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HINGE STRUCTURE FOR MOLDED BOXES

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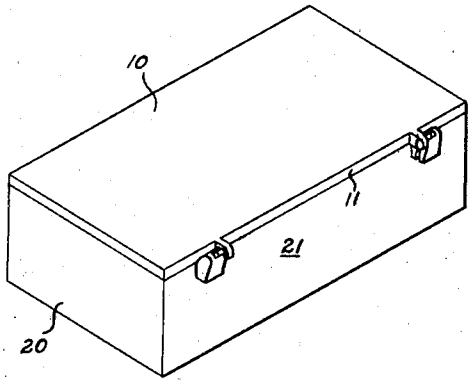


Fig. 1

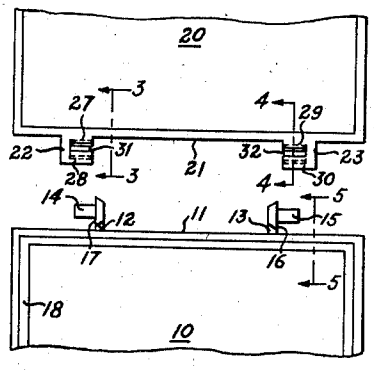


Fig. 2

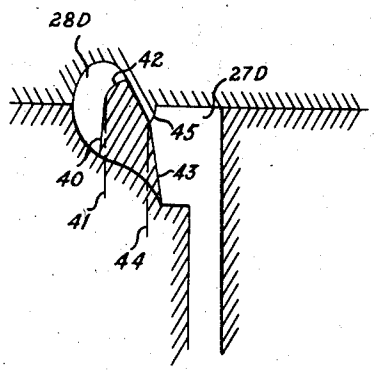


Fig. 3

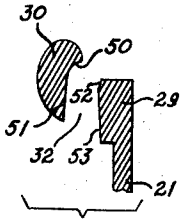


Fig. 4

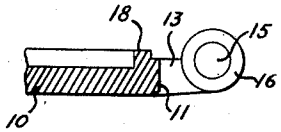


Fig. 5

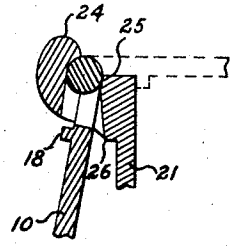


Fig. 6

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HINGE STRUCTURE FOR MOLDED BOXES

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4 Claims. (Cl. 220—31)

This invention relates to a hinge structure for molded boxes and, more particularly, to a type of hinge structure wherein the coacting hinge portions may be readily molded integrally with their respective box cover and box body portions.

An object of the invention is to provide an improved hinge structure for molded boxes which permits an extended path of rotation of the box cover with respect to the box body.

Another object is to provide an improved hinge structure for molded boxes having substantial strength and with reduced likelihood of hinge breakage upon careless use of the box.

Another object is to provide an improved hinge structure for molded boxes suitable for manufacture by injection molding by use of simple and relatively inexpensive dies.

A further object is to provide an improved hinge structure for molded boxes adapted for efficiently utilizing the resiliency of one hinge portion for engaging the other hinge portion therewith and for retaining the hinge in assembled relation.

Other objects and advantages will become more apparent as the description proceeds and when considered in conjunction with the accompanying drawings in which:

Fig. 1 is a perspective view of a molded box embodying the invention;

Fig. 2 is a plan view of the interior of the cover and body portions of the box of Fig. 1 shown in detached but aligned position;

Fig. 3 is a detail view of one hinge portion taken on line 3—3 of Fig. 2 and to a larger scale and indicating diagrammatically an arrangement of dies suitable for injection molding of the hinge portion;

Fig. 4 is a sectional view of one hinge portion taken on line 4—4 of Fig. 2;

Fig. 5 is a sectional view of the second hinge portion taken on line 5—5 of Fig. 2; and

Fig. 6 is a sectional view through a portion of the assembled molded box showing the cover in fully opened position.

As seen in Figs. 1 and 2, the assembled box includes a cover **10** having integrally formed with its rear wall **11** a pair of spaced pintle supports **12** and **13**. These pintle supports project outwardly from the rear wall and support laterally projecting cylindrical members **14** and **15** which, preferably, are extended toward the respective ends of the cover and have an axis substantially parallel to the rear wall **11**. As best seen in Fig. 5, the respective pintle supports include abutment portions **16** and **17** of larger size than the cylindrical members and serving to abut against the extreme ends of the bifurcated portions of the companion hinge elements, later to be described, and to serve in maintaining the assembled box cover in axial alignment with the box body. On its interior surface, the cover may, if desired, be provided with a continuous shoulder **18** adapted to fit snugly against the inner top wall of the box body **20**.

The box body may include a rear wall **21** in substantially the same plane as the rear wall of the cover when assembled and having spaced hinge seats integrally formed with that rear wall and suitably disposed to coact with the spaced pintles, as will later appear. These hinge seats include bosses **22** and **23** extending outwardly from the rear wall of the box body and having their top-most edge **24** substantially above the top edge **25** of the box body on which cover **10** is adapted to seat, and their lower-most edge **26** substantially below the top edge of the box body, as seen in Fig. 6. Thus, a substantial section of molded material integral with the rear wall of the box body is provided for hinge strengthening purposes. Each hinge seat is provided with bifurcated legs **27**, **28** and **29**, **30** projecting laterally from the boss or web sections **22** and **23**, respectively, and extending in a direction opposite to the direction of the cylindrical member of the cover with which they are to cooperate. The legs **27** and **29**, for example, are molded integrally with rear wall **21** of the box body, thus serving to further strengthen the hinge, and each leg of the hinge seats is substantially longer than the cylindrical member of the cover, preferably about twice as long.

Each of the legs **27**, **28**, **29** and **30** is provided interiorly with a segmental arcuate bearing surface having a radius corresponding to the radius of the coacting cylindrical member of the cover. In addition, the ends of these legs are located so as to engage the respective abutments **16** and **17** when the cover is installed. The bifurcated portions of the hinge seats thus provide apertures generally designated **31** and **32** for reception of the hinge pintle portions and, as shown in Fig. 3, these apertures may be readily molded by simple dies using injection molding techniques. For example, the die space 28D will be seen to have a tapered boundary **40** which is displaced from vertical line **41** at its lower end but which merges with the arcuate seat **42** at its upper end. Likewise, the die space 27D will be seen to have a tapered boundary **43** which is displaced from vertical line **44** at its lower end but which merges with the arcuate seat **45** at its upper end. In general, an angle of about 5–10° between the vertical lines **41** and **44** and the tapered boundaries is satisfactory. Thus, a simple two-piece mold having a horizontal parting line and requiring no undercut in the mold, may be employed for forming both the box body and its integral hinge seat in accordance with my invention. As will be seen, the tapered boundaries form inclined flat pintle inserting surfaces for assembling the cover upon the box body.

Referring now to Fig. 4, it will be apparent that the right hand molded hinge seat, for example, thus includes an arcuate bearing surface **50** which merges into the tapered pintle-inserting surface **51** of leg **30**, and an arcuate bearing surface **52** which merges into the tapered pintle-inserting surface **53** of leg **29**, and with these surfaces defining aperture **32** through which cylindrical member **15** of the cover may be passed. Thus, a maximum spacing between surfaces **51** and **53** results at a point farthest removed from the axis of pintle rotation and a minimum spacing results at the point where those surfaces merge with the arcuate surfaces. The minimum spacing, moreover, is made slightly less than the diameter of the cylindrical member so that the cover is required to be pressed into assembled position on the box body against the resiliency afforded by the cantilever mounted leg **30**. After passing by this point of minimum spacing, the member serving as a pintle is free to rotate upon the arcuate bearing seats and the leg **30** springs back into normal position, all as known to those skilled in the art of snapon hinges.

Referring now to Fig. 6, the cover is shown in fully opened assembled position and it will be seen that an

arc of rotation of about 260–270° from the closed position (shown in dotted lines) is thus provided. This important feature of the invention is due in large part to the off-set relation of the cylindrical members 14 and 15 with respect both to the pintle supports 12 and 13 and to the hinge seats and is achieved without structural weakening of the molded assembly. Numerous prior molded plastic boxes have provided covers which may rotate through an equally great angle, but, so far as I am aware, they have also required a more expensive construction or have been subject to easy breakage during careless usage.

In contrast, for example, with boxes requiring a separate locking means for holding the hinge in assembled relation, or a deformation of the box body or box cover to engage the hinge portions initially, this invention employs the elastic deformation of a single leg of each hinge seat and with that leg being reinforced by the boss to which it is attached. A sturdy and relatively inexpensive box which may be subjected to relatively heavy duty usage without hinge breakage therefore results.

Having thus described the invention in one particular embodiment thereof, it will be understood that within the scope of the appended claims other modifications may be made without departing from the spirit of the invention.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. A molded plastic box having in combination a box body including a rear wall portion, a cover for said box body including a rear wall portion, and a pair of spaced hinge structures for pivotally mounting said cover upon said box body at the rear wall portions thereof and including in each hinge structure a pintle support fixedly carried on the rear wall of said cover and projecting outwardly therefrom, said support having a cylindrical member extending laterally therefrom in a first direction and substantially parallel to the rear wall of said cover, a hinge seat fixedly carried on the rear wall of said body and projecting outwardly therefrom, said seat comprising a boss having a laterally extending bifurcated portion with a first leg attached to the rear wall of said body and a second leg spaced from said first leg, each of said legs extending in the same direction from said boss and oppositely to the direction of said cylindrical member, each of said legs having an inner segmental arcuate bearing surface for rotatably mounting said cylindrical member and with the axes of said surfaces extending substantially parallel to the rear wall of said body, and an inclined flat pintle-inserting surface on each of the confronting lower surfaces of said legs merging with the arcuate bearing surfaces thereof and diminishing from a maximum spacing therebetween at a point farthest removed from the axis of pintle rotation to a minimum spacing therebetween at the point of said merging thereof with the respective bearing surfaces, the diameter of said cylindrical member being slightly larger than said minimum spacing whereby said member may be pressed into operative position against said bearing surfaces and retained thereagainst by the resiliency of said bifurcated portion.

2. A hinge structure as defined in claim 1 wherein said pintle-inserting surfaces are substantially parallel to the plane of the rear wall of said box body, one of said surfaces being inclined about 5 to 10° in one direction from said plane and the other of said surfaces being inclined about 5 to 10° in an opposite direction from said plane.

3. A molded plastic box having in combination a box body including a rear wall portion, a cover for said box body including a rear wall portion, and a pair of spaced hinge structures for pivotally mounting said cover upon said box body at the rear wall portions thereof and including in each hinge structure a pintle support fixedly carried on the rear wall of said cover and projecting outwardly therefrom, said support having a cylindrical member extending laterally therefrom in a first direction and substantially parallel to the rear wall of said cover, and a flat abutment surrounding said member at its juncture with said support, a hinge seat fixedly carried in the rear wall of said body and projecting outwardly therefrom, said seat comprising a boss having a laterally extending bifurcated portion with a first leg attached to the rear wall of said body and a second leg spaced from said first leg, each of said legs extending in the same direction from said boss and oppositely to the direction of said cylindrical member, the ends of said legs being adapted to contact the abutment of said pintle support, each of said legs having an inner segmental arcuate bearing surface for rotatably mounting said cylindrical member and with the axis of said surfaces extending substantially parallel to the rear wall of said body and an inclined flat pintle-inserting surface on each of the confronting lower surfaces of said legs merging with the arcuate bearing surfaces thereof and diminishing from a maximum spacing therebtween at a point farthest removed from the axis of pintle rotation to a minimum spacing therebetween at the point of said merging thereof with the respective bearing surfaces, the diameter of said cylindrical member being slightly larger than said minimum spacing whereby said member may be pressed into operative position against said bearing surfaces and retained thereagainst by the resiliency of said bifurcated portion.

4. A hinge structure as defined in claim 3 wherein the length of said cylindrical member is substantially less than the length of said legs.

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