June 3, 1941. C. E. ALLEN 2,244,182

GARAGE DOOR

Filed April 20, 1940 2 Sheets-Sheet 1

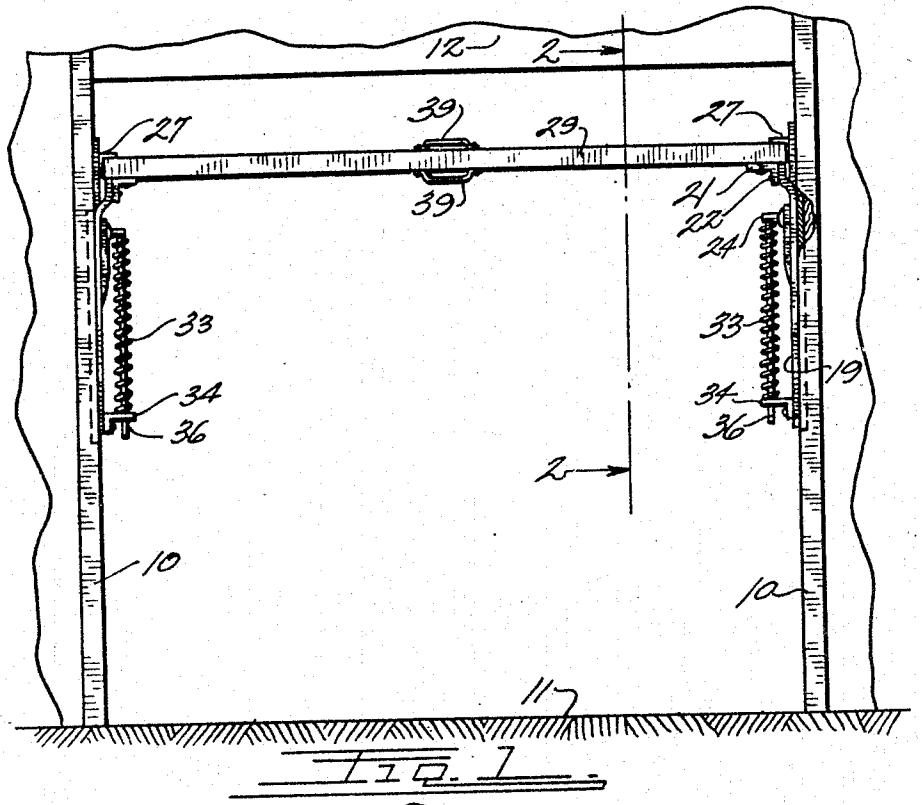


FIG. 1

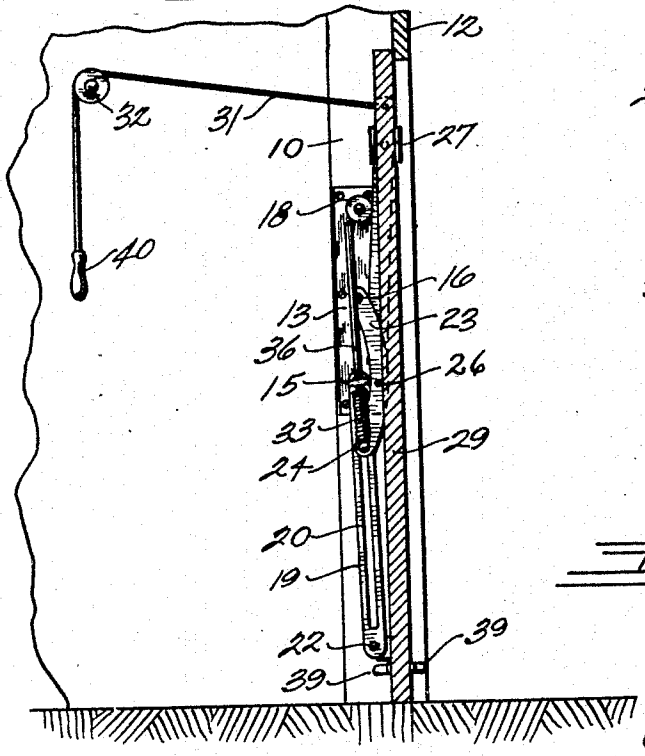


FIG. 2

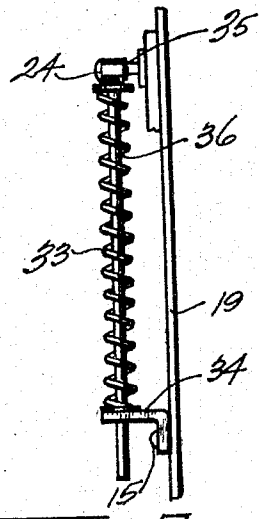


FIG. 3

INVENTOR
CHARLES E. ALLEN
BY
Martin E. Anderson
ATTORNEY

June 3, 1941. C. E. ALLEN 2,244,182

GARAGE DOOR

Filed April 20, 1940 2 Sheets-Sheet 2

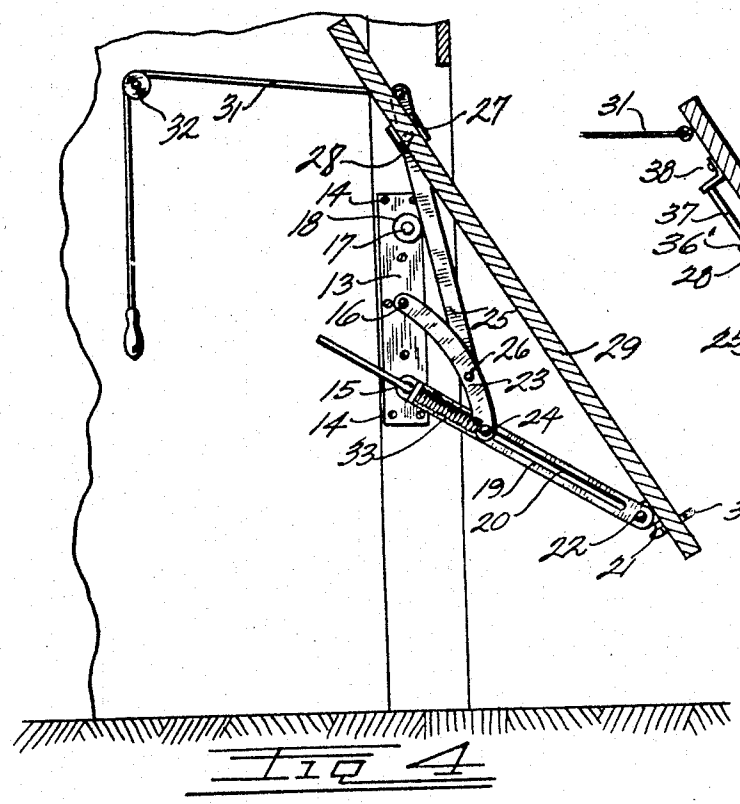


Fig. 4

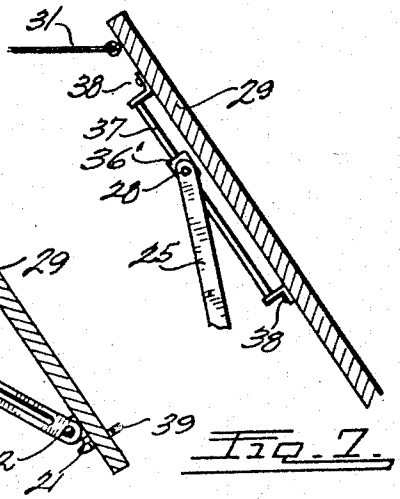


Fig. 7.

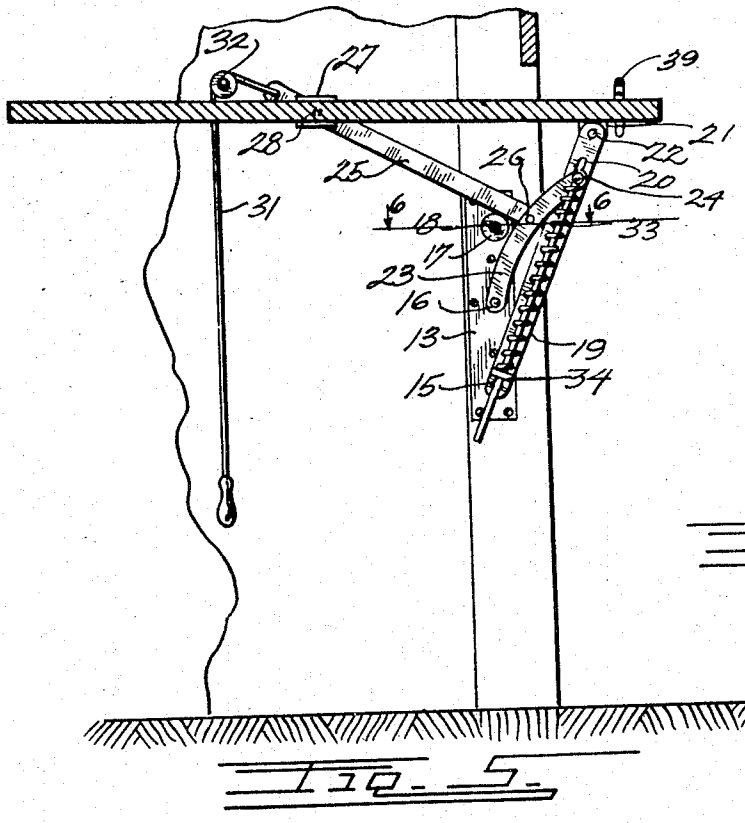


Fig. 5.

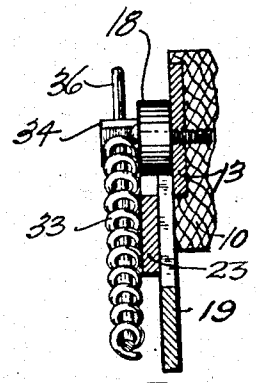


Fig. 6.

INVENTOR
CHARLES E. ALLEN
BY
Martin E. Anderson
ATTORNEY

Patented June 3, 1941

2,244,182

UNITED STATES PATENT OFFICE

2,244,182

GARAGE DOOR

Charles E. Allen, Arvada, Colo.

Application April 20, 1940, Serial No. 330,701

6 Claims. (Cl. 20—16)

This invention relates to improvements in garage doors and mechanisms for operating the same.

It is getting to be quite common to provide garage doors that open by an upward and inward movement, which moves the door from a vertical to a horizontal position, as such doors leave the entire door opening clear and do not require any additional space either inside or outside of the garage.

As an example of such a door and the mechanisms for openings and closing the same, reference is made to patent numbered 2,164,648, granted July 4, 1939, in which a door operating in a manner analogous to that described in the present invention, has been shown.

It is the object of this invention to produce a door operating mechanism that can be assembled in the factory and secured to the door jambs by bolts or screws in such a way that the garage door can readily be attached thereto.

Another object is to provide mechanism for opening and closing garage doors that can be manufactured without the employment of any expensive and special machinery and which can therefore be manufactured at a comparatively small cost.

A further object of this invention is to produce a door operating mechanism that can be operated either manually or by means of an electric motor.

The above and other objects that may become apparent as this description proceeds are attained by means of a combination and arrangement of parts that will be now described in detail and for this purpose reference will be had to the accompanying drawings in which the invention has been illustrated in its preferred form and in which:

Figure 1 is an end elevation of a garage showing the door in open position;

Figure 2 is a section taken on line 2—2, Figure 1, and shows the door in closed position;

Figure 3 is a fragmentary view showing the spring employed to cushion the closing movement of the door;

Figure 4 is a section taken on line 2—2, Figure 1, but showing the door in a partially open position;

Figure 5 is a section similar to that shown in Figure 4 but showing the door in a fully open position;

Figure 6 is a section taken on line 6—6, Figure 5 and;

Figure 7 is a fragmentary section similar to that shown in Figure 4 but showing a slightly modified construction.

In the drawings reference numeral 10 designates the two vertical door jambs and reference numeral 11 designates the floor of a garage, while reference numeral 12 designates that portion of the garage wall directly above the door opening.

The mechanism to which this invention relates consists of two substantially identical assemblies, one of which is a right and the other a left. Since the mechanism on opposite sides of the door opening are duplicates, except as to the matter above mentioned, only one of the assemblies will be described herein.

Each assembly consists of a steel plate 13 that is secured to the door jamb by means of screws or bolts 14. Carried by the plate 13 are three pivots which have been identified from bottom to top by reference numerals 15, 16 and 17. Pivot 17 has a roller 18 mounted thereon and will be referred to as a guide member. The roller 18 serves merely as a friction limiting means and so far as the invention is concerned may be omitted. Pivoted to the lowermost pivot 15 is a link 19 that is shown as provided with a longitudinally extending slot 20. The lower end of link 20 is attached to a bracket 21, carried by the door, by means of a pivot pin 22. Secured to the intermediate pivot (pivot 16) is a second link which has been designated by reference numeral 23. This link is shorter than link 19 and is slidably and pivotedly connected to the latter by means of a bolt or pin 24. It is now apparent that links 19 and 23 can be simultaneously rotated about their pivots and whenever these links are rotated the pin 24 will slide along the slot 20. The slot and pin connection shown are illustrative only and it is to be understood that any equivalent means can be substituted.

A third link which has been designated by reference numeral 25 is pivotally attached at its lower end to link 23, the attaching means being indicated by reference numeral 26. The position of the pivot 26 can be varied dependent upon the position of other parts and it is to be understood that applicant does not intend to be limited to the exact relative position shown in the drawings.

Link 25 normally rests one edge against the roller 18 and is provided at its upper end with a U-shaped slide 27 which is attached to the link 25 by means of a pivot 28. The link 25 may extend above the pivot 28 in the manner shown in Figures 4 and 5 but it may also terminate at the pivot in the manner indicated in Figure 7. A door

29 is provided at its lower end with a bracket 21 to which the lower end of link 19 is pivoted in the manner shown in the drawings. The edge of the door is mounted to slide in the U-shaped member 27. The door is provided at its lower end with a handle 39 and a cable 31 is shown as attached to the upper end of link 25 and as passing over a pulley 32. This cable may be attached to the door in the manner shown in Figure 7 and whichever of these constructions is considered to be the most desirable can be employed. A compression spring 33 has been shown as positioned between the pivots 15 and 24. A bracket 34 is attached to the link 19 adjacent to the pivot 15 and pivot 24 extends through an eye 35 in the end of a rod 36 whose other end extends through an opening in bracket 34. The purpose of the rod 36 is to prevent the spring from buckling during compression. An inspection of the drawings will show that when a door is in the closed position, as shown in the Figure 2, pivots 15 and 24 are the minimum distance apart and that this distance increases gradually as the door opens, in which position the spring is extended to its maximum length, as shown in Figure 5. The purpose of this spring is to cushion the closing of the door and to assist somewhat in opening the same.

With the arrangement shown the force exerted by spring 33 is least effective for turning the door when the latter is in closed position, due to the fact that the line of force extends through pivots 15 and 16. It is also possible so to adjust the parts that the force exerted by the spring when the door is in closed position will tend to hold the door closed; this can be accomplished by so arranging the parts that pivots 14, 15 and 16 will form an over-set toggle when the door is closed.

Although the device has been shown as provided with a compression spring, positioned for operating in the manner above described, it is evident that a tension spring can be substituted, in which case it can be positioned between pivots 22 and 24 or between pivots 17 and 26. It is to be understood, therefore, that applicant does not desire to be limited to the specific position of his spring 33 but expects to substitute an equivalent arrangement if this should prove to be desirable.

Referring now in particular to Figure 7, it will be seen that instead of the U-shaped slide 27, between the sides of which the edge of the door is positioned, the upper end of link 25 has pivotally attached to it a tubular crosshead 36' that is slidably connected with a rod 37 which is secured to the door by means of bracket 38. With this arrangement the edge of the door can fit snugly against the door jamb and the cable 31 can be secured to the door in manner shown instead of to the upper end of link 25. With this construction it is possible to produce a closer fit between the door and the door jamb than with the construction previously described.

Bearing in mind that the door is provided with two operating mechanisms, one at each end thereof, in the manner shown in Figure 1, we shall now describe the operation of opening and closing the door.

Let us assume that the door is in closed position, as shown in Figure 2, the operator grasps the handle 39 and moves the door upwardly and outwardly, whereupon it moves gradually into the position shown in Figure 4 and from thence to the final open position shown in Figure 5. During the opening operation link 25 has one edge resting on the roller 18 and remains in contact with this roller during the entire operation. It will be seen that only one roller is employed on each side of the door and that this guides the link 25 in such a way as to bring the door when fully opened to a position that is substantially horizontal.

Instead of opening the door by exerting force on the handle 39 the operator may exert a pulling force on handle 40 at the end of cable 31, whereupon the force thus exerted will cause the parts to pivot on the roller 18 as the fulcrum and this in turn will move the door into the positions shown in Figures 4 and 5. It is to be observed that as the door opens the spring 33 expands and the force of this spring therefore serves to assist the opening movement and conversely it will help to cushion the shock which would otherwise result when the door is moved to closed position.

In the drawings the three pivots 15, 16 and 17 are arranged in a vertical line but this is not an essential consideration because it is possible to move the pivot 17 farther to the left than as shown in Figure 4, which may be desirable in some instances. The pivot 26 can also be consolidated with pivot 24 and substantially the same results obtained. The exact position of these pivots may be as shown in the drawings or may be slightly altered therefrom under certain conditions, and applicant therefore reserves the right to make such changes as may be indicated as desirable and which fall within the scope of the appended claims.

From the above description it will be apparent that the invention herein described and illustrated on the drawings is very simple; that it eliminates the necessity of an over-head track; that it requires only a single roller at each side and that the parts can be made from flat stock such as is procurable from any steel mill.

Where it is desirable to operate the door by means of an electric motor some suitable electrical operating means can be employed, such for example as the ones described and claimed in applicant's prior Patent Numbers 1,859,064 and 2,026,956 granted respectively on March 17, 1932, and January 7, 1936.

Having described the invention what is claimed as new is:

1. A garage door opening and closing device comprising in combination, a base having three spaced pivots arranged in substantial alignment, a link connected with one end pivot, a second link pivotally connected with the intermediate pivot and both slidably and pivotally connected with the first link, a third link pivotally connected with the second link and slidably connected with the third pivot, a door pivotally connected with the free end of the first link, and means for slidably and pivotally connecting the end of the third link to the door whereby an assembly is formed in which the door will move from a vertical to a substantially horizontal position when it is raised.

2. A garage door opening and closing mechanism comprising in combination, a base having two spaced pivots and a pivoted roller arranged in substantial alignment, a link having one end attached to the end pivot, a second and shorter link attached at one end to the pivot adjacent the roller, means for slidably attaching the other end of said second link to the first link. A third link having one end pivoted to the second link and one edge resting on the roller, a door having one end pivotally connected with the end of the

first link and means for pivotally and slidably connecting the other end of the third link with the free end of the door.

3. A garage door opening and closing mechanism comprising in combination, a base having three pivots arranged in substantial vertical alignment, the upper pivot forming a guide. A link having one end attached to the lowermost pivot, a second and shorter link attached at one end to the intermediate pivot the other end being slidably and pivotally attached to the first link, a third link pivotally attached at its lower end to the second link, one edge of the third link resting on the upper or guide pivot, a door pivotally attached adjacent its lower end, to the free end of the first link, and means for slidably and pivotally attaching the upper end of the third link with the door whereby the door can be raised and lowered while the third link remains in contact with the guide.

4. A garage door opening and closing mechanism comprising in combination, a base having three vertically spaced pivots projecting from one side thereof, the upper pivot forming a guide, a link having one end connected with the lowermost pivot, a second and shorter link having one end attached to the intermediate pivot and the other end slidably and pivotally connected with the first link, a third link having its lower end pivotally attached to the second link and slidably associated with the guide, a door, a pivotal connection between the first link and one end of the door, and means for effecting a pivotal and slidable connection between the other end of the door and the free end of the third link.

5. In a garage door construction, the combination of a single rigid door section, a guide member at each side of the door-way, two vertically spaced pivots positioned below the guide member, the upper pivot being positioned some distance below the guide member, a link having one end attached to the lower pivot and the other end pivoted to the door near the lower end thereof, a second link attached at one end to the upper pivot, means for slidably and pivotally attaching the free end of the second link to the first link whereby both links may move simultaneously about their spaced pivots, a third link having its lower end pivotally attached to the second link, and means for pivotally and slidably attaching the upper end of the third link to the door near its upper end, one edge of the third link being in engagement with the guide member, whereby when the door is raised upwardly its lower end will move in a path controlled by the first link and its upper end in a path which is a resultant of the interaction of the several links.

6. A garage door construction comprising a combination, a base having a guide member near its top and two pivots positioned below the guide member, said pivots being spaced unequal distances from the guide member, two links, each having one end movably attached to a pivot, the link attached to the lower pivot being the longer, means for slidably and pivotally attaching the free end of the shortest link to the longer whereby the two links may move simultaneously about their pivots, the two links and a line joining the pivots forming a triangle one side of which varies in length, a third link pivoted to the second link and slidably associated with the guide member, a door pivotally attached at its lower end to the free end of the first mentioned longer link and slidably and pivotally connected with the free end of the third link, the several links and the door, including the lines joining the pivots and the line joining one pivot with the guide, forming a plurality of distortable triangles each having one side of variable lengths.

CHARLES E. ALLEN.