July 25, 1967 H. L. ZUMWALT 3,332,568

LINER ASSEMBLY CLIP

Filed April 1, 1965

FIG. 1

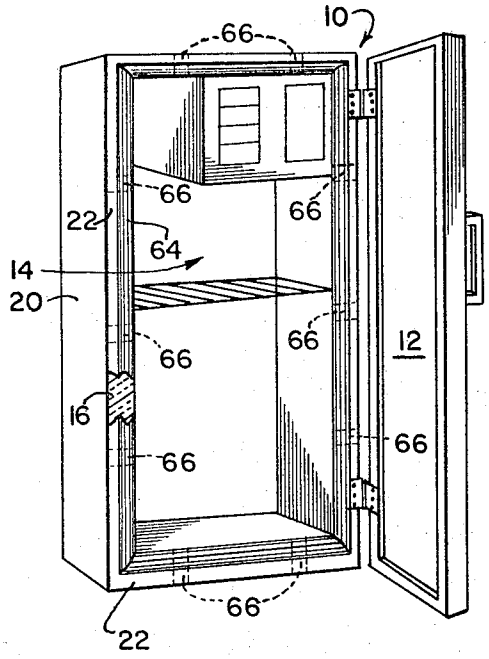


FIG 3

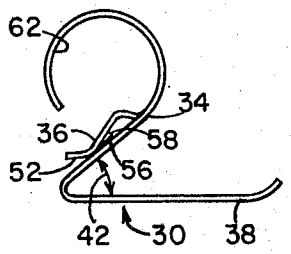


FIG. 4

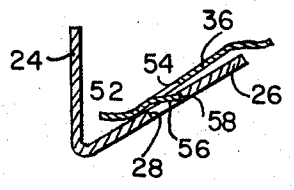
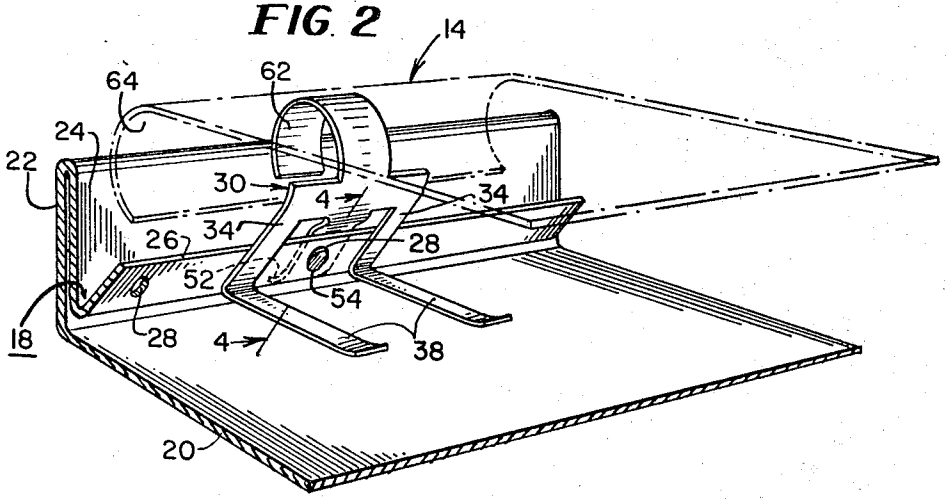


FIG. 2



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LINER ASSEMBLY CLIP

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ABSTRACT OF THE DISCLOSURE

A clip for use with an easily fabricated V shape channel of a refrigerator cabinet for securing a liner therein. The clip is semi-permanently positioned on one of the channel flanges, and derives support from an adjacent side wall of the refrigerator cabinet.

This invention relates in general to clip fastened installations, and pertains more particularly to an improved arrangement for securing a lining material to an adjacent refrigerator cabinet shell.

It is conventional in the construction of refrigerators and the like to have an outer metal cabinet shell and an inner molded plastic food liner in spaced relation therewith. The area between the outer metal shell and the molded food liner contains an insulating material to aid in the preservation of food. To this end, a channel is formed along the inner edges of the refrigerator cabinet shell and the molded plastic food liner is secured thereto by means of resilient food liner clips.

In conventional refrigerator design the channel formed along the inner edge of the refrigerator cabinet shell is of a very complex configuration, necessitating numerous complicated bending operations performed by press brake operations or costly roll forming equipment. The high cost of a large roll former or other similar type sheet metal forming machine has heretofore precluded many small fabricators and sheet metal shops from manufacturing refrigerators and other equipment requiring similar type channels.

The invention generally comprises a relatively simple V shaped channel formed along the inner edge of the refrigerator cabinet shell, and a novel resilient food liner clip. The simplicty of the V shaped channel allows it to be formed with conventional sheet metal rolling equipment costing only one-fourth the amount of a typical heavy-duty roller, thus substantially reducing initial equipment costs. In addition, the design of the V channel effects a direct and substantial savings in material costs due to a reduction in the quantity of sheet metal stock required for fabrication.

In accordance with the invention the resilient food liner clip is semi-permanently positioned on a portion of the V shaped channel, namely the flange, by a positive engagement means. It also co-operates with the inner edge of the cabinet shell in such a manner that much of the force which would ordinarily be resisted by the flange is transferred to the side wall of said cabinet shell.

The primary object of this invention is to provide an improved and simplified refrigerator cabinet shell and liner construction.

Another object of this invention is to provide a food liner clip suitable for use with an easily formable channel in securing a food liner to a refrigerator cabinet shell.

A further object of this invention is to provide a refrigerator cabinet shell of simplified channel construction and a mating food liner securable thereto by means of simple, reliable food liner clips fastened to said channel.

A feature of this invention resides in a refrigerator cabinet shell which includes a V shaped channel construction and resilient food liner clip wherein the stress

normally resisted solely by the channel, is partially distributed to a side wall of the refrigerator cabinet shell.

The primary advantage of this invention rests in the ability to use standard low cost sheet metal rolling equipment to fabricate the V channel structure against which a food liner is retained.

Other objects of this invention will become apparent upon an examination of the following description taken in conjunction with the accompanying drawings wherein:

FIG. 1 is a perspective view of a conventional household refrigerator, illustrating a preferred environment for the invention, showing the door open, a food liner in place within the metal cabinet shell, and insulation therebetween.

FIG. 2 is an enlarged, perspective, cutaway view of the V shaped channel of a refrigerator metal cabinet shell constructed in accordance with the invention and illustrating its co-operation with the food liner and resilient food liner clip.

FIG. 3 is an elevation view of a resilient food liner clip illustrating its general configuration.

FIG. 4 is an enlarged sectional view taken along the lines 4—4 of FIG. 2 for clearly showing how a resilient food liner clip is semi-permanently fastened to the V shaped channel.

FIG. 1 of the drawings, illustrating the preferred environment for the invention, shows a refrigerator of a type currently available for household use. It comprises a metal cabinet shell 10 which is cooled by conventional refrigerating means, not illustrated. Refrigerator cabinet shell 10 includes an access opening adapted to be closed by a door 12, which together with the refrigerator cabinet shell, defines an enclosed volume for fresh food storage. A deformable molded food liner 14 is placed within the refrigerator cabinet shell by slightly deforming a lip thereon and the resultant small space therebetween filled with insulating material 16.

As best seen in FIG. 2, the border of the access opening consists of a side 20 which is also a side wall of the metal cabinet shell, and a perpendicular front edge 22 incorporating an inturned fold 24. A V shaped channel 18 is formed of inturned fold 24 and a flange 26 at an angle thereto. Flange 26 contains a plurality of locking apertures 28 along its length which cooperate with one or more resilient food liner clips in a manner to be explained.

Most prior art refrigerator constructions, which used resilient clips for retention of a food liner, incorporated a U shaped or other complex channel design. These prior art constructions involved at least four separate bends for fabrication. It should be noted that the entire structure which borders the access opening of the illustrated embodiment requires only three bends to fabricate, thus reducing the number of bending operations.

Prior art channel design also necessitated a large width of sheet metal to conform to the complex bends. This large width of material prevented the use of conventional low cost sheet metal rolling equipment. The improved channel design requires only slightly more than one-half the width of material formerly required, thus the bending operations may easily be accommodated by conventional rolling equipment. In addition, there is a substantial savings in material costs as a result of the reduction of sheet metal required.

A resilient food liner clip (FIGS. 2, 3 and 4) generally referred to by reference numeral 30 is fabricated of spring metal or the like and used to secure food liner 14 snugly against inturned edge 24 of V shaped channel 18. Resilient food liner clip 30 includes a body which in the illustrated embodiment consists of a pair of flat shanks 34 and a finger 36. Each shank terminates in a body support 38

having an inwardly turned end. Body supports **38** are disposed to shanks **34** at an angle **42**, such that the magnitude of angle **42** is slightly larger than the complement of the angle V shaped channel **18**.

Finger **36** is struck from clip **30** in an offset manner but is substantially parallel to a plane defined by the flat surface of shanks **34**. The finger includes an outwardly turned end **52**, and a partially-punched aperture **54**, the punched portion **56** of which protrudes beyond the surface of finger **36**. The perimeter of the protruding punched portion **56** forms an edge **58** which is substantially perpendicular to the flat surface of finger **36**.

An integrally formed food liner support **62**, located opposite finger **36**, is generally circular in shape with a thin rectangular cross-section. The food liner support is preferably dimensioned such that the shortest distance between it and an adjacent portion of inturned fold **24** is less than the thickness of an arcuate portion **64** of food liner **14**. It is readily apparent from the material of which the food liner clip is formed, that the entire clip structure has resilient properties.

At an appropriate time during the assembly of a refrigerator, a plurality of resilient food liner clips **30** are secured along flange **26** at, for example, the locations indicated by reference numerals **66**, best seen in FIG. 1. The food liner clips are secured on the flange by forcing them over the flange at points opposite locking apertures **28** such that the respective fingers **36** straddle one side of the flange and shanks **34** the other side. When each food liner clip is firmly set on flange **26**, its perpendicular edge **58** (clearly shown in FIG. 4) of punch portion **56** engages a corresponding locking aperture **28**, and the abutting surfaces hold the clip securely. With the clip engaged in this manner, it is impossible to disengage without initially lifting the finger away from the flange to separate perpendicular edge **58** from the edge of locking aperture **28**.

As the resilient food liner clip is forced over the flange, body supports **38** gradually slide along the inner surface of refrigerator side wall **20**. Coincident with the body supports sliding along the side wall, a flexing action occurs in the clip in the area of angle **42**, as the angle between body supports **38** and shanks **34** conforms to the angle between flange **26** and side wall **20**. This flexure of the clip and its resilience in the area of angle **42** produces a force moment in one direction about the free edge of flange **26**.

In the illustrated embodiment, a molded plastic food liner **14** is snugly held in place by the resilient food liner clips **30**. After the resilient food liner clips are secured to the flange, the arcuate edge **64** of food liner **14** is urged between inturned edge **24** and food liner supports **62** by biasing them away from the inturned edge. Since the gap between liner supports **62** and inturned edge **24** is less than the thickness of arcuate edge **64**, the food liner is tightly "sandwiched" in place and securely held by friction between the elements. A similar operation for each of the remaining edges of the food liner results in its placement within the metal cabinet shell.

Placement of the arcuate portion of food liner **14** between inturned edge **24** and liner support **62** produces a force moment opposite the force moment produced by the food liner clip being firmly set on flange **26**. It is readily seen that these opposite moments about flange **26** tend to cancel each other, significantly reducing the stress on the flange by transferring a portion thereof to the relatively stable side wall **20**.

Should it become necessary to remove the food liner during the lifetime of the refrigerator, this may be neatly and easily accomplished by forcing it in a direction opposite the inturned edge **24** and simultaneously pulling it away from the channel. This ease of disassembly facilitates the replacement of plastic food liners should the need arise.

What has been described is an inexpensive, reliable and novel combination of elements for securing a food liner within a refrigerator cabinet shell. It is recognized that many modifications and alterations of the invention, far different both in appearance and details of construction from the embodiments herein illustrated but nevertheless utilizing the basic teachings of the invention, will be readily apparent or devised upon study by persons skilled in the art. Accordingly, the scope of the protection to be afforded should not be limited by the particular embodiment illustrated and described, but should be determined from the descriptions of the essence of the invention which appear in the appened claims.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. In combination: a cabinet channel; a liner; and a liner retaining clip; said cabinet channel including a first side, a second side substantially perpendicular to said first side, and a flange disposed at a first angle to said first side; said liner retaining clip comprising a body, at least one flexible body support emanating from a first end of said body and disposed at a second angle thereto, whereby in the unflexed condition of said retaining clip said second angle is larger than said first angle, a finger formed from the first end of said body, said finger co-operating with said body for securing said clip to said flange, said body support contemporaneously flexing upon said clip being secured; and a compressible liner support affixed to a second end of said body opposite said first end, said compressible liner support co-operating with said second side for securing a liner therebetween by frictional engagement.

2. A liner assembly for household refrigerators comprising: a cabinet channel including a side portion, a front portion substantially perpendicular to said side portion, and a flange defining an aperture, said flange forming a first acute angle with said front portion; a retaining clip including a body having a bifurcated-resilient body support disposed at a second acute angle thereto and in supportable association with said side portion, whereby said second acute angle is slightly larger than the complement of said first acute angle before said body support is associated with said side portion, a finger including a half-punched button struck from said body and co-operating therewith for securing said retaining clip to said flange at said aperture, and a compressible liner support co-operating with said front portion for maintaining a plastic liner therebetween by frictional engagement therewith.

3. In combination: a refrigerator cabinet shell and V shaped channel of unitary sheet metal construction, a first side wall and a second side wall formed at substantially a right angle thereto, said second side wall including said V shaped channel formed of an inturned folded edge terminating in a flange disposed intermediate said angle between said side walls, said flange defining multiple longitudinally displaced locking apertures, a liner retaining clip of unitary construction; said retaining clip including a center locking portion co-operating with one of said locking apertures for positively securing said retaining clip to said flange, first support means emanating from one end of said center locking portion and co-operating with said first wall to firmly brace said retaining clip between said flange and said wall, second support means opposite said first support means, said second support means including a thin, substantially circular resilient member in spaced relation with said second side wall, and a plastic liner substantially parallel to said first side wall including an inwardly arcuate edge of sufficient thickness for frictional retention between said second support means and said second side wall.

4. In combination: a cabinet having a channel capable of being formed by conventional roll forming equipment comprising a first side, a second side substantially perpendicular to said first side, and a flange disposed intermediate the angle between said sides; and a normally con-

cealed liner retaining clip for securing a liner member to said cabinet; said retaining clip comprising a central body portion forming locking means cooperating with said flange for securing said retaining clip thereto, a body support secured to an end of said central body portion and cooperating with said first side to stabilize said retaining clip, and resilient liner support means formed at a second end of said central body portion and biased toward said second side, said resilient liner support urging said liner member against said said and frictionally securing it therebetween.

5. In combination: a refrigerator cabinet shell having a first side wall; a second side wall substantially perpendicular to said first side wall; a V shaped channel formed of said second side wall and a flange disposed intermediate the angle between said side walls; a liner to be secured to a side wall of said cabinet shell; a normally concealed liner retaining clip including a center body portion having locking means straddling said flange and cooperating therewith for positively securing said retaining clip thereto, support means extending obliquely from a first end of said center portion to said first side wall

for relieving strain at the connection between said flange and said locking means, and a resilient liner support arcuately extending from a second end of said center portion toward said second side wall for compressing an edge of said liner therebetween, thereby frictionally securing it to said refrigeration cabinet shell.

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