Oct. 4, 1932. H. L. BLOOD 1,880,727

FLUID ACTUATED DEVICE

Filed Oct. 29, 1926

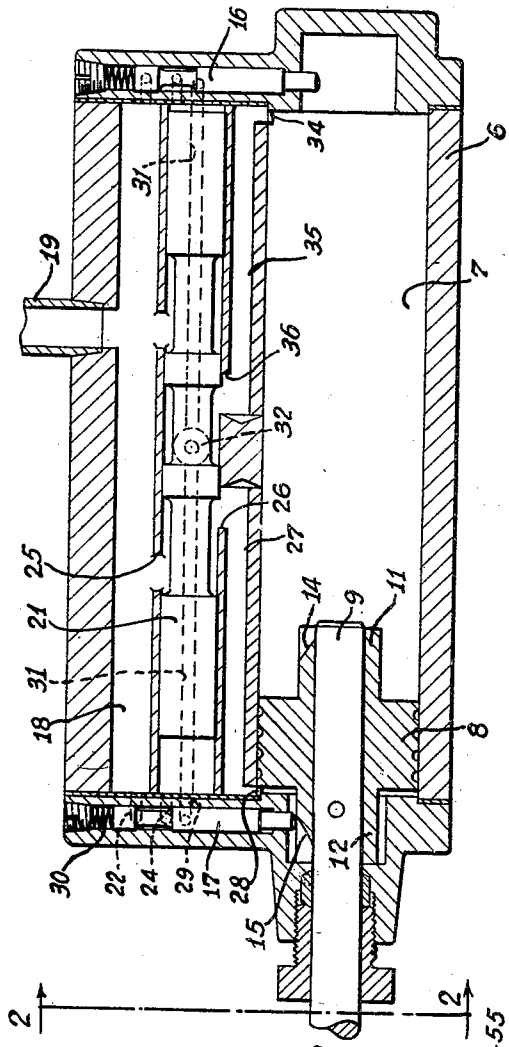


Fig. 1.

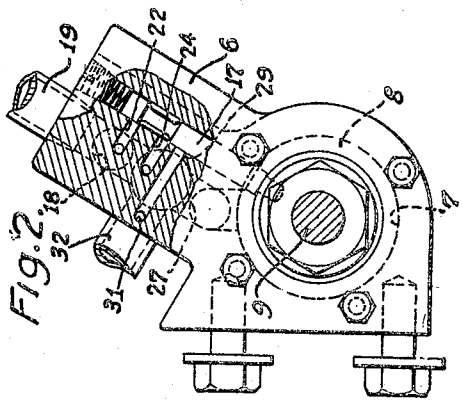


Fig. 2.

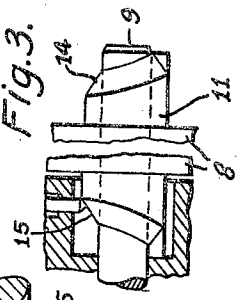


Fig. 3.

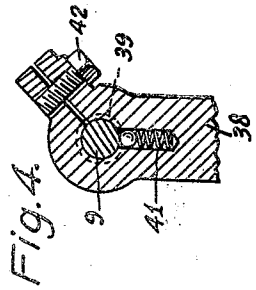


Fig. 4.

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UNITED STATES PATENT OFFICE

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FLUID ACTUATED DEVICE

Application filed October 29, 1926. Serial No. 144,941.

This invention relates to fluid actuated devices, and more particularly to a reciprocating fluid motor having an adjustable length of stroke.

An object of the invention is to provide a fluid actuated device whose length of stroke may be quickly and conveniently altered.

The invention contemplates the provision of means for reversing the piston of a fluid driven motor before it completes its maximum stroke. In accordance with one embodiment thereof, the invention contemplates the provision of a fluid driven reciprocating motor for reciprocating a distributing element having a slide valve whose action is controlled by mechanism actuated by the piston to regulate the length of stroke of the piston.

It is believed that a complete understanding of the invention may be had by reference to the following description taken in conjunction with the accompanying drawing, in which

Fig. 1 is a longitudinal sectional view of a reciprocating fluid motor;

Fig. 2 is a transverse sectional view thereof taken on the line 2—2 of Fig. 1, with a portion of the structure broken away,

Fig. 3 is a detail view of the helicoidal cams used in the motor,

Fig. 4 is a cross-sectional view taken on the line 4—4 of Fig. 1, disclosing frictional means for adjusting the piston cams.

Referring to the drawing in which similar reference characters designate the same parts in the several views, a casting or housing for the apparatus is designated generally by the reference numeral 6. The housing is provided with a large cylindrical bore which constitutes a cylinder 7 in which a piston head 8 supported on a piston rod 9 is reciprocally mounted. The ends of the piston head 8 are provided with cams 11 and 12, one of which has a sloping right hand helicoidal face 14 and the other has a sloping left hand helicoidal face 15. The cam 11 is adapted to engage a tappet valve 16 which is located at one end of the cylinder and the cam 12 is adapted to engage a tappet valve 17 at the other end of the cylinder. When the piston is in the position shown in Fig. 1 the cam 12 will be in engagement with the stem of the tappet valve 17 holding the valve in such a position that a fluid passage 18, to which fluid is supplied under pressure through a supply pipe 19, is connected to a slide valve 21 through curved ports 22 and 24 (Figs. 1 and 2), thereby moving the slide valve 21 to the designated position. When the slide valve 21 is in its other position it opens a path for the fluid from the fluid passage 18 through port 25, port 26, passage 27, to port 28 from which it enters the cylinder and exerts a pressure on the piston head 8. The pressure on the piston head will cause the piston to move to the other end of the cylinder and release the tappet valve 17 which will be restored to its normal position by a spring 30 and connect the port 24 to a curved port 29 leading to a longitudinal passage 31 from which the fluid is led to an exit 32, discharging the fluid into this exit when the slide valve is subsequently moved to its other position. As the piston moves to the right, the fluid ahead of the piston will be forced out through a port 34 into passage 35, through port 36, and out of the exit 32.

The piston will continue its movement to the right until the cam 11 depresses the stem of the tappet valve 16 causing the fluid pressure to operate the slide valve in the opposite direction and reversing the direction of the piston in the same manner as described in connection with the operation of the tappet valve 17.

In view of the fact that the helicoidal face 14 of the cam 4 has a right hand pitch and the helicoidal face 15 of the cam 12 has a left hand pitch, as shown in detail in Fig. 3, it will be seen that when the cam is slightly rotated it will increase or decrease the length of the stroke of the piston depending on the direction of rotation and the stroke will be altered an equal amount at each end. The rotation of the cams is accomplished by rotating the piston rod 9 which carries a hand wheel 37 for this purpose.

The piston rod 9 is attached to an arm 38 which rests on the one side against a shoulder 39 and on the other side against a sleeve 41 which is secured to the shaft by means of a

set screw, so that the arm will reciprocate with the piston rod. The arm may be firmly clamped on the piston rod by means of a nut 42, however, when it is desired to change the length of the stroke at frequent intervals, as when the apparatus is used to reciprocate a guide for winding cables on a reel, the nut 42 may be loosened and the rod is prevented from rotating and changing its adjustment by a ball and spring plunger 44 carried by the arm and pressing against the rod. The arm 38 is shown attached to a shaft 45 which may be operatively connected with any apparatus to which it is desired to communicate reciprocating motion and in the embodiment of the invention shown the shaft 45 has fixed thereto a strand guide 55 for distributing strands of wire on a reel.

The variable stroke motor herein disclosed is particularly applicable to distributing devices for cable take-up reels for oscillating the cable being taken up back and forth across the reel through the actuation of a suitable distributing head, and the variable stroke feature provides for such a distribution in cables of different diameters, serving to shift or direct the smaller diameter cables a greater extent laterally to place or direct the cables flush against or in abutting relationship with the inner surfaces of the reel heads or ends. By rotating or adjusting the helical cam surfaces 14 and 15 through actuation of the hand wheel 37 to cause these cam surfaces to operate the tappet valve 16 or 17 at relatively sooner or later periods in the cycle of operation of the piston 8 such cables or other strand may manifestly be distributed in the above mentioned manner to properly place or direct the strand flush against the ends of the reel.

It will be understood that the embodiment of the invention herein described and illustrated is merely a convenient and useful form of the invention which is capable of many other modifications without departing from the spirit and scope of the invention.

What is claimed is:

In a fluid actuated motor, a piston having integral helicoidal cam faces in each end thereof, a slide valve for causing oscillation of the piston, a pair of tappet valves for engaging the helicoidal faces of the piston at each end of its stroke to control the slide valve, a piston rod connected to said piston, an adjusting arm clamped to the piston rod, and a hand wheel secured to the piston rod for turning the piston rod in the arm and adjusting the engagement between the aforementioned tappet valves and the helicoidal piston cams to vary the length of stroke of the piston in each direction.

In witness whereof, I hereunto subscribe my name this 18th day of October A. D., 1926.

HAROLD LANGLEY BLOOD.