May 7, 1935. H. HUEBER ET AL 2,000,890

MOTOR

Filed June 7, 1932 2 Sheets-Sheet 1

Fig. 1.

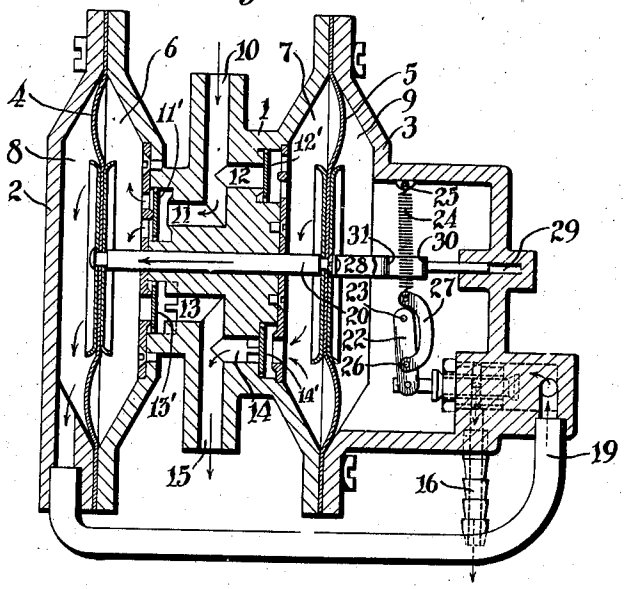


Fig. 7.

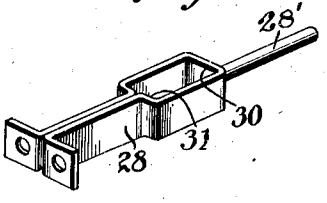


Fig. 2.

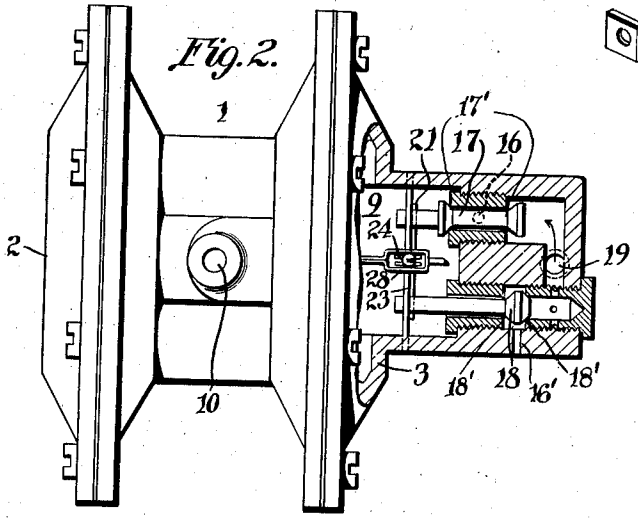
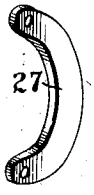


Fig. 8.



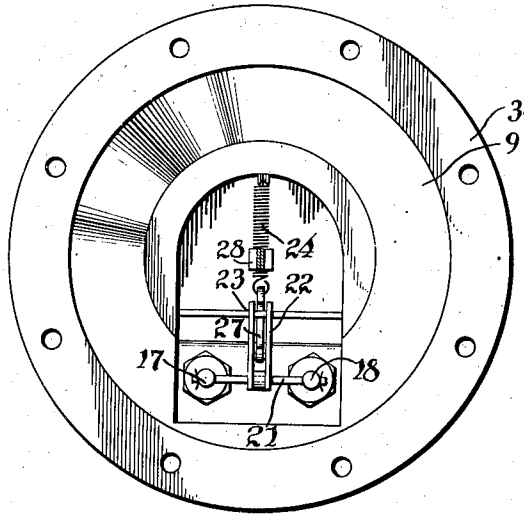
INVENTORS
Henry Hueber
BY Erwin C. Horton
Beau & Brooks. ATTORNEY

May 7, 1935. H. HUEBER ET AL 2,000,890

MOTOR

Filed June 7, 1932 2 Sheets-Sheet 2

Fig. 3.



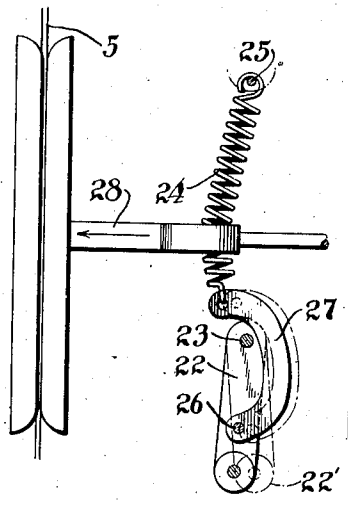


Fig. 4.

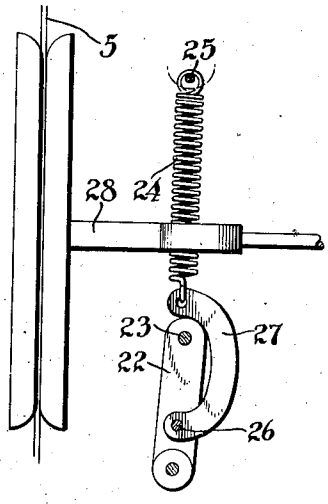


Fig. 5.

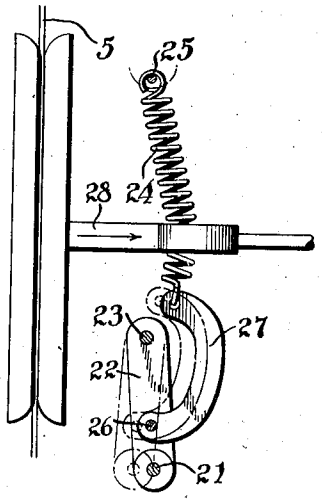


Fig. 6.

INVENTORS
Henry Hueber
BY Erwin C. Horton
Beaux & Brooks ATTORNEY

Patented May 7, 1935 2,000,890

UNITED STATES PATENT OFFICE

2,000,890

MOTOR

Henry Hueber, Buffalo, and Erwin C. Horton, Hamburg, N. Y., assignors to Trico Products Corporation, Buffalo, N. Y.

Application June 7, 1932, Serial No. 615,920

5 Claims. (Cl. 121—48)

This invention relates to a suction or fluid operated motor and to the valve mechanism for operatively applying fluid pressure thereto.

The object of the present invention is to provide an improved fluid pressure operated motor which will be more efficient in operation and more durable in construction.

In the drawings:

Fig. 1 is a longitudinal sectional view through a pump construction embodying the present invention.

Fig. 2 is an elevation thereof showing the valve mechanism in section.

Fig. 3 is an inside elevation of the valve carrying head of the motor.

Figs. 4, 5 and 6 are diagrammatic views setting forth the operation of the valve action.

Figs. 7 and 8 are perspective views of detail parts of the valve mechanism.

In accordance with the present showing the casing embodies a central or intermediate body portion 1 having heads 2 and 3 forming therewith end compartments. These heads serve to secure the peripheral portions of diaphragms 4 and 5 against the body 1, such diaphragms partitioning the end compartments into pump chambers 6 and 7 and motor chambers 8 and 9. The body portion 1 is provided with an inlet passage 10 branching through ports 11 and 12 into the pump chambers 6 and 7, the latter being provided with outlet ports 13 and 14 discharging through a common outlet passage 15, and the several ports being provided respectively with suitable valves 11', 12', 13', and 14', to direct the flow of fluid into and out of the respective chambers as is obvious from Fig. 1.

The numeral 16 designates the suction supply port or passage which is connected to a suitable source of suction, such as the intake manifold of the internal combustion engine in a motor vehicle, and this suction passage is alternately connected with the two motor chambers 8 and 9 by means of the valve member 17 alternately engaging its two seats, a second valve member 18 alternately cooperating with its pair of seats to open the unconnected chamber to the atmosphere through port 16'. The motor chamber 8 is connected by a conduit or passage 19 through seats 17' and 18' respectively engageable by the valve members 17 and 18 in such manner that said conduit alternately serves first as a suction passage and then as an atmospheric passage. The two pistons 4 and 5 are preferably of the diaphragm type and serve as the movable member of the motor in the chambers 8 and 9 and as the pumping element in the chambers 6 and 7, the two diaphragms being joined, as by a connecting rod 20, to effect movement in unison of the two diaphragms. As shown, the rod 20 is slidable through the central body portion 1 which latter serves as a guide therefor.

The two valve members 17 and 18 have outwardly extending stem parts coupled by a transverse pin 21 to one end of a lever 22 the latter being fulcrumed as at 23. Rocking of the lever 22 will move each valve member from one of its operative positions to its other operative position. Thus, in Fig. 2 the valve member 17 has closed the suction passage to the motor chamber 9 and opened the same through the conduit 19 to the motor chamber 8, while at the same time the atmosphere is in communication with the chamber 9 and closed to chamber 8.

Resilient means are provided for effecting a quick lever movement to shift the valve member from one to the other of its two positions, such resilient means being herein depicted as consisting of a spring 24 anchored at one end to a fixed part of the head 3, as at 25, and connected to the lever at a point which is movable across a dead center position or from one side of the fulcrum 23 to the opposite side. In the illustration the spring 24 has connection with the lever 22 at 26, between the fulcrum point 23 and the coupling pin 21. This connection is affected by a link 27, the latter being bowed to straddle the fulcrum pin 23.

A spring tensioning member 28 is connected to and movable by the diaphragm 5 to shift the spring 24 under tension from one side to the other of the dead center position so as to effect a quick snap-over movement of the lever. This spring tensioning member has its free outer end 28' received in a bearing 29 in head 3 for guiding support. Its intermediate portion is provided with a pair of shoulders 30 and 31 which alternately engages the spring 24 to position the same for valve shifting operation. These shoulders may be the opposite ends of an open loop through which the spring is passed, as illustrated in the drawings. The members 20 and 28 may extend along the same axis and both constitute guide members for the central portion of the diaphragm 5 so that in reality the actuator or tensioning member 28 is given sliding support at both ends or adjacent both ends to steady and guide the shoulders 30 and 31 as they act upon the spring 24.

In operation, assuming that the diaphragm 5 is moving in the direction of the arrows in Figs. 1 and 4 to expel fuel from the chamber 7 and in-

take fuel into the chamber 6, the source of suction will be connected with the chamber 8 and the atmosphere with the chamber 9. As this piston movement continues the shoulder 30 will make direct contact with the spring 24, placing the same under tension and moving the spring force laterally a sufficient extent to exert a reverse urge on the lever and thereby shift the lever 22 from the dotted position 22' to the full line position in Fig. 4. The dotted position of the link 27 indicates approximately the position to which it has been moved immediately preceding the snap-over.

On the return movement the tensioning member 28 will pass through a neutral position in which the spring will assume its normal position, as indicated in Fig. 5, following which the opposite shoulder 31 will contact with the spring and flex it in the opposite direction sufficiently to effect a shifting of the lever 22, as indicated in Fig. 6.

On both strokes, the moving or actuating pressure for the valve mechanism is applied to the spring 24 and thereby a cushioning action is obtained, the tension in which is gradually increased throughout the extent of movement of the member 28.

What is claimed is:

1. A fluid motor comprising a casing having end compartments with an intermediate body portion, each compartment being partitioned by a diaphragm to define a motor chamber, inlet and outlet ports for the chambers, a connecting rod between the two diaphragms guidingly supported in the intermediate body portion, a rigid member extending from the outer side of one of the diaphragms substantially axially of the connecting rod, said rigid member having its free end guidingly supported in the end wall of said casing whereby the attached diaphragm is guidingly supported at its opposite sides by said rod and said rigid member, said rigid member and said connecting rod being rigidly fixed to said attached diaphragm, and automatic valve mechanism operable by said rigid member for operatively admitting fluid to said motor chambers.

2. A valve action for fluid motors wherein a piston is reciprocated back and forth by a reversal of the pressure differential, comprising valve means for alternately connecting the fluid pressure first to one side of the piston and then to the opposite side thereof, a lever rockable back and forth from one to the other of two positions operatively connected to said valve means, a spring anchored at one end at a point spaced from the lever and having its opposite end connected to the lever for movement from one side to the other side of the lever fulcrum, and means fixed to said piston and engaging the spring for bowing the latter from one side to the other side of said lever fulcrum to reverse the resilient urge of said spring on said lever.

3. A valve action for fluid motors wherein a piston is reciprocable in a chamber by the reverse applications of fluid pressure comprising valve means movable from one to the other of two positions for operatively admitting fluid into the chamber first at one side of the piston and then the opposite side thereof, a lever pivotally mounted at one end and having its opposite end connected to the valve means, resilient means connected at one end to the lever and anchored at its opposite end, said resilient means movable back and forth under tension to opposite sides of the pivotal mounting of the lever to shift said valve means from one of its positions to its other position and an actuator operable by the piston and directly engaging said resilient means so as to move the latter, said actuator being in the adjacent end wall portion of the chamber for moving the resilient means.

4. A valve action for fluid motors wherein a piston is reciprocable within a chamber by the reverse applications of fluid pressure thereto, comprising valve means movable from one to the other of two positions for operatively admitting fluid first to one side of the piston and then to the opposite side thereof, a lever pivotally mounted at one end and having its opposite end connected to the valve means, resilient means suspending one end of the lever and anchored at its opposite end, said resilient means movable back and forth under tension to opposite sides of the pivotal mounting of the lever to shift said valve means from one of its positions to its other position, and an actuator operable by the piston and engaging said resilient means to move the same by and during movement of the piston.

5. A valve action for fluid motors wherein a piston is reciprocable in a chamber by the reverse applications of fluid pressure comprising valve means movable from one to the other of two positions for operatively admitting fluid into the chamber first at one side of the piston and then the opposite side thereof, a shiftable member connected to the valve means for shifting the same, resilient means connected at one end to the shiftable member and anchored at its opposite end, said resilient means movable back and forth under tension between two operative positions for actuating said shiftable member to shift said valve means from one of its positions to its other position, and an actuator operable by the piston and directly engaging said resilient means to so move the latter.

HENRY HUEBER.
ERWIN C. HORTON.

Patent No. 2,000,890. May 7, 1935.

HENRY HUEBER, ET AL.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 2, second column, line 20, claim 3, after "being" insert the word guided; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 18th day of June, A. D. 1935.

Leslie Frazer

(Seal) Acting Commissioner of Patents.