July 13, 1943. A. C. D'ALFONSO 2,324,138

OVERHEAD GARAGE DOOR

Filed Feb. 12, 1940

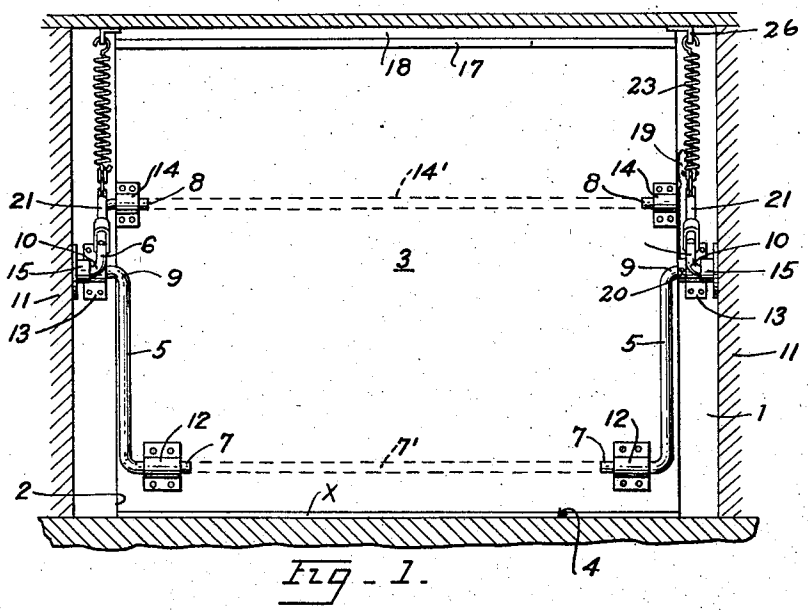


Fig. 1.

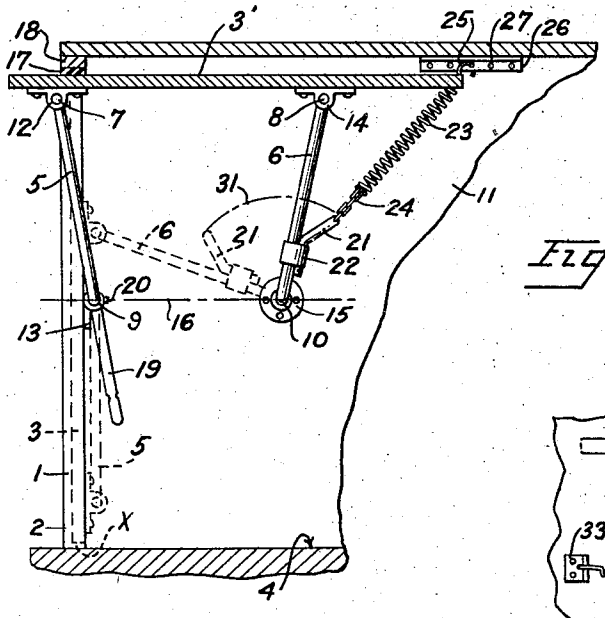


Fig. 2.

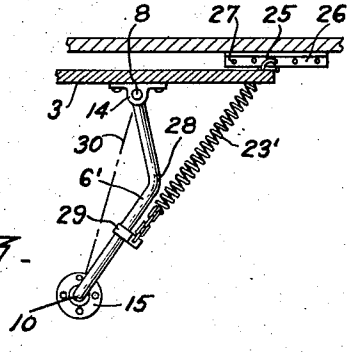


Fig. 3.

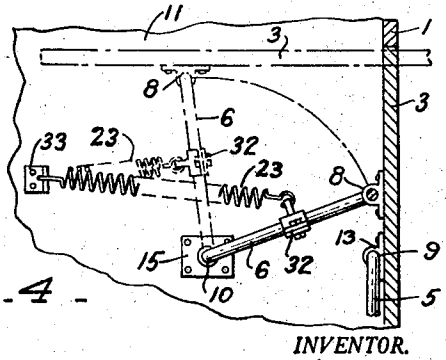


Fig. 4.

INVENTOR.

ALEXANDER C. D'ALFONSO

BY J. A. Bried

ATTORNEY.

Patented July 13, 1943

2,324,138

UNITED STATES PATENT OFFICE

2,324,138

OVERHEAD GARAGE DOOR

Alexander C. D'Alfonso, Santa Barbara, Calif.

Application February 12, 1940, Serial No. 318,467

5 Claims. (Cl. 20—16)

The invention relates to garage doors of the overhead swinging type. This application is a continuation in part of my copending applications filed under Serial No. 134,884 on April 3, 1937, and Serial No. 184,985, filed January 14, 1938, combining the species originally shown in Fig. 3 of the first case with a modification of the same species shown in the second case, and to take the place of the latter case. The object of the invention is to provide improvements in the arrangement of door suspension and springs which makes the door simpler to install and better in its operation. Other advantages of the invention will appear in the following description and accompanying drawing.

In the drawing:

Fig. 1 is an elevation of my improved door mounting arrangement showing the closed door as seen from inside of the garage.

Fig. 2 is a vertical central section of the door taken at right angles to the view of Fig. 1, and showing the same in open or overhead position.

Fig. 3 is a side elevation of one of the rear guiding levers, showing a modified form thereof.

Fig. 4 is a side elevation similar to that of Fig. 3 but showing a still further modification.

Briefly described, the invention comprises an overhead swinging door mounting, and wherein the door is bodily suspended on one pair of pivoted arms when closed, and pivotally carried on two pairs of pivoted arms or links during opening and when open, and spiral tension springs are connected to the upper, rearmost set of arms to assist in raising the door, the invention having principally to do with the form of and positioning of the members in relation to one another whereby easier installation and better operation of such doors is achieved.

In the drawing the front wall of the garage or door frame is designated 1, the opening for the door 2, and the door itself 3 and the garage floor 4.

The door is, in opeartion, carried on two pairs of pivoted arms 5 and 6 arranged adjacent both vertical edges of the door and both pivoted at one end on horizontal axes 7 and 8 respectively to the door, and at the other ends on horizontal axes 9 and 10 to fixed points on or adjacent the side walls 11 of the garage. When the door is closed arms 5 (as shown in dotted lines), hang vertically in position to carry the entire weight of the doors and positively determine its clearance from the floor.

The arms at each edge of the door may be in line with one another when viewed as in the showing of Fig. 1, but are there displaced laterally to avoid confusion in the drawing, also to keep the springs beyond the edge of the door.

The lower set of arms 5 are substantially S shaped in having their ends oppositely directed as shown in Fig. 1, and with the lower inwardly directed ends 7 pivotally engaging in bearings 12 secured to the door, and upper outwardly directed ends 9 pivotally suspended in bearings 13 secured to the front inner wall or door jamb (or side wall of the garage if close enough). The lower ends 7 of arms 5 may if desired extend clear across the inner face of the door and be joined as dotted at 7' if the greatest strength is desired.

The upper set of arms 6 are also S shaped and the inwardly turned ends 8 of the upper arms are pivotally carried in bearings 14 secured to the door and may also be extended to join together as dotted at 14' if desired. The opposite ends 10 of these arms are outwardly directed and pivotally carried in bearings 15 secured to the side walls 11 of the garage or to a suitable post if no side wall is near enough.

The bearings 12 are secured to the door near its lower edge, and the bearings 14 about one third way down from the upper end, and the two sets of arms are preferably both of the same length, and positioned so that the pivotal axes of their other ends fall on the same level or horizontal line 16 as indicated in Fig. 2, and the fixed axes so placed that when the door is swung upwardly and inwardly to overhead position 3' (see Fig. 2) with the door striking a suitable stop such as a rubber bumper 17 on the underside of the upper doorway lintle 18, arms 5 will be slightly inclined iwardly toward their lower pivotal ends 9, and arms 6 will be slightly angularly inclined in the opposite direction as shown in this figure. As the arms may be duplicates in length, the same arm serves for all four and thus simplifies manufacture. Also they are all very short so as to cost very little for material compared with the very long arms used heretofore, an important feature in a highly competitive art.

When the door is swung down to vertical closed position the arms will take the dotted positions indicated in Fig. 2, and any desired form of stops and latch (not shown) may be provided for locking or latching the door when closed.

At least one of the outwardly turned ends 9 of arms 5 is preferably provided with an operating handle or lever 19 suitably secured through its hub to end 9 of arm 5 as by a pin 20. By pulling this handle from upper position shown

in Fig. 1 to the lower position shown in Fig. 2 the door will be opened and vice versa. Arms 6 are preferably provided with rearwardly and upwardly extending brackets 21 (as viewed in Fig. 2) firmly secured to the arms as at 22 or by welding thereto and to the rear ends of which brackets powerful helically coiled tension springs 23 are connected as by several chain links 24, while at the opposite end the springs each connect as at 25 with a suitable anchoring bolt or device secured to the side wall or top of the garage and which anchoring device may take the form of an angle plate 26 with several holes 27 in it and into any of which the end hook 25 of the spring may be engaged to adjust the tension of the springs at the time of or after the installation is made if desired. The tension of the springs may also be adjusted by changing the number of links 24 of the short chain at the lower end of the springs or in any other desired manner.

Instead of arms 6 being straight and provided with rearwardly and upwardly extending brackets 21 as shown in Fig. 2, they may, as shown in Fig. 3 at 6', be angularly bent to form an elbow as at 28 and the lower ends of the spring 23' connected to a clamp collar 29 adjustable along the bent arm toward or from the elbow to vary the tension, and by which construction the spring connecting point to the arm may assume the same offset relation to a straight line 30, extended between the upper and lower pivotal axes of the arms, as it would in the showing of Fig. 2.

The helical springs 23 are, when the door is overhead, extended preferably at an angle of about 45 degrees from a vertical line dropped from the upper anchor pin, and are of a length to be then almost relaxed or under slight tension only, and whereby, due to the angular position of the arms and points of pivoting and connection of the springs, when the door is swung forward (to the left) from its overhead position shown in Fig. 2, the lower end of the springs swing upwardly along an arc 31 struck from the pivotal lower ends 10 of arms 6 so that very little tension is put upon the springs until the door begins to descend, and whereupon the tension quickly increases to carry the weight of the door, thus forming an increasing counterweight substantially balancing the door perfectly at all points and making it extremely easy to start either up or down, yet preventing its falling, all so that a slight pressure in either direction on handle 19 will effectively swing a large massive double or triple garage door from either position.

More carefully analyzed, a study of Figs. 2 and 3 will show that with the door open the forward angle of arms 5 give the overhead door a tendency to fall, while the very slight rearward angle of arms 6 counteract this tendency so that the door is stabilized by its own weight, and springs 23 being connected to arm 6 at a point so far offset rearwardly from a straight line 30 connecting pivots 8 and 10, instead of immediately being put under increased tension as the door is swung toward closed position simply swing upward on arcs 31 until they start downward before they begin to retard the movement of the door, and this makes the door very easy to operate. This desired effect has not been heretofore secured with so simple an overhead door mounting insofar as I am aware, as prior constructions using helical springs made it too difficult for a person of ordinary strength to operate the door.

Another advantage, particularly with the spring hooked to the elbow as shown in Fig. 3, is that the spring itself acts as a resilient stop for the arm against excessive, rearward motion of the door, thus making it possible to avoid the use of a resilient bumper strip at 17. This advantage is not had with the arrangement of Fig. 4.

The arrangement of arms shown in Fig. 4 is substantially the same as that above described for Figs. 1 to 3 but does not have the advantages contributed by elbow 6' or definite rearward offset 21. In this form the elements already described are similarly numbered except that arm 6 when in the upper dotted position with the door open is not inclined rearwardly as much as shown in Figs. 2 and 3 and the spring 23 is pivotally anchored at its rear end at 33 on a lower place on the garage, and pivotally connected at its forward end to a bracket 32 clamped to an intermediate point on arm 6. The spring is under more tension than in Figs. 2 to 3 to keep the door from falling. But attention is called to the fact that with either construction the accidental breakage of a spring will never cause the door to sag as its entire weight when closed is carried by arms 5 in which it is suspended as in a cradle, and thus the clearance X under the lower edge of the door above the flat floor 4 is always maintained, whereas with some forms of such doors the breakage of a spring drops the door to the floor and makes it inoperative.

Having thus described my improvement in a door mounting of the kind set out, what I claim is:

1. In an overhead swinging garage door guided from vertical closed position to substantially horizontal overhead position on two pairs of pivoted arms, one pair pivoted on horizontal axes each at one to the lower part of the door, and at the other end to a fixed higher point on the garage structure, and the other pair similarly pivoted at one end each to the upper part of the door and at the opposite end to a point on the garage about midway in the height of the doorway, a coiled tension spring anchored at one end to a fixed point adjacent to the upper part of the garage and connected at its other end with one of the upper pair of arms at a point which is substantially on a line passing through said fixed point and the fixed pivot of the arm when the door is fully open.

2. In an overhead swinging garage door guided from vertical closed position to substantially horizontal overhead position on two pairs of pivoted arms, one pair pivoted on horizontal axes each at one end to the lower part of the door, and at the other end to a fixed higher point on the garage structure, and the other pair similarly pivoted at one end each to the upper part of the door and at the opposite end to a point on the garage about midway in the height of the doorway, a coiled tension spring anchored at one end to a fixed point adjacent to the upper part of the garage and connected at its other end with one of the upper pair of arms in a manner to exert a pull on the same to substantially counterbalance the weight of the door in swinging from one position to the other, the arm to which the coiled spring is connected being bent to provide an elbow about midway in the length of the arm and adjacent which elbow said connection is made so as to be offset a substantial distance rearwardly from a straight line extending through the pivotal points of both pivoted ends of the arm as viewed when the door is overhead,

said coiled tension spring being substantially in line with the lower portion of the bent arm when the door is overhead and in position to resiliently stop said arm against excessive rearward movement.

3. In an overhead swinging garage door adapted to swing through a doorway from closed vertical position to overhead substantially horizontal open position, a rigid door, means suspending the door in closed position comprising a pair of door suspending arms substantially vertically disposed respectively at opposite vertical margins at the rear of the door each pivotally connected at its lower end to the door adjacent its lower end on a horizontal axis and each pivotally connected at its upper end on a fixed horizontal axis carried by the garage structure about midway in the height of the door in a manner adapted to carry the full weight of the door when closed, and a pair of guiding arms for the upper part of the door each respectively pivoted at one end to the vertical margins of the door on a horizontal axis above the center of the door, said guiding arms extending rearwardly from the closed door and each pivoted at its inner end to the garage on a horizontal axis substantially midway in the height of the door, and a pair of helical tension springs pivotally connected respectively at one end each to an intermediate point on said guiding arms and pivotally connected at the opposite end to the garage.

4. In an overhead swinging garage door adapted to swing through a doorway from closed vertical position to overhead substantially horizontal open position, a rigid door, means suspending the door in closed position comprising a pair of door suspending arms substantially vertically disposed respectively at opposite vertical margins at the rear of the door each pivotally connected at its lower end to the door adjacent its lower end on a horizontal axis and each pivotally connected at its upper end on a fixed horizontal axis carried by the garage structure about midway in the height of the door in a manner adapted to carry the full weight of the door when closed, and a pair of guiding arms for the upper part of the door each respectively pivoted at one end to the vertical margins of the door on a horizontal axis above the center of the door, said guiding arms extending rearwardly from the closed door and each pivoted at its inner end to the garage on a horizontal axis substantially midway in the height of the door, and a pair of helical tension springs pivotally connected respectively at one end each to an intermediate point on said guiding arms and extending rearwardly and upwardly and pivotally connected at the opposite end to the garage, said arms all being of identical length and their pivotal connections to the garage being on the same horizontal plane.

5. In an overhead swinging door mounting as set out in claim 4, a hand lever secured to one of the door suspending arms and projecting upwardly from its upper axis, when the door is closed.

ALEXANDER C. D'ALFONSO.

CERTIFICATE OF CORRECTION.

Patent No. 2,324,138. July 13, 1943.

ALEXANDER C. D'ALFONSO.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 2, second column, line 39, claim 1, after "one" insert --end--; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 5th day of October, A. D. 1943.

(Seal)

Henry Van Arsdale,
Acting Commissioner of Patents.