Dec. 5, 1950 G. W. MERRITT 2,532,456

AIRPLANE HANGAR DOOR CONSTRUCTION

Filed May 14, 1945 3 Sheets-Sheet 1

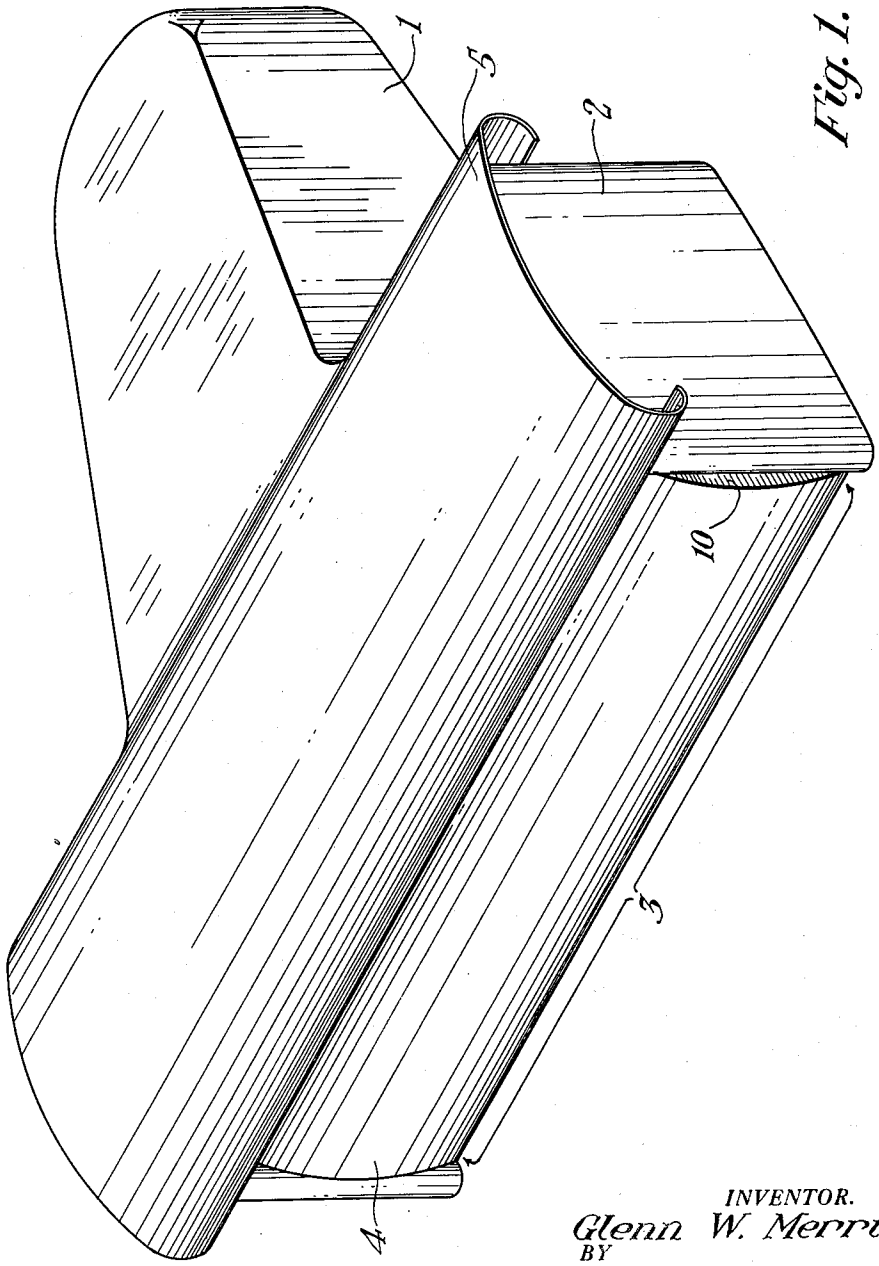


Fig. 1.

INVENTOR.
Glenn W. Merritt.
BY
George J. Croninger
ATTORNEY

Dec. 5, 1950 G. W. MERRITT 2,532,456

AIRPLANE HANGAR DOOR CONSTRUCTION

Filed May 14, 1945 3 Sheets-Sheet 2

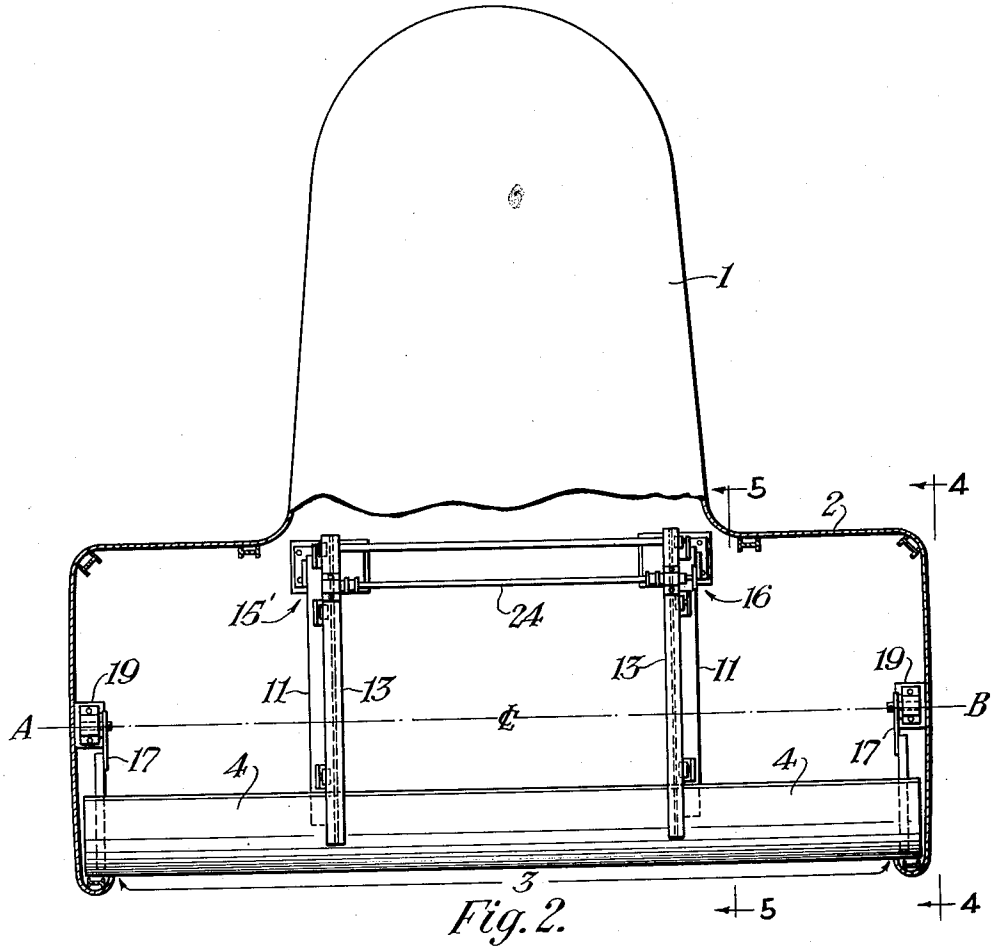


Fig. 2.

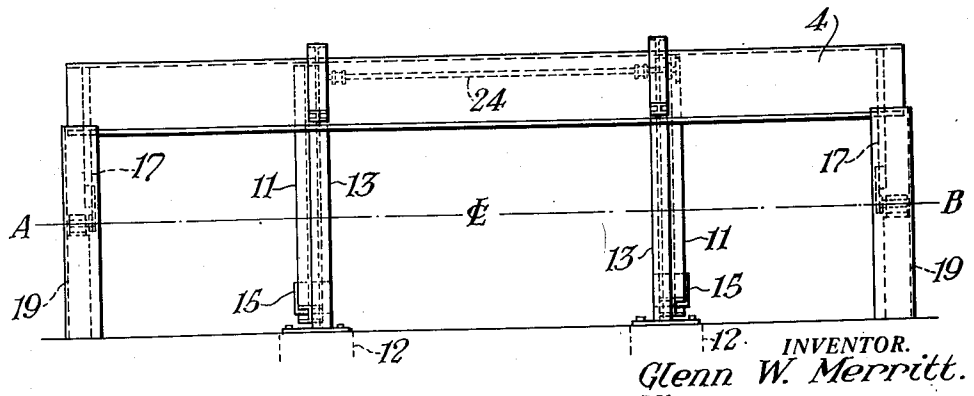


Fig. 3.

INVENTOR.
Glenn W. Merritt.
BY
George J. Cranings
ATTORNEY

Dec. 5, 1950 G. W. MERRITT 2,532,456

AIRPLANE HANGAR DOOR CONSTRUCTION

Filed May 14, 1945 3 Sheets-Sheet 3

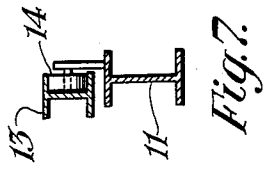


Fig. 7.

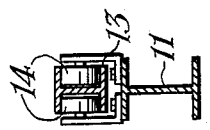


Fig. 8.

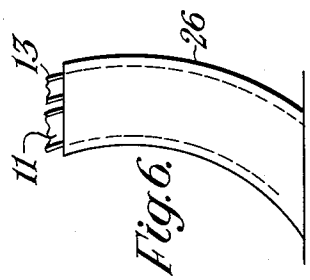


Fig. 6.

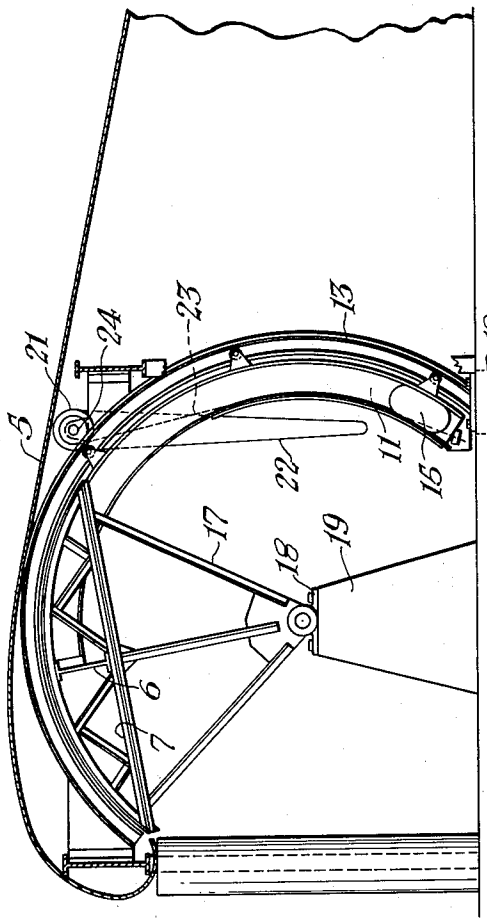


Fig. 4.

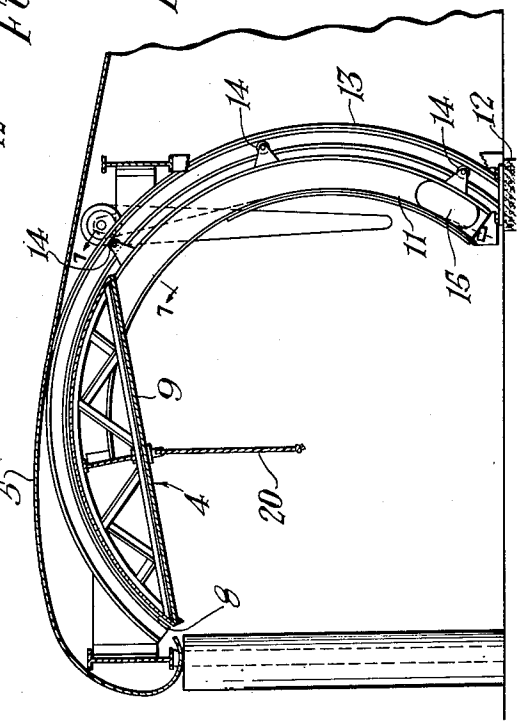


Fig. 5.

INVENTOR.
Glenn W. Merritt.
BY
George J. Cromwell
ATTORNEY

Patented Dec. 5, 1950 2,532,456

UNITED STATES PATENT OFFICE

2,532,456

AIRPLANE HANGAR DOOR CONSTRUCTION

Glenn W. Merritt, Bowerston, Ohio

Application May 14, 1945, Serial No. 593,709

8 Claims. (Cl. 20—16)

1

This invention relates to improvements in airplane hangars, particularly that class known as T hangars having space accommodations for a single plane and usually employed to house small, privately owned aircraft.

It has to do particularly with a door assembly for closing the plane entrance doorway which extends substantially the full width of the front of the building and one of the principal objects is to provide for a door assembly which will permit of the doorway being closed by a single span overhead door that may be easily moved from one position to another with a minimum of manual effort.

Heretofore, hangars of the class described have been provided with heavy, cumbersome, swinging or endwise sliding doors that add to the space requirements for the hangar and are exceedingly difficult to move by hand. Furthermore, such doors are expensive to make and install and due to their large, flat surface area and exposed position are wind hazards and are subject to being blown shut or off their hinges unless precautionary measures are taken. Besides this, these large, unwieldy doors are unsightly and detract from the appearance of the hangar.

Other objects of this invention are to provide for a single span door for closing the doorway of a hangar which is light in weight; to provide an overhead door assembly wherein the door is supported in such fashion that it cannot accidently fall into closed position and possibly injure persons or damage property standing in the doorway; another object is to provide for a door assembly wherein the door is biased toward open position and will require little or no effort to raise it; another object is to provide for a door assembly wherein the door is supported in such fashion as to avoid bending or sagging between the ends thereby eliminating any tendency to bind or stick and not move freely; another object is to provide a door assembly wherein the support for the door is so constructed and arranged as to permit the use of a single lightweight door for a long span and lastly to provide a door assembly which is simple in design and construction and inexpensive to manufacture.

In accordance with this invention, the door assembly hereof is most suitably used with T hangars having a wide entrance door extending across the front thereof and a tail offset in the center rear and, broadly speaking, the door assembly includes a single span overhead door and a support therefor formed as a cantilever having a movable extension which carries the door proper,

2

the cantilever being positioned inside the hangar and in rear of the doorway adjacent the tail offset or between the tail offset and the sides of the hangar.

Other objects and advantageous features will be noted in the accompanying drawings and written description wherein like reference characters designate corresponding parts and wherein:

Figure 1 is a perspective view of a T hangar with the door assembly hereof incorporated therein and showing the door in closed position.

Figure 2 is a top plan view of the hangar of Figure 1 with the roof partly broken away to show the door assembly.

Figure 3 is a front elevation of the door assembly with the door in raised position.

Figure 4 is an end view of the hangar looking in the direction of arrows 4—4 of Figure 2 with the near sidewall of the hangar removed to show the door assembly in side elevation.

Figure 5 is a vertical section through the door assembly taken on line 5—5 of Figure 2.

Figure 6 is a detail showing a cantilever shroud.

Figure 7 is a section taken on line 7—7 of Figure 5.

Figure 8 is a section similar to Figure 7 showing a double roller mounting.

With reference to Figure 1, the building structure shown therein is commonly known as a T hangar. It has a tail offset 1 having space accommodations usually only sufficient for the tail of an airplane and a wide front section 2 to accommodate the wings and nose of the plane. Across the front of this wing section is a wide entrance doorway 3 of sufficient span to allow a plane to be moved in and out with a foot or so clearance on each side. Said doorway is closed by a door 4 of the type generally referred to as an overhead door which in open position occupies a position inside the hangar, above and in rear of the doorway below the roof 5.

The door hereof, due to the manner in which the same is supported, is of lightweight construction. It may be of fabricated metal construction as shown or may be made of wood, plastic or other suitable materials.

In the illustration, the door has a center spar in the form of an I beam 6 extending longitudinally thereof from end to end to which are attached fabricated metal frames 7 in spaced, crosswise position. Figures 4 and 5. The front panel or cover 8 for the door is bowed over these frames and secured in position in any suitable manner as by riveting or welding. The rear of the door

may be uncovered in the interest of reducing weight or it may be covered with a panel 9 as shown The ends of the door are closed by panels 10.

The door assembly includes a support for the door 4 in the form of a cantilever, including a fixed or stationary post or cantilever 11 which is bolted or fixed to a foundation 12 located inside the hangar and in rear of the entrance doorway. Said post may take the form of an I beam, see Figure 7, which is uniformly curved and projects upwardly into the space near the roof of the hangar and forwardly to a point just in rear of and above the entrance doorway. The axis of curvature of the cantilever is the axis about which the door 4 revolves in moving from one position to another and for the purpose of illustration is shown by centerline *a*—*b* in Figures 2 and 3.

The support for the door also includes a movable member 13 in the form of a curved I beam which co-acts with post 11 to form an extensible cantilever. This member is curved but has a shorter radius of curvature than post 11 and is adapted to be mounted to move inside the curve of post 11. The door 4 is directly connected to member 13 preferably by welding or otherwise securing the center spar 6 to the front end thereof. The dead weight of the door however is transmitted to the post 11 through spaced rollers 14 attached to the rear section of member 11 in order to distribute the load and apply it to the anchor end of the post where resistance to bending is greatest. These rollers roll between the upper and lower flanges of the I beam 13 and there is preferably a minimum clearance therebetween in order to eliminate or minimize any tendency of the door to teeter on the post. Thus when the door 4 is in raised position, the post and the member co-act as a cantilever to support the door and as the door is lowered, it is caused to reliably follow a predetermined path about axis *a*—*b* into closed position by the joint action of the two members.

When in raised position, the door is preferably tilted forward so as to facilitate starting towards lowered position. In the present structure, the length of the curved member 13 is such that the door will assume this position when the member 13 is in fully retracted position. In order to counterbalance the door, weights 15 are attached to the lower end of the member 13 and they are preferably of such weight as to bias the door at all times toward open position.

In a T hangar, I prefer to support the door by a plurality of cantilevers, and to locate them between the sides of the hangar and the tail offset or at any other position where they will not interfere with movement of the airplane into or out of the building. Thus, for example, one cantilever may be placed at 15', Figure 2, in rear of the doorway and adjacent the left hand side of the tail offset and another cantilever at 16 in a complemental position on the other side of the tail offset. Thus where the movable members 13 of the cantilevers are joined to the door, they will co-act to support it in the central region or zone of the long span where, in the customary end supported door the tension and compression strains are greatest. Thus a lighter weight door not requiring heavy braces and struts for such a long span may be employed.

If desired, the present door may be given auxiliary support at the ends thereof by affixing to each end a supporting frame 17, Figure 4, to be pivotally connected to a bearing 18 mounted on top of a concrete pier 19 or, if desired, cantilever supports of the type herein described may be mounted at the ends of the door if the span is exceptionally long.

Where two oppositely disposed cantilever supports are employed, as for instance on each side of the tail offset, each semi-circular member 13 may be supported on its post by a single row of rollers 14 mounted to roll in the outside flange groove of each post as illustrated in Figure 7. If desired, a double row of rollers may be employed as illustrated in Figure 8.

Due to the ease with which the door hereof may be moved from one position to another, it may be raised merely by pushing up on the same or it may be so counterbalanced that incident to unlocking, it will raise of its own accord. To lower the door, only the customary thong 20 is required by means of which it may be manually pulled down into closed position. If desired however, the door may be moved from one position to another by mechanical means such as, for instance a hoist mechanism 21 having an operating chain 22. A cable 23 is attached to the lower end of one of the curved members 13 and wound on a pulley or drum on overhead shaft 24 turned by the hoist mechanism.

Due to the fact that the door assembly is not dependent upon the frame of the hangar for support, the hangar frame may be of much lighter construction than ordinarily required. Furthermore, since the door revolves in a predetermined path from one position to another, the roof of the structure may also be formed as a curved surface without increasing the headroom. This adds to the appearance of the hangar and also facilitates run off. All frame members, such as the corner posts at the ends of the doorway may be shrouded for the sake of appearance and safety. The lower ends of the cantilevers may also be shrouded as at 26 for the same reasons as shown in Figure 6.

I claim:

1. In door construction, a door member, an inwardly projecting frame carried by said door member, means for pivotally mounting the inner end of said frame for swinging movement about a horizontal axis, an arcuate extension movable bodily with said door member and forming a component part thereof, a vertically disposed cantilever-type supporting post structure having one end thereof secured to a stationary foundation and disposed immediately adjacent to said door member extension in concentric relation about the axis of turning movement of said door member, an arcuate guide formed by said post structure, antifriction devices carried by said extension and engageable in the guide of said post structure, and counterbalancing means for said member carried by said extension.

2. Overhead single span door construction for the doorways of vehicle storage buildings comprising a rigid door member, an inwardly directed supporting frame carried by said door member at each end of the latter, means pivotally mounted on the inner ends of said frames for turning movement about a common horizontally disposed axis, spaced segmental frame extensions secured to said door member intermediately of the length of the latter between said supporting frames, said extensions being disposed in concentric relation to said horizontal axis and projecting laterally and inwardly beyond an inner longitudinal edge of said door member, a pair of arcuate cantilever-

type posts arranged immediately adjacent to and in concentric relation with the frame extensions of said door member, said posts being formed with arcuate guides, and roller devices carried by said extensions and arranged for movement in the arcuate guides of said posts.

3. In door construction as specified in claim 2 and wherein said door member is formed with an outer arcuate wall having its center of curvature in said horizontal axis.

4. Door construction as specified in claim 2 and wherein the frame extensions of said door members are formed with weighted inner ends to counterbalance the weight of the door member to facilitate swinging movement thereof about said horizontal axis.

5. Door construction of the type having an elongated rigid door member with means for pivotally supporting the door member at its ends for swinging movement in a vertical plane about a substantially horizontal axis comprising: means for supporting said door member between its ends to sustain the span thereof in all its operating positions, said supporting means embodying a plurality of spaced stationarily mounted posts arranged at the rear of and extending above said door member, and movable suspension means carried by said door member cooperative with said posts providing sustained support for said door member throughout its operative range of swinging travel.

6. Wide span door construction comprising an elongated rigid door member, means for supporting said door member between its ends in all operating positions thereof, said supporting means embodying a plurality of longitudinally spaced stationary posts disposed at the rear and extending above said door-member, said posts being formed with arcuate guides, and movable suspension means carried by said door member cooperative with the posts and guides therein to provide sustained support for said door member throughout its entire range of travel with respect to the guides of said posts.

7. Wide span door construction for vertical storing structures comprising: an elongated rigid door member, arcuate frame extensions carried by said door member between the ends thereof, a plurality of spaced stationary posts arranged at the rear and extending above said door member, said posts being formed with arcuate guides concentric to said frame extensions, and movable suspension means cooperative with said frame extensions and said guides to provide sustained support for said door member throughout its entire range of swinging travel in connection with the guides furnished by said posts.

8. Wide span door construction as specified in claim 7 and wherein said supporting posts are of the cantilever-type having base support at their lower ends.

GLENN W. MERRITT.

REFERENCES CITED

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

UNITED STATES PATENTS

Number	Name	Date
1,970,222	Byrne	Aug. 14, 1934

FOREIGN PATENTS

Number	Country	Date
102,137	Australia	Oct. 14, 1937