May 15, 1962 G. N. WILLIS 3,034,817

FASTENING DEVICE

Filed Nov. 4, 1959. 2 Sheets-Sheet 1

FIG. 1.

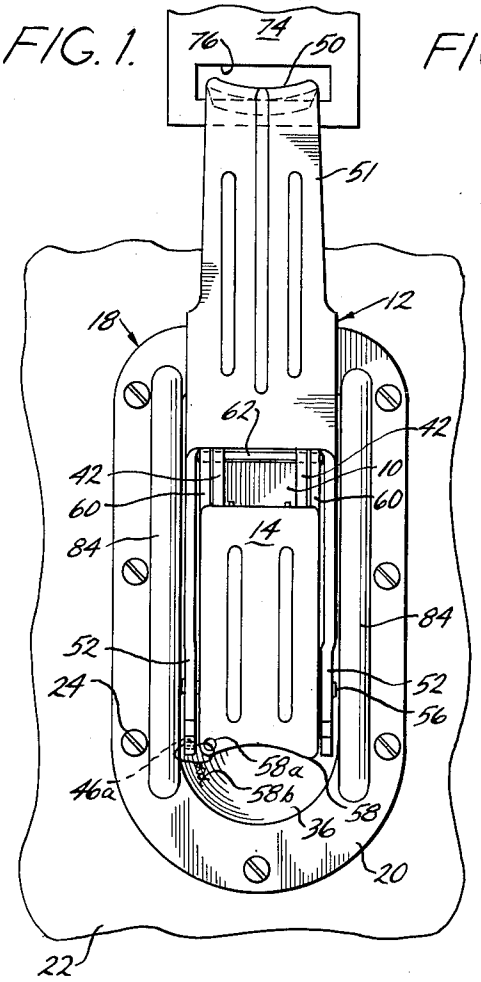


FIG. 2.

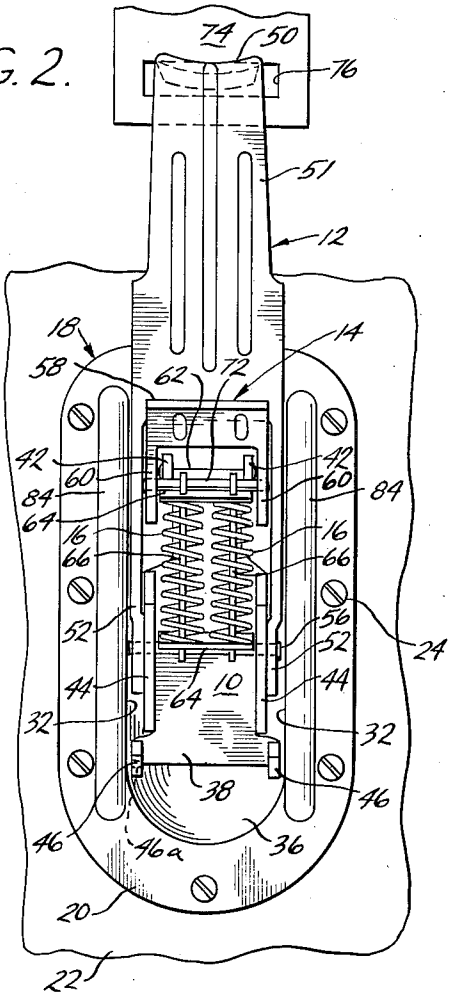
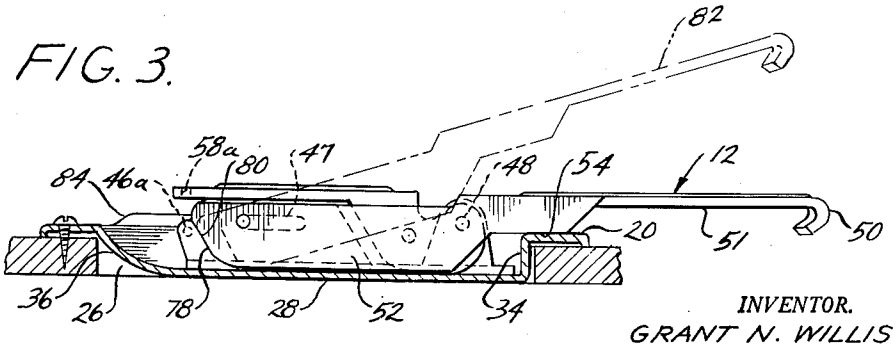


FIG. 3.



INVENTOR.
GRANT N. WILLIS
BY Steward & Steward
ATTORNEYS

May 15, 1962 G. N. WILLIS 3,034,817

FASTENING DEVICE

Filed Nov. 4, 1959 2 Sheets-Sheet 2

FIG. 4.

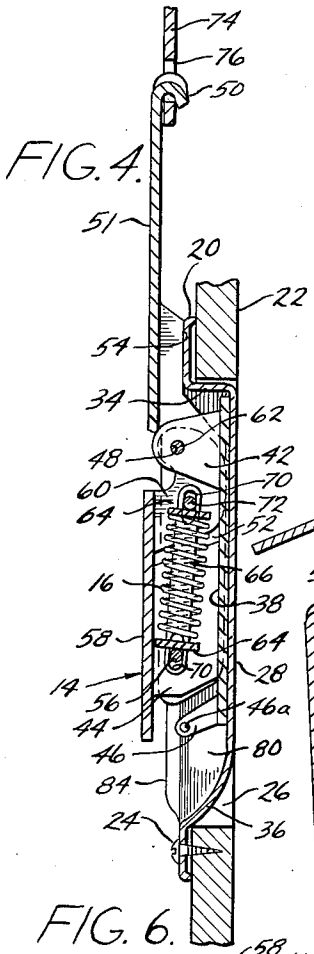


FIG. 5.

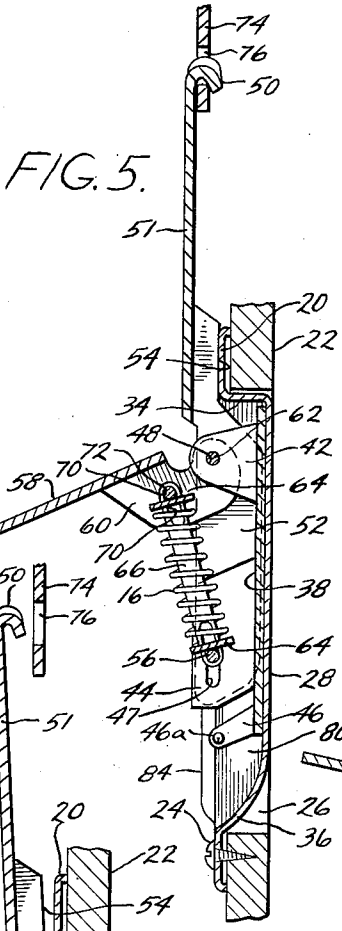


FIG. 7.

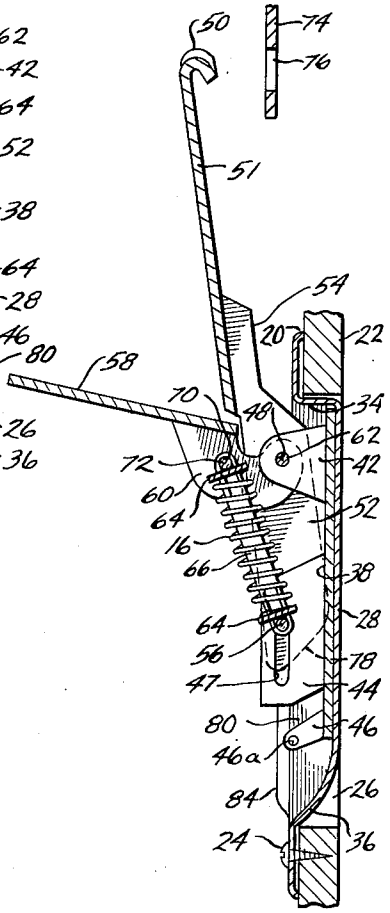
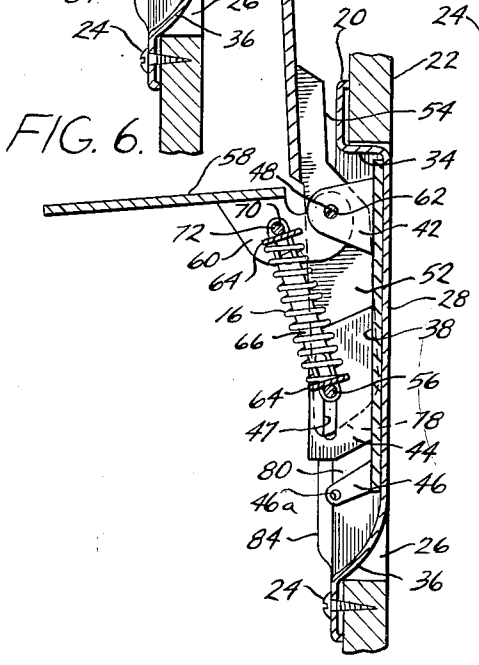


FIG. 6.



INVENTOR.
GRANT N. WILLIS
BY Steward & Steward
ATTORNEYS

United States Patent Office 3,034,817 Patented May 15, 1962

3,034,817
FASTENING DEVICE

Grant N. Willis, Bristol, Conn., assignor to J. H. Sessions & Son, Bristol, Conn., a corporation of Connecticut

Filed Nov. 4, 1959, Ser. No. 850,845
6 Claims. (Cl. 292—113)

The invention relates to fasteners for tightly securing the lids of boxes and other similar containers and more particularly to spring-loaded toggle fasteners in which a force is applied to the lid, after it has been drawn into engagement with the container, constantly acting to maintain that engagement.

Although many different constructions for such fasteners are known, these constructions have not been completely satisfactory in certain applications. Some constructions require that two hands be used in effecting engagement of the fastener with the lid and in drawing the lid into engagement with the container. In other constructions the movable parts of the fastener are so arranged as to move through wide arcs of travel and, upon the release of the force acting to hold the lid in engagement with the container, these parts are rapidly swung upwardly and outwardly through their arcs of travel, often to the injury of the person opening the fastener. In some constructions no provision is made for maintaining the catch of the fastener in a retracted position after the lid is removed from the container, while others are subject to accidental opening because of an exposed operating lever that may be accidently struck by extraneous objects.

It is, accordingly, the general object of the present invention to provide a fastener in which the foregoing disadvantages of prior known constructions are eliminated or substantially overcome.

More particularly, the invention has for its object the provision of a fastener which may be operated with only one hand while effecting engagement of the fastener with the lid and while drawing the lid into engagement with the container. Another object of the invention is to provide a fastener in which the movable parts of the fastener will be so arranged as to limit or prevent the parts from rapidly swinging through wide arcs of travel upon the opening of the fastener. Still other objects of the invention are to provide a fastener which will have means for maintaining the catch in a retracted position when the lid is removed from the container and which will have guard means for deflecting extraneous objects that might otherwise strike the operating lever and open the fastener.

Other objects of the invention will be apparent from a reading of the following specification and from an examination of the accompanying drawings.

Briefly, and in general, the invention comprises a base adapted to be mounted on the outer surface of a container adjacent an edge thereof, a catch and an operating lever which are each pivotally connected to the base independently of each other, and resilient means connected between the catch and the operating lever so as to be compressed upon pivotal movement of the operating lever inwardly toward the outer surface of the container. In addition to its pivotal connection with the base, the catch is also mounted so that the pivoted end thereof is movable with respect to the base in a direction substantially parallel to the outer surface of the container.

The resilient means preferably comprises one or more springs which are pivotally connected at one end to the operating lever at a point on the lever spaced from the lever's pivotal connection with the base, and are connected at the opposite end to the catch at the axis of the pivotal connection between the catch and the base. The operating lever is formed so that the point of connection with the springs, upon pivotal movement of the lever

inwardly and outwardly of the outer surface of the container, moves inwardly and outwardly of a plane passing through the pivot points of the catch and the operating lever.

For the purpose of illustrating the invention a preferred embodiment of the invention is shown in the drawings and this preferred embodiment will be described in detail hereinafter. However, it is to be understood that the following detailed description and the accompanying drawings are by way of example only and do not define or restrict the scope of the invention, the claims appended hereto being relied upon for that purpose.

Of the drawings:

FIG. 1 is a plan view of a preferred embodiment of the invention showing the positions of the various parts when the fastener is engaged with the lid;

FIG. 2 is a view similar to that of FIG. 1 showing the positions of the various parts when the fastener is disengaged from the lid;

FIG. 3 is a side view of the preferred embodiment of the invention, partially in section, showing the positions of the parts when the fastener is disengaged from the lid and with the operating lever of the fastener in its innermost position;

FIGS. 4–7 are sequential, sectional views taken along the longitudinal center line of the fastener, FIG. 4 showing the positions of the various parts when the fastener is engaged with the lid;

FIG. 5 shows the positions of the various parts after the operating lever has been moved to release the toggle;

FIG. 6 shows the positions of the various parts after the operating lever has been moved farther outwardly; and

FIG. 7 shows the positions of the various parts with the operating lever in its extreme outwardly position.

For the purpose of describing a preferred embodiment of the invention, reference will now be made to the drawings. As shown, the fastener comprises a base 10 (best shown in FIG. 2), a catch 12, an operating lever 14 and a pair of springs 16. In order to obtain as flat a construction as possible, the base 10 is fixedly secured, by spot welding or some other suitable means, at the bottom of a recessed plate 18 but this is not necessary and where desired could be secured directly to the container instead. The plate 18 is provided with a peripheral flange 20 and is adapted in use to be secured to the outer surface of a container 22 adjacent an edge thereof (not shown) by means of a plurality of screws 24 at spaced points on the flange 20. An opening 26 is provided in the container 22 to accommodate the recess 28 of the plate 18 (FIG. 4).

The recess 28 has generally parallel side walls 32 and straight and curved end walls 34 and 36 respectively. The base 10 has a flat bottom 38 with two pairs of upstanding bracket arms 42, 44 and a pair of upstanding lugs 46 formed at the sides thereof and is positioned immediately adjacent the straight end wall 34 of the recess 28. A pair of longitudinally extending laterally opposed slots 47 are formed in the bracket arms 44, while bracket arms 42 are provided with circular holes 48. The slots 47 in the brackets 44 are substantially parallel to the outer surface of the container 22.

Catch 12 is formed with a hook-like end portion 50 and has a substantially planar portion 51 that is provided with a pair of spaced, inwardly turned legs 52 extending longitudinally beyond the planar portion of the catch 12. The legs 52 lie closely adjacent the side walls 32 of the recess 28 and the inner edges thereof are formed with stepped portions 54 that engage the flange 20 of the plate 18 to limit inward movement of the catch. A rod 56 is positioned in and extends between the legs 52 adjacent their ends and passes through the slots 47 in the brackets

44. The fit of the rod 56 in the slots 47 is loose enough to permit the rod to fully pivot or move longitudinally therein. One end of the rod 56 is fixed against rotation in a leg 52 of the catch, as by staking or welding.

Operating lever 14 comprises a substantially planar finger piece 58 having a pair of curved, inwardly turned arms 60 formed at one end. A rod 62 passes through the outer end of the arms 60 and through the holes 43 in the brackets 42 to pivotally connect the operating lever 14 to the base 10 at a spaced distance from the pivotal connection of the catch 12 to the base 10 and at a point closely adjacent the planar portion 51 of the catch. The arms 60 of the operating lever 14 lie within and closely adjacent to the legs 52 of the catch 12 and the finger piece 58, in its innermost position, lies flatly between the legs 52 substantially in the plane of the planar portion 51 of the catch 12.

Preferably, the springs 16 are coil springs and two such springs are shown although a single spring only could also be used if desired. The ends of the springs 16 rest against plates 64 and each spring has a narrow bar 66 passing through its center and through slots (not shown) in the plates 64. The bars 66 have elongated slots 70 formed at both ends and the rod 56 of the catch 12 passes through the slots 70 at one end of the bars 66 while a pin 72 positioned between the arms 60 of the operating lever 14 passes through the slots 70 at the opposite ends of the bars 66. In order to provide a toggle action for the fastener, the pin 72 is positioned in the arms 60 at a point spaced from the rod 62 so that inward and outward pivotal movement of the operating lever 14 moves the pin 72 inwardly and outwardly of a plane passing through the rods 56 and 62. (See FIGS. 4 and 5.) As here shown, pin 72 is offset inwardly from planar portion 51 of catch 12, whereby the finger portion 58 of lever 14 lies substantially flush with the aforesaid planar portion 51 of the catch in the closed position of handle 14, yet pin 72 has at the same time been moved over-center of the toggle connection. This inward offset of pin 72 thus permits a construction of the catch and operating lever which is substantially flush and uninterrupted on the exposed face of the device.

Engagement of the fastener with the lid (not shown) of the container is effected by engagement of the hook portion 50 of the catch 12 with a strap 74 which is fixedly secured to the lid and which has a slotted opening 76 therein that serves to retain the hook portion 50 of the catch 12. (See FIG. 4.) The lid is drawn into engagement with the container by the action of the fastener in drawing the strap 74 toward the recessed plate 18 and the action of the fastener in drawing the strap 74 toward the recessed plate 18 will next be described with reference to FIGS. 4–7. While these views show the fastener vertically mounted on the side surface of the container 22, and the action will be described with reference to this mounting, it is to be understood that the fastener may be mounted horizontally or at any other angle just as well as vertically and is operative in any position.

In order to properly position the hook 50 to engage the opening 76 in the strap 74, it is necessary to move the operating lever 14 to its outermost position. Movement of the lever 14 to this position causes the springs 16 to raise the rod 56 and the catch 12 vertically upward until the rod 56 engages the top edges of the slots 47 in the brackets 44 (FIG. 7). The operating lever 14 is then pivoted downwardly causing the pin 72 in the arms 60 of the operating lever to move downwardly and inwardly (FIG. 6). This downward and inward movement of the pin 72 and the tops of the springs 16 causes the bottoms of the springs to move downwardly and to pivot about the axis of the rod 56. Since the springs 16 constantly urge the plates 64 apart, there is sufficient friction between the plates 64, the bars 66 and the rod 56 to cause the rod 56 to pivot in the slots 47. Because the rod 56 is fixed against movement relative to the catch, the catch 12 is also pivoted inwardly toward the strap 74 (FIG. 6).

By the time the operating lever 14 has been pivoted inwardly to the point where compression of the springs 16 starts to take place (FIG. 5), the hook 50 has been pivoted sufficiently inwardly and downwardly to become engaged with the slot 76 in the strap 74, and the stepped portions 54 of the catch have engaged the flange 20 on the plate 18. Further pivotal movement of the springs 16 cause the bars 66 to slip with respect to the rod 56. Thereafter further pivotal movement of the operating lever 14 draws the lid into engagement with the container and compresses the springs 16. When the lever 14 is pivoted inwardly sufficiently to move the pin 72 inwardly of the plane passing through the rods 56 and 62, the compression on the springs 16 is relieved slightly and the operating lever snaps to its innermost locking position (FIG. 4). As the springs are placed in compression because of the resistance of the closing of the lid, the distance between the rods 56 and 72 is reduced and the rods 56 and 72 no longer bear against the ends of the slots 70 in the bars 66.

In releasing the lid from engagement, the operation is reversed. Operating lever 14 is pivoted outwardly to move the pin 72 outwardly of the plane through the rods 56 and 62 and this releases the load on the springs 16, permits the lid to disengage from the container and causes the rods 56 and 72 to again frictionally engage the edges of the slots 70 in the bars 66. Thereafter, further outward pivotal movement of the operating lever 14 moves the hook 50 of the catch upwardly and out of engagement with the slotted opening 76 in the strap 74, the pivotal movement of the hook again resulting from the frictional engagement between the rod 56, bars 66, plates 64 induced by the pivoting springs 16.

It will be noted that whenever the fastener is closed with the catch under load, the ends of the legs 52 of the catch 12 do not engage the lugs 46 at the bottom of the base 10. However, as shown in FIG. 3, whenever the operating lever 14 of the fastener is closed with the catch unloaded, the ends of the legs 52 do engage the lugs 46. In order to provide positive means for maintaining the catch in its innermost position when the fastener is not holding the lid, the ends of the legs 52 are formed to provide straight cam surfaces 78 that engage corresponding cam surfaces 80 on the lugs 46, and these surfaces act to constantly urge the catch to its innermost position. The cam surfaces 78 and 80 act in this manner to return the catch 12 to its retracted position as long as the catch has not been moved outwardly of the position 82 shown in phantom lines in FIG. 3.

For the purpose of minimizing accidental opening of the fastener when under load due to the striking of the finger piece 58 of the operating lever 14 by an extraneous object, longitudinally extending guards 84 are provided on the flange 20 of the recessed plate 18 immediately adjacent the sides of the recess 28. The guards 84 extend upwardly above the flange 20 and are provided with rounded top surfaces 86 which serve to deflect objects that might otherwise accidentally release the operating lever 14.

The present invention as typified by the embodiment shown and described herein is believed to possess several advantageous features. Pivotally connecting the catch to the base independently of the operating lever results in more positive engagement with the lid since pivotal movement of the operating lever subsequent to engagement does not tend to disengage the catch. In addition, the independent connection of the catch to the base avoids any rapid pivoting of the catch resulting from the release of the load on the fastener. In the applicant's invention only the operating lever can snap through its arc of travel and the extent of this travel is restricted by the

bars 66 connecting the rod 56 and pin 72. The operating lever 14 is thus limited to the outermost position shown in FIG. 7.

The transmission of the pivotal movement of the operating lever 14 to the rod 56 and catch 12 results in the fastener being operable by one hand only. The positive positioning of the catch 12 by the cam surfaces 78 and 80 prevents the catch from loosely flopping during the times when the lid is removed from the container and retains the catch in a position from which it can engage the lid quickly and easily and with a minimum amount of movement. Provision of the guards 84 minimizes accidental opening of the fastener by deflecting extraneous objects upwardly away from the finger piece 58 of the operating lever 14. And the substantially flush, continuous exposed surface presented by the latch in its closed position further minimizes the chance of accidental opening or disengagement of the latch through contact of adjacent articles during shipment or transportation of the container to which the latch is attached.

What is claimed is:

1. A toggle fastener for tightly securing the lids of boxes and similar containers, said fastener comprising a base adapted in use to be mounted on an outer surface of a container adjacent an edge thereof, a substantially planar catch having a pair of spaced legs extending longitudinally of said catch and being pivotally connected adjacent their ends to the base at a point on the base adjacent the bottom thereof, said legs being mounted to be movable in a direction substantially parallel to said outer surface and the base, an operating lever having an end pivotally connected to the base at a point adjacent the planar portion of the catch and at a spaced distance from the point at which the legs of the catch are connected to the base, and resilient means pivotally connected to the legs of the catch adjacent the connection between said legs and the base and pivotally connected to the operating lever at a point spaced from the connection of the lever and the base.

2. A toggle fastener as set forth in claim 1, wherein said base has a pair of laterally opposed slots formed therein extending in a direction substantially parallel to the plane of said outer surface and said catch has a rod fixed in said longitudinally extending legs adjacent their ends with the ends of the rod extending into the slots formed in the base so as to join the catch to the base and to permit pivotal and substantially parallel movement of the catch with respect to the base and said outer surface of the container.

3. A toggle fastener as set forth in claim 2, wherein said resilient means comprise at least one coil spring having a bar passing through the center thereof, one end of which is pivotally connected to the operating lever at a point spaced from the connection of the lever to the base and the opposite end of which frictionally engages the rod fixed in the longitudinally extending legs of the catch.

4. A toggle fastener as set forth in claim 3, wherein said base is fixed to a recessed plate at the bottom of the recess in the plate and said plate is provided with longitudinally extending guards adjacent the side edges of the recess which guards extend upwardly above the plate and serve to deflect objects which might otherwise accidentally release the operating lever.

5. A toggle fastener as set forth in claim 1, wherein the ends of said longitudinally extending legs are formed to provide cam surfaces thereon and said base is provided with cam surfaces engageable with the cam surfaces at the ends of said longitudinally extending legs whenever said catch is not under load and said operating lever is in its innermost position and acting to urge said catch to move inwardly to its innermost position.

6. A toggle fastener for tightly securing the lids of boxes and other similar containers, said fastener comprising a base adapted in use to be mounted on an outer surface of a container adjacent an edge thereof and having a pair of laterally opposed slots formed therein extending in a direction substantially parallel to the plane of said outer surface, a catch having a rod fixed therein with the ends of said rod extending into the slots formed in the base so as to join the catch to the base and to permit pivotal and substantially parallel movement of the catch with respect to the base and outer surface of the container, an operating lever having an end pivotally connected to the base at a spaced distance from said slots, said operating lever also having a pin which is offset from the plane of the lever and which moves inwardly and outwardly of a plane passing through the pivot points of the lever and the rod in the catch, and resilient means pivotally connected to the pin in the operating lever at one end and frictionally secured at the other end to the rod in the catch, said resilient means comprising at least one coil spring having a bar passing through the center thereof, said bar having elongated slots at both ends through which said rod and pin extend whereby limited relative movement of the pin with respect to the rod may be perimtted.

References Cited in the file of this patent

UNITED STATES PATENTS

2,249,644	Anderson	July 15, 1941
2,605,123	Claud-Mantle	July 29, 1952
2,751,240	Claud-Mantle	June 19, 1956

FOREIGN PATENTS

491,723	Great Britain	Sept. 5, 1938