July 6, 1943. W. G. DEURING 2,323,585

OVERHEAD SLIDING DOOR

Filed Dec. 11, 1939 2 Sheets-Sheet 1

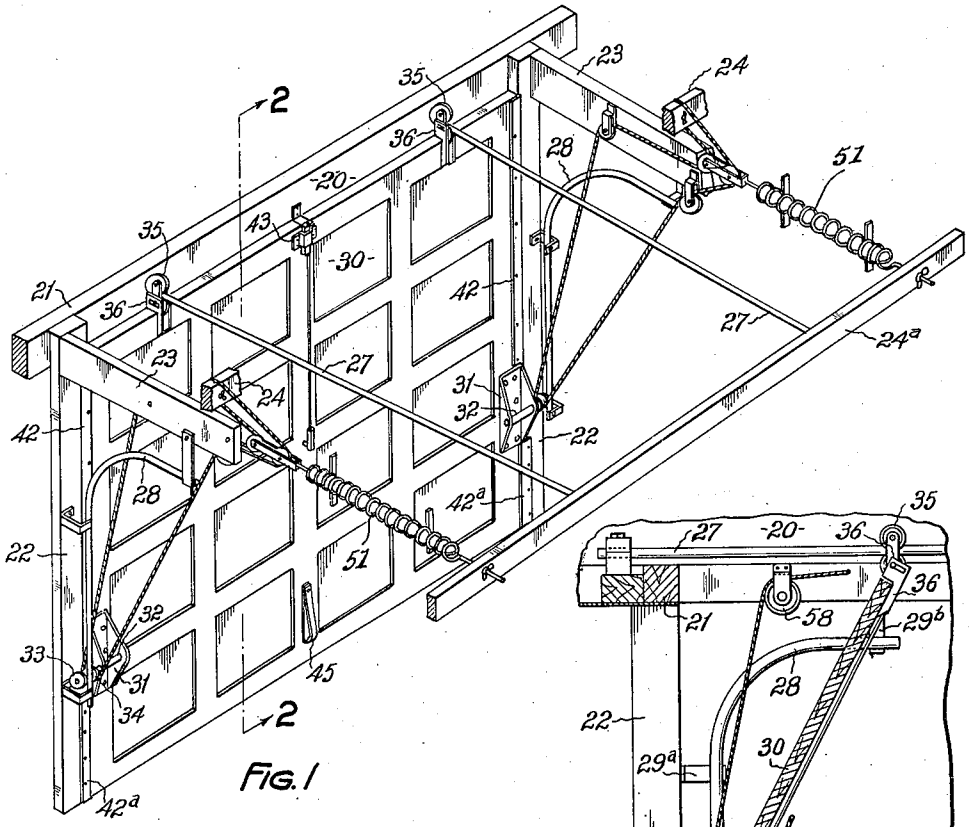


FIG. 1

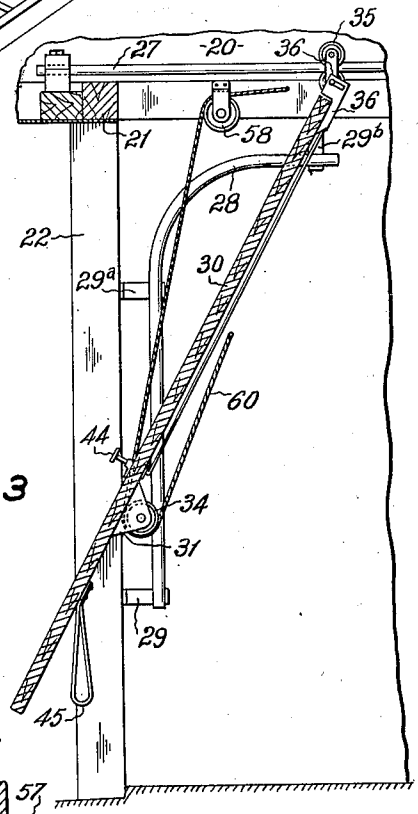


FIG. 3

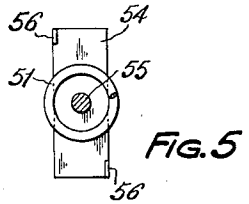


FIG. 5

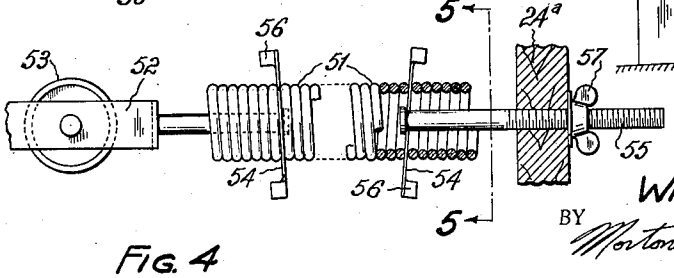


FIG. 4

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OVERHEAD SLIDING DOOR

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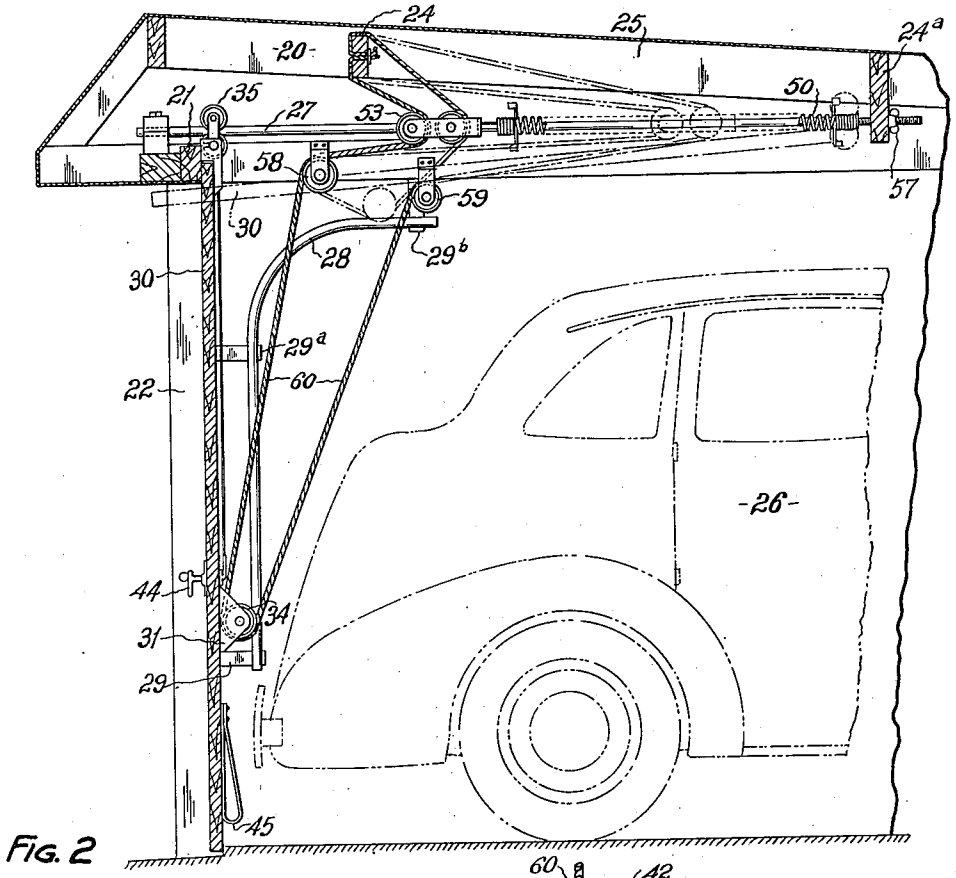


FIG. 2

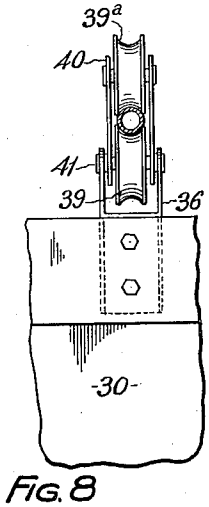


FIG. 8

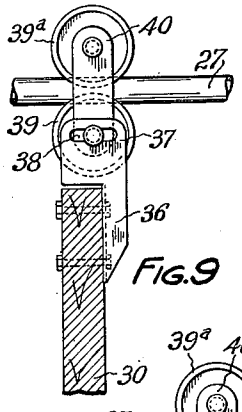


FIG. 9

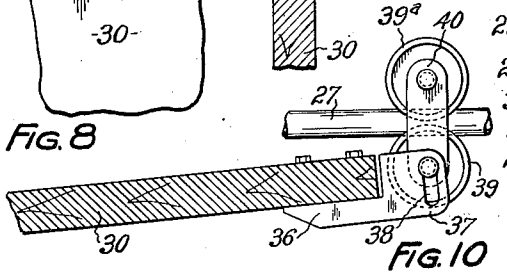


FIG. 10

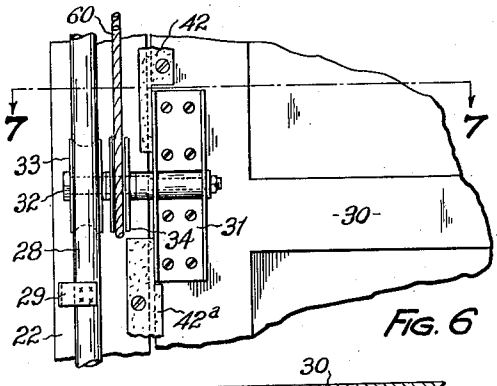


FIG. 6

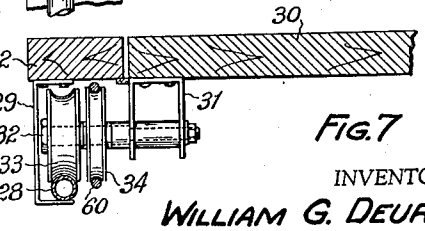


FIG. 7

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OVERHEAD SLIDING DOOR

William G. Deuring, Cleveland, Ohio

Application December 11, 1939, Serial No. 308,537

5 Claims. (Cl. 20—19)

This invention relates to doors and particularly to the one-piece type of door that slides overhead and which is adaptable and appropriate for use on a private or home garage.

The principal object of this invention is to provide an overhead door of the type mentioned which is inexpensive and easy to manufacture and install and which is readily adaptable for use in conventional frame garages in substitution of the hinge-type of door originally found thereon.

Another object is to equip such doors with operating accessories, and with a compound pulley and spring suspension means that facilitates and eases the opening and closing of the door.

A further object is to construct a one-piece overhead door that is completely protected, covered and inside of the garage when the door is fully opened.

A still further object is to equip an overhead sliding door with suspension and balance means which do not allow the door to slam, drop or otherwise get out of control.

These and other objects and features of the invention will become apparent from a study of the following description and claims together with the accompanying drawings in which like parts are designated by like reference characters and wherein:

Figure 1 is a perspective inside view of a part of a garage building showing the door and apparatus for hanging same;

Figure 2 is a side sectional view taken along the lines 2—2 of the Figure 1 showing the door and apparatus for hanging the same and also showing, in broken lines, the position of the door and apparatus when it is fully opened;

Figure 3 is a side sectional view of the door partly opened;

Figure 4 is an enlarged view of part of the adjustable counterpoise mechanism used with the door;

Figure 5 is a sectional view taken along the lines 5—5 of the Figure 4;

Figure 6 is an enlarged view of a side track and roller bracket engaged therewith;

Figure 7 is a sectional view of the side track and roller bracket taken along the lines 7—7 of the Figure 6;

Figure 8 is an enlarged view of a door trolley and a rail engaged therewith;

Figure 9 is a side sectional view of the door, door trolley and rail engaged therewith; and

Figure 10 is a similar view of the door, trolley and rail and showing relative positions of the door and trolley when the door is fully opened.

Broadly this invention consists of a one-piece or unitary door or closure member designed to cover an opening in a frame building such as a garage, which member is suspended and guided by overhead trolleys and side rails or tracks and is also balanced and partially controlled by a spring counterpoise.

In the drawings there is illustrated a conventional garage building 20 which has a lintel piece 21, two side jamb pieces 22, two parallel and rearwardly extending beams 23 which project horizontally from the junctures of the beams and lintel pieces, and two laterally extending joists 24 and 24a which are attached to the sloping rafter members 25. The front joist 24 is slightly higher above the beams 23 than the rear joist 24a. The construction of buildings of this type varies considerably and the parts mentioned are not always spaced or positioned as shown, however, the instant drawings show in a general way the more conventional models and approximately where the said members are located. The Figure 2 of the drawings also shows in broken line a part of a standard size and design of an automobile 26 to illustrate the proportion and relative positions of parts and particularly to show the clearance of the automobile and the closure or door member 30.

The stationary guides on which the door member rolls from its vertical or closed position to its horizontal or open position consists of straight overhead rails 27 and curved side tracks 28. The straight rails 27 are secured at their forward ends to the lintel 21 and extend back parallel to each other in a substantially horizontal position to the rear joist 24a to which they are securely fastened. These rails are simply lengths of ordinary iron pipe about an inch and a quarter in diameter and a little longer than the door is high.

The curved side tracks 28 are attached at their bottom ends to the door jambs 22 by means of the brackets 29, at their upper ends to the beams 23 by means of the brackets 29a and between their ends to some frame member by means of the brackets 29b. The tracks 28 are parallel to each other and are attached so that their outer surfaces clear the jambs and beams sufficiently to permit the flanged wheels 33 to roll smoothly over them. These tracks 28 may be made of lengths of ordinary pipe similar to and of about the same diameter as the top rails 27. The brackets 29 are simply L shaped pieces of stiff metal suitably drilled for attachment to the jambs and tracks.

The closure member or door 30 is rigid and fits into the opening formed by the lintel and jambs 21 and 22 respectively. About two feet from the bottom on each side of the door, there are attached roller and pulley brackets 31, which are more clearly illustrated in the Figures 6 and 7.

Each of the brackets are provided with outwardly projecting roller axles or pins 32. These pins extend past the side edges of the door member and into the space between the jambs 22 and the side tracks 28. On the outer ends of the pins

32 there are mounted flanged rollers or wheels 33 which engage the two side tracks 28. Just inside the wheels 33 and between them and the bracket portions 31 there are mounted pulleys 34 which engage the cable 60 hereinafter referred to in the description of the counterpoise member. The bracket elements 31 are also referred to herein as bearings as they provide pivotal points on which the door member turns as it rises.

The trolleys 35, by means of which the door member 30 engages the overhead rails 27, are attached to the inside top edge of the door and are spaced to match the rails 27. Each of the trolley devices, as is more clearly shown in the Figures 8, 9 and 10, consists of a bracket 36 which has parallel upwardly extending pieces 37 which in turn have parallel slots 38. The slots 38 are also referred to herein as channels. The lower and upper trolley rollers 39 and 39a respectively are connected together in tandem fashion by means of the links 40 with the rails 27 therebetween. The extreme lower ends of the links 40 are provided with lateral pins 41 which slidably engage the brackets 36 at the channels 38.

In order to seal the door member 30 against inclement weather, weather strips are provided for the side edges thereof. The weather strips 42 are attached to the inside edges of the door member above the side brackets 31 and the weather strips 42a are attached to the door jambs 22 below the side bracket 31.

A snap-catch or fastener 43 is provided for the upper inside part of the door and lintel members, which fastener may be locked or operated by the handle member 44 on the outside of the door proper. A looped handle or strap 45 is attached to the lower part of the door so that it may be more easily pulled down to its closed position or raised to its upper position.

The drawings show two rails 27 and two trolley devices 35 but only one may be used if the weight of the door permits and likewise more than two sets may be used if the door member is extremely heavy or large.

The counterpoise mechanism 50 consists of an extension spring 51, also referred to herein as a propelling means, the rear end of which is connected to the rear joist 24a or some other neighboring building member. The loose or forward end of the spring 51 carries a double sheave block 52 in which the movable pulleys 53 are connected in tandem. In order to adjust the tension of the extension springs 51 so that they properly balance the door member 30, both ends of the springs are provided with swivel plates 54, the centers of which engage the heads of the bolts 55. In order to facilitate the turning of the plates for such adjustment, they are provided with finger grips 56. Also, in order to properly position the spring members and attached sheaves, after the tension has been adjusted, the rear bolts 55 which are rather long, are provided with wing-nuts 57 so that they may be moved with reference to the joist 24.

The fixed pulley means is attached to the building proper. It consists of forward pulleys 58 and rear pulleys 59, one of each being mounted on a beam member 23 on each side of the door. The forward pulleys 58 are mounted substantially on a plane with the lintel 21 and are about eighteen inches inward therefrom. The rear fixed pulleys 59 are mounted in line with the front pulleys 58 but are about four inches lower and about eighteen inches to their rear.

The looped flexible element or cable means 60 which may also be a simple cord or chain, has both of its ends securely attached to the front joist 24 or to some neighboring rigid building member. The looped cable before being fastened is, however, trained on or otherwise made to engage the two pairs of movable pulleys 53 in the sheave block, the two pairs of fixed pulleys 58 and 59 respectively and the two side bracket pulleys 54 in the manner clearly shown in Figures 1 and 2.

Among the many advantages this door has over other similar doors, is the one which permits it to be opened or closed with very little energy. Once the counterpoise is properly balanced with the weight of the door and the various pulleys are properly positioned, it may be easily opened or closed without slamming or banging. Its operation is smooth and almost automatic. The main reason for this is the cable and compound pulley arrangement and the reaction therewith of the special trolley mechanism.

By referring to the Figure 2, it will be observed that when the trolley devices 35 are on the minor portion or part of the rail forward of the point on the rail 27 that is directly above the axis of the pulley 34, the counterpoise mechanism will tend to draw the door member to a closed position; and similarly, when the trolley devices are on the major portion or part rearward of this point, the springs will tend to open the door. The only energy required to open the door is that necessary to move the top of the door past the critical point which is directly over the axis of the pulley 34; and when it is noted that, because the side pulleys 34 are rather low, a considerable leverage is obtained by pushing inward near the top of the door member 30, its operation becomes very easy.

The operation of closing the doors is just as easy. The only energy required is that small amount needed to overcome the tension of the counterpoise mechanism. For example; a closure member having a door weighing one hundred pounds will have the counterpoise mechanism adjusted to balance about one hundred and fifteen or one hundred and twenty pounds. The operator then would only have to apply a force of about fifteen or twenty pounds to the fully opened door to bring the side rollers 33 down to the straight lower ends of the tracks 28. This small force is easy to apply inasmuch as the door is conveniently pulled down from an overhead position by the strap 45. Actually, the closure member, as it is hung and operated in accordance with this invention, constitutes a toggle device. The door acting as a toggle lever has its peak resistance when the trolley device 35 is at a point on the rail 27 which is immediately above the pulley 34.

In order to distinguish this toggle closure device further, it may be pointed out that single fixed pulleys may be substituted for the two spaced pulleys 58 and 59 on each side of the door and single lengths of cable may be used to engage the side brackets and the pulleys instead of the looped cable 60 as shown; but it has been found in practice that if only one fixed pulley is used, the toggle action is rather abrupt and is apt to cause a sudden loss of control of the door and cause unnecessary banging at its extreme positions. With two rollers as shown, the toggle action is gradual and more even. The operation of the door is also smoother because

there is no abrupt stop when the rollers **34** reach the top ends of the guide rails **28**. The substantially horizontal portion of the cable member **60** which happens to be between the rollers **58** and **59** when the door is fully opened serves as a buffer or tensioned cradle-like support for the roller **34** and the bottom portion of the door adjacent thereto.

Contributing to this smoothness of action and ease of operation are the specially designed channelled trolley devices **35** which automatically shift the suspended weight of the door from forward to rearward positions. This shifting takes place when the trolley **35** is about midway between the two fixed pulleys **58** and **59**. At this midway point the weight of the door also shifts from the top roller **39***a* to the bottom roller **39** or vice versa depending on which way the door is moving. When the trolley **35** is forward of the midway point between the fixed rollers, the door rides the overhead rails **27** on the lower trolley roller **39** and when it is back of this midway point, the door rides on the upper roller **39***a*.

It should be noted further that while the door **30** is closed and is in a vertical position, and even when the roller **39** is in the portion of the slot **38** to the rear of the inside surface of door **30**, an imaginary line connecting the pin **32** of the roller **33** and the pin **41** of the roller **39** would not be vertical. In that position both the trolley **35** and the entire bulk of the door **30** is forward of the component of force exerted on the pulley **34** and the track **38** by the counterpoise mechanism. The spring **51**, therefore, after reaching a certain critical point, tends to close the door.

It will now be clear that there is provided by this invention an overhead sliding door which accomplishes the objects set forth. While the invention has been illustrated in a specific form and while certain specific terms have been used to describe it, it is to be understood that the embodiment of the invention as described and illustrated is suggestive only and is not to be considered in a limiting sense. It is also to be further understood that there may be other forms or adaptations of the invention and those modifications are also considered to be within the broad scope of the invention as no limitations upon it are intended other than those imposed thereon by the breadth of the appended claims.

I claim:

1. An overhead door assembly, comprising in combination, a building frame forming a doorway, a movable closure member including a trolley device and side bearings closing the doorway when in a substantially upright position and opening the doorway when in a prone position, a rail member having a major portion extending rearwardly of the bearings and a minor portion extending forwardly thereof, and a counterbalancing mechanism mounted on the aforesaid frame and connected to the said bearings in a manner urging the closure member to the open position when the trolley device is on the said major portion or to the closed position when the trolley device is on the said minor portion.

2. An overhead door assembly, comprising in combination, a building frame forming a doorway, a movable unitary closure member including a trolley device and side bearings and closing the doorway when in a substantially upright position and opening the doorway when in a prone position, a rail member having a major portion extending rearwardly of the bearings and minor portion extending forwardly thereof, and a tensioned counterbalancing mechanism mounted on the aforesaid frame and having looped flexible elements connected to the said bearings in a manner urging the closure member to the open position when the trolley device is on the said major portion or to the closed position when the trolley device is on the said minor portion.

3. An overhead door assembly, comprising in combination, a building frame having a lintel and jambs and forming a doorway thereat, a movable closure member including a trolley device and side rollers closing the doorway when in a substantially upright position and opening the doorway when in a prone position, a rail member attached to said lintel and extending rearwardly thereof and engaging the said trolley device, side tracks attached to the said jambs and engaging the said side rollers, and counterbalancing mechanism mounted on the said frame and including flexible elements connected to the closure member in a manner urging the closure member to the open position when the trolley device is rearward of the side rollers or to the closed position when the trolley device is forward thereof.

4. An overhead door assembly, comprising in combination, a building frame having a lintel and jambs and forming a doorway thereat, a movable unitary closure member including an overhead trolley device and side rollers closing the doorway when in a substantially upright position and opening the doorway when in a prone position, an overhead rail member attached to the said lintel and extending rearwardly thereof and engaging the overhead trolley device, side tracks attached to the said jambs and engaging the said side rollers, and a counterbalancing mechanism mounted on the said frame and including looped flexible elements connected to the side rollers in a manner urging the closure member to the open position when the trolley device is rearward of the side rollers or to the closed position when the trolley is forward thereof.

5. An overhead door assembly, comprising in combination, a building frame, having a lintel and jambs and forming a doorway thereat, a movable unitary closure member including an overhead trolley device and side rollers closing the doorway when in a substantially upright position and opening the doorway when in a prone position, an overhead rail member attached to the said lintel and extending rearwardly thereof and engaging the trolley device, side tracks having curved portions mounted on the said jambs and engaging the side rollers and a counterbalancing mechanism mounted on said frame and including looped flexible elements connected to the side rollers in a manner urging the closure member to the open position and the side rollers to the said curved position when the trolley device is rearward of the side rollers or to the closed position when the trolley device is forward thereof.

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