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PLASTIC DEFORMABLE MOUNTING

Filed Jan. 5, 1962

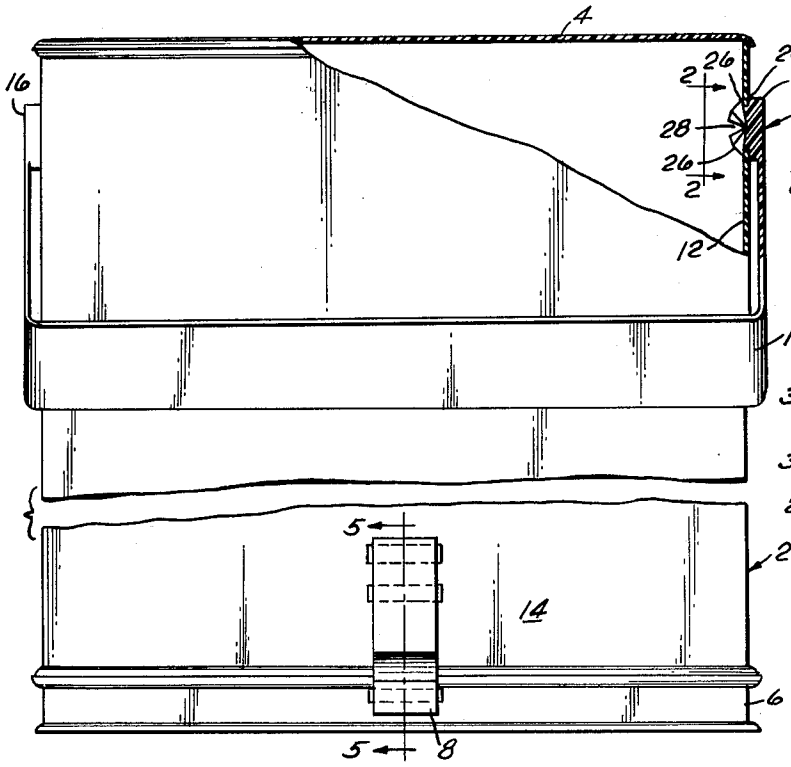


Fig. 1

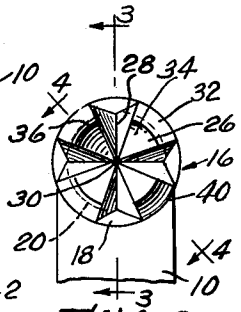


Fig. 2

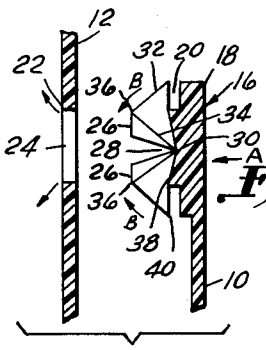


Fig. 3

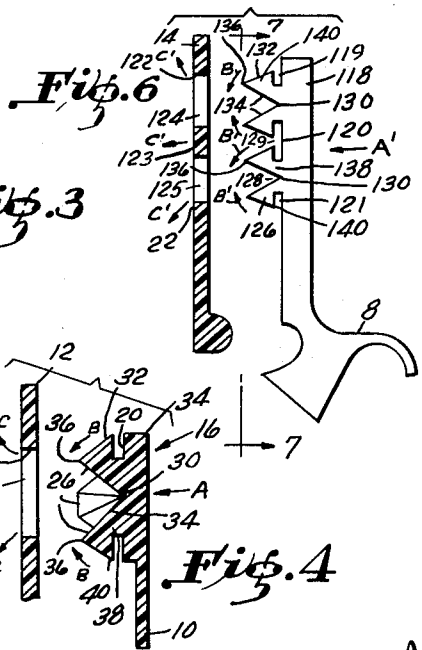


Fig. 6

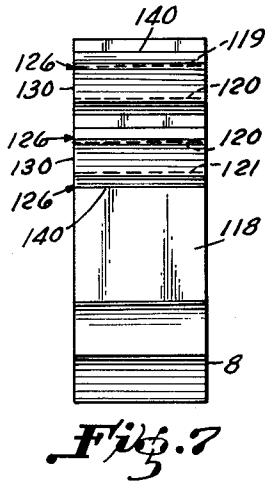


Fig. 7

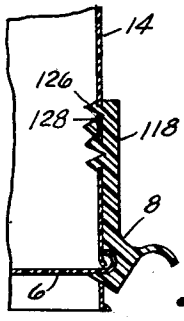


Fig. 5

Fig. 4

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PLASTIC DEFORMABLE MOUNTING

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1 Claim. (Cl. 24—213)

This invention relates to plastic deformable mountings and, more particularly, to mountings having lugs engaging through one or more openings in a wall of plastic sheet material for securing an element thereto.

The primary object of the invention is to provide mountings formed of elastically deformable and bendable plastic material, such as polyvinyl resin, characterized by its capability of elastic deformation and bending in response to externally applied force, and its springy return to original shape upon cessation of the deforming force. The mountings with which the invention is concerned are intended particularly for insertion through cooperating apertures in a wall of elastically deformable and stretchable sheet material, although flexibility and deformability of the sheet are not necessary characteristics. The particular objects are to provide for the elastic deformation of the lugs on the mounting during insertion of the lugs through the aperture, and providing further for the entrapment of the edge material by the lugs on the mounting when the latter return to normal shape and position after insertion.

While it is intended that the principles of the concepts be applicable to mountings of various other forms, the particular objects of this invention are to provide mountings of what are hereinafter termed "button" type and "strip" type which may be rapidly inserted through cooperating apertures in sheets.

These and other objects will be apparent from the following specification and drawings, in which:

FIG. 1 is an elevational view, partly broken away, of a refuse container embodying both the button form and the strip form of the invention;

FIG. 2 is an enlarged elevational view of the button form of the invention removed from the wall, as seen looking in the direction of the arrows 2—2 in FIG. 1;

FIG. 3 is a vertical cross section along the lines 3—3 of FIG. 2 and a fragmentary view of a wall in which the button is to be mounted, diagrammatically illustrating with arrows the directions of material movements when the button is inserted through an aperture in the wall;

FIG. 4 is a cross-section similar to FIG. 3 but taken along the lines 4—4 of FIG. 2;

FIG. 5 is a fragmentary cross section along the line 5—5 of FIG. 1 illustrating the strip form of the invention;

FIG. 6 is an enlarged side elevation of the strip showing in cross-section the wall in which the strip is to be mounted, and diagrammatically illustrating with arrows the movements of the materials when the strip is mounted through the apertures in the wall; and,

FIG. 7 is an elevational view of the strip as seen looking in the direction of the arrows 7—7 in FIG. 6.

Referring now to the drawings, in which like reference numerals denote similar elements, the environment of the species of this invention is an all-plastic refuse container 2 having a top 4 and bottom 6 pivoted as more fully described in our copending application entitled End Structure for Plastic Containers Serial No. 164,495, now Patent No. 3,072,283, filed on even date herewith, the bottom being releasably secured by a catch 8, more fully described in our copending application entitled Catch Mechanism Serial No. 164,491, also filed concurrently herewith. Container 2 has a handle 10 pivoted to side walls 12, catch 8 being affixed on the front wall 14. For purposes of understanding this invention, the

only critical feature of the container is that side and front walls are of plastic sheet material, approximately 1/16 of an inch thick, the wall material being somewhat flexible, capable of some elastic stretching or deformation by manually applied forces, as contrasted with rigidity or brittleness. After stretching deformation, the material springs back to its original size and shape. Such materials, polyvinyl resins for example, are widely used to form the walls of wastebaskets and squeeze-bottles for medicines and cosmetics. The invention is concerned with mountings by which elements such as handle 10 and catch 8 are secured through apertures in walls, for example, such as those of the type described above.

The ends of handle 10 are bonded or integrally formed, no matter which, to button 16, of plastic material having the same general characteristics as the side wall but which, being considerably thicker in cross section, are somewhat more resistant to bending or elastic deformation. The provision of clearance or relief space to accommodate displaced material, and the provision of necks to predetermine lines of bending are important features of the invention. In the example of the buttons shown in FIGS. 1–4, which have a circular body 18, the object is to entrap, within the peripheral groove 20, the peripheral material 22 which surrounds circular aperture 24 in side wall 12 by merely forcing the inner side of the button inwardly through the aperture.

On the inner side of button 16 are four segmental wedge-like lugs 26 separated from one another by grooves 28. The grooves have V-shaped bottoms and are also V-shaped in plan, with the points of the V's meeting at a common center 30. Lugs 26 have shoulder-like cam surfaces 32 on their outer sides and inwardly inclined V-shape surfaces 34 whose apexes also meet at center point 30. Cam surfaces 32 and inner surfaces 34 meet along nose angles 36.

In FIGS. 3 and 4 particularly it will be apparent that each lug has a thin zone, or neck 38 between the inner side of peripheral groove 20 and the inner surface 34 where the material is considerably thinner than in adjacent regions and, by comparing FIGS. 3 and 4 with FIG. 2, it will be apparent also that the necks 38 are disposed across the V-shape lugs about half way between their wider and narrower ends.

In operation of the FIGS. 1–4 embodiment, when button 16 is forced in the direction of arrow A towards aperture 24 until cam surfaces 32 engage the inner periphery of the aperture, lugs 26 bend inwardly, in the direction of curved arrows B, the primary axes of bending being about necks 38. V-shape grooves 28, plus the relief space between the inner surfaces 34 of lugs 26 provide spaces to accommodate the displaced portions of the lugs as the latter bend inwardly. As the lugs 16 enter deeper through aperture 24, the peripheral material 22 of the wall adjacent the aperture stretches slightly as indicated by curved arrows C until the edge of the aperture passes ledges 40 at the lower and outer ends of lugs 26, whereupon the peripheral material 22 snaps into peripheral groove 20, i.e., to the position shown in FIG. 1. Peripheral groove 20 and aperture 24 both being circular, button 16 can rotate, thereby constituting pivotal mountings for handle 10. If non rotation is desired, aperture 24 and peripheral groove 20 can be other than circular, with appropriate modification of the specific forms of lugs 26 and V-grooves 28.

FIGS. 5–7 illustrate a non-rotative mounting utilized to secure catch 8 to wall 14. The elements in the FIGS. 5–7 embodiment most nearly corresponding in function with those in FIGS. 2–4 embodiment are denoted with numerals of the same units and tens series but with 100's prefixes added.

The body 118 of the mounting is in the form of a strip, preferably of material similar in characteristics as in body 18, the object here being to trap, in grooves 119, 120 and 121 the material 122 and 123 adjacent slots 124 and 125. To this end there are provided, on the inner side of strip body 118, four transverse rib-like lugs 126, the upper and lower pairs of lugs being separated by V-shape grooves 128 and the two middle lugs being separated by a V-groove 129. The V-grooves 128 which provide clearance between the end pairs of lugs and permit them to bend towards one another, are defined by converging surfaces 134 on what may be termed the back or non-working sides of lugs 126, the surfaces meeting at points 130 which lie slightly deeper in strip body 118 than do grooves 119, 120 and 121. The working sides of lugs 126 have cam surfaces 132 extending from nose edges 136 to ledges 140 at the grooves 119, 120 or 121.

Between the inner ends of grooves 119, 120 or 121 and the back sides 134 of lugs 126 the material is thin, as compared with adjacent regions, providing necks 138. Thus, when strip body 118 is forced towards wall 14 in the direction of arrow A', cam surfaces 132, just below nose edges 136, engage the edges of slots 124 and 125 and, as lugs 126 move into the slots, they flex, primarily in the regions of necks 140, in the direction of curved arrows B', the V-grooves 128, 129 providing the space to accommodate the bent portions of the lugs. The material of wall 14 stretches somewhat in the directions of arrows C' until the edges of slots 124, 125 slide over ledges 140, whereupon it snaps into the then widened mouths of slots 124, 125, and lugs 126 resume their original shapes and postures, and the wall material adjacent slots 124, 125 is trapped in the respective slots 119, 120, 121 as shown in FIG. 5.

Neither embodiment of the invention is limited to the specific form shown for purposes of illustration, it being apparent to those skilled in the art that the broad concepts are applicable to various forms and shapes within the scope of the following claim.

We claim:

In combination, a sheet having a pair of substantially rectangular apertures spaced from one another by intermediate material having parallel straight edges along respective sides of said apertures and providing a series of four parallel straight edges comprising an inner pair

consisting of the aperture edges along the intermediate material and an outer pair consisting of the aperture edges opposite to those along the strip, an element, and means for mounting said element on said sheet comprising a series of four parallel and substantially straight lugs upstanding on said element, said lugs being formed by flexible resilient plastic material generally triangular in cross-section with bases on said element and opposite sides converging towards free end edges remote from said element, said four lugs comprising an outer pair consisting of the outermost ones of the series and an inner pair consisting of the two intermediate ones of the series, each of said lugs having a transverse slot extending partly across the base thereof from one side towards the other and being bounded along one side by said base portion, the material of each lug between the inner end of the slot and the other side constituting a neck for predetermining a region of bending of the lug, the surface of said one side of each lug between the outer end of the slot and the free edge thereof constituting a cam surface which terminates towards the base along a ledge overhanging the slot, the slots and cam surfaces on the outer pair of lugs facing outwardly and away from one another, the slots and cam surfaces of the inner pair of lugs facing towards one another, the distance between the ledges of the outer pair of lugs being greater than the distance between the outer pair of aperture edges, the distance between the free edges of the outer pair of lugs being less than the distance between the outer pair of aperture edges, the distance between the ledges of the inner pair of lugs being less than the distance between the inner pair of edges, and the distance between the free edges of the inner pair of lugs being greater than the distance between the inner aperture edges.

References Cited in the file of this patent

UNITED STATES PATENTS

103,571	Collins et al.	May 31, 1870
494,825	Spicer	Apr. 4, 1893
2,794,277	Dryden	June 4, 1957
2,797,607	Blaski	July 2, 1957
2,969,570	Petri et al.	Jan. 31, 1961

FOREIGN PATENTS

1,111,742	France	Nov. 2, 1955