March 31, 1942. O. MOWERS ET AL 2,277,932

DOOR OPERATING MECHANISM

Filed Dec. 5, 1940

Fig. 2.

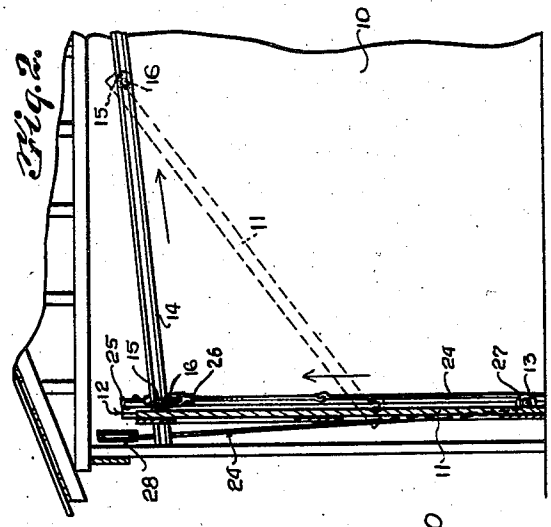


Fig. 3.

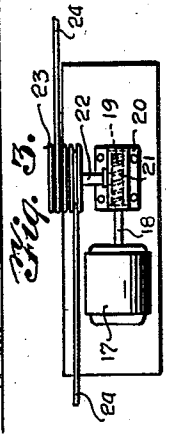


Fig. 4.

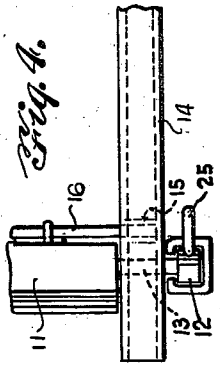
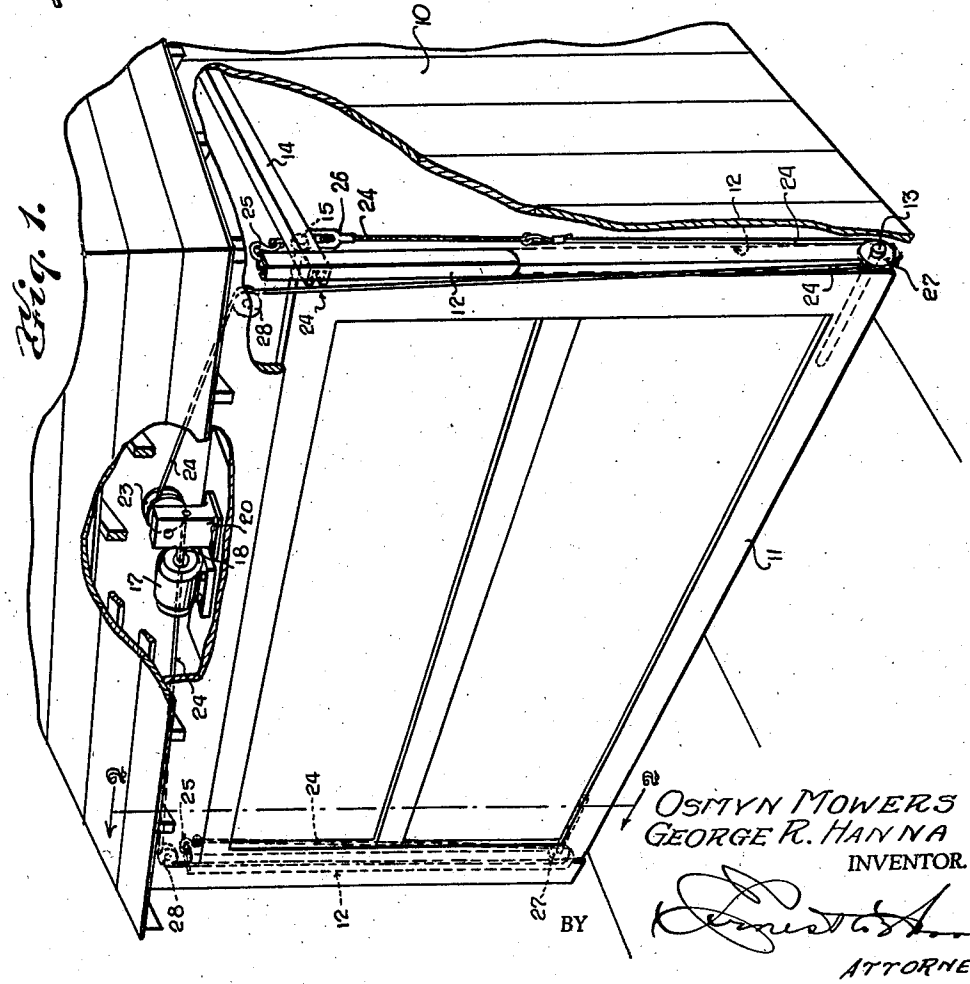


Fig. 1.



OSMYN MOWERS
GEORGE R. HANNA
INVENTOR.

ATTORNEY

Patented Mar. 31, 1942

2,277,932

UNITED STATES PATENT OFFICE

2,277,932

DOOR OPERATING MECHANISM

Osmyn Mowers and George R. Hanna,
Dallas, Tex.

Application December 5, 1940, Serial No. 368,677

4 Claims. (Cl. 268—59)

This invention relates to door operating mechanism and it has particular reference to such mechanism especially adaptable to garage doors.

The principal object of the invention is to provide a cable operated door wherein a single cable suffices as the actual suspending means for the door as it is moved thereby from one position to another through power supplied by a reversible motor.

Another object of the invention is to reduce to the very minimum the parts required to operate a door and which remain the same in number and function whether the door is for a single or double garage. Moreover, with little time and cost, the elements of the invention may be applied to any type of door in order to change the same from a swinging to an overhead type of door.

Another object of the invention resides in the provision of means for maintaining proper tension on the cable by which the door is actuated, should there be a tendency on the part of the cable to stretch or contract.

With the foregoing objects as paramount, the invention has particular reference to its salient features of construction and arrangement of parts which will become manifest as the description proceeds, taken in connection with the accompanying drawing, wherein:

Figure 1 is a fragmentary perspective view of a garage with portions broken away to show the operating elements of the invention, some of which are shown in dotted lines.

Figure 2 is a sectional view on line 2—2 on Figure 1.

Figure 3 is a detail plan view of the motor and cable drum, with encased speed reduction gears, and

Figure 4 is a fragmentary plan view of the door and guide rails or tracks.

Continuing with a more detailed description of the drawing, the building shown in Figure 1 is represented as a double garage 10, provided with a door 11. Mounted vertically at either end of the door are channel members 12, the channel in the foreground (Figure 1) being broken away at its lower end for clarity and continued with dotted lines.

The channels 12 are confronting, with their grooves directed toward the edges of the door and each receives at its lower end the laterally projecting end of a stub shaft 13, one of which is provided on each side of the door near the bottom thereof. While it is not essential, a small roller may be mounted on the stub shaft 13 to operate in the channel member 12.

Adjacent the top of the door 11, on either side thereof, there is mounted a channel member 14. These channels are likewise confronting and are disposed on an incline or slight angle relative to the vertical channels 12. A roller 15 is arranged to operate in each channel 14 and these rollers are each connected to the door near the top by means of a shaft 16 (Figure 2).

It is apparent from the foregoing that when a pull is exerted on the lower portion of the door 11, the top thereof will be thrust inward as the initial movement as the cable 24 becomes taut so that the power required to lift the door to open position will be lessened and will gradually be reduced as the door, guided by the rollers 13 and 15, operating in their channels 12 and 14 respectively, is raised.

To accomplish the foregoing, a reversible motor 17 is mounted above the door, inside of the building and whose armature shaft 18 carries a worm 19, disposed in a housing 20. This worm engages a worm gear 21 whose shaft 22 extends from the housing and carries a drum 23. A simple electric circuit (not shown) supplies the motor 17 with current to rotate the drum 23.

It is to be noted that only a single length of cable 24 will be required to operate the door since this cable is passed through an opening diametrically arranged in the drum 23 and the ends thereof threaded over and under the series of pulleys to be presently identified and described. The cable 24, of course, is secured at the point where it passes through the drum 23 so that when the latter is rotated, an equal amount of cable will be taken up and let out to insure uniform effect upon the door 11.

The free ends of the cable 24 are each provided with a hook 25 to engage over the upper ends of the channels 12, as a suitable form of cable anchor. Spaced from each anchor end of the cable 24 is a turnbuckle 26 whose incorporation in the length of cable on either side of the drum enables the cable to be adjusted as to tension.

The cable extends from its point of securement by hooks 25 under a pulley 27, one of which is mounted on each stub shaft 13, thence upward alongside the door 11 and over a pulley 28 above the door and in substantial alignment with the side edges thereof but resting against the outer surface near the edge so that, when tightened by initial movement of the drum 23, will thrust the door inward at the top. The cable then extends to and through the drum 23, where it is fastened,

thence over pulley 28 on the opposite side of the door opening and downward under pulley 27 thence upward alongside the door 11 to a point where it is anchored to the top of the companion channel 12 on the opposite side of the door.

In operation, when the circuit to the motor 17 is closed by a suitable switch located at the garage, the dwelling adjacent the garage or in the driveway, the motor rotates the drum 23 and due to the manner of its securement to the drum, the cable is wound thereon in a clockwise and counter-clockwise direction, exerting an equal pull on the door at the points where the cable is passed under pulleys 27. The peculiar manner in which the cable 24 is disposed relative to the face of the door causes the upper portion of the door to be thrust inwardly so that sufficient impetus will be given the same on the initial opening movement that the motor is relieved of undue strain. Once set into motion, the upper end of the door travels along the channel 14 while the lower end thereof is constrained to move vertically by reason of the roller engagement with the vertical channels 12. When the door has been raised to a position substantially equal to the plane of the channels 14, the motor circuit is broken automatically in the usual manner and the motor reverses. Further closing of the circuit will result in lowering of the door 11 to its original closed position preparatory to further operation.

Manifestly, the construction as shown and described is capable of some modification and such modification as may be construed to fall within the scope and meaning of the appended claims is also considered to be within the spirit and intent of the invention.

What is claimed is:

1. In a door mounted in a frame for upward and tilting movement, an operating means therefor comprising vertically disposed guide channels on either side of said door, a pair of analogous guide channels inclined rearwardly from said door and whose forward ends are disposed inwardly and across the upper ends of said vertical guide channels, a cable drum mounted above said door midway between said vertical guide channels, rollers mounted adjacent the upper corners of said door and operable in said inclined guide channels, rollers mounted adjacent the lower corners of said door, pulleys disposed above the upper ends of said vertical guide channels and forwardly of said door, a cable connected midway between its ends to said drum, and threaded over said pulleys and under said last named rollers and anchored above said door whereby the downward lead thereof will lie forwardly of said door and means for rotating said drum to wind said cable thereon.

2. In a door mounted for vertical and tilting movement, operating means therefor comprising a pair of vertical guide channels and a pair of inclined channels whose forward ends are disposed inwardly and across said vertical channels, means for suspending the upper portion of said door for movement along said inclined channels, a cable drum, a cable connected midway between its ends to said drum, pulleys disposed above and forwardly of said door at either side thereof, rollers carried by the lower corners of said door, said cable being passed over said pulleys and under said rollers and anchored above said door and means for rotating said drum to wind said cable whereby to raise said door.

3. In a door mounted for vertical and tilting movement, an operating means therefor comprising vertical guide channels with which the lower portion of said door is constrained to travel, a pair of rearwardly inclined guide rails whose forward ends lie across the upper ends of said vertical guide channels on the inner sides thereof and with which the upper portion of said door is constrained to travel, rollers mounted adjacent the lower corners of said door, a cable drum, a cable arranged to be wound in two directions on said drum, having its oppositely extending leads overlying a portion of the front of said door and underlying said rollers and anchored above said door whereby tension imposed on said leads by rotation of said drum will impart an inward thrust to the upper portion of said door during the initial opening movement thereof and means for rotating said drum.

4. A door operating means as set forth in claim 3 in which the cable leads on opposite sides of the cable drum are provided with length adjusting means, said means comprising turnbuckles incorporated in the said leads next adjacent to the anchors thereof.

OSMYN MOWERS.
GEORGE R. HANNA.