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H. L. APFELBAUM

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HINGE

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Fig. 1

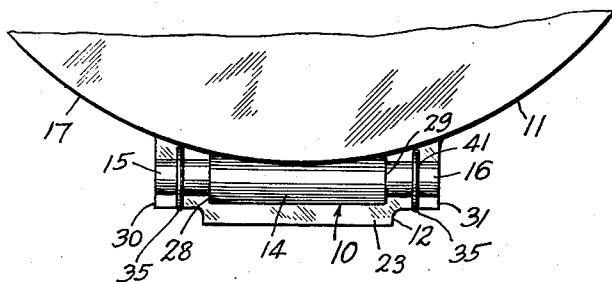


Fig. 2

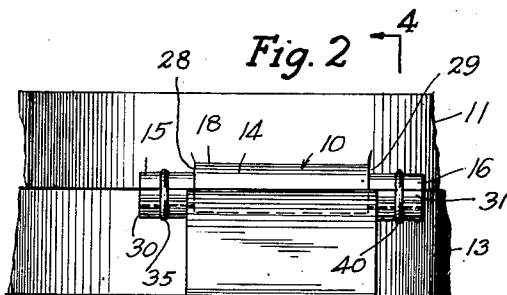


Fig. 3

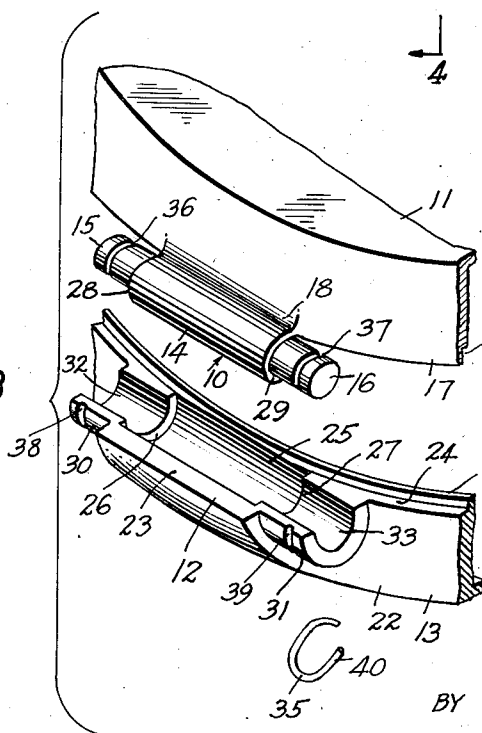
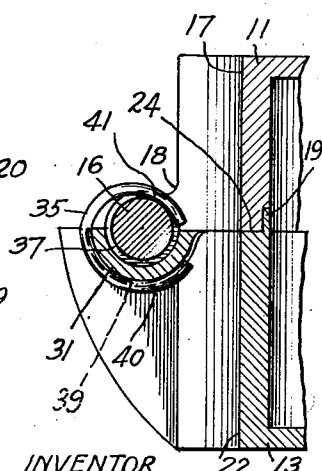


Fig. 4



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HINGE

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1

This invention relates to molded hinges and particularly to such hinges as are molded integrally with the cover and container parts of molded boxes and the like, and is an improvement over my prior Patent No. 2,347,981, for Molded hinge.

In my said prior patent, the two molded hinge parts are held against separation by means of a pair of end sleeves. Such sleeves, while satisfactorily operative are comparatively expensive. The present invention is therefore directed to a simple, inexpensive and easily available means for holding the hinge parts together, while permitting the required relative rotation.

The invention further contemplates the provision of such holding means as is not likely to creep along the held parts during long continued use of the hinge and is permanently fixed in place and hence not likely to get out of order.

The various objects of the invention will be clear from the description which follows and from the drawings, in which

Fig. 1 is a fragmentary top plan view of a box showing my hinge applied thereto.

Fig. 2 is a front elevation thereof.

Fig. 3 is a perspective view of the same showing the parts disassembled.

Fig. 4 is a fragmentary vertical section taken on the line 4-4 of Fig. 2.

In the practical embodiment of the invention shown by way of example, the cylindrical hinge member 10 which may be termed the male member is shown molded integrally with the box cover 11, while the recessed hinge member 12, which may be termed the female member is shown molded integrally with the container part 13 of the box.

The male hinge member 10 comprises the generally cylindrical central portion 14 terminating at each end in a coaxial end portion or pin as 15 or 16 preferably of reduced diameter. Preferably, through not necessarily, the pins are of the same length and diameter, the total length of the male hinge member including the central enlarged portion and the projecting end portions or pins, the end portions 15 and 16 being in rearward spaced relation to the rear wall 17 of the cover 11.

Said male member is preferably joined integrally to said rear wall 17 by the connecting portion 18, being molded integrally and simultaneously with the molding of the cover.

The female member 12 of the hinge is provided with inner surfaces designed to fit and engage and to serve as a partial bearing for the outer surfaces of the male member and to allow rota-

2

tion of the male member thereon. Said female member is therefore molded preferably in semi-cylindrical form and as a projection outstanding from the rear surface 22 of the container part 13 of the box. The top surface 23 of the member 12 is preferably coplanar and continuous with the upper edge 24 of the container part, an inner peripheral lip as 19 upstanding from the upper edge of the container part and being arranged to enter the corresponding groove 20 of the cover to provide a friction closure. In the central part of the female member, is made the recess 25, of semi-cylindrical form corresponding to and adapted to receive the under half of the central portion 14 of the male member. The inner surfaces of the end walls 26 and 27 of the recess 25 are adapted to engage the corresponding end walls 28 and 29 respectively of the cylindrical portion 14 and to prevent longitudinal movement of the portion 14 in the recess and thereby to align the box cover with the container part of the box and to prevent relative sidewise movement thereof.

Projecting respectively from the end walls 26 and 27 the hollow semi-cylindrical pin-receiving end projections 30 and 31, each of which has a semi-cylindrical recess therein. The pin 15 of the male member is adapted to fit snugly into the recess 32 while the pin 16 similarly fits into the recess 33 of the part 31, said recesses 32 and 33 being of the proper size to permit rotation of the respective pins therein. The recesses 25, 32, and 33 are all open at the top and are in coaxial alignment with each other so that when the male portion 14 is moved downwardly through the open top of and into the recess 25, the pins 15 and 16 fit snugly and rotatably in their respective recesses 32 and 33 in the parts 30 and 31.

In the closed position of the cover 11, the under edge rests on the upper edge 24 of the container part with the lower half of the portion 14 in the recess 25 and the lower halves of the projections 15 and 16 similarly rotate within and stay in the recesses 32 and 33 therefor, the male member being prevented by means soon to be described from lifting out of the female member during such rotation.

Suitable means are provided to prevent lifting of the male member out of the female member or possible separation of the hinge parts. Said means is intended to form a permanent fastening after being once assembled and is inexpensive to make and to position. As shown, the fastening means takes the form of an open ring 35 preferably of non-resilient wire. To make a permanent

3

and secure connection between the hinge parts, the circumferential groove 36 is made in and around the pin 15 in inward spaced relation to the end thereof and the similar groove 37 is made in the corresponding pin 16. The depth of the groove is preferably at least half the thickness or diameter of the material of the wire ring 35.

Concentric and substantially coplanar with the groove 36 is the circumferential groove 38 in the outer surface of the recessed member 30, the corresponding groove 39 being concentric and substantially coplanar with the groove 37. Thus, when the hinge parts are assembled as shown in Figs. 1, 2 and 4 the groove 36 is substantially aligned with the groove 38 and the groove 37 similarly aligned with the groove 39. The wire member 35 in substantially U-shaped form is then arranged in place, the lower leg 40 being inserted into the groove as 36 of the recessed member and the other leg into the groove as 38 of the pin. The free ends of the wire member 35 are then bent toward each other by means of a suitable tool such as a pair of pliers to squeeze the member into the form of a somewhat flattened open ring.

It will be noted that because of the difference in the diameters of the concentric grooves as 36 and 38, the member 35 does not assume a completely circular shape (see Fig. 4) and enters only the inner part of the smaller groove. Enough of the member engages the pin 15 however, to prevent adequately any relative transverse separation of the hinge parts, while permitting the cover to rotate relatively to said wire member, the longer portion of which engages a considerable part of the groove walls of the recessed member.

Since different parts of the groove walls of the pin engage the pin holding portion 41 of the wire member 35 during the rotation of the cover during its opening and closing movement, no appreciable wear of the parts occurs. There is further no danger of the wire member becoming straightened or slipping out of the grooves, hence it will be seen that I have provided a permanent, efficient, and non-slipping fastening means for the parts inexpensive to manufacture and assemble and well designed to perform its functions.

Any variation or modification of the invention described above within the spirit thereof is intended to be included in the scope of the appended claims.

I claim:

1. In a molded container, a male hinge member molded integrally with one part of the container and having a central cylindrical portion and end cylindrical portions of lesser diameter than the central portion, a female hinge member molded integrally with another part of the container and provided with a central recess receiving the central cylindrical portion of the male member and with end recessed projections receiving the end reduced cylindrical portions of the male member, each of said hinge members having an external circumferential groove therein near each end thereof, the grooves at corresponding ends of said members being coplanar and concentric, said grooves being in radial spaced relation by an amount corresponding substantially to the thickness of the end recessed projection of the female member, and a pair of wire fastening members each fitted into the major part of the groove in the female member and into the inner portion of the groove in the male member and thereby securing said members together against transverse separation, each of the fastening members having

4

one part of the same diameter as that of the groove of the end projection of the female member and having the end portion of the remaining part of a different diameter.

2. In an integral molded hinge for a two part box, a male member integrally molded with one part, said member having a central cylindrical portion and end cylindrical portions of reduced diameter, a recessed female member on the other box part, said female member having a recessed central portion receiving part of the central cylindrical portion of the male member and having recessed end projections receiving respective parts of the reduced cylindrical portions of the male member, each end cylindrical portion having a circumferential groove around the outer surface thereof and each end projection having a corresponding circumferential groove around the outermost surface thereof and in outward spaced relation to the groove of the cylindrical portion by an amount equal substantially to the thickness of the wall of the end projection, and a bent fastening having an end part of one diameter fitted into part of the groove of the cylindrical portion and having another part of a different diameter fitted into a segment of the groove of the end projection.

3. In a molded hinge for a hinged box, a male member on one part of the box, said member having end portions of lesser diameter than the central portion thereof, a female member fitted to the male member and rotatably engaging half of the surfaces of the male member and serving as a partial bearing therefor, a pair of spaced annular shoulders on the male member at the juncture of the central portion and the end portions of the male member, a pair of corresponding and correspondingly spaced annular shoulders on the female member engaging the respective shoulders of the male member, and wire members each in the form of a generally U-shaped open ring and each having an end part fitted into an external groove in the end part of the female member and having a different end part engaging part of an external groove in a reduced part of the male member, the parts of each wire member entering the respective grooves being of different diameters.

4. In a molded hinge, a male member having a central cylindrical surface of one diameter and end cylindrical surfaces of lesser diameter, a female member receiving half of the male member and having free end walls and provided with recesses therein corresponding in diameter to the diameters of those portions of the male member received thereby, each of the end cylindrical external surfaces of the male member having an annular groove therein, the female member having corresponding external annular grooves therein and a pair of fastening members passing around the members and each having different relatively eccentric end parts thereof fitted into a pair of corresponding respective grooves.

5. In a molded box hinge, a generally cylindrical member integral with one part of a box, a recessed member fitted around and receiving substantially half of the cylindrical member and integral with a different part of the box, interengaging shoulders on said members preventing relative longitudinal movement of the members, each of the members having a circumferential groove in the outermost surface thereof and a bendable fastening element having end parts entering the respective grooves and preventing transverse separation of said members.

5

6. In a molded hinge, a pin member, a recessed bearing member rotatably receiving part of the surface of the pin member concentrically therewith, the opposite part of the surface of the pin member projecting out of the bearing member, each of the members having a circumferential groove in the external surface thereof, and a substantially U-shaped fastening element having relatively eccentric end parts entering the respective grooves and preventing relative longitudinal and transverse movement of the members.

7. In a molded hinge, a pin member of one diameter, a bearing member of a larger diameter receiving rotatably substantially half of the lateral surfaces of the pin member and concentric therewith, each of said members having an external circumferential groove in the lateral surface thereof, and a wire member having opposite end parts thereof arranged in the grooves of the pin and bearing members and bent into the shape of a generally U-shaped open ring.

8. In a molded hinge, a pin member, a recessed bearing member rotatably receiving part of the pin member concentrically therein, the opposite

6

part of the pin member projecting out of the bearing member, each of the members having an external circumferentially arranged groove therein, the grooves of said members being concentric and substantially coplanar, and a wire fastening member having relatively eccentric end parts fitted into the respective grooves.

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