H. A. ADAMS.

OSCILLATING MOTOR.

APPLICATION FILED OCT. 21, 1909.

973,400. Patented Oct. 18, 1910.

2 SHEETS—SHEET 1.

Fig. 1.

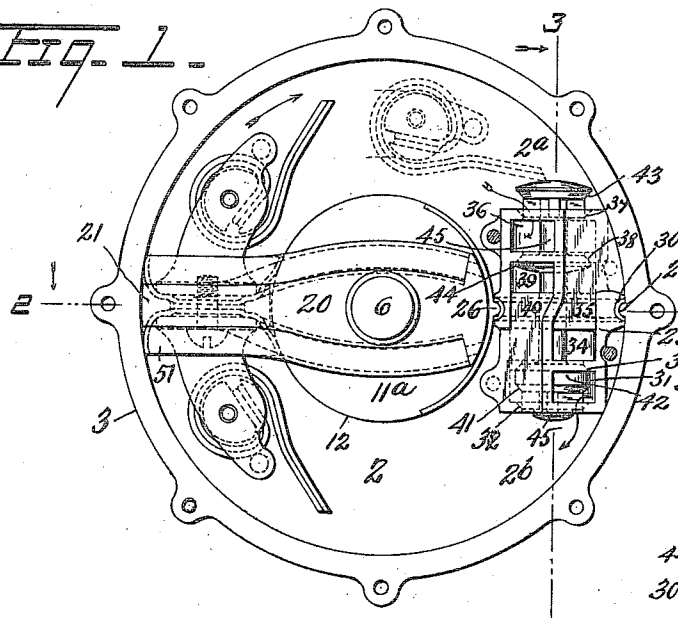


Fig. 12.

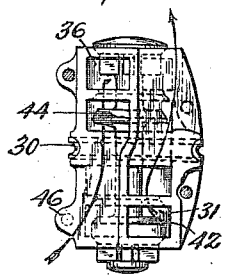
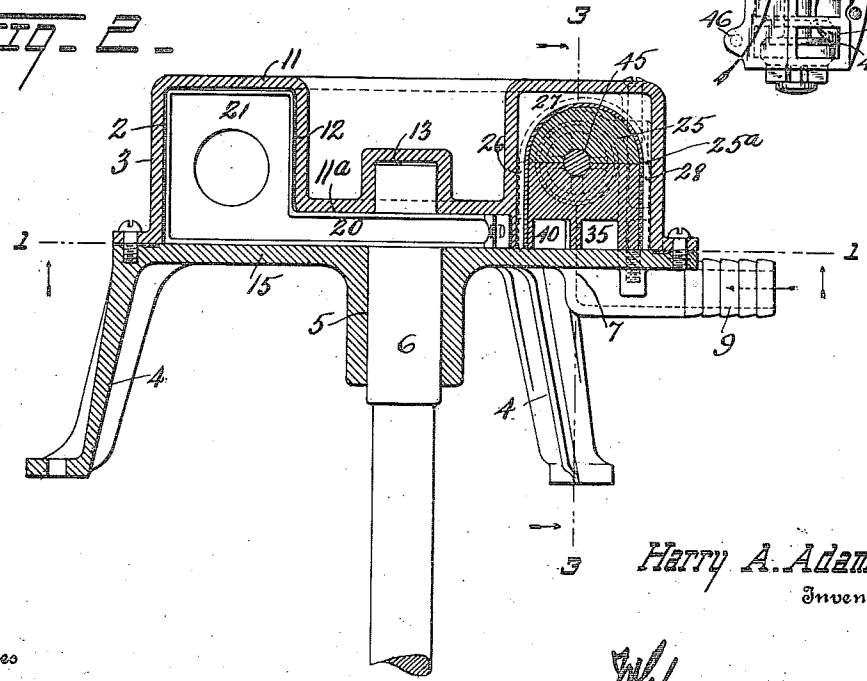


Fig. 2.



Witnesses

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2 SHEETS—SHEET 2.

Fig. 5.

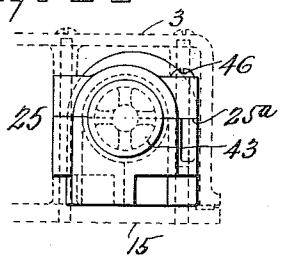


Fig. 3.

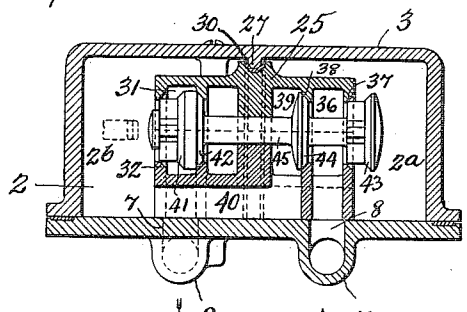


Fig. 6.

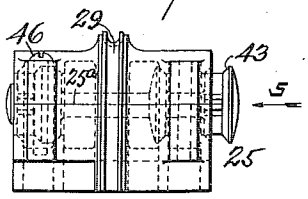


Fig. 4.

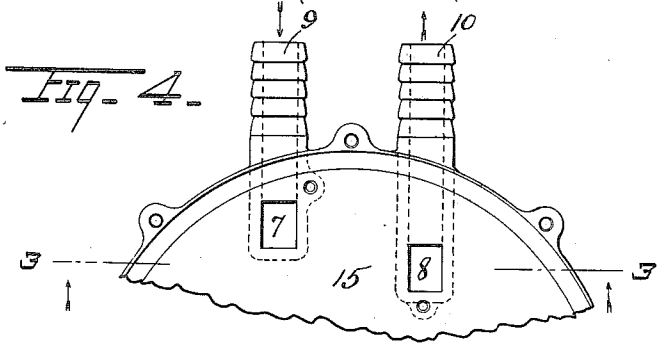


Fig. 11.

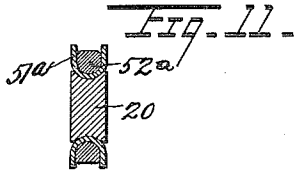
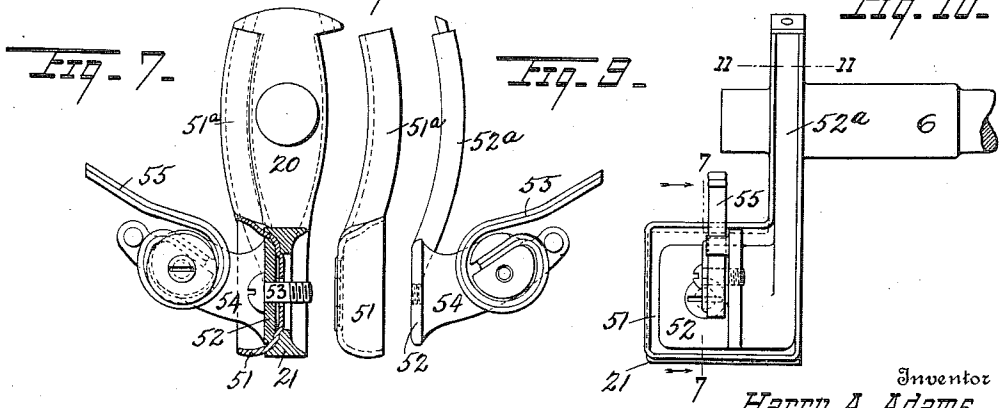


Fig. 8.

Fig. 7.

Fig. 9.

Fig. 10.



Witnesses

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UNITED STATES PATENT OFFICE.

HARRY A. ADAMS, OF READING, PENNSYLVANIA, ASSIGNOR, BY MESNE ASSIGNMENTS, TO EDWIN E. PRYOR, OF READING, PENNSYLVANIA.

OSCILLATING MOTOR.

973,400. Specification of Letters Patent. Patented Oct. 18, 1910.

Application filed October 21, 1909. Serial No. 523,740.

To all whom it may concern:

Be it known that I, HARRY A. ADAMS, a citizen of the United States, and a resident of the city of Reading, in the county of Berks and State of Pennsylvania, have invented certain new and useful Improvements in Oscillating Motors, of which the following is a specification.

My invention relates to oscillating piston motors adapted particularly for operating washing machines or the like; and it consists mainly in providing an improved fluid-controlling mechanism therefor comprising a single piston-operated valve-stem, as hereafter fully described in connection with the accompanying drawings, the novel features being specifically pointed out in the claims.

Figure 1 is a bottom plan view, on the line 1—1 of Fig. 2, showing the cylinder section of a motor embodying my invention, the valve-casing and piston being shown in position therein. Fig. 2 is a sectional elevation on the line 2—2 of Fig. 1, but with the piston packing removed and the cylinder base plate added. Fig. 3 is a sectional elevation on the line 3—3 of Figs. 1, 2 and 4. Fig. 4 is a fragmentary plan view of the cylinder base plate showing the inlet and outlet ports and hose-connections. Fig. 5 is an end view of the valve casing looking in the direction of arrow 5, Fig. 6; the cover section and cylinder base being indicated in dotted lines. Fig. 6 is a side elevation of the valve casing looking in the direction of arrow 6, Fig. 5. Fig. 7 is a plan view of the piston, partly in section on the line 7—7 of Fig. 10, the packing being removed from one side thereof. Fig. 8 is a separate view of the removed packing, and Fig. 9 is a separate view of the removed packing clamp and valve-operating arm. Fig. 10. is a side view of the piston complete. Fig. 11 is a section through lines 11—11 of Fig. 10, of the piston packing. Fig. 12 shows the valve-casing as in Fig. 1, but with the valve shifted and the inlet and exhaust reversed, as indicated by the arrows.

The annular piston chamber 2 is formed in the cylinder section 3 of the motor, the open-end of which section is secured to a circular base-plate 15. This base-plate, as shown, is provided with supporting legs 4, and has a central bearing 5 in which the piston shaft 6 is mounted, and inlet and outlet openings 7 and 8 respectively for the operating medium, with hose connections 9 and 10 therefor. The wall 11 forming the closed end of the cylinder 3, is centrally cupped as shown to form the inner cylinder wall 12 of the annular piston chamber 2 and a depressed central wall portion 11^a. The latter is provided with an upper shaft bearing 13 and is spaced apart from the base-plate 15 of the motor sufficiently to receive the reduced shaft-connecting arm 20 of the piston 21, the main pressure surface of which is thus located at a distance from the shaft 6 so as to use the operating fluid most effectively. The inner end of the piston arm 20 bears against a segmental partition depending from the casing 11, as shown. The piston is oscillated in the annular chamber 2 between the ends 2^a and 2^b thereof, which ends are on opposite sides of a valve casing forming a partition in said annular chamber and having valve-controlled passages connecting said inlet and outlet openings 7 and 8 with said piston-chamber ends 2^a, 2^b, as will now be fully described. This valve-casing 25, as shown, is formed separately from the cylinder 3, which latter however is provided with a packing rib 26, 27, 28 on the inner walls of the annular chamber 2, adapted to engage a peripheral packing groove 29 and a packing 30 therein, so as to insure the forming of a tight partition in said chamber 2 when the casing 25 is rigidly secured therein as indicated.

The fluid inlet 7 leads into an inlet chamber 31 in the valve-casing 25, which chamber 31 is provided with a valve-seated wall-opening or passage 32 leading directly into the piston-chamber end 2^b, and with another similar passage 33 and connecting ways 34, 35 leading into the opposite piston-chamber end 2^a. An outlet chamber 36 in the valve-casing, connecting with the fluid outlet 8 from the cylinder, is in like manner provided with a valve-seated opening or passage 37 leading directly from the piston-chamber end 2^a, and with another similar passage 38 and connecting ways 39, 40 leading from the opposite piston chamber end 2^b. The said valve-seated passages 32, 33, 37 and 38 are all arranged in alinement and are controlled by a series of correspondingly spaced valves 41, 42, 43, 44 arranged on a single valve-stem 45. The valve-casing is

made up in two parts which are united on the central valve-stem plane 25ª by means of independent screws 46 as shown, thereby enabling the same to be readily formed and finished as required, and thereafter conveniently applied to and removed from the motor cylinder as desired.

The piston 21 with its reduced shaft-connecting arm 20, requires to be very effectively packed, and to this end I provide on each side thereof an L-shaped leather packing-cup 51, 51ª conformed to the cross-section of the cylinder section 3 shown in Fig. 2; and a correspondingly shaped clamping-plate 52, 52ª; the inner ends of the clamping plates being held in engagement with the end of the shaft-connecting arm 20 as indicated in Figs. 7, 8 and 9, and the parts being rigidly secured at the piston 21 by a clamping screw 53. Each clamping plate 52, as shown, is formed with an ear 54, to which a spring-arm 55 is secured, which latter is adapted to contact with an end of the valve-stem 45 at each extreme of its piston movement so as to properly shift said valve-stem and thereby automatically reverse the piston movement.

The simple operation of my improved valve-mechanism will be readily understood by referring to Figs. 1 and 12. In Fig. 1 the piston is in central position and moving in the direction indicated by the arrows; that is toward the end position indicated in dotted lines at which point the valve is automatically operated to reverse the piston movement. The operating fluid is entering the piston-chamber end 2^b while the exhausting fluid is discharging from the end 2^a, as indicated by the respective arrows. As soon as the valve stem has been automatically shifted as stated the inlet and outlet flow is reversed as indicated by the respective arrows in Fig. 12.

It will be seen that both the construction and operation of my improved motor is extremely simple and satisfactory, the required flow of the operating fluid being automatically controlled by a single movable part. The preferred construction specifically described and shown may be readily modified without departing from my invention as pointed out in the claims. The separately formed valve-casing for instance, though advantageous may obviously be dispensed with and the essential parts thereof be formed directly in the cylinder casting.

What I claim is:—

1. An oscillating-piston motor having a cylinder provided with separate inlet and outlet chambers each having alined valve-seat openings communicating with the respective ends of the piston chamber, and a single valve-stem having four rigidly spaced valves adapted to seat in pairs in said seats, said valved stem being shifted by the oscillating piston at each extreme of its movement to reverse the inlet and outlet flows substantially as set forth.

2. An oscillating-piston motor having a cylinder provided with fluid-controlling means comprising a valve stem adapted to be reversely moved by the oscillating piston, said cylinder being provided with inlet and outlet openings and valve-seated passages extending from each of said openings to each end of the piston chamber and said valve stem carrying a series of spaced valves whereby communication between said piston chamber ends and said inlet and outlet openings is automatically reversed by the oscillating piston at each end of its movement substantially as set forth.

3. In an oscillating-piston motor having a cylinder with an annular piston chamber provided with inlet and outlet openings, a separately formed valve-casing rigidly secured in said annular chamber and provided with separate chambers communicating with said inlet and outlet openings respectively, alined valve-seat openings from each of said valve-casing chambers to the opposite ends of said piston chamber and a piston-operated valve-stem having four rigidly spaced valves adapted to seat in pairs in said seats.

4. In an oscillating-piston motor having a cylinder with an annular piston chamber provided with inlet and outlet openings, a separately formed parted valve-casing rigidly secured in said annular chamber and provided with separate chambers communicating with said inlet and outlet openings respectively, alined valve-seat openings from each of said valve-casing chambers to the opposite ends of said piston chamber and a piston-operated valve-stem having four rigidly spaced valves adapted to seat in pairs in said seats.

5. An oscillating-piston motor having a cylinder provided with separate inlet and outlet chambers each having alined valve-seat openings communicating with the respective ends of the piston chamber, a single valve-stem having four rigidly spaced valves adapted to seat in pairs in said seats, and an oscillating piston carrying oppositely arranged spring-arms adapted to contact with and reversely operate said valve-stem substantially as set forth.

6. In an oscillating-piston motor having a cylinder formed with an annular piston chamber and an end plate provided with inlet and outlet openings, a separately formed valve-casing having a peripheral packing groove and secured in said annular chamber to form a tight partition therein, said valve-casing having separate chambers communicating with said inlet and outlet openings respectively, alined valve-seat openings from each of said valve-casing chambers to the opposite ends of said pis-

ton chamber and a piston-operated valve-stem having four rigidly spaced valves adapted to seat in pairs in said seats.

7. In an oscillating-piston motor having a cylinder formed with an annular piston chamber having an inlet-and-exhaust valve-casing forming a partition therein and with a central piston-shaft mounting, an oscillating piston in said chamber having a reduced shaft connecting arm and L-shaped packing-cups and clamping plates therefor on each side of said piston and its shaft connecting arm substantially as set forth.

8. In an oscillating-piston motor having a cylinder formed with an annular piston chamber having an inlet-and-exhaust valve-casing forming a partition therein and with a central piston-shaft mounting, an oscillating piston in said chamber having a reduced shaft connecting arm and L-shaped packing-cups and clamping plates therefor on each side of said piston and its shaft connecting arm, said clamping plates carrying valve-operating spring-arms, substantially as set forth.

In testimony whereof, I affix my signature, in the presence of two witnesses.

HARRY A. ADAMS.

Witnesses:
D. N. STEWART,
W. G. STEWART.