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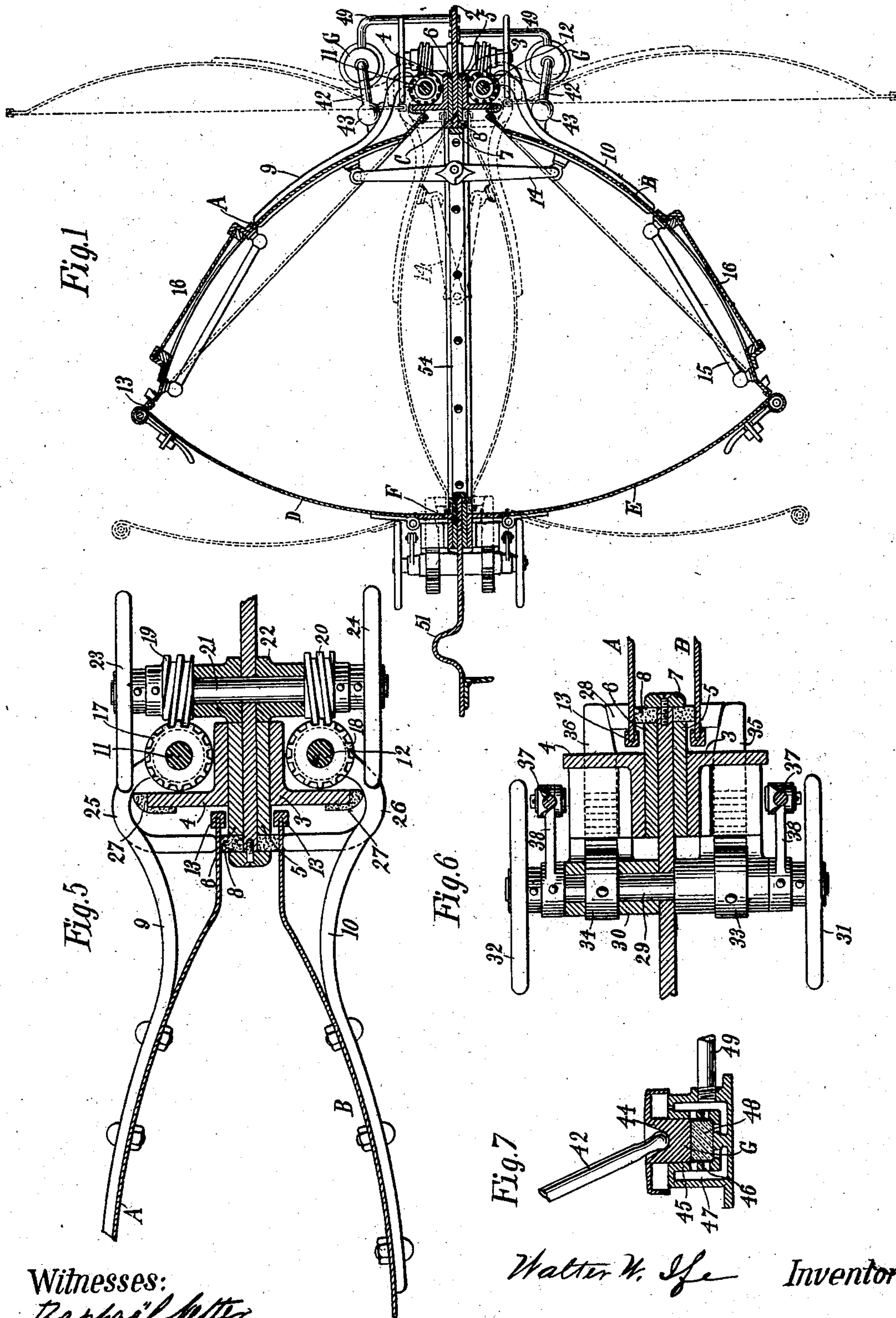
Patented June 17, 1902.

W. W. IFE.  
BULKHEAD DOOR.

(Application filed May 25, 1901.)

(No Model.)

2 Sheets—Sheet 1.



Witnesses:  
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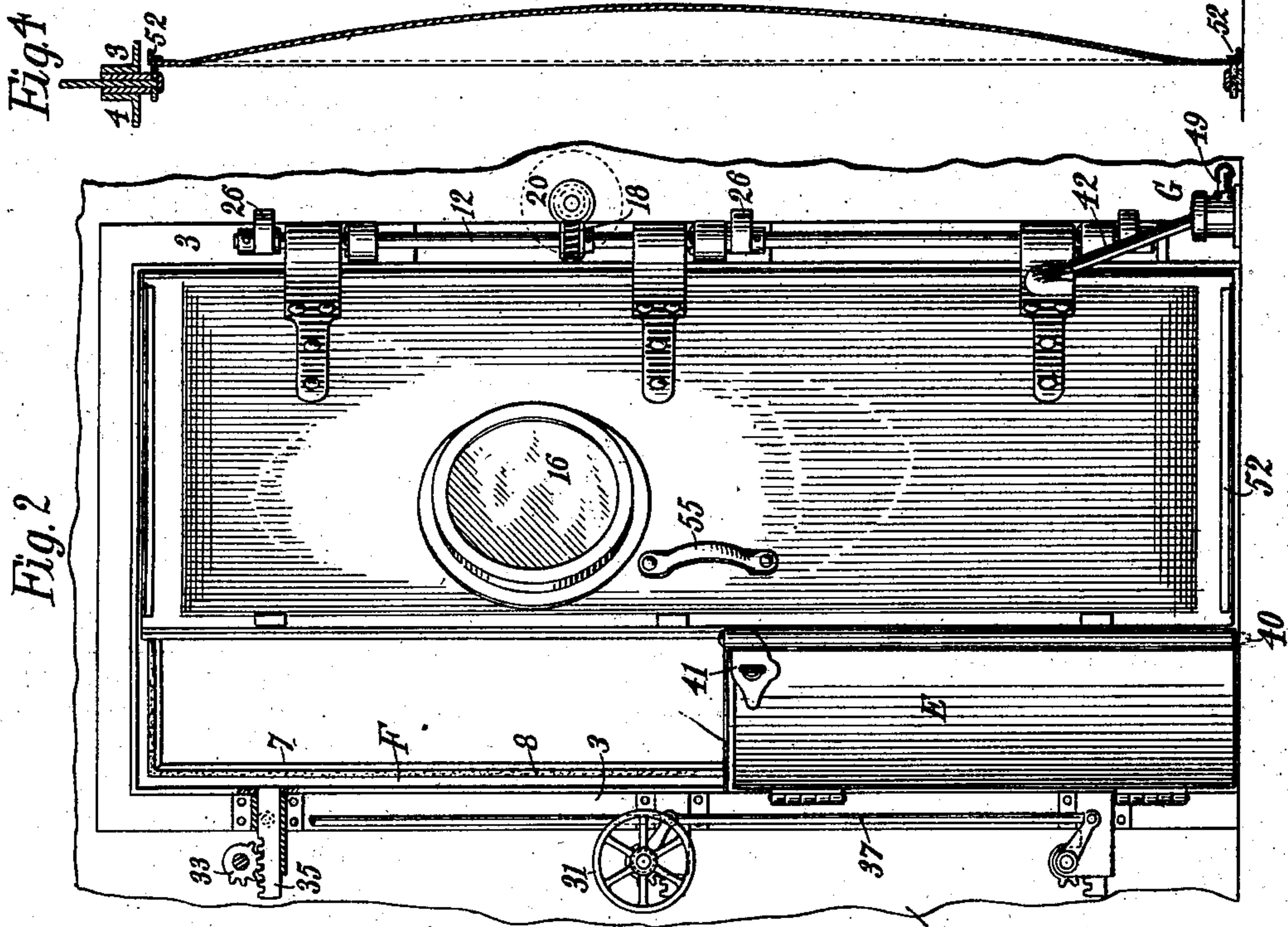
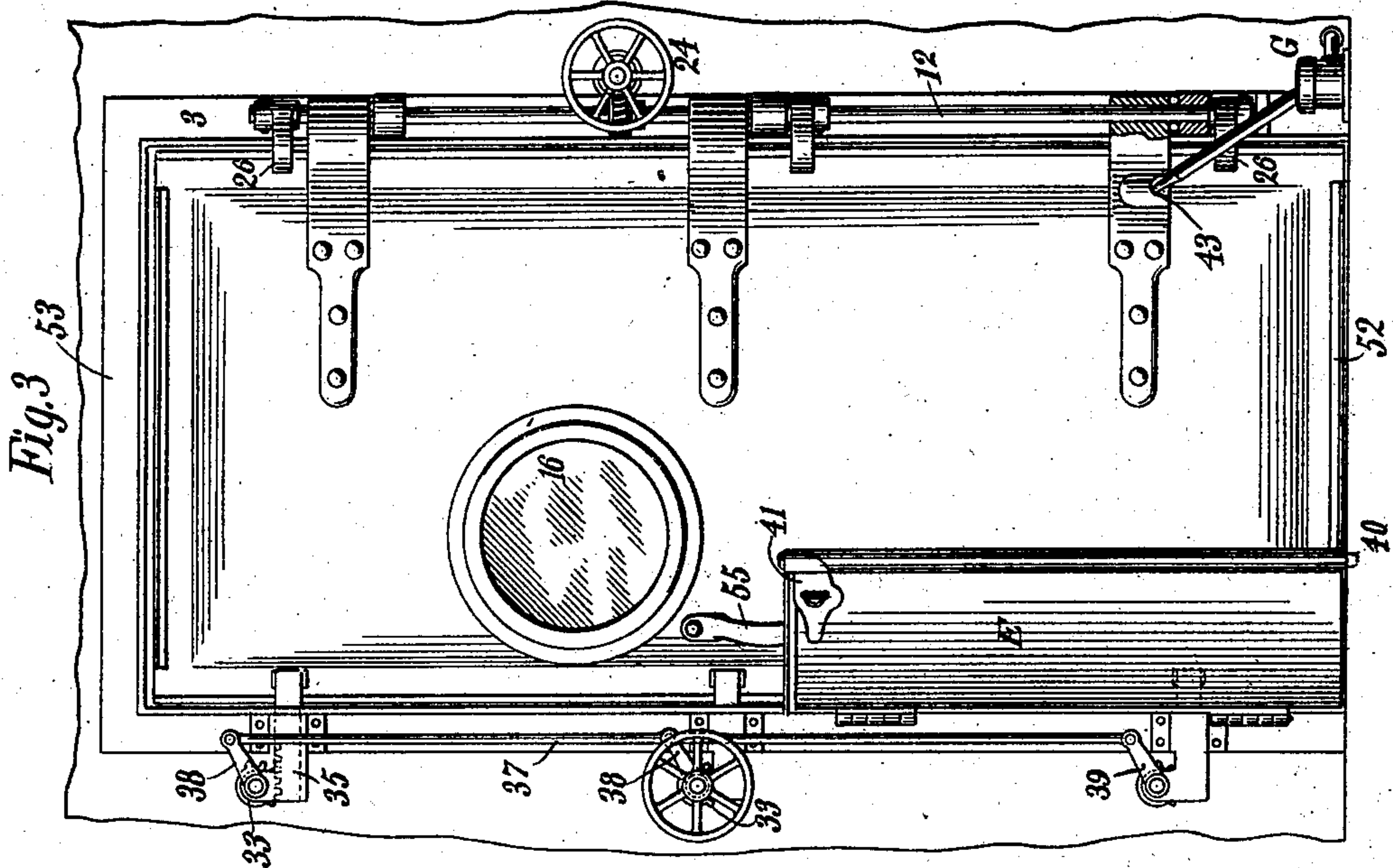
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# UNITED STATES PATENT OFFICE.

WALTER W. IFE, OF BUFFALO, NEW YORK.

## BULKHEAD-DOOR.

SPECIFICATION forming part of Letters Patent No. 702,651, dated June 17, 1902.

Application filed May 26, 1901. Serial No. 61,843. (No model.)

*To all whom it may concern:*

Be it known that I, WALTER W. IFE, of Buffalo, county of Erie, State of New York, have invented a new and useful Bulkhead-Door, of which the following is a specification.

My invention relates to improvements in water-tight compartments and bulkheads in steamships and other vessels, its object being to provide a door for the doorway in the bulkhead between adjacent compartments which will automatically close under the pressure of water in either compartment, so as to prevent its flow into the adjacent one, while permitting free passage for persons from one compartment to the other.

To this end my invention consists in providing two similar doors, both hinged to the same jamb and so connected together that they are normally held substantially at a right angle with each other. Upon the sides of the opposite jamb of the doorway I hinge a pair of cylindrical segments, the curvature of each conforming to the arc described by its opposed door. By this mode of attachment of both doors and segments to their respective jambs the segments may be set to form a casement closely adjacent to and parallel with the arcs described by the respective doors in their oscillation while interconnected. When the vessel is in port and being loaded or unloaded, the segments may be turned back on their hinges and the doors disconnected from each other and turned back on their hinges, whereby the doorway is left entirely unobstructed and open to its full width. When the vessel is at sea, the segments are set forward to form a casement and the doors are connected together and free to oscillate within the casement if there is occasion for passing through the doorway. If not, the doors are disconnected from each other or the connecting-brace is folded together to permit the doors to be closed toward each other and into contact with the door-casings. In this position they are firmly pressed against the casings by suitable devices, so as to perfectly seal the opening. The doors are preferably provided with gravity-hinges, so that when left free to swing or oscillate they will turn to equilibrium in mid or normal position, both standing with their edges within the casement. A sudden inrush of water into a compartment, as the

result of a collision, will by its pressure instantly swing the connected doors toward the other compartment and close the doorway, thus protecting the second compartment and its contents. While any desired form of gravity-hinge may be employed, I prefer one which will be so affected by a gradual inflow of water into either adjacent compartment as to cause the connected doors to automatically swing toward the other compartment, and thereby close the opening and prevent the water from entering the second compartment.

The various details of construction are particularly set forth in the following description and claims and illustrated in the accompanying drawings, which form a part hereof.

In the drawings, Figure 1 is a horizontal section of my invention, the full lines indicating the normal positions of the parts when the door is in condition for use, the dotted lines of the cylindrical segments indicating their positions when thrown back to leave the doorway open. The dotted lines adjacent to the doorway represent the position of the doors when closed toward each other and sealing the door-aperture, and the other dotted lines the outward limit of oscillation of the doors, as well as their position when disconnected from each other and thrown back to leave the doorway free. Fig. 2 is a front elevation of my invention in the position shown in Fig. 1, the door being in the position indicated by the full lines of Fig. 1. Fig. 3 is a similar view of the door when sealing the doorway or aperture. As is shown in Figs. 2 and 3, the cylindrical segments which form the casement within which the doors oscillate extend to about one-half the height of the doors, it being unnecessary to have the casement higher for the purposes for which it is employed. Fig. 4 is a horizontal section of one of the doors, illustrating its convex shape. Fig. 5 is an enlarged sectional detail of part of Fig. 1, illustrating the manner in which the door-wings are folded together and clamped against the opposite sides of the door-casing, so as to seal the same on both sides of the jamb. Fig. 6 is an enlarged sectional detail of the opposite door-jamb, showing the means for clamping the edges of the door-wings, so as



to seal the aperture at that side of the doorway. Fig. 7 is a detail of the gravity-hinge attachment, whereby the door is normally maintained at equilibrium and in the position of the full lines of the drawings.

In the drawings, 2 represents the partition or bulkhead between compartments, A and B the respective doors independently hinged to the door-jamb C, and D and E the respective cylindrical segments independently hinged to the opposite door-jamb F. The door-jamb C is made up, preferably, of vertical angle-irons 3 and 4, arranged on opposite sides of the bulkhead and with interposed plates 5 and 6. The vertical bar 7 forms the casings of the jamb. Between the shoulders formed by its projecting edges and the edges of the plates 5 and 6 are arranged cushions 8, which serve when the door-wings are brought in contact therewith to hermetically seal the doorway.

Each door is preferably stamped out of sheet metal, as illustrated in Figs. 2 and 3, whereby the outer face is made convex, while all of its four edges are in a common plane. The doors are supported by means of hinge-eye members 9 and 10, secured thereto and turning upon pintles 11 and 12. The edges of the doors are reinforced and stiffened by means of channel-irons 13, into the grooves of which the edges of the door enter and are there secured. The jointed brace 14 serves to interconnect the doors and hold them at approximately an angle of ninety degrees with each other; but which will allow them when the brace is doubled or turned on its joint to be brought together sufficiently close to fit each on its adjacent face of the door-casing, as indicated by the dotted lines in Fig. 1.

15 is a hand-rod arranged on the inside of each door-wing, and 55 are handles on the outside.

16 represents dead-lights arranged in the door-wings and sealed in any suitable manner.

The pintles 11 and 12 are adapted to be turned in their sockets or bearings and are provided with worm-gears 17 and 18, with which respectively mesh the reverse worms 19 and 20, mounted upon the shaft 21, turning in the bearings 22, and actuated by either of the hand-wheels 23 and 24 from either side of the bulkhead. Also secured rigidly upon the pintles are the clamp-jaws 25 and 26, which when turned by means of the worm-gear are brought into bearing contact with the outer face of the respective doors opposite the cushions 8, so as to hermetically seal the joints between the doors and the door-jamb. The edges of the projecting members of the angle-irons 3 and 4 may also be fitted with cushion-strips 27, against which the edges of the doors make contact when in partially open position, so as to form a close joint. The door-jamb F is similarly constructed with angle-irons 3 and 4, interposed plates 5 and 6, facing-strip

7, and cushion-strips 8. In order to seal the doors adjacent to this jamb, I provide upon the outer face of the doors, near the edges adjacent to this jamb, inclined blocks 28, as shown in Fig. 6, and provide a shaft 29, mounted in a bearing 30 and extending through the bulkhead in the same manner as the similar device on the opposite jamb. This shaft is turned by means of either of the hand-wheels 31 or 32 and carries segmental gears 33 and 34, which mesh with the rack-bars 35 and 36, working through openings in the projecting web of the angle-bars 3 and 4 and having inclined faces which ride upon the blocks 28, and thereby serve to clamp the doors firmly against the pads 8. Similar racks and pinions are arranged at the tops and bottoms of the doors, as shown on Fig. 3, and are operatively connected with the shaft 29 by means of the connecting-rod 37, the crank-arm 38, and the other crank-arm 39, whereby the rotating of the shaft 29 simultaneously causes all of the rack-bars 35 and 36 to be operated in either direction. The cylindrical segments D and E are fastened in normal position by means of bolts 40, which may be shot into the floor of the compartment and locked in such position by means of the attachment 41, near the top of the segment.

Fig. 7 is an enlarged sectional detail of the gravity-hinge attachment G, which serves to automatically turn the connected door-wings to their normal mid-position when either has been opened to extreme position. This consists of a stilt 42, the upper end of which engages in a socket 43 upon the door, and the foot of which rests in a socket-block 44. This block is mounted to work in a cylinder or box 45, the side and bottom walls of which are provided with perforations 46, opening into a chamber 47 within its double walls. In the space beneath the block 44 in the box 45 is arranged a mass 48 of some water-soluble material which while dry serves as a firm support for the block 44. With the inner space 47 is connected a pipe 49, which leads through the bulkhead and opens into the compartment on the opposite side. The purpose of this attachment is that when in normal condition the socket 44 serves as a support for the stilt 42 on each door and lifts the door on its hinges as the stilt 42 is carried by the door toward a vertical position. Hence if the doors are swung to either extreme position from the normal one the stilt upon the outward-swung door will lift it higher upon its pintle and cause it to tend to swing inward, and thereby carry the connected doors back to normal position.

If water should gradually enter one of the compartments, some will pass through the pipe 49 and the openings 46 into contact with the soluble mass 48. This will be dissolved, allowing the block 44 to descend, thereby allowing the adjacent door to slip downward on its pintle. The stilt of the opposed door by its thrust will then turn its door toward the



doorway, thus automatically closing the door against the inflow of water into the other compartment. The described devices for sealing the doorway are intended to be employed when the vessel has been loaded and has left its dock, so that the doorways are absolutely sealed unless occasion arise for opening them during the voyage.

Sometimes accident to the vessel's hull may cause an indentation thereof, and if such indentation be near a bulkhead it may distort the casing of the doorway and prevent the operation of the door. To avoid this, I provide the bulkhead between the doorway and the hull with a vertical corrugation 51, which will readily yield to any such thrust and bend further, so as to prevent strain upon the doorway or its frame.

The doors at top and bottom are preferably reinforced by angle-irons 52, so that without any additional attachments when their vertical edges are clamped into sealing position the top and bottom edges bear against the top casing 53 and the door-sill 54.

The operation is evident from the foregoing description.

While the vessel is at its dock, the casement-segments and doors are all thrown back to their limit to permit free passage for loading and unloading. Before leaving port the arc-doors should be closed together and clamped against the door-casings. During the voyage if it is necessary to pass through any doorway the parts should be connected and set in full-line position. Persons can then open the door by means of the handle 55, pass into the space between the doors, force them in the opposite position by grasping the hand-rod 15, and pass into the next compartment, the outward-swung door being automatically carried back to normal position by its gravity-hinge. Should collision occur and a violent inrush of water follow in a compartment, its force will swing the adjacent door to closed position, the opening being sealed by the pressure of the water upon the door. If the inflow of water be slow, enough will find its way through the pipe 49 to dissolve the mass 48, when the doors will turn to close the opening, as above described.

I claim—

1. In a bulkhead-doorway, in combination, a pair of similar, interconnected doors positioned at substantially a right angle with each other and both hinged to the same door-jamb, a concave casement upon the opposite jamb within which the free edges of said doors oscillate and closely fit, and sealing devices, the bulkhead cooperating with either door when in closed position.

2. In a bulkhead-doorway, a pair of similar doors independently hinged to one jamb and connected at right angles to each other, a cylindrically-curved casement for the free edge of each door, and sealing devices for the door edges.

3. In a bulkhead-doorway, in combination

a pair of interconnected doors substantially at right angles with each other, a cylindrical casement for each door, an intermediate stop for both doors, and sealing devices for the door edges, as and for the purposes set forth.

4. In a bulkhead, a pair of doors, hinged to the same jamb on opposite sides of the bulkhead and interconnected so as to be maintained at substantially right angles with each other, a cylindrically-curved casement for each door, adjusted closely to its arc of movement, and means whereby the joints around each door are sealed when the door is closed against the edges of the doorway.

5. In a bulkhead-doorway, in combination, a pair of angularly-disposed doors hinged at their adjacent edges to one door-jamb and arranged one on each side of the bulkhead, and a concave casement upon the opposite jamb within which the doors closely fit, said doors being larger than the doorway-opening, substantially as and for the purposes specified.

6. In a bulkhead-doorway, in combination, a pair of doors each larger than the opening arranged on opposite sides of the bulkhead at an angle with each other and hinged to the same jamb, a concave casement upon the opposite jamb to receive the free edges of the doors, and sealing devices between the faces of the doors and the edges of the doorway.

7. In a bulkhead-doorway, in combination, the pair of interconnected doors positioned substantially at right angles to each other and hinged to the same jamb, the concave casement upon the opposite jamb, the stops intermediate of said doors in the plane of the bulkhead, and the devices between said doors and said stops serving when either door is brought into contact therewith to seal the door-opening.

8. In combination with a bulkhead-doorway, a pair of angularly-disposed doors hinged to one door-jamb and oscillating within concave casements upon the opposite jamb, a jointed interconnecting brace for said doors, and means for gripping the doors against the opposite faces of the door-jamb to seal the joints between the same.

9. A bulkhead-doorway having sealing devices upon both faces, a concave casement upon one door-jamb, a pair of doors hinged to the opposite jamb, a collapsible detachable brace interconnecting the doors and normally holding them at substantially right angles with each other, and means when said doors are folded together for gripping them against said sealing devices.

10. In a structure of the class described, a pair of oppositely-disposed doors adapted to be closed against opposite sides of the door-casings, each door being arched or convexed outwardly but with plane-surfaced margins along all its edges.

11. In combination with a bulkhead-doorway, a pair of outwardly-convexed doors, one on each side of the doorway and hinged to the same jamb, devices for sealing the joints be-



tween the edges of the doors and the casing of the doorway, and means for gripping the doors upon the sealing devices.

5 12. In an organism of the character described, having a pair of interconnected, oscillating doors, a stilt for each door adjusted to lift the same as it turns outwardly, as and for the purposes set forth.

10 13. In a structure of the class described, a pair of doors hinged to the same jamb and swinging on opposite sides of the bulkhead, and adapted each to be closed against the casings of the doorway, each door being centrally convexed outwardly, but with margins  
15 plane-surfaced, and sealing attachments upon the door casings or jambs with which the door-margins contact when closed.

14. In combination with a pair of doors as described, gravity-closing devices for both

doors, consisting of stilts or levers having a 20 water-soluble support, and a conduit connecting said support with the compartment on the opposite side of the bulkhead, as and for the purposes set forth.

15. In a structure of the class described, a 25 door-jamb comprising the bulkhead-sheet, the casing-strip upon the edge of the sheet, the marginal strip on each side of the sheet slightly spaced from the casing-strip and cushion-strips in the channels between the mar- 30 ginal and casing strips substantially as and for the purposes specified.

Signed at Buffalo, New York, this 14th day of May, 1901.

WALTER W. IFE.

Witnesses:

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