United States Patent

Somann

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[54] SELF-LOCKING STRAP BUCKLE

[72] Inventor: **Gert Somann,** Huron Park, Ontario, Canada

[73] Assignee: **Ferplas Industries Limited,** Huron Park, Ontario, Canada

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[30] **Foreign Application Priority Data**

Apr. 2, 1969 Canada 047577

[52] **U.S. Cl.** **24/74,** 24/16

[51] **Int. Cl.** **A44b 11/00**

[58] **Field of Search** 24/74, 26, 16

[56] **References Cited**

UNITED STATES PATENTS

3,377,666	4/1968	Sherman	24/74
3,112,543	12/1963	Derrickson	24/74

FOREIGN PATENTS OR APPLICATIONS

210,068	5/1957	Australia	24/26

Primary Examiner—Bobby R. Gay
Assistant Examiner—Garry Moore
Attorney—Philip T. Mitches

[57] **ABSTRACT**

It has been found that buckles made of metal for us with plastic or cloth web strapping material fail because the arms of the buckles bend under the stress of the web.

A buckle is disclosed herein which does not bend under normal strapping stresses. This is achieved by welding one of the four parallel arms rigidly to the body of the buckle to constrain the buckle from bending.

4 Claims, 6 Drawing Figures

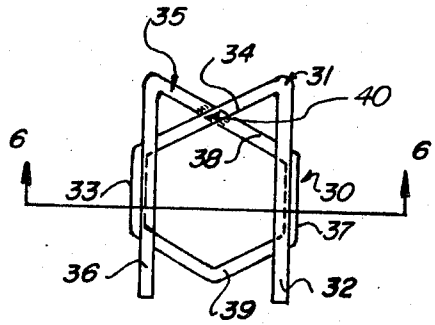


FIG 1

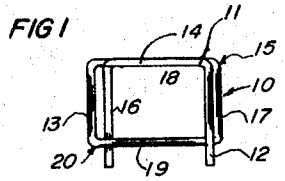


FIG 2

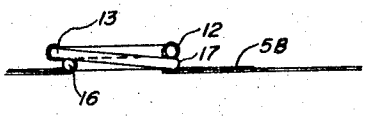


FIG 3

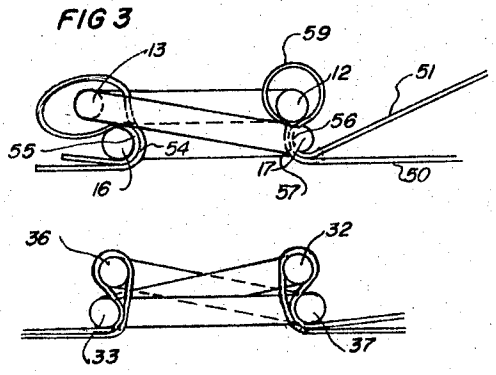


FIG 4

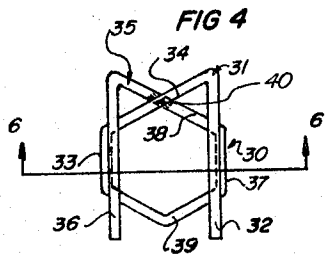
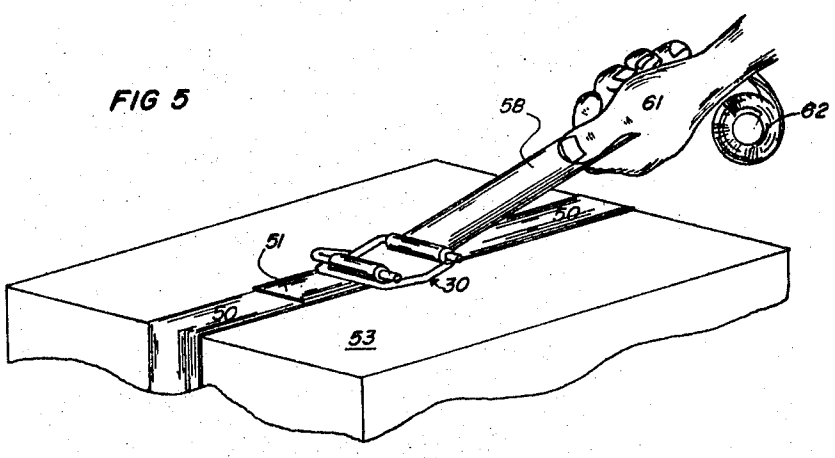


FIG 6

FIG 5



INVENTOR:
GERT SOMMAVILLA
BY
PHILIP MITCHES
AGENT

SELF-LOCKING STRAP BUCKLE

This invention relates to an improved connector or buckle for securing the opposite ends of a flexible strap loop which is arranged in taut relation about a package, bail, box or bundle or other object that is to be tied.

With the advent and subsequent popularity of non-metallic strapping such as nylon, polypropylene, rayon and the like, whether in rope or cord configuration, or band or strap configuration, they brought about a demand for specialized fasteners or buckles for securing and tensioning the opposite ends, particularly of strap loops, by means of frictional engagement rather than by means of strapping and sealing tools.

As a result two types of fasteners or buckles have emerged for non-metallic strapping; those made from a rigid or semi-rigid molded plastic material and those made from spring wire steel. Both types have serious limitations which have unduly limited the full exploitation of the unique advantages of plastic strapping over steel strapping.

Referring to U.S. Pat. No. 3,206,816 issued Sept. 21, 1965 to I. J. Vilcins, a light packing strap buckle composed of plastic is disclosed which, under heavy tension distorts and causes subsequent failure of the plastic material. Stronger tortion free plastics composed of polycarbonate are not economical to make for these applications.

Referring to U.S. Pat. No. 3,014,256 issued Dec. 26, 1961 to M. O. Derrickson and in U.S. Pat. No. 3,349,444 issued Oct. 31, 1967 to J. R. Beach a buckle is disclosed composed of a single length of steel wire appropriately shaped. It has been found, that buckles made in accordance with these inventions, distort under heavy tension well below the breaking point of the plastic strapping being used. This distortion is of such nature that it destroys the parallel arrangement between the pairs of strap engaging arms at the opposite ends of the buckle and thus reduces the frictional hold which the buckle has on the plastic strapping to cause slipping and hence loosening of the strapping about the package or object which is to be tied.

This asymmetrical distortion is caused by the fact that one side of the buckle is formed from a length of wire which has one or two bends while the opposite side is formed from a straight length of wire. Under the heavy tension, the rectangular shape of such buckle distorts tending to straighten out the bends which compose the buckle. This in turn destroys, as we have noted, the parallel arrangement of the two pairs of strap engaging arms at opposite ends of the buckle.

It has been found, that the parallelism of the strap engaging arms can be maintained, irrespective of the tension whereby excellent holding properties of the buckle are achieved, if the buckle itself is made rigid.

The invention therefore contemplates a buckle for use in connection with flexible strapping comprising a single piece of wire formed as follows:

a. First generally U shaped portion including a distal leg formed from one end of said single piece of wire, a proximal leg and a bight;

b. A second generally U shaped portion including a distal leg formed from the other end of said single piece of wire, a proximal leg, and bight;

c. An intermediate wire portion connecting the proximal legs of each U shaped portion; said two proximal legs and said intermediate wire portion lying in a plane having essentially a U shaped configuration; said two distal legs lying parallel to each other as well as parallel to said proximal legs, the ends of said distal legs extending across the intermediate wire portion; each proximate leg of the first and second generally U shaped portions connected to the intermediate wire portion at obtuse angles and wherein said proximate legs are disposed in one plane said distal legs disposed in another plane, both planes being coplanar; and

d. Connection means securing the overlying bights on the buckle to hold the proximate legs in parallel relationship.

The invention will now be described by way of example reference being had to the accompanying drawings in which;

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

FIG. 2 is a side elevation view showing a strap in process of being laced with a connector;

FIG. 3 is an end view of the embodiment of FIG. 1;

FIG. 4 is a plan view of yet another embodiment of the invention;

FIG. 5 is a perspective view showing one manner of tightening a strap about a package when using the connector of FIG. 4;

FIG. 6 is a section along line 6 — 6 of FIG. 4.

Referring to FIG. 1 and one embodiment of the invention, a buckle **10** includes a first generally U shaped portion **11** with distal leg **12**, proximate leg **13**, and bight **14**; a second generally U shaped portion **15** including a distal leg **16**, proximal leg **17**, and bight **18**. An intermediate wire portion **19** connects the proximate legs **13** and **17** into a U shaped planar portion. The distal legs may be held in parallel relationship as by welding **20**, the end portion of distal leg **16** to intermediate wire portion **19**.

Referring to FIG. 4 and another embodiment of the invention, a buckle **30** is constructed in a like manner to that of buckle **10**. Particularly, the buckle **30** includes a first generally U shaped portion **31** with distal leg **32**, proximate leg **33**, and bight **34**; a secondly U shaped portion **35** including a distal leg **36**, proximate leg **37**, and bight **38**. Particularly, the first and second generally U shaped portions, **31** and **35** are distorted as more particularly seen. As a result, an intermediate wire portion **39** which connects the proximate leg **33** and **37** is bent in an obtuse form to create a likewise distorted U shaped planar portion consisting of the intermediate wire portion **39**, and proximate legs **33** and **37**. Distal legs **36** and **32** are parallel and co-planar one with respect to the other and this arrangement is maintained by making each U shaped portion **31** and **35** rigid with respect to one another as by affixing the overlap of bight **38** with bight **34** to one another as by a weld or other securing means **40**.

Now referring to buckle **10** and to FIG. **2** a plastic strap **50** may be secured to the buckle in the following manner.

The free end **51** of the strap is thread over a distal leg **12** and thence between the distal leg **12** and the adjacent proximate leg **17** thence beneath and around the proximate leg **17** to overlie the strap **50**. This is more clearly seen in the right hand portion of FIG. **3** wherein the strap is shown in its "loose" position around the distal leg **12**. The end of the strap should extend at least one inch beyond the buckle **10** in order to provide sufficient free strap should there be any giving of the buckle and strap during tightening (refer to FIG. **5**). The other end of the strap **50** after having looped about a package **53** which is to be tied, is threaded over the other proximate arm **13** and thence between that proximate arm **13** and its adjacent distal leg **16** as more particularly shown in the left hand portion of FIG. **3**.

Tightening can be accommodated as shown in FIG. **5** by pulling the taut end **58** of the strap to make the strap **50** snug.

Referring particularly to FIG. **3**, it will be noted, that with respect to buckle **10**, the proximate leg **13** is disposed from the distal leg **16** to a greater extent than the distal leg **12** is disposed from the proximate leg **17**. The greater disposition of the proximate leg **13**, insures greater frictional engagement of strap **50** about the distal leg **16** because the strap regions **54** and **55** are in abutting relationship and wrapped about the distal leg **16** to a greater extent than they otherwise would if the proximate leg **13** did not overlie the distal leg **16** so much. On the other hand, in order to assist the tightening of the strap **50** about the package **53**, the distal leg **12** overlies the proximate leg **17** by only a relatively small amount. This insures that the strap region **56** and **57** which are abutting, only wrap about the proximate leg **17** approximately one quarter of the circumference of the proximate leg **17**. This is sufficient to give good frictional contact between regions **56** and **57**, and yet allow tightening of the strap **50** by hand (FIG. **5**).

In view of the fact that the distal leg **12** is not welded to the intermediate portion **19**, this permits a looping of the strap **50** to be made and the eye **59** of the loop to be passed over the

open end of the distal leg **12** and capable of being pulled taut as by the hand **61** (FIG. **5**).

If the distal leg **12** were welded to the intermediate wire portion **19**, the strap **50** would have to be cut from the spool **62** and threaded through the space between abutting distal leg **12** and proximate leg **17** in a like manner as the free end **51** is threaded about proximate leg **13** and between proximate leg **13** and distal leg **16** as earlier described.

Referring to FIG. **6** and to FIG. **4**, both distal legs **36** and **32** are subjacent to the proximate legs **33** and **37** and thereby provides similar frictional engaging characteristics as that of the respective legs of buckle **10**; however, on careful examination of FIGS. **4** and **6** it will be seen that the distal legs **36** and **32** of buckle **30** are what may be considered the load bearing legs, while the buckle **10** of FIGS. **1** and **3**, the load bearing legs consist of the distal leg **12** and the proximate leg **13**.

The embodiments of the invention in which an exclusive property and privilege are claimed are defined as follows:

1. A buckle for use in connection with flexible strapping comprising a single piece of wire formed as follows:

a. First generally U shaped portion including a distal leg formed from one end of said single piece of wire, a proximal leg and a bight;

b. A second generally U shaped portion including a distal leg formed from the other end of said single piece of wire, a proximal leg, and bight;

c. An intermediate wire portion connecting the proximal legs of each U shaped portion; said two proximal legs and said intermediate wire portion lying in a plane having essentially a U shaped configuration; said two distal legs lying parallel to each other as well as parallel to said proximal legs, the ends of said distal legs extending across the intermediate wire portion; each proximate leg of the first and second generally U shaped portions connected to the intermediate wire portion at obtuse angles and wherein said proximate legs are disposed in one plane said distal legs disposed in another plane, both planes being coplanar; and

d. Securing means fixedly connecting the overlying bights on the buckle to hold the proximate legs in parallel relationship.

2. The buckle of claim **1** wherein the securing means (d) is a spot weld.

3. The buckle of claim **1** wherein the distal legs are superadjacent to and disposed relatively closer to each other than the proximate legs.

4. The buckle of claim **2** wherein the distal legs are superadjacent to and disposed relatively closer to each other than the proximate legs.

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