May 18, 1948. W. E. WREAD 2,441,741

MEANS FOR MOUNTING OVERHEAD GARAGE DOORS

Original Filed Aug. 30, 1940 4 Sheets-Sheet 1

Fig. 1

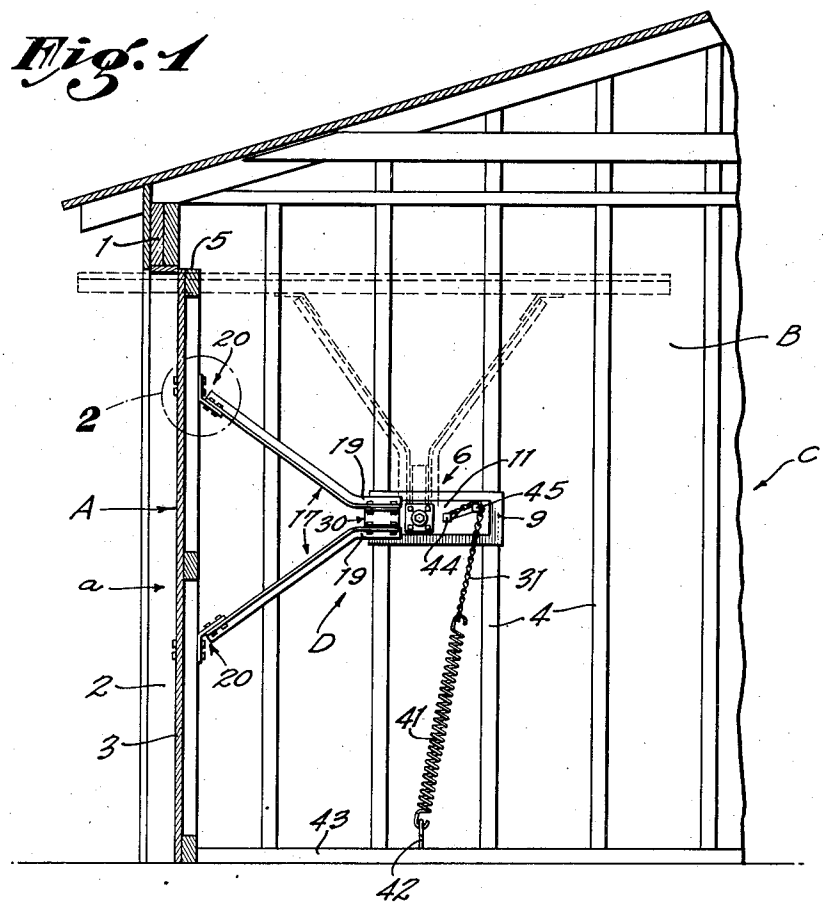


Fig. 2

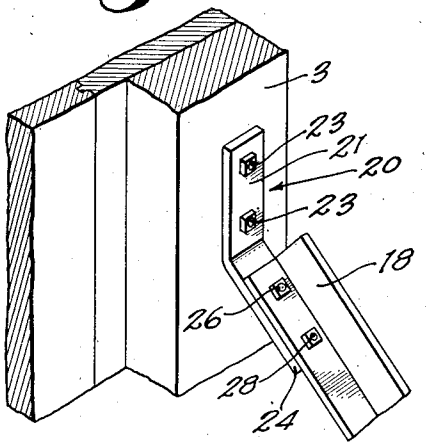
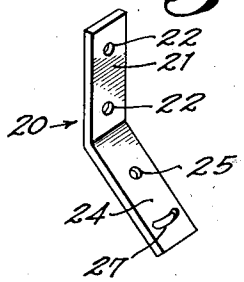


Fig. 3



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MEANS FOR MOUNTING OVERHEAD GARAGE DOORS

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Fig. 4

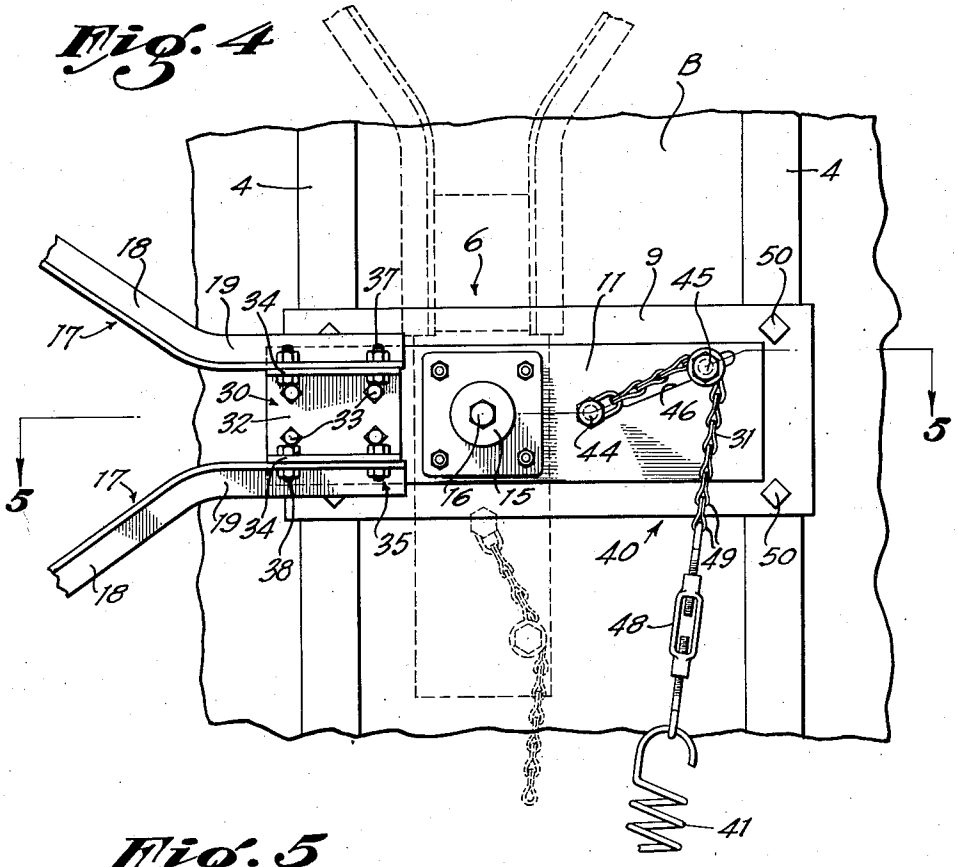
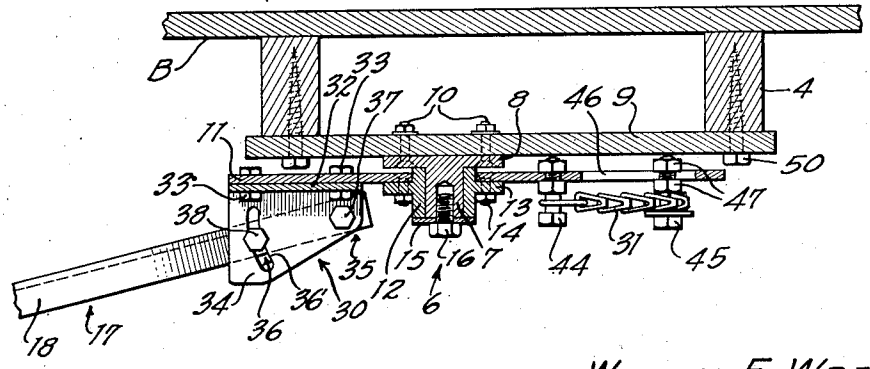


Fig. 5



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MEANS FOR MOUNTING OVERHEAD GARAGE DOORS

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Fig. 6

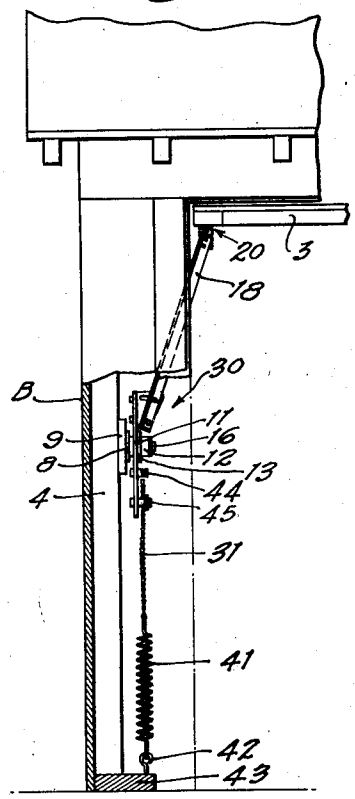


Fig. 7

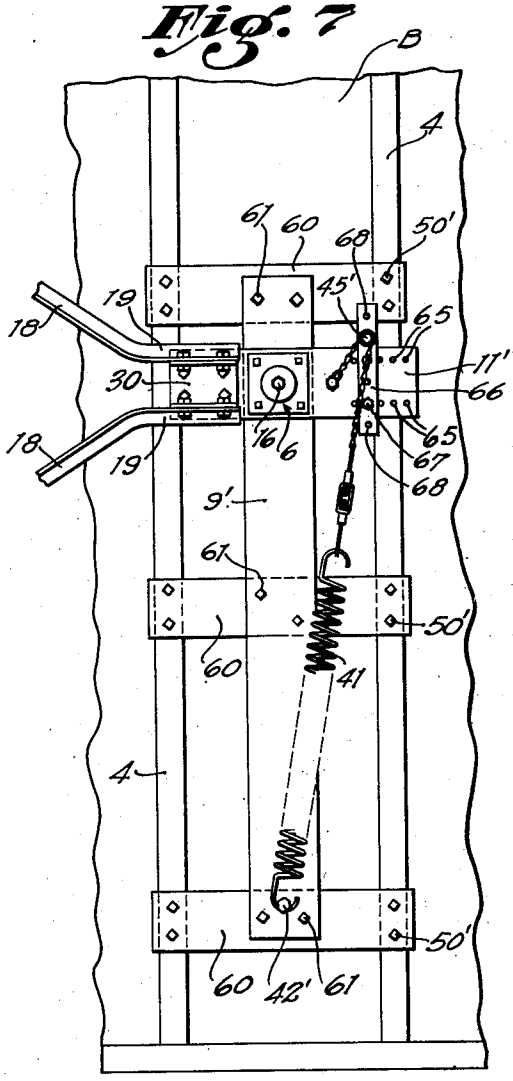
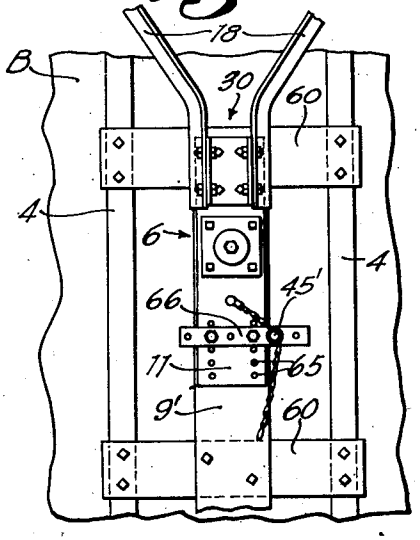


Fig. 8



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MEANS FOR MOUNTING OVERHEAD GARAGE DOORS

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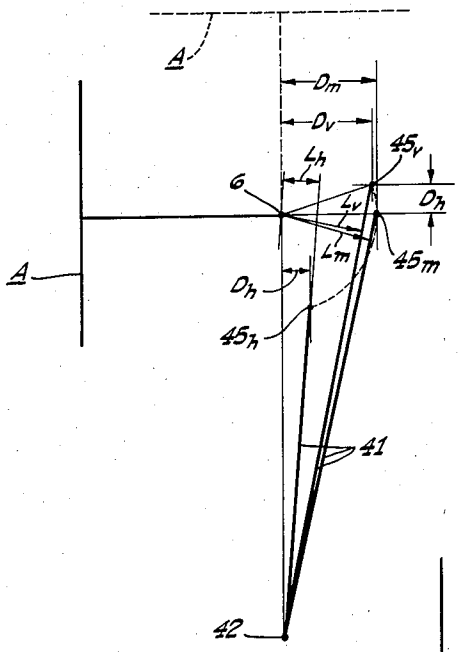


Fig. 9.

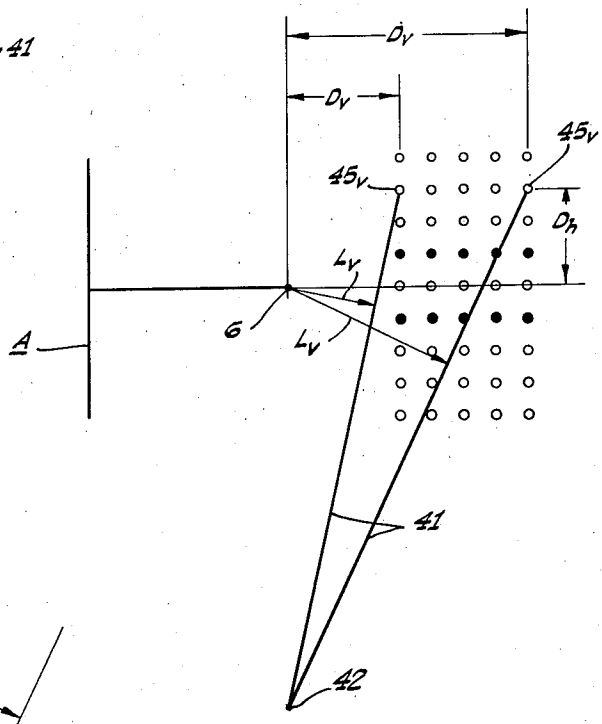


Fig. 10.

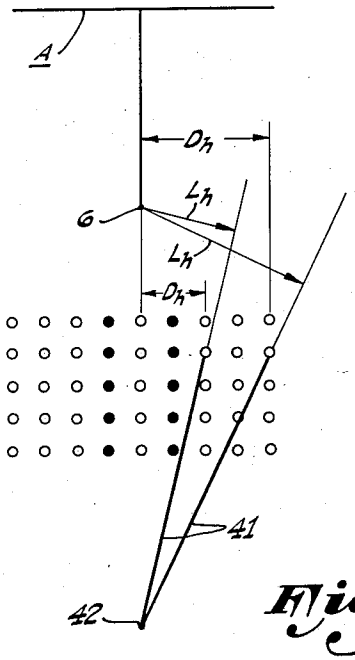


Fig. 11.

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Patented May 18, 1948

2,441,741

UNITED STATES PATENT OFFICE

2,441,741

MEANS FOR MOUNTING OVERHEAD GARAGE DOORS

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Continuation of application Serial No. 573,170, January 17, 1945, which was substituted for abandoned application Serial No. 354,873, August 30, 1940. This application December 3, 1945, Serial No. 632,380

5 Claims. (Cl. 16—129)

1

My invention relates to means for mounting overhead garage doors and the like, and particularly to the hardware by which an overhead door is pivotally and adjustably mounted upon a support whereby it may be raised or swung about a horizontal axis to a position above the doorway.

An object of my invention is to provide a novel means for mounting overhead doors whereby the door may be easily and quickly balanced so that very little effort is required in the raising and lowering operations even though it be quite large or heavy.

An object of my invention is to provide a novel means for mounting overhead doors which are particularly suitable for private garages, and in which simple and inexpensive means are provided whereby the door may be easily and quickly adjusted relative to the opening it is to close, and whereby the door may be easily and quickly "balanced" so as to prevent unnecessary slamming at the end of its opening or closing movements.

Another object of my invention is to provide a novel means for mounting overhead doors which is particularly simple and economical to manufacture, and which may be easily installed by unskilled workmen.

Another object is to provide a novel means for mounting overhead doors and which incorporates novel and simple means for adjusting and maintaining the adjustment of a counter-balance spring so that the door may be maintained in perfect working order over a considerable period of time.

Another object is to provide a novel adjustable means for pivotally mounting overhead doors whereby a counter-balancing spring used in conjunction therewith may be easily and quickly installed, initially, and subsequently adjusted, and which will not accidentally work loose.

A still further object is to provide a novel means for mounting overhead doors whereby the difficulties and dangers likely to be encountered in using an overhead counter-balance spring will be eliminated.

A still further object is to provide a novel means for pivotally mounting overhead doors which may be assembled, packed, shipped and sold as a unit for installation by unskilled workmen.

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A still further object is to provide novel means for mounting overhead doors by which material savings in manufacture and installation costs are obtained over structure heretofore used, and the necessary offset from the supporting wall is obtained without requiring the "building up" of a supporting base or the bending of the supporting arms to suit a particular installation.

A still further object is to provide novel means for pivotally supporting overhead doors whereby a standard set of hardware may be used to support pivotally overhead garage doors of all types used in the residential field.

Advantages and features of my invention include the elimination of an overhead counter-balancing spring with its difficulties in mounting, as well as the attendant dangers to life, limb, and property in the event the spring breaks or becomes disengaged; the side walls of the enclosure are left free for shelves and doors by eliminating the overhead balancing means; lighter materials may be used in the construction of my invention without sacrificing strength because of the use of leverages; and the simplicity of the adjustable features and of the journal plates of my supporting means eliminates the necessity of heavy material in the hub construction.

Other objects, advantages and features of invention may appear from the accompanying drawings, the subjoined detail description, and the appended claims.

The present application is a continuation of earlier-filed application Serial No. 573,170, filed January 17, 1945, now abandoned, which in turn was a substitute for application Serial No. 354,873, filed August 30, 1940.

The accompanying drawings illustrate the invention in some of the forms I at present deem preferable.

Figure 1 is a vertical sectional view through a closure member associated with a garage, a fragment of which is shown, and shows my novel overhead door mounting means in elevation, the dotted lines indicating the door and supporting means in its raised or open position;

Figure 2 is a perspective view, on enlarged scale, of the door arm connecting means shown in the dot and dash circle numbered 2 in Figure 1;

Figure 3 is a view in perspective of a detached

door and arm connecting plate or attaching bracket;

Figure 4 is a side elevational view on an enlarged scale showing one of the journal or pivot members with associated door supporting arms and counter-balance means, certain parts being broken away to contract the view, and the dotted lines indicating the position of the parts when the door or closure member is moved to open position;

Figure 5 is a sectional view taken on irregular line 5—5 of Figure 4;

Figure 6 is a front elevational view of one side of a garage and its door opening with the door moved to open position and supported by my novel supporting means;

Figure 7 is a side elevational view of a modified form of my novel pivot and supporting means constructed as a "unit" and shows a modified form of adjustment for the counter-balance spring, with the parts in their position with the door closed, a portion of the garage side wall also being shown;

Figure 8 is a fragmental side elevational view on an enlarged scale and shows the means for adjusting the tension of the counter-balance spring in the embodiment of Figure 7, the parts being positioned as with the door overhead, that is, in its open position;

Figure 9 is a diagrammatic showing of the effective lever arms available to the counter-balance spring with the door in the vertical and horizontal positions;

Figure 10 is a diagrammatic showing illustrating the variations available in lever arms for the counter-balance spring with the door in the vertical or closed position;

Figure 11 is a diagrammatic showing illustrating the range of lever arms available to the counter-balance spring with the door in the horizontal open position.

The door or closure member A is adapted to be mounted in any conventional opening or doorway *a*, and is particularly adapted for garages or aeroplane hangars the openings in which may be either large or small. The door may, however, be used to close any opening, and although I have shown in the drawings a portion of a garage and door therefor, the same is illustrative only.

The doorway as shown is usually delimited by a header 1 and door jamb members 2. The door proper or closure member 3 is pivotally mounted to the side walls B of the garage or enclosure C and preferably to the studding 4 thereof immediately behind the header 1 so that, when in its vertical position, its upper margin 5 is positioned adjacent to and in overlapping contact with the inner edge of the header, as shown in Figure 1. When the door is moved to its closed position, header 1 acts as a stop.

My invention particularly relates to the means for mounting a door or closure member for closing and opening an aperture. These means, indicated generally at D in the drawings, includes the novel pivot or journal means and supporting arm structure associated therewith, as hereinafter fully described.

The door 3 is pivoted about horizontal journal axis means 6 provided at each side of the door. These means are duplicated and for simplicity only one is illustrated and described, it being understood that a complement of the same is provided at the opposite side or edge of the door (not shown).

Journal means 6 includes a hub 7 provided at one end with a flange 8 which is secured to a main supporting plate or base 9 by suitable means such as the bolts 10. A main journal plate 11 is journaled intermediate its ends upon the hub 7 by means of a journal member 12 to the flange 13 of which the plate is secured by bolts 14. A washer 15 is connected to the hub 7 by means of a stud bolt 16, and serves to retain the journal member 12 on the hub 7.

Adjustably secured to one end of the main journal plate 11 is a pair of diverging bracket arms 17, the major portions 18 of which extend in obtuse angular relationship. The bracket arms 17 are preferably made of angle iron and are bent so that their leg portions or ends 19 at the plate 11 extend parallel. The outer ends of portions 18 of arms 17 extend to the door 3 and are adjustably connected thereto by means of arm attaching brackets 20. Each bracket 20 also includes an arm 24 extending angularly with respect to arm 21 and provided with an opening 25 and an arcuate slot 27. An anchor bolt 26 and a locking bolt 28, carried by the outer ends of the arms 18 are secured in opening 25 and slot 27, respectively, to obtain advantages which will be fully explained hereinafter.

The inner parallel ends 19 of the arms 17 are adjustably mounted on the main journal plate 11 by means of an arm mounting bracket 30 preferably U-shaped and secured at its base, or web 32, to plate 11 by means of bolts 33. The upstanding side walls 34 of U-shaped bracket 30 are provided with pivotal connections, indicated generally at 35, and with an angularly adjustable connection, indicated generally at 36 for the arms 17. The pivotal connection 35 is formed by the bolts 37 extending through the walls 34 and arms 17, and the adjustable connection 36 by the bolts 38 extending through the arms 17 and the arcuate slots 36' in the walls 34.

In the form of my invention shown in Figures 1–5, the spring counter-balancing means 40 comprises a coil spring 41 secured at one end, as by an eye bolt 42, to the sill or similar base 43 of the building or enclosure. The other end of coil spring 41 is secured to one end of a flexible member, such as a link chain 31, which has its opposite end secured to an anchor bolt or post 44 attached to the plate 11 upon the opposite side of hub 7 from the arms 17. The flexible member 31, intermediate its ends, passes over an adjustable stud 45 seated in a slot 46 provided in the end of the main journal plate 11 upon the same side of hub 7 as post 44. Slot 46 is positioned in plate 11 so as to be inclined, as shown in Figure 4 in an upward direction from the hub 7 when the door is in closed position and bolt 45 is secured in adjusted position therein by means of lock nuts 47 upon opposite sides of the plate. Adjustment of the bolt 45 in slot 46 adjusts the lifting and holding power of the spring 41 and varies the force which it exerts to lift and maintain the door 3 in open position. It will be apparent that as the adjusting bolt 45 is moved radially from the hub 7, the lifting power of spring 41 is increased as its effective lever arm increases. It will also be apparent that by moving the bolt 45 upwardly in the slot 46 so as to increase its horizontal displacement from a vertical plane through the hub 7 with the door in its open position, as shown in dotted lines in Figure 4, the holding power of spring 41 also will be increased.

As illustrated in Figure 4 the flexible member

41 may be provided with a turnbuckle 48 to obtain a minute adjustment of the tension of spring 41 rather than by adding or removing links 49.

Lag screws 50 secure the main supporting plate or base 9 to the uprights 4 of the side wall B of the building structure.

In the embodiment shown in Figures 7 and 8 I have shown the device as embodied in a "unit construction" with a modified form of main journal plate 11' for obtaining varying adjustments of the lifting and holding power of spring 41. The embodiment of Figures 7 and 8 is particularly designed to permit of variations in the adjustment of the lifting and holding power of spring 41, that is, in the door "balance," by an unskilled workman in the field and without the use of expensive apparatus.

In the unit construction shown in Figure 7 the supporting plate or base 9' is elongated and preferably metallic and extends vertically, the journal means 6 being secured thereto as in the first embodiment. Base 9' is fastened by bolts 61 to vertically spaced cross plates 60 extending between studding 4 and held thereon by means of lag screws 50'. Spring 41 is secured to a suitable anchor, bolt, or eye 42' positioned at the lower end of the plate 9', and as the journal means 6 and the bolt 42' are both mounted on plate 9' the adjustment of the tension of spring 41 obviously can be made at the factory. This results in an assembly or "unit" which may be secured to the side walls B of the building with a minimum of skilled labor being required.

Turning now to the details of the construction shown in Figures 7 and 8, the left hand portion of the main journal plate 11' is the same as shown in Figures 1, 4 and 5. The right hand portion of plate 11', as shown in Figures 7 and 8, that side to which the counter-balance spring means is connected, is provided with a plurality of apertures 65. Similarly the plate or strap 66 is provided with a plurality of apertures 68 and bolts 67 passing through spaced apertures 68 formed in plate 66 and apertures 65 in plate 11' secure the plates together. The spring tension adjusting bolt 45' is secured in one of the apertures 68 and, as the apertures 68 are spaced over a greater distance than the length of the slot 46 of the first embodiment, it follows that a wider range of adjustment can be obtained by adjusting bolt 45' than can be obtained by adjustment of the bolt 45 in the slot 46 shown in Figures 1, 4 and 5. The apertures 68 in plate 66 may be so spaced that the distance between three apertures 68 equals the vertical distance, as shown in Figure 7, between a pair of apertures 65. Accordingly, a multiplicity of adjustments may be obtained to position properly the adjusting bolt 45' relative to the hub by positioning the bolt 45' in plate 66 and by positioning plate 66 relative to plate 11'.

Referring again to the embodiment of Figures 1 to 5, inclusive, it is apparent that an overhead door may be mounted to close the opening in an enclosure and the mounting means for the door secured to the enclosure side walls with a minimum requirement of skilled labor, having been previously adjusted so as to be operable. In this respect, when using the construction shown in Figures 1 to 5, inclusive, the arm attaching brackets 20 are suitably secured to the door and the arms 17 connected thereto and also to the arm supporting bracket 30. The bolts 28 and 38 as well as the pivotal bolts 26 and 37 are left initially in a slightly loosened condition so that upon positioning the supporting means or plate 9 adjacent to the upright 4, the major portions 18 of arms 17 may be adjusted to the proper angular inclination between the door and the main journal plate 11, as shown in Figures 5 and 6, in order to locate properly the journal means 6 relative to the side walls B. When this has been done the journal member 12 may be removed from the hub 7 and the supporting base 9 secured to the uprights by means of the lag screws 50. Thereafter the journal member 12 is again mounted on the hub 7 and the bolts 26, 28, 37 and 38 securely tightened. The tension of spring 41 may then be properly adjusted to give the appropriate lifting and holding power to the device to balance the door correctly. If it is preferred, however, the position of the plate 9 on the uprights may be determined by measurement, the plate secured, and then the journal member 12 mounted on its hub 7.

Referring again to the embodiment of the invention shown in Figures 7 and 8, in the "unit" type of mounting to mount the door the arms 17 and the journal means 6 are secured to the door and the door placed in closing position. The unit construction including the journal 6 is then moved to position the cross plates 60 adjacent the uprights 4 to which they are secured by lag screws 50'. The bolts at the ends of arm 17 are then tightened to hold the parts in adjusted position. Adjustment of the tension of the counter-balance spring will be apparent.

From the foregoing, it is believed to be clear to those skilled in the art that if desired the type of main journal plate 11' and its associated adjustable plate 66 as shown in Figures 7 and 8 may be substituted for the main journal plate 11 shown in Figures 1, 4 and 5, or vice versa, without departing from the spirit of my invention.

A feature of my invention is in the provision of a mounting means for a swivel type door in which the door proper is adjustably secured by arms 17 to one end of the main journal plate 11 which in turn is journaled intermediate its ends, counter-balance means being connected to the other end of the main journal plate 11 and extending downwardly therefrom to a point substantially vertically below the pivot or journal of plate 11. The device may be sold as a "unit construction" or mounted on a post (not shown) without requiring additional braces or built-up mounting means. The construction eliminates likelihood of danger to life, limb, and property in the event the counter-balance means should break. It will be noted that I have provided in a door structure a closure member A from which a pair of bracket arms 17 extends inwardly and laterally adjacent each side thereof. Each pair of arms 17 defines a substantially Y-shaped structure, the inner extremities 19 of which are adjustably connected by the arm supporting bracket 30 to the main journal plate 11. The latter is journalled intermediate its ends to hub 7 whereby the closure member may be rotated about a horizontal axis through the hub 7 so as to be movable between vertical and horizontal positions. I have provided counter-balancing means 40 anchored at one end to a fixed support such as the eye bolts 42 or 42' and secured at its other end to the journal plate in rear of the horizontal axis of the closure member, that is, to a point on the main journal plate 11 opposite that from which the

arms 17 extend. The counter-balancing means is preferably arranged largely below the horizontal axis when the door is in its closing position and is below that axis when the door is in open position.

The closure supporting means constructed in accordance with the present invention has certain desirable operating characteristics which are possibly evidenced most clearly in Figure 9 in which the relative effective lever arms available to the tension spring 41 are indicated with the door in a vertical and horizontal positions. With the door A positioned vertically, the stud 45 is positioned as shown at the point 45_v and is spaced a horizontal distance D_v from the hub 6. Coil spring 41 is fixedly connected at its lower end at 42 and exerts a lifting force upon the door A through its effective lever arm L_v comprising a normal to the line connecting points 45_v and 42. Upon the operator lifting the door slightly the stud 45 moves in a circle about hub 6 to point 45_m and the distance D_v increases, as shown in the drawing to D_m, the corresponding lever arm L_m for the spring 41 then being greater than L_v. During this initial movement, therefore, the lifting power of the spring increases as the door opens. After a short arcuate movement, however, the lever arm for the spring decreases until finally, with the door in its horizontal open position, as shown in dotted lines in Figure 9, and with stud 45 positioned at point 45_h, the minimum lever arm L_h is reached and is smaller than the preceding lever arms available to the spring. The distances D_v represent the distance the stud 45 is spaced horizontally from the hub 6 while the distance D_h represents its vertical displacement relative to a horizontal line through the hub, the directions being those applicable with the door closed. It is to be noted that distance D_v controls primarily the lever arms L_v, and so the initial lifting force exerted by the spring, while the distance D_h determines primarily the final lever arm L_h and so the sustaining force exerted by the spring with the door in its horizontal position. Clearly the door lifting force exerted through the lever arms L_v will be much greater than the door sustaining force exerted through the lever arm L_h.

Referring now to Figures 10 and 11 in particular the range of possible positions for the stud 45' with the door in the vertical position and in the horizontal position is illustrated diagramatically. The stud 45' is adapted to be shifted on plate 66 and the plate is itself adapted to be shifted vertically and horizontally on journal plate 11' thereby giving a multiplicity of possible positions for the stud 45' with the door in the vertical or closed position. This is clearly shown in Figures 10 and 11 in which stud 45' is adapted to occupy any of the positions 45_v indicated by open circles. The closed circles are positions used by the bolts 67. As stud 45' is shifted outwardly from hub 6, thereby increasing the distance D_v, the effective lever arm L_v is increased, resulting in an increase in the initial lifting force exerted by the spring 41 upon the door A. As the stud 45' is moved up or down relative to the horizontal axis through the hub 6, with the door vertical as shown in Figure 10, the distance D_h is varied. Distance D_h, as stated, gives primary control to the lever arm L_h through which the spring 41 acts with the door in the vertical position, as is shown most clearly in Figure 11. It is true that adjustment of the stud 45' horizontally in Figure 10 will have an effect upon the

lever arm L_h in Figure 11, but the effectiveness of such an adjustment is relatively small as compared to the effect of the adjustment vertically by which the distance D_h is varied. Accordingly, it is accurate in the practical sense to say that the adjustment of the distance D_v controls the door lifting force of the spring 41 with the door in the vertical position while the adjustment of the distance D_h controls the door-sustaining force of the spring with the door in the horizontal position.

It is to be understood, of course, that while the form of my invention illustrated and described herein is now deemed to be the preferred form thereof, I do not mean to limit myself to that particular form, but intend to include all equivalents thereof as defined by the appended claims.

I claim:

1. Closure member supporting means, including a base member provided with a hub; a plate journaled intermediate its ends on said hub; door supporting arms adjustably connected to one end of said plate; the other end of said plate being provided with an anchor post and an adjustable stud; and a counterbalance means for said closure member having one end connected to said base member, and its other end extended over said adjustable stud and secured to said anchor post.

2. Means for pivotally supporting a closure member including a hub; a plate journaled to said hub intermediate its ends; door supporting arms connected to said plate on one side of said hub, and said plate being provided on the other side of said hub with an inclined slot; counter-balancing means connected to said plate; and a stud adjustable in said slot and cooperative with said counter-balancing means to vary the tension thereof.

3. Means for pivotally supporting a closure member including a hub; a plate journaled to said hub intermediate its ends; door supporting arms connected to said plate on one side of said hub, and said plate being provided on the other side of said hub with a plurality of holes; an upstanding plate having a plurality of holes, a pair of which are adapted to coincide with a pair of holes in said journal plate, means extending through said holes to secure said plates together in adjusted position; a stud on said upstanding plate, an anchor post on said journal plate; and counter-balance means connected to said anchor post and extended over said stud.

4. Means for pivotally supporting a closure member including a hub; a plate journaled to said hub intermediate its ends; door supporting arms connected to said plate on one side of said hub, and said plate being provided on the other side of said hub with an anchor post positioned in a substantially horizontal plane from the axis of said hub when said closure member is in a vertical position; counter-balance means having one end connected to a fixed support and its other end connected to said post; a stud member cooperating with said counter-balance means; and means whereby said stud member may be secured to said plate at predetermined points relative to horizontal and vertical axes passing through the hub.

5. Means for pivotally supporting a closure member including a hub; a plate journaled to said hub intermediate its ends; door supporting arms connected to said plate on one side of said

hub, and said plate being provided on the other side of said hub with an inclined slot; resilient counter-balancing means connected to said plate on the side opposite that to which the door supporting arms are connected; and a stud adjustable in said slot and cooperative with said counter-balancing means to vary the tension thereof.

WILLIAM E. WREAD.

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