

June 23, 1970

O. KOLESKE  
PLASTIC HINGE

3,516,115

Filed April 24, 1968

2 Sheets-Sheet 1

*Fig. 1.*

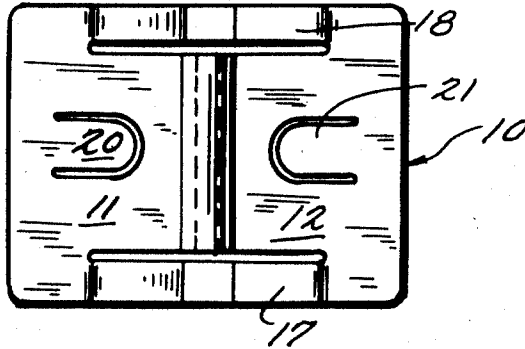


*Fig. 2.*

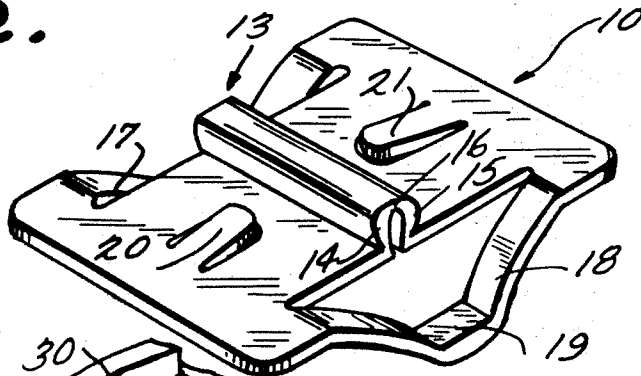
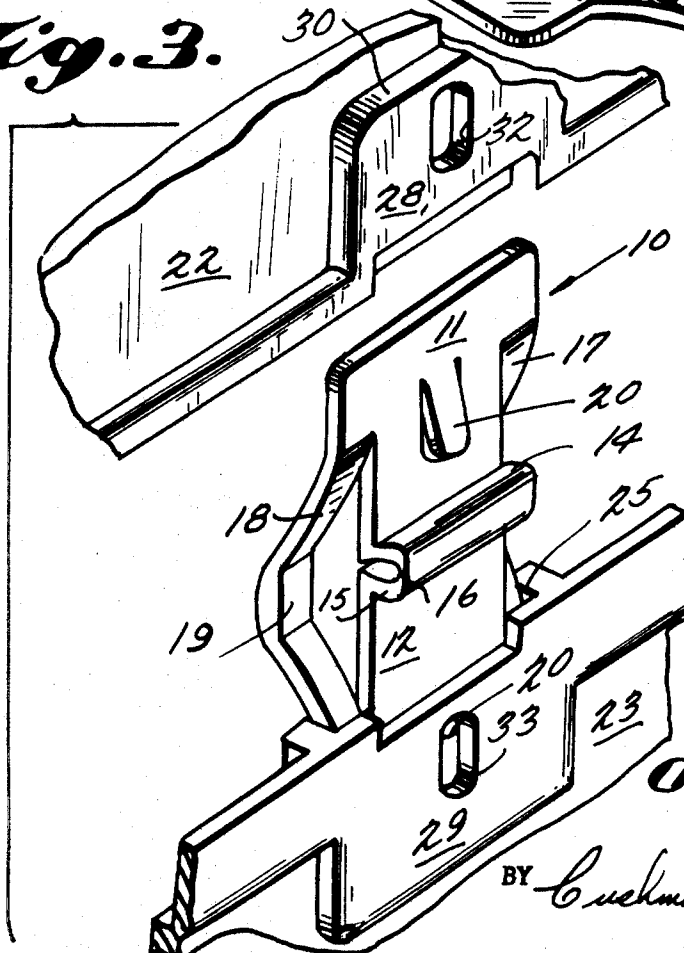


*Fig. 3.*



INVENTOR

*Otto Koleske*

BY *Cushman, Saaby & Cushman*  
ATTORNEYS

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*Fig. 4.*

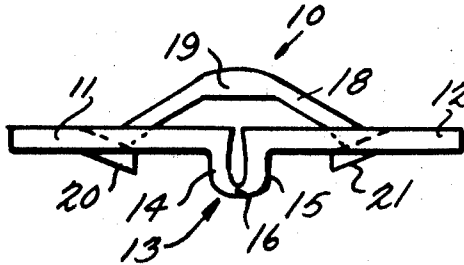


*Fig. 5.*

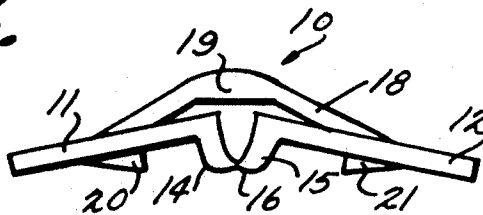


*Fig. 6.*

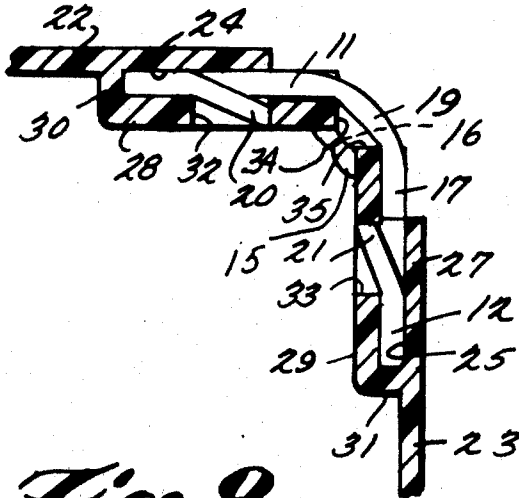


*Fig. 7.*

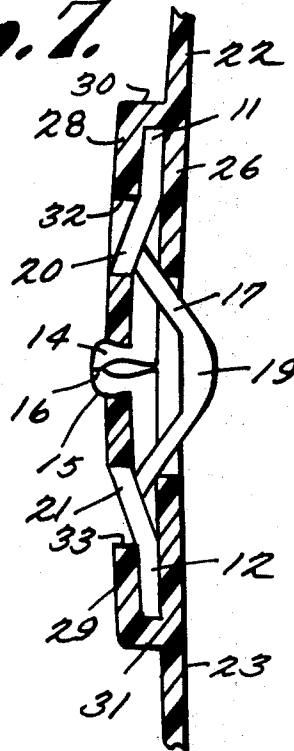
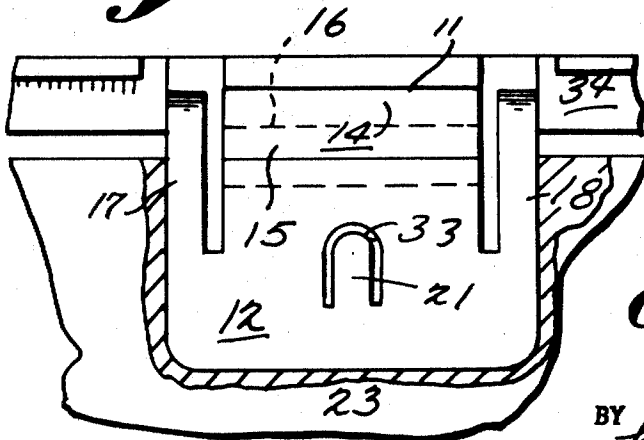


*Fig. 8.*



INVENTOR

*Otto Koleske*

BY *Buchman, Staley & Buchman*  
ATTORNEYS

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3,516,115

## PLASTIC HINGE

Otto Koleske, Sunbury, Pa., assignor to Wilson Manufacturing Corporation, Sunbury, Pa., a corporation of New York

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7 Claims

### ABSTRACT OF THE DISCLOSURE

A hinge molded from one of the memory plastics to be used primarily with plastic containers. One leaf of the hinge fitting a recess in the base of the container and the other leaf fitting a recess in the cover. Each leaf of the hinge provided with means cooperating with the recesses in the base and cover of the container to hold the hinge in its assembled position. Stop straps having each of their ends connected to one of the leaves and having a body portion unconnected to the hinge and extending over the pivot point of the hinge. The straps being thickened at their middle portion and controlling the normal opening of the cover to substantially 90° but permitting the cover to be opened to a greater angle without damaging the container parts.

The present invention relates to a plastic hinge for joining together members for relative pivotable movement. More particularly, the hinge is used for connecting the cover and base section of molded plastic containers.

As the use of molded plastic containers becomes greater, the need of a simple, dependable hinge which can be cheaply manufactured, is a necessity. Plastic containers on the market today either use hinges molded as an integral part of the container or use separate hinges, some of which may be metal and secured to the container by fastening means such as screws, pins or the like.

The containers which use an integrally molded hinge have a disadvantage in that the material selected may not be the best for both the container and hinge. In other words, the material used may not produce a hinge having the desired properties whereas in the case of a separate hinge any material can be selected for its manufacture and this would not change the characteristics of the container.

When separate fastening means are used, the amount of damage to the containers rises sharply because if any extra strain is put on the hinge, such as opening the cover slightly beyond its normal open position, the plastic material of the cover and base has the tendency to crack or break and render the container useless.

It is therefore an object of the invention to provide a plastic hinge which can easily be assembled with a container cover and base without the use of screws, pins or other such fastening means.

A further object of the invention is to provide a plastic hinge which will control the opening of the cover of a container to a desired degree but which will permit the cover to be opened further than the intended normal opening and still prevent damage to either the hinge or container.

A further object of the invention is to make the hinge from one of the memory plastics and more specifically from polypropylene so the parts of the hinge may be stretched beyond their normal use without breaking and then return to normalcy upon being relaxed for a sufficient time.

Another object of the invention is to provide simple fastening means on the leaves of the hinge to permit them to be readily attached to the cover and base por-

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tions of the container without the use of special tools or equipment.

A further object of the invention is to produce a plastic hinge which can be manufactured cheaply and which will give high performance over a long period of time.

Still another object of the invention is to provide a plastic hinge in which the controlled degree of opening of the cover section can be changed without great expense or extensive manufacturing changes.

A further object of the invention in the preferred form is to mold the hinge and its associated parts as a single integral piece.

These and other objects of the invention will be apparent from the following specification taken in conjunction with the drawings wherein like numerals are used throughout to distinguish like parts and wherein:

FIG. 1 is a top elevational view of the plastic hinge;

FIG. 2 is a perspective view of the plastic hinge;

FIG. 3 is an exploded view of a container cover and the hinge partially assembled with the base of the container;

FIG. 4 is a side elevational view of the hinge in completely closed position;

FIG. 5 is a side elevational view of the hinge in partly opened condition;

FIG. 6 is a sectional view showing the hinge assembled with a container base and cover with the cover in full open position;

FIG. 7 is a sectional view showing the hinge assembled with a container base and cover with the cover in fully closed position; and

FIG. 8 is a view of the hinge assembled with a container base and cover with the cover in full open position and with the front wall of the recess in the base broken away.

Now having more particular reference to the drawings an illustrative embodiment of the plastic hinge of the invention is generally indicated at 10.

The plastic hinge 10 has a pair of leaves 11 and 12 which can be of any length or width depending upon the use of the hinge. The leaves 11 and 12 are connected together along their adjacent edges by a flexing section generally indicated at 13.

The section 13 is formed from flanges 14 and 15 each of which extends substantially at right angles from one of the adjacent edges of the leaves 11 and 12. A thin flexible web 16 connects the flanges 14 and 15 and permits the leaves of the hinge to pivot relative to each other and thereby defines a line of flexure.

A pair of stop straps 17 and 18 are provided and extend outwardly from the inside surface of the hinge at the edges thereof and have their ends connected one to each of the leaves 11 and 12. The body portion of the stop straps is not connected to the hinge and is freely movable relative thereto. The center of each of the stop straps 17 and 18 is provided with a thickened portion 19. This thickened portion 19 may be changed as desired for a purpose which will be explained hereinafter.

The lengths of the straps are so chosen as to permit the leaves of the hinge to pivot through a desired angle. In the preferred form of the invention, this angle is one of substantially 90°.

It is obvious that instead of using two stop straps, a single strap placed in the middle of the hinge could be used or more than two straps could be used and be placed equally spaced along the length of the hinge, the number of straps would depend on the length of hinge and on its use.

In the preferred form of the hinge, each of the leaves 11 and 12 has struck therefrom tabs 20 and 21. These tabs are angled toward the outside of the hinge and slightly

upward toward the line of flexure as clearly shown in FIGS. 4 and 5. Tabs 20 and 21 are used to hold the leaves of the hinge assembled with the structures to which they are to be attached by protruding through openings provided within the walls of the structures as will be more fully described hereinafter.

The hinge 10 and its associated parts are preferably integrally molded as a single piece from one of the memory plastics and in particular from polypropylene. Polypropylene is well known as plastic which has good flexibility and tensile strength as well as resistance to fatigue. In addition, polypropylene has the ability to stretch beyond a given limit without damage and then return to within the given limits upon being relaxed for a sufficient time. This property is very important in the structure of the hinge of the invention because the stop straps, which are of a given length, to help control the angle through which the hinge can be opened, can be stretched beyond the given angle without causing damage to the hinge or to the structure to which it is attached. The straps, upon being relaxed for a sufficient amount of time, will return to their normal length and again be able to control the opening of the hinge to the desired angle.

The hinge finds its primary use as a hinge for plastic containers and particularly containers provided with opposed recesses in the adjacent rear walls of the cover and base section of the container.

Such a use is shown in FIGS. 3, 6 and 7 wherein the downwardly rear wall of the cover is indicated at 22 and the upwardly extending rear wall of the base of the container at 23. Opposed recesses 24 and 25 are molded into the walls 22 and 23 respectively, and have front walls 26 and 27 and rear walls 28 and 29 connected at their lower end by bottom walls 30 and 31. The number of recesses and size depend on the size of the container and the weight of the cover which the hinges have to support. Each of the rear walls 28 and 29 is provided with an aperture 32 and 33, respectively. It will readily be understood all that is necessary to assemble the hinge to the cover and body section of the container is to slide the leaf 11 in recess 24 and leaf 12 in recess 25. As the leaves reach the bottom of the recess, tab 20 will snap into opening 32 and tab 21 will enter opening 33. Inasmuch as these tabs are formed as being angled outwardly from the plane of their respective leaves, any force tending to separate the cover from the base will only seat the hinge more firmly in the recess. It can be seen the hinge is easily assembled in place without the use of special or expensive tools. To remove each of the leaves of the hinge, it is only necessary to insert a pointed object such as a pencil into either of the openings 32 and 33 and press the tab toward the front wall of the recess while gently pulling upwards on the cover until the leaf clears the recess, the remaining leaf of the hinge being removed from its recess in a like manner. Again no special tools were needed.

When the hinge is in place and the cover in the opened position as shown in FIG. 6, the thickened portion 19 of the straps rests against the lower edge 34 of wall 28 and against the upper edge 35 of wall 29 to control, with the aid of the length of the straps 17 and 18, the angle of opening for the cover. It will be seen that if the thickened portion 19 were to be made thicker or thinner, then the amount of opening of the cover would be changed. Accordingly, it will further be understood that if in the event the cover is accidentally moved through an angle greater than the desired angle, the stop straps will stretch and damage to the hinge or container will be prevented.

If the straps are stretched as above stated and the cover is closed for a sufficient time, the straps will creep back to their original length and the cover will once again be able to be opened to the desired amount and stay at that position.

Plastic containers which are each and every day finding more and more uses have for the most part used metal

hinges and when the covers of these containers were forced beyond their normal opening angle, the containers were damaged. Therefore, the use of a hinge as described herein prevents such damage and the ease with which the hinge can be manufactured and assembled with the container makes for a much improved efficient product at a reduced cost. Although in the preferred embodiment the hinge is molded as a single piece, it is obvious that the straps could be separate pieces connected to the leaves of the hinge in any suitable manner and that instead of using the tabs for fastening the hinge in place, other type fastening means could be used. However, the simplicity of the tabs cooperating with the openings in the walls of the recess can be appreciated.

Although a specific embodiment of the invention has been shown to illustrate the principles of the invention, it should be clear that modifications can be effected that do not depart from these principles and therefore this invention should be limited only by the spirit and scope of the following claims.

What is claimed is:

1. A plastic hinge for connecting two members having opposed edges, said hinge comprising a pair of leaves connected by a thin flexible web defining a line of flexure, means for attaching said leaves to said members so that one member is able to pivot about an axis parallel to said line of flexure, at least one stop strap having each of its ends connected to one of said leaves, the body of said strap being unconnected to the hinge and extending over said line of flexure, the center of said body of said strap having a thickened portion which cooperates with the said opposed edges of the said member to control the relative angular movement of said leaves and of said members through an angle of substantially 90°, said stop strap being made of memory plastic material so that said strap is capable of stretching when one of the said members moves through an angle greater than 90° to prevent damage to the said members and of returning to its original length upon being relaxed for a sufficient length of time.

2. A hinge according to claim 1 wherein the hinge is made of polypropylene.

3. A hinge according to claim 1 wherein the hinge and its associated parts are molded as a single integral piece.

4. A hinge according to claim 1 wherein there are a plurality of said stop straps axially spaced along the body of said hinge.

5. A plastic hinge for a container having base and cover sections each provided with a rear wall, said rear walls having opposed edges, said walls having provided in their outer edges, in opposed relationship recesses, one of said recesses provided in each of the rear walls of said base and said covers, the outside walls of each of said recesses provided with at least one aperture, said hinge having a pair of leaves connected by a flexible axially extending web defining a line of flexure, at least one tab struck from each of said leaves to cooperate with said apertures to hold the leaves in said recesses, at least one stop strap having each of its ends connected to one of said leaves, the body of said stop strap being unconnected to the hinge and extending over said line of flexure, the center of said stop strap body having a thickened portion, said portion cooperating with the opposed outer edges of said rear walls of said cover and base of the container to control by means of the thickness of the said portion the extent to which the cover will open and said stop strap being of sufficient length to permit said cover to open to an angle of substantially 90°, said hinge and said stop strap being made of a memory plastic so that said stop strap will stretch if said cover is opened through an angle much greater than 90° to prevent damage to the container and then return to its original length upon being relaxed for a sufficient length of time.

6. A hinge according to claim 5 wherein the hinge is made of polypropylene.

7. A hinge according to claim 7 where there are two stop straps provided, one stop strap being formed at each of the outer side edges of the hinge.

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BOBBY R. GAY, Primary Examiner

5 D. L. TROUTMAN, Assistant Examiner