

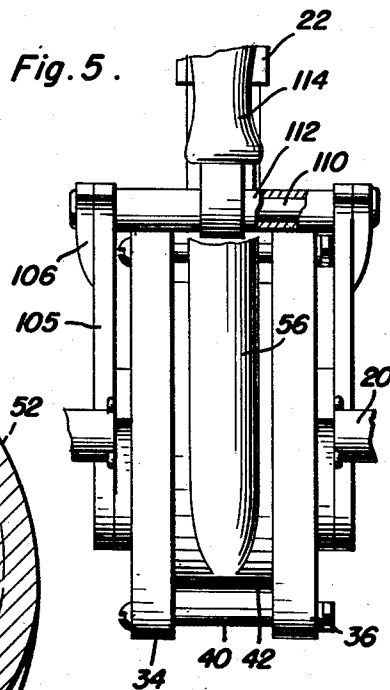
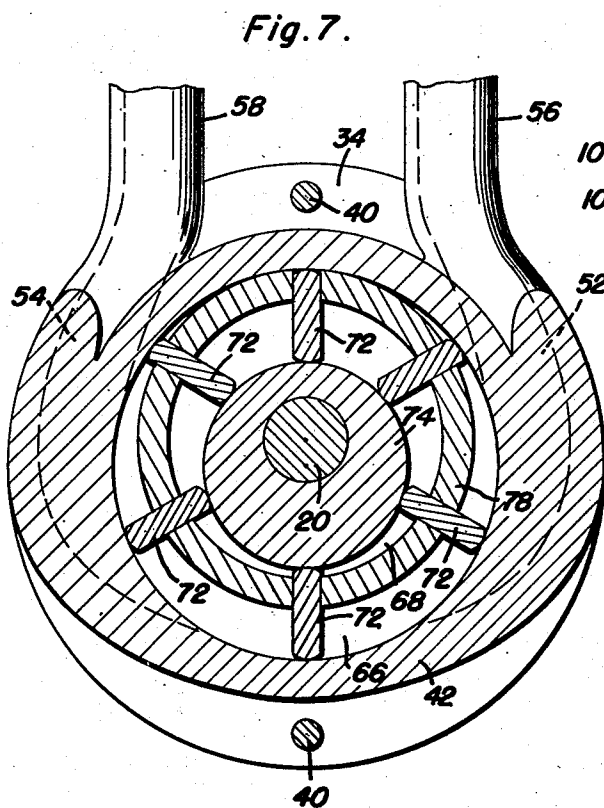
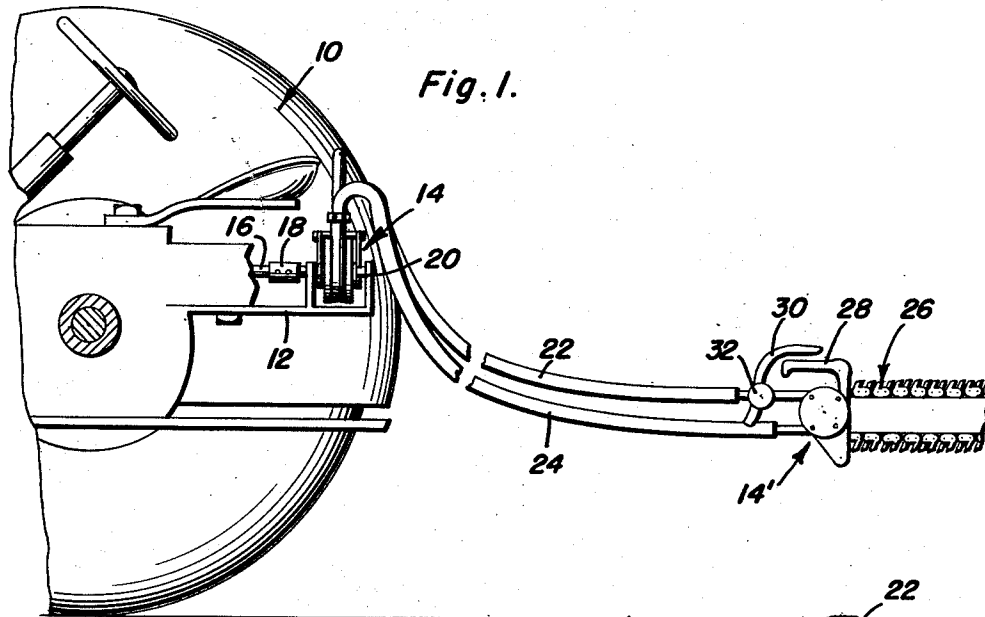
July 21, 1953

L. R. BERGEN
FLUID MOTOR OR PUMP

2,646,004

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3 Sheets-Sheet 1



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Fig. 2.

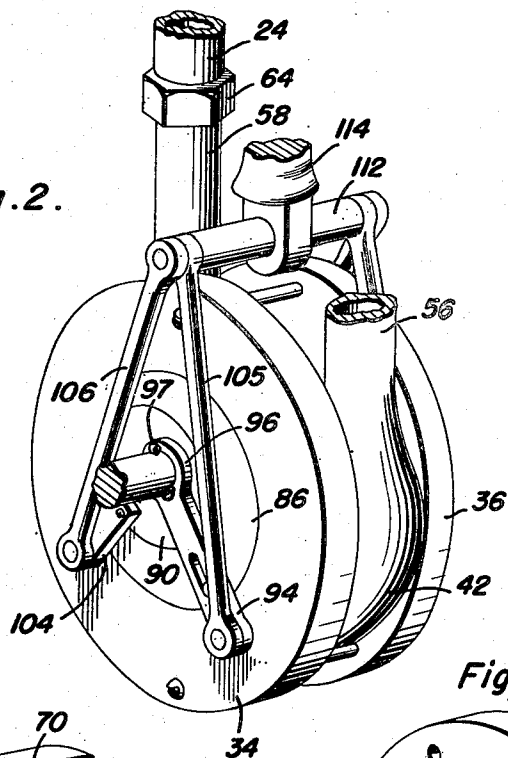


Fig. 8.

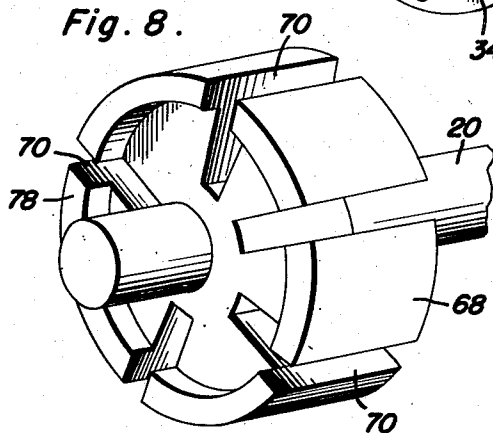


Fig. 9.

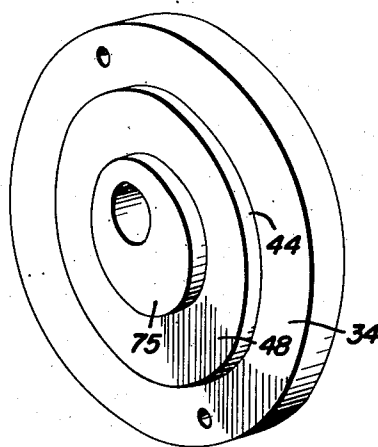
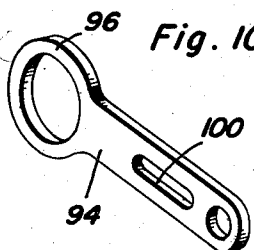


Fig. 10.



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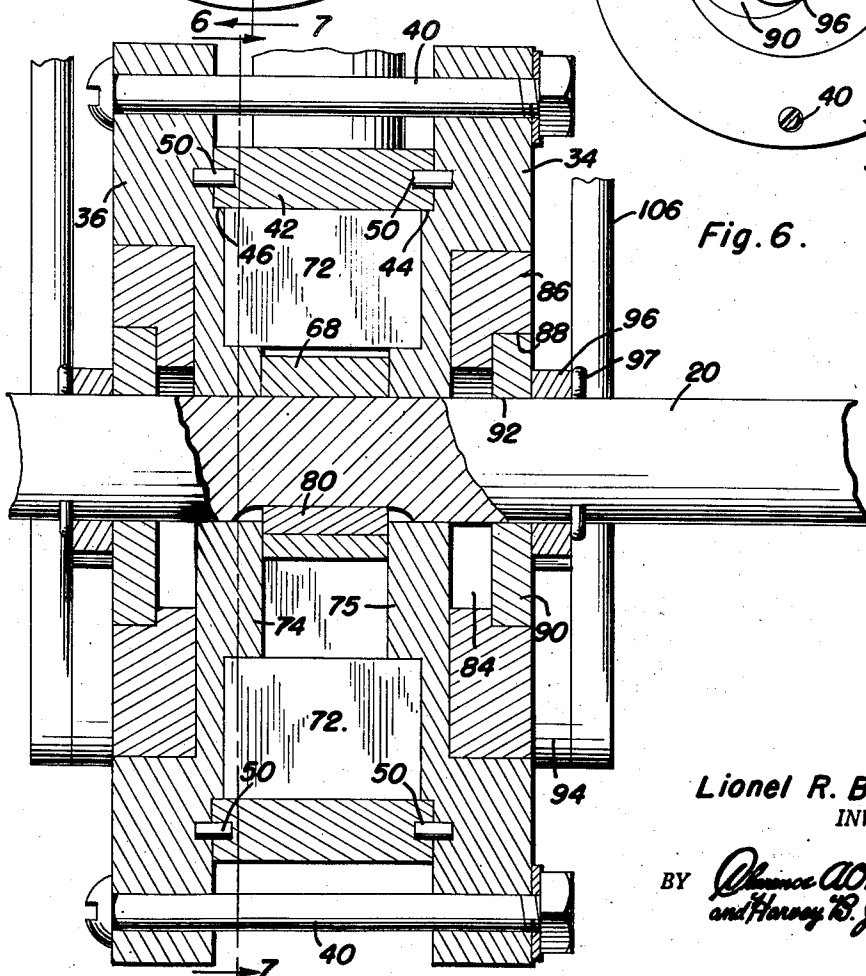
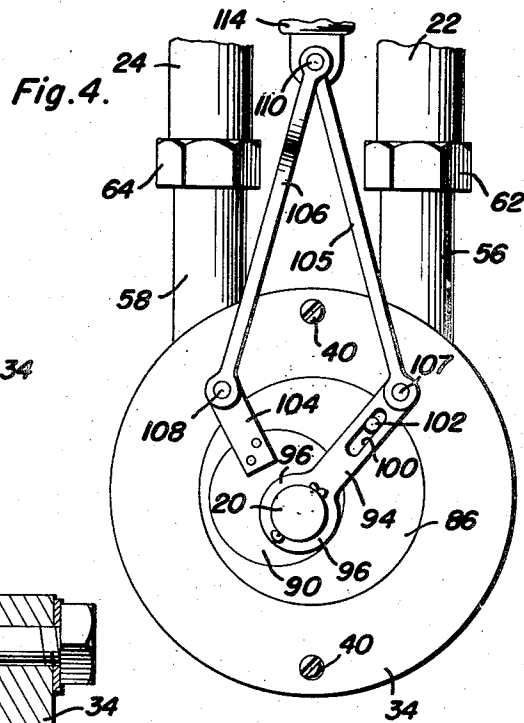
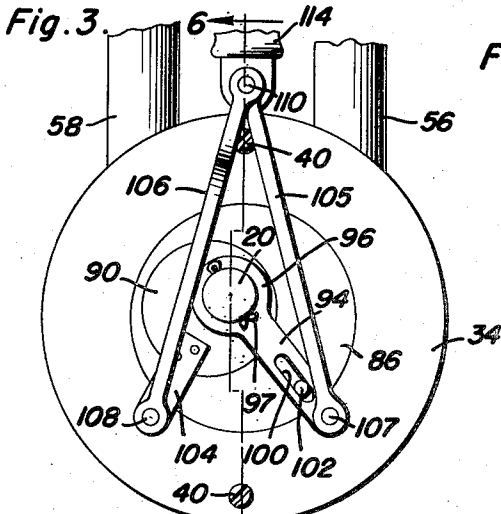
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3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

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FLUID MOTOR OR PUMP

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1 Claim. (Cl. 103—120)

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This invention relates to novel and useful improvements in combination motor and pump devices.

An object of this invention is to provide an improved mechanical device capable of use as a motor or as a pump depending upon whether torque is delivered to or from the shaft of the device.

Another object of this invention is to incorporate in the device an arrangement whereby upon manipulation of control levers, the casing of the device is laterally displaced relative to the axis of rotation of the shaft of the device so that the delivery of torque from the shaft of the device is capable of being varied from maximum to zero and then to reverse direction.

Other objects and features will become apparent in following the description of the illustrated form of the invention.

In the drawings:

Figure 1 is a fragmentary and largely schematic view of a suggested use of two of the devices, employing the power take-off of a tractor to operate one of the devices as a pump and employing another of the devices as a motor which, in turn operates a saw;

Figure 2 is a perspective view of the device;

Figure 3 is an end view of the device showing the controls in one position;

Figure 4 is an end view of the device showing the controls in another position;

Figure 5 is a side view of the device in Figure 3, portions being broken away in section to illustrate detail of construction;

Figure 6 is an enlarged view taken substantially on the line 6—6 of Figure 3 and in the direction of the arrows;

Figure 7 is a view taken substantially on the line 7—7 of Figure 6 and in the direction of the arrows;

Figure 8 is a perspective view of the rotor;

Figure 9 is a perspective view of one of the end plates showing the arrangement of cams therein; and

Figure 10 is a perspective view of one of the control links suggested for employment with the device and forming a part of the means for laterally displacing the casing relative to the axis of the shaft.

In Figure 1 there is illustrated a conventional tractor generally indicated at 10 fragmentarily, the tractor showing one suggested use of the invention. Fixed to a mounting bracket 12 is one of the combination motor and pump devices generally indicated at 14 which in this in-

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stance is acting in the nature of a pump inasmuch as power is delivered from the power take-off shaft 16 of the tractor 10 to the shaft 20 of the device. The power take-off shaft 16 of the tractor 10 is connected by means of a coupling 18 with the shaft 20 of the device.

A pair of conduits 22 and 24, respectively, extend from the device 14 and terminate in the device generally indicated at 14'. The device at 14' is operatively connected with a chain saw 26 and has a slightly different housing thereon, from the housing indicated at 14. A hand rest 28 forming a part of the saw passes over top of the housing for facility of operating the valve handle 30. The valve 32 is conventional in nature connecting the lines 22 and 24 so that the direction of fluid may be controlled by the valve 32. This is merely one suggested use of an adaptation of the device and the special arrangement shown at 14' is but one suggested employment thereof.

Referring to Figure 6 the specific structure of the combination motor and pump device is most clearly evident. An end plate 34 is connected to another end plate 36 by means of bolts 40. Any number of such bolts may be employed, as dictated by design principles. An annular center section 42 is disposed between the end plates 34 and 36 abutting the shoulders 44 and 46 which are formed respectively integral with the end plates 34 and 36. These shoulders are formed by the raised portions, one of which is indicated in Figure 9 at 48. Centering pins 50 are employed for connecting the center section 42 with the end plates 34 and 36. The end plates 34, 36 and center section 42 form the casing of the device.

Fluid inlet and outlet passages 52 and 54 are formed in the center section 42 and have conduits 56 and 58 extending therefrom at diametrically opposite sides thereof, to which are attached the couplings 62 and 64. The conduits or hoses 22 and 24 are connected with said conduits 56 and 58 by means of these couplings or other analogous ones.

The fluid inlet and outlet passages 52 and 54 open into the circular fluid chamber 66 which is defined by the center section 42 and the end plates 34, 36.

Reference to Figure 8 shows a part of the rotor construction. The hub 68 is supplied with radially disposed slots 70, which accommodate the vanes 72. These vanes have rounded outer and inner end surfaces which are adapted to slide on the inside surface of the center section 42 and

on cams 74, 75 integrally formed with the end plates 36, 34.

Each face of the rotor hub 68 has a flange 78 around the periphery thereof through which the vanes 72 are operable. The hub 68 is keyed as at 80 to the shaft 20 so that whether power is either delivered to the shaft 20 or delivered from the shaft 20, the hub moves with the shaft in a rotative manner.

From the above described structure, operation of the device as either a motor or a pump is manifest. If the shaft 20 is mounted in a suitable bearing at each end and passed through the two end plates 34 and 36 with the rotor disposed in the fluid chamber 66, fluid passing into the conduit 56 under pressure causes the rotor to operate and the fluid is exhausted through the conduit 58. Of course, the reverse is true in so far as flow direction is concerned. If power is delivered to the shaft 20, fluid may be urged either from or into the conduit 56 and the same holds true for the conduit 58.

By displacing the casing, that is, the end plates 34, 36 and the center section 42, laterally with respect to the axis of rotation of the shaft 20, the center of rotation of the rotor hub 68 is displaced as, for example, to the right or to the left or upwardly or downwardly. Assuming that fluid is entering the conduit 56 (Figure 7) and the rotor in the position of adjustment as shown, the device will operate as a pump and at a predetermined pumping capacity. By shifting the casing to the right with respect to Figure 7 the fluid quantity at the inlet is larger but the fluid quantity at the outlet is smaller (with respect to capability of the pump). Hence, the pump will deliver less fluid per revolution thereby decreasing the amount of fluid delivered. The same is true of motor operation, power being applied to the shaft 20 to cause the rotor to be operated.

The instant device has means for laterally displacing the casing to cause this operation. Various adaptations of this particular means may be arrived at. However, it is suggested that each end plate be supplied with an identical structure. The end plate 34 is provided with a recess 84. A disk 86 having a central opening 88 is disposed therein. The disk 86 is capable of rotation in the recess 84, while an eccentric 90 is mounted for rotation in the opening 88. This eccentric has an aperture 92 off-centered and formed therein accommodating the shaft 20. An identical structure is provided for the end plate 36.

Means for rotating the eccentric 90 with respect to the disk 86 is supplied. This means may take the form of a pair of arms. The arms 94 have a bearing 96 at one end encircling the shaft 20 and held in place by a conventional pin 97. The arm 94 is provided with a slot 100 through which the pin 102 is operable. The pin is fixed to the disk 86 so that when the arm is rotated about the shaft 20 as an axis, the pin is slid in the slot 100 causing simultaneous rotation of the disk 86.

An arm 104 is fixed to the eccentric 90 by any suitable means. Both the arm 94 and the arm 104 are adapted for simultaneous operation. The means illustrated in Figures 3, 4 and 5 show this simultaneous operation means. A pair of links 105 and 106, respectively, are pivoted at their lower ends by pivot pins 107 and 108 to the arms 94, 104, respectively, and are mounted in a pivotal fashion on the pin 110. This pin is carried by the sleeve 112 which is concentrically arranged with respect to the pin 110. A handle 114 is secured to the sleeve 112 so that by lifting or in some manner pushing or pulling, the links are caused to spread apart or be contracted and thus operated to positions as shown in Figures 3 and 4 or other intermediate positions. This operation results in rotation of the eccentric 90 and rotation of the disk 86 which is reflected directly in lateral displacement of the casing of the device with respect to the axis of rotation of the shaft 20, causing the hub 68 to be displaced in the pump chamber.

Having described the invention, what is claimed as new is:

A combination motor or pump comprising a casing which includes a pair of end plates with an annular center section disposed between said plates, said end plates having openings therein, a fluid chamber between said end plates and inside said center section fluid inlet and outlet members in said section communicating with said chamber, a shaft passed through said openings, a hub fixed to said shaft and having radially disposed slots, sliding vanes in said slots and engaging the inside surface of said section, an internal cam secured to each of said end plates and engaged by said vanes, and means mounting said shaft in the openings of said end plates and for mounting said casing relative to said shaft for displacement to shift the relative position of the axis of rotation of said shaft including for each plate, a disk mounted in one of the openings and having an aperture eccentric to the axis of rotation of said shaft, and an eccentric disposed in said aperture and carrying said shaft, means operatively connected with said disk and said eccentric for rotating said disk and said eccentric with respect to each other to laterally displace said casing with respect to the axis of rotation of said shaft, said disk and eccentric rotating means including an arm fixed to said eccentric, a second arm mounted rotatively at one end on said shaft, said second arm having a slot therein intermediate its ends, a pin secured to said disk and disposed in said slot, and means connected to the outer ends of said arms for simultaneously actuating said arms.

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