

Aug. 3, 1926.

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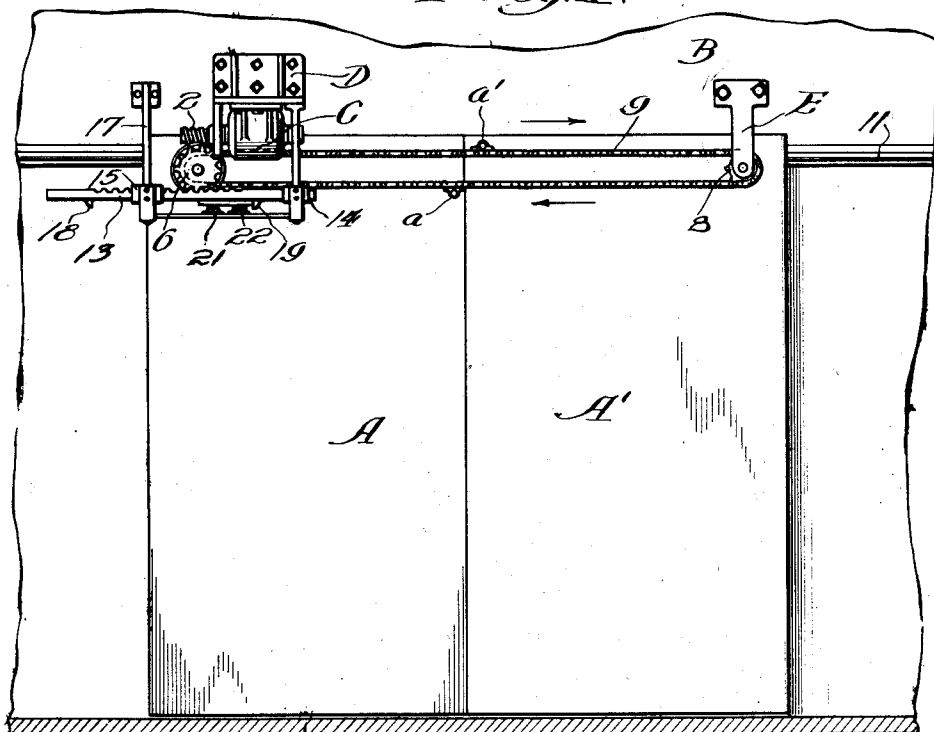
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APPARATUS FOR OPERATING SLIDING DOORS AND THE LIKE

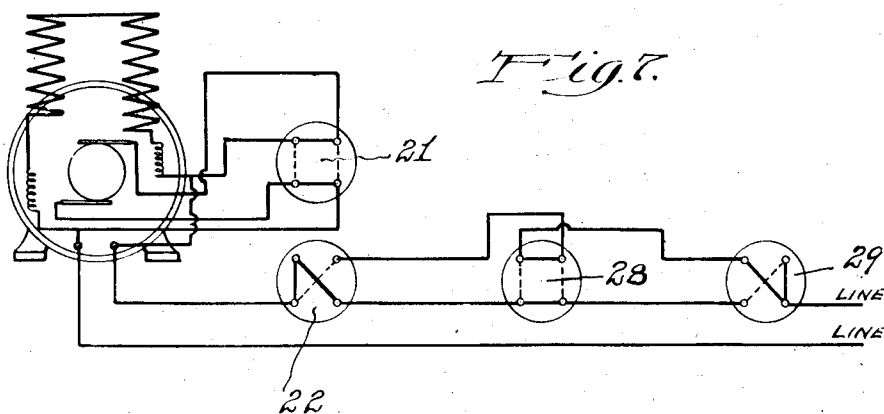
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*Fig. 1.*



*Fig. 7.*



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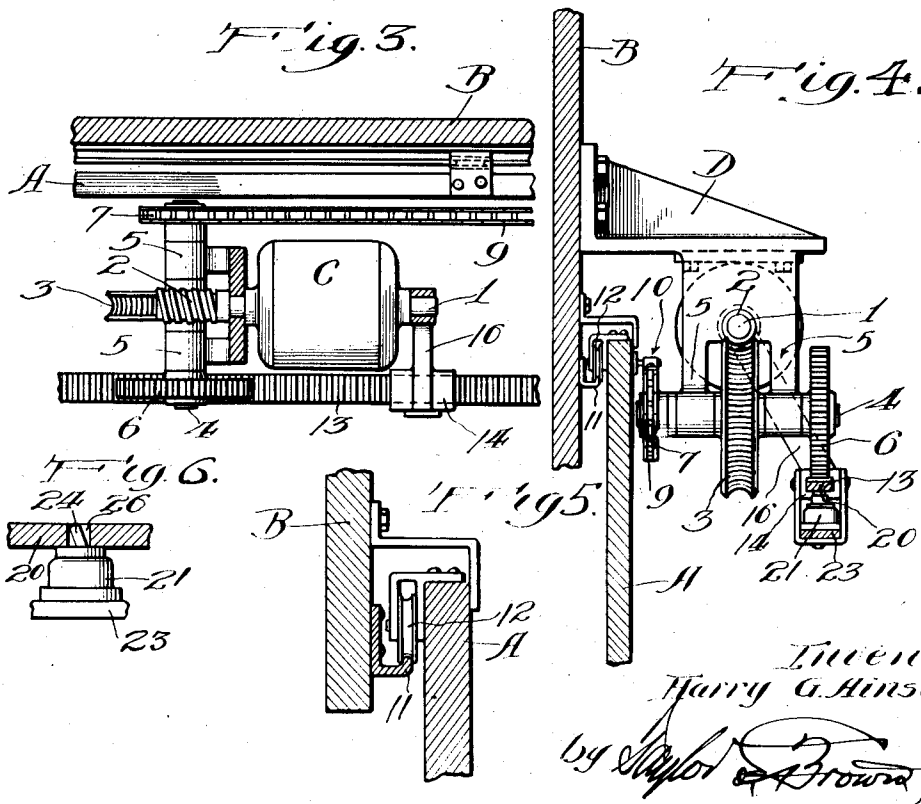
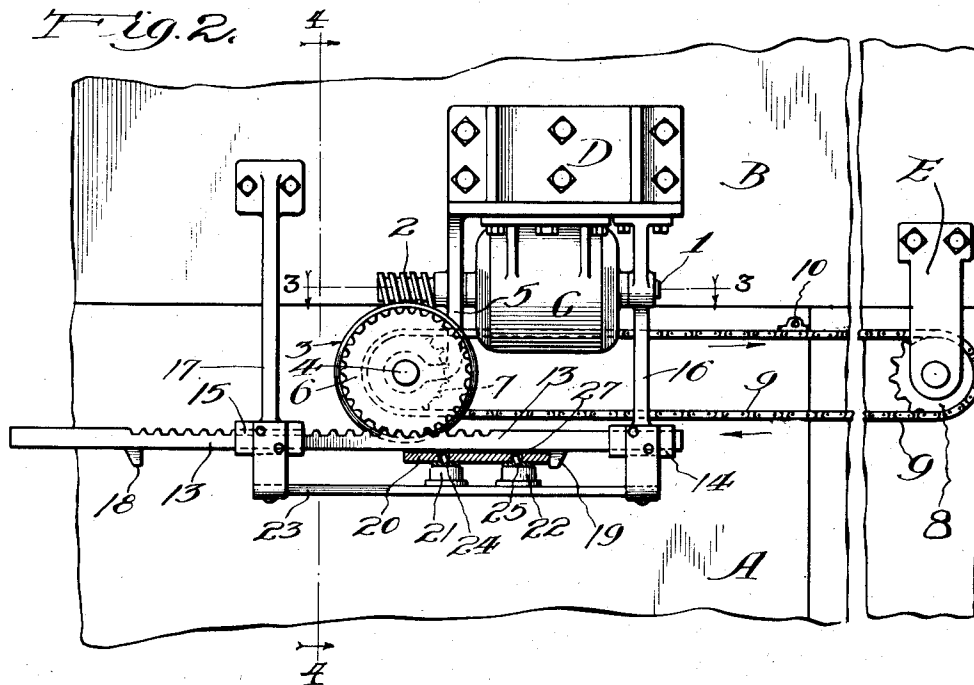
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2 Sheets-Sheet 2



## UNITED STATES PATENT OFFICE.

HARRY G. AINSWORTH, OF KENTLAND, INDIANA.

APPARATUS FOR OPERATING SLIDING DOORS AND THE LIKE.

Application filed March 24, 1924. Serial No. 701,611.

This invention relates to means for operating slidable members such as sliding doors, large valves, theatrical fire curtains and the like, and more particularly to electrically operated means including a reversing motor.

The main object of the present invention is to produce mechanism, simple in character but effective in operation, whereby a sliding member or a pair of sliding members may be moved first in one direction (say to open) and then in the opposite direction (to close), by means of an electric motor set in motion by a switch in the electric circuit, which motor operating in one direction until automatically stopped shall have its field reversed so that when again operated it will reverse its direction of motion. Other objects and advantages of the invention will more fully appear as I proceed with this specification.

The invention consists in the devices and combination of devices herein illustrated, described and claimed.

In the accompanying drawings:

Fig. 1 illustrates my invention, in side elevation, as applied to a pair of sliding doors.

Fig. 2 is a side elevation, enlarged, of the same, as applied to one door.

Fig. 3 is a sectional plan view of the same taken in the horizontal plane of the dotted line 3-3 of Fig. 2.

Fig. 4 is an end view, partly in section, the section being in the vertical plane of the dotted line 4-4 of Fig. 2.

Figs. 5 and 6 are enlarged views of details.

Fig. 7 is a diagrammatic view of the operating circuit.

In said drawings, and referring more particularly to Figs. 2, 3, 4 and 5, I have designated the door by the letter A, the fixed support of the building to which it is slidably mounted as B, the motor as C, the bracket carrying the motor as D, the latter being secured to the support B.

The motor is so secured in the bracket as to bring its shaft 1 in a horizontal position at some distance from the door and approximately in line with the top thereof, so that the door will be between the support and the motor, as clearly seen in Figs. 3 and 4.

The motor shaft extends at one end to carry the worm 2 which operates a worm gear 3 on a transverse shaft 4 journaled in extension arms 5, 5, of the bracket D. The

worm gear shaft 4 extends at each end beyond the arms 5, one end carrying a spur gear 6 and the other a sprocket wheel 7, the latter being positioned adjacent the door A.

The bracket D is located adjacent one margin of the door opening in the support B, and another bracket E is secured to said support adjacent the opposite margin of the door opening. The bracket E carries at its lower end a sprocket wheel 8 in line with the sprocket wheel 7 and a sprocket chain 9 is mounted upon the wheels 7 and 8. One link of the chain 9 is secured at 10 to the door to operate the door in whichever direction the link of the chain is moving.

The door A will be mounted in any convenient manner to freely slide bodily to open or close the opening in the support B, and as this is not part of the present invention, I deem it unnecessary to illustrate and describe the door supporting and sliding means, but merely indicate same by the track 11 and wheels 12.

The spur gear 6 is enmeshed with a traveling rack bar 13 slidably mounted in suitable aligned guideways 14, 15. The guideway 14 is shown at the lower end of an extension 16 of the bracket D and the other guideway 15 being supplied by a bracket 17 secured to the support B. The lower face of the rack bar 13 is provided with projecting lugs or stop lugs 18, 19, suitably spaced apart. These lugs operate a switch bar 20.

Below the switch bar 20 are a pair of switches 21 and 22 in the electric circuit with the motor C, one switch (say the switch 21) acting to change or reverse the field of the motor and the other (switch 22) to break the circuit and stop the motor. These switches may be conveniently mounted on a bar 23 supported by the bracket 17 and the extension 16.

The switches 21 and 22 are provided with projecting operating members 24, 25, respectively, which enter suitable apertures 26, 27, in the movable switch bar 20 and by which said members 24 and 25 are moved to the right or to the left as said bar 20 is moved to the right or to the left with the rack bar 13.

It will be understood that to operate two doors, such as the doors A, A', shown in Fig. 1, the devices above described will be used, the only difference in the installation being to connect each door to a link of the sprocket chain and to have these connections

on different laps of the chain. Thus, as shown in Fig. 1, the door A will be connected at *a* to a link on the lower lap, while the door A' will be connected at *a'* to a link on the upper lap of the sprocket chain. When the motor shaft 4 is turning in one direction, as for example to the right or clockwise, the link on the upper lap connected to the door A' at *a'* will move to the right, while the link of the lower lap connected to the door A at *a* will move to the left. Thus the doors A' and A will separate, sliding to the right and left, respectively, and these doors will move in the opposite directions or toward each other, when the now reversed motor is again actuated and reverses the movement of the sprocket chain.

The motor C need not be further described as any conventional type of reversing motor may be used. The circuit will of course be provided with one or more operating switches 28, 29, located at convenient points of access, whereby the operator by turning same will close circuit, thereby energizing the motor and cause the door A or doors A and A', to open or to close, as the case may be.

I do not wish my invention to be limited to the particular arrangement nor to the specific details of construction herein illustrated, except as set forth in the appended claims; since it will be manifest that various changes therein will be required with different installations and will readily occur to the skilled mechanic. For example, the reciprocating parts *a*, *a'*, and 10, attached to the door or other sliding member to be acted upon, may be reciprocated by a drum, gearing or other conventional device instead of by the chain and sprocket shown.

While I have shown the invention as applied to a sliding door of a garage or other building, it will be manifest that it may be used upon other sliding members, such for example as a theatrical curtain, a slide or screen opposite an elevator shaft, shutter doors, large valves and the like.

I claim as my invention:

1. An apparatus for operating a door, curtain or other slidable member comprising a bracket secured to a fixed support, a motor on the bracket, a worm on the motor shaft, a second shaft rotatably mounted in said bracket, a worm wheel on said second shaft in mesh with the worm, a sprocket wheel and a spur wheel upon opposite ends of said second shaft, a second bracket on the fixed support, a sprocket wheel on said second bracket, a sprocket chain on said wheels, one link of which is secured to the slidable member, an electric circuit, a pair of switches therein, one to open and close the circuit and the other to reverse the field of the motor, and means for actuating said switches simultaneously.

2. An apparatus for operating a door,

curtain or other slidable member, comprising a shaft rotatably mounted on a fixed support, a sprocket wheel, a spur wheel and a worm wheel mounted on said shaft, a motor, a worm driven by the motor and in mesh with the worm wheel, a second sprocket wheel mounted upon a rotatable shaft and in line with the first mentioned sprocket wheel, an endless sprocket chain on said sprocket wheels, a slidable member secured to one link of the sprocket chain, an electric circuit, a pair of switches, one to open and close the circuit, and one to reverse the field of the motor, and means operatively connected with the spur gear and with said switches for actuating the latter simultaneously.

3. An apparatus for operating a door, curtain or other slidable member, comprising a shaft rotatably mounted on a fixed support, a sprocket wheel, a spur wheel and a worm wheel mounted on said shaft, a motor, a worm driven by the motor and in mesh with the worm wheel, a second sprocket wheel mounted upon a rotatable shaft and in line with the first mentioned sprocket wheel, an endless sprocket chain on said sprocket wheels, a slidable member secured to one link of the sprocket chain, an electric circuit, a pair of switches, one to open and close the circuit, and one to reverse the field of the motor, and means operatively connected with the spur gear and with said switches for actuating the latter simultaneously, said means including a reciprocating rack bar in mesh with and actuated by the spur gear, and connections between the rack bar and said switches.

4. An apparatus for operating a door, curtain or other slidable member, comprising a bracket secured to a fixed support, a motor on the bracket, a worm on the motor shaft, a second shaft rotatably mounted in said bracket at right angles to the motor shaft, a worm wheel on the second shaft in mesh with the worm, a sprocket wheel and a spur wheel on opposite ends of said second shaft, a second bracket on the fixed support, a sprocket wheel on said second bracket, a sprocket chain, one link of which is secured to the slidable member, an electric circuit, a pair of switches therein, one to open and close the circuit and the other to reverse the field of the motor, means for actuating said switches simultaneously, including a movable switch bar operatively connected with said pair of switches, a reciprocating rack bar operatively connected with the spur gear, and a pair of spaced apart lugs on the rack bar for alternately engaging and actuating the movable switch bar.

In testimony that I claim the foregoing as my invention I affix my signature this 20th day of March, 1924.

HARRY G. AINSWORTH.