March 25, 1930. F. L. LINDHORST 1,751,640

IRRIGATING DEVICE

Filed May 15, 1926 2 Sheets-Sheet 1

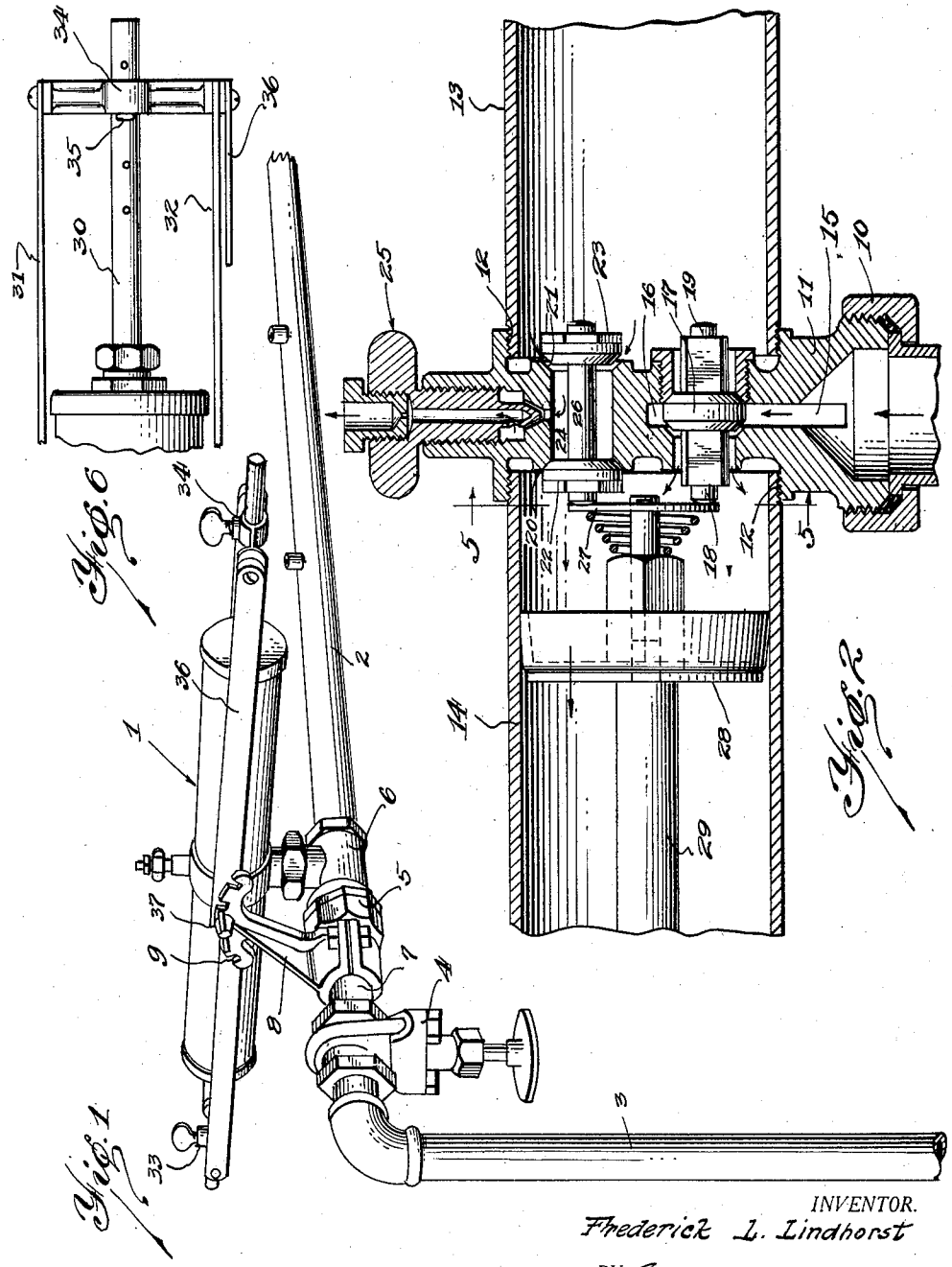

Fig. 1

Fig. 2

Fig. 6

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Fig. 3

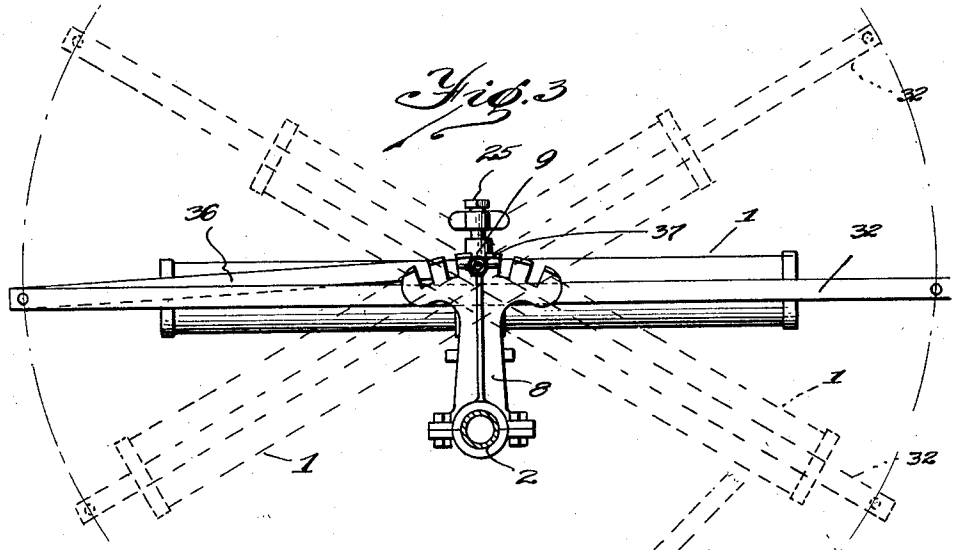


Fig. 4

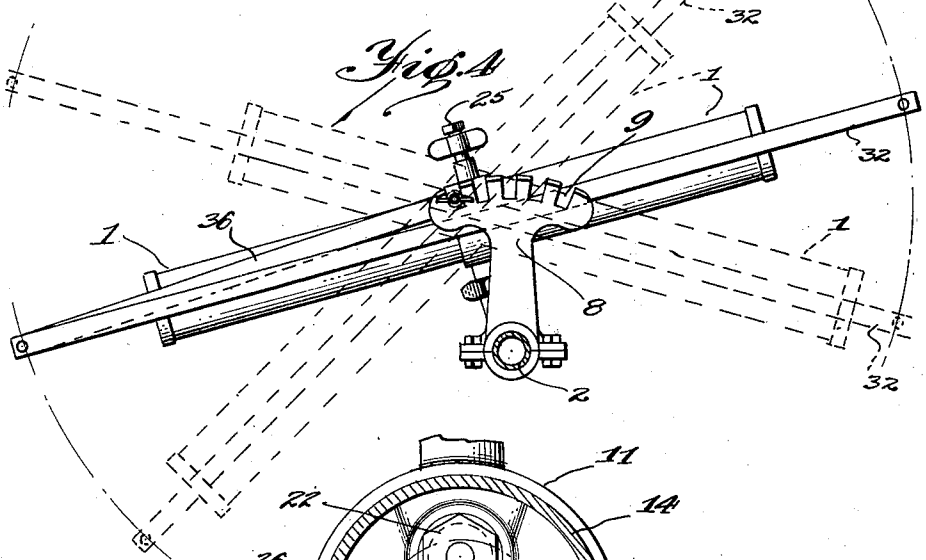
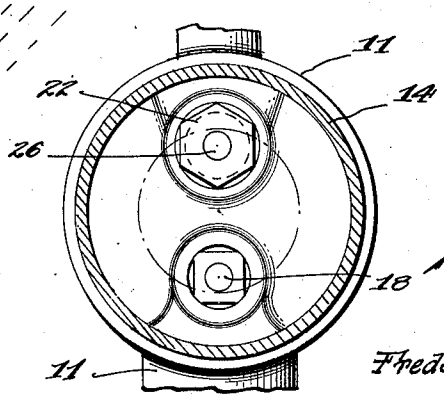


Fig. 5



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UNITED STATES PATENT OFFICE

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IRRIGATING DEVICE

Application filed May 15, 1926. Serial No. 109,233.

This invention relates to fluid pressure motors of the oscillating type and has to do particularly with a motor which is especially adapted for oscillating spray conduits forming a part of overhead irrigation systems.

Hitherto in the art of oscillating spray conduits for distributing water, many different devices have been designed for effecting oscillation of the spray pipe. These various devices have operated on various different theories and principles and while more or less practical results have been obtained, all of such devices have been very complicated, expensive and cumbersome.

One of the objects of this invention is the provision of a fluid pressure motor of the oscillating type, which is adapted to be supported by and turnable with the spraying pipe and which motor is of very simple, compact and inexpensive construction. A further feature of this invention is the provision of means for effecting variable oscillation of the motor structure and readily adjustable means for varying the path of movement, or oscillating path of the motor structure and the connected spray conduit.

A still further feature of this invention has to do with the provision of automatic valve structure for effecting reversal of the motor and novel means adjustable to vary the oscillating stroke at either side of the common center, said valve structure and said adjustable means forming an integral part of the piston and cylinder structures of the motor.

In the drawings:

Fig. 1 is a perspective view of my novel motor structure and spray conduit shown in assembled relation.

Fig. 2 is an enlarged fragmentary longitudinal section of the piston and cylinder construction and illustrating the method of operation of the reversal valves.

Fig. 3 is a detail view, partially diagrammatic, of the means for controlling the center of oscillation of the motor structure.

Fig. 4 is a view similar to Fig. 3, showing the means for controlling the oscillation of the motor positioned at a different point with relation to the means for controlling the path of oscillation, the dotted lines in Fig. 4 showing the resulting change in the path of oscillation as compared with Fig. 3.

Fig. 5 is a detailed view taken on line 5—5 of Fig. 2.

Fig. 6 is a fragmentary plan view of one end of the cylinder and piston structure of the motor.

Referring particularly to Fig. 1, it will be understood that my oscillating motor structure may be utilized with any type of spraying conduit. The motor is of the fluid pressure oscillating type and may be generally designated 1. This motor may be supported directly by the spraying conduit itself and in the drawings the spraying conduit is shown as at 2 and a suitable support therefor is shown as at 3, the support 3 forming also the supply conduit. A suitable valve 4 may be inserted between the support 3 and oscillatable conduit 2. A swiveled or universal union 5 of any standard design may be inserted between the valve 4 and the conduit 2, one end of this union 5 being preferably connected with a suitable T 6.

The short portion of pipe or conduit between the valve 4 and the union 5 may be designated 7 and is preferably rigid with the valve 4. To this rigid pipe 7 is clamped an adjusting member 8. The upper end of this adjusting member 8 is preferably arcuate in shape and provided with a series of teeth or serrations 9.

The T 6 serves as a support or standard for the motor element 1, and as clearly shown in Fig. 2, the upper part of the T 6 is provided with a collar 10 for adjustably securing the same to a cylinder supporting and receiving member 11. This cylinder receiving member 11 is internally threaded as at 12 for receiving two cylinders 13 and 14. This cylinder receiving element 11 is also provided with suitable valve ports and seats as will be presently described. The lower part of the member 11 is provided with a suitable passageway 15 for conducting a portion of the water from the spray conduit to the motor structure. The upper end of this port 15 terminates in a two-way valve port 16, having suitable valve seats for contacting

with opposite sides of a valve 17. Suitable passageways lead in transverse directions from the port 16 so as to conduct the water into the cylinders 13 and 14. The valve 17 is provided with suitable pins 18 and 19 which extend upon opposite sides of the valve 17 and which pins also project past the faces of the element 11.

The upper part of the element 11 is provided with two oppositely positioned valve seats 20 and 21 for receiving suitable exhaust valves 22 and 23. The valve seats 20 and 21 co-operate with a common passageway 24 through which the water is conducted to a suitable spray orifice 25, which may be threaded or otherwise connected to the upper end of the cylinder receiving member 11. The valves 22 and 23 are rigidly secured to a common stem 26 and are so positioned on said stem that the closing of one valve will open the other valve. The stem 26 preferably protrudes past the face of the valves 22 and 23 and is preferably of the same length as the pins 18 and 19 of the inlet valve.

The pins 18 and 19 and the ends of the stem 26 are designed to contact with and be operated by a suitable disc 27 which forms a part of the inner end of the pistons which operate in the cylinders 13 and 14. In Fig. 2 I have shown a piston 28 and piston rod 29 moving in an outwardly direction. The inner end of the piston is shown provided with a suitable nut and coil spring securing the disc 27 resiliently thereto.

In operation of the valve, piston and cylinder structure it will be obvious that if the piston 29 moves inwardly the disc 27 will contact with the pin 18 and stem 26 to move the valve 17 to the right (as shown in Fig. 2), and to also close the exhaust valve 22 and open exhaust valve 23. Upon movement of the valve 17 to the right, it will be obvious that water under pressure from the spray conduit will be admitted to the passageway 15 and into the cylinder 14 back of the piston 28. The pressure of this incoming water thus forces the piston and piston rod outwardly and will continue to so force such piston outwardly until the opposite piston in the cylinder 13 is moved inwardly to a position to contact with the pin 19 and stem 26 to reverse the positioning of the valves and to admit water to the cylinder 13 and exhaust the water in the cylinder 14.

The pistons are respectively provided with piston rods 29 and 30 which extend outwardly past the ends of the cylinders 13 and 14. The ends of the piston rods 29 and 30 are connected by suitable frame structure which preferably comprises two parallel rods 31 and 32 which are connected to the ends of the piston rods by means of suitable clamps 33 and 34. These clamps are adjustably secured to the ends of the piston rods by means of suitable thumb screws, as clearly shown in Fig. 1. Each piston rod may be provided with suitable apertures in the ends thereof for the reception of suitable cotter pins 35.

The oscillating action of the motor is accomplished by means of a rod 36 which is pivotally secured at one end to one of the clamps 34 and which may be detachably connected at the other end by means of a suitable thumb screw 37 to the adjusting element 8. This rod 36 is pivotally secured to the element 8 and it will be obvious that by so securing said rod 36 to the rigid adjusting element 8 that the center of the frame structure formed by the parallel rods 31 and 32 will be maintained in a fixed position. In other words, the forcing of water within one of the cylinders to move either of the pistons outwardly will not change the position of the piston rods relative to the center of the motor, but will instead move the cylinders 13 and 14 back and forth to cause oscillation of the motor about the center of the spray conduit or about the center of the supporting T 6. The rod 36 being pivoted at a point spaced from the center line of movement of the cylinders or general motor structure, it will be obvious that the oscillating stroke of the motor will be varied. In other words as the motor approaches the end of its oscillating stroke its speed of motion will increase in order to effect a more even spraying of the ground surface.

In Fig. 3 I have illustrated the various positions of the motor, the normal central position being illustrated in solid lines and the extreme positions of the motor at the end of each oscillating stroke being illustrated in dotted lines. It will be obvious that by loosening the thumb screw 37 and changing the position of the rod 36 with respect to the adjusting element 8, that the normal center line of the motor will be changed and that although each oscillating stroke may remain normal, yet the general path of movement will be changed in accordance with the change of adjustment of such thumb screw 37. The change in the path of movement is illustrated in Figs. 3 and 4, Fig. 3 showing the normal oscillating path when the rod 36 is positioned in the center tooth or serration 9, and Fig. 4 illustrating the path of oscillation when the rod 36 has been changed and positioned in the end tooth or serration of such adjusting element 8.

It is often desirable in spraying devices of this nature to vary the oscillating stroke, or the length of the oscillating movement of the motor, and I have provided means for accomplishing this result in a very easy and efficient manner. The ends of the piston rods 29 and 30 being adjustably secured to the clamps 33 and 34, it will be obvious that by loosening the thumb screws and removing the cotter pins that the position of the piston relative to the cylinder may be changed. That

is, by loosening such thumb screw and by moving the piston inwardly or outwardly the time of contact between disc 27 and the valve pins will be changed and the time of return or change of stroke will also be changed. It will thus be obvious that both pistons may be adjusted to simultaneously increase or decrease the oscillating movement equally on both sides of the spray conduit, or that just one piston may be adjusted so that the spray conduit will spray water over a relatively wide sector on the one side and a relatively small sector on the other side.

It will thus be obvious that I have provided a fluid pressure motor which may be quickly and easily connected to any spray conduit and which when so connected will be operable by the fluid pressure of the water passing through this spray conduit. It will further be obvious that I have provided a fluid pressure motor which has a minimum number of exposed parts and which are so connected to the spray conduit that either its path of movement may be readily and quickly adjusted or its stroke to either or both sides of the motor easily and quickly adjusted. It will be further obvious that I have provided a novel support for connecting the motor with the spray conduit, said support being preferably one integral unit adapted to receive the oppositely disposed pistons and also to provide passageways for and receive the inlet and outlet valves.

What I claim is:

1. In a liquid distributing system, the combination with a fluid pressure oscillating motor of the type having a stationary element and oscillatable unit, and a spray conduit rigidly secured to said oscillatable unit and movable in unison therewith, of means pivotally and adjustably connecting said stationary element with said oscillatable unit, said adjustable connection between said stationary element and oscillatable unit permitting the position of the central point of the path of oscillation of the motor to be varied.

2. In a liquid distributing system, the combination with a spray conduit having stationary and rotatable parts, and a fluid pressure motor for oscillating the conduit back and forth, of means for directly and adjustably connecting the motor with the stationary part of the conduit, said adjustable connection permitting the varying of the position of the central point of the path of oscillation.

3. In a liquid distributing system, the combination of a rotatably supported spray conduit and a motor having a part thereof supported by and turnable with the spraying conduit, and including a rigid horizontally adjustable element securable to the supported part for varying the position of the central point of the path of oscillation of the spraying conduit.

4. In a liquid distributing system, the combination of a fluid pressure motor having an oscillating unit supported by and turnable with a spraying conduit, said motor including a cylinder and opposed pistons, a frame for connecting said pistons, means for adjusting one of said pistons relative to the cylinder for varying the stroke of the motor and the amplitude of oscillation of the spraying conduit, stationary means, means connecting said stationary means and said frame for effecting oscillation of said unit, and means for adjustably connecting said stationary means and the pistons for varying the position of the central point of the path of oscillation of said spraying conduit.

5. In a liquid distributing system, the combination of a rotatably supported spraying conduit and a motor having an oscillating unit supported by and turnable with the spraying conduit, said motor including cylinder and piston structure and means for adjusting the piston relative to the cylinder for varying the stroke of the motor and the amplitude of oscillation of the spraying conduit.

6. In a liquid distributing system, the combination of a fluid pressure oscillating motor having a stationary element and an oscillating unit, and a spray conduit secured to said oscillating unit and movable in unison therewith, said motor including cylinder and piston structure, means for adjusting the piston relative to the cylinder for varying the stroke of the motor and the length of oscillation of the spraying conduit, stationary means, and means for adjustably connecting the stationary means and the piston for varying the position of the central point of the path of oscillation of the spraying conduit.

7. A fluid pressure motor for use in liquid distributing systems comprising a central element for connecting the motor to a rotatably supported spraying conduit, two oppositely disposed cylinders secured to said element, pistons disposed within said cylinders, means carried by said element and actuated by the movement of said pistons for controlling the movement of the pistons, a stationary element positioned adjacent said central element, means connecting said pistons and pivoted means connecting said stationary element with said connecting means whereby to cause oscillation of the motor, said pistons being adjustably secured to said connecting means whereby to independently control the stroke of the motor.

8. In a liquid distributing system, the combination of a rotatably supported spraying means and a motor having an oscillating unit supported by and turnable with said spraying means, said motor including oppositely disposed cylinder and piston structure and means for independently adjusting each piston relative to its cylinder for varying the stroke of the motor and the amplitude of oscillation of the spraying means.

9. In a liquid distributing system, the combination of a rotatably supported spraying conduit and a motor having an oscillating unit supported by and turnable with said conduit, said motor including oppositely disposed cylinder and piston structure and means for independently adjusting each piston relative to its cylinder for varying the stroke of the motor and the amplitude of oscillation of the spraying conduit, means for connecting said pistons, and adjustable means pivotally connected to said connecting means for varying the position of the central point of the path of oscillation of the spraying conduit.

In testimony whereof I affix my signature.

FREDERICK L. LINDHORST.