Dec. 12, 1950 J. M. BUNCH 2,533,423

MECHANISM FOR OPENING AND CLOSING DOORS

Filed June 17, 1947 2 Sheets-Sheet 1

Fig. 1.

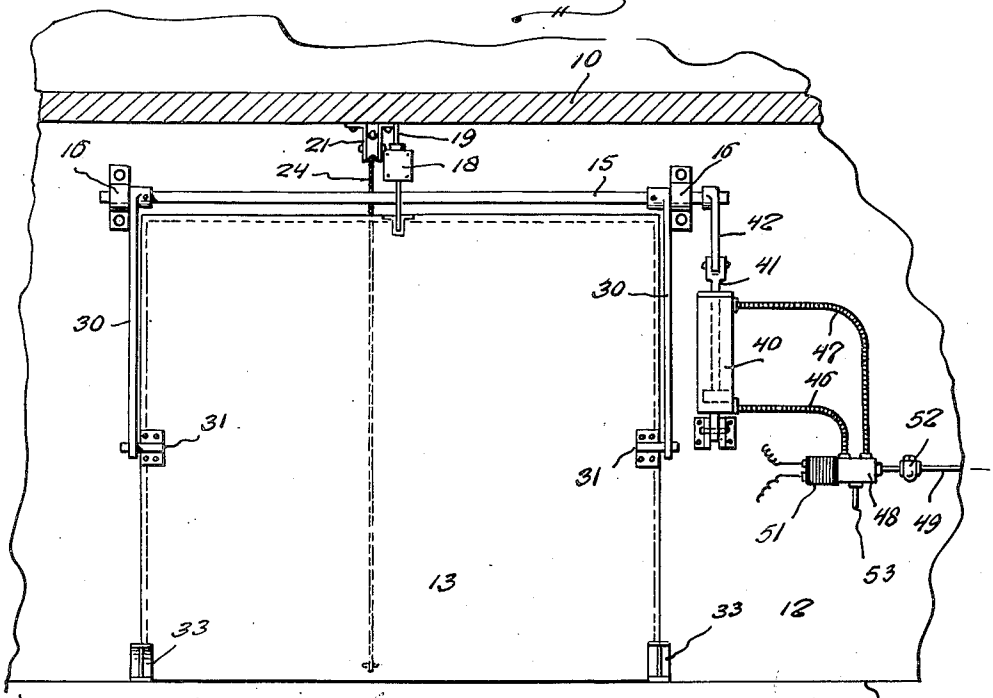
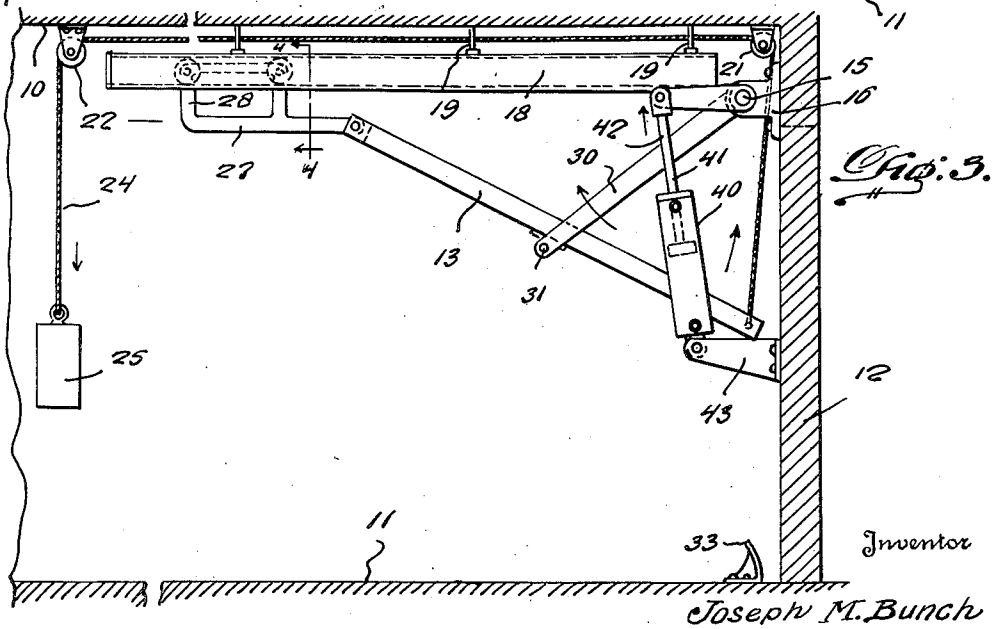


Fig. 3.



Inventor

Joseph M. Bunch

By McMorrow, Berman & Davidson

Attorneys

Dec. 12, 1950 J. M. BUNCH 2,533,423

MECHANISM FOR OPENING AND CLOSING DOORS

Filed June 17, 1947 2 Sheets-Sheet 2

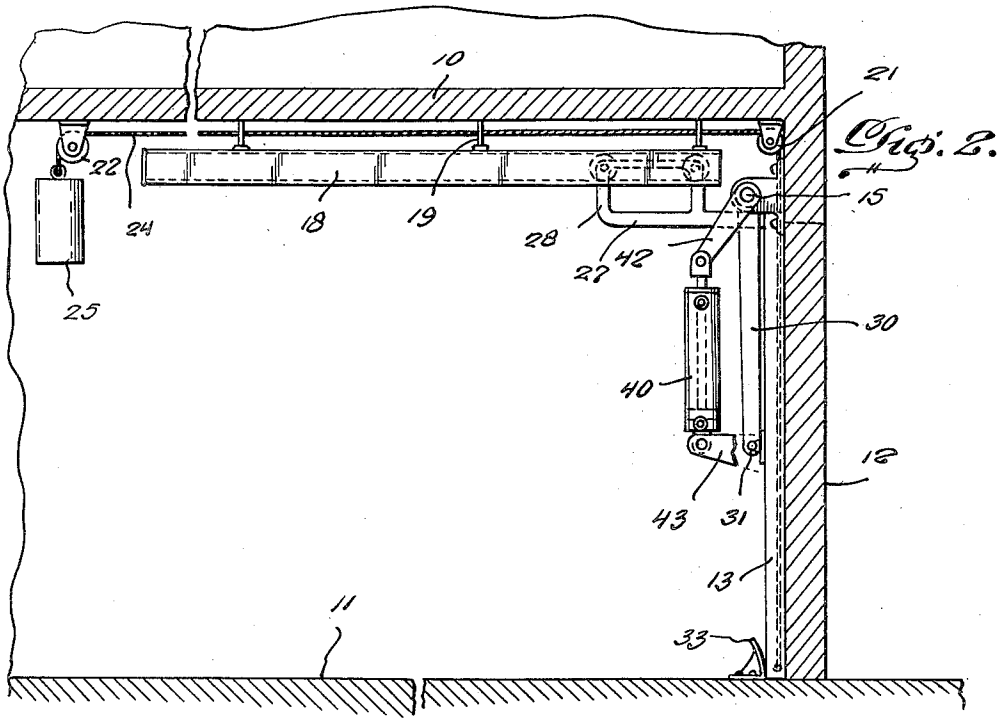


Fig. 2.

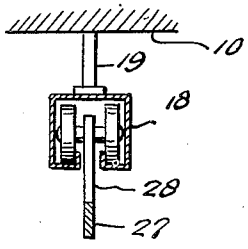


Fig. 4.

Inventor
Joseph M. Bunch,

By McMorrow, Berman & Davidson
Attorneys

Patented Dec. 12, 1950 2,533,423

UNITED STATES PATENT OFFICE

2,533,423

MECHANISM FOR OPENING AND CLOSING DOORS

Joseph M. Bunch, Ferguson, Mo.

Application June 17, 1947, Serial No. 755,117

2 Claims. (Cl. 268—75)

1

This invention relates to means for opening and closing doors by remote control, and more particularly to such means for opening and closing overhead garage doors.

A principal object of the invention is to provide a mechanism for swinging a garage door so that the top of the door moves horizontally while the bottom moves vertically. While the invention is shown applied to a garage door, it is to be understood that it is equally applicable to other types of doors and also to windows and other closures.

The invention contemplates a horizontal overhead track on which the top portion of the door is carried horizontally, and a counterweight attached to the bottom portion of the door to facilitate the movement thereof. The power means for actuating the door may be hydraulic or electric, and may be positioned adjacent the door or at a remote station.

A preferred embodiment of the invention is illustrated in the accompanying drawings, but it is understood that modifications may be made therein without departing from the spirit of the invention as hereinafter claimed.

Figure 1 represents a rear elevation of a single garage door equipped with the mechanism of the present invention, the view being taken from inside the structure.

Figure 2 is a sectional view of the garage structure, taken at right angles to the showing of Figure 1.

Figure 3 is a section similar to Figure 2, but showing the garage door in the process of being raised and opened.

Figure 4 is a vertical section through the overhead track hereinbefore mentioned, taken along the line 4—4 of Figure 3.

The drawings show a garage or similar structure comprising a ceiling 10, a floor 11, and a front wall 12. A single garage door 13 is complementary with the front wall 12, but it is obvious that two or more doors may be substituted.

A horizontal shaft 15 is mounted in bearings 16 which are secured to the front wall 12. A horizontal track 18 runs longitudinally of the structure, at right angles to the front wall 12, and is supported from the ceiling 10 by means of a series of stringers 19. A front pulley 21 and a rear pulley 22 are also attached to the ceiling 10, and a cable 24, carrying a counterweight 25 at the rear end, is attached at the front end to the bottom of the door 13. The top of the door 13 is hinged to a horizontal arm 27 that forms part of a carriage 28 that is adapted to ride on

2

the track 18. It is obvious, therefore, that if the top of the door 13 is moved horizontally along with the carriage 28, the bottom of the door 13 rides vertically, the movement of the door 13 being facilitated by the counterweight 25.

The shaft 15 is slightly longer than the door 13. At the ends of the shaft 15 are fixed two arms 30, and the free ends of the arms 30 are pivoted to the door 13 by means of two pintles 31 secured to approximately the mid-portion of the door 13. The dimensions of the arms 30 are such that when the arms 30 are in a vertical position, as indicated in Figure 2 of the drawings, the door 13 will also be vertical, the lower portion of the door 13 abutting the floor 11. To aid in the movement of the lower portion of the door 13, an arcuate guide 33 may be fixed to the floor 11 slightly back of the closed position of the door 13, so that the door 13 will be guided properly as it descends.

One type of door control comprises a hydraulic cylinder 40, that contains a plunger 41. The top of the plunger 41 is pivoted to one end of a link 42, the other end of which is made fast to one end of the shaft 15, as illustrated in Figure 1 of the drawings. The cylinder 40 is pivotally supported on a bracket 43 that is secured to the front wall 12. Two conduits 46 and 47 lead to the bottom and the top of the hydraulic cylinder 40, respectively, and a valve 48 controls the flow of fluid from a supply line 49 to either one of the conduits 46 and 47. A motor 51 controls the valve 48. A check valve 52 may lock the valve 48 in the open or closed position of the door 13, as will be more fully described hereinafter. A drain 53 permits escape of undesired fluid from the conduits 46 and 47 and from the valve 48. As is obvious, the valve 48 and accompanying elements may be situated at a point remote from the door 13.

In the operation of the device, the motor 51 is energized to permit fluid to pass through the conduit 46 into the bottom of the cylinder 40. The plunger 41 will be actuated upwardly, and the link 42 will turn the shaft 15 clockwise, as indicated in Figure 3 of the drawings. The arm 30 fixed to the shaft 15 will also turn clockwise, and since the bottom of the door 13 is constrained to vertical movement, the top of the door 13 will slide horizontally with the carriage 28. The device is so designed that when the door 13 is fully open, it is either horizontally positioned adjacent the ceiling 10, or the bottom of the door 13 is sufficiently high to avoid interference with persons or vehicles entering the structure.

After the door 13 has assumed its open position, the check valve 52 will automatically lock the door 13 in such positidn.

To close the door 13, the valve 48 is actuated to operate the plunger 41 in the opposite direction, whereupon the door 13 is swung about its pintles 31 to achieve the vertical position shown in Figure 2. Thereupon, the check valve 52 is once more operated to lock the door 13 in closed position.

If desired, an electric motor control may be substituted for the hydraulic cylinder 40 and its associated members. All that is necessary is that the control means actuate the link 42 to rotate the shaft 15 in one direction to open the door and in the opposite direction to close the door. Also, it is not essential that the cable 24 be attached to the bottom end of the door 13. If desired, the cable 24 may be attached to a point on the door 13 some distance above the bottom, so that this point will ride vertically, the portion of the door 13 below this point thereupon constituting a projecting canopy outside the garage wall 12 when the door 13 is fully open. Also, the vertically moving portions of the door 13 may be held in guideways in the door jambs of the front wall 12.

I claim:

1. The combination with a garage including a ceiling, a front wall provided with a door opening, and a door positioned in face to face relation with respect to the door opening, of a raising and lowering mechanism operatively connected to said door, said mechanism comprising a horizontally disposed track positioned in parallel spaced relation with respect to said ceiling adjacent to said front wall and dependingly supported from said ceiling, a carriage mounted in said track for back and forth movement therealong, a horizontally disposed arm dependingly carried by said carriage and having one end pivotally connected to one end of said door, a horizontally disposed shaft arranged transversely of said track and rotatably supported on the inner face of said front wall adjacent the upper end of the latter, a second arm positioned adjacent one of the sides of said door and having one end pivotally connected to said door intermediate the ends of the latter an having the other end fixedly secured to said shaft, a third arm positioned adjacent the other side of said door and having the other end pivotally connected to said door intermediate the ends of the latter and having the other end fixedly secured to said shaft, a hydraulic cylinder positioned adjacent said door opening and pivotally supported on inner face of said wall, a plunger positioned within said cylinder and mounted therein for back and forth movement, a link having one end pivotally connected to said plunger and having the other end secured to said shaft, a source of fluid pressure operatively connected to said cylinder for causing the up movement of said plunger and simultaneous rotation of said shaft in the direction to effect the raising of said door and for causing the down movement of said plunger and simultaneous rotation of said shaft in the direction to effect the lowering of said door, and a weight movably and dependingly supported from said ceiling and operatively connected to other end of said door for counterbalancing said door.

2. The combination with a garage including a ceiling, a front wall provided with a door opening, and a door positioned in face to face relation with respect to the door opening, of a raising and lowering mechanism operatively connected to said door, said mechanism comprising a horizontally disposed track positioned in parallel spaced relation with respect to said ceiling adjacent to said front wall and dependingly supported from said ceiling, a carriage mounted in said track for back and forth movement therealong, a horizontally disposed arm dependingly carried by said carriage and having one end pivotally connected to one end of said door, a horizontally disposed shaft arranged transversely of said track and rotatably supported on the inner face of said front wall adjacent the upper end of the latter, a second arm positioned adjacent one of the sides of said door and having one end pivotally connected to said door intermediate the ends of the latter and having the other end fixedly secured to said shaft, a third arm positioned adjacent the other side of said door and having the other end pivotally connected to said door intermediate the ends of the latter and having the other end fixedly secured to said shaft, a hydraulic cylinder positioned adjacent said door opening and pivotally supported on inner face of said wall, a plunger positioned within said cylinder and mounted therein for back and forth movement, a link having one end pivotally connected to said plunger and having the other end secured to said shaft, a source of fluid pressure operatively connected to said cylinder for causing the up movement of said plunger and simultaneous rotation of said shaft in the direction to effect the raising of said door and for causing the down movement of said plunger and simultaneous rotation of said shaft in the direction to effect the lowering of said door, a weight, a pair of spaced pulleys dependingly supported from said ceiling, and a cable trained over said pulleys and having one end connected to said weight and having the other end connected to the other end of said door for counterbalancing said door.

JOSEPH M. BUNCH.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
647,671	DeLew	Apr. 17, 1900
683,102	Colby et al.	Sept. 24, 1901
693,952	Cross	Feb. 25, 1902
1,191,697	Hild et al.	July 18, 1916
1,431,174	Ogden et al.	Oct. 10, 1922