Feb. 23, 1937. M. L. CORNELL ET AL 2,071,500

OVERHEAD ACTING DOOR

Filed April 26, 1935 2 Sheets-Sheet 1

Fig. 1

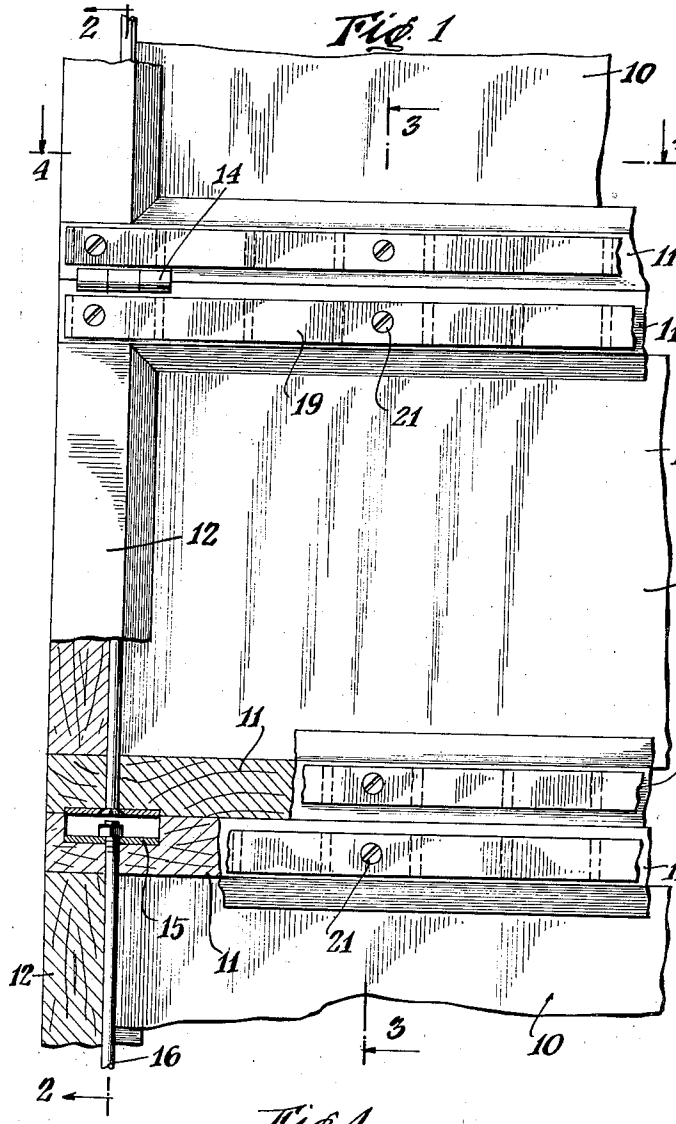


Fig. 2

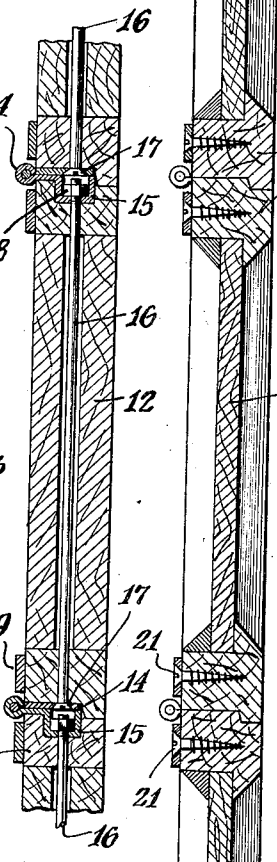


Fig. 3

Fig. 4

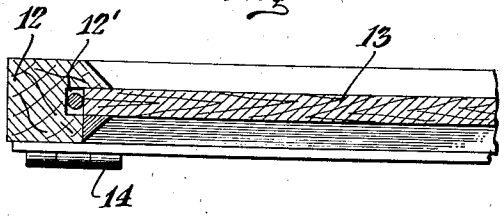
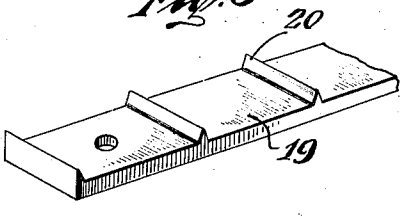


Fig. 5



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Filed April 26, 1935 2 Sheets-Sheet 2

Fig. 6

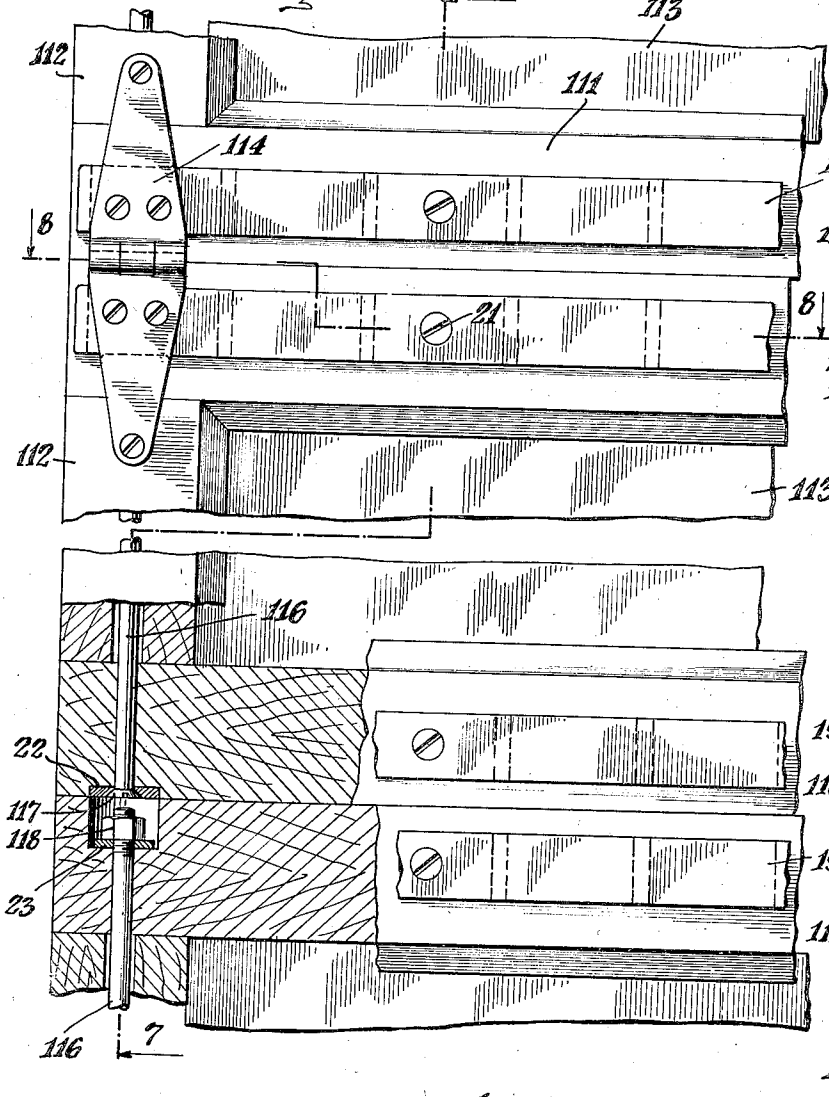


Fig. 7

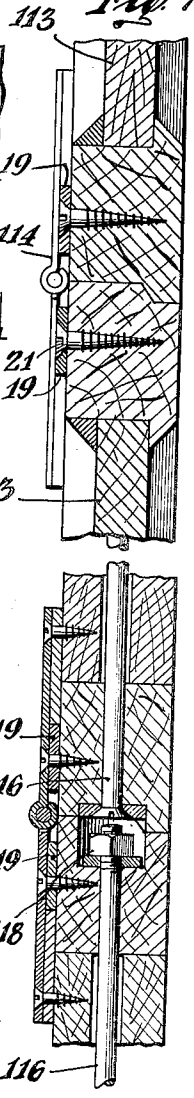
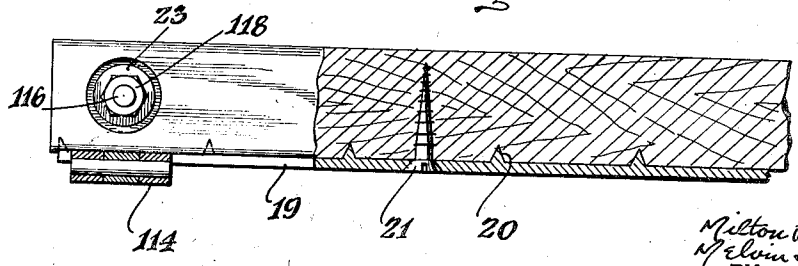


Fig. 8



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Patented Feb. 23, 1937 2,071,500

UNITED STATES PATENT OFFICE

2,071,500

OVERHEAD ACTING DOOR

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Application April 26, 1935, Serial No. 18,387

9 Claims. (Cl. 20—20)

This invention relates to overhead acting doors of the kind comprising a plurality of flexibly articulated sections or panel frames which are adapted to form a door closure when in vertical position and to be moved therefrom to overhead horizontal position.

A general object of the invention is to provide a door structure of this kind having improved and strengthened construction affording a longer service life.

More particularly, objects of the invention are to provide a wooden overhead acting door having flexibly articulated sections wherein the frame members are protected against harmful stresses in both the vertical and horizontal positions of the door without unduly increasing the weight of the door.

Other objects of the invention will in part be obvious and will in part appear hereinafter.

The invention accordingly comprises the features of construction, combination of elements, and arrangement of parts, which will be exemplified in the construction hereinafter set forth and the scope of the application of which will be indicated in the claims.

For a fuller understanding of the nature and objects of the invention reference should be had to the following detailed description taken in connection with the accompanying drawings, in which:

Fig. 1 is a fragmentary rear elevation at one side of a paneled overhead acting door embodying features of the present invention, certain parts being shown in section better to illustrate the construction;

Fig. 2 is a vertical sectional view taken transversely through the door substantially along line 2—2 of Fig. 1;

Fig. 3 is a transverse vertical sectional view taken substantially along line 3—3 of Fig. 1;

Fig. 4 is a horizontal sectional view taken substantially along line 4—4 of Fig. 1;

Fig. 5 is a fragmentary perspective view of a reinforcing element;

Fig. 6 is a fragmentary contracted rear elevation corresponding to Fig. 1, but showing another form of the invention;

Fig. 7 is a transverse vertical sectional view taken along line 7—7 of Fig. 6; and

Fig. 8 is a horizontal view partly in section, taken along line 8—8 of Fig. 6.

Wooden overhead acting doors comprising flexibly hinged wooden sections are widely used as closures for large door openings such as those in garages, warehouses, and the like. During periods of non-use these hinged door sections are slid up into horizontal overhead position, being guided by suitable tracks. The wooden framing members of these sections, comprising the rails, stiles and muntins, are subjected to a number of stresses during operation. When the door is in its horizontal overhead position, for example, the laterally extending rail members, especially when supported only at their ends, are subjected to a downward bending movement tending to cause them to sag between their supported portions and in time this sagging force frequently acts permanently to distort the door framing. Also, it sometimes happens that a door will be left in partially closed position so that some of its sections are suspended in vertical position without resting on the door sill. When this occurs, and also during the opening and closing of the door, pulling stresses are exerted on the joints between the rail and stile members. That is, the weight of any suspended section is transmitted through these joints, and exerts a tendency to loosen or pull them apart. Many of these doors are made with round wooden dowels connecting the stiles and muntins to the rails so that only the glue used is depended upon to prevent them from pulling apart. Another construction comprises tenons on the stiles and muntins which fit mortises in the rails. Steel pins are usually driven through the rail and tenon to help the holding action of the glue, but they do not add much strength against tensile pulling forces, and are prone to split the tenon if these forces become excessive or considerable.

In accordance with the present invention, the harmful effects accruing from destructive or distorting forces such as those described have been eliminated or markedly minimized.

The present improvements relate chiefly to the door structure per se, and it will be understood that the hereinafter described door may be mounted, guided, operated, counterbalanced, etc., in any conventional or suitable manner.

Referring more particularly to the drawings, there is shown in Fig. 1 a portion of the rear part of a wooden overhead acting door. Parts of three sections, each generally designated 10, are shown. These sections each comprise laterally extending top and bottom rails 11 connected at their ends by vertical stiles such as 12. The rails are also preferably connected by muntins, not shown, located at suitable intervals between the end stiles. Panels 13 are inset in these rail and stile members, suitable molding

grooves being provided for retaining them in place.

In the present illustrative embodiment, the top rail of each section is connected to the lower rail of the next superposed section by means of butt hinges 14 which have their wings turned inwardly between the adjacent rails. These wings are screwed, bolted by through bolts, or otherwise firmly fastened to their respective rails. One wing is provided with a depressed hollow 15 which is fitted into an accommodating recess in the rail.

In order to relieve the joints between the stiles 12 and the rails 11 from vertical tensile stress, tension rods such as 16 are provided to connect the several hinges 14, as is best illustrated in Fig. 2. Each tension rod is made of metal or other material having greater tensile strength than wood and is preferably in the form of an elongated bolt having a head 17 which is countersunk in and seats against a wing of one hinge 14. The other end of this bolt is threaded and the entire bolt is adapted to be screwed tightly into a nut 18 confined within the recess 15 of an adjacent alined hinge 14. By virtue of this construction the several panel frames are suspended from their uppermost support when in vertical position by a metal tension resisting system comprising the rods 16 and the hinges 14 to which they are connected. This has the effect of hanging the several panel frames on this tension resisting rod and hinge system, so that tensile stresses between the wooden rails and stiles are eliminated or largely relieved.

It is customary also to provide hinges between adjacent section rails opposite the muntins spaced laterally across the door, and the described tension resisting system also tends to relieve the separating strain at such muntin and rail joints. If desired, a system of tension members may be provided vertically through the door at one or more of these muntins, the arrangement being substantially the same as that for the stiles.

Preferably the tension rods 16 are accommodated within the groove or recess 12' (Fig. 4) which accommodates the panel 13, the recess 12' being made a bit deeper than usual for this purpose. If preferred, the tension member 16 may be mounted in any other suitable manner so long as it operates to transmit a substantial part of the pulling forces from one hinge past the rail and stile joints to the next vertically alined hinge without subjecting these joints to this strain.

In order to counteract the tendency of the sections to sag when they are in horizontal overhead position and supported only at their ends, there is provided a laterally extending reinforcing bar or strap 19 made of metal or other material more resistant to tension and less subject to fracture than wood, which extends along the rear faces of the rails of each panel frame uninterruptedly from side to side thereof. This strap 19 has along one face sharp upstanding projections preferably in the form of ribs or ridges 20 which are adapted to bite or be inset into the wooden rail member against which they are located so as to project into the wood below its general surface. These ridges may be hammered, pressed, fitted or otherwise driven into the wood so as to take a firm bite therein, and when thus driven home the strap is screwed into place by a number of suitably spaced wood screws 21. This form of reinforcement has a marked rigidifying effect on the entire section and effectively aids the frame in resisting sagging. The presence of the projections 20 greatly enhances the rigidity of the combined rail and strap structure by precluding any possible creeping or crawling between these parts as the door tends to sag into arcuate form. The rail and strap are thus compelled to act as a single unit wherein the metal strap, being below the neutral axis of the beam formed by the combined strap and rail, takes tensile strains in such beam. The wooden rail member, being largely located above such neutral axis, takes the compressive strains, which it is well able to do.

The projections 20 are provided at sufficiently frequent intervals to preclude any creeping of the strap with respect to the rail. This prevents the exertion of pulling forces on the attaching screws 21 which, in the absence of the locking projections, might be loosened and pulled askew. The sharpened projections, although preferably in the form of ribs extending from side to side of the strap 19, may take any other suitable form adapted to assure relative non-movement between the strap and rail. For example, they may comprise a suitable number of outwardly projecting pins, lugs, or the like.

The door, constructed in this manner, with means for protecting it against the destructive effects of tensile strains at the frame joints, together with effective means for preventing sag with its consequent possibly permanent distortion, is equipped for and capable of giving extended service, since it is especially suited to withstand some of the worst deteriorating factors to which doors of this type are subjected.

In Figs. 6 to 8, another form of construction embodying the invention and having most of the advantages of the above described form is shown. Here, the several sections are formed from laterally extending rail members 111 connected at their ends by stiles 112. These rail and stile members, and suitable muntins (not shown), are adapted to hold panel sections 113.

The upper rail of each section is connected to the lower rail of the next superposed section by means of strap hinges 114, the wings of which are screwed to the rear face of the door as shown, instead of being inturned in butt relation as was the case with the first described form. The upper and lower rails of each section are connected by a tension member 116 having its opposite ends anchored in the rails in the vicinity of the hinges 114. One end of this tension member has a head 117 seated in a metal washer 22 which in turn is countersunk in the rail member. The other end of the tension member is threaded into a nut 118 which seats against a metal washer 23, the nut and washer also being countersunk in a suitable recess as illustrated. The ends of the tension member, while not being directly attached to the hinges 114, are nevertheless effective to transmit tensile forces through the door without affecting the joints between the rails and stiles or indeed any part of the wooden stiles except in the vicinity of the hinges where the wood is well reinforced with metal by the wings of the hinges and by the straps 19. The transmission of such forces from a given hinge wing to the adjacent anchored end of a tension member preferably occurs as shown in Fig. 6 entirely within the rail member, or if an overlapped or rabbeted type of joint is used, then closely adjacent the hinge so that but little of the frame is used as a tensile force transmitting means.

The tension members 116 may be accommodated in a suitable vertical bore extending through the stile members if desired, as shown

in Figs. 6 and 7, in which case they assist also to prevent warping of the wooden stiles. They may be accommodated also in a deepened panel section accommodating recess such as the recess 12' described in the first form and shown in Fig. 1. The rails 111 are provided with anti-sag straps 19 which have the same form and operation as the straps described in connection with Fig. 1. The wings of the hinges 114 beyond straps 19 may be suitably shimmed as at 23, the strap 19 and hinge wing being preferably overlapped and interconnected by screws, as shown, better to tie up the strain resisting system and to provide a well reinforced corner where strains are transferred from the tension rods to the hinges. The interconnection of the strap 19 with the hinges enables the latter to assist in holding the strap against undesired movement by means of the hinge screws.

It will be seen that an overhead acting door of wooden construction has been provided which is well suited to give extended service life.

Since certain changes may be made in the above construction and different embodiments of the invention could be made without departing from the scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

It is also to be understood that the following claims are intended to cover all of the generic and specific features of the invention herein described, and all statements of the scope of the invention which, as a matter of language, might be said to fall therebetween.

Having described our invention, what we claim as new and desire to secure by Letters Patent is:

1. An overhead acting door comprising a plurality of superposed wooden sections, each section having wooden rails and stiles, vertically alined hinges connecting the upper rail of one section with the lower rail of the next superposed section, and metallic tension members connecting said hinges and taking vertical tensile strains in said door.

2. An overhead acting door comprising a plurality of superposed wooden sections, each section having wooden rails and stiles, vertically alined hinges connecting the upper rail of one section with the lower rail of the next superposed section, and tension rods connecting said hinges and passing vertically through said stiles to take vertical tensile strains in said door.

3. An overhead acting door comprising a plurality of superposed wooden sections, each section having wooden rails and stiles, vertically alined hinges connecting the upper rail of one section with the lower rail of the next superposed section, said hinges having wings turned inwardly between the adjacent rails, and tension members passing through each section and connecting the inturned hinge wings at the top and bottom thereof.

4. An overhead acting door comprising a plurality of superposed wooden sections, each section having wooden rails and stiles, said stiles having recesses to accommodate a panel, vertically alined hinges connecting the upper rail of one section with the lower rail of the next superposed section, and tension members connecting said hinges and passing through the recesses in said stiles.

5. An overhead acting door comprising a plurality of superposed wooden sections, each section having spaced wooden rails and stiles connecting the ends thereof, said stiles having recesses to accommodate a panel, vertically alined hinges connecting the upper rail of one section with the lower rail of the next superposed section, and tension members in each section passing through said recesses and having their ends anchored in the section framing adjacent said hinges.

6. An overhead acting door comprising a plurality of superposed wooden sections, each section having spaced wooden rails and stiles connecting said rails at the ends thereof, vertically alined hinges having wings respectively anchored to the upper rail of one section and the lower rail of the next superposed section, and tension members in each section having their ends anchored in such section adjacent said hinges.

7. An overhead acting door comprising a plurality of superposed wooden sections, each section having spaced wooden rails and stiles connecting said rails at the ends thereof, vertically alined hinges having wings respectively anchored to the upper rail of one section and the lower rail of the next superposed section, tension members in each section having their ends anchored in such section adjacent said hinges, and metallic reinforcements including wings of said hinges for strengthening the portion of said section adjacent the anchored ends of said tension members.

8. An overhead acting door comprising a plurality of superposed wooden sections, each section having wooden rails and stiles, vertically alined hinges connecting the upper rail of one section with the lower rail of the next superposed section, metallic tension members connecting said hinges and taking vertical tensile strains in said door, at least one of said rails having a metal strap fastened thereto along its under face when in overhead postion, and a plurality of integral projections on said strap extending into the wood of said rail.

9. An overhead acting door comprising a plurality of superposed wooden sections, each section having spaced wooden rails and stiles connecting said rails at the ends thereof, vertically alined hinges having wings respectively anchored to the upper rail of one section and the lower rail of the next superposed section, tension members in each section having their ends anchored in such section adjacent said hinges, and a metallic strap adjacent one of said rails for taking horizontal tensile strains along said rail when the door is in overhead position, said strap being anchored to hinges on said rail.

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