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CABINET DOOR HINGE

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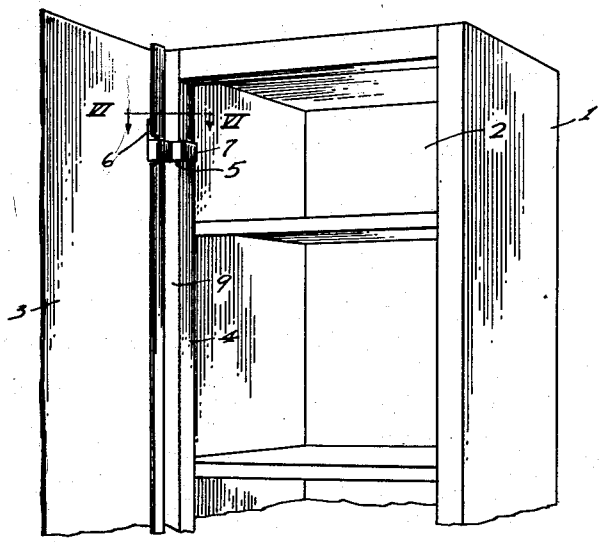


Fig. 1.

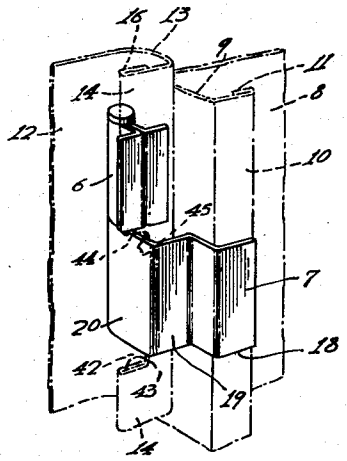
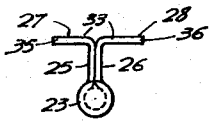


Fig. 2.



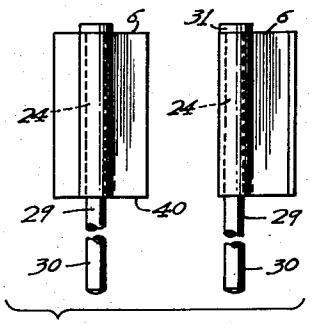


Fig. 3.

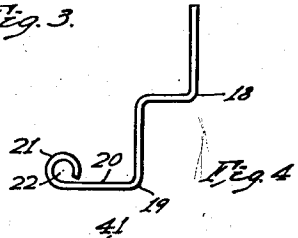


Fig. 4.

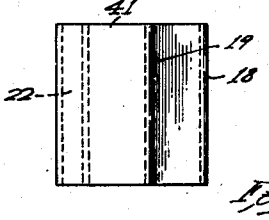


Fig. 5.

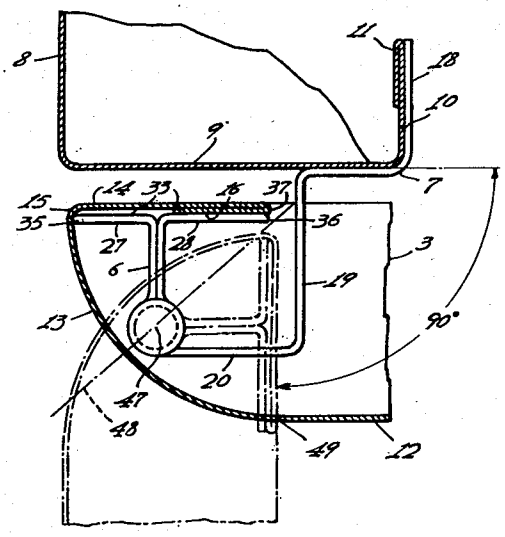


Fig. 6.

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CABINET DOOR HINGE

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2 Claims. (Cl. 189—46)

1

This invention relates to a cabinet door and hinge, and, more particularly, to a cabinet door constructed of sheet metal and hinge therefor.

It is frequently necessary to place cabinets side-by-side, and in such case, it is desirable to have doors on the cabinets which will not swing beyond the edge of the cabinet in the opening movement of the door. Where the portion of the door adjacent its hinge connection moves beyond the edge of the door in the opening movement thereof, the projecting portion of the door in open position will interfere with the opening movement of the door on an adjacent cabinet. From the standpoint of appearance, it is also desirable that the hinge providing a pivotal support for the door be concealed. Hinges which are concealed and which will not swing a portion of the door beyond the edge of the cabinet in opening movement are known in the art. However, known types of such hinges are not adaptable for door structures which are constructed from sheet metal. The construction of the door from sheet metal is of course desirable in that such doors may be manufactured at considerably less cost than other types of doors.

Accordingly, this invention has as one of its objects the provision of a concealed hinge which is particularly adaptable for use on doors constructed of sheet metal.

A further object of this invention is to provide a sheet metal door having a partial enclosure at one edge thereof together with a novel form of concealed hinge including a hinge part which is mountable entirely in the space at the edge of the door provided by such enclosure.

A further object of the invention is to provide an interlocking door and hinge structure which will be effective to limit opening movement of the door and to prevent separation of the hinge parts in all positions of the door except a predetermined position.

Still another object of the invention is to provide a novel form of hinge bracket for a sheet metal door which is effective to automatically locate a predetermined position of pivot axis when the hinge bracket is placed in its mounting position.

Other objects and advantages of the invention will be apparent from the following description.

In the drawings, there is shown a preferred embodiment of the invention. In this showing:

Fig. 1 is a partial perspective view of a sheet metal cabinet and door provided with a hinge constructed in accordance with the principles of this invention, the showing of Fig. 1 illustrating the door fragmentarily in its full open position;

2

Fig. 2 is an enlarged perspective view of the cooperating hinge parts in the relative positions illustrated in Fig. 1, the structure of the door to which such hinge parts are connected being illustrated in a fragmentary and diagrammatic manner;

Fig. 3 is a group view illustrating the structure of the hinge part connected to the door in top, front, and side elevation;

Fig. 4 is a top plan view of the hinge part which is secured to the cabinet;

Fig. 5 is a front elevational view of the hinge part shown in Fig. 6; and

Fig. 6 is a sectional view taken substantially along the line VI—VI of Fig. 1, the solid lines indicating the relative positions of the hinge parts with the door in its fully closed position and the broken lines indicating the relative positions of such parts with the door in its fully opened position.

In the drawings, the numeral 1 indicates a cabinet having an opening 2 in the front thereof, and a door 3 as a closure for the opening 2. The door 3 is pivotally connected to the cabinet 1 by at least a pair of hinges along one vertical edge 4 of the cabinet, only one of such hinges being illustrated and such hinge being designated as a whole by the numeral 5. The hinge 5 comprises hinge parts 6 and 7 respectively secured to the door 3 and cabinet 1 in a manner to be described.

The cabinet 1 and door 3 are preferably constructed entirely of sheet metal and have their edge portions specially constructed for the hinge parts 6 and 7 which are secured thereto. For the purposes of this invention, it will be sufficient to point out that the cabinet 1 has a side wall 8 with a front margin 9 defining one edge of the opening 2. The margin 9 has a flange 10 extending inwardly at right angles to the margin 9. The inner end of the flange 10 is doubled back on itself as at 11 to reinforce the flange 10.

The door 3 is formed with a flat sheet metal panel 12 at the front thereof, and a curved flange 13 along one vertical edge of the panel 12, and extending inwardly therefrom toward the cabinet 1. The curved flange 13 has the shape of a quarter round, and the door 3 thus has a thickness equal to the radius of the quarter round 13. A reinforcing strip 14 extends inwardly from the outer edge 15 of the door 3 a distance equal to the radius of the quarter round, and has a

part 16 doubled back on itself for reinforcing purposes. It will be noted that the outer edge 15 of the door 3 is flush with the side wall 8 of the cabinet when the door is in its closed position. In addition, it will be noted that the formation of the curved flange 13 in the shape of a quarter round imparts an improved and streamlined appearance to the cabinet which is particularly pronounced when the door 3 is in a closed position. With the door 3 in a closed position, the quarter round shape of the flange 13 makes the door appear more a part of the cabinet structure than just a closure therefor.

Referring now to the structure of the hinge 5, it will be noted that the hinge part 7 is stationary and is constructed entirely of a strip of sheet metal which is bent to provide a pair of integrally connected angles 18 and 19. The inner angle 18 has its inner faces placed in abutting engagement with the outer faces of the sheet metal parts 9 and 10 and is secured thereto as by welding. The outer angle 19 provides a strip 20 spaced from and parallel to the marginal strip 9 of the cabinet 1 and has its outer end looped as at 21 to provide a cylindrical opening 22 for a pivot pin in a manner to be described.

As best shown in Fig. 3, the pivot part 6 is movable and is constructed entirely of sheet metal and has its center portion 23 formed to provide a cylindrical opening 24. The end portions 25 and 26 of the strip are placed in abutting relation and extend outwardly in a common direction from the center portion 23. The terminals 27 and 28 of the end portions 25 and 26 respectively are bent at right angles to the end portions 25 and 26 so that they diverge and lie in a common plane. A pivot pin 29 has a press fit within the opening 24 of the hinge part 6 and its lower end 30 extends downwardly below the lower edge of the pivot pin 6 for a purpose to be described. The press fit of the pin 29 in the opening 24 is effective to prevent rotation and axial movement of the pin 29 with respect to the hinge part 6, but the pin 29 is provided with a head 31 for limiting downward movement of the pin 29 when it is forced into the opening 24.

The hinge part 6 is mounted in position by placing the back surfaces 33 of the legs 27 and 28 against the inner surface of the strip 14 and welding it in position. When the strip 14 has an inwardly turned lip 16 as shown in Fig. 6, the back surface 33 of the leg 28 will abut against the lip 16 as shown in Fig. 6. The distance across the legs 27 and 28 is made the same as the width of the strip 14 so that the pivot axis of the door will be automatically located when the hinge part 6 is secured in position as by welding. The distance across the legs 27 and 28 is so proportioned that the end 35 of the leg 27 will move into abutting engagement with the inner surface of the curved flange 13 when the end 36 of the leg 28 is flush with the inner edge 37 of the reinforcing strip 14. By constructing the hinge part 6 in this manner, it is merely necessary to place it in position with its edge 35 in abutting engagement with the inner surface of the flange 13 and with the back surfaces 33 engaged with the inner surface of the strip 14 and then weld it to the strip 14 to prevent its movement out of this position.

With the hinge parts 6 and 7 secured in position as described above, a pivot connection of the door 3 may be readily made to the cabinet 1. This connection is made by holding the door almost in its closed position and moving it so that

the part 29 extends into the space defined by the quarter round 13 and strip 14, this space having a substantially segmental shape. When the axis of the opening 22 in the end 21 of the strap 20 is aligned with the axis of the pivot pin 29, the pivotal connection of the door 3 to the cabinet 1 may be made by dropping the door downwardly to move the pivot pin 29 into cylindrical opening 22. The door will move downwardly until the lower edge 40 of the strip forming the hinge part 6 abuts against the upper edge 41 of the strip forming the hinge part 7. The engagement of the pin 29 and the opening 22 will then provide a pivotal connection by which a door may be swung to and from a closed position with respect to the cabinet 1.

In order that the hinge strap 20 will not interfere with this opening movement, a notch 42 is cut in the strip 14. The notch 42 has a lower edge 43, an upper edge 44, and an inner edge 45. The depth of the notch 42 is so selected that the inner edge 45 will move into abutting engagement with the strap 20 to limit opening movement of the door with respect to the cabinet. The parts are so constructed that this abutting engagement takes place when the door is moved to an open position preferably about 115° from its fully closed position, but which may be any selected angle of from about 90° to about 135° from the fully closed position. As soon as the door moves substantially out of its closed position, the edges 43 and 44 of the notch 42 move to positions in which they straddle the upper and lower edges of the metal strip forming the angle 19. This straddling action provides an interlock between the strip 14 and the angle 19 which is effective to prevent axial movement of the door with respect to its pivot axis when it is in an open position. In this manner, the door may be moved axially to disengage the hinge parts only when the door is in a predetermined position, namely, a substantially closed position. From the foregoing, it will be noted that the provision of the notch 42 and the manner in which it cooperates with the angle 19 is effective to both limit opening movement of the door and to prevent disengagement of the door with respect to the cabinet 1 when the door is in an open position.

The location of the pivot axis as determined by the mounting of the hinge part 6 is in a sense critical to the door of this invention. The location of the pivot axis is so arranged that no part of the door will move beyond the plane of the side wall 8 during its opening movement and so that a door having an edge with the shape of a quarter round may be employed. The pivot axis is of course parallel to the axis of the quarter round 13 and is located adjacent the inner surface of the flange 13 and spaced from the axis of the quarter round. In addition, the pivot axis 47 intersects with a radius 48 of the quarter round 13, and the radius 48 substantially bisects the angle formed by the terminal radii of the sectorial shape defined by the quarter round. By locating the pivot axis 47 so as to intersect the bisecting radius 48, the terminal points 15 and 49 of the flange 13 will move into positions flush with the plane of the side wall 8 as the door is moved through an angle of 90° between its closed and opened positions. In other words, in the closed position of the door, the terminal end 15 of the flange 13 is flush with the side wall 8, and in the open position, the terminal edge 49 of the flange 13 and the panel 12 will be located in a plane common to the plane of the side wall 8. If the radius 48 and axis 47 were moved clockwise

from the position shown in Fig. 6, then the point 49 would extend beyond the edge of the side wall 8. On the other hand, if the radius 48 and axis 47 were moved counter-clockwise from the position illustrated in Fig. 6, then the point 15 and strip 14 would have to be spaced a greater distance from the marginal edge 9 of the cabinet so that the edge 15 would clear the front of the marginal portion 9 in opening movement of the door. A greater spacing of the strip 14 from the marginal portion 9 would result in a noticeable gap between the strip 14 and cabinet 9 which would be undesirable from the standpoint of the appearance of the completed structure. A location of the pivot axis 48 substantially as illustrated in Fig. 6 is essential in order that a door having a curved flange with a shape of a quarter round may be employed, in order that there will not be a noticeable gap between the strip 14 and the cabinet 9, and in order that the edges 43 and 44 of the notch 42 will straddle the upper edge of the strip 14 when the door is moved a slight amount out of its fully closed position, it being noted at this point that the initial straddling action takes place with respect to the portion of the angle 19 which extends perpendicularly to the marginal portion 9 of the cabinet 1.

From the foregoing, it will be apparent that the hinge of this invention is particularly adapted for a door constructed entirely of sheet metal and having a curved flange in the shape of a quarter round at its side edge. Attention is particularly directed to the fact that the operative parts 6 and 7 of the hinge are located entirely within the sectorial area defined by the curved flange 13 and its terminal radii. In this manner, there is provided a concealed hinge by which the door may be pivotally moved to and from its opened and closed positions, and in so moving, no part of the door is moved beyond the plane of the side wall 8 thereby enabling cabinets to be placed side-by-side without the opening movement of one door interfering with the opening movement of another door.

Particular attention is also directed to the fact that the structure of the hinge part 6 facilitates its mounting on the reinforcing strip 14, and that the structure of the legs 27 and 28 with respect to the ends 35 and 36 automatically locates the pivot axis of the door in the mounting of such hinge parts. Attention is also again directed to the interlocking action provided by the provision of the notch 42 in the strip 14 for preventing undesired disengagement of the door from the cabinet 1 when in an open position and for limiting the movement of the door beyond a predetermined open position.

Although the curved edge flange 13 has been described as having the shape of a quarter round, and the terminal points 15 and 49 of the flange 13 have been shown as being spaced approximately 90° apart, it will be understood that the shape or curvature of the flange 13 may be modified and the points 15 and 49 may be spaced apart an angle greater or less than 90°. More specifically, the curved flange 13 need not have the exact shape of a quarter round, but may have a flatter curvature or a composite curvature with portions having different radii of curvature. In addition, the pivot axis 47 need not be exactly located on a line bisecting the angle defined by the flange terminal points 15 and 49, but may be positioned off the line 48 within reasonable limits.

While we have illustrated and described one specific embodiment of our invention, it will be understood that this is merely by way of illustration, and that various changes and modifications may be made therein within the contemplation of our invention and under the scope of the following claims.

We claim:

1. A sheet metal door and hinge structure comprising a sheet metal panel having a side edge curved in the shape of a quarter-round with a flange parallel to said panel and projecting inwardly from the outer edge of the quarter-round and terminating along a line adjacent the axis of said quarter-round, and hinge means comprising a pivot pin positioned substantially centrally of the inner and outer edges of said quarter-round and adjacent the inner surface thereof with its axis parallel thereto, stationary and movable hinge parts positioned in vertically spaced relation and detachably connected by said pin, one of said hinge parts having a permanent connection with said pin and the other having a sliding connection therewith providing for assembly and disassembly of said hinge parts upon movement of said hinge parts relative to each other in a vertical direction along the axis of said pin, a mounting bracket for said movable hinge part comprising a base member secured to the inner surface of said door flange and having a supporting arm extending outwardly therefrom and connected with said movable hinge part, and a mounting bracket for said stationary hinge part comprising an angle having its apex positioned inwardly of the inner edge of said quarter-round with one arm extending parallel to the door panel and a connection at its outer end to said stationary hinge part and its other arm extending normal to said door panel and spaced a slight distance from the inner edge of said door flange when the door is in a closed position, said door flange having a slot in its said inner edge in which said angle is received upon movement of the door a small distance out of its closed position whereby hinge part disengaging movement of the door is prevented except when the door is in a substantially closed position.

2. A sheet metal door and hinge structure comprising a sheet metal panel having a marginal flange along one vertical edge thereof with an inwardly turned lip parallel to said panel, and hinge means comprising a pivot pin positioned in the space between said lip and panel lying beyond the inner edge of said lip, the pivot axis of said pin being parallel to the said inner lip edge, stationary and movable hinge parts positioned in vertically spaced relation and detachably connected by said pin, one of said hinge parts having a permanent connection with said pin and the other having a sliding connection therewith providing for assembly and disassembly of said hinge parts upon movement of said hinge parts relative to each other in a vertical direction along the axis of said pin, a mounting bracket for said movable hinge part comprising a base member secured to the inner surface of said lip and having a supporting arm extending outwardly therefrom and connected with said movable hinge part, and a mounting bracket for said stationary hinge part comprising a supporting member connected with said stationary hinge part and extending inwardly therefrom with respect to the door for connection to a supporting structure, the inwardly extending portion of said supporting member being clear of

and spaced from the inner edge of said lip when the door is in a closed position, said lip having a slot in its said inner edge in which said supporting member is received upon movement of the door a small distance out of its closed position whereby hinge part disengaging movement of the door is prevented except when the door is in a substantially closed position.

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