relatively to the inner portion 14^2 thereof whereby the outer arcuate surface of the former is disposed at a somewhat greater distance from the pivotal axis than the outer arcuate surface of the inner portion 14^2, as clearly shown in Figure 2. More particularly, the inner arcuate surface of the outer portion 14' may be disposed on the same arc as the outer arcuate surface of the inner portion 14^2.

The transverse surface at the free outer end of the outer portion 14' of each blade head sealingly engages the inner periphery of the cylinder as shown, and outwardly of an arc 21 produced from the outer arcuate surface of the inner portion 14^2 of the head, which inner portion sealingly engages the rotor body 12.

A seal is formed between the outer arcuate surface of the inner portion 14^2 of each blade and the adjacent portion of the rotor body by means of a relatively thin substantially rigid strip 24 of metal or other suitable material arranged "on edge" and partly received in a transverse slot formed in the rotor body, such strip extending the full width of the blade and being pressed outwardly into contact with the blade head by means of a corrugated strip spring 24' or other suitable resilient means arranged at the bottom of said slot. Preferably each inner end portion of the sealing strip is slitted to form lugs 24^2 which are bent laterally into a corresponding enlargement of the accommodating slot, the strip being thus retained and properly located in position. See Figures 2, 4 and 4*a*.

Each blade 14 is urged outwardly into sealing contact with the cylinder by spring loaded plungers 22 interposed between it and the rotor body 12. When the rotor revolves in such a direction that the blade heads are disposed in advance of the pivotal axes, i. e. in the direction indicated by the arrow in Figure 2, and the pressure of fluid ahead of said blades is greater than the pressure behind them, the fluid pressure exerted upwardly on the outwardly offset outer portion 14' of each successive blade head assists in maintaining same in contact with the cylinder.

If, however, the rotor were rotated in the reverse direction and the pressure exerted on the then leading concave inner faces of the blade heads were greater than the pressure on the convex faces thereof the excess fluid pressure would tend to depress the successive blades.

However, according to the present invention each of the said pivoted blades 14 is associated with an auxiliary impeller member which preferably takes the form of a second blade 25 pivotally mounted on the pin 20 of the respective main blade and extending in the same direction, said auxiliary blade being similarly provided at its outer end with an arcuate head 25'. The transverse surface at the outer end of the head of each auxiliary blade sealingly engages the inner periphery of the cylinder inwardly of the aforesaid arc 21 produced from the outer arcuate surface of the inner portion 14^2 of the head of the main blade 14, while in addition it is sealingly connected to the inner arcuate surface of the outer offset portion 14' of the head of the coacting main blade.

For this purpose a transverse spring loaded sealing strip similar to the sealing strips 24 above described is preferably mounted in a slot in the outer face of the head of each auxiliary blade.

Thus the arc 21 (Figures 1 and 2) produced from the outer arcuate surface of the inner portion 14^2 of the head of the main blade intersects the periphery of the cylinder inwardly of the cylinder sealing surface of the head of the main blade 14 and outwardly of the cylinder sealing surface on the head of the auxiliary blade 25. The auxiliary blades 25 also are urged outwardly by means of spring members 26 interposed between the arms thereof and the arms of the corresponding main blades.

Accordingly, when the rotor revolves in the reverse direction above referred to, excess fluid pressure ahead of the blades in such direction of rotation and acting upwardly on the lower end of the head of each auxiliary blade 25 assists in maintaining sealing contacts between it and the cylinder. Thus the rotor of the pump or engine herein disclosed is reversible while the cylinder 10 remains in any set position and without arranging the main blades 14 in oppositely directed pairs.

The cylinder in the construction shown in Figure 1 is displaceable relatively to the rotor axis and housing along the vertical diameter for which purpose it is guided by the abovementioned radially projecting guide elements 17 and accommodating sockets 18. Each of these sockets 18 communicates with one of the spaces 16 by means of grooves 17' formed either in the guide elements or in the wall of the socket to permit of the displacement of fluid to and from the sockets when the cylinder is moved.

It will be evident also that the fluid pressures inside and outside the cylinder are substantially balanced.

Thus when the device is used as a pump, the rotor may be driven in either direction and the direction in which the liquid is pumped may be reversed (without changing the direction of rotation of the rotor) by displacing the cylinder within the casing. Similarly when the apparatus is used as a motor the direction of rotation of the rotor may be reversed either by reversing the direction of flow of the liquid supplied thereto or by displacing the cylinder.

Such apparatus finds many useful applications as variable speed power transmission mechanism as well as for other purposes.

In the modified construction shown in Figure 5, the auxiliary sealing member constitutes a

blade 27 slidably received in and projecting outwardly from a transverse slot in the head of the pivoted main blade 14 and urged into sealing contact with the cylinder by a plurality of springs, as 28. The convex outer face 14^2 of the head of the main blade is provided with an outward projection 14' which engages the cylinder at a position outwardly of the arc 21 produced from said convex outer face, while the free end of the auxiliary blade 27 engages the cylinder inwardly of the said arc as clearly shown.

I claim:

1. A rotary pump or fluid motor comprising a cylinder having inlet and outlet ports for fluid, a rotor therein, at least one depressible main impeller member on the rotor, mechanical means forming a substantially fluid tight seal between said main impeller member and the rotor, a transverse surface on said impeller member for frictional sealing engagement with the inner periphery of the cylinder, a depressible auxiliary impeller member movable relatively to and arranged at one side of said main impeller member for fluid displacement cooperation with the main impeller at all times irrespective of direction of rotation of the rotor, a transverse cylinder sealing surface on said auxiliary impeller member, and mechanical means forming a substantially fluid-tight seal between said main and auxiliary impeller members whereby pressure of the fluid passing about the rotor will tend to maintain the transverse surface of said main impeller member in frictional sealing engagement with the inner periphery of the cylinder when the rotor is turned in one direction and whereby the transverse cylinder sealing surface of the auxiliary impeller member is maintained in frictional sealing engagement with the cylinder when the rotor is turned in the opposite direction.

2. A rotary pump or fluid motor comprising a cylinder having inlet and outlet ports for fluid, a rotor therein, at least one depressible main impeller blade on the rotor, sealing means between the blade and the rotor, a transverse surface on said main blade for frictional sealing engagement with the inner periphery of the cylinder, means pivotally connecting said blade to said rotor about a transverse axis spaced from the blade in the peripheral direction of the rotor, an auxiliary impeller member movable relatively to and arranged at one side of said main blade for fluid displacement cooperation with the main blade at all times irrespective of the direction of rotation of the rotor, a transverse cylinder sealing surface on said auxiliary impeller member, and mechanical means forming a substantially fluid-tight seal between the auxiliary impeller member and the main impeller blade whereby pressure of the fluid will tend to maintain the transverse surface of said main impeller blade in frictional sealing engagement with the inner periphery of the cylinder when the rotor is turned in one direction and whereby the transverse cylinder sealing surface of the auxiliary impeller member is maintained in frictional sealing engagement with the cylinder when the rotor is turned in the opposite direction.

3. A rotary pump or fluid motor comprising a cylinder having inlet and outlet ports for fluid, a rotor therein, at least one main depressible impeller blade on the rotor, at least one arm on one side of said main blade, means pivotally connecting said arm to the rotor about a transverse axis spaced from said blade in the peripheral direction of the rotor, a transverse surface on said main blade for fluid-tight sealing engagement with the inner periphery of the cylinder, interengaging surfaces maintaining a substantially fluid-tight seal between one side of said main blade and the adjacent part of the rotor, an auxiliary depressible impeller member arranged at one side of said main impeller blade, means providing interengaging fluid sealing surfaces between said auxiliary impeller member and said main impeller blade and a transverse surface on said auxiliary impeller member for sealing engagement with the inner periphery of the cylinder and wherein an arc struck from the pivotal axis of said arm on the main impeller blade and produced from said interengaging sealing surfaces between the main impeller blade and the rotor passes between said transverse cylinder-sealing surfaces on said main impeller blade and said auxiliary impeller member respectively.

4. A rotary pump or fluid motor comprising a cylinder having inlet and outlet ports for fluid, a rotor therein, at least one depressible main impeller blade on the rotor, at least one arm on one side of the blade, means pivotally connecting said arm to the rotor about a transverse axis spaced from said main blade in the peripheral direction of rotor, a transverse surface on said main blade for frictional sealing engagement with the inner periphery of the cylinder, interengaging surfaces maintaining a substantially fluid-tight seal between one side of said main blade and the adjacent part of the rotor, a depressible auxiliary impeller member arranged at one side of said transverse surface on said impeller blade and arranged between the latter and the pivotal axis thereof, means providing interengaging fluid sealing surfaces between said auxiliary impeller member and said main impeller blade, a transverse surface on said auxiliary member for frictional sealing engagement with the inner periphery of the cylinder and wherein an arc struck from the pivotal axis of said arm on the main impeller blade and produced from said interengaging sealing surfaces between the main impeller blade and the rotor passes between said transverse cylinder sealing surfaces on said main impeller blade and said auxiliary impeller member respectively.

5. A rotary pump or fluid motor comprising a cylinder having inlet and outlet ports for fluid, a rotor therein, at least one main depressible impeller blade on the rotor, at least one arm on one side of said main blade, means pivotally connecting said arm to the rotor about a transverse axis spaced from said main blade in the peripheral direction of the rotor, a transverse surface on said main blade for frictional sealing engagement with the inner periphery of the cylinder, interengaging surfaces maintaining a fluid tight seal between one side of said main blade and the adjacent part of the rotor, resilient means arranged to urge said main impeller blade outwardly toward and into frictional sealing engagement with the cylinder, an auxiliary depressible impeller member arranged at one side of said main impeller blade, means providing interengaging fluid sealing surfaces between said auxiliary impeller member and said main impeller blade and a transverse surface at the outer end of said auxiliary impeller member for frictional sealing engagement with the inner periphery of the cylinder, and wherein an arc struck from the pivotal axis of said arm on the main impeller blade and produced from said interengaging sealing surfaces between the main impeller blade and the rotor passes between said transverse cylinder-

sealing surfaces on said main impeller blade and said auxiliary impeller member respectively.

6. A rotary pump or fluid motor comprising a cylinder having inlet and outlet ports for fluid, a rotor therein, at least one main depressible impeller blade on the rotor, at least one arm on one side of said main blade, means pivotally connecting said arm to the rotor about a transverse axis spaced from said main blade in the peripheral direction of the rotor, a transverse surface on said main blade for sealing engagement with the inner periphery of the cylinder, interengaging surfaces maintaining a substantially fluid-tight seal between one side of said main blade and the adjacent part of the rotor, resilient means arranged to urge said main impeller blade outwardly toward and into frictional sealing engagement with the cylinder, an auxiliary depressible impeller member arranged at one side of said main impeller blade, means providing interengaging fluid sealing surfaces between said auxiliary impeller member and said main impeller blade, a transverse surface at the outer end of said auxiliary impeller member for frictional sealing engagement with the inner periphery of the cylinder, and resilient means arranged to urge said auxiliary impeller member outwardly toward and into contact with the cylinder, and wherein an arc struck from the pivotal axis of said arm on the main impeller blade and produced from said interengaging sealing surfaces between the main impeller blade and the rotor passes between said transverse cylinder-sealing surfaces on said main impeller blade and said auxiliary impeller member respectively.

7. A rotary pump or fluid motor comprising a cylinder having inlet and outlet ports for fluid, a rotor therein, at least one depressible main impeller blade on the rotor, at least one arm on one side of the blade, means pivotally connecting said arm to the rotor about a transverse axis spaced from said main blade in the peripheral direction of the rotor, a transverse surface on said main blade for sealing engagement with the inner periphery of the cylinder, interengaging surfaces maintaining a fluid seal between one side of said main blade and the adjacent part of the rotor, said interengaging surfaces being arranged at the opposite side of said main blade to the pivotal axis thereof, a depressible auxiliary impeller member arranged between the impeller blade and the pivotal axis thereof, means providing interengaging fluid sealing surfaces between said auxiliary impeller member and said main impeller blade, a transverse surface at the outer end of said auxiliary member for frictional sealing engagement with the inner periphery of the cylinder and characterised in that an arc struck from the pivotal axis of said arm on the main impeller blade and produced from said interengaging sealing surfaces between the main impeller blade and the rotor passes between said transverse cylinder sealing surfaces on said main impeller blade and said auxiliary impeller member respectively.

8. A rotary pump or fluid motor comprising a cylinder having inlet and outlet ports, a rotor therein, a plurality of depressible main impeller blades on the rotor, at least one arm projecting from one face of each impeller blade, means pivotally connecting each arm to the rotor about a transverse axis at a position spaced from the respective main impeller blade in the peripheral direction of the rotor, interengaging surfaces forming a substantially fluid-tight seal between the outer face of each main impeller blade and the adjacent portion of the rotor, a transverse cylinder sealing surface on each main impeller blade, an auxiliary depressible impeller blade associated with each main impeller blade and arranged between the said cylinder-sealing surface of the blade and the pivotal axis thereof, means forming a substantially fluid-tight seal between each auxiliary blade and the coacting main blade, a transverse cylinder sealing surface on each auxiliary blade, and resilient means urging said main and auxiliary blades outwardly toward and into contact with the inner periphery of the cylinder and characterised in that an arc struck from the pivotal axis of the arm on each main blade and produced from said interengaging surfaces between it and the rotor passes between the said transverse cylinder-sealing surfaces on said main blade and the associated auxiliary blade.

9. A rotary pump or fluid motor comprising a cylinder having inlet and outlet ports therein for fluid, a rotor therein, a plurality of spaced depressible main impeller blades on the rotor, at least one arm on one side of each main blade, means pivotally connecting each arm to the rotor about a transverse axis spaced from the respective main blade in the peripheral direction of the rotor, a transverse surface on each main blade for sealing engagement with the inner periphery of the cylinder, interengaging surfaces maintaining a substantially fluid-tight seal between one side of each main blade and the adjacent part of the rotor, a plurality of spaced depressible auxiliary impeller blades one associated with each main blade, each said auxiliary impeller blade arranged for fluid-tight sealing engagement with the respective main impeller blade and arranged between the latter and the pivotal axis thereof, means pivotally connecting each auxiliary impeller blade to the rotor about the same axis as the coacting main impeller blade, a transverse surface on each auxiliary impeller blade for fluid-tight sealing engagement with the inner periphery of the cylinder, and means resiliently urging said main and auxiliary impeller blades into fluid-tight sealing engagement with the cylinder, each coacting pair of main and auxiliary impeller blades being so arranged that an arc struck from the common pivotal axis thereof and produced from said interengaging sealing surfaces between the main impeller blade and the rotor passes between said transverse cylinder sealing surfaces on said main and auxiliary impeller blades respectively.

10. A rotary pump or fluid motor comprising a cylinder having inlet and outlet ports for fluid, a rotor therein, a plurality of spaced depressible main impeller blades on the rotor, at least one arm on one side of each main blade, means pivotally connecting each arm to the rotor about a transverse axis spaced from the respective main blade in the peripheral direction of the rotor, a transverse surface on each main blade for frictional sealing engagement with the inner periphery of the cylinder, a movable transversely arranged sealing member interposed between one face of each main impeller blade and the rotor, resilient means urging each said sealing member in such direction that the outer edge thereof maintains a fluid seal between the rotor and the coacting main impeller blade, a plurality of spaced depressible auxiliary impeller blades one associated with each main blade, each said auxiliary impeller blade arranged for frictional sealing engagement with the respective main im-

peller blade and arranged between the latter and the pivotal axis thereof, means pivotally connecting each auxiliary impeller blade to the rotor about the same axis as the coacting main impeller blade, a transverse surface on each auxiliary impeller blade for frictional sealing engagement with the inner periphery of the cylinder, and means resiliently urging said main and auxiliary impeller blades into frictional sealing engagement with the cylinder, each coacting pair of main and auxiliary impeller blades being so arranged that an arc struck from the common pivotal axis thereof and produced from said outer edge of the coacting transversely arranged sealing member passes between said transverse cylinder sealing surfaces on said main and auxiliary impeller blades.

11. A rotary pump or fluid motor comprising a cylinder having inlet and outlet ports for fluid, a rotor therein, a plurality of main depressible impeller blades on the rotor, means pivotally connecting each main impeller blade to the rotor about a transverse axis spaced from the respective main blade in the peripheral direction of the rotor, a transverse surface on each main blade for frictional sealing engagement with the inner periphery of the cylinder, a plurality of transverse sealing strips, one of said sealing strips being slidably mounted in the rotor at one side of each main impeller blade, resilient means urging each sealing strip into frictional sealing engagement with the adjacent side of the respective main impeller blade, a plurality of auxiliary depressible impeller members, one such auxiliary member being arranged at one side of the transverse cylinder-sealing surface and in frictional engagement with each main impeller blade, and a transverse surface on each auxiliary impeller member for frictional sealing engagement with the inner periphery of the cylinder and characterised in that an arc struck from the pivotal axis of each main impeller blade and produced from that face thereof which is engaged by the coacting sealing strip passes between said transverse cylinder-sealing surfaces on said main impeller blade and the coacting auxiliary impeller member.

12. A rotary pump or fluid motor comprising a cylinder having inlet and outlet ports for fluid, a rotor therein, a plurality of spaced depressible main impeller blades on the rotor, at least one arm on one side of each main blade, means pivotally connecting each arm to the rotor about a transverse axis spaced from the respective main blade in the peripheral direction of the rotor, a transverse surface on each main blade for fluid-tight sealing engagement with the inner periphery of the cylinder, interengaging surfaces maintaining a substantially fluid-tight seal between one side of each main blade and the adjacent part of the rotor, a depressible auxiliary impeller blade slidably mounted in each main blade and forming a fluid-tight seal therewith, a transverse surface on each auxiliary impeller blade for fluid-tight sealing engagement with the inner periphery of the cylinder, and means resiliently urging said main and auxiliary impeller blades into sealing engagement with the cylinder, each coacting pair of main and auxiliary impeller blades being so arranged that an arc struck from the pivotal axis of the arm of the respective main blade and produced from said interengaging sealing surfaces between the latter and the rotor passes between said transverse cylinder-sealing surfaces on said main and auxiliary impeller blades.

13. A rotary pump or fluid motor comprising a cylinder having inlet and outlet ports therein, a rotor therein, a plurality of spaced depressible main impeller blades on the rotor, at least one arm on one side of each main blade, means pivotally connecting each arm to the rotor about a transverse axis spaced from the respective main blade in the peripheral direction of the rotor, a transverse surface on each main blade for frictional sealing engagement with the inner periphery of the cylinder, each main impeller blade having an arcuate outer face concentric with the pivotal axis thereof, a plurality of transverse sealing strips slidably mounted on edge in the rotor, one such sealing strip being arranged outwardly of each main impeller blade, resilient means urging the outer edge of each sealing strip into frictional sealing contact with the arcuate outer face of the corresponding main blade, a plurality of spaced depressible auxiliary impeller blades one associated with each main blade, each said auxiliary impeller blades being arranged between the respective main impeller blade and the pivotal axis of the latter, means pivotally connecting each auxiliary impeller blade to the rotor about the same axis as the coacting main impeller blade, a transverse surface on each auxiliary impeller blade for frictional sealing engagement with the inner periphery of the cylinder, means forming a substantially fluid-tight seal between each auxiliary impeller blade and the coacting main impeller blade, and means resiliently urging said main and auxiliary impeller blades into frictional sealing engagement with the cylinder, each coacting pair of main and auxiliary impeller blades being so arranged that an arc struck from the common pivotal axis thereof and produced from the arcuate outer face of the respective main impeller blade passes between said transverse cylinder sealing surface on said main and auxiliary impeller blades.

14. A rotary pump or fluid motor comprising a cylinder having inlet and outlet ports for fluid, a rotor therein, a plurality of spaced depressible main impeller blades on the rotor, means pivotally connecting each main blade to the rotor about a transverse axis spaced therefrom in the peripheral direction of the rotor, a transverse surface on each main blade for frictional sealing engagement with the inner periphery of the cylinder, interengaging surfaces maintaining a substantially fluid-tight seal between the rotor and that side of each main blade which is remote from the pivotal axis thereof, a plurality of spaced depressible auxiliary impeller blades one associated with each main blade and arranged between the latter and the pivotal axis thereof, means pivotally connecting each auxiliary impeller blade to the rotor about the same axis as the coacting main impeller blade, a transverse surface on each auxiliary impeller-blade for frictional sealing engagement with the inner periphery of the cylinder and interengaging surfaces maintaining a substantially fluid-tight seal between the outer face of each auxiliary impeller blade and the adjacent inner face of the coacting main impeller blade, each corresponding pair of main and auxiliary impeller blades being so arranged that an arc struck from the common pivotal axis thereof and produced from said interengaging sealing surfaces between the respective main impeller blade and the rotor passes between said transverse cylinder sealing surfaces on said main and auxiliry impeller blades.

15. A rotary pump or fluid motor according to

claim 14 wherein said interengaging fluid sealing surfaces between each main impeller blade and the rotor, comprises an arcuate outer face on said main impeller blade for frictionally engaging the inner periphery of the cylinder, a transverse sealing strip arranged on edge and slidably mounted in the rotor and including resilient means urging each said sealing strip into contact with said arcuate outer face on the corresponding main impeller blade.

16. A rotary pump or fluid motor according to claim 14 wherein said interengaging fluid sealing surfaces between each coacting pair of main and auxiliary impeller blades comprises an arcuate face on one of said blades, a transverse sealing strip arranged on edge and slidably mounted in the other blade and including resilient means urging the outer edge of each such sealing strip into engagement with said adjacent arcuate face on the coacting blade.

17. A rotary pump or fluid motor according to claim 12 wherein each auxiliary impeller member is arranged between said cylinder-sealing surface on the corresponding main blade and the pivotal axis of the latter, and wherein the outer face of each said main blade is concentric with the respective pivotal axis and constitutes one of said interengaging sealing surfaces, a transverse sealing strip arranged on edge and slidably mounted in the rotor outwardly of the arcuate outer face of each main blade, and resilient means urging each sealing strip into sealing contact with said arcuate outer face of the corresponding main blade.

18. A rotary pump or fluid motor comprising a cylinder having inlet and outlet ports for fluid, a rotor therein, at least one composite impeller on said rotor, said composite impeller comprising a depressible main impeller blade, sealing means between said blade and an adjacent portion of the rotor and a depressible auxiliary impeller member arranged at one side of said main impeller blade, a transverse surface on said main blade for fluid-tight sealing engagement with the inner periphery of the cylinder, means pivotally connecting said main blade to said rotor about a transverse axis spaced from said main blade in the peripheral direction of the rotor, a transverse cylinder sealing surface at the outer end of said auxiliary impeller member and interengaging relatively slidable sealing means on said main impeller blade and said auxiliary impeller member whereby the pressure of the fluid will tend to maintain said main impeller blade in fluid-tight sealing engagement with the inner periphery of the cylinder when the rotor is turned in one direction and whereby the auxiliary impeller member is maintained in sealing engagement with the cylinder when the rotor is turned in the opposite direction.

R. MOORE.

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