

Oct. 24, 1967

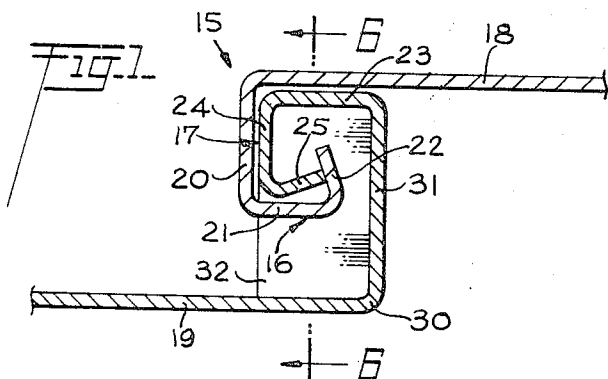
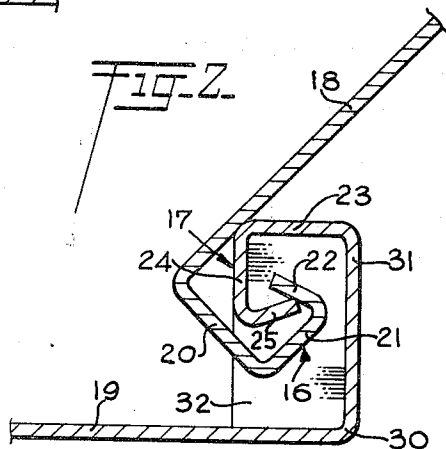
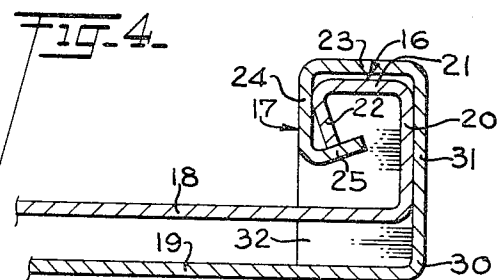
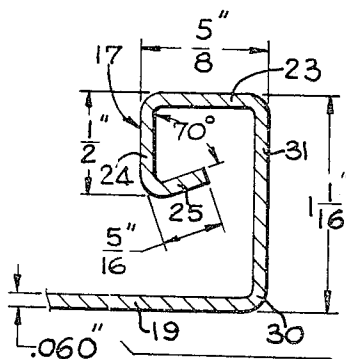
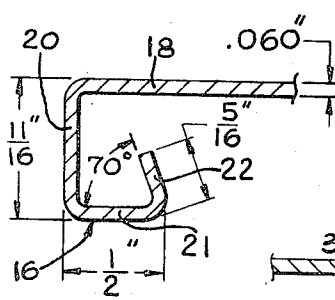
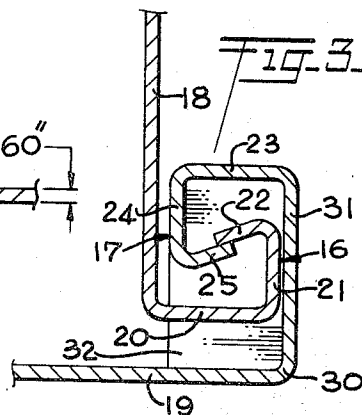
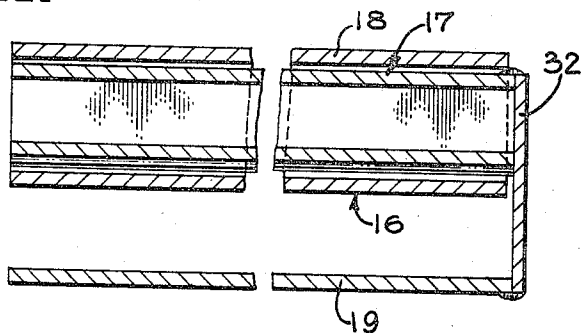
R. I. WILHELMSSEN ETAL

3,348,259

HINGE

Filed July 9, 1965

2 Sheets-Sheet 1



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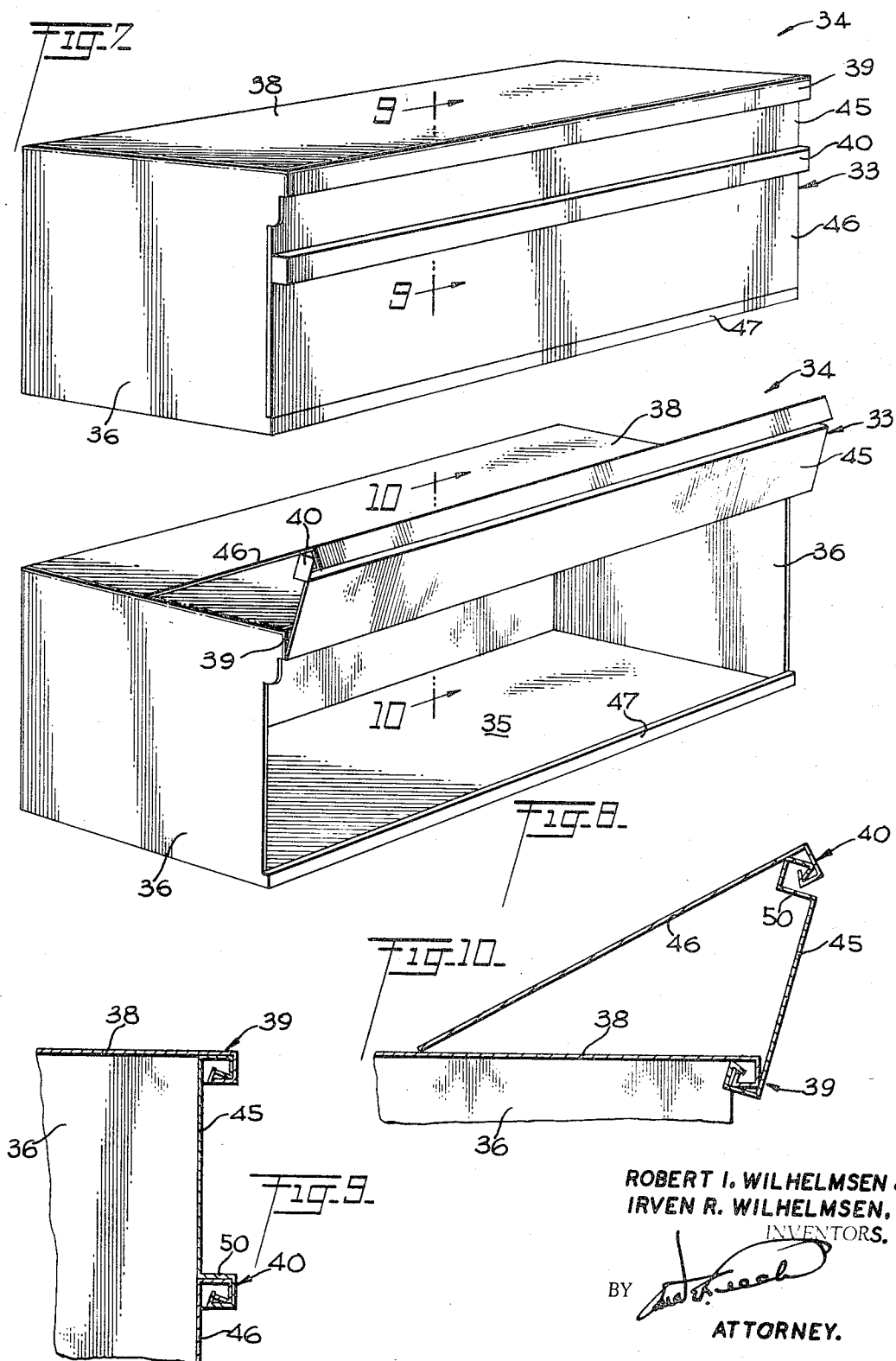
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5 Claims. (Cl. 16—128)

ABSTRACT OF THE DISCLOSURE

A structure comprising two interlocking channel elements formed respectively by bending operations from the material of contiguous edge portions of two sheet metal plates, which structure prevents broadside separation of said plates while allowing free relative articulation through an angle of 180°, and producing a tight joint between said plates at each extremity of said articulation.

BACKGROUND OF THE INVENTION

1. Field of the invention

The development of simple hinges joining contiguous edge portions of two sheet metal plates, wherein said edge portions are caused to interlock by the formation of a series of bends incorporated in said edge portions by the application thereto of a sheet metal brake.

2. Description of the prior art

The nearest prior art of which the applicants are aware is disclosed in U.S. Patents Nos. 2,644,556 and 3,236,405.

The first of these patents shows a lighting fixture hinge construction for supporting both sides of a glass panel beneath a ceiling lighting element and operable to optionally cause both sides of said panel to be supported from the lighting element frame with the panel in horizontal position beneath the lighting element, or, upon successively lifting said panel slightly, shifting the same to one side and then lowering that side of said panel, to release that side of the panel from support without support being lost for the other side thereof, whereby the panel will hang vertically from the edge still supported, allowing access from beneath to the lighting element. A reversal of these steps return the glass panel to its original position in which it is disposed horizontally and supported at both sides beneath the lighting element.

Patent No. 3,236,405 shows a hinge uniting the back edge of a flat sheet metal cover for a sheet metal housing for holding a garbage can. The hinge comprises inter-fitting hooks 37 and 40 which are bent respectively from the back edge of the cover and the rear wall 39 of the housing. These hooks interlock to permanently assemble the cover on the housing, allow an articulation therebetween of about 95° and produce a tight joint in the hinge at each extremity of the articulation.

SUMMARY OF THE INVENTION

The present invention undertakes to improve the hinge disclosed in U.S. Patent No. 3,236,405 by providing a hinge of the same general class which will possess the facility of allowing an articulation of 180° between the plates united thereby and produce a novel and superior tight joint along the line of the hinge at each extremity of the articulation.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a cross-sectional view through a preferred embodiment of the hinge of the invention, made approximately to true scale, and showing a hinge substantially in its extreme closed position.

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FIG. 2 is a view similar to FIG. 1 and illustrates a partial rotation of about 45° of one of the members of said hinge from the fully extended position shown in FIG. 1 towards a fully open position shown in FIG. 4.

FIG. 3 is a view similar to FIG. 2 and illustrates said members relatively rotated to the mid position, half way or 90° between fully extended and fully closed positions.

FIG. 4 is a view similar to FIGS. 1, 2 and 3 and illustrates the relative rotation between the members of the hinge continued to the fully open position thereof.

FIG. 5 is a shop drawing to full scale of the interlocking members of the hinge, the operation of which is illustrated in FIGS. 1-4 inclusive.

FIG. 6 is a longitudinal sectional view taken on the line 6—6 of FIG. 1 and illustrates the welding or adding of one or more end cap plates on one of said hinge members to prevent disassembly of the hinge and exclude rain from having access to the interior of said hinge.

FIG. 7 is a perspective view of a metal cabinet, such as may be provided for holding tools on a pick-up truck, said cabinet being equipped with a door which is hingedly related to the metal body of said cabinet by two hinges of the present invention, the door in this view being shown in closed position.

FIG. 8 is a perspective view of the cabinet shown in FIG. 7 showing said hinges articulated by the opening of said door.

FIG. 9 is an enlarged diagrammatic fragmentary sectional view taken on the line 9—9 of FIG. 7.

FIG. 10 is an enlarged diagrammatic fragmentary sectional view taken on the line 10—10 of FIG. 8.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring specifically to the drawings and particularly to FIGS. 1-6 inclusive, which comprise a series of cross-sectional views to the same true scale of a preferred embodiment 15 of the hinge of the invention, said hinge is seen to comprise first and second channel members 16 and 17 which are formed integrally along contiguous edges of first and second flat sheet metal structural elements 18 and 19 respectively by a series of brake ending operations.

The first channel member 16 is thus formed from the material along one edge of the first structural element 18 so as to be co-extensive therewith, said first channel member including a first wall 20 which is bent at a right angle from structural element 18, a second wall 21 which is bent at a right angle from first wall 20 and a third wall 22 which is bent at an angle of 70° from said second wall. As shown in the scale drawings of FIG. 5, the preferred proportionate dimensions of these three walls in first channel member 16 is represented by the first wall 20 being $1\frac{1}{16}$ " in overall width the second wall 21 being $\frac{1}{2}$ " in overall width and the third wall 22 being $\frac{5}{16}$ " in overall width. For these proportionate widths of the three walls of first channel member 16, the material is preferably .06" in thickness.

In a like manner, second channel member 17 is formed by bending from the material of said second structural element 19, lying along one edge thereof and co-extensive with said edge, to provide a first wall 23 which is at right angles with said second structural element, a second wall 24 which is at right angles with said first wall 23 and a third wall 25 which is joined with said second wall 24 by a bend of 70°. The overall widths of the first, second and third walls of said second channel member, as indicated in FIG. 5, are preferably $\frac{3}{8}$ ", $\frac{1}{2}$ " and $\frac{5}{16}$ ", respectively. The thickness of the sheet metal of the second channel member and second structural element are the same as

that of said first channel member and first structural element. Under some circumstances one of the structural elements 18 and 19 may have a right angle bend formed therein parallel with the hinge 15 at any desired distance from the bend between said element and the channel member formed thereon. In the form of the hinge 15 shown in FIG. 1-6 inclusive a bend 30 is thus shown in second structural element 19 which forms a wall 31 having an overall width of $\frac{1}{8}$ " which has the effect of making the balance of second structural element 19 parallel with first structural element 18 when the latter is in either of its extremely open or closed positions relative to the second element 19 as shown in FIGS. 1 and 4 respectively.

In assembling the hinge 15, after the first and second channel members 16 and 17 have been formed as above described on edge portions of the first and second structural elements 18 and 19, one of said channel members is telescopically slid lengthwise into interlocking relation with the other of said channel members as these are shown in FIGS. 1, 2, 3, 4 and 6. An end cap plate 32 may be welded on one end of one of said channel members so as to prevent disassembly of said channel members excepting by the enclosed channel member being slid, in the opposite direction from said plate, from the other channel member having said plate. On the other hand, cap plates may be welded to both ends of one of said channel members after the two channel members have been telescopically assembled as above noted, which will permanently lock said channel members in assembled relation. This permanent assembly of the hinge 15, when capped on both ends, results from the fact that, when assembled, the third walls 22 and 25 of the first and second channel members 16 and 17 are at all times in opposition with each other thereby positively preventing a broadside separation of the two channel members forming the hinge 15.

FIGS. 1, 2, 3 and 4 illustrate how these hinge members articulate freely about the longitudinal dimension of the hinge between the open position shown in FIG. 1 and the closed position shown in FIG. 4 and these views also show how a relatively tight seal is formed between said third walls in both of these two extreme positions.

Referring now to FIGS. 7-10 inclusive, a practical application of a hinge of the invention is here shown to a double hinged mounting of a door 33 upon a sheet metal tool cabinet 34 such as is commonly used for storing tools on pickup trucks and the like. The tool cabinet 34 includes a sheet metal bottom plate 35, end plates 36, a back plate 37 and a top plate 38 all of which are united together at their contiguous edges as by welding. The open front of the cabinet 34 is covered by the door 33 which is hingedly suspended from the front edge of the top plate 38 by a hinge 39. The door 33 is also provided with a hinge 40 which divides the door horizontally into upper and lower panels 45 and 46.

By articulation of the hinges 39 and 40 the upper and lower panels 45 and 46 of door 33 may be articulated relative to each other and relative to the top plate 38 of the cabinet so as to readily swing these panels of the door from downward vertical alignment, as shown in FIGS. 7 and 9, to an articulated upward and rearward position as shown in FIGS. 8 and 10. In like manner these panels may be quickly swung downwardly to vertical position in which suitable locking means (not shown) is usually provided to lock the cabinet 34 against opening. Such a lock is usually applied to the lower panel 46 and engages a lip 47 provided along the front edge of the bottom plate 35 of the cabinet. When the door 33 is thus locked, it may not be pried open without the use of very considerable force because the hinge 40 is solidly locked against permitting the panels 45 and 46 to rotate relative to each other so as to pull the hinge 40 forwardly from the position in which it is shown in FIGS. 7 and 9. In a similar manner the hinge 39 is solidly locked in this position against permitting the upper panel 45 to be forced rearwardly into the cabinet 34 so

that the door 33, when locked, forms a secure cover for the front of the cabinet preventing unauthorized access thereto.

Furthermore, it is to be noted that, when the door 33 is closed, substantially tight seals are formed by the hinges 39 and 40 by the snug engagement of the third walls of the channel members of said hinges as illustrated to a larger scale in FIGS. 1 and 4.

Attention is now directed to the differences in structure between the hinges 39 and 40 and the hinge 15 shown in FIGS. 1-6 inclusive. The hinges 39 and 40 operate on substantially the same principle of the invention as that above described for hinge 15 and represent the application of said principle to the particular design of cabinet 34. For instance, hinge 39 is like hinge 15 excepting for the straightening of the bend 30 in second structural element 19 which comprises the upper panel 45 of door 33.

Hinge 40 is like hinge 39 excepting that the first structural element of this hinge has a reverse right angle bend 50 which places said element in vertical alignment with the second structural element of the hinge when the door 33 is closed.

The weather tight character of hinges 39 and 40 in the cabinet 34 is believed readily apparent from an examination of FIGS. 7 and 9 show the door 33 closed. Each of the hinges 39 and 40 in these views not only provide sealed joints between the upper and lower panels 45 and 46 and between the upper panel 45 and the top plate 38 but that seal is continuous from end-to-end of these hinges. This is of course a very considerable advantage in protecting tools contained in the cabinet 34 from moisture.

While detailed drawings are provided herein of only one preferred embodiment of the invention, and two variations shown in the design of cabinet 34, it is to be understood that these disclosures are for exemplification only and that various modifications and changes may be made in the specific devices disclosed without departing from the spirit of the invention or the scope of the appended claims.

The claims are:

1. In combination: a first flat sheet metal structural element; a second flat sheet metal structural element; a first channel member formed integral with an edge of said first structural element, said member having three consecutively angularly united walls, the first of which is united with said edge of said first element at a right angle therewith, the second wall being united with said first wall at a right angle therewith, and the third wall being united with said second wall at less than a right angle therewith the free end of the third wall being spaced from the first structural element a distance less than the width of the second wall; and a second channel member formed integral with an edge of said second structural element and substantially like said first channel member, one of said channel members being lengthwise slid into the other channel member so as to be articulate relative thereto while being locked against broadside separation from said other channel member by the constant opposition to each other of the third walls respectively of said channel members.

2. A combination as recited in claim 1 wherein said angle between the third wall and the second wall of each of said channel members is approximately 70°.

3. A combination as recited in claim 1 wherein the width of said third wall of each of said members is approximately half that of said first wall thereof and the width of said second wall thereof is intermediate those of said first and third walls.

4. In combination: first and second flat sheet metal structural elements; first and second substantially like channel members, each of which has inner and outer sidewalls, said outer side wall being substantially wider than said inner side wall and integrally joins an edge of one of said elements approximately at a right angle thereto so that said channel member faces said element, one of said channel members being slid lengthwise into the other

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channel member so as to be articulate about the lengthwise dimension thereof relative to said other channel member while being locked against broadside separation from said other channel member by the constant opposition to each other of the inner side walls respectively of said channel members wherein an articulation of approximately 180° is provided between the inner and outer channel members (16) and (17) and wherein the walls of said members are so dimensioned that, at one extremity of said articulation, (FIGURE 4), the inner channel member (16) snugly nests within the outer side wall (23) of the outer channel (17), and at the other extremity of said articulation, (FIGURE 1), the outer channel member (17) snugly nests within the outer side wall (20) of the inner channel member (16).

5. In combination: first and second flat sheet metal structural elements; first and second substantially like channel members, each of which has inner and outer sidewalls, said outer side wall being substantially wider than said inner side wall and integrally joins an edge of one of said elements approximately at a right angle thereto so that said channel member faces said element, one of said channel members being slid lengthwise into the other channel member so as to be articulate about the lengthwise dimension thereof relative to said other channel

member while being locked against broadside separation from said other channel member by the constant opposition to each other of the inner side walls respectively of said channel members wherein an articulation of approximately 180° is provided between the inner and outer channel members (16) and (17) and wherein the walls of said members are so dimensioned that, at one extremity of said articulation (FIGURE 4), the free edge of the inner side wall (22) of the inner channel (16) is brought into pressural engagement with a side face of the inner side wall (25) of the outer channel (17), and at the other extremity of said articulation, (FIGURE 1), the free edge of the inner side wall (25) of the outer channel (17) is brought into pressural engagement with a side face of the inner side wall (22) of the inner channel (16).

References Cited

UNITED STATES PATENTS

20	2,644,556	7/1953	Ledbetter	-----	49—397
	3,236,405	2/1966	Reil.		

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