Feb. 6, 1951 G. W. SJOBOEN 2,540,761

ACTUATING AND COUNTERBALANCING MECHANISM FOR OVERHEAD HORIZONTALLY HINGED CLOSURES

Filed June 13, 1947 2 Sheets-Sheet 1

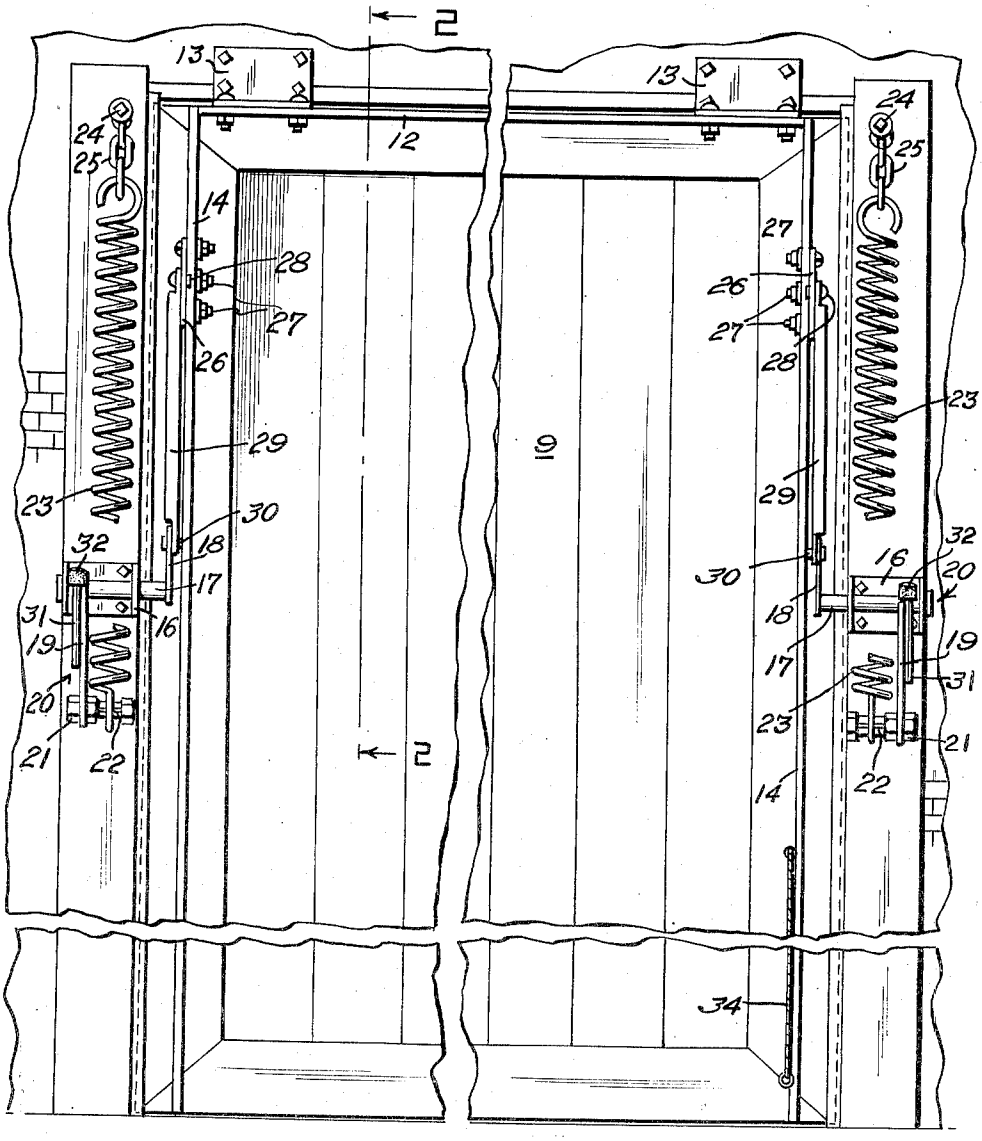


Fig. 1.

Inventor

George W. Sjoboen

By Randolph & Beavers

Attorneys

Feb. 6, 1951 G. W. SJOBOEN 2,540,761

ACTUATING AND COUNTERBALANCING MECHANISM FOR OVERHEAD HORIZONTALLY HINGED CLOSURES

Filed June 13, 1947

2 Sheets-Sheet 2

Fig. 2.

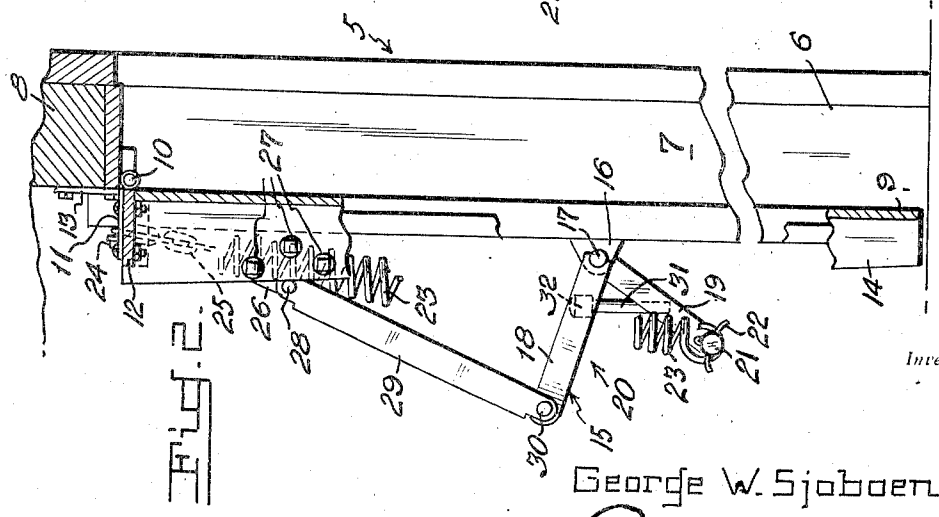
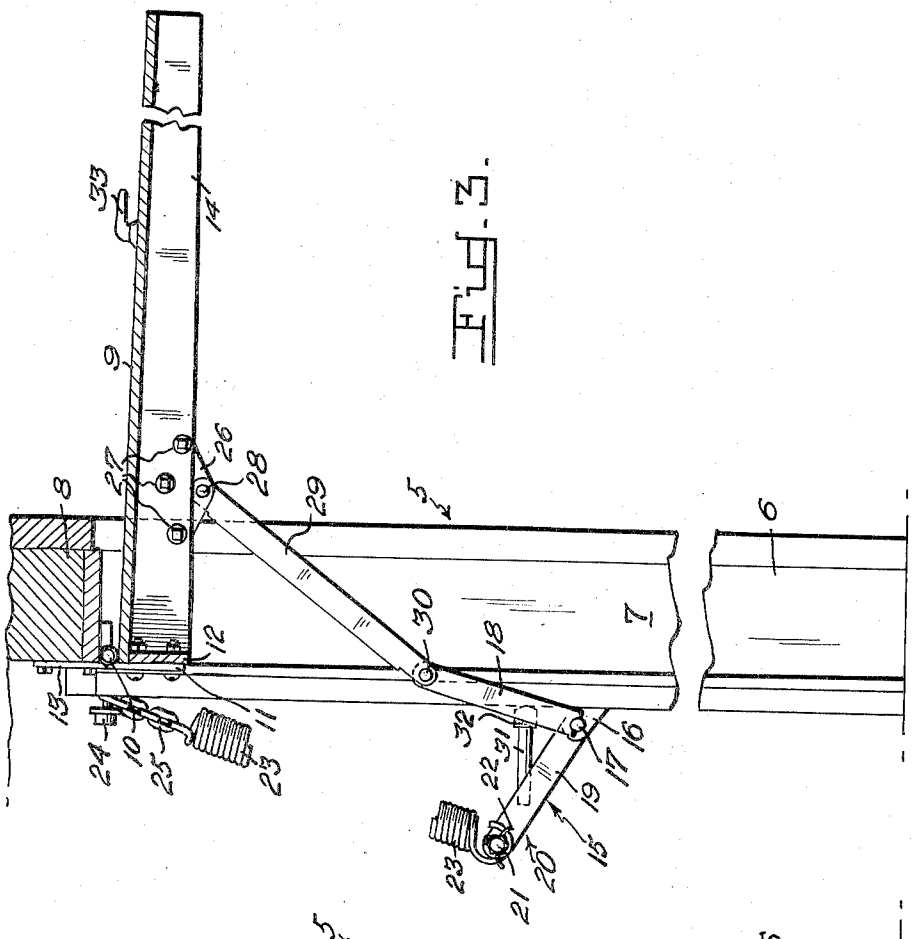


Fig. 3.



Inventor

George W. Sjoboen

By Randolph & Beavers

Attorneys

Patented Feb. 6, 1951

2,540,761

UNITED STATES PATENT OFFICE

2,540,761

ACTUATING AND COUNTERBALANCING MECHANISM FOR OVERHEAD HORIZONTALLY HINGED CLOSURES

George W. Sjoboen, San Diego, Calif.

Application June 13, 1947, Serial No. 754,495

2 Claims. (Cl. 16—1)

1

This invention relates to an improved construction of closure and closure operator for doors, gates or the like, which are adapted to swing upwardly to an open position and is especially adaptable for and will be described in connection with a garage.

Among the primary objects of the present invention are to provide a closure that will swing outwardly and upwardly to an open position to afford a canopy over the opening of a garage or the like and by means of which the upper portion of the interior of the garage is left substantially free and uncluttered by rails, springs and other mechanisms, normally provided for supporting a garage door in an open and raised position within the garage.

Still another object of the invention is to provide an improved construction of operator for a canopy type overhead door which will effectively function to counterbalance the weight of the door for supporting it in an open position and for minimizing the amount of manual effort required to open or close the door.

Still another object of the invention is to provide a closure operator of extremely simple construction which will function effectively for its intended purpose and which may be economically manufactured and sold and for the most part constructed from stampings.

Still a further object of the invention is to provide a closure and closure operator of the aforedescribed character which, as a unit, may be much more economically manufactured, sold and installed than conventional overhead type doors or closures.

Various other objects and advantages of the invention will hereinafter become more fully apparent from the following description of the drawings, illustrating a preferred embodiment thereof, and wherein:

Figure 1 is an elevational view, looking toward the inner side of a closure, constructed in accordance with the invention, including the improved operator and shown in a closed position;

Figure 2 is a vertical sectional view thereof taken substantially along a plane as indicated by the line 2—2 of Figure 1, and

Figure 3 is a view similar to Figure 2, but showing the closure in an open position.

Referring more specifically to the drawings, for the purpose of illustrating a preferred embodiment and preferred adaptation or application of the invention, a portion of the forward end of a garage is illustrated and designated generally 5 and includes a garage door opening 6 defined by the two vertical sides or jambs 7 and a header 8.

The invention includes a door 9 for closing the opening 6 and which may be formed of any suitable material such as plywood or light metal

2

and which is hingedly mounted along its upper edge by means of hinges 10 having leaves 11 attached to the inwardly extending upper flange 12 of the door 9, and each of which hinges 10 also includes a leaf 13 which is fastened to the inner side of the header 8. The door 9 is also provided with inwardly extending side flanges 14.

The closure operator, designated generally 15 includes two corresponding units, each of which includes a bearing 16 which is fastened to the inner side of a jamb 7, so that one of said bearings 16 is secured to each jamb. The bearings 16 provide journals for horizontally disposed shafts 17 to the inner, adjacent ends of which are fixedly secured levers 18. A lever 19 is fixed to and projects from each shaft 17, outwardly with respect to the levers 18, and so that said levers 19 are disposed behind the jambs 7. As clearly illustrated in Figures 2 and 3, the levers 18 and 19 are disposed at acute angles with respect to one another and said levers combined with the shafts 17 to form bell cranks 20.

The levers 19 at their outer ends are provided with fastenings 21 which extend toward one another and which afford journals for saddle members 22, one of which is journalled on each of said fastenings 21, and to each of which saddle members is connected an end of a contractile coil spring 23. The springs 23 extend upwardly from the levers 19 on the inner sides of the jambs 7 and are attached at their upper ends to anchor fastenings 24, preferably by means of a flexible member interposed therebetween, such as the chains 25, so that by either connecting the upper ends of the springs 23 to different links of the chains 25 or by connecting different links of said chains to the anchor fastening 24, adjustment of the tension of the springs 23, can be accomplished.

The side flanges 14, adjacent their upper ends, each have a bearing bracket 26 secured thereto by a plurality of fastenings 27. Bearing brackets 26 project from the inner or free longitudinal edges of the flanges 27 and are each adapted to be pivotally connected by pivot means 28 to an end of a rigid connecting link 29. The opposite ends of the connecting links 29 are pivotally connected at 30 to the free ends of the complementary levers 18.

A bumper rod 31 is welded or otherwise secured to each lever 19, intermediate of its ends and is disposed at an acute angle thereto and extends in a direction toward the plane of the associated lever 18. Each bumper rod 31 is provided with a cushioning element 32 on its inner end which may be adjustably mounted thereon in any suitable manner to be advanced or retracted relatively thereto, for a purpose which will hereinafter become apparent.

The door 9 carries a handle 33 on its outer

side and at a convenient level and has a flexible member 34 anchored thereto adjacent one side edge thereof.

When the door 9 is in a closed position, as seen in Figure 2, the springs 23 will be extended and under tension and the pivot points 28 will be disposed inwardly of a line extending between the hinges 10 and the fastenings 21 by which the springs 23 are connected to the bell cranks 20 and an extension of the center lines of the links 29 will pass to the left or on the inner side of the hinges 10, as seen in Figure 2, so that said springs 23 will tend to retain the door in its closed, substantially vertical position. To open the door, the handle 33 is grasped and an outward pull exerted thereon for swinging the door 9 outwardly and upwardly. This will cause the pivot 28 to cross the dead centers of the hinges 10 and the pivots 30 during the initial opening movement of the closure 9 so that the line of force along the longitudinal axes of the links 29 will then pass to the right of the hinges 10 to permit said bell cranks to begin to rock in a clockwise direction in response to the tension on the springs 23, as seen in Figures 2 and 3. Consequently, after only a slight movement of the door 9 toward an open position, the pivots 28 will have passed across the line joining the points 10 and 30 so that the springs 23 will begin to exert an upward clockwise pull on the bell cranks 20 for swinging the closure 9 outwardly and upwardly. As this clockwise movement of the bell cranks 20 continues, the levers 19 thereof will be swinging away from the inner sides of the jambs 7 so as to increase the leverage exerted by the pull of the springs 23 in order that said springs will effectively swing the door 9 outwardly and upwardly. When the door 9 reaches a substantially horizontal position, as seen in Figure 3, the cushions 32 of the bumpers or stops 31 will strike the inner sides of the jambs 7 to prevent further clockwise rotation of the bell cranks 20 and so that said closure will be supported in an open position and inclined slightly outwardly and downwardly in order that rain water or the like will drain outwardly and off the outer edge of the closure 9 and away from the door opening 6. By adjusting the cushioning elements 32 on the bumper members 31, the extent of swinging movement of the bell cranks 20 in a clockwise direction can be regulated, to regulate the height to which the door 9 will be raised and as previously described, tension on the springs 23 can be varied so as to cooperate with the bumper means 31, 32 to minimize the jar occasioned by the closure 9 reaching a fully opened position. Further, the adjustability of the cushioning elements 32 regulates the pull required to start the door toward a closed position by regulating the extent that the pivot 30 will move toward the dead center of the pivots 17 and 28 and, accordingly, the extent of the resulting toggle action.

When the closure 9 is in an open position, the flexible member 34 will depend downwardly from the underside thereof and is conveniently disposed to be grasped for pulling the door downwardly and back toward a closed position and against the counterbalancing action of the springs 23, the adjustment of which can be such that only a slight pull will be required to return the door or closure to its closed position of Figure 2. The movement of the closure toward a closed position will cause the links 29 to exert a push on the bell cranks 20 in a counterclockwise direction thereby rocking said bell cranks counterclockwise from their positions of Figure 3 toward their positions of Figure 2. As the door 9 approaches a fully closed position, the pivots 28 will cross the line joining the points 10 and 21, so that said springs thereafter will act to retain the closure in its fully closed position of Figure 2.

Various modifications and changes are contemplated and may obviously be resorted to, without departing from the spirit or scope of the invention as hereinafter defined by the appended claims.

I claim as my invention:

1. A closure actuating mechanism for opening and supporting a closure, which is horizontally hinged along its upper edge, in an open substantially horizontal position, comprising counterbalancing mechanism adapted to support the weight of a horizontally hinged closure in an open substantially horizontal position and for swinging the closure in a vertical plane from adjacent a closed vertical position to an open position, said counterbalancing mechanism including a bell crank adapted to be pivotally mounted on a side of a frame of the closure, a link having one end pivotally connected to one arm of the bell crank and an opposite end pivoted to a portion of the closure above the bell crank, an extension of the longitudinal axis of said link passing on the inner side of the closure hinge when the closure is in a closed, vertical position, and a power means connected to the free end of the other arm of the bell crank for urging said bell crank to swing in one direction, the force exerted by the power means on the link through the bell crank acting to retain the closure in a fully closed position, the end of the link which is pivoted to the closure swinging outwardly with the closure as the latter is initially moved toward an open position whereby the line forming an extension of the axis of the link will then pass across the outer side of the closure hinge so that the force exerted by the power means on the closure through the link will then urge the closure to an open substantially horizontal position.

2. A closure actuating mechanism as in claim 1, said power means comprising a contractile coil spring having an upper end anchored to the closure frame and a lower end anchored to the outer end of the last mentioned arm of the bell crank, said last mentioned bell crank arm being disposed below the first mentioned bell crank arm when the closure is in a closed position and extending downwardly and inwardly relatively to said closure and closure frame whereby the free end of the last mentioned bell crank arm is swingable upwardly and inwardly relatively to the closure frame as the closure is swung to an open position by the biasing action of the coil spring.

GEORGE W. SJOBOEN.

REFERENCES CITED

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

UNITED STATES PATENTS

Number	Name	Date
1,073,003	Troyer	Sept. 9, 1913
1,090,697	Eddelman	Mar. 17, 1914
1,215,418	Selleck	Feb. 13, 1917
2,220,766	Hubbs	Nov. 5, 1940
2,327,026	Deuring	Aug. 17, 1943