May 22, 1951 L. SWEET 2,553,882

SPRING HINGE

Filed Dec. 6, 1946

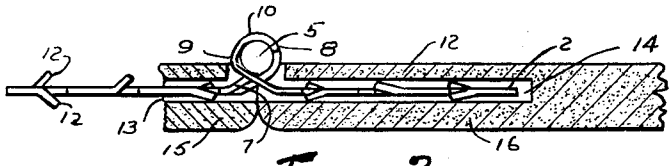



FIG. 2

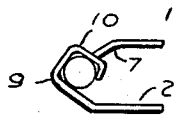



FIG. 7

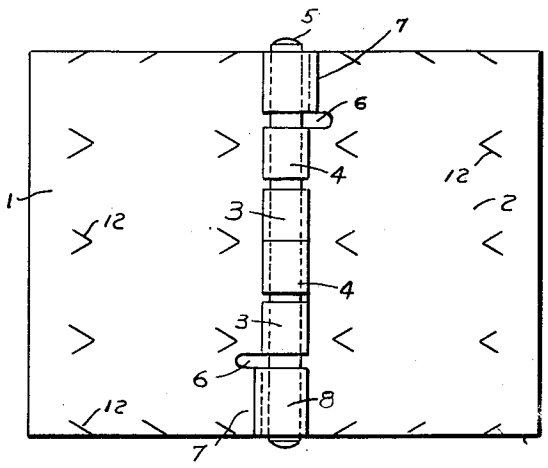



FIG. 1

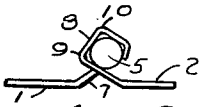



FIG. 3

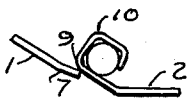



FIG. 4

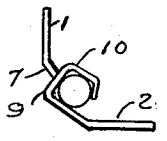



FIG. 5

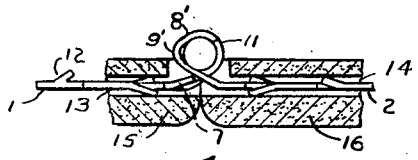



FIG. 8

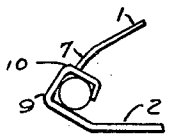



FIG. 6

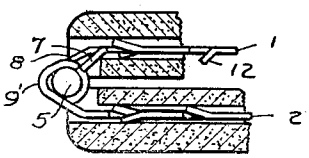



FIG. 9

INVENTOR.
LAURIE SWEET
BY
Bates, Teare & McBean
ATTORNEYS

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2,553,882

## SPRING HINGE

Laurie Sweet, London, England, assignor to Tinnerman Products, Inc., Cleveland, Ohio, a corporation of Ohio

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3 Claims. (Cl. 16—142)

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This invention relates to spring hinges of the kind comprising plates or leaves provided with co-operating knuckle members through which a hinge pin or pintle extends.

An object of the invention is to provide a simple spring hinge of the kind specified having a self- or snap-closing and/or self- or snap-opening action. A further object of the invention is to provide a spring hinge of the kind specified which, apart from the hinge pin, may be readily manufactured out of sheet material. Yet another object of the invention is to provide a spring hinge which is particularly suitable for use with containers made of plastic, wood or other relatively soft material and which may be easily secured to the lid and body portion of such containers by the mere act of inserting the hinge plates in slots formed in the lid and body portion, the use of screws, rivets or other extraneous fastening devices being obviated. A still further object of the invention is to provide a spring hinge of the kind specified wherein the hinge plates, and thus the parts secured thereto, are retained in their closed and open positions against unintentional relative movement.

In accordance with the present invention I form the plates of my spring hinge of resilient sheet material and I provide one plate with an integral cam member having one or more crests or shoulders and I provide the other plate with an integral spring tongue or other form of resilient follower that engages the cam member during opening and closing of the hinge and that co-operates with the cam member to give the hinge a self- or snap-opening action and/or a self- or snap-closing action.

Two forms of spring hinge in accordance with my invention are illustrated in the accompanying drawing, in which:

Fig. 1 is a plan view of one form of hinge;

Fig. 2 is a side view of the hinge, which is here shown with its plates inserted in slots formed in the lid and body portions of a container shown in section;

Figs. 3 to 7 illustrate diagrammatically the various positions occupied by the spring tongues in relation to the cam members in moving the hinge from the fully open to the fully closed position;

Fig. 8 is a view similar to Fig. 2 illustrating a modified form of hinge, and

Fig. 9 is a view similar to Fig. 8 showing the position of the spring tongues of this modified form of hinge when the lid of the container is in its closed position.

The hinge illustrated in Figs. 1 and 2 comprises two plates 1, 2 of resilient sheet material, preferably spring steel, each having at adjacent sides thereof spaced intermediately disposed bent over portions 3, 4 respectively which form interfitting knuckle members through which a hinge pin 5 extends. Each plate is slit transversely near one end as shown at 6 to form a tongue 7 that is bent up out of the plane of the plate and has at the other end a cam member 8 which comprises a portion which is bent over similarly to the knuckle members of the plate and which is shaped to provide two crests 9, 10, the arrangement being such that the end of each spring tongue 7 engages the surface of its opposed cam member 8 with the hinge pin 5 extending into the recesses of the cam members.

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The action of the hinge is as follows: With the plates substantially co-planar, i. e., with the hinge in the fully open position, as shown in Figs. 1, 2 and 3 the end of each spring tongue 7 engages its co-operating cam member 8 on the inner side of the inner crest 9 thereof. As the hinge is moved to the closed position, each tongue first comes into engagement with the first crest 9 of its cam member, as shown in Fig. 4, and is bent somewhat until it reaches the top of the crest. This bending of the tongue provides a certain resistance to the closing movement. Each tongue then snaps over the top of the crest and resumes its initial position relatively to its plate, as shown in Fig. 5. The tongues then wipe freely over the surface of each cam member between the two crests 9 and 10. Further closing of the hinge brings each tongue into contact with the second crest 10, as shown in Fig. 6, each tongue snapping over the top of the crest 10 and assisting in bringing the hinge to its closed position. In such position, each tongue resumes its initial or untensioned position with regard to its plate, as shown in Fig. 7.

When the hinge is opened, the reverse action takes place. The end of each tongue 7 engages the outer crest 10 of its cam member and a certain resistance is given to the initial opening movement due to the bending of the tongue from its normal position. On further movement each tongue snaps over the outer crest of its cam member, the opening movement being then assisted. The hinge then opens freely until the tongues reach the inner crests 9 of the cam members, the opening movement being further assisted when the tongues snap over the tops of such crests. It will be appreciated that the crests 9, 10 of the cam members serve to hold the hinge plates in the closed and open positions.

The second or outer crest 10 may advanta-

geously provide an abrupt shoulder which the tongue, with the hinge in the closed position, engages so that the hinge, and thus the parts hinged together, are more firmly held in closed position and a relatively large torque has to be applied to the hinge to bring the tongue out of engagement with the shoulder when it is desired to open the hinge. Such abrupt shoulder may, if desired, be provided by the free end of the cam member.

In the modified form of hinge shown in Figs. 8 and 9 each cam member 9' has a single inner crest 9' and a free end 11 forming an abrupt shoulder with which the free end of the tongue 7 engages when the hinge plates are in the closed position, as shown in Fig. 9. In other respects, this form of hinge is similar to that shown in Figs. 1 and 2.

The inner crest of the cam members may also advantageously provide an abrupt shoulder which operates to hold the hinge, and thus the parts hinged together, more firmly in open position, a relatively large torque being required to commence closing of the hinge.

In either form of hinge shown, the two hinge plates may be readily formed out of sheet material by simple stamping and forming operations and it will be appreciated that, since the parts are not of opposite hand, one set of tools will provide both hinge plates.

In accordance with an important feature of my invention the body portion of each hinge plate has sharp pointed tongues or claws struck and formed therefrom to project out of the plane of the plate with the points of the tongues extending towards the hinge pin. Such a construction allows the hinge plates to be secured in suitably shaped recesses provided in the parts to be hinged together by the mere act of inserting the plates into their recesses, the tongues, during such insertion, yielding to allow the plates to be pushed into the recesses but digging into the walls of the recesses to resist withdrawal of the plates from such recesses. Such a hinge is particularly adapted for use with containers formed of plastic, wood or other material softer than the plates, e. g., cigar and cigarette cases and boxes for holding toilet articles, since it is merely necessary to insert the hinge plates into slots or recesses formed in the lid and body portion, the use of screws, rivets or other extraneous fasteners to secure the hinge being obviated.

In the drawing the hinge plates of each form of hinge have tongues or claws 12 as described above and such plates are shown secured by the tongues 12 in slots 13 and 14 in the lid and body portions 15 and 16 respectively of a container.

In some cases, particularly in the case of hinges which it is desired should open through an angle considerably less than 180° e. g. 90°, the cam members could be provided with one crest or shoulder only.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:

1. A spring hinge comprising a pair of identical plates having cooperating knuckle members, a hinge pin extending through said members, each of said plates having a cam thereon and each of said plates having a resilient follower adapted to coact with the cam on the opposing plate, said coacting cams and followers operating with a snap action to hold one plate in a predetermined angular position with respect to the other plate.

2. A spring hinge comprising a pair of plates each having a knuckle member, a hinge pin extending therethrough, one of the knuckle members having an intermediately located outward bulge forming a cam, said knuckle member having a free end forming an abrupt shoulder, a spring tongue carried by the other plate and extending in a direction radial of the hinge pin and engaging said shoulder in the closed position of the hinge, said tongue trailing over the knuckle and across said bulge as the hinge is opened.

3. A spring hinge comprising a pair of plates, each having at least two knuckle members, one of the members of each plate being substantially cylindrical to snugly embrace a hinge pin, a hinge pin occupying such cylindrical knuckles of both plates, the other knuckle member of each plate having two arcuately spaced shoulders at least one of which is intermediately located and formed by outward bulging of the knuckle, each plate having a spring tongue adapted to engage said shoulders of the other plate successively upon the complete movement of the hinge.

LAURIE SWEET.

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