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INTEGRAL HINGE AND HINGE BIAS STRUCTURE

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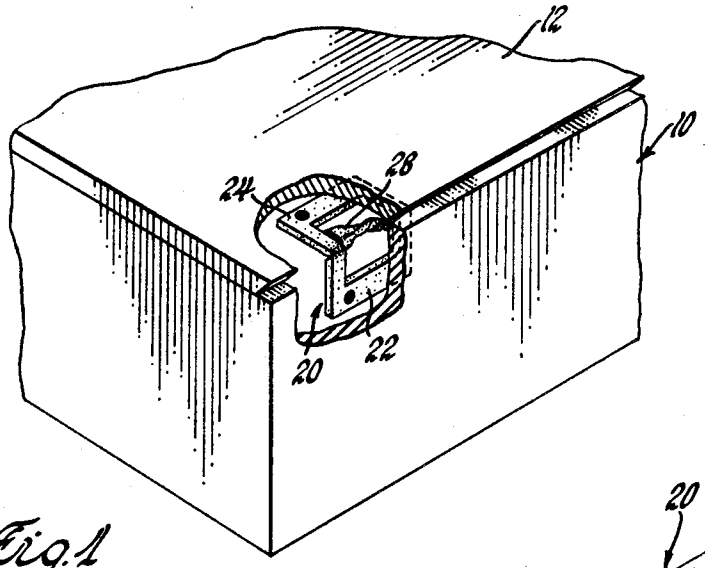

Fig. 1

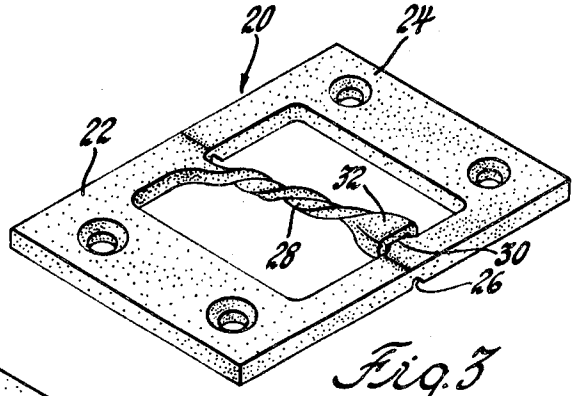

Fig. 3

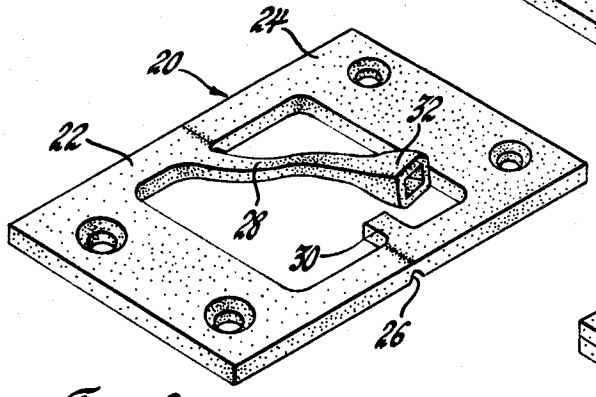

Fig. 2

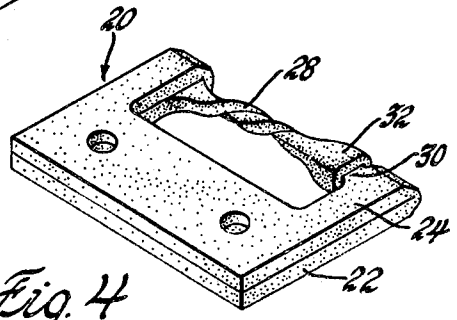

Fig. 4

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INTEGRAL HINGE AND HINGE BIAS STRUCTURE

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This invention relates generally to hinge structures and more particularly to an improved integral hinge and hinge bias structure.

One feature of this invention is that it provides a new and improved plastic integral hinge structure having integral hinge biasing means. Another feature of this invention is that it provides a new and improved plastic hinge and hinge bias structure including a pair of hinge leaf portions swingably interconnected by a necked-down integral hinge, and an integral biasing portion connected between the hinge leaf portions in a manner to be resiliently deformable upon repeated relative movement between the hinge leaf portions for bias thereon without being subject to localized permanent deformation robbing it of its resiliency. Another feature of this invention is that the biasing portion is formed simply and economically of an elongated leg portion formed integrally at one end to one of the hinge leaf portions and connected at its other end to the other leaf portion in a manner to be twistable about its axis of elongation upon movement of the leaf portions relative to each other in one direction whereby to provide a bias in the other direction. Other features reside in provisions for prestress in the biasing portion, and the compactness of integral formation of the biasing portion with the two leaf portions.

These and other features and advantages of the invention will be readily apparent from the following specification and the drawings wherein:

FIGURE 1 is a fragmentary partially broken away perspective view of the hinge and hinge bias structure of this invention as installed within a compartment and compartment closure structure;

FIGURE 2 is a perspective view of the hinge structure showing the biasing portion thereof in disconnected relation with the hinge leaf portions;

FIGURE 3 is a view similar to FIGURE 2 showing the hinge leaf portions in one relative position and the biasing portion in a prestressed operative relation connected therebetween; and

FIGURE 4 is a view similar to FIGURE 3 showing the hinge leaf portions in a second relative position.

Referring to FIGURE 1 of the drawings, the hinge and hinge biasing structure of this invention is shown installed within a compartment box or structure **10** provided with a cover or closure **12** adapted for movement between a closed position as shown and an open position, not shown. A hinge and hinge bias structure, designated generally as **20**, has one hinge leaf portion thereof **22** suitably secured to a wall of box **10** and the other hinge leaf portion **24** thereof suitably secured to the closure **12** whereby to mount the closure **12** for movement between its positions relative to the box **10**.

Referring to FIGURES 2 through 4, the hinge and hinge bias structure **20** is fabricated or molded of flexible plastic material into generally sheet like configuration. For the purpose of the integral hinging hereinafter discussed, the plastic material used should have the characteristics of high flex life and tensile strength, and the stock should be of sufficient thickness as to partake of the rigidity of the material to be self-sustaining as to form. At present, material such as polypropylene has been found to best provide these characteristics.

As shown in the drawings, the two hinge leaf portions **22** and **24** are swingably interconnected by an integral hinge defined by a groove **26** formed in at least one side of the stock and providing a necked-down portion therein. Groove **26** may be formed either directly by molding or by cutting of the surface of the stock, or in the case of material such as polypropylene, by a repeated flexing of the initial flat stock along the line desired for the groove **26**. By proper selection of material as aforenoted, the integral hinge is capable of long flex life under repeated swinging of the hinge leaf portions **22** and **24** from the generally unfolded, as fabricated position of FIGURES 2 and 3, to an abutting folded position as shown in FIGURE 4.

The hinge and hinge bias structure **20** is fabricated to provide a central aperture or apertures and an elongated biasing leg **28** lying within the aperture and being generally of the same thickness as hinge leaf portions **22** and **24**. One end of leg **28** is formed integral with hinge leaf **22** at one side of the integral hinge provided by groove **26**. The other hinge leaf portion **24** is provided with an integral ear **30** at the opposite side of groove **26**, and the free end of leg **28** has a generally cup-shaped formation **32** sized to be snugly nonrotatably received on the ear **30**. Thus connected, leg **28** is resiliently twistable about its axis of elongation upon relative movement between the hinge leaf portions in one direction to provide bias in the other direction. The leg **28** may of course be formed integral at either end with the hinge leaf portions **20** and **22**, but it is preferable that one end remain free so that it may be independently prestressed or twisted about its axis of elongation and subsequently interconnected between the two hinge leaf portions by placing the cup **32** over ear **30**. This operation is shown in a comparison of FIGURES 2 and 3 wherein it is seen that with the direction of pretwist appearing in FIGURE 3, the leg **28** will seek to untwist in a direction biasing the hinge leaf portions to the abutting position of FIGURE 4. With a proper number of initial twists or turns to the leg **28**, the leg remains stressed even when in full abutting position, thereby providing a predetermined degree of hold open or hold closed force on the two hinge leaf portions. In the installation shown in FIGURE 1, the hinge leaf portions move only to a half unfolded position allowing even less relaxation of the prestress on leg **28** and the closure **12** is accordingly held by significant bias in full closed position. The twist in leg **28** may of course be reversed to provide a hold open effect.

It is seen from the proximity of the leg **28** at either end thereof to the groove **26** and the actuate angular relationship of the leg therewith, that it is insured that the leg will freely twist upon movement of the hinge leaf portions about the hinge line of the groove without undergoing any significant degree of bending at a point or points intermediate its ends which might cause localized permanent deformation within the leg sufficient to rob it of its resilience. Further, it is seen that by the use of the configuration shown, the leg **28** remains generally within the surface confines or thickness of the two hinge leaf portions during hinging movement therebetween, and will not interfere with adjacent surfaces of box **10** or closure **12**.

Having thus described the invention, what is claimed is:

1. In an integral hinge of the type constructed of flexible plastic material and including a pair of hinge leaf portions swingably interconnected by a necked-down integral hinge portion for substantially free swinging movement of one relative to the other between first and second positions, the improvement comprising an integrally formed elongated biasing portion connected between said

leaf portions, said biasing portion having its axis of elongation arranged relative to the hinge line of said integral hinge portion to be repeatedly resiliently deformable upon repeated relative movement of said one leaf portion from said first to said second position thereof, said biasing portion biasing said one leaf portion from said second to said first position thereof.

2. Integral hinge structure as recited in claim 1 wherein said biasing portion is arranged relative to the hinge line of said integral hinge portion to be resiliently twistable about its axis of elongation upon relative movement between said leaf portions.

3. Integral hinge structure as recited in claim 2 wherein said biasing portion is integrally formed at only one end thereof with a respective one leaf portion whereby such biasing portion may be independently twisted about said

one end for prestress in the first position of said leaf portions.

4. Integral hinge structure as recited in claim 3 including integrally formed means on the other end of said biasing portion and on the other of said leaf portions cooperable to connect said biasing portion and said other leaf portion.

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