Feb. 13, 1951 H. A. VETTER 2,541,848

STORAGE DEVICE

Filed Oct. 8, 1946 3 Sheets-Sheet 1

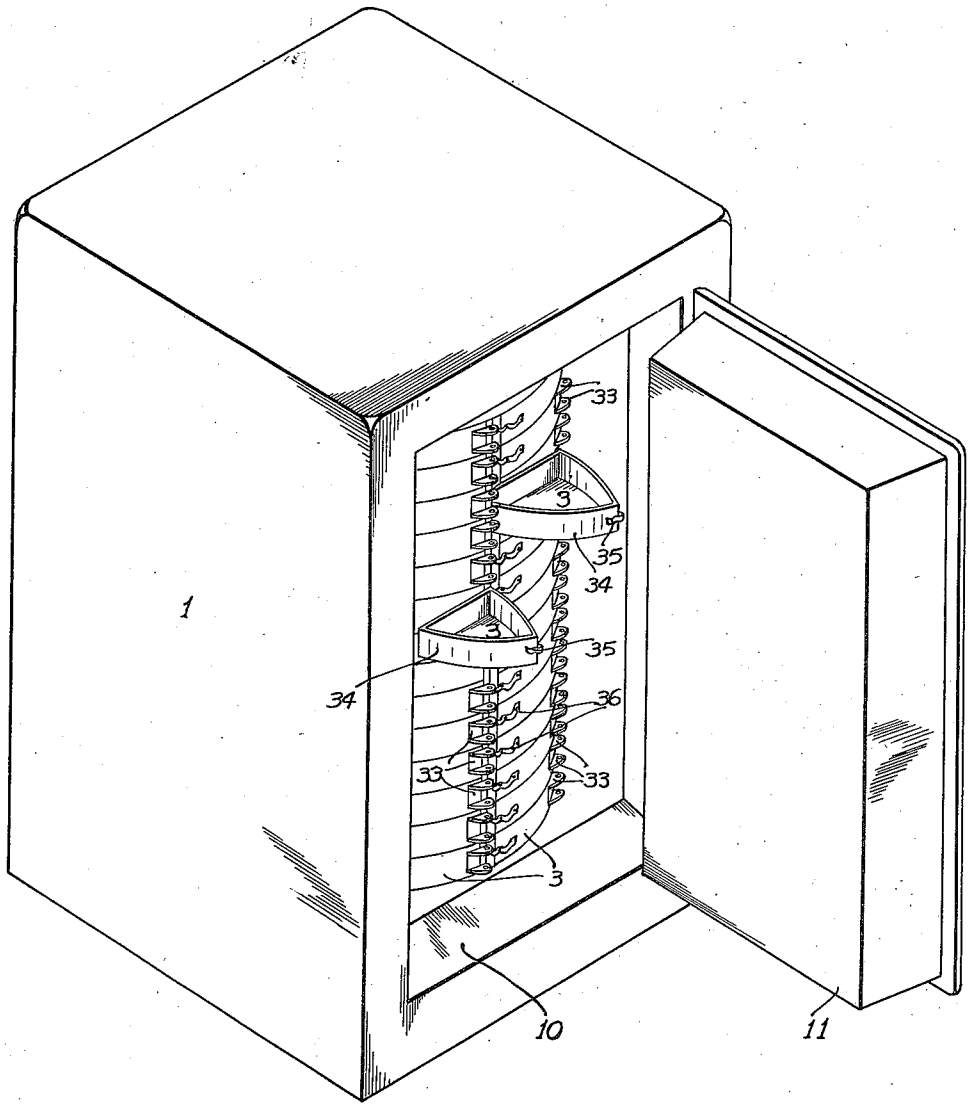


Fig. 1

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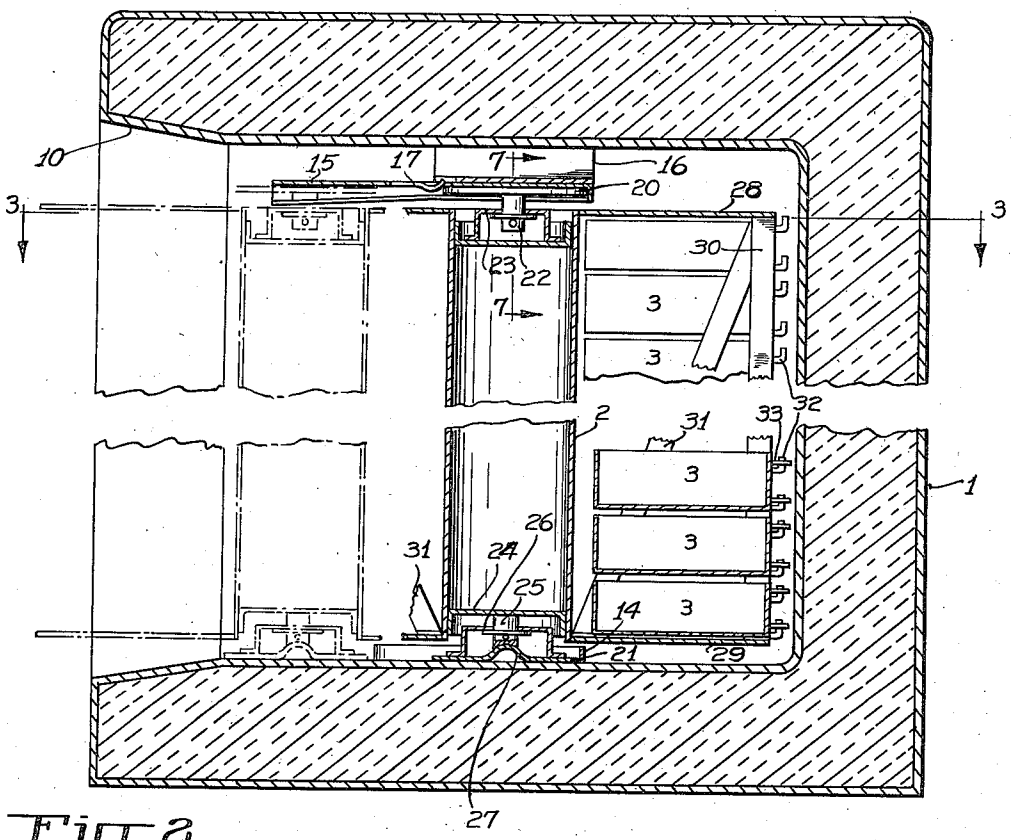


Fig. 2

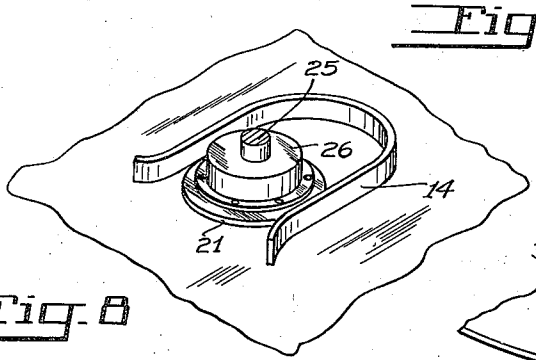


Fig. 8

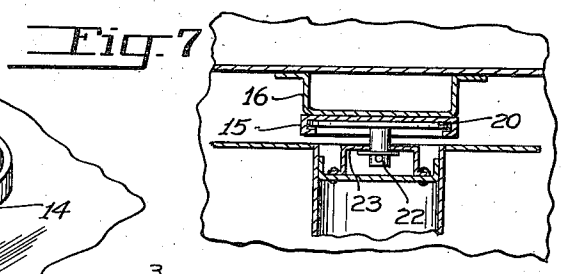


Fig. 7

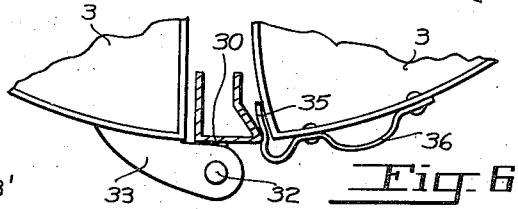


Fig. 6

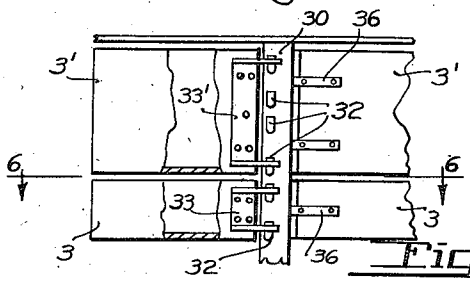


Fig. 5

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Feb. 13, 1951 H. A. VETTER 2,541,848

STORAGE DEVICE

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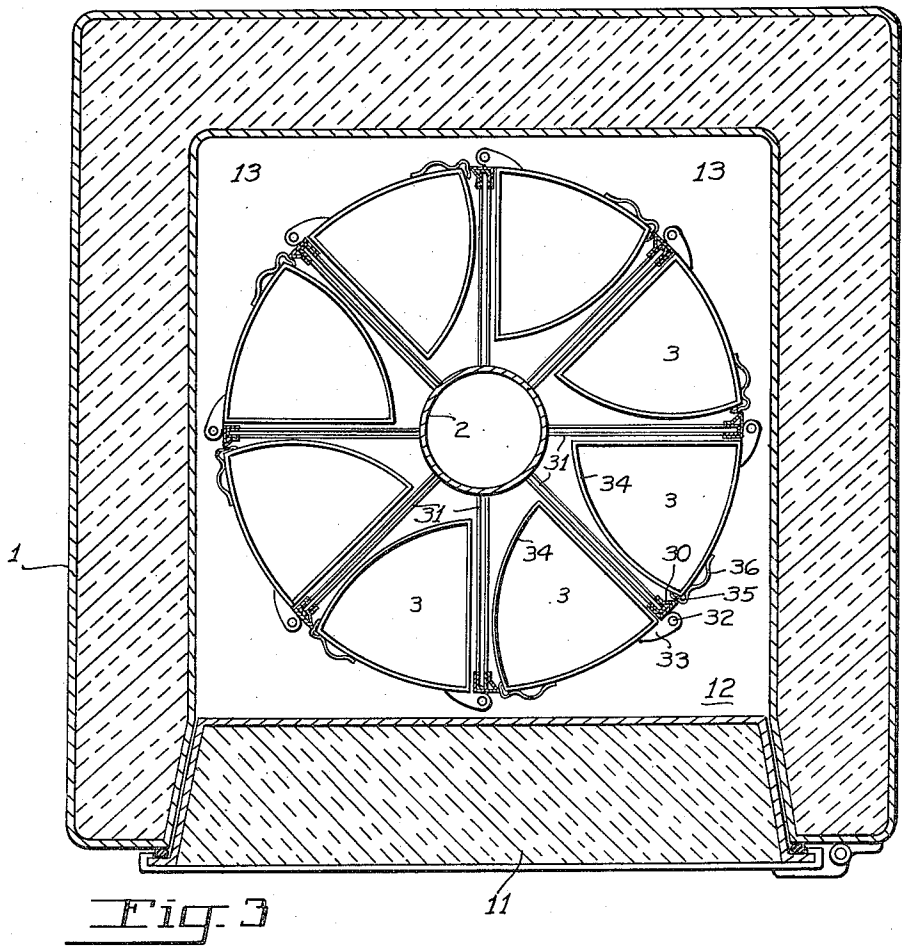


Fig. 3

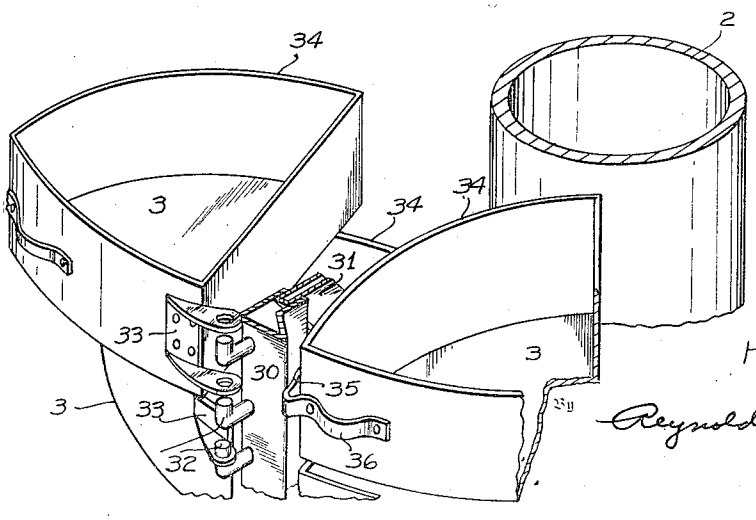


Fig. 4

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Patented Feb. 13, 1951

2,541,848

UNITED STATES PATENT OFFICE

2,541,848

STORAGE DEVICE

Harry A. Vetter, Seattle, Wash.

Application October 8, 1946, Serial No. 701,985

2 Claims. (Cl. 312—157)

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My invention relates to storage devices, such devices being particularly useful in refrigerators, for example domestic cold storage units intended for storing food over a considerable period of time. The invention as applied to refrigerators concerns particularly the accommodations for the food to be stored.

The principal advantage of my storage mechanism is the provision of individual containers, all of which are accessible with equal ease for insertion of articles into or removal from the container. In accomplishing this object the containers mounted within a refrigerator are movable into a position adjacent to an access opening.

An additional important feature of my storage structure is to enable each of the individual containers to be removed independently of the others from the storage assembly, so that a container may be filled or emptied while thus removed. The container mounting also enables any container to be moved independently of the other containers into a position for filling or emptying while still supported by the refrigerator structure.

More specifically it is an object of my invention to support individual containers within a casing on a rotor which may be revolved to dispose containers at any side of the rotor opposite an access opening to the casing. By supporting each container independently of the others in a stack any container in such stack may be withdrawn from registry with the stack without disturbing the other containers in such stack.

Another object is to construct the container-supporting rotor as a unit, independently of a casing in which it may be housed, so that in such an installation the rotor may be inserted bodily into and withdrawn from the casing. Such construction also enables my storage device to be installed in a casing not designed originally for such a unit. Securing mechanism for mounting the rotor in the casing will retain the rotor securely while enabling it to be removed readily when desired.

Additional advantages of my storage device will be discussed in the following specific description of the type of installation which I now prefer, shown in the accompanying drawings as installed in a refrigerator casing.

Figure 1 is a top perspective view of a refrigerator casing incorporating my storage structure. Figure 2 is a vertical section taken through the casing along a plane perpendicular to the access opening, and Figure 3 is a horizontal section through the casing taken on line 3—3 of Figure 2.

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Figure 4 is an enlarged fragmentary perspective view of a portion of my storage structure. Figure 5 is a fragmentary side elevation view of a portion of the mechanism with parts broken away showing an optional form of container, and Figure 6 is a fragmentary plan view taken along line 6—6 of Figure 5.

Figure 7 is a detail sectional view taken along line 7—7 of Figure 2, showing an upper portion of the rotor mounting structure, and Figure 8 is a top perspective view of rotor mounting structure.

The refrigerator casing 1 may be of conventional construction, but, as shown in Figures 2 and 3, it should have an access opening 10, closed by a door 11, which extends substantially the full width and height of the refrigeration chamber 12 to enable the entire rotor assembly to be moved bodily through it into or out of the casing. Moreover, as shown in Figure 3, it is preferred that the space available within the refrigerator casing for reception of my storage container mechanism be of substantially the same width parallel to the plane of the access aperture 10 as its depth between the inner surface of the door 11 and the wall of the refrigeration chamber opposite such door. It will be evident, of course, that the width of the chamber parallel to the access opening might be greater than such depth to provide space for shelves alongside my storage structure, or to enable more than one of the storage units to be mounted in a single chamber.

My storage unit takes the form of a rotor assembly supported by a central tubular column 2. Where this rotor is mounted in a refrigeration space of substantially square shape in horizontal section, the corner spaces 13 may accommodate refrigeration coils or chilling units of other type. If such space is not required for this purpose the walls of the compartment behind the rotor may conform to its contour and lie close to it. Alternatively, it is not necessary that my rotor unit be encompassed closely by walls, for its mounting requires only proper support for its column 2 at top and bottom. Thus a number of my rotor storage units could be mounted in a cold storage room unconfined locally by encircling walls.

The central supporting column 2 for the storage rotor is rotatably supported by suitable bearing units for its upper and lower ends. Preferably the rotor unit as a whole is removable from its supporting structure and the compartment in which it is mounted, and consequently the bearing mechanism for the central column is preferably interposed between such column and non-

rotative upper and lower slide plates 20 and 21, respectively. To the upper slide plate is secured a stem 22 which extends downward through and is anchored in a hole in a plate 23 secured to the upper end of tube 2. A plate 24 secured to the lower end of the tube carries a stem 25 which extends downward through and is anchored in a hole in a plate 26 mounted on the slide plate 21. The central portion of this latter slide plate may be bulged upward to form a bearing button 27 on which the cupped lower end of stem 25 seats, to constitute a thrust bearing. The stems may be anchored to the respective plates through the apertures of which they extend by a washer and cotter key arrangement as shown, or by equivalent mechanism.

To limit the bodily movement of the rotor structure relative to its mountings, the lower slide plate 21 may be slid into the recess formed by a retaining wall 14 upstanding from the floor of the casing and closely embracing the slide plate laterally. The ends of this wall adjacent to the casing access aperture 10 may diverge to form a flared opening for guiding movement of the slide plate 21 into the recess formed by the wall.

A corresponding guide for the upper slide plate 20 is formed by the plate 15 of generally channel shape, which is supported with its flanges projecting downwardly by a bracket 16 secured to the ceiling of the casing. The flanges of the channel plate have their edge portions bent toward each other to form inwardly facing grooves, and these flanges are tapered and converge away from the access opening 10, as shown in Figure 2, to decrease progressively the width of such grooves and reduce their spacing from a distance in excess of the slide plate width to a spacing affording a close fit for the slide plate. In its limiting, inner position the opposite edges of the slide plate 20 will be embraced closely adjacent to their upper and lower faces in the grooves formed by the flanges of the channel guide 15. Such limiting inward position is established by a flange closing the end of such channel remote from the access opening 10.

When the rotor unit has been moved into the casing to its limiting position, a spring tongue 17, preferably formed integral with the guide channel 15, will move downward behind the slide plate 20 to be engaged by its edge for restraining inadvertent movement of it outward toward the access opening under the influence of unequal loads on the rotor tending to tilt it.

The individual storage containers 3 are grouped in stacks around the rotor supporting column 2. Preferably four or more stacks of containers are arranged around such column, Figure 3 showing eight stacks of containers. As shown, these containers are of substantially circular sector shape, and if recesses for more than eight stacks of containers are provided an excessive amount of waste space will occur at the central portion of the rotor about column 2, whereas if such containers are arranged in fewer than about six stacks, the individual containers may be larger than desirable.

The containers 3 in the several stacks are carried by a rotor frame. Each container is supported independently of the others from upright bars 30 extending between and secured to the upper rotor plate 28 and the lower rotor plate 29. These bars also serve as spacer members interconnecting such upper and lower rotor plates, and the rotor structure is stiffened by brace bars 31 inclined from the upper ends of bars 30 downwardly and inwardly to the lower end of the central rotor column 2. The bars 30 and 31 thus form radial partitions dividing the rotor into sectors, each accommodating a stack of containers 3.

Because of the rotatable mounting of the rotor, it can be turned to locate at least one and, as shown in Figure 1, possibly two stacks of containers 3 substantially opposite the access aperture 10 to the casing 1. In order to facilitate filling and emptying of such containers, it is essential that each be supported independently of the others so that any selected container in a given stack may be withdrawn from the stack to enable articles to be placed in it or its contents removed. Each container may be supported merely for shifting into an access position projecting beyond the periphery of the rotor, while still supported by the rotor, or may be bodily removable from the rotor assembly. My container supporting mechanism affords either of these operations at the will of the user.

To enable each container 3 to be shifted out of its stack while still carried by the rotor structure, the containers are mounted on hinges 32 carried by the upright bars 30 of the rotor frame. Such hinges could be constructed in various ways, but they are illustrated as including pintles secured to and projecting from the bars 30, and a bracket 33 secured to one outer apex of the container 3 and including spaced parallel ears having pintle-receiving apertures in them. The outer corner of the container to which the bracket 33 is secured is the center point for the curvature of the arcuate container side 34 opposite such corner, and the radius of such arc is substantially the chordal distance between adjacent bars 30. Consequently, each container 3 may swing outward about its hinge 32, 33 from a position in registry with its stack of containers into the exposed or access position projection beyond the rotor periphery, shown best in Figure 1, in which the container is still supported from the rotor frame.

The pintles 32 may be formed by rods having their ends turned upwardly. The holes in the spaced ears of brackets 33 then merely fit over the upwardly turned rod ends so that, if desired, the entire container when swung outwardly may be lifted upward to remove the bracket ears from the pintles. In this manner each container, independently of the others, may be removed entirely from the rotor assembly and out of the casing.

For use in storing many food products in a refrigerator, such as berries and vegetables, for example, the containers 3 are preferably made rather shallow, and might be termed trays, but the rotor construction is adapted without change to accommodate deeper containers. In Figure 5, for example, a container 3' is shown, which is approximately twice the depth of the tray 3 beneath it. The deeper container is supported from hinge pintles 32 in the same manner as the shallower containers, but, if desired, a longer hinge bracket 33' may be used, which has ears spaced apart a distance to engage pintles 32 which are not adjacent to each other. In the arrangement of Figure 5 the ears are spaced apart a distance to skip two of such pintles. Thus, containers of a depth approximating any multiple of the depth of trays 3 may be carried by the rotor frame without requiring any change in it.

Because the containers will be subjected to centrifugal force tending to swing them outwardly

if the rotor is swung quickly, it is desirable to provide means for holding the containers in their inwardly swung positions in registry with their respective container stacks. While the hinges 32, 33 might be made of the spring type to exert a resilient inwardly swinging force on the containers, such an arrangement might interfere with ready removal and replacement of the containers, and would be somewhat objectionable in requiring some special provision to hold the containers in their exposed or access position while filling or emptying them. To retain each container normally in its inwardly swung position, therefore, I provide a latch 35, preferably formed integral with a pull handle 36, on the outer corner of each container remote from its hinged corner, and adapted to engage resiliently a corner of bar 30.

To install in a casing a rotor of the type described, the lower guide wall 14 and the upper bracket 16 and channel 15 are mounted on the floor and ceiling, respectively, of the casing chamber. The rotor supporting column 2, the upper and lower plates 28 and 29 and the upright and inclined bars 30 and 31 are all assembled outside the casing to form a cylindrical frame divided into container receiving sectors. This frame is then slid bodily through the access opening 10 and from the broken line position shown in Figure 2 into the solid line position within the casing, in which the lower slide plate 21 has reached its limiting position within wall 14, and the upper slide plate 20 has been inserted into the grooves of channel 15 beyond the retaining tongue 17. When thus installed the rotor frame may be turned to any position, so that the hinge brackets 33 or 33' of the containers 3 and 3' can be engaged with the pintles 32. The containers may be filled either before or after they are thus mounted on the rotor frame.

To facilitate cleaning of the interior of casing 1, or to repair cooling elements in it or the rotor structure, all the containers 3 and 3' are removed from the rotor frame, whereupon it may be slid outward and removed bodily from the casing. While spring tongue 17 will hold the rotor in place against inadvertent displacement, its holding action may be overcome by a sharp outward pull exerted on the rotor column to depress the tongue out of holding position.

An installation of my storage cylinder or rotor unit in a refrigerator has been described, for which purpose it is particularly well suited. Nevertheless, it will be evident that such units may be utilized for storage or display purposes other than in a refrigerator, and, in fact, not even in a casing. Moreover, while the containers have been shown as being freely open, suitable covers may be provided for them if desired. These covers, or the containers themselves, or both, may be made of sheet metal, or of transparent material, such as plastic, if desired, to reveal their contents without requiring them to be swung out.

I claim as my invention:

1. A storage structure comprising a casing having an entrance side, a substantially cylindrical rotor frame received in said casing and divided into a plurality of sector spaces, a stack of containers received in each sector space of said frame, means supporting said containers from said frame, means to support and guide said frame at top and bottom for rotation substantially about its central axis, said support means including separate slide elements at top and bottom of said frame, and retainer-guide means for said slide elements, mounted in said casing at top and bottom thereof and having entrance openings facing the entrance side of said casing, said guide means guiding and retaining said respective slide elements inserted therein by lateral movement of the frame into said casing through its entrance side, to removably retain said frame in vertical rotative position.

2. The structure defined in claim 1, wherein the top retainer-guide means includes vertically spaced guide elements arranged in horizontally spaced pairs to receive the top slide element between them, a stop element between such pairs to limit movement of such slide element during insertion of the frame into the casing, and resiliently actuated detent means cooperable with the slide element to yieldably restrain the inserted slide element against inadvertent withdrawal from the retainer-guide means.

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