

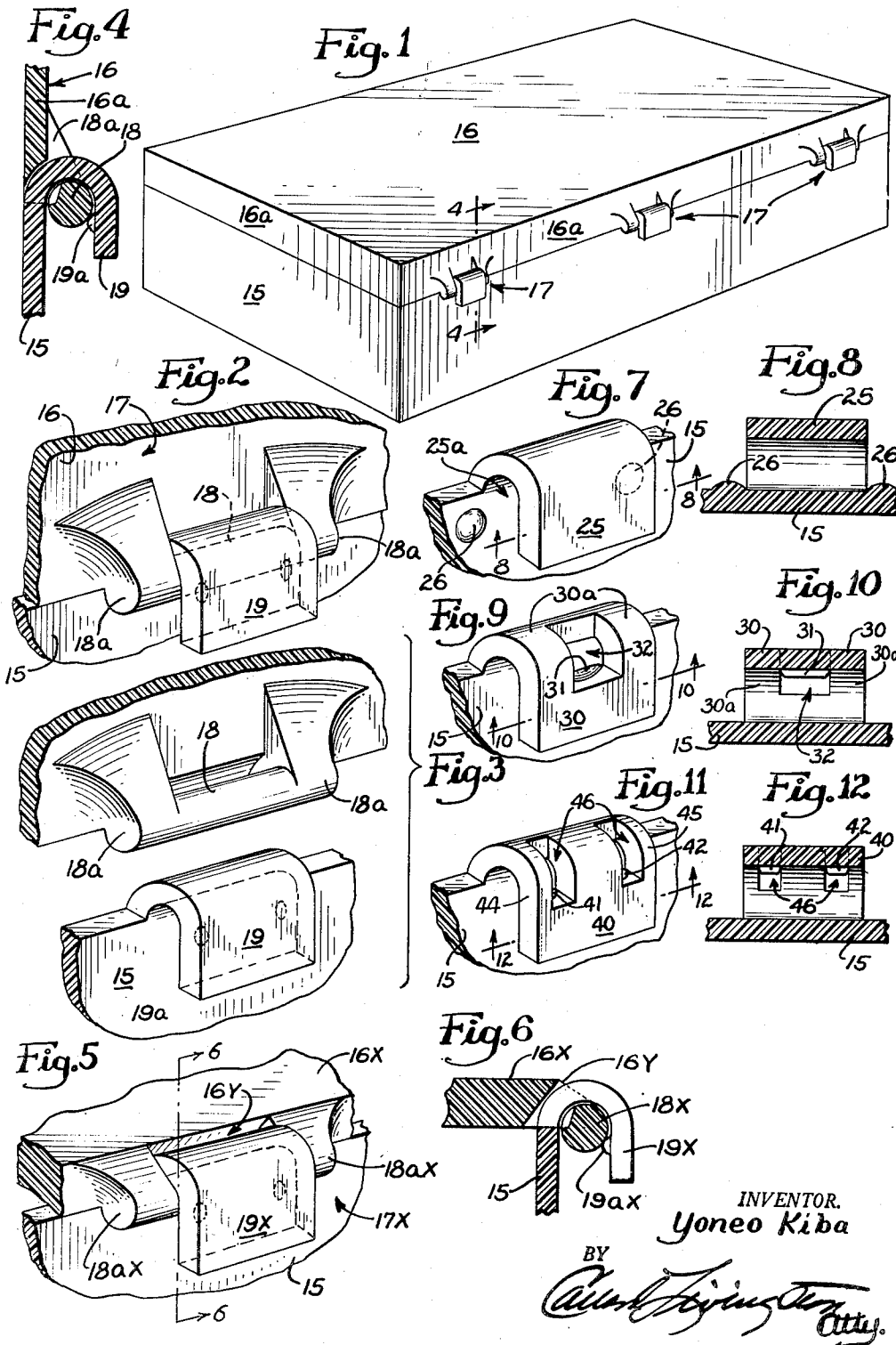
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HINGE STRUCTURE, ESPECIALLY FOR MOLDED BOXES

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HINGE STRUCTURE, ESPECIALLY FOR
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The present disclosures relate to improvements in hinge structures, especially for molded boxes.

A principal characteristic of the new hinge structure is the fact that it is suitable for the manufacture of covered boxes and the like by injection molding from thermoplastics and the like, and the box proper and its cover are formed with complementary hinge elements respectively integral therewith, and adapted to be hingedly interengaged in a simple assembly of the box and cover as these parts come from the molds.

An important object of the invention is the provision of a permanent hinge structure, including cooperable parts respectively formed integrally with a box and a lid therefor, which is strong, readily assembled without special tools or operations in joining the lids to the boxes, and which is adapted to the processes of injection molding by use of simple and relatively inexpensive dies requiring no troublesome or uneconomical inserts or the like, and which can be formed, if desired, so that the lid and box are practically inseparable once they have been assembled.

Additional objects and aspects of novelty and utility relate to details of the constructions and operations hereinafter described in view of the annexed drawing in which:

Fig. 1 is a perspective view of a lidded box embodying a multiple hinge attachment according to the invention;

Fig. 2 is an enlarged fragmentary perspective of one form of molded hinge structure;

Fig. 3 is an exploded view similar to Fig. 2 with the complementary hinge parts separated;

Fig. 4 is a vertical sectional detail of the hinge structure shown in Figs. 1, 2, and 3, and is taken along lines 4—4 of Fig. 1;

Fig. 5 is a perspective fragment of the hinge structure applied to a modified form of box;

Fig. 6 is a vertical sectional detail of the hinge structure taken along the line 6—6 of Fig. 5;

Fig. 7 is a perspective fragment of another modified hinge structure with respect to the hook and interlock parts thereof;

Fig. 8 is a horizontal sectional detail taken along lines 8—8 of Fig. 7;

Fig. 9 is a perspective fragment of another hinge structure also modified with respect to the hook and interlock parts thereof;

Fig. 10 is a horizontal sectional detail of the hook structure of Fig. 9 and is taken along lines 9—9 of the latter figure;

Fig. 11 is a perspective fragment of the hook part of still another modification of the hinge structure;

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Fig. 12 is a horizontal section of the hook and interlock parts of Fig. 11, as viewed along lines 12—12 thereof.

Referring to Fig. 1, one of the embodiments of the hinge structure is shown applied to a molded box consisting of the box-proper or bottom section 15, and its lid or top section 16, said sections being hingedly joined by a plurality of hinge units generally indicated at 17.

As viewed in Figs. 2 and 3, the hinge units 17 consist of a pintle part 18 and a hook portion 19, the latter being an integral part of box 15, and in the nature of a tongue of plastic turned back in a sense upon itself with a free end portion and inner wall which is spaced sufficiently from the box to permit embracing the bar or pintle 18 when the part 19 is hooked onto the pintle. The pintle pin or bar 18 is firmly attached to the lid 16 as an integral part thereof by spaced bosses 19a, likewise integral with the pin and box.

A characteristic of the embodiment of Figs. 1 to 3 is the provision of a yieldable interlock means, which is best described in view of Fig. 4, wherein it appears that there are provided on the hook portion or tongue 19 small protrusions or bosses 19a, preferably situated near the opposite side margins of the tongue or free-end portion 19, and projecting inwardly to underlie, in effect, the pins 18, in each hinge unit.

The complementary parts of the hinge units 17, with particular respect to the diameter of pins 18, and the spacing of tongue or hook portions 19 from the wall of the box to receive said pins, and the distance the bosses 19a project beneath the pins 18, is predetermined in designing the molds such that it is necessary in assembling the hinge parts to force the pins 18 past the bosses 19a at a time closely following the ejection or removal of the molded parts from the molds, and while there is yet some yieldability to the plastic body before it takes a final set. These conditions are applicable where the lids are to be more or less permanently attached to the boxes, as where the boxes are to be filled with vendible commodities for package sales.

It will be observed, as another characteristic of the novel hinge structure, that the reentrant or hooked shape of one of the hinge parts 19 is calculated to afford some yieldability for purposes of assembly of the parts.

For purposes of efficiency and economy in molding by present methods, it is desirable, though not essential, that the thickness of the hook or tongue parts 19 be the same as the thickness of the walls of the box, and where specifica-

tions call for a thick box wall, the tongue or hook part may be correspondingly thick and hence relatively unyieldable. With fairly large bosses the hinge parts may be easily joined when the lid and box are placed in assembly promptly after they leave the mold. However, after a relatively short period of time, and after the plastic has set, there is considerably less resiliency in the hook relative to the receptacle so that the bosses are operative in a manner wherein the lid and box become practically inseparable. In other words, the hook is considerably more resilient immediately after the molding operation so that the pintle can quickly be moved toward the bight portion of the hook, despite the small distance between the outer edge of the boss and the inner free surface of the hook. After the plastic has set, a certain resiliency still is present in the hook, but the bosses serve to effectively lock the pintle in position.

The type of box shown in Figs. 1 through 4 has a recessed or skirted cover 16, by which is meant that the cover has depending, bordering side walls 16a, and the hinge parts 18, 18a are formed on the depending wall portions 16a.

In Figs. 5 and 6 there is shown a type of hinge unit 17x similar to the unit 17 except that the box lid 16x is a flat piece without a rim or skirted side wall, and the pins 18ax lie in the plane of the lid; and the latter is relieved, as at 15y for the dual purpose of clearing the tongue part 19x in opening motions, and to admit die parts useful in forming the pintle portions.

In accordance with Fig. 7, the hinge structure is modified to the extent that the hook or tongue part 25 has no bosses, the latter being formed, as at 26, on the wall of the box 15 at a point closely adjacent the opposite side edges 25a of the hook part, the advantage in this construction being that, while the hook part retains all of its relative yieldability, the die parts for forming the bosses 26 are easier to make and require no reliefs or undercuts.

The assembly of the box and lid when using the hinge structure of Figs. 7 and 8 is similar to that described for the structure of Fig. 2, and the same dimensional considerations may be applied with respect to the assembly.

A further modification of the interlocking structure is shown in Figs. 9 and 10 wherein the tongue or hook 30 is provided on its inside surface with an elongated lip or ridge 31 centrally located to underlie a considerable extent of the pintle pin 19 (not illustrated in the presently discussed views, but analogously to the underlying bosses 19a of Fig. 4).

In order to form such a lip in a single molding operation, it is necessary for a mold projection to enter to the inner region of the hook, and accordingly the bight portion of the hook is cut away at a central point to provide a cut-out or passage 32 substantially overlying the lip 31 to permit formation of the latter part, while leaving flanking connecting bight portions 30a.

A similar interlock structure of modified character is shown in Figs. 11 and 12, wherein the hook or reentrant tongue 40 is provided on its inside surface with a plurality, in this instance two, interlocking or pintle-retaining bosses 41, 42 spaced apart horizontally, that is to say along the hinge axis but both lying well inside the two opposite side edges 44, 45 of the hook part at points which would be normally inaccessible to mold parts, so far as presently known economical and practical molding practices permit, except

for the present disclosure as to the provision of overlying passages 46 partly in and adjoining the bight portion of the hook, whereby entrance and withdrawal is afforded for mold elements necessary to the formation of such interiorly-situated interlocking formations 41, 42.

It is understood, of course, that the interlocking interior lip 31 of Figs. 9 and 10 and the axially spaced, interiorly-situated, bosses 41, 42 of Figs. 11 and 12 cooperate with a pintle bar 13 to underlie the latter and prevent separation of the hinge parts in substantially the same manner as do the bosses 19a and 26 in the previously described embodiments of Figs. 1 through 8.

The hinge structure in general is characterized by the provision of an elongated tongue or hook portion which affords a limited yieldability, and by the location on or opposite the elongated, free end portion on the tongue, either on the inside face thereof, or opposite or juxtaposed or closely adjacent wall portions of the integral box member opposite thereto, of locking or retaining formations such as bosses or lips which may be economically and feasibly formed in production quantities by any of the several methods and constructions disclosed, that is to say by locating the locking bosses or lips either in certain positions for access of mold parts to side portions of the tongue in such manner that the molded product may be withdrawn from the mold after formation, or by providing certain openings in the hinge parts to afford access and withdrawal for the mold parts so that the finished product will not become locked in the mold or dies upon forming.

I claim:

1. A hinged structure for molded plastic boxes including a receptacle part and a cover therefor, both having side walls in the same plane, comprising a cylindrical pintle fixedly carried on one wall of the cover spaced outwardly therefrom and disposed longitudinally of and substantially parallel to the lower edge of the wall of said cover, a flat hook having a bight integral with a portion of the upper edge of that wall of the receptacle adjacent the pintle-carrying wall of the cover, said hook having an inner wall disposed in substantially spaced parallel relation to the outer face of the receptacle wall and extending downwardly below the said upper edge, said hook having a resiliency relative to said receptacle to permit limited outward movement of the wall of said hook relative to the wall of said receptacle, a boss carried by the receptacle below the upper edge of said receptacle wall in proximity to but outwardly of each side margin of the hook, said bosses being positioned a distance from the upper edge of the receptacle wall less than the distance from said upper edge to the free end of the hook, the diameter of said pintle being less than the distance between the inner wall of the hook and the wall of the receptacle, said diameter being greater than the distance between the outermost portion of the boss and the inner wall of the hook, said pintle being movable to a position between the boss and the bight whereby the inner wall of the resilient hook is moved outwardly to permit movement of the pintle between the inner wall and the boss toward said bight whereupon said inner wall and hook return to their normal position, said pintle being rotatably received by said hook adjacent to and bearing against said bight, and a portion on said pintle also bearing against and being locked in position by said inner wall and said boss.

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2. A hinged structure for molded plastic boxes including a receptacle part and a cover therefor, both having side walls in the same plane, comprising a cylindrical pintle fixedly carried on one wall of the cover spaced outwardly therefrom and disposed longitudinally of and substantially parallel to the lower edge of the wall of said cover, a flat hook having a bight integral with a portion of the upper edge of that wall of the receptacle adjacent the pintle-carrying wall of the cover, said hook having an inner wall disposed in substantially spaced parallel relation to the outer face of the receptacle wall and extending downwardly below the said upper edge, said hook having a resiliency relative to said receptacle to permit limited outward movement of the wall of said hook relative to the wall of said receptacle, bosses fixedly carried by the receptacle below the upper edge of said receptacle wall a distance from said upper edge less than the distance from said upper edge to the free end of the hook, each boss being positioned in proximity to but outwardly of the side margins of the hook, the diameter of said pintle being less than the distance between the inner wall of the hook and the wall of the receptacle, said diameter being greater than the distance between the outermost portions of the bosses and

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the inner wall of the hook, said pintle being movable to a position between the bosses and the bight whereby the inner wall of the resilient hook is moved outwardly to permit movement of the pintle between the inner wall and the bosses toward said bight whereupon said inner wall and hook return to their normal position, said pintle being rotatably received by said hook adjacent to and bearing against said bight, and a portion on said pintle also bearing against and being locked in position by said inner wall and said bosses.

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