July 5, 1960 H. W. PATTERSON 2,943,371

TYING AND FASTENING DEVICE

Filed April 10, 1958

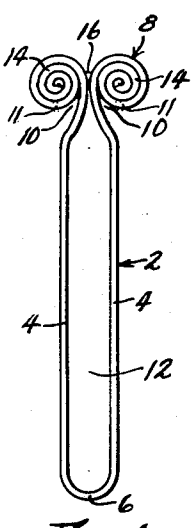


Fig. 1

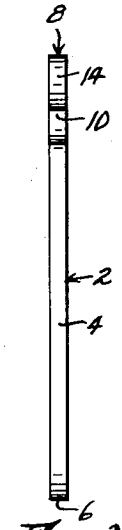


Fig. 2

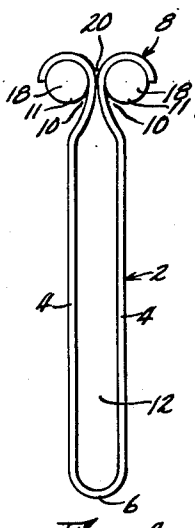


Fig. 4

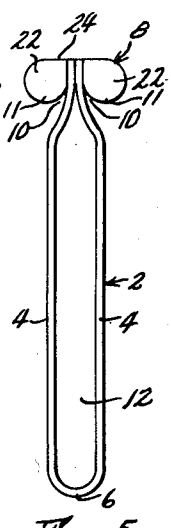


Fig. 5

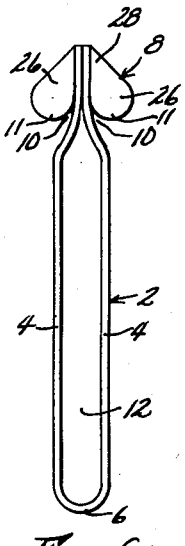


Fig. 6

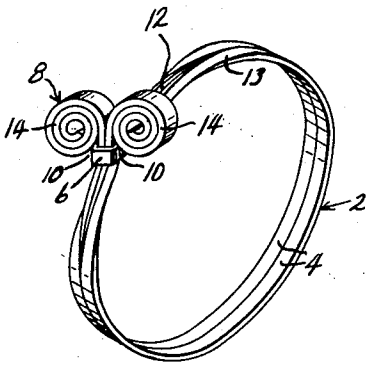


Fig. 3

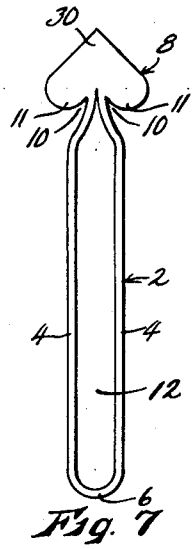


Fig. 7

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2,943,371

Patented July 5, 1960

2,943,371

TYING AND FASTENING DEVICE

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Filed Apr. 10, 1958, Ser. No. 727,700

7 Claims. (Cl. 24—16)

This application is a continuation-in-part arising from my co-pending application, Serial No. 380,449, filed September 16, 1953, now Patent No. 2,917,423, and entitled "Tying and Fastening Device and Method of Making Same."

This invention relates to new and useful improvements in fastening devices in the general class of rubber bands, and relates particularly to tying or fastening devices comprising an elongated loop of elasitc material having an enlarged head at one end thereof. The loop is passed about the objects to be fastened together or bound thereby, and is secured by passing said head through the bight portion of the loop, in which it is retained by its configuration. This invention is an improvement over the structure shown in my Patent No. 2,648,879, issued August 18, 1953.

The principal object of the present invention is the provision, in a tying and fastening device of the character described, of an improved configuration for the device, particularly the arrangement of the head and the immediately adjacent portions of the loop, whereby said head may be more easily disengaged from the bight of the loop when it is desired to release the fastener, without at the same time sacrificing any appreciable degree of the security of the fastener while operative. My prior patent above identified contemplates the use of a planar head of the same material as the loop, as a practical and economical construction. Turning of the head so that its plane was in alignment with the loop opening, in which position it could be pulled through and disengaged from the loop to release the fastener, was prevented by forming notches in the head in which the loop engaged to prevent turning of the head therein. These locking notches were of course essential to prevent accidental release of the fastener, but they also rendered intentional release more difficult under some circumstances in that such intentional release could be accomplished only by the application of considerable torque to the head, or by manually enlarging the loop to such an extent that the head could pass therethrough. Accordingly, the improvement of the present invention contemplates a fastener of the class described wherein the above difficulties of release are overcome, this object being accomplished generally by the attachment of both reaches of the loop directly to the head member, rather than through the intermediacy of a single strand neck as in my prior patent above identified. Release is accomplished by pulling on one of the reaches of the loop adjacent the bight.

Other objects are simplicity and economy of construction, efficiency and dependability of operation, and adaptability for use in a wide variety of tying and fastening operations. With these objects in view, as well as other objects which will appear in the course of the specification, reference will be had to the drawing, wherein:

Fig. 1 is an elevational face view of a tying and fastening device embodying the present invention,

Fig. 2 is an edge view of the device as shown in Fig. 1,

Fig. 3 is a perspective view showing the device with the head operatively secured in the loop, and

Figs. 4, 5, 6 and 7 are views similar to Fig. 1 and showing respectively different modified forms of construction.

Life reference numerals apply to similar parts throughout the several views, and the numeral 2 applies generally to an elongated loop formed of a strand of soft elastic rubber or the like, said loop having a pair of opposite reaches 4 connected at one end by a connecting portion 6 hereinafter designated the bight of the loop, and connected at their opposite ends to an enlarged head 8, said reaches being directly adjacent, or closely spaced apart, at their points of attachment to said head. The head is planar, its plane corresponding to that of loop 2. In its plane, said head projects substantially equally at opposite sides of the loop, as shown. Respectively at the distal sides of loop reaches 4, a pair of notches 10 are formed in head 8, said notches opening generally in a direction toward bight 6, as shown in Figs. 1, 4, 5, 6 and 7. Referring to Figs. 1, 2 and 3, it will be seen that the two reaches 4, at the point they join the head, have a combined thickness, in a direction lying in the plane of the loop and at right angles to reaches 4, approximately equal to the thickness of the loop, in a direction at right angles to its general plane. This proportion is an important feature in the present invention, as will be described below.

In use, the reaches 4 of the loop are wrapped coextensively around a bundle of objects to be secured or bound together, and head 8 is pulled through the bight portion 6 of the loop 2, as best shown in Fig. 3, the loop engaging securely in notches 10 as shown. Exemplary uses of the device are for tying vegetables or the like in bundles, or for securing ladies' hair in braids or the "pony tail" style of hairdress, or for closing sacks or bags, of liners therefor, particularly where it is desired that the fastener be usable repeatedly to re-close the bag or liner, or generally for any use to which ordinary rubber bands may be placed. It is particularly applicable, of course, where the ends of the objects to be bundled or secured are not accessible, or are otherwise not so disposed that an ordinary rubber band may be conveniently passed thereover.

It will be seen that the engagement of loop 2 in the notches 10 of the head prevents the head from turning or twisting (around the loop reaches 4 as an axis) so that the plane thereof could accidentally become aligned with the loop opening 12 when the device is secured operatively as in Fig. 3, since to do so causes interference between the loop reaches and solid portions of the head, namely knobs 11. Also, accidental turning of the head may be prevented by the planar shape of the head, in that said head tends in most cases to rest flat against the object or bundle of objects about which the fastener is secured, whereby it is prevented from turning.

However, when it is desired to release the fastener, it is of course desirable that the head actually can be turned so that the plane thereof is aligned with loop opening 12. In the present device, release is accomplished by grasping one of loop reaches 4 adjacent bight 6, as for example at point 13 in Fig. 3, and pulling this reach away from the opposite reach and away from head 8. This of course tensions and stretches the bight portion of the strand. Bight 6 has a high-friction engagement or contact with reaches 4 adjacent the head, and stretching the bight therefore applies a torsional force to reaches 4 adjacent the head, tending to twist them together about their own axis. This turns head 8 about the same axis, and when it has turned sufficiently that its plane is aligned with loop opening 12, it will pass therethrough to release the fastener.

At least two specific features of the present structure assist in the releasing action just described. Firstly, the fact that both ends of the strand are connected directly to the head, rather than the head being connected to the loop by a single strand neck as in my above identified prior patent, provides that the loop bight encircles a member which is much broader, in a direction lying in the plane of the head, than was previously the case, with the result that tensioning and stretching the bight operates about a greater moment arm, or has better leverage, to twist the head into the plane of the loop opening. With a narrow single-strand neck, much less torsion can be exerted on the head. There is of course a limit to the combined thickness of the strands which is practical to employ. If this dimension is too great, even the slight torsion exerted on the reaches by the bight due to the fact that the fastener may have been applied with the reaches 4 in unequal tension, may be sufficient to turn the head into the plane of the loop opening and cause accidental release. It has been found that good release properties consistent with good holding properties can be obtained where the combined cross-sectional area of reaches 4 adjacent the head is approximately square; that is, where the thickness of the two strands combined, in the plane of the loop, is approximately equal to the thickness of the loop at right angles to the plane of said loop. While this proportion is not particularly critical, too large a deviation therefrom in either direction will cause an objectionable loss of either the ease of release, or of the holding efficiency of the device.

Secondly, the relase action just described is further assisted in the present structure by the fact that both reaches of the loop are secured directly to the head, rather than to a single-strand neck, in a manner quite separate from the extra width and better torsion discussed above, this second operation arising out of the very fact that the loop bight does encirle a double-strand "neck." When one of reaches 4 is pulled in the releasing operation previously described, it exerts a force directly on the knob bounding the notch **10** in which that reach is engaged, thereby tending to force the head out of normal alignment with the double-strand "neck" formed by the portions of reaches 4 contained within the bight **6** of the loop. Such misalignment is of course essential or at least highly instrumental in the eventual alignment of the head with loop opening **12** to procure release, but it is accompanied by a bending and twisting of the double-strand "neck" above described. If said neck were single strand as in my above identified prior patent, and were broadened to provide the torsional advantage previously discussed, it would be relatively stiff and rigid, and would have correspondingly greater resistance to the bending and twisting just described. However, when the neck comprises a double strand as in my present invention, the strands can and do slip longitudinally with respect to each other, and thereby provide that the head can be more easily moved with respect to the loop to permit easier release. In other words, the double-strand connection to the head is more flexible and yieldable than a single-strand neck of comparable overall cross-sectional area.

The specific structure providing the loop and head arrangement thus far described may be of many different forms, as exemplified by the modifications illustrated in the drawing. In the species shown in Figs. 1, 2 and 3 both the loop and head are formed from a single strand of rubber. The end portions of said strand are coiled spirally to provide a pair of generally circular discs **14**, and securing them in this form by cementing, vulcanizing, or the like. The two knobs are then brought together so as to be substantially tangential at the points of attachment of strands 4 thereto, and secured together as at **16** by cementing, vulcanization or the like. The lower portions of discs **14** form knobs **11**.

In the form of the device shown in Fig. 4, head **8** is formed of a pair of solid circular discs **18**, the end portions of loop reaches **4** being wrapped respectively about the edges of said discs and cemented or vulcanized thereto, and the strands being likewise secured together, as at **20**, generally tangentially at their points of joinder with said discs.

The form of the device shown in Fig. 5 is substantially identical to that shown in Fig. 4, except that the members **22** thereof, which correspond to the discs **18** of Fig. 4, are not circular, but are shaped to present a straight edge **24** along the upper edge of the head, as clearly shown, thereby providing a longer attachment between the reaches 4 and knobs **22** that is possible in the Fig. 4 species. The Fig. 5 modification has the advantage of preventing the tendency of the two knobs to "roll" upwardly together under the pressure of the loop thereabout, as could occur under extreme conditions of tension in the species shown in Figs. 1 and 4. Such a roller action tends to open the notches **10**, and permit accidental escape of the loop **2** therefrom.

The species of the device shown in Fig. 6 is substantially identical to that shown in Fig. 5 except that in Fig. 6 the two members **26**, which correspond to the members **22** of Fig. 5, and the intervening portions of loop reaches **4**, are extended upwardly to form a generally triangular tab **28**. This tab is of assistance in pulling the head through the loop since it has a greater area to provide a good finger grip, and because of its pointed shape is more easily inserted through the loop.

The species of the device shown in Fig. 7 is substantially identical to that of Fig. 6 in general finished configuration, but is formed with the head **8** and loop **2** integral, by means of extrusion, molding or the like. That is, the loop **2** is extruded through a suitable die in the form of an elongated tube, with the head **8** as a continuous rib extending longitudinally along said tube. The tube and rib are then severed into short lengths to form the finished devices. The operation of this species is identical to that shown in Fig. 6, the upper triangular portion of the head forming a tab **30** similar to tab **28** of Fig. 6.

While I have shown and described certain specific embodiments of my invention, it will be readily apparent that many minor changes of structure and operation, such as the shape, proportions and configuration of head **8**, knobs **11** and notches **10**, could be made without departing from the spirit of the invention as defined by the scope of the appended claims, and it is accordingly desired that my protection extend to all subject matter falling properly within the purview of said claims.

What I claim as new and desire to protect by Letters Patent is:

1. A tying and fastening device comprising an elongated strand of elastic material and an enlarged, generally planar head, both ends of said strand being secured directly to said head in closely adjacent relation, said head including a pair of knobs spaced apart respectively from the distal sides of the end portions of said strand at their points of attachment to said head, whereby to form a pair of notches respectively between each of said knobs and the adjacent end portion of said strand, said notches opening outwardly from said head in the general direction of the extension of said loop therefrom, and said strand forming a loop lying in the plane of the head and having a bight portion distal from said head, whereby when said enlarged head is inserted through the bight portion of said loop, the bight will engage the strand just below said head, and the enlargement of said head will prevent its pulling through said loop.

2. A tying and fastening device as recited in claim 1 wherein the combined thickness of the end portions of said strand, in the plane of said loop, is approximately equal to the thickness of the loop in a direction at right angles to the plane of the loop.

3. A tying and fastening device as recited in claim 1 wherein said head is provided with a reduced extension projecting generally oppositely from said head as compared to said loop, whereby to form a tab useful in pulling said head through the bight of said loop.

4. A tying and fastening device as recited in claim 1 wherein said head is formed by integrally secured extensions of said strand at each end thereof, each of said extensions being arranged and secured in tight spiral form to form one of said knobs, said knobs being secured together substantially tangentially at the points of joinder of said strand thereto.

5. A tying and fastening device as recited in claim 1 wherein the end portions of said strand are secured together in side by side relation, and wherein said knobs are joined respectively to the distal sides of said strand at the portions thereof joined together.

6. A tying and fastening device as recited in claim 1 wherein said head and said strand are secured integrally together.

7. A tying and fastening device as recited in claim 1 wherein said head and said strand are secured integrally together, said head having a substantially arrowhead shape with its point disposed oppositely from the points of connection of said strand thereto, and having re-entrant notches formed therein respectively at the distal sides of said points of connection.

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