Oct. 12, 1943. R. H. OSBORNE 2,331,497

OVERHEAD DOOR AND LOCKING MEANS THEREFOR

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Fig. 1.

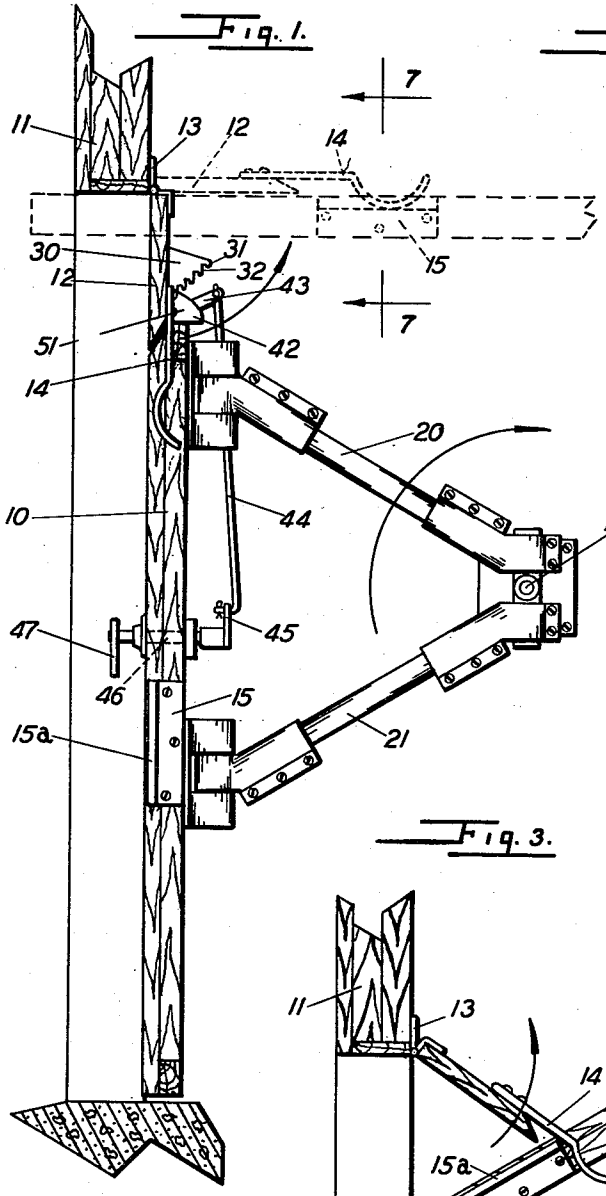


Fig. 2.

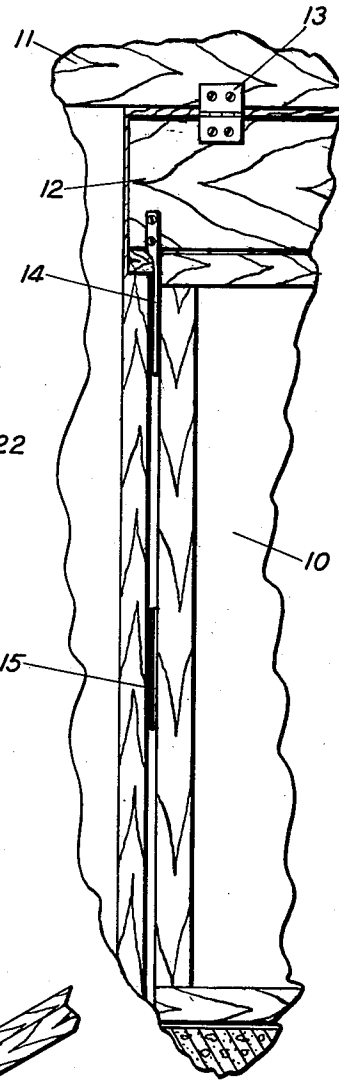


Fig. 3.

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Fig. 4.

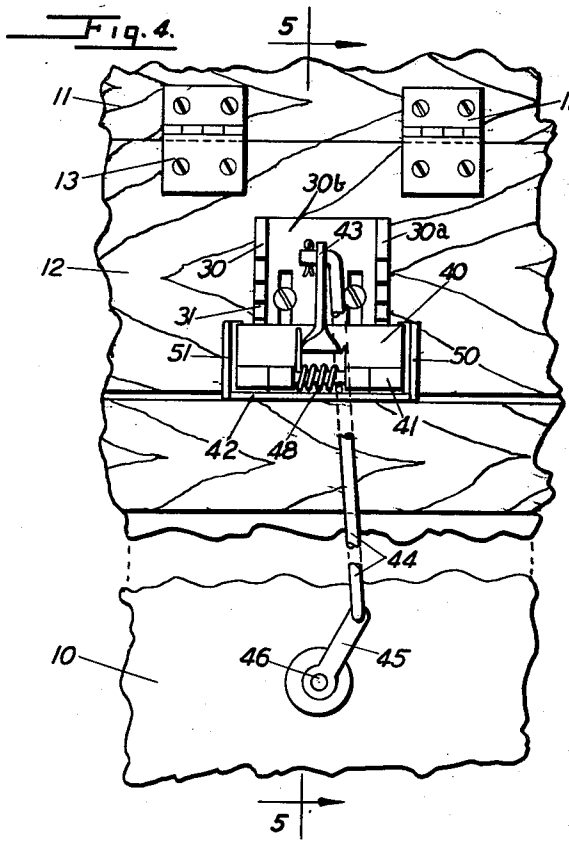


Fig. 5.

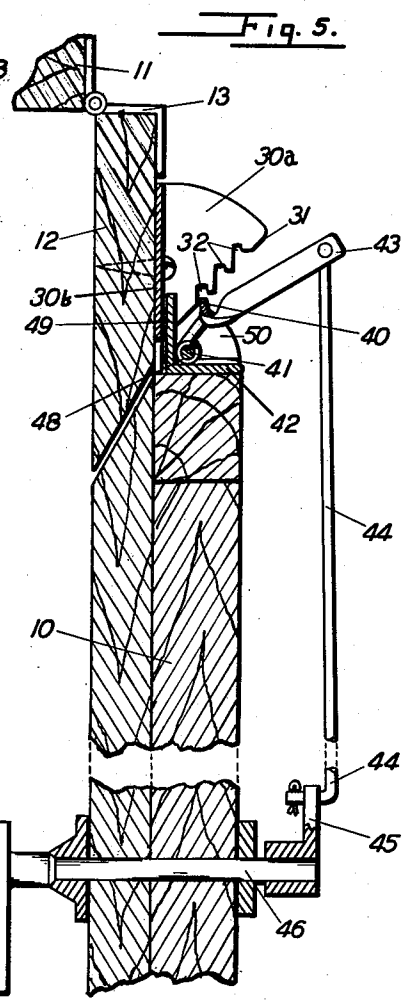


Fig. 6.

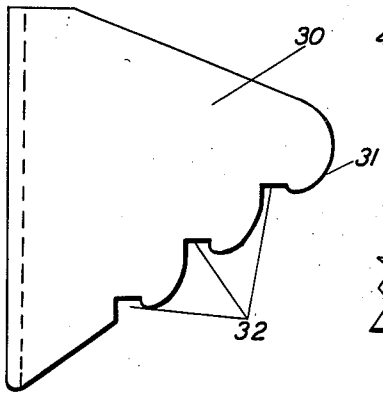
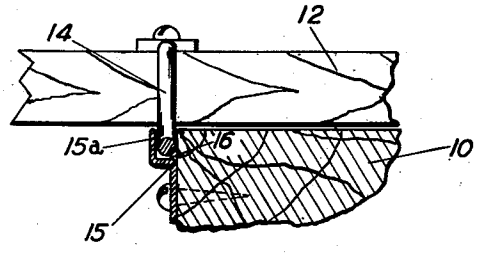


Fig. 7.



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UNITED STATES PATENT OFFICE

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OVERHEAD DOOR AND LOCKING MEANS THEREFOR

Ralph H. Osborne, West Los Angeles, Calif.

Application December 26, 1940, Serial No. 371,687

6 Claims. (Cl. 20—16)

My invention relates generally to overhead doors for garages and other structures, and more particularly to that type of overhead door which is rotated from a closed vertical position to an open horizontal position.

The conventional overhead door of this type requires considerable head room to allow for the curved path traveled by the upper edge of the door, and although various expedients have been tried in attempting to adapt rotating doors to conditions where the head room is limited, the problem still remains.

It is therefore the major object of my invention to provide an overhead door which may be installed at no additional cost, in locations where there is a minimum amount of head room available.

It is another object of my invention to provide an overhead door which is largely constructed of conventional materials, and which is not restricted to any particular method of door operation or support.

It is a further object of my invention to provide a lock for overhead doors which provides a positive holding and substantially jimmy-proof means of locking the door under all conditions.

These and other objects of my invention will become apparent from the following description of a preferred form thereof, and from the drawings illustrating that form, in which

Fig. 1 is a side elevational view of a door assembly embodying my invention,

Fig. 2 is a rear elevational view of a portion of such a door in lowered position, looking from the inside toward the outside of the door,

Fig. 3 is a side elevational view of a section of the assembly showing the door in the process of being opened,

Fig. 4 is a rear elevational view of my preferred form of lock used in conjunction with said door,

Fig. 5 is a vertical cross-sectional view taken at 5—5 in Fig. 4,

Fig. 6 is a side elevational view of an optional form of keeper which may be used in my said lock, and

Fig. 7 is a horizontal cross-sectional view taken at 7—7 in Fig. 1.

Referring now to the drawings, and particularly to Fig. 1 thereof, the numeral 10 indicates an overhead door supported by a pair of angularly positioned arms 20 and 21 mounted for rotation about an axis 22, it being understood that various systems of mounting the door may be employed. A conventional header 11 is provided across the top of the door opening, but the door 10 instead of extending clear up to the header, terminates below it leaving an intervening space which is closed by a movable member 12 which I will term a sub-header. In the preferred form of my invention illustrated herein, the sub-header 12 is pivotally hung from the stationary header 11 by means of offset hinges 13. It will be apparent, of course, that other methods of attachment may be used which permit the sub-header 12 to be vertically aligned with the door 10, while at the same time permitting it to be moved out of its normal position closing the space between the door and the header.

As indicated by the long arrow in Fig. 1, the door 10 is opened by rotating it clockwise about the axis 22 until it reaches the horizontal overhead position shown in dotted outline in Fig. 1. During the course of this travel the upper edge of the door will of course describe an arc about the axis 22, and the highest point of the arc will be considerably above the final height of the door when it comes to rest in its overhead position. For example, with some installations, a door 7 feet high requires 16 inches of head room above the bottom of the header 11 to allow for the arc traveled by the upper edge of the door, and the necessity of having this extra space often prevents the use of overhead doors. If the height of the door is decreased, the amount of head room necessary is likewise decreased, even though the center of rotation of the door remains unchanged. However, reducing the height of the door without lowering the header a corresponding amount, leaves a horizontally extending space between the door and the header which must be closed by suitable means such as the movable sub-header above described. I have found that by the use of my invention it is possible to install an overhead door of the type shown with as little as 4" of overhead space above the height of the door opening.

It will be apparent that because of the angular displacements involved, a given reduction in door height will not necessarily permit an exactly equal reduction in the required amount of head room, but these two quantities will generally be roughly equal to each other, the exact ratio depending on the height of the total opening and the location of the center of rotation of the door.

As seen best in Fig. 1, the lower edge of the sub-header 12 and the upper edge of the door 10 may be beveled to facilitate raising the door without the upper edge thereof binding against the sub-header. The bevel also aids in forming

a water-tight joint between the door and the sub-header.

It will be apparent that the sub-header 12 may be raised by direct engagement with the door 10, but I have found this to be usually inadvisable since it is difficult to keep the two surfaces from rubbing together, which removes the paint from the door. I therefore prefer to employ a depending arm 14 which is attached to the sub-header 12 adjacent the end thereof, and beyond the side edge of the door, so as to be free thereof. To improve the appearance of the door assembly, the arm 14 is usually attached to the inside surface of the sub-header, so that it is not visible from the exterior side of the door, though it is evident that other locations may be used.

To raise the arm 14, and consequently the sub-header 12, I prefer to use a plate 15 fastened to the side edge of the door 10 and provided with an offset edge portion 15a adapted to cooperate with the edge of the door to form a channel space or groove 16 in which the lower end of the rod 14 may ride. In this connection I prefer to curve the lower end of rod 14 as shown in Figs. 1 and 3 to facilitate its travel along the channel 16 and also to hold the sub-header 12 out of engagement with the door 10 when they are being rotated. For the proper functioning of the assembly, the length of the arm 14 and the position of the track plate 15 must be correlated so that the plate will properly raise and lower the arm as will be hereinafter explained. By way of example only, I have found that if the arm extends approximately 14 to 16 inches below the free edge of the sub-header 12, and the track 15 is about 11 inches long and located approximately one-third of the distance up on a door of normal height, satisfactory results will be obtained.

In the operation of my assembly, assuming the door 10 and the sub-header 12 to be closed and in substantially vertical positions, the door is opened by lifting it so that the top portion is rotated upwardly and inwardly, while the sub-header 12 continues to hang in a substantially vertical position. As rotation of the door continues, a point is reached where the upper end of track plate 15 engages the curved lower end of arm 14, and still further rotation of the door rotates the sub-header 12 as shown in Fig. 3 until they both reach the overhead horizontal position shown in dotted lines in Fig. 1. In closing the door 10, the above cycle of movements is of course reversed, permitting the sub-header to swing back to its normal position. By thus raising and lowering the sub-header 12 in response to movement of the door, positive action is at all times assured without the possibility of jamming. It is to be understood of course, that the door 10 is usually provided with a spring or counter-balancing system (not shown) to aid in opening and closing it.

As is well known in the art, large doors of the type generally used for garages are prone to warp and bow in at their centers, and it is considerable of a problem to supply a lock which will function both before and after this warping. To effectively meet this problem I have devised the lock shown in Figs. 1, 4 and 5, and now to be described.

As seen best in Fig. 5, I provide a keeper 30 which extends outwardly from the rear face of sub-header 12 and is generally triangular in vertical section with one side of the triangle being secured to the sub-header 12, and another of its sides extending upwardly and outwardly from the sub-header at an angle in the neighborhood of 45°. The angular side of the keeper which I will term the keeper face 31, is provided with a plurality of downwardly facing undercut notches 32 which are engaged by a latch 40 mounted on the upper edge of the door 10. It will be apparent that the keeper 30 may vary in thickness from a relatively thin plate to a large block, but I prefer to make it of two parallel plates preferably formed out of a single piece of metal bent twice to form a U. The base 30b of the U is fastened to the sub-header 12 and the two arms of the U provide parallel keeper plates 30 and 30a each provided with a series of notches 32.

To engage the keeper 30 I provide a latch 40 mounted on the top edge of the door 10, and adapted to fit into the notches 32 so as to prevent upward movement of the door, the latch 40 consisting of a metal plate hingedly attached at 41 to a base plate 42, the latter being secured to the top edge of the door. To rotate the latch 40 away from the keeper 30 and disengage it from the notches 32, I provide the latch with rigidly attached arm 43 connected by a rod or chain 44 to a crank 45 firmly attached to the inner end of a rotatable shaft 46 extending through the door 10 and provided with a lockable handle 47 on its outer end. By this means, rotation of the handle 47 in either direction will cause the arm 44 to be pulled downwardly to hold the latch 40 out of engagement with its keeper 30. A spring 48 urges the latch forwardly into engagement with said keeper, and a guard plate 49 prevents the latch from rotating too far forward.

The latch and keeper are assembled in such manner that when the door is new and unwarped the upper lip of the latch will engage one of the notches of the keeper before the latch reaches its extreme forward position against the guard 49. In this position it can be rotated rearwardly without interference from the shoulders between the notches 32, but when the latch lip is seated well within a notch 32 upward movement of the door is impossible. However, there will be times when the latch lip comes to rest against one of the notch shoulders and rotation of the door might be possible without the lip engaging the next above notch. By mounting the latch so that it is urged forwardly, the latch lip will in effect follow the keeper and always engage a notch upon rotation of the door, unless it is first retracted. As a further protection along this line I bend the engaging lip of the latch forwardly so that even in retracted position it points substantially in a vertical direction. These same features also solve the problem of locking the door when it is warped, for as the door bows inwardly and the latch is thus displaced rearwardly away from the keeper, it rotates forwardly under the urging of spring 48 so as to continually engage the keeper and thus lock the door shut despite the fact that the latch and keeper are bodily displaced with respect to each other.

By providing a plurality of the notches 32 the door may be locked even though it is not entirely closed, due to an obstruction on the ground or some other reason. However, so long as the door is sufficiently closed so that the latch may engage one of the notches 32, the door may be effectively locked in that position. The guard 49, besides limiting the forward stroke of the latch, provides protection against the unlawful inser-

tion of a tool between the sub-header 12 and the door 10, and the forcing of the lock back out of the way. Additional guard plates 50 and 51 may also be provided, one on either side of the latch, to prevent the insertion of a tool from the side. In practice, the three guard plates 49, 50 and 51, and the base plate 42, are formed out of a single piece of metal, and the axis 41 consists of an axle journalled in the two side guards 50 and 51, thus making a compact and sturdy lock which is practically jimmy-proof under all conditions of use.

In Fig. 6 I have shown a slightly modified form of keeper plate in which the outer face of the shoulder between the notches 32 is curved to facilitate movement of the latch lip thereover when the door is being closed. Also in this form the notches are slightly shallower and broader, but the same action is accomplished as just described. This form is to be desired when the door is already warped out of shape and the keeper and latch must of necessity be separated more.

While I have shown a preferred form of movable header and lock in detail, it is to be understood that they are merely illustrative of the broad principles involved as set forth in the appended claims.

I claim as my invention:

1. An overhead door assembly for installation in a doorway having a header, which includes: a door rotatable about a horizontal axis and extending upwardly from the sill of said doorway to a point below said header; a subheader pivotally hung from said header and extending down to the top of said door; a depending curved arm on said subheader; and track means along one side of said door adapted to engage and guide said arm to raise said subheader to open position when said door is rotated to open position.

2. An overhead door assembly for installation in a doorway having a header, which includes: a door rotatable about a horizontal axis and extending upwardly from the sill of said doorway to a point below said header; a pivotally mounted subheader extending downwardly from said header to the top of said door; a depending arm on said subheader; and track means along one side of said door adapted to engage and guide said arm to raise said subheader to open position when said door is rotated to open position.

3. An overhead door assembly for installation in a doorway having a header, which includes: a door rotatable about a horizontal axis and extending upwardly from the sill of said doorway to a point below said header; a subheader pivotally mounted in the upper portion of said doorway and extending downwardly from said header to the top of said door, said door being mounted on an axis separate from and not connected to said subheader whereby said door and subheader may be rotated independently of each other; and means associated with said door and subheader adapted to swing said subheader upwardly in response to the opening of said door.

4. An overhead door assembly for installation in a doorway having a header, which includes: a door rotatable about a horizontal axis and extending upwardly from the sill of said doorway to a point below said header; a subheader pivotally and independently mounted in the upper portion of said doorway and extending downwardly from said header to the top of said door whereby said subheader may be swung independently of said door; and means associated with said door and subheader adapted to swing said subheader upwardly in response to the opening of said door.

5. An overhead door assembly for installation in a doorway having a header, which includes: a door rotatable about a horizontal axis and extending upwardly from the sill of said doorway to a point below said header; a subheader pivotally mounted in the upper portion of said doorway and extending downwardly from said header to the top of said door, said door being mounted on an axis separate from and not connected to said subheader whereby said door and subheader may be rotated independently of each other; a member depending from said subheader; and means on said door adapted to engage said member and swing said subheader upwardly when said door is swung upwardly.

6. An overhead door assembly for installation in a doorway having a header, which includes: a door rotatable about a fixed horizontal axis and extending upwardly from the sill of said doorway to a point below said header; a subheader pivotally and independently mounted in the upper portion of said doorway and extending downwardly from said header to the top of said door, said subheader being adapted to be swung upwardly by the opening of said door.

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