United States Patent [19]

Schauweker et al.

[11] **3,813,734**

[45] **June 4, 1974**

[54] **BUCKLE**

[75] Inventors: **George H. Schauweker,** Southbridge; **Harry Dostourian,** Worcester, both of Mass.

[73] Assignee: **American Optical Corporation,** Southbridge, Mass.

[22] Filed: **Nov. 3, 1972**

[21] Appl. No.: **303,444**

[52] **U.S. Cl.** ..... **24/200,** 24/74 A

[51] **Int. Cl.** **A44b 11/02**

[58] **Field of Search** ..... 24/200, 198, 79, 74 A

[56] **References Cited**

UNITED STATES PATENTS

3,075,268	1/1963	Schwartz	24/200
3,206,816	9/1965	Vilcins et al.	24/200
3,214,815	11/1965	Mathison	24/200
3,315,324	4/1967	Ward	24/16 PB
3,414,943	12/1968	Hattori	24/200

Primary Examiner—Francis K. Zugel
Assistant Examiner—Darrell Marquette
Attorney, Agent, or Firm—H. R. Berkenstock; William C. Nealon

[57] **ABSTRACT**

A self-locking buckle for straps, belts, bands or ties formed of a one-piece unit having two sections, one folded over the other to form a first strap connection at the juncture of folding and a second adjustable strap connection adjacent corresponding free ends of the folded unit. The latter connection is adapted to receive one end of a strap threaded over one free end of the unit and beneath the other free end reversely upon itself for longitudinal sliding adjustment of its effective length relative to the buckle and automatic locking at preselected positions of the adjustment.

3 Claims, 5 Drawing Figures

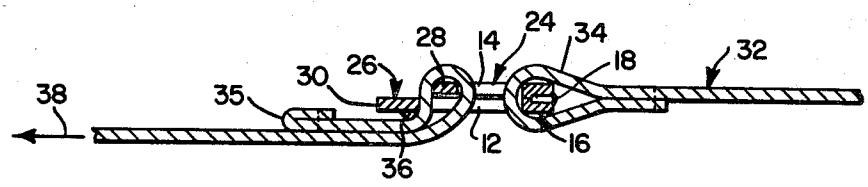


FIG. 1.

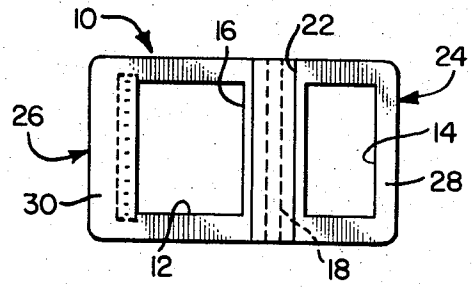


FIG. 2.

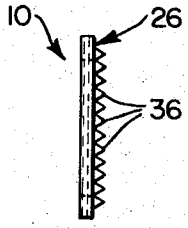


FIG. 3.

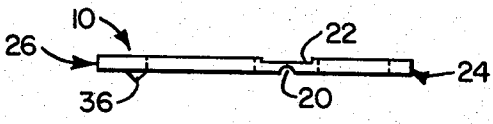


FIG. 4.

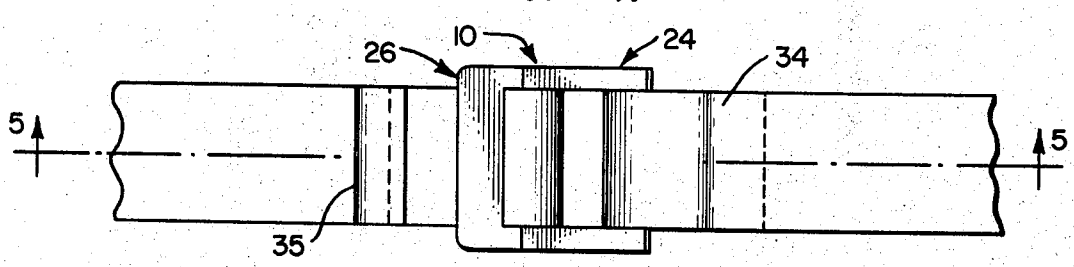
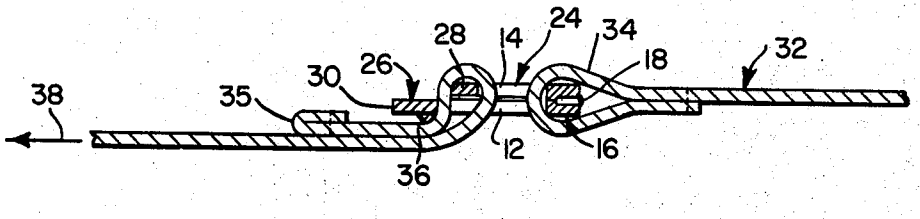


FIG. 5.



BUCKLE

BACKGROUND OF THE INVENTION

1. Field of the Invention

Buckles for straps, belts, bands or ties and the like with particular reference to a sliding self-locking buckle.

2. Description of the Prior Art

Buckles normally used for interconnecting straps, belts, headbands or ties have, heretofore, involved relatively costly and ungainly assemblies of a plurality of initially separate parts usually formed of metal. In addition to the drawback of possible mechanical failure, these buckles are usually relatively heavy in size and weight, highly absorptive to heat or cold rendering them uncomfortable to wear in certain environments and unsuitable for use in potentially explosive atmospheres requiring the wearing of completely nonmetallic nonelectrically-conductive articles of clothing and accessories.

Accordingly, an object of the present invention is to provide an inexpensive self-locking buckle for straps, belts, headbands or ties and the like which may be quickly and easily selectively released after locking and which is of light weight, nonelectrically conductive, inexpensive one-piece construction, relatively comfortable and safe to wear, corrosion resistant, substantially free of fouling and mechanical failure and minimally abrasive to the materials of connecting straps, belts, headbands or ties and the like.

SUMMARY OF THE INVENTION

The foregoing and corrollary objects of the invention are accomplished through the provision of a one-piece buckle which may be molded, cast or similarly formed of a suitable dielectric plastic material such as polypropylene. The buckle is formed with a very thin, line-like cross-section extending thereacross between its opposite ends. This cross-section forms a bending line or hinge of the type commonly referred to in the art of molded plastics as a "living hinge". Sections of the buckle at opposite sides of the hinge are apertured and when folded over and against each other, the buckle becomes immediately adaptable to use. In use with a strap, belt, headband or tie, one end of the strap is looped around the hinged portion of the folded buckle and secured in place while the opposite end of the strap is threaded over one of corresponding free ends of the folded buckle and reversely upon itself beneath the other free end of the buckle. The strap may then be drawn away from the buckle to a desired length adjustment. Retraction of the strap during and following such adjustment of its length is prevented by a tightening together of the two adjacent ends of the buckle caused by the reverse threading of the strap therethrough. This self-locking effect is enhanced by serrations located beneath the second mentioned free end of the folded sections of the buckle. Release of the strap in the buckle may be effected simply and quickly by lifting the end of the buckle nearest to the serrations slightly away from the strap.

The invention will be more fully understood by reference to the following detailed description taken in conjunction with the accompanying drawings.

DESCRIPTION OF THE DRAWINGS

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

FIG. 2 is an end view of the buckle shown in FIG. 1;

FIG. 3 is a side elevational view of the buckle;

FIG. 4 is a plan view of the buckle illustrated in use with a strap; and

FIG. 5 is a longitudinal cross-sectional view taken along line 5—5 of FIG. 4.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring more particularly to FIGS. 1–3, buckle **10** being generally rectangular as illustrated comprises a flat piece of molded plastic material such as polypropylene having a pair of openings **12** and **14** extending therethrough and separated by bridge **16.**

Bridge **16** has hinge **18** comprised of a thinned-down line-like section of the material of buckle **10.** This thin section is produced by forming groove **20** on one side of bridge **16** and recess **22** on its opposite side, each brought to a depth relative to the other sufficient to maintain the integrity of the bridge but with sufficient flexibility of the hinge for completely freely folding one section **24** of buckle **10** over its other section **26** as shown in FIGS. **4** and **5.** These properties of mobility and flexibility, without breakdown, in thin sections of articles molded of polypropylene and similarly characterized plastic materials are well known in the art of making "living hinges." Those interested in details of such hinges may refer to U.S. Pat. No. 3,628,215.

FIGS. **4** and **5** illustrate use of the buckle **10.** Therein it can be seen that section **24** of buckle **10,** preferably being shorter than section **26,** is folded about hinge **18** so as to overlie section **26** with its end rail **28** adjacent but slightly rearwardly of the corresponding end rail **30** of section **26.**

The buckle, so folded, is attached to strap **32** by looping the strap through openings **12** and **14** around the now folded bridge **16.** The free end of loop **34** is stitched, riveted, cemented or otherwise secured to the main portion of strap **32.** The opposite end **35** of strap **32** is then extended up through both of openings **12** and **14,** over rail **28** and downwardly again through opening **12,** this time between rails **28** and **30,** and thence outwardly beneath rail **30** reversely upon itself. Molded teeth or serrations **36** on rail **30** grip strap **32** for positive locking against slippage in the buckle when a pulling force in the direction of arrow **38** is applied. This pulling force, or a tightening of strap **32** around an object which causes the same effect, draws rail **28** downwardly toward section **26** and simultaneously forces strap **32** tightly upwardly against the bottom of rail **30.** The resulting self-locking of buckle **10** can, at any time, be immediately released by lifting section **24** with a thumb and finger sufficiently to allow strap **32** to slide reversely around rail **28.**

Tightening of strap **32** by pulling end **35** thereof away from buckle **10** may be accomplished simply and easily and retraction of the strap is prevented at all times by the aforementioned self-locking of the buckle until release as mentioned above, is intentionally effected.

Buckle **10** may be readily inexpensively mass produced in the flat configuration of FIGS. **1–3** of molded or cast plastic material such as polypropylene which is

characteristically light in weight, nonconductive to electricity and noncorrosive to fabric, leather, plastic or other strap materials which may be used therewith. The buckle itself is essentially noncorrosive and is minimally abrasive and wearing to materials of the strap. It is resistant to overheating or the transmittance of excessive cold when worn in respectively hot or cold environments and is further distinctively automatically self-locking during and following any and all strap tightening operations.

We claim:

1. The combination of a self-locking buckle and strap, said buckle comprising a unitary main body having a pair of openings extending therethrough, a bridge separating said openings, a portion of the material of said buckle being thin and flexible in a line extending along said bridge, said line defining first and second sections of said buckle respectively at opposite sides of said bridge and said thin and flexible portion of said

material constituting a hinge for folding said sections one over another when said buckle is in use, one of said sections of said buckle being folded over the other section, said strap having one of its ends looped around said bridge and its opposite end threaded completely through both of said openings in one direction thence over an outermost end of one of said sections and back through the opening in the remaining section of said buckle in a direction reversely upon itself.

2. The combination according to claim **1** wherein said looped one of said strap is secured against withdrawal from said buckle.

3. The combination according to claim **2** wherein said opposite end of said strap is drawn tightly in said buckle and said outermost end of said one section of said buckle is pulled tightly against said reversely directed portion of said strap for locking said strap against retraction in said buckle.

* * * * *