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SPRING HINGE CONSTRUCTION FOR BULKHEAD DOORS

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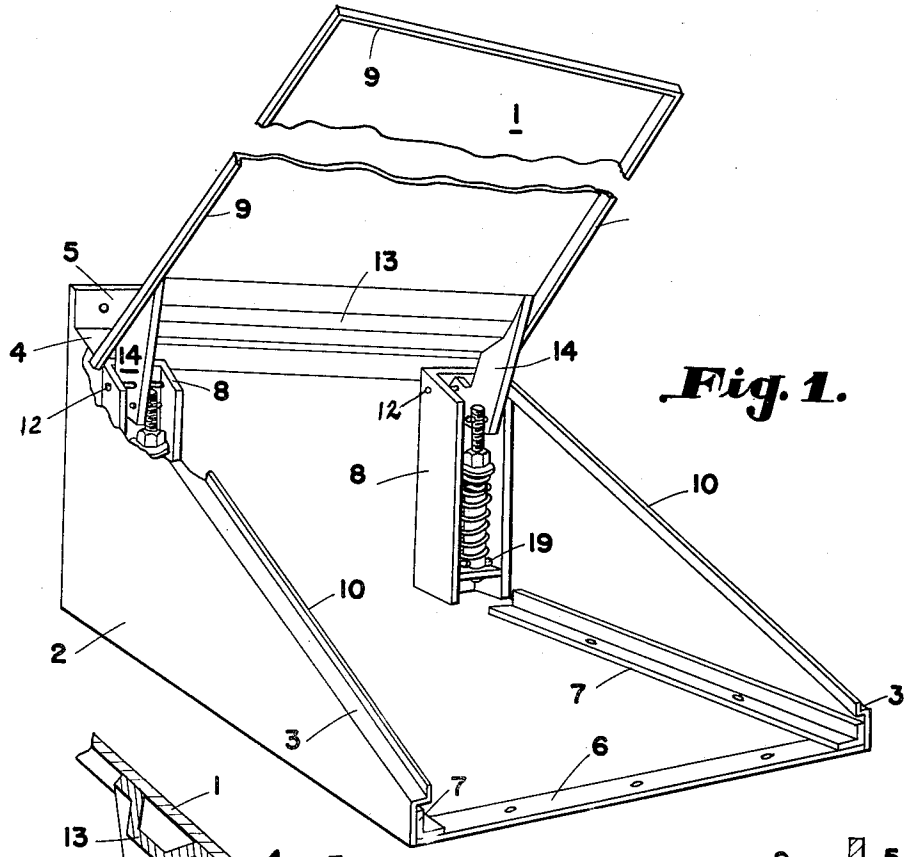



Fig. 1.

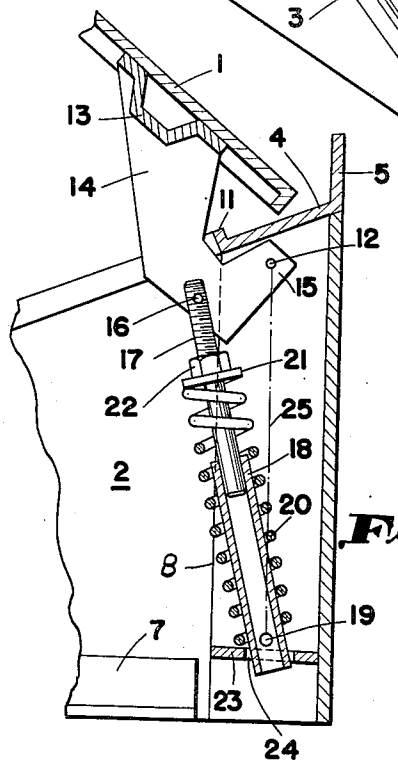



Fig. 2.

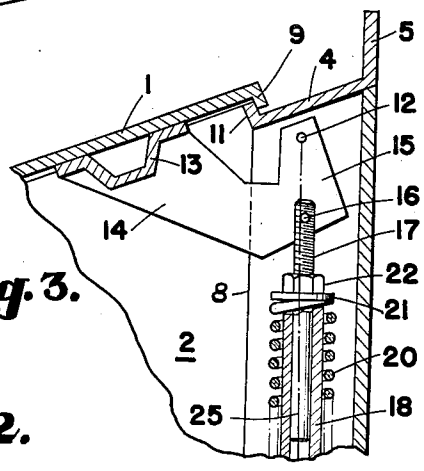



Fig. 3.

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## SPRING HINGE CONSTRUCTION FOR BULKHEAD DOORS

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1 Claim. (Cl. 16—135)

1

This invention relates to improvements in bulkhead or cellar doors, of the type that give access from out-of-doors to a hatchway or stairway leading to the basement of a building.

Objects of the invention are to simplify the construction and assembly of such devices and in particular to provide, in connection with the hinging of the door, a spring action which is effective, on the opening movement of the door, to counterbalance the latter's weight, and which also holds the door, when closed, tightly and firmly seated on its casing or frame.

Other and further objects and advantages of the invention will be made apparent in the following detailed description thereof taken in connection with the accompanying drawings in which

Fig. 1 is a perspective view, showing the bulkhead door of our invention in its open position.

Figs. 2 and 3 are fragmentary larger scale sectional views, illustrating the spring action in the open and closed position, respectively, of the door.

Like reference characters refer to like parts in the different figures.

In the illustrated embodiment of our invention, the door 1 and its casing or frame are preferably constructed of sheet metal. These parts are of substantially conventional form throughout, the casing being constructed to fit over and to box in the usual rectangular ground level cellar-opening. That is to say, said casing has the customary upright side walls 2, 2 which are triangular in shape, so as to give the casing's top or cover the usual downward slope, outwardly from the building wall. Said sloping top or cover comprises side panels 3, 3, and a connecting upper panel 4, the side panels at their outer edges being suitably connected with the sloping upper edges of the respective triangular walls 2, 2, and the upper panel 4 having a flange 5 by which to obtain, in any usual way, a substantially water-tight connection with the building wall. The cover panels 3, 3 and 4 thus provide three sides of a rectangular casing opening that gives access to the boxed-in hatchway, the fourth side of such opening being substantially at ground level and being provided by a suitable plate 6 connecting the outer ends of the casing sides 2, 2. Suitable bolt holes in said plate 6, and also in angle bars 7, 7 welded along the bottom edges of the casing sides 2, 2 may be provided, for attachment of the casing to the masonry or the sills, as the case may be, which surround the cellar-opening, and similar bolt holes for attachment of the casing to the building wall, may be provided in the flange 5. The casing at its

2

inner corners is reinforced, as shown, by a pair of upright channel irons 8, 8, welded by their respective outer sides to the inside surfaces of walls 2, 2 along the latter's upright edges and serving, as hereinafter described, for the hinging of door 1 and the mounting of the spring action of our invention.

The rectangular door 1 is of sufficient size to overlap the edges of the casing opening, and said door's edges are preferably down turned, as shown at 9, 9, and are adapted, in the door's closed position, to lie outside of the upturned edges 10, 10 of side panels 2, 2 and the upturned edge 11 of upper panel 4. For the hinging of said door, each channel iron 8 near its upper end has alined apertures in its sides to receive a horizontal pivot pin 12, the two pivot pins being in alinement with each other. The door 1 on its under surface has a transverse reinforcement 13, from the ends of which project, rearwardly into the respective channels 8, 8, a pair of vertically disposed brackets or plates 14, 14. Each plate 14 has an upturned arm 15 which is apertured to receive one of the pins 12, thereby to provide a pair of hinges for the door to swing on, in moving from the closed position of Fig. 3 to the open position of Fig. 2, and vice versa. Our improved spring action, by which the door, despite its weight, can be raised, substantially without effort, to its open position, is applied to and has the same construction for both of the above-described hinges; hence a description of one of such spring actions will suffice for both.

As shown in Figs. 2 and 3, each hinge plate 14, substantially at the base of its upturned arm 15, is apertured for passage of a pin 16, the latter serving for the pivotal connection to said plate of a depending threaded rod 17, whose lower end, as best shown in Figs. 2 and 3, is telescopically received in a tubular member 18. Extending diametrically through member 18 near the lower end thereof is a pin 19, whose oppositely projecting portions provide a seat or abutment for the lower end of a compression spring 20, surrounding the member 18 and extending past the latter's upper end, so as to bear against a washer 21 encircling the threaded rod 17, beneath an adjusting nut 22 thereon. The oppositely projecting portions of pin 19 rest upon a substantially horizontal plate 23, which is secured by welding or the like within the associated channel 8. Said plate 23 has an opening 24, large enough to receive, loosely and rockably, the end portion of the tubular member 18 that lies beyond and below the pin 19. In this way, the above de-

scribed spring action assembly is seated on the plate **23**, in such manner as to have freedom for rocking movement, with pin **19** serving as a trunnion, when the door **1** is moved from open to closed position and vice versa.

In the door's movement to closed position, not only are both springs **20, 20** put under compression, but also, as shown in Fig. 3, the spring action assemblies are swung over to a substantially vertical position, with each pivot pin **16** preferably moved by the door's weight, to a point just beyond a line **25** connecting the hinge axis **12** and the trunnion axis **19**. Under these conditions, the compressed springs are effective through a small leverage to keep the door tightly closed. However, the initial effect of an upward manual pull on the door is to shift each pivot pin **16** to the other side of line **25**, whereupon the stored-up force of both springs **20, 20** is at once applied, with constantly increasing leverage, to the movement of door **1** to its full open position, as shown in Figs. 1 and 2. In other words, as soon as the closed door **1** is manually swung upwardly through a very small arc, the springs **20, 20** take over, in whole or in part, the work of raising the door, by an expanding action which, as shown in Fig. 2, forces each rod **17** upwardly, relative to the tubular member **18** in which it is slidably telescoped. Initially, when the compressed spring's expansive force is at its maximum, the leverage is small, but such leverage increases rapidly as the pivotal connection **16** swings more and more to the left (Figs. 2 and 3) thereby to compensate for the spring's gradually decreasing expansive force.

We claim:

A spring hinge construction for the cover or door of a bulkhead or hatchway, comprising a channel member adapted to be secured in substantially upright position within said bulkhead, a bracket adapted to be secured to said door and projecting into the upper end of said channel member, a pivot pin passing horizontally through said bracket and the sides of said channel member to provide a hinge at said channel member's upper end for the swinging movements of said door, a plate secured across the lower end of said channel member and having an aperture whose axis is alined substantially with a perpendicular line from the axis of said pivot pin, a tubular member loosely received at its lower end in said plate aperture, a pin extending transversely through said tubular member and seating on said plate, to provide a trunnion support, substantially parallel with said pivot pin axis for the swinging movement of said tubular member, a threaded rod having a pivotal connection at its upper end with said bracket, in offset relation to said pivot pin axis, said rod's lower end being telescopically slidable in said tubular member, an adjusting nut threaded onto said rod, and an expansion spring surrounding said telescoped parts and confined between said nut and said plate so as to be put under compression by closing movement of said door, said spring's force being effective for the opening movement of the door when said pivotal connection lies at one side of said perpendicular line, and being effective to hold said door closed when said pivotal connection moves to the other side of said perpendicular line.



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