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REFRIGERATED WAREHOUSE DOOR AND HINGE CONSTRUCTION

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FIG. 1.

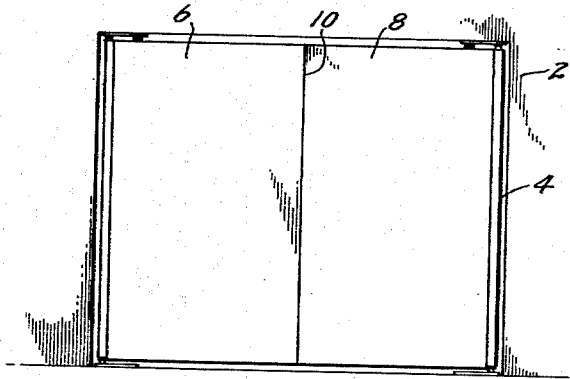


FIG. 2.

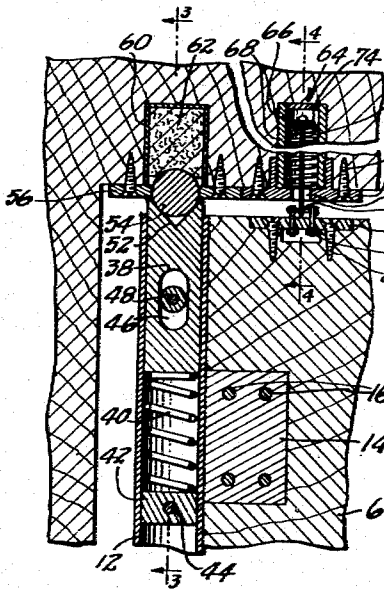


FIG. 3.

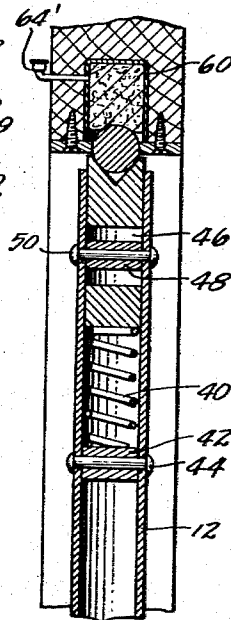


FIG. 4.

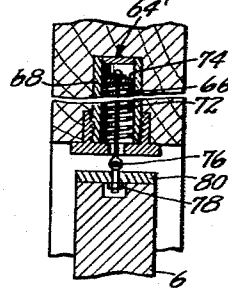
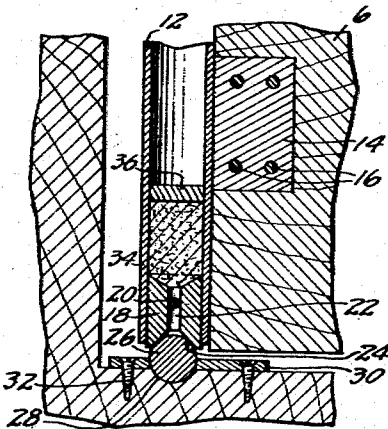


FIG. 5.



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REFRIGERATED WAREHOUSE DOOR AND
HINGE CONSTRUCTION

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9 Claims. (Cl. 20-16)

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This invention relates to storage door and hinge constructions, and more in particular to a releasable door for use in a cold storage warehouse and hinge constructions therefor.

In accordance with the present invention, cold storage compartments and similar enclosures are provided which have light weight doors which are easy to operate and quick in action, and yet which are not apt to be damaged during use. An important feature is that the light weight doors are mounted upon hinges which provide easy operation and at the same time release the door automatically under any conditions when the door or the hinges might otherwise be damaged. For example, if an operator approaches a door with a truck at a relatively high speed and there is an impact which would damage a heavy slow-moving door, the hinges supporting the light weight door are released or separated so that the door moves from its frame and neither the door nor the hinges are damaged. The arrangement is such that when the door is dislodged from the door frame, it is held suspended adjacent the edge of the doorway and substantially the entire doorway is cleared. Thus, trucks may pass through the doorway without touching the door.

The door and hinge construction is such that the operator may dislodge or disconnect the door manually if the traffic conditions are such that the passageway should be kept clear. However, the door and the hinges are sufficiently light in weight to permit the operator to open the door manually or with a hand-propelled truck. Whenever the door is dislodged it may be replaced both easily and quickly and it automatically closes rapidly whenever it is supported by its hinges and permitted to swing freely.

Accordingly, it is an object of the present invention to provide an improved storage warehouse construction. It is a further object to provide improved door and hinge arrangements which avoid the difficulties which have been encountered in the past. It is a further object to accomplish the above with structure which is inexpensive to manufacture, sturdy and light weight in construction, easy to operate and which does not involve excessive maintenance costs. These and other objects will be in part obvious and in part pointed out below.

The invention accordingly consists in the features of construction, combinations of elements, and arrangements of parts as will be exemplified in the structure to be hereinafter described and the scope of the application of which will be indicated in the following claims.

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In the drawing:

Figure 1 is an elevation of one embodiment of the invention;

Figure 2 is an enlarged vertical section at the upper left-hand portion of Figure 1;

Figures 3 and 4 are sectional views respectively on the lines 3-3 and 4-4 of Figure 2; and, Figure 5 is a sectional view similar to Figure 2 but showing the construction at the lower left-hand portion of Figure 1.

Referring to Figure 1 of the drawing, a cold storage compartment is separated from an entrance passageway by a wall 2 which has a doorway 4 therein surrounded by a door frame, and this doorway is closed by a pair of swinging doors 6 and 8. Door 6 is hinged at the left adjacent the left-hand side of the doorway, and door 8 is hinged at the right adjacent the right-hand side of the doorway. Thus, when the doors are both open substantially the entire doorway is free of obstructions, and attendants or operators even with relatively large trucks may pass easily therethrough. The doors have a normal rest position (as shown) in alignment with the general plane of the wall 2 and with their mating edges 10 substantially in contact with each other.

The two doors are mounted and function identically, and the present discussion will relate to the left-hand door 6 specifically, with the understanding that the right-hand door 8 operates in the same manner. Referring to Figures 2 and 5, door 6 has at the left a hinge cylinder 12 which is attached to the door by a plurality of metal plates 14 which are welded to the cylinder and project to the right into recesses in the door, and each plate 14 is clamped to the door by four bolts 16. Cylinder 12 has (see Figure 5) a sleeve or end plug 18 in its lower end which is fixed in the position shown by a rivet 20. Sleeve 18 has conical recesses in its ends and a center bore 22, and its lower end presents a conical bottom surface 24. This bottom surface 24 rests upon a fixed steel ball 26 which in turn rests in a recess 28 in the adjacent floor surface, and a steel plate 30 fixed to the floor by a plurality of screws 32. Directly above sleeve 18 is a chamber 34 filled with oil-retaining fibers in the form of waste or the like which is held in place by a disc 36. At the time of installation and periodically thereafter, the chamber 34 is supplied with oil and the oil then feeds automatically onto the ball 26 and the surfaces contacting the ball. Thus, a hinge is provided which assists in supporting the door and yet is anti-friction in nature so that there is no substantial resistance to the swinging of the door.

Referring now to Figure 2, a sliding hinge sleeve or block 38 is mounted with limited sliding movement in the top end of cylinder 12. The block is urged upwardly by a compression spring 40, the bottom end of which rests upon a disc 42 which is fixed in place by a rivet 44. Block 38 has an elongated transverse slot 46 (see also Figure 3) in which is positioned a sleeve 48 which is held in place by a rivet 50. Sleeve 48 is of such size that block 38 may slide up and down without substantial interference, but the sleeve provides a stop at the two ends of the slot so as to limit this sliding movement. The top end of block 38 has a conical surface 52 which engages a steel ball 54. Ball 54 has slightly less than its lower half exposed and it is held stationary by a fixed top plate 56 which is secured by a plurality of screws 58 to the top of the door frame. Directly over ball 54 there is a cylindrical oil shell 60 which forms an oil chamber 62 which contains a mass of oil-retaining fibers. An oil cup 64' is mounted in wall 2 and provides an oil passageway to shell 60 so that chamber 62 may be supplied with oil which keeps ball 54 and the surfaces which it contacts lubricated. Referring again to Figure 5, an oil cup (not shown) provides a similar oil passageway to the oil-retaining chamber 34 for the lower hinge.

It is thus seen that door 6 is hinged on a single axis which is the axis of cylinder 12 and support is provided at the top and bottom of the door. The two conical surfaces engaging balls 26 and 54 are constantly coated with oil with the oil being fed to ball 26 through bore 22 and with oil being passed directly from the fiber in chamber 62 to ball 54. Thus, the door is hinged to swing easily and quickly about its pivot.

The door is held in the normal rest or closed position shown in Figure 1 by a unit 64 which includes a compression spring 66 mounted in a cylindrical shell 68 on the top of a plate 69. Extending centrally through spring 66 and through an opening 70 in plate 69 is a flexible heavy steel wire 72 which is riveted at its top end to a disc 74 which rests upon the top of spring 66 and is slidable in shell 68. The bottom end of wire 72 is formed into a loop which is attached to the top edge of door 6 by a bolt 76 extending through the loop and attached at its ends to a pair of eye-bolts 78. Eye-bolts 78 are in turn fixed to a plate 80 which is fixed to the top of the door by a plurality of screws 82. When the door is swung in either direction from its normal rest position, wire 72 is pulled down and it acts through disc 74 to compress spring 66. When the door is released the spring draws the wire 72 back to the position shown and this swings the door to its position of rest wherein it closes the doorway.

It has been indicated above that impacting or striking the door with a substantial force will dislodge the door rather than damage it. This functioning results from block 38 of the upper hinge construction being slidable downwardly from the position shown. Thus, when the door is subjected to a heavy blow, the force which is exerted at the bottom of the door causes the conical surface 24 to ride on ball 26 and the door is elevated slightly so that block 38 is cammed or urged downwardly against the action of spring 40; and, the bottom of the door moves out of the doorway away from ball 26. Under some circumstances, the conical surface 52 may ride away from ball 54 so that the top of the door is released first. This spring has such characteristics

that it holds block 38 in the position shown, except when a substantial force is exerted on the door. Accordingly, as indicated above, the door is free to swing and may be pushed open and it swings closed when released, but at any time that it is struck with a substantial impact, the block 38 slides down and to the side of ball 54. When the hinge is thus released, the top of the door is free (Figure 1) except for the attachment by wire 72 which is sufficiently strong to support the door. As the top of the door moves away from ball 54, the bottom of the door is lifted to some extent and it moves away from ball 26. Thus, the impact instantaneously releases the door from the hinges and the door hangs freely from wire 72.

Normally, a substantial impact against the door would be near the right-hand side of the door and, therefore, substantially to the right of the attachment between wire 72 and the door. Thus, the impact would also tend to swing the door as it is supported by the wire so that it is fully opened and supported adjacent the left-hand side of the passageway. Presumably, under normal circumstances the right-hand door 8 would be struck simultaneously with a similar blow which would dislodge it from its hinged supports and it would be swung to the right-hand side of the passageway and supported solely by its wire 72. Thus, substantially the entire passageway is immediately free for the passage of the truck or other vehicle, and the doors do not tend to swing back to their door-closing positions.

When one of the doors 6 or 8 is dislodged from its hinge connections and is being supported by its wire 72, the operator may readily grasp the edge of the door and restore it to the position shown. This involves, first positioning the bottom of the door as shown in Figure 5, and then pushing the top of the door into place while pushing down on block 38. Under some circumstances it is unnecessary to exert any direct pressure on block 38 because the cam action of the surface of ball 54 will tend to slide the block down.

The doors may be dislodged from their hinge connections manually, for example, by opening a door and then pulling down or pushing up on its edge 40. It is thus seen that the operator may dislodge one or both of the doors prior to approaching the doors with a truck; then the doors will stay open until they are replaced to the normal position shown.

As many possible embodiments may be made of the above invention and as many changes might be made in the embodiment above set forth, it is to be understood that all matter hereinbefore set forth, or shown in the accompanying drawing, is to be interpreted as illustrative and not in a limiting sense.

I claim:

1. In a construction of the character described, the combination of, wall means having a door passageway therein, a door normally extending in closing relationship with respect to said passageway, releasable hinge means comprising cooperating parts which are resiliently urged into a mating relationship, with one part mounted upon said wall means, and the other part mounted upon said door, whereby one part projects into a recess in the other to provide a pivotal interrelationship which is released by the movement of one part away from the other, said parts having cooperating cam-like surfaces and pivoting said door to swing from said rest position to open said passageway and adapted to be released by forces exerted on said door, and flexible means

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mounted upon said wall means to normally urge said door to said rest position and adapted to provide support for said door when said door is released from support by said hinge means.

2. Apparatus as described in claim 1 wherein said hinge means comprises means forming ball and socket hinge arrangements respectively at the bottom and the top of the door providing a pivot axis substantially in alignment with the edge of the door.

3. Apparatus as described in claim 2 wherein each of said hinge arrangements is formed by a metal ball mounted fixedly and a member presenting a cupped surface to said ball, and means providing for lubrication of the contacting surfaces.

4. Apparatus as described in claim 3 wherein one of said members presenting a cupped surface is slidably mounted and is spring-urged against its ball.

5. Apparatus as described in claim 4 wherein said hinge means includes a vertical cylindrical member extending along the hinged edge of the door, and a plurality of anchor plates fixed to said cylindrical member and attached to the door, and means forming oil chambers including a chamber in said cylinder.

6. Apparatus as described in claim 1 which includes, a door control and supporting member providing a resilient connection between the top of the door and the door frame comprising a flexible wire and spring means resiliently drawing said wire so as to normally tend to hold said door in closed position.

7. Apparatus as described in claim 6 wherein said spring means comprises a coil spring mounted in a door frame with the wire extending axially through it with one end connected to the top of the spring and the other end extending down-

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wardly and connected to the door whereby the door is supported by the wire when the hinge mounting is disassociated.

8. In apparatus of the character described, means forming a door opening, a pair of doors swingably mounted to normally close said opening with their hinged edges at opposite sides of the door opening and with their free edges adjacent each other, disconnectable hinge means having cooperating and mating parts which are resiliently urged together, whereby a portion of one part projects into a recess into the other part to provide a pivoting relationship, said parts being mounted respectively on said doors and said means forming a door opening with inter-related cam-like surfaces and mounting said doors and adapted to be disconnected by impacts of substantial magnitude, and means resiliently urging each of said doors toward its normal closed position including flexible supporting means attached to said means forming a door opening and also to said doors adjacent the respective tops of the hinged sides of the doors and adapted to support the doors after they have become otherwise disconnected.

9. Apparatus as described in claim 8 wherein said means forming the door opening is an insulated wall and said doors are lightweight structures.

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