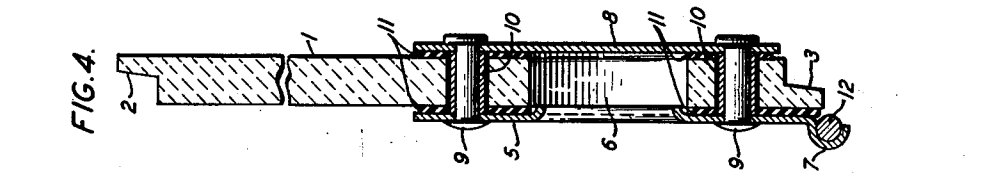
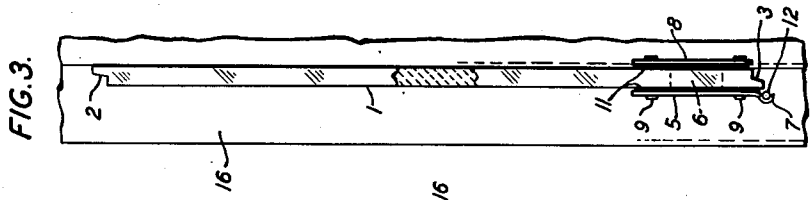
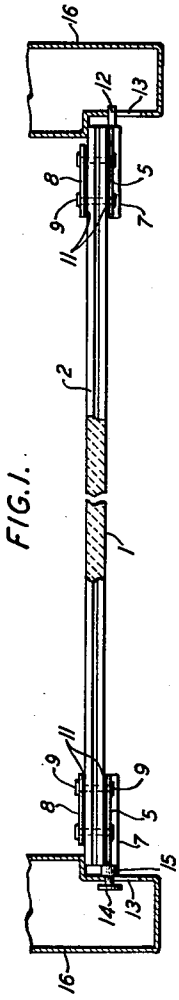
Sept. 2, 1952 E. T. BALL 2,608,727

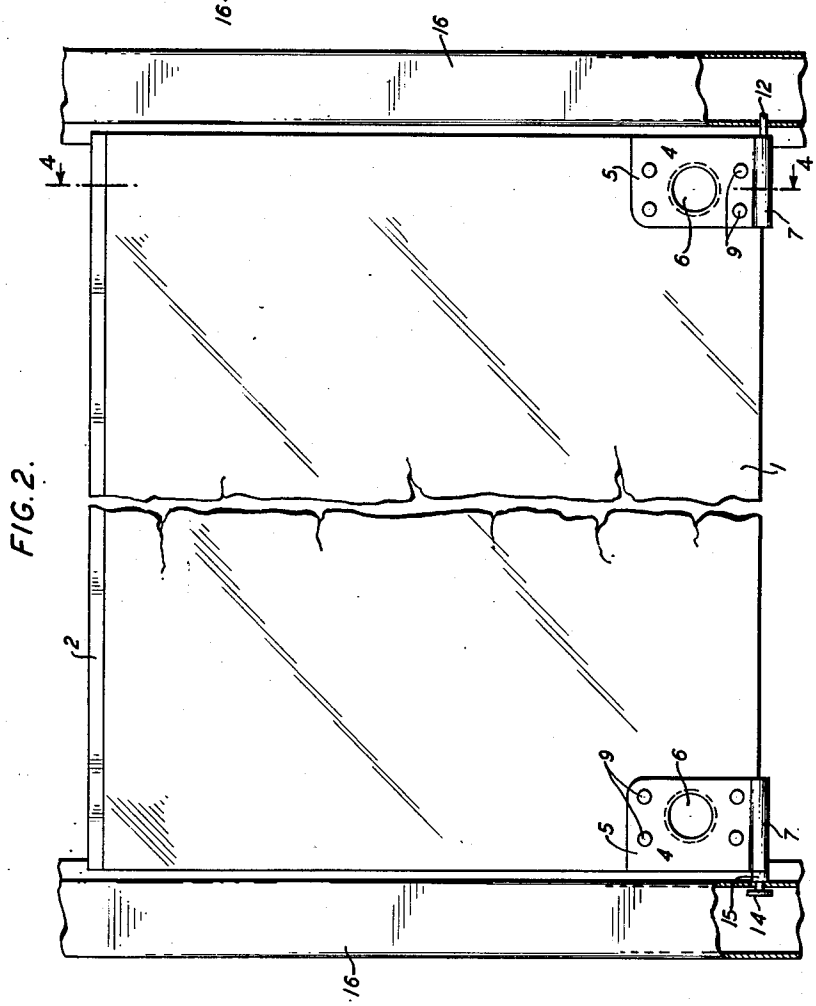
DOOR

Filed Nov. 14, 1947 3 Sheets-Sheet 1









INVENTOR
E. T. BALL
BY
J. W. Schmied
ATTORNEY

Sept. 2, 1952 E. T. BALL 2,608,727

DOOR

Filed Nov. 14, 1947 3 Sheets-Sheet 2

FIG. 5.

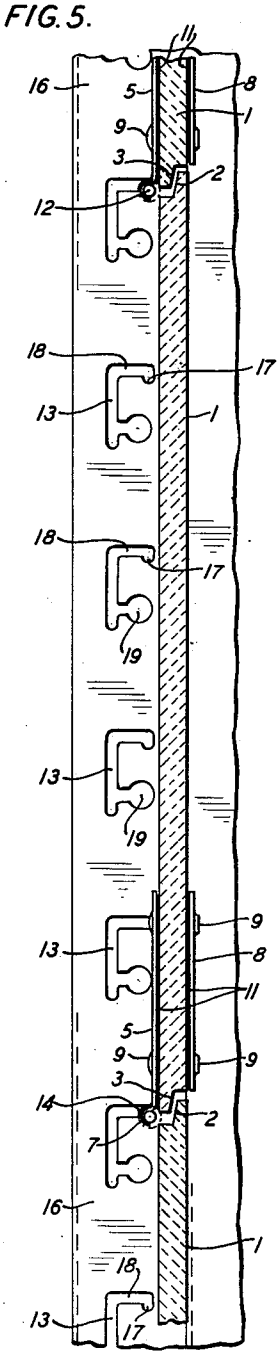


FIG. 7.

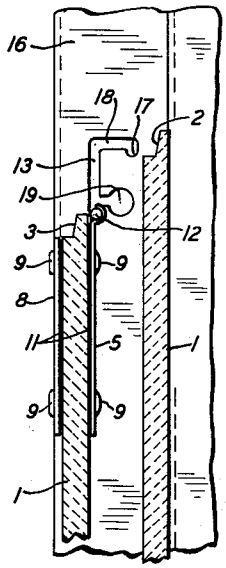


FIG. 6.

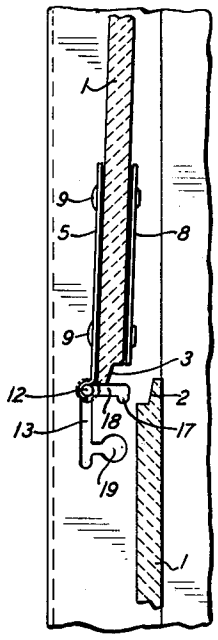


FIG. 8.

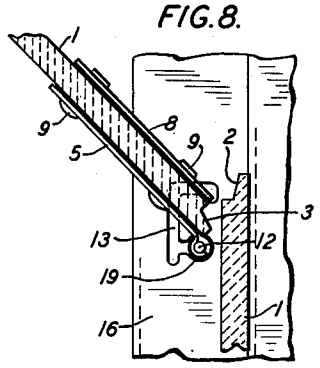


FIG. 9.

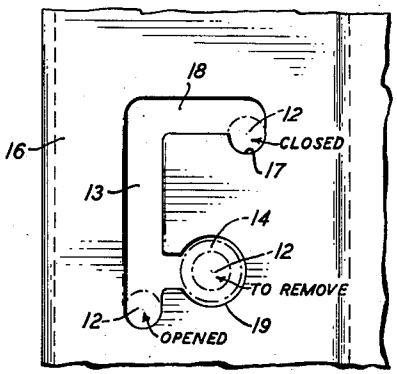
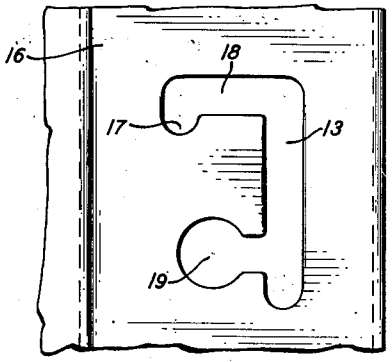


FIG. 10.



INVENTOR
E. T. BALL
BY
J. W. Schmied
ATTORNEY

Sept. 2, 1952 E. T. BALL 2,608,727

DOOR

Filed Nov. 14, 1947 3 Sheets-Sheet 3

FIG. 13.

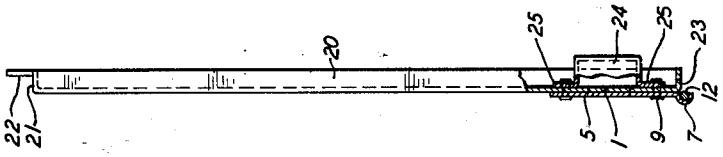


FIG. 12.

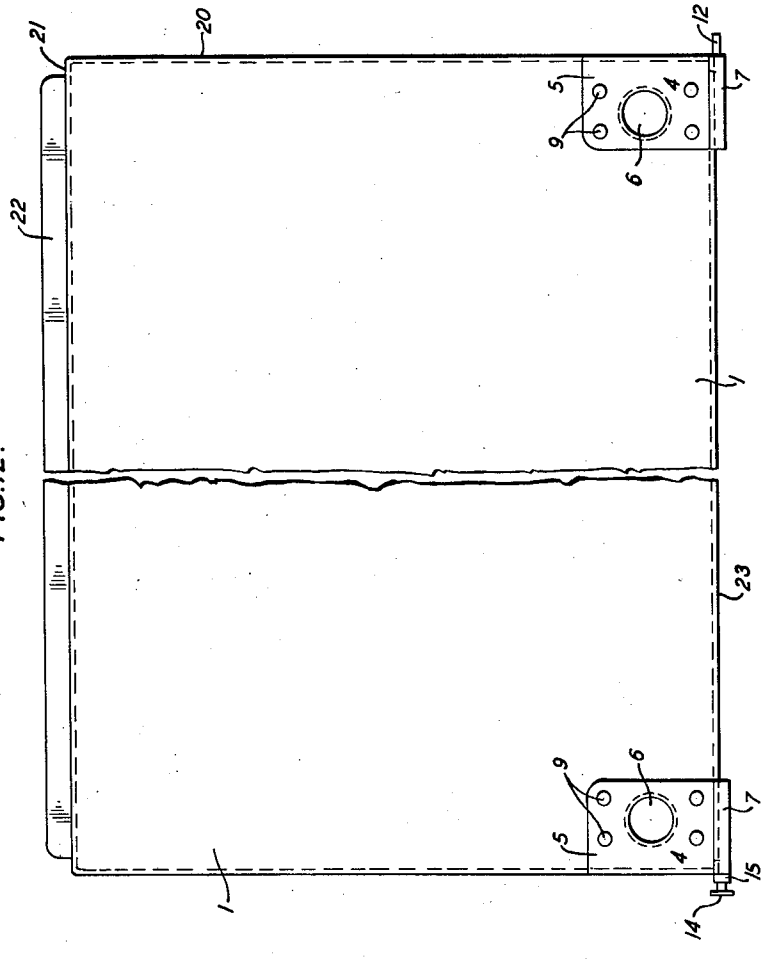
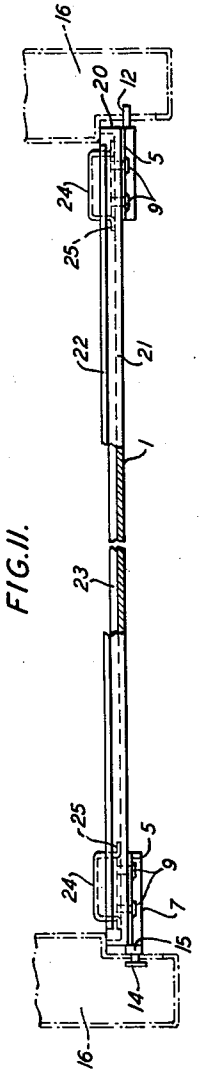


FIG. 11.



INVENTOR
E. T. BALL
BY
J. W. Schmied
ATTORNEY

Patented Sept. 2, 1952 2,608,727

UNITED STATES PATENT OFFICE

2,608,727

DOOR

Eustace T. Ball, Fanwood, N. J., assignor to Bell Telephone Laboratories, Incorporated, New York, N. Y., a corporation of New York

Application November 14, 1947, Serial No. 786,103

7 Claims. (Cl. 20—16)

1

This invention relates to a door and hinge construction and more particularly to a door and hinge construction for enclosing the front of a switchboard frame.

In apparatus having mechanically moving parts, and particularly in electrical apparatus in which electrical circuits must be completed by the closing of mating contacts, dust is one of the basic causes of poor operation or failure. Much time and money have been expended in research toward the developement of electrical contact-making means which would be affected to the minimum by dust particles lodging on the contacts, and towards the development of a great variety of individual or group apparatus covers. However, the relative freedom from failure due to dust by the utilization of individual or group covers has usually been attained at the expense of visibility of the operation of apparatus mounted within the covers, and has increased the time required for inspection and maintenance of the equipment due to the necessity of removal of such covers.

Since much equipment in industrial use and particularly equipment associated with telephone switching systems is most conveniently mounted in frames, a switchboard frame has been designed which is entirely enclosed and thus obviates the need for individual covers for the items of equipment contained therein while providing a relatively dustproof installation. Such a frame is disclosed in Patent 2,577,101, granted December 4, 1951 to E. T. Ball, J. G. Ferguson and J. E. Greene, whereas this application is directed at a novel and improved means for enclosing the front of said switchboard frame.

An object of this invention, therefore, is to provide a means to close the front of a compartment while maintaining ready accessibility to the apparatus mounted therein.

Another object of this invention is to enclose the front of a compartment with a substantially dustproof cover.

Another object is to provide a front cover which does not protrude beyond the face of a frame in either the opened or closed positions thereby obviating the danger of damage either to the cover or to passers-by.

A further object of the invention is to completely enclose the front of a compartment without appreciably obstructing the view of the apparatus contained therein.

In accomplishing these objects, the inventor has devised a cover comprising a plurality of panels mounted adjacent one another in a vertical row. Each panel is rabbeted at its opposite

2

edges so as to effectively interlock the adjacent panels or to lock a panel to an adjacent frame member and thus provide a dust-tight joint. In order that the individual covers may be opened to provide access to the apparatus contained within the frame, a novel hinging means has been devised by means of which the hinged edge of each panel may be moved outwardly and downwardly thereby releasing the panel from its interlocked engagement with its adjacent panels and permitting the panel to be rotated about its hinged edge to a position in which it does not interfere with access to the apparatus in the frame. Further provision has been made for completely and easily removing the individual panels if so desired. The utilization of transparent panels is suggested and disclosed herein to attain the desired visibility, although metal or other opaque materials may be used as hereinafter described.

The invention may be more fully understood by reference to the accompanying drawings in which:

Figs. 1, 2 and 3 are top, elevational, and side views, respectively, of a transparent panel and a hinge construction in accordance with the invention;

Fig. 4 is an enlarged end view of a section through 4—4 of Fig. 2;

Fig. 5 is an end view of a frame upright with a series of panels shown in the closed position;

Fig. 6 is an end view of the section about one hinge showing the initial step in opening one of the panels;

Fig. 7 is an end view of the section about one hinge showing one panel in a fully opened position;

Fig. 8 is an end view of the section about one hinge showing the positioning of the panel for removal from the frame;

Fig. 9 is an enlarged view of a hinge aperture in the upright at the left of the frame as the viewer looks at the front of the frame;

Fig. 10 is an enlarged view of a hinge aperture in the other upright; and

Figs. 11, 12 and 13 show the top, elevational, and side views, respectively, of a modification of the invention in which an opaque metallic material is used for the panel.

Referring now to Figs. 1, 2, 3 and 4 showing one of a series of transparent panels for an equipment bay, the panel or door 1 of Plexiglas, Lucite or similar transparent material is of rectangular form and is rabbeted along its upper 2 and lower 3 edges to interlock with the adjacent edges of the panels immediately above and below. Each

of the hinge plates 4 mounted at the lower corners of the door 1 comprises a front plate 5 having a forwardly extending semicircular flange 7 along its bottom edge and having a hole 6 arranged to overlie a corresponding hole in the panel 1. Front plate 5 and back plate 8 are affixed to the panel 1 by means of tubular rivets 9 or by other suitable means. To absorb shock and to prevent undue stress on the material of panel 1, sleeves 10 and rubber gaskets 11 are provided. Affixed to the flanges 7 by welding or similar means are hinge pins 12 which extend outwardly to engage apertures 13 in the upright members 16 of the frame as will be hereinafter disclosed. One of these pins has a flanged head 14 and a shoulder 15 to prevent the panel being inadvertently removed from the frame during opening or closing operations.

In Fig. 5 a complete cover or panel 1 and portions of adjacent panels 1 are shown in the closed position. The interlocking rabbeted joints 2 and 3 have been illustrated with a gap between adjacent panels for purposes of clarity, but it is to be understood that the structure is designed so that there is a tight, dustproof fit between adjacent panels. In this closed position, the hinge pins 12 rest in the notches 17 of the upper horizontally extended portions 18 of the F-shaped apertures 13 in the upright members 16 of the equipment bay frame. It is evident in the view of Fig. 5 that the individual panels may be hinged about any pair of perforations, slots or apertures 13 in the upright members 16 to provide flexibility in the location of the individual panels or doors 1 in respect to the location of the apparatus mounted within the equipment bay.

The procedure to be followed in opening an individual panel 1 is demonstrated in Figs. 6 and 7. The panel is grasped adjacent the lower, hinged edge by inserting a finger in each of the holes 6 (Fig. 2) and pulling the lower edge of the door outwardly until the hinge pins 12 are at the intersection of the upper horizontal arms 18 and the vertical arms of the substantially F-shaped apertures 13, or into the position as shown in Fig. 6. The panel 1 is then allowed to drop downwardly until the hinge pins 12 are at the bottom of the vertical arms of the F-shaped apertures. This operation will lower the panel sufficiently to free the upper edge of the panel 1 from its interlocking engagement with the lower edge of the panel immediately above it, and therefore the panel may be rotated about the axis of its hinged edge to a substantially vertical position as in Fig. 7, thereby opening a section of the switchboard for access to the apparatus mounted therein. The operation of closing the cover is the reverse of the above recited method and comprises the swinging of the panel 1 about its hinged edge, lifting the panel substantially vertically until the upper rabbeted edge is engaged with the lower rabbeted edge of the panel above it, and then pressing the base of the panel inwardly to the closed position.

It is apparent from the above description of the process of opening and closing the panel that T-shaped apertures 13 would suffice for these operations. However, to provide means for entirely removing the panel 1 from the equipment bay, the apertures 13 are provided with lower horizontally extending arms terminating in enlarged portions 19. As previously indicated, one of the hinge pins 12 is provided with a shoulder 15 and a flanged head 14 to prevent undue lateral movement of the panel 1 within the frame. To permit the removal of the cover, therefore, an

enlarged opening 19 has been provided of sufficient diameter to allow the flanged head 14 of the hinge pin 12 to pass therethrough. To remove any panel 1 from the frame, the cover 1 is opened as above described and then moved so that the hinge pins 12 are aligned with the enlarged sections 19 of the apertures 13. The panel 1 may then be slid laterally by permitting the shoulder 15 on one hinge pin 12 to be passed through the enlarged aperture section 19. Such lateral movement will cause the other hinge pin 12 to be withdrawn from its aperture 13 and permit the panel to be removed by the subsequent withdrawing of the flanged head 14 of the first-mentioned hinge pin 12 through the enlarged aperture section 19.

Figs. 9 and 10 are enlarged views of hinge apertures or slots 13 in the left and right uprights 16, respectively, as viewed from a position facing the front of the frame. In Fig. 9 the position of the hinge pin 12 is shown with the panel 1 closed, the panel 1 opened, and with the panel 1 properly located for removal from the frame. It is believed to be apparent from the above description that the same results could be obtained from the use of a single hinge plate 4 located along the base of the plate 1 with a single hinge pin 12 of suitable length. It is further believed to be apparent that essentially the same results could be obtained if the hinge or hinges were mounted on the upper edges of the panels 1 and the aperture suitably shaped so that the panel could be opened by swinging it upwardly.

Inasmuch as in some utilizations of the panels herein disclosed an unobstructed view of the apparatus contained in the equipment bay is not essential, a modified form of the panel has been presented in Figs. 11, 12 and 13 in which an opaque metallic material is employed for the panel 1. The panel 1 is formed of a metal sheet having sections along each side bent backwardly at right angles to the face of the panel as indicated by the numeral 20. At the top edge of the panel 1 the metal is bent rearwardly as at 21 and thence flanged upwardly as at 22. At each end of the flange 22 portions are removed to permit an interlocking engagement with the lower edge of the next panel above. At the lower edge of each panel 1, the material is bent rearwardly to form a flange 23, and a section is removed therefrom of similar shape and size to the cross-section of the flange 22 to provide a recess into which the flange 22 of the next panel below may fit. Flange 23 may be seen in the section at the center of Fig. 11. The construction of the hinge member is similar to that previously described in connection with the transparent panel and the elements thereof are similarly numbered. The front hinge plate 5, the metal panel 1 and a cup-shaped member 24 having a flange 25, are riveted or otherwise fastened together. Apertures 6 in hinge plate 5 and panel 1 provide means for grasping the panel by the insertion of the fingers through said apertures and into the cups 24.

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

What is claimed is:

1. In combination with a support frame having a plurality of apertures therein, a cover for said frame comprising a plurality of doors having their edges rabbeted so that adjacent doors

are interlocking, and means for pivotally mounting each of said doors so that each door may be individually opened comprising a hinge connected to one edge of each of said doors and engageable in two of said apertures, said hinge being movable horizontally and then vertically in said apertures to unlock the door from its adjacent door so that said door may be pivoted about its hinge to an open position.

2. In a combination with a support frame having a plurality of apertures therein, a cover for said frame comprising a plurality of doors having their edges rabbeted so that adjacent doors are interlocking, and means for pivotally mounting each of said doors so that each door may be individually opened comprising a hinge connected to each of said doors and engageable in two of said apertures, said hinge means being movable laterally in said apertures being movable horizontally and then vertically in said apertures to unlock the door to which it is individual from the adjacent door so that said door may be pivoted about its hinge to an open position and being then movable longitudinally to render the door removable.

3. In combination with a door support member having two substantially Γ-shaped slots therein, a door arranged to lock with a member adjacent said door, and hinging means pivotally mounting said door comprising hinge pins and means for affixing said hinge pins to said door, the ends of said hinge pins slidably engaging the substantially Γ-shaped slots so that the door may be disengaged from the member adjacent the door and opened by moving the hinged edge of the door so that said hinge pins slide to the lower extremes of the associated Γ-shaped slots and thereafter pivoting said door about said hinge pins to an open position.

4. In combination with a door support member having a plurality of substantially Γ-shaped slots therein, a plurality of interlocking doors, and hinging means individual to each of said doors for pivotally mounting each of said doors comprising hinge pins and means for attaching said hinge pins to the associated door, the ends of said hinge pins engaging two of the substantially Γ-shaped slots so that each door may be disengaged from its adjacent door and opened by moving the hinged edge of the door so that said hinge pins slide to the lower extremes of the associated Γ-shaped slots and thereafter pivoting said door about said hinge pins to an open position

5. In combination with a door support member having two substantially F-shaped slots with an enlarged opening at the extreme of the lower cross bar of each of the F-shaped slots, a door interlockable with a member adjacent said door, and hinging means for pivotally mounting said door comprising hinge pins and means for attaching said hinge pins to said door, the ends of said hinge pins slidably engaging two of the substantially F-shaped slots so that the door may be disengaged from the member adjacent the door and opened by moving the hinged edge of the door so that said hinge pins slide to the lower extremes of the associated F-shaped slots and thereafter pivoting said door about said hinge pins to an open position and so that the door may be removed by moving the door so that said hinge pins slide to the enlarged portions on the lower cross bars of the substantially F-shaped slots.

6. In combination with a door support member having a plurality of substantially F-shaped slots with an enlarged opening at the end of the lower cross bar of each of said slots, a plurality of interlocking doors, and hinging means individual to each of the doors for pivotally mounting each of said doors comprising hinge pins and means for attaching said hinge pins to the associated door, the ends of said hinge pins engaging two of the substantially F-shaped slots so that each door may be disengaged from its adjacent door and opened by moving the hinged edge of the door so that said hinge pins slide to the lower extremes of the associated F-shaped slots and thereafter pivoting said door about said hinge pins to an open position, and so that the door may be removed by moving the hinged edge of the door so that said hinge pins slide to the enlarged portions at the ends of the lower cross bars of the associated substantially F-shaped apertures.

7. In combination with a support member having a plurality of substantially F-shaped perforations therein, a plurality of covers for enclosing the front of said member, each of said covers comprising a panel and individual hinging means for pivotally mounting the panel, said hinging means comprising hinge plates secured to the lower edge of said panel and a hinge pin extending outwardly from each of said plates, one of said pins having a flanged head, said hinge pins engaging in said substantially F-shaped perforations whereby said panel may be pivoted about the axis of the hinge pins, the upper and lower edges of said panels being so rabbeted that when the upper edge is positioned behind the lower edge of the panel above it and the lower edge of the panel is pushed back until its hinge pins engage in notches of the horizontally extended portions of the F-shaped perforations, the covers all become aligned, each of the F-shaped perforations in said uprights being arranged with an enlarged portion at the extreme of the lower cross bar thereof to permit the flanged head of said one hinge pin to be drawn therethrough to permit removal of said panel.

EUSTACE T. BALL.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
992,760	Dudley	May 23, 1911
1,630,160	Bayles	May 24, 1927
1,641,391	Lewis	Sept. 6, 1927
1,670,554	Sostheim	May 22, 1928
1,903,065	Paget	Mar. 28, 1933
2,196,399	Rubel	Apr. 9, 1940

FOREIGN PATENTS

Number	Country	Date
91,499	Sweden	1938