April 29, 1930. C. H. FULLER 1,756,910

SERVO MOTOR

Filed Oct. 20, 1927

FIG. 1

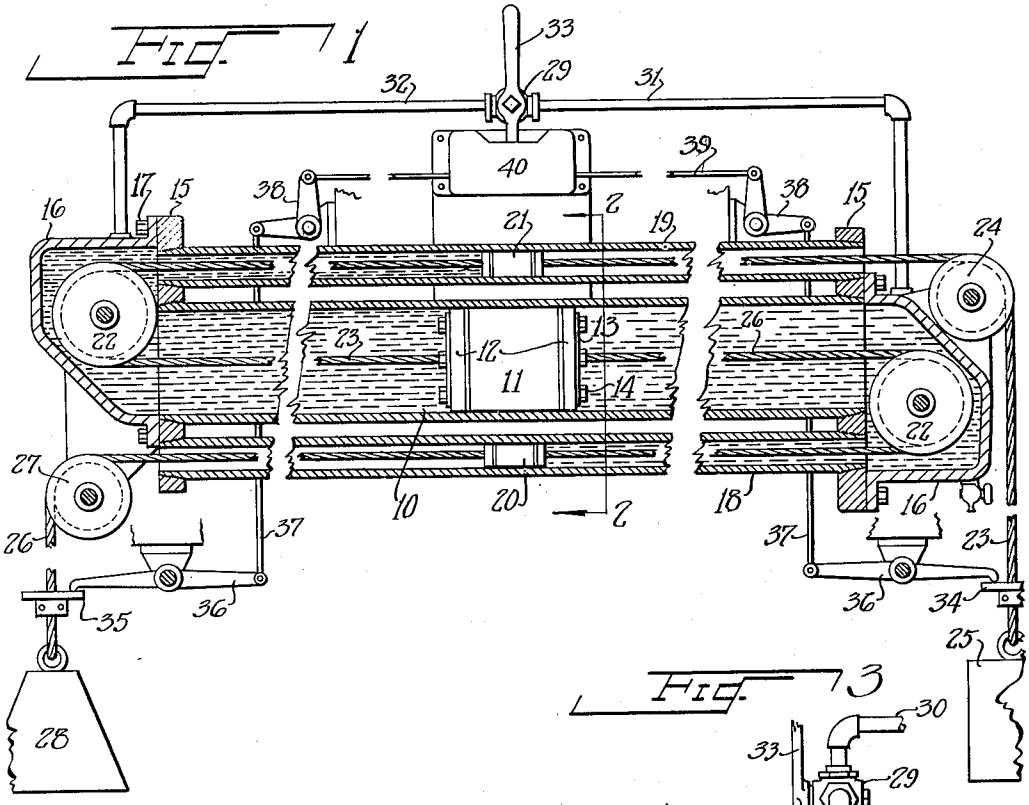


FIG. 3

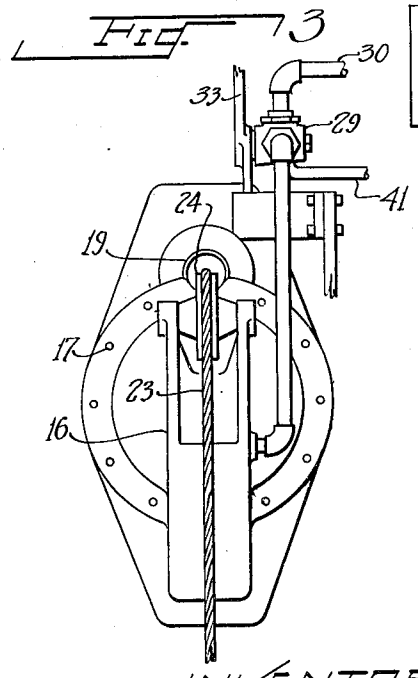
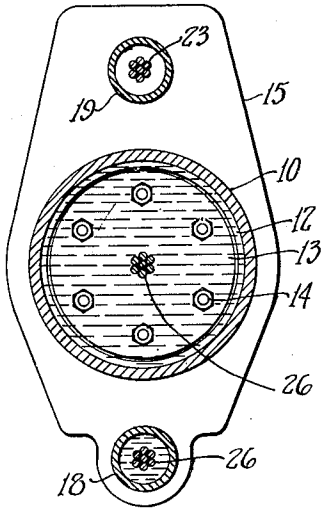


FIG. 2



INVENTOR
C. H. Fuller
BY C. B. Birkenbeuel.
ATTORNEY

Patented Apr. 29, 1930 1,756,910

UNITED STATES PATENT OFFICE

CHARLES H. FULLER, OF LOS ANGELES, CALIFORNIA, ASSIGNOR OF ONE-FOURTH TO C. P. BOLLMAN, OF GLENDALE, CALIFORNIA

SERVO-MOTOR

Application filed October 20, 1927. Serial No. 227,376.

This invention relates generally to servo-motors.

The main object of this invention is the construction of a servo-motor which will provide any practical range of movement, and which will eliminate long and expensive cylinders and pistons and substitute therefore ordinary steel cable.

The second object is to make the device capable of either using a fluid from a reservoir and re-using same, or to operate same by wasting the discharged liquid.

The third object is to render the device automatic in its reversal at the end of the travel of the piston or subject to reversal at any position of travel.

These, and other objects, will become more apparent from the specification following as illustrated in the accompanying drawing, in which:

Figure 1 is a longitudinal section through the device having portions cut away for shortening purposes. Figure 2 is a transverse section taken along the line 2—2 in Figure 1. Figure 3 is an end elevation of the device.

Similar numbers of reference refer to similar parts throughout the views.

Referring in detail to the drawing, there is illustrated a main cylinder 10 in which is placed a piston 11 provided at each end with a cup leather 12 which is held in place by the follower 13 and the bolts 14.

On each end of the cylinder 10 is mounted a flange 15 which supports the housing 16, which housing is secured to its flange 15 by means of the bolts 17. On opposite sides of the cylinder 10 are the small auxiliary cylinders 18 and 19 whose ends are also mounted in the flange 15. The auxiliary cylinder 18 is provided with a piston 20 and the cylinder 19 is provided with a piston 21.

Each housing 16 is provided with a sheave 22. On one side of the piston 11 a cable 23 passes around the sheave 22 and then back through the small cylinder 19 through the piston 21 and then around a sheave 24, which is mounted on the housing 16 to the weight or load 25. From the opposite side of the piston 11 a cable 26 passes around the second sheave 22 and then through the cylinder 18 and piston 20 and around the sheave 27 to the weight 28, which, of course, may be any form of load or operating means, as is also the case with the weight 25.

Mounted on the cylinder 10 is a reverse valve 29 from whose supply pipe 30 fluid may be distributed to either of the branch pipes 31 or 32, or may be cut off altogether. The valve 29 is normally operated by the hand lever 33, but to prevent self-destruction the device is made automatic so that as the piston 11 reaches the end of its travel in either direction so that either the weight 25 or 28 is uppermost, then the reversal will be automatic. This is accomplished by placing a stop 34 on the cable 23 and a stop 35 on the cable 26.

In the path of each stop 34 and 35 is placed a rock lever 36 provided with a connecting rod 37 which operates a bell crank lever 38, each of which is provided with a connecting rod 39 which connects with the lever 33.

It is preferable, of course, to provide a lever 33 with some form of full stroke mechanism within the casing 40, although the use of such devices is too well understood to require further drawing or explanation.

The operation of the device is as follows: When fluid is admitted through the pipe 32 against the leather 12 of the piston 11 the piston moves in a corresponding direction drawing the cable 23 after it and ultimately raising the weight 25. The slack in the cable 26 is taken up by the weight 28. The weight 25 continues to rise until the stop 34 trips the lever 36 and reverses the lever 33. A corresponding operation is performed on the opposite side of the device causing the weight 28 to rise and the weight 25 to lower.

A waste pipe 41 is also provided through which fluid can be exhausted from either side of the cylinder 10 and either wasted away or returned to a reservoir for re-use, as seems most desirable.

It can be seen that from this construction all rigid pistons are eliminated, as well as stuffing boxes and similar contrivances for preventing wasting of the liquid.

I am aware that numerous changes can be

made in the details of this device; I therefore do not intend to cover such devices broadly, but to be bound only within the limits of the following claims.

I claim:

1. A servo-motor having, in combination, a main cylinder provided with a piston; an auxiliary cylinder at each side of said main cylinder each of which is provided with a piston; a housing covering one end of said main cylinder and adjacent end of an auxiliary cylinder, said housing having a sheave therein around which a line can be passed from the main cylinder to the auxiliary cylinder; the other end of said main cylinder has a similar housing connecting same with the second auxiliary cylinder having a sheave therein over which a line can be passed from the main cylinder into the auxiliary cylinder; a line passing through said main cylinder and secured to the piston thereof having its ends passing through the auxiliary cylinders and secured to the pistons thereof; and means for admitting fluid to either end of said main cylinder including means for cutting off the supply of fluid when the main piston reaches the extreme end of travel.

2. A servo-motor having in combination a main cylinder having a piston mounted therein, a sheave mounted at each end of said cylinder, a cylinder head over each sheave, an auxiliary cylinder at each end of said main cylinder opening into the cylinder head at its respective end, each auxiliary cylinder having a piston therein having a cable attached to one end thereof passing around its adjacent sheave and fastening to the piston in the main cylinder, the opposite end of each auxiliary piston having a cable attached thereto extending out of the remaining end of the auxiliary cylinder to the point at which work is to be performed.

CHARLES H. FULLER.