Jan. 26, 1965 L. P. MANSHIP 3,166,809

STRING FASTENING DEVICE

Filed Sept. 17, 1962

FIG.1.

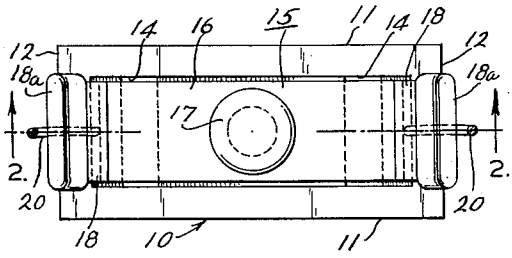


FIG.2.

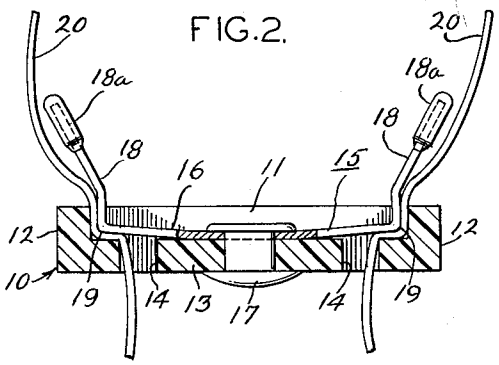


FIG.3.

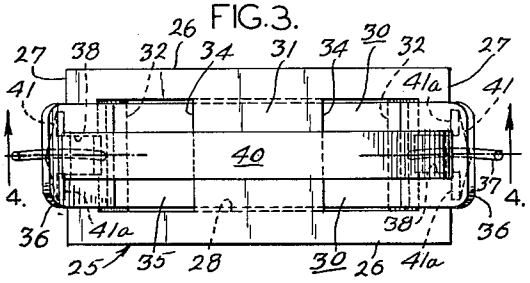


FIG.4.

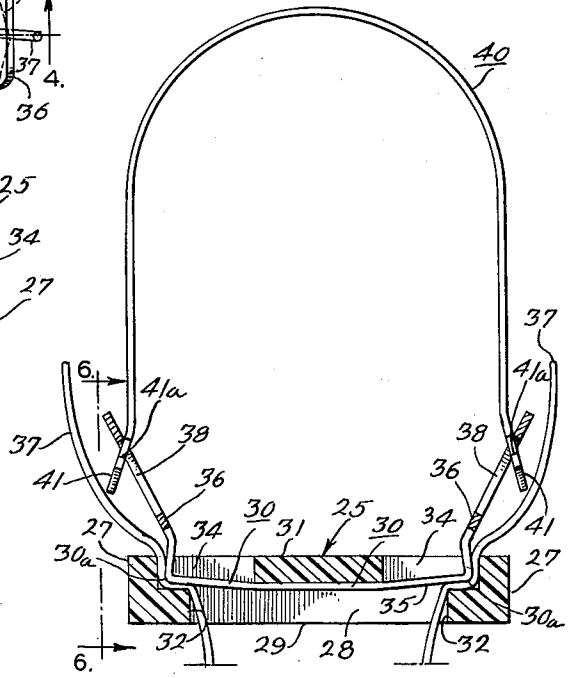


FIG.5.

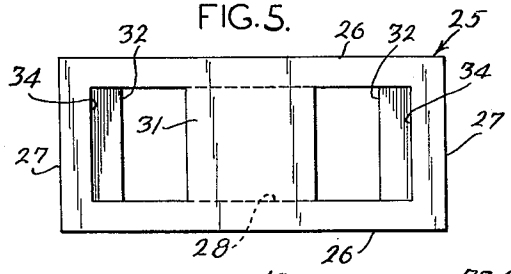


FIG.6.

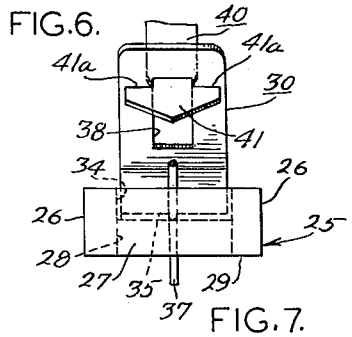


FIG.7.

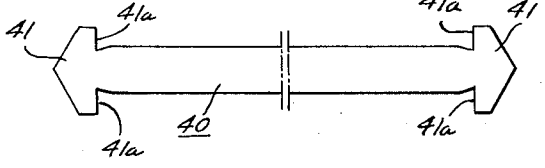
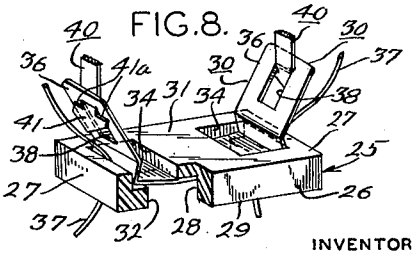


FIG.8.



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STRING FASTENING DEVICE

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This invention relates to a string fastening device, and more particularly to a device for tightening a drawstring and holding it firmly in tightened condition.

The invention may have widespread application but it is of particular interest in connection with ironing table covers. In their more usual form, such covers are secured to the ironing table top by means of a drawstring extending through a marginal hem or the like. In order to provide a smooth ironing surface it is important that the drawstring be pulled up with sufficient tightness to create a tension in the fabric. It is difficult to tie the ends of the string while maintaining this tension even when more than two hands are used, and it is virtually impossible for an unaided person to do it. At best, it is usual for a certain amount of looseness to exist when tying is completed.

A number of attempts have been made to provide a string tightening device, but they are all lacking in some respects with the result that none of them has been commercially applied. The proposed devices of the prior art fall in general into the following categories:

(*a*) An arrangement in which spring means permits movement of the device in either direction but resists such movement. This is unsatisfactory because the string may eventually work loose after initial tightening.

(*b*) An arrangement in which spring means permits movement of the device toward tightening position, but movement in the reverse direction causes the clamping means to bite into the string. This is undesirable since it may result in damage to the string.

An object of this invention is to provide a string clamping device that is readily movable toward tightening position, and one in which unintentional loosening is prevented by means that avoid damage to the string.

Another object of the invention is to provide a device of the above kind that may be manipulated easily by an unaided person.

A further object of the invention is to provide simple and positive means to remove the clamping pressure when the device is to be moved to a loosened position.

Another object of the invention is to provide a device of the above described kind that may be inexpensively manufactured.

In the drawings:

FIG. 1 is a plan view of one embodiment of the invention;

FIG. 2 is a sectional elevation taken along line 2—2 of FIG. 1;

FIG. 3 is a plan view of another embodiment of the invention;

FIG. 4 is a sectional view taken along line 4—4 of FIG. 3;

FIG. 5 is a plan view of the casing of FIG. 3;

FIG. 6 is a sectional view taken along line 6—6 of FIG. 4;

FIG. 7 is a plan view of a device for loosening the clamping pressure; and

FIG. 8 is a perspective view partly in section showing the embodiment of FIG. 3.

Referring to FIGS. 1 and 2, a shallow box or tray casing 10 is provided, preferably constructed of moulded plastic. The casing is substantially rectangular in shape and comprises side walls 11, end walls 12, and a thick bottom 13

relative to overall thickness of casing 10. Two apertures 14 through the bottom 13 are spaced inwardly from the end walls 12 and are here shown as rectangular slots parallel to the end walls, although they may be of other shape. A generally U-shaped leaf spring 15 is fixed to the bottom inside the casing by means of a centrally located rivet 17, or the like, which extends through bottom 13. The bottom of the leaf spring is slightly narrower and shorter than the space inside the walls of the box casing and conforms to the bottom of the casing, thereby overlying and closing slots 14. The upward extending legs 18 of spring 15, as seen in FIG. 2, are formed at 90° to the bottom 16, and closely parallel end walls 12. Above the end walls 12 the legs 18 are formed to diverge from one another. The ends of legs 18 are preferably coated with plastic to provide smooth grips 18*a* for manual manipulation.

In assembly, the free ends of the drawstring 20 are threaded upward through apertures 14 until they lie outside casing 10. Leaf spring 15 is then secured in place by means of rivet 17. The presence of the string causes the ends of the bottom portion 16 of the spring to bow upward creating a bias which clamps the string tightly against the portions of bottom 13 adjacent the end walls. A secondary clamping occurs between bends 19 and the insides of end walls 12. The bowing of the spring, mentioned above, causes the bottoms of legs 18 to slope inward resulting in substantially a line contact between bend 19 and the string, which creates maximum effective clamping pressure.

When casing 10 is moved toward tightening position, i.e. downward as viewed in FIG. 2, frictional engagement between the string and the leaf spring causes the ends of spring bottom portion 16 to lift and bends 19 to move upward and inward, thereby reducing the clamping effect and permitting the device to be pushed to fully tightened position while maximum tension is being maintained on the string. When the movement is discontinued, the spring immediately clamps the string against the two surfaces arranged at 90° to each other. The tension tending to move the string toward loosened position augments the spring bias pressure at both points through frictional engagement between the string and the spring, and the fact that the string is pulled against a small radiused corner or bend 19 between both clamping surfaces assists in locking the string against any movement.

FIGS. 3 to 6 represent an alternative and preferred embodiment, comprising a generally U-shaped spring 30, similar to spring 15 previously described, and a casing 25 having side walls 26 and end walls 27 illustrated in FIGS. 5 and 6. Casing 25 is substantially rectangular in shape but departs from box or tray form in that it includes a rectangular recess 28 formed in its bottom 29 leaving only narrow ledges 32 adjacent to end walls 27. These ledges 32 have a depth of approximately one-half the thickness of the casing. Intermediate the end walls 27 of casing 25 and extending between the side walls 26 at their top edge is a bridge 31. Occupying approximately the upper half of the thickness of the casing 25, bridge 31 is so arranged that two substantially square recesses 34 are thereby formed above the ledges 32 and between the bridge 31 and the end walls 27. Recesses 34 are of approximately the same width as recess 28 and the recesses overlap to form apertures on each side of the bridge between the bridge 31 and the ledges 32. The inner surfaces of end walls 27 and upper surfaces of ledges 32 are preferably at 90° to each other. The distance between the end walls 27 is only slightly greater than the distance between legs 36 of spring 30 at the radii 30*a* with its bottom 35.

In assembly, the free ends of draw-string 37 are threaded upward (in the sense of FIG. 4) through the

apertures until the ends lie outside casing 25. Leaf spring 30 is then installed, for example by feeding the end of one arm 36 downward through one recess 34 into recess 28 and then upward through the other recess 34. Squeezing together the arms 36 permits the spring to be positioned so that it may be snapped into the assembled position shown in FIG. 4. Preferably, the relative depths of recesses 28 and 34 are such that the vertical distance between the bottom of bridge 31 and the tops of ledges 32 is substantially equal to the thickness of the bottom 35 of leaf spring 30. The presence of the string between the inner faces of the end walls 27 and the ledges 32, respectively, and leaf spring 30 causes a bowing of the spring, as illustrated, creating a bias force which results in a clamping action on the string as described in connection with the first embodiment. Spring 30 is held in place by its own resilience so that no riveting or other attachment means is required.

It will be seen that in both embodiments clamping is provided between smooth spring faces and smooth casing faces, including smooth spring radii at the bends between the bottom and each arm so that damage to the string is avoided.

When loosening is desired, the extended free ends of the spring 30 are pressed toward each other, thereby releasing the clamping action at all points, and the device can be slipped along the string at will. The user requires only a single hand for either tightening or loosening, leaving the other hand free for manipulation of the string. To facilitate releasing the clamping pressure, divergent portions of arms 36 of the spring may be provided with an actuating means. Through slots 38 in arms 36 as indicated in FIGS. 4, 6 and 8 extend the ends 41 of flexible plastic strip 40. The arrow-shaped tips 41 (See FIG. 7) are threaded through the slots 38 by turning the strip 40 so that the relatively narrow width of tip 41 will pass through the slot. When the ends are through the slot and the strip is returned to its normal orientation, shoulders 41*a* engage the arms 36 of the spring 30 adjacent the slot. A finger inserted into the loop thus formed and pulled upward on strip 40, as shown in FIG. 4, causes the ends of the spring to move inward, thereby releasing its clamping surfaces from the string so that the string is free to move.

Although only two embodiments of the invention have been described, modifications will be apparent to persons skilled in the art; and it is therefore to be understood that the invention is not to be limited in interpretation except by the scope of the following claims.

I claim:

1. In a string fastening device, the combination comprising a casing having string receiving means at opposite portions thereof, said casing including horizontal and vertical surfaces adjacent each end, a leaf spring overlying said horizontal surfaces including a 90 degree bend forming vertically extending portions positioned closely adjacent said vertical surfaces, and means for biasing said spring toward said horizontal surfaces whereby a string interposed between said spring and said surfaces at either end portion of said casing will be clamped by said leaf spring at two places at 90° to each other.

2. A string fastening device in accordance with claim 1, in which the vertically extending ends of said spring extend outside the casing for manual manipulation.

3. In a string fastening device, the combination comprising a casing having string receiving means at opposite portions thereof, said string receiving means of said casing including two surfaces arranged at approximately 90 degrees to each other, yieldable clamping means having portions shaped with an approximate 90 degree bend to substantially conform to said casing surfaces, and mounting means to hold said clamping means in a position such that one portion of said clamping means will clamp a string against one casing surface and the portion of said

clamping means at approximately 90 degrees to said one portion will clamp the string against the other casing surface at approximately 90 degrees to said one casing surface, thereby clamping the string on two surfaces approximately 90 degrees to each other.

4. A string fastening device in accordance with claim 3, wherein said clamping means presents a smooth surface to the string, and the string is clamped against a smooth surface.

5. A string fastening device in accordance with claim 3, adapted for use with a drawstring mounted in the marginal hem of an ironing table cover.

6. The string fastening device of claim 3 in which the yieldable clamping means comprises a leaf spring with the end portions of said leaf spring beyond said 90 degree bend being formed at an angle to extend outside said casing for manual manipulation.

7. In a string fastening device, the combination comprising a casing having a central recess in its lower face and two recesses adjacent respective ends of said casing in its upper face forming a central portion in said casing, said two recesses opening in part into said central recess in a manner to form upwardly facing ledges adjacent each end of said casing, each said ledge having a horizontal and vertical surface, and a leaf spring extending beneath the portion of said casing between said two recesses, said leaf spring being biased toward engagement with the horizontal surfaces of said ledges by said central portion of said casing, said leaf spring including an approximate 90 degree bend forming vertically extending portions closely adjacent the vertical surfaces of said ledges of said casing, whereby a string imposed between said spring and the faces of said ledge will be clamped against two surfaces at 90 degrees to each other.

8. A string fastening device in accordance with claim 7, wherein a loop of flexible material is provided interconnecting both terminal portions of said leaf spring whereby a pull on said loop will move said terminal portions toward each other.

9. A string fastening device in accordance with claim 7, in which the vertical surfaces of said ledges cooperate with the vertical extending portions of said leaf spring in retaining said spring in operating position.

10. In a string fastening device, the combination comprising a casing having a central recess in its upper face and two recesses adjacent respective ends of said casing in its lower face, said two recesses opening into said central recess in a manner to form an upwardly facing ledge having horizontal and vertical surfaces adjacent each end of said casing, a leaf spring overlying said horizontal surfaces of said casing, and means restraining said spring at its center downwardly toward the casing surface of said central recess, said leaf spring being biased toward engagement with the horizontal surfaces of said ledges, said leaf spring including approximate 90 degree bends forming vertically extending portions which cooperate with the vertical surfaces of said casing whereby a string imposed between said casing and the faces of said ledge will be clamped between two surfaces at 90 degrees to each other.

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