Jan. 31, 1967 R. T. CORNELIUS 3,301,430

INTEGRALLY MOLDED PLASTIC COVER AND HINGE

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Fig. 1

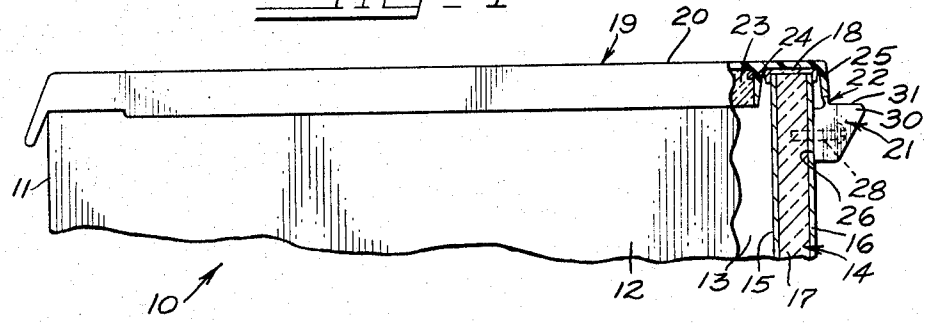

Fig. 2

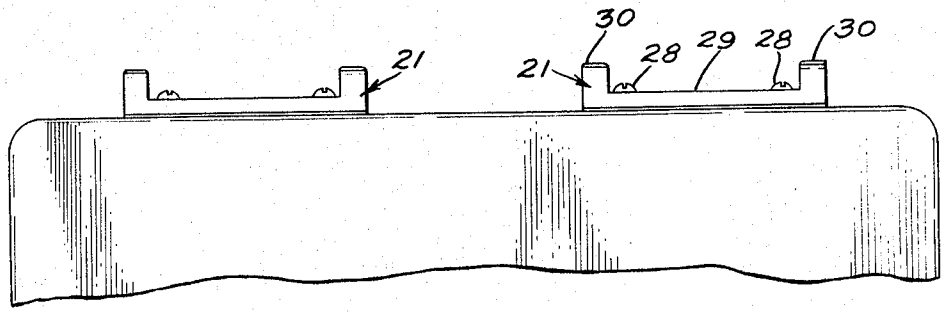

Fig. 3

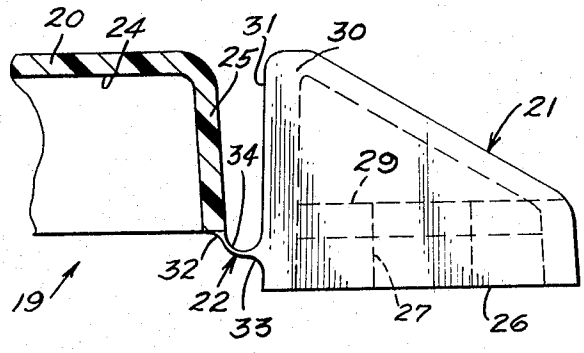

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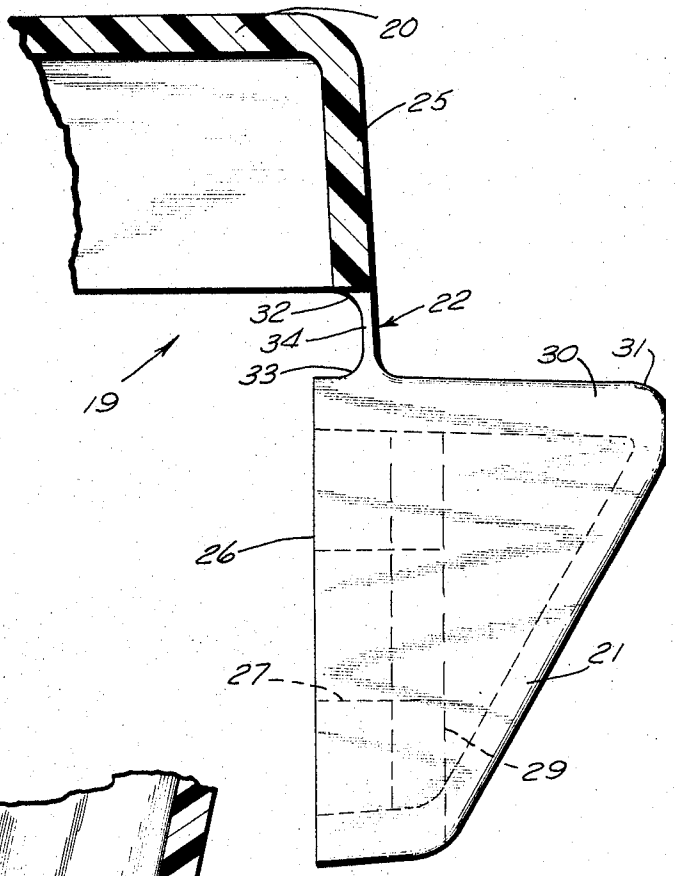
FIG 4



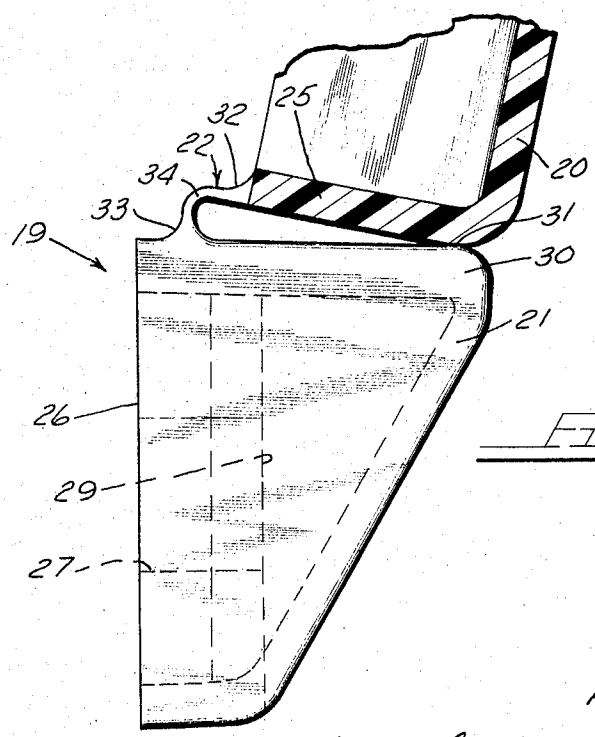


FIG 5

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3,301,430

INTEGRALLY MOLDED PLASTIC COVER AND HINGE

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Filed Apr. 23, 1965, Ser. No. 450,478
11 Claims. (Cl. 220—31)

This invention relates generally to a cabinet construction, and more specifically to a plastic cover having a hinge integral therewith.

Although the principles of the present invention may be included in various devices, a particularly useful application is made in a cabinet or chest that employs or provides an upwardly directed opening, such as a refrigerated cabinet.

The present invention contemplates the utilization of a substantially rigid cover and a substantially rigid hinge block which are integrally joined to each other by a flexible web which serves as a hinge. The mounting block also serves as a stop for limiting the extent of angular cover movement. All of these elements are molded as a single unit from plastic, and preferably the as-molded condition of the hinge structure corresponds to substantially the open position of the hinge.

Accordingly, it is an object of the present invention to provide an inexpensive combined cover and hinge structure.

Another object of the present invention is to provide a cover or door which is molded of plastic in such a manner that the angular travel thereof is both enabled and limited.

A still further object of the present invention is to provide a hinge which includes a flexible hinge so constructed that its internal flexing stresses either tend to hold the cover shut or tend to hold the cover open, and preferably further that the mass of the open or shut cover overcomes such stresses to hold the cover respectively open or shut.

Yet another object of the present invention is to provide a hinge and stop arrangement which includes a flexible hinge so constructed that internal stresses tending to close the cover are overcome by the mass of the cover when the cover has been opened and pivoted to a point beyond center for engagement with stop structure.

Many other advantages, features and additional objects of the present invention will become manifest to those versed in the art upon making reference to the detailed description and the accompanying sheets of drawings in which a preferred structural embodiment incorporating the principles of the present invention is shown by way of illustrative example.

On the drawings:

FIG. 1 is a fragmentary side view, partly in cross-section, of a refrigerated chest or cabinet having a combined cover or door and hinge arrangement provided in accordance with the principles of the present invention;

FIG. 2 is a fragmentary top view thereof;

FIG. 3 is an enlarged detailed view of the hinge structure, partly in cross-section, illustrating the as-molded configuration thereof;

FIG. 4 is an enlarged view of the structure shown in FIG. 3, illustrating the as-closed configuration thereof; and

FIG. 5 is an enlarged view of the hinge structure of FIG. 3, illustrating the as-opened configuration thereof.

As shown on the drawings:

The principles of this invention are particularly useful when embodied in a chest or cabinet such as illustrated in FIG. 1, generally indicated by the numeral **10**. The cabinet **10** includes a front wall **11**, a pair of side walls **12**, **13**, and a rear wall **14**, the latter being illustrated in cross-

section. Each of the walls **11–13** is constructed in the manner illustrated for the wall **14** which includes a liner **15**, an outer jacket **16**, and suitable insulation of a rigid type **17** therebetween. The upper edges of the elements **15–17** are enclosed by a breaker strip **18** which overlies the walls **11–14** to define an upwardly directed opening that is closed by a cover, generally indicated at **19**, and provided in accordance with the principles of the present invention. The cover **19** includes a cover portion **20**, a pair of mounting blocks **21**, **21**, and a web portion **22** for each mounting block.

The cover **19**, comprising the cover portion **20**, mounting block or blocks **21**, and web portion **22**, is a unitary single element molded from plastic wherein such elements **20** and **21** are integral with the web portion **22**. The cover portion **20** is molded with a suitable recess into which suitable insulation **23** is subsequently added, such recess being indicated at **24**.

The cover **19** comprises plastic, polypropylene being a preferred type of plastic. The cover portion **20** and the block portions **21** have such configuration and plastic thickness as to render such portions substantially rigid, while, as best seen in FIGS. 4 and 5, the web portion **22** is of such reduced thickness as to render the plastic material flexible, the flexible portion being in the nature of a web.

The cover portion **20** at its outer edges has a transversely extending flange, normally directed in a downward direction in a surrounding relation to the upper end of the walls **11–14**, and in particular, has a flange **25** at its rear edge, the web portion **22** being integral with the lower edge of such flange **25**. The flange **25** is also substantially rigid.

Each of the mounting block portions **21** of the cover **19** has a mounting surface **26**, disposed against the outside of the rear wall **14**. The mounting block **21** is generally rectangular throughout its length, but hollow, and is provided with a pair of apertures **27** through which mounting screws **28** project. The elongated generally rectangular nature of the mounting block **21** may be seen in FIG. 2, and in dashed lines in FIG. 3, the surface against which the heads of the screws **28** bear is shown at **29**. At opposite ends of the generally rectangular configuration, each of the blocks **21** is enlarged in a hollow manner as at **30**, **30** to provide a normally upwardly directed stop surface **31** against which the flange **25** may abut at a point of engagement to limit the angular travel or opening of the cover portion **20**.

The web portion **22** preferably extends along the entire length of the mounting block **21**, and as stated above, is integral therewith. A corresponding length of the web portion **22** is integral with the lower edge of the flange **25**. The web thickness is preferably rather heavy along the lines of juncture with the flange **25** and the block **21**, and tapers as shown at **32** and **33** to a relatively thin web portion **34** which typically may have a thickness on the order of .010 inch, the flange **25** being several times thicker. A typical length for the web portion **22** and the block **21** is between 4 and 5 inches. The use of two spaced blocks **21** as shown in FIG. 2 minimizes any tendency for tearing stresses to be applied to the thinnest portion **34**. The dimensions given are representative and provide the necessary flexibility and durability.

In the manufacture of the combined cover and hinge structure **19**, the portions **20**, **21**, and **22** are molded in the relative relationship illustrated in FIG. 3. The surface **26** is vertical, it can be seen that the as-molded configuration comprises or defines the position of the cover portion **20** when it extends substantially parallel to the surface **26**, and thus comprises an open position.

The combined cover and hinge structure **19** is removed from the mold while hot and while in the relative rela-

tionship illustrated in FIG. 3. Immediately, the plastic hinge is allowed to cool in the as-molded position.

Alternatively, the hinge **22** is flexed one to four times to orient the materials. Such flexure is preferably between the positions illustrated in FIG. 3 and FIG. 4. Thereafter, the combined cover and hinge structure **19**, before it has appreciably cooled, is placed on a cooling fixture (not shown) which holds the combined cover and hinge structure **19** in what is to be later the normally closed position. Generally, this corresponds to that shown in FIG. 4. The cover portion **20** is of rather light weight, but it has sufficient mass to hold the cover in a tightly closed position as shown in FIG. 1. The cooling fixture (not shown) may be constructed so that the angle between the mounting surface **26** and the bottom of the cover portion **20** is less than 90°.

Upon assembly into the relationship shown in FIGS. 1 and 4, stresses are applied to the web portion **34** which act in conjunction with the weight of the cover **20** to hold the same tightly shut, or alternatively, to slightly offset the weight. As the cover portion **20** is tilted between the closed position shown in FIG. 4 and the fully open position shown in FIG. 5, flexing stresses build up or are relieved, particularly in the thinnest portion **34** of the web portion **22**, and are spread to some extent by the tapered portions **32** and **33**. Once the center of mass of the cover portion **20** passes over the effective center of the web hinge **34**, there begins to develop an effective moment arm on which such mass acts, thereby producing a gradually increasing torque which tends to open the cover further. The cover mass, the location of the stop surface **31**, and the internal stresses in the web portion **34** are so related that any spring-like tendency of the web **34** to close the cover is completely overcome by the mass of the cover creating a greater torque in the opposite direction prior to the limiting of opening movement of the cover.

Thus, the cover portion **20** may be moved in an opening direction until the flange **25** abuts the surfaces **31** of the stop portions **30** to preclude further angular movement of the cover, such abutment occurring after the cover portion **20** has been moved angularly over center by a distance sufficient to overcome the cover-closing tendency produced by the internal stresses in the web portion **34**.

The openings **27** in the block portions **21** are slightly elongated in a vertical direction, as installed in FIG. 1, so that the cover portion **20** may rest on the entire length of the breaker strip **18**, even of the screws **28** are not located accurately vertically.

By the disclosed and claimed structure, a highly advantageous hinge arrangement is provided which is simple to manufacture and install, and by which savings in cost are effected.

Although various minor modifications might be suggested by those versed in the art, it should be understood that I wish to embody within the scope of the patent warranted hereon all such embodiments as reasonably and properly come within the scope of my contribution to the art.

I claim as my invention:

1. A combined cover and hinge for selectively closing and exposing an opening in a cabinet, comprising:

a unitary device of molded plastic, including

(a) a substantially rigid cover portion;

(b) an elongated substantially rigid mounting block portion, and

(c) a flexible web portion integrally joined to said cover portion and to said mounting block portion along opposite edges of said web portion; said web portion having an as-molded configuration conforming to an open position of said cover portion with respect to the cabinet opening.

2. A combined cover and hinge for selectively closing and exposing an opening in a cabinet, comprising:

a unitary device of molded plastic, including

(a) a substantially rigid cover portion having a transversely extending rigid flange;

(b) an elongated substantially rigid mounting block portion; and

(c) a flexible web portion integrally joined to said flange and to said mounting block portion along opposite edges of said web portion, said web portion having an as-molded configuration conforming to an open position of said cover portion with respect to the cabinet opening;

(d) said cover portion being pivotable by flexure of said web portion to a limiting position defined by positive engagement between said flange and said mounting block portion at a point of contact remote from said web portion.

3. A cabinet, comprising:

(a) a pair of side walls, a front wall and a rear wall jointly defining an upwardly directed cabinet opening;

(b) a polypropylene mounting block secured to the outside of said rear wall and disposed slightly below said opening;

(c) a polypropylene cover normally overlying the upper edges of said walls and closing said opening, said cover having a substantially rigid downwardly directed flange integral with the rear edge thereof and directed toward said mounting block;

(d) a polypropylene web having a thickness on the order of .010", and integrally joined to said flange and to said mounting block along opposite edges of said web, said web having internal stresses which increase in response to movement of said cover in a direction away from its normally closed position; and

(e) said flange being engageable with said mounting block remotely from said web in such position as to limit the angular movement of said cover in said direction when the cover-closing tendency of said stresses has been overcome by the mass of said cover tending to move said cover in said direction.

4. A combined cover and hinge for selectively closing and exposing an opening in a cabinet, comprising:

a unitary device of molded plastic, including

(a) a substantially rigid cover for normally closing such opening, and having a transversely extending rigid flange,

(b) an elongated substantially rigid mounting block constructed to be secured to the cabinet adjacent to such opening,

(c) a web having such reduced thickness as to render it flexible, and integrally joined to said flange and to said mounting block along opposite edges of said web, said web having internal stresses which increase in response to angular movement of the cover in a direction away from such opening, and

(d) said flange being engageable with said mounting block remotely from said web to limit the angular movement of said cover in said direction when said stresses have been overcome by the mass of said cover tending to move said cover in said direction.

5. A combined cover and hinge for selectively closing and exposing an opening in a cabinet, comprising:

a unitary device of molded plastic, including

(a) a substantially rigid cover portion for overlying the cabinet opening,

(b) an elongated substantially rigid mounting block portion, and

(c) a flexible web portion integrally joined to said cover portion and to said mounting block portion along opposite edges of said web portion, said web having such resiliency and free shape as to have internal stresses which bias said cover

portion in a closing direction when said cover portion is in a fully closed position.

6. A combined cover and hinge for selectively closing and exposing an opening in a cabinet, comprising:

a unitary device of molded plastic, including

(a) a substantially rigid cover portion,

(b) an elongated substantially rigid mounting block portion, and

(c) a flexible web portion integrally joined to said cover portion and to said mounting block portion along opposite edges of said web portion, said web having internal stresses biasing said cover portion in a closing direction about a horizontal axis, said stresses being of such maximum magnitude as to enable the mass of said cover portion, when moved over center, to apply a torque about said axis to hold said cover portion open.

7. A cabinet, comprising:

(a) a pair of side walls, a front wall and a rear wall jointly defining an upwardly directed cabinet opening;

(b) a polypropylene mounting block secured to the outside of said rear wall and disposed slightly below said opening;

(c) a poypropylene cover normally overlying the upper edges of said walls and closing said opening, said cover having a substantially rigid downwardly directed flange integral with the rear edge thereof and directed toward said mounting block;

(d) a polypropylene web having a thickness on the order of .010", and integrally joined to said flange and to said mounting block along opposite edges of said web, said web having internal stresses which decrease in response to movement of said cover in a direction away from its normally closed position; and

(e) said flange being engageable with said mounting block remotely from said web to limit the angular movement of said cover in said direction when said stresses are near a minimum.

8. A combined cover and hinge for selectively closing and exposing an opening in a cabinet, comprising:

a unitary device of molded plastic, including

(a) a substantially rigid cover for normally closing such opening, and having a transversely extending rigid flange,

(b) an elongated substantially rigid mounting block constructed to be secured to the cabinet adjacent to such opening,

(c) a web having such reduced thickness as to render it flexible, and integrally joined to said flange and to said mounting block along opposite edges of said web, said web having internal stresses which decrease in response to angular movement of the cover in a direction away from such opening, and

(d) said flange being engageable with said mounting block remotely from said web to limit the angular movement of said cover in said direction when said stresses are near a minimum.

9. A combined cover and hinge for selectively closing and exposing an opening in a cabinet, comprising:

a unitary device of molded plastic, including

(a) a substantially rigid cover portion,

(b) an elongated substantially rigid mounting block portion, and

(c) a flexible web portion integrally joined to said cover portion and to said mounting block portion along opposite edges of said web portion, said web having such resiliency and free shape as to bias said cover portion in an opening direction when said cover portion is fully closed.

10. A combined cover and hinge for selectively closing and exposing an opening in a cabinet, comprising:

a unitary device of molded plastic, including

(a) a substantially rigid cover portion, block portion, and

(b) an elongated substantially rigid mounting

(c) a flexible web portion integrally joined to said cover portion aand to said mounting block portion along opposite edges of said web portion, said web having internal flexing stresses, when said cover portion is fully open, which tend to bias said cover portion in a closing direction about a horizontal axis, said stresses being of such maximum magnitude as to enable the mass of said cover portion to apply a torque about said axis to hold said cover portion open.

11. A combined cover and hinge for a cabinet, comprising:

a unitary device of molded plastic, including

(a) a substantially rigid cover portion for overlying the cabinet and having a horizontally extending rigid flange lying in a substantially vertical plane when the cover is in a closed position,

(b) an elongated substantially rigid mounting block portion of a configuration enabling it to be secured to the outside of the cabinet, said block having a substantially horizontal stop surface, and

(c) a flexible web portion integrally joined to said flange and to said mounting block portion along opposite edges of said web portion,

(d) said cover portion being pivotable slightly beyond an over-center position, by flexure of said web portion, to a limiting stable position defined by positive engagement between said normally substantially vertical flange and said substantially horizontal stop surface on said mounting block portion.

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