Nov. 15, 1966 LE ROY H. EASTON 3,285,325

ACTUATOR FOR RETRACTABLE WALL

Filed March 19, 1964 2 Sheets-Sheet 1

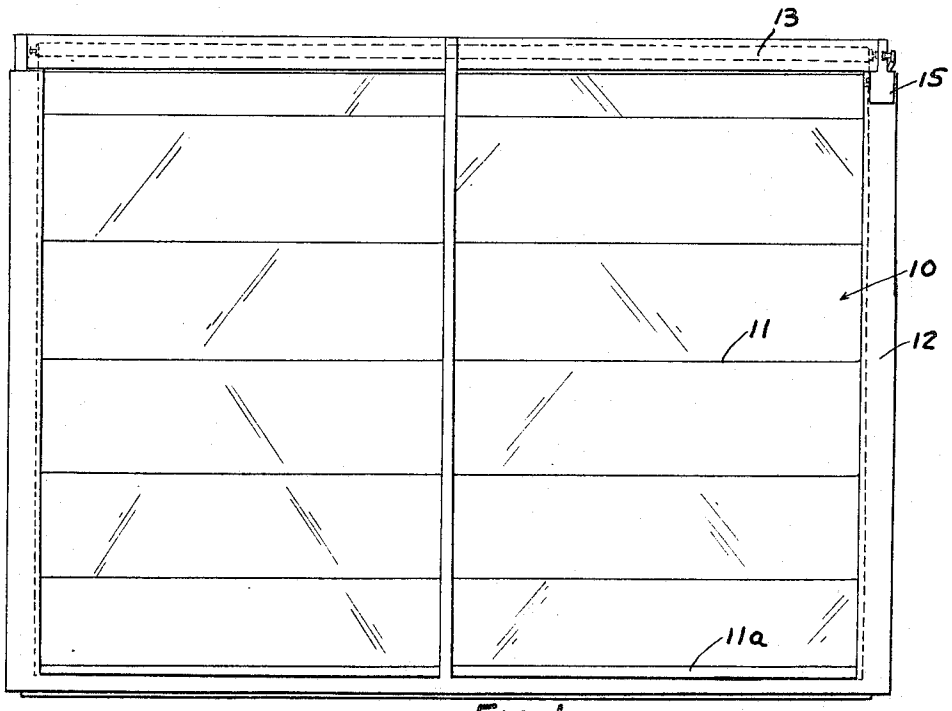


FIG. 1

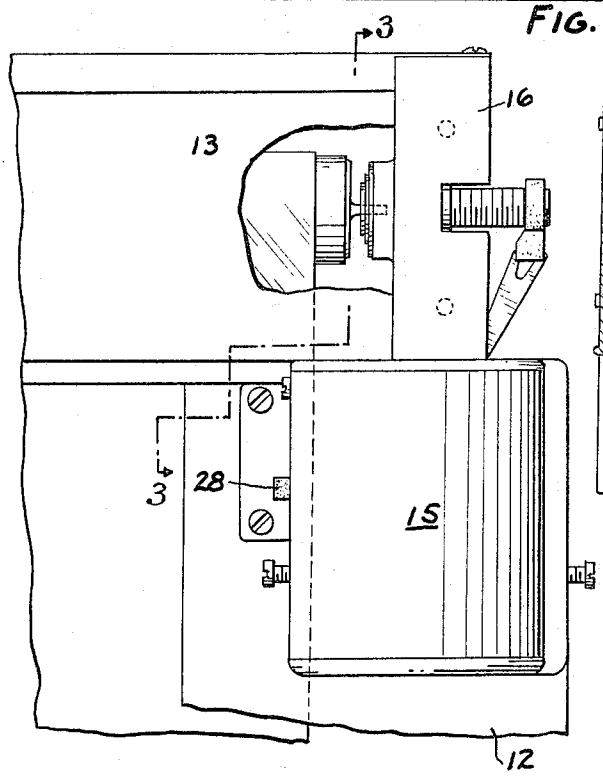


FIG. 2

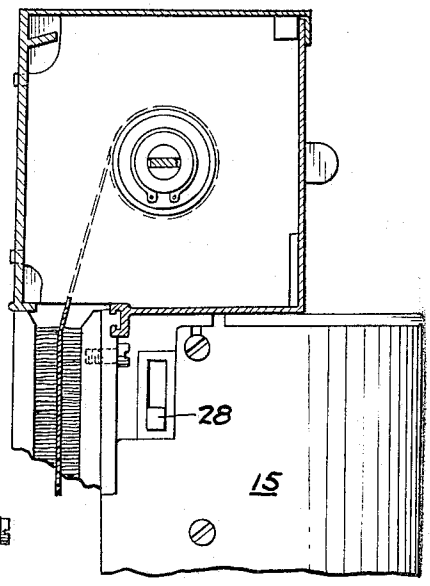


FIG. 3

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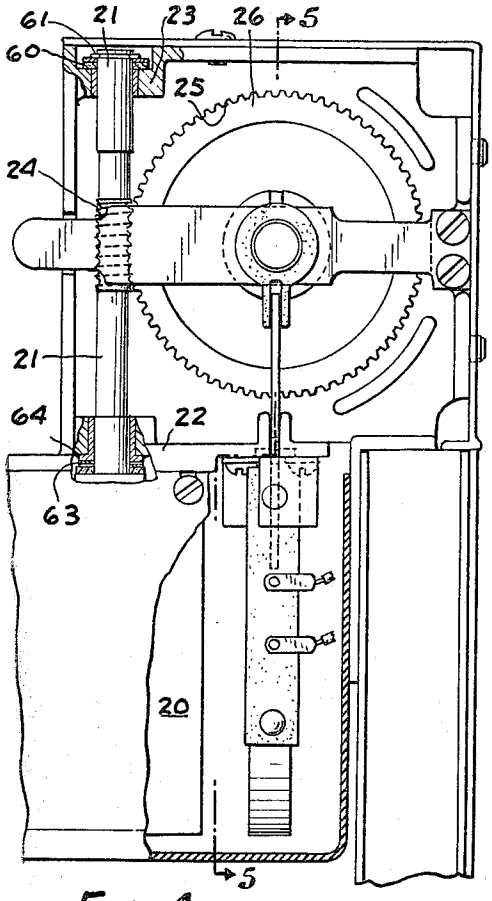


FIG. 4

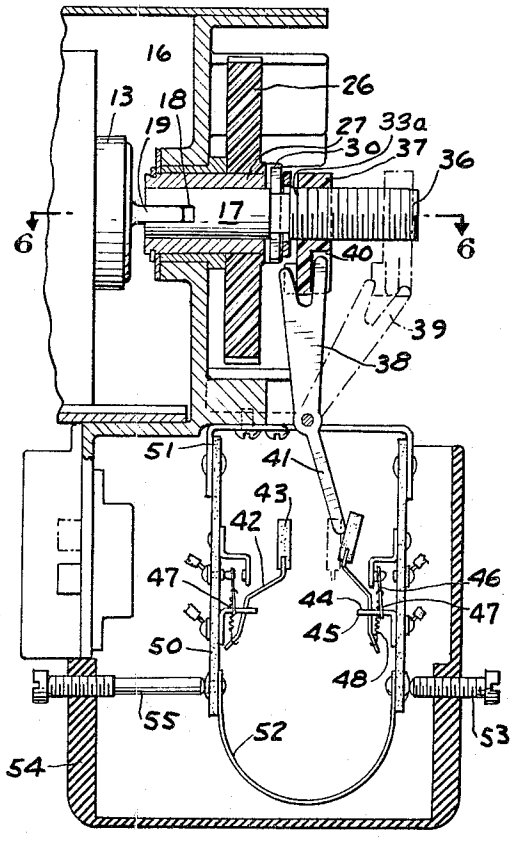


FIG. 5

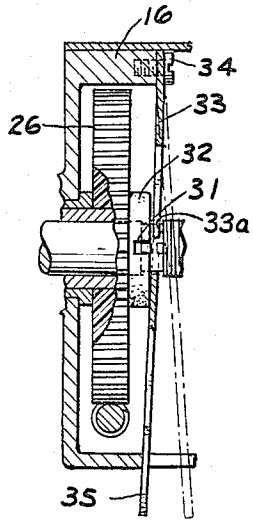


FIG. 6

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ACTUATOR FOR RETRACTABLE WALL

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2 Claims. (Cl. 160—310)

This invention relates to retractable walls and particularly to an electric actuator for such a retractable wall.

In the copending application Serial No. 67,062, filed October 25, 1960, titled Weatherproof Retractable Wall, now abandoned, there is disclosed and claimed a retractable wall that comprises a flexible panel including vertically spaced horizontal rods fastened to the panel. The panel is adapted to be wound and unwound on a roller.

It is an object of this invention to provide a novel actuator for raising and lowering the retractable wall.

It is a further object of the invention to provide such an actuator wherein the retractable wall may be raised manually in the event of power failure.

In the drawings:

FIG. 1 is an elevational view of a retractable wall embodying the invention.

FIG. 2 is a fragmentary view on an enlarged scale of the portion of the retractable wall embodying the actuator, parts being broken away.

FIG. 3 is fragmentary sectional view taken along the line 3—3 in FIG. 1.

FIG. 4 is a fragmentary end view of the actuator shown in FIG. 2, parts being broken away.

FIG. 5 is a fragmentary sectional view taken along the line 5—5 in FIG. 4.

FIG. 6 is a fragmentary sectional view taken along the line 6—6 in FIG. 5.

Referring to FIG. 1, the retractable wall comprises a flexible panel 10 having longitudinally spaced horizontal rods 11 therein which extend beyond the ends of the panel and ride in tracks 12 in the vertical members. The wall is adapted to be wound on a roller 13 to permit the interior of the room to be opened to the adjoining area.

In accordance with the invention, an actuator 15 is provided on the upper end of the retractable wall and is adapted to drive one end of the roller 13 to raise and lower the retractable wall. As shown in FIG. 2, the actuator comprises a frame 16 in which an output shaft 17 is journalled. The output shaft 17 has a slot 18 in one end thereof into which a projection 19 on the roller 13 extends.

The actuator 15 also includes a reversible electric motor 20 (FIG. 4) which has a drive shaft 21 journalled between the flanges 22, 23 of the frame 16. The drive shaft 21 is provided with a worm 24 that engages teeth 25 on the periphery of a gear 26, preferably made of plastic, journalled on a sleeve 27 around the output shaft 17. When the reversible motor 20 is operated, the drive shaft 21 rotates the gear 26. The control of the operation of the motor is achieved by a manual switch 28 (FIGS. 2 and 3), which is electrically connected to the motor in a manner not shown.

A manually disengageable clutch is provided between the gear 26 and the output shaft 17 in order to permit the drive from the motor to be disconnected in the event of power failure. This has the further advantage, as presently described, of not interfering with the setting of the contact for controlling the movement of the motor.

Specifically, the clutch comprises a square pin 30 that extends radially outwardly from the output shaft, the ends of the pin 30 engaging square radial slots 31 in the hub 32 of the gear 26. A flat spring member 33 has one

end thereof engaging the frame 16 and held in position by a screw 34. The face of the spring 33 engages and presses the pin 30 into the slot 31. Spring 33 includes a slot which engages a shoulder 33*a* on the output shaft. In the event of power failure, the other end 35 of the spring 33 can be engaged and moved to the dotted line position shown in FIG. 6, moving shaft 17 axially to disengage pin 30, permitting the roller 13 to be rotated independently of the drive from the motor including the gear 26. In this fashion, the great torque which would be required to turn the motor through the gear and drive shaft 21 is obviated.

In order to control the movement of the panel and stop the operation of the motor when the flexible panel is wound entirely on the roller 13 or when the flexible panel has been unwound to its lowermost position, the actuator 15 includes switches which will stop the operation of the motor.

As shown in FIG. 5, the other end of the output shaft 17 is threaded as at 36 and a traveling nut 37, preferably made of plastic, is threaded on the threaded end 36. A switch arm 38 is pivoted to the frame 16 about a generally horizontal axis and its upper end is bifurcated as at 39 to engage opposed slots 40 in the traveling nut so that as the nut travels back and forth to the rotation of the output shaft 17, the switch arm 38 is pivoted. The lower end 41 of the switch arm 38 is adapted to alternately engage the ends of actuating arms 42 of the switches. As shown, each actuating arm 42 has an insulator block 43 on the upper end thereof. Each arm 42 has shoulders 44 engaging the edges of a bracket 45 whereby the actuating arm 42 is pivoted on the bracket 45. An electrical flat spring contact member 46 similarly has shoulders 47 pivoting it to the bracket 45. A tension spring 48 extends between the lower end of actuating arm 42 and the contact 46. As each actuating arm 42 is pivoted from the solid line position shown on the left in FIG. 5 to the solid line position shown on the right in FIG. 5, it swings the contact member over center. In each switch, the respective actuating arm 42 is pivoted at 44 on the bracket 45, and similarly also a flat spring metal electrical contact arm member 46 is pivoted at 47 on the bracket 45, with a tension spring 48 connected between the lower swinging end of arm 42 and a point of the contact arm 46 above its pivot 47. For the normally closed condition, as shown at the left switch in FIG. 5, the spring 48, in tending to shorten and to pull the bottom end of 42 against the lower leg of the bracket 45, is located with its axis or line of action inward of the pivot axis at 44, thereby pulling and holding arm 46 in closed position. As the actuating arm is moved from its normally closed position by arm 41, then by the swing of its lower end the spring is further stretched and tensioned, and its line of action, approximately its axis (or the line between its points of attachment on arms 42 and 46), shifts outwardly across and beyond the pivot axis at 47, thereby snapping arm 46 to its open position as shown in solid lines for the switch at the right of FIG. 5, with spring 48 still under a tension greater than that for the closed position. As arm 41 retreats, the tension in 46 swings the lower end of arm 42 back toward the bracket, and snaps arm 46 to normally closed position when the spring axis or line of action has again passed inward of the pivot axis at 47. Thus, each switch is a normally closed switch with a spring returned actuating arm 42 which upon displacement by advance of arm 41 is thrown to open condition returning to normal closed condition upon retreat of arm 41.

Each bracket 45 of each switch is mounted on a thin, flat insulator block 50 which is riveted to a main bracket 51. Bracket 51 is formed with a slot through which a

screw 51*a* extends so that each bracket 51 is adjustably mounted on frame 16 to provide a rough adjustment of the position of the switch thereon. The insulator block 50 and bracket has some limited flexing movement relative to the frame 16 to permit adjustment of the time of engagement of the end 41 of the switch arm 38 with an actuating arm 42. The lower ends of block 50 are interconnected by a single flat spring 52 and the position of each block 50 and, in turn, of its corresponding contact is controlled by a screw 53 extending through housing 54 surrounding the motor 20 into engagement with the end of the blocks 50. Spring 52 adds rigidity and insures contact of blocks 50 with the ends of screws 53. In this fashion, the limits of the operation of the motor can be established by rotating the screws 53 inwardly and outwardly.

Since the manual disconnect clutch is provided between the gear and the output shaft, in the event of manual disengagement of the motor, the settings of the contact swiches are not disturbed because the traveling nut continues to rotate even if the roller 13 is moved manually. It may be noted that the manual disconnect may be needed in the event of a storm where there is a power failure and it is desired to pull the flexible panel downwardly and unwind it off of the roller in order to close the retractable wall.

It can thus be seen that there has been provided an actuator which is simple, efficient and effective for raising and lowering the flexible panel.

It has been found that it is preferable for the reversible motor to have a greater power in the direction of lifting of the flexible panel than in the direction of lowering the flexible panel, since there is a greater load in lifting the panel.

In order to prevent overtravel due to the weight of the panel 10 and rods 11 when the panel is being lowered to close the opening, a disc 60 of friction material is interposed between the C-clip 61 on the end of the drive shaft 21, and a corrugated spring 63 is interposed between a collar 64 in the casing 22 and the armature. The limit switch which controls the de-energization of the motor when the panel is being lowered is set to de-energize the motor just before the panel reaches its fully extended lowered position. The weight of the panel and rods causes a continued movement or coasting action until the lowermost rod or panel 11*a* (FIG. 1) strikes the base of the frame. During this movement, the weight of the panel 10 and rods 11 is transferred back through the gearing in the form of an upward thrust on the drive shaft 21. This maintains the spring 63 compressed between the armature and the flanged collar 64. When the bar 11*a* rests on the bottom of the frame, the weight of the panel 10 and rods 11 no longer produces an upward thrust on the drive shaft 21. As a result, the load spring 63 forces the drive shaft 21 downward, bringing the seat clip 61 against the friction disc 60 and forcing the friction disc against the frame 16. This positively stops the rotation of the drive shaft 21 and, in turn, the movement of the panel so that the panel is stopped in closed position without any slack in the panel and without any wrinkling of the panel.

I claim:

1. For use in raising and lowering a flexible retractable wall that is wound and unwound from a roller, the combination compising

an output shaft,

means for journalling the output shaft in position adjacent one end of the roller for a driving engagement with the roller,

a gear rotatably mounted on said output shaft,

a reversible electric motor,

means interengaging said electric motor and said gear,

clutch means between said output shaft and said gear,

said clutch means comprising a diametral pin in said output shaft and radial slots in said gear,

said pin having a square cross section,

and a spring arm engaging said output shaft and yieldingly urging said cross pin into engagement with said gear,

said spring arm being adapted to be manually tensioned and thereby remove the yielding force on said pin,

a traveling nut on said output shaft,

a switch arm pivoted for engagement and swinging motion with the movement of said traveling nut,

a pair of switches,

a flexible element individual to each said switch,

means for mounting one end of said flexible element in such a manner that the other end of said flexible element has limited angular movement,

means for mounting each said switch on its respective flexible element,

spring means interconnecting the free ends of said flexible element and yieldingly urging said free ends away from one another,

and means engaging and individual to each said flexible element for holding said lower end of said flexible element in fixed position against the action of said spring means, and

wherein the slotted portion of said gear is made of plastic material.

2. For use in raising and lowering a flexible retractable wall that is wound and unwound from a roller, the combination comprising

an output shaft,

means for journalling the output shaft in position adjacent one end of the roller for a driving engagement with the roller,

a plastic gear rotatably mounted on said output shaft,

a reversible electric motor,

means interengaging said electric motor and said gear,

clutch means between said output shaft and said gear,

a traveling nut on said output shaft,

a switch arm pivoted for engagement and swinging motion with the movement of said traveling nut,

a pair of contacts,

said contacts being alternately actuated by said switch arm to alternately control the movement of the electric motor in the two directions of drive,

each of said pair of contacts being adjustable independently of the other,

said clutch means comprising a diametral pin in said output shaft having a non-circular cross-section and radial slots in said gear,

and a spring arm engaging and yieldingly urging said cross pin into engagement with said gear,

said spring being adapted to be manually untensioned and to be manually tensioned and thereby remove the yielding force on said pin.

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