

Jan. 9, 1962

J. J. RAPUZZI

3,015,865

UNIVERSAL INSERTED BALL TYPE BUCKLE

Filed May 24, 1960

2 Sheets-Sheet 1

Fig. 1.

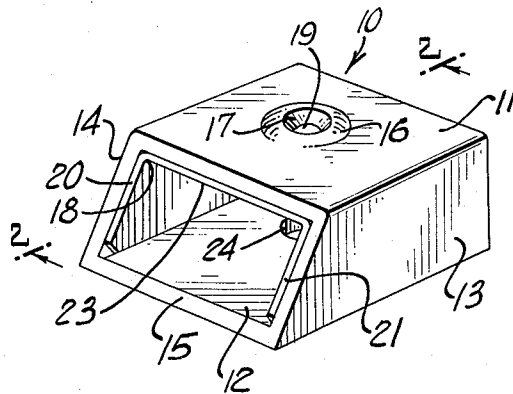


Fig. 2.

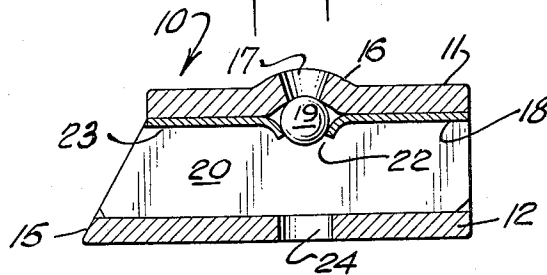
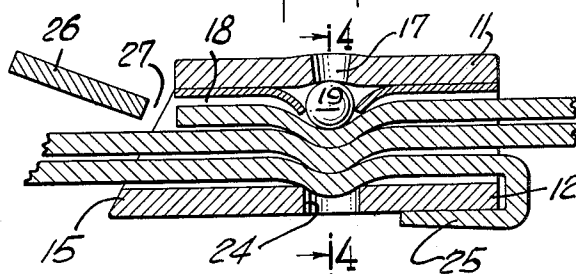


Fig. 3.



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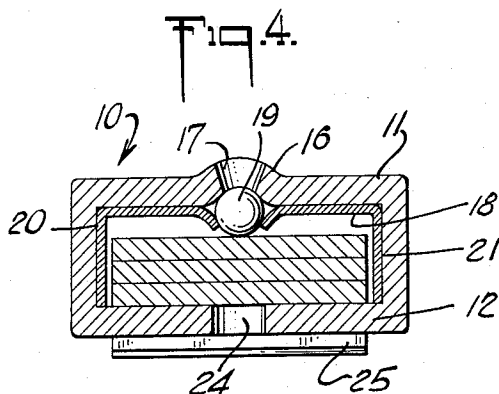
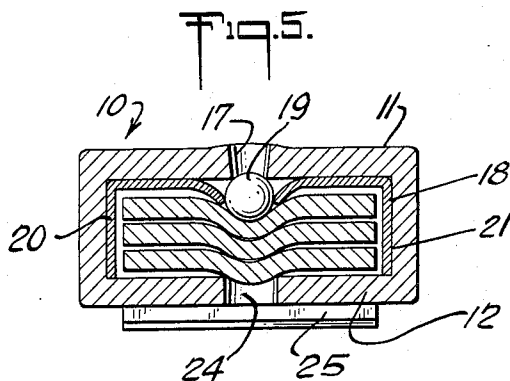
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2 Sheets-Sheet 2



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3,015,865

UNIVERSAL INSERTED BALL TYPE BUCKLE

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5 Claims. (Cl. 24—21)

(Granted under Title 35, U.S. Code (1952), sec. 266)

The invention described herein may be manufactured and used by or for the Government of the United States of America for governmental purposes without the payment of any royalties thereon or therefor.

This invention relates to banding and banding tools and in particular, to the buckles employed in a banding operation. Banding operations have become almost universal in their utility in coupling or joining objects together in addition to packaging. The range of usefulness of banding extends from repair of split trees to coupling of high pressure pipes and hoses. With this increased utility, various manufacturers have developed a variety of tools and buckles.

At present, there are available various types of banding tools which might be classed into two basic types. The function of these banding tools is virtually identical, that is, to apply tension to the strap while the buckle is held in a fixed position so that the strap may be locked in position. The design of the buckles to be used with each tool is appreciably different from the buckle to be used with another tool. The buckle designed for a particular tool cannot, in most cases, be used with some other tool. Where large quantities of buckles are to be employed or where it is expedient to stock these buckles, it has been the policy of various users to carry supplies of various types of buckles in order to insure the availability of suitable buckles for each make of tool and to replenish these supplies through proprietary purchases.

Heretofore, no attempts have been made toward either standardization of the various banding tools or the buckles to be used with these tools. It is both simpler and less expensive to redesign the buckle in view of the fact that the tools are already in the possession of the users and the buckles are continually being purchased. A redesign of the buckle would accomplish standardization almost immediately whereas, redesign of the tool itself, would either require expensive present replacement or later replacement when these tools are worn out or inoperative.

An object of this invention is to provide a simple, practical, convenient, and inexpensive banding buckle which can be selectively used with various banding tools.

Another object of this invention is to provide a simple, practical method for the fabrication of a universal buckle capable of being used in conjunction with various banding tools.

A still further object is to provide a universal buckle which can readily be applied by various banding tools and which will be securely locked to prevent expansion of the band strap.

Still another object of this invention is to provide a universal buckle which will not be excessively distorted and prevent cutting of the band strap when the strap is locked to prevent expansion and displacement of the band strap.

Another object is to provide a universal buckle which is usable in coupling together hoses subject to high internal pressures.

Other objects and advantages will be apparent from the following description of an embodiment of the invention and the novel features thereof will be particularly pointed out hereinafter in connection with the appended claims.

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In the accompanying drawings:

FIG. 1 is a perspective of an embodiment made in accordance with this invention;

FIG. 2 is a cross-sectional plan approximately along the line 2—2 of FIG. 1;

FIG. 3 is a cross-sectional plan approximately along the line 3—3 of FIG. 1 with the band strap illustrated therein;

FIG. 4 is similar to FIG. 3 after the band strap has been locked; and

FIG. 5 is similar to FIG. 2 with the band strap added and locked.

In the embodiment of the invention illustrated in FIG. 1, an approximately rectangular cylindrical body 10 of rigid material, as for example, stainless steel (where corrosion is a problem) or any other metal, has two opposing stretches 11 and 12 disposed in spaced face to face relation with their opposing edges joined by sides 13 and 14 which extend therebetween, thereby forming a closed loop. The body 10 may be fabricated either in separate units and then joined together, or as has been found satisfactory from both an economical and structural standpoint, from a section of tubing which has been flattened or directly from a standard stock of rectangular metal tubing. The distance measured in a direction normal to, and between the stretches, is slightly greater than the combined thicknesses of the superposed banding strap layers to be coupled together within the loop and the width or distance measured normal to and between the sides 13 and 14 is selected so as to accommodate the width of the strap to be used for banding.

Although the stretches measured lengthwise of the loop can be made the same length, it has been found preferable to extend the lower stretch 12 somewhat and to bevel the leading edge 15 of this stretch (see FIG. 2) to facilitate the entrance of the strap into the loop and to allow the strap to be tightened more easily and without as great a risk of strap rupture when applying tension thereto.

The upper stretch 11 has an approximately centrally disposed recess 16 opening into the loop toward the lower stretch 12. Various suitable shapes and forms for the recess or cavity may be employed although excellent results have been obtained where the upper stretch is deformed so as to form a portion of a sphere or protrusion extending slightly above the outer surface of the upper stretch. The upper stretch has a guide for an indenting element or as in its simplest form an aperture 17 extending therethrough and disposed centrally with respect to the protrusion or recess 16 in the upper stretch 11, so as to be directed toward the center of the recess. Partially confined within the recess or cavity 16, by an adhesive or as has been found practical, an elongated U-shaped retainer member 18, is a tool or a spherical member or ball 19 of hardened metal, as for example, steel. The tool may assume various forms, as for example, a solid cylinder or a pin, providing the inner contour of the recess is such as to confine therein a portion of the tool. It of course is essential that the largest dimension of the aperture 17 be smaller than the largest dimension of the tool so that the tool will be partially confined within the recess and will be acted upon when the upper stretch is downwardly indented in the vicinity of the recess. The U-shaped retainer 18 is formed so as to be confined in and to fit snugly within the inner walls of the loop, and may, if desired, extend across the entire length of the loop. The outer surfaces of the retainer abut the sides 13 and 14 and the inner surface of the upper stretch. The retainer arms 20 and 21 are of a length such that their edges tightly abut the lower stretch thereby further confining the retainer within the loop. The retainer 18 may be of any thin spring-like material, as for example, brass, copper or stainless steel (corrosion

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resistant and preferably of the same material as the ball or tool 19. The retainer member has a hole 22 disposed approximately centrally of its cross arm 23 and the hole is aligned with the aperture 17. The edges of the hole 22 are directed slightly downwardly toward the lower stretch 12 thereby forming a lip. The ball 19 is confined between the recess or cavity 17 in the upper stretch 11 and the lipped hole 22 in the retainer member since both the hole 22 and aperture 17 are of a size so as to prevent the passage of the ball through them.

Aligned with the aperture 17, the ball 19 and the hole 22 and disposed in the lower stretch 12 is another cavity or recess which has been illustrated in the embodiment as an opening 24 extending through the lower stretch. This opening serves to receive and confine therein that portion of a banding strap which is indented therein by an operation that will be explained hereinafter. It is quite obvious that in order to accomplish this receiving and confining function, a cavity or recess of any number of shapes could be employed although an opening as described, is the simplest and most inexpensive form, provided it is sufficiently large to accomplish its intended purpose.

In order to explain the relationship between the elements previously described and to better point out the inventive features of the present invention, a description of the operation and application of the buckle is given. The general method of applying bands and buckles with most banding tools is quite similar. The banding straps or bands are generally thin, pliable metallic strips and the buckles are of sufficient loop width to allow the strap to be passed lengthwise through the buckle. The strap is generally passed twice around the object or objects to be banded and also twice lengthwise through the buckle loop, to provide greater strength in the completed superposed strap layer clamp. The end of the band 25 illustrated in FIG. 3 adjacent the lower stretch is bent over the edge of and under the buckle to prevent lengthwise movement of the band relative to the buckle in the direction of the tension which is to be applied to the band. The free end 26 of the band is attached or threaded into the tensioning or band tool (not shown) and depending on the particular type of tool employed a portion of the tool is brought into contact with an edge of the buckle opposite to the edge under which the band had been previously bent. The free end of the band strap is gripped in the tool by a suitable gripping mechanism which forms a part of the tool and tension is applied to the band by action of the tool pulling the band through the buckle while any motion of the buckle relative to the tool is prevented by that portion of the tool abutting against the edge of the buckle. The tool may be operated through a lever and ratchet gripping dog mechanism or by a tensioning screw depending on the type and manufacturer of the tool. When sufficient tension has been applied to the band, as determined by the operator of the tool, the band is locked or secured to the buckle and the free end of the band is either broken off or cut off if a cutter is incorporated into the tool as shown at 27.

Illustrated in FIG. 4 in addition, to a cross-section of the buckle, are the various superposed layers of the band strap. The strap layers fit quite easily into the loop of the buckle since the strap is smaller in width than the distance between inner surfaces of the arms 20 and 21 of the retainer 18 and the distance between the stretches or the lower surface of the cross arm 23 of the retainer and the upper surface of the lower stretch is greater than the combined thicknesses of these superposed band layers. With the strap held under tension, an indenting element is placed in contact with the guide or aperture 17 and either by striking the element or in some other well-known fashion, the element drives the ball 19 downwardly in the direction of the lower stretch. A like result may be accomplished simply by striking the protrusion in the upper stretch with a hammer. Under the action of the indenting element (not shown) or the hammer, the upper stretch is

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deformed so as to flatten the bulge and drive the ball downward. The ball in turn depresses the lips of the retainer hole 22 and forces the abutting strap layers to deform and be pressed downwardly in the direction of the lower stretch. Since the ball is aligned with the opening 24 in the lower stretch the lowermost layer is indented into the opening as shown in FIG. 5 and received and confined therein. The protrusion in the upper stretch is flattened so that the lower surface of the stretch 11 abuts and confines the ball in this lowered position which in turn forces each of the superposed strap layers to tightly abut the adjacent layer in the vicinity of the indentation. This confining of the strap layers to one another and to the lower stretch (in the opening 24) prevents the strap from loosening and maintains tension thereon even after the free end of the strap has been severed.

It will be understood that various changes in the details, materials and arrangement of parts, which have been herein described and illustrated in order to explain the nature of this invention, may be made by those skilled in the art within the principle and scope of the invention as expressed in the appended claims.

I claim:

1. A universal banding buckle for use in coupling together overlapping portions of a band strap, selectively by any one of a plurality of banding tools, which comprises a body of rigid material having the shape of a closed loop band with two approximately flat opposite stretches and there being a space in a transverse direction between said flat stretches just slightly greater than the combined thicknesses of the superposed band strap portions to be coupled within the loop, one of said stretches having a cavity opening into the loop towards the opposite stretch, means for holding and confining an indenting ball with a portion of said ball extending beyond the face of said opposite stretch in a direction toward said one stretch, said means being a U-shaped member disposed within said loop and the cross arm of said member having a hole therethrough from face to face aligned with said ball, said hole being smaller than said ball, said cross arm approximately abutting the interior wall of said opposite stretch and the side arms of said member tightly abutting the inner walls of said loop joining said stretches, whereby said ball is confined between said opposite stretch and said cross arm, when said ball is moved toward said one stretch the superposed band strap layers are indented with said ball confined thereagainst to resist relative movement of said band strap layers out of said loop and relative to each other.

2. The banding buckle according to claim 1, wherein said opposite stretch has a recess opening into said loop for confining therein a portion of said ball and aligned with said cavity.

3. The banding buckle according to claim 2, wherein said opposite stretch has a guide aligned with said recess for an indenting element.

4. The banding buckle according to claim 3, wherein said guide is the opposite stretch having an indent aperture smaller than said ball therethrough extending from face to face and aligned with said opening.

5. A universal banding buckle for use in coupling together overlapping portions of a band strap, selectively by any one of a plurality of banding tools, which comprises a body of rigid material having the shape of a closed loop band with two approximately flat opposite stretches and there being a space in a direction between said flat stretches just slightly greater than the combined thicknesses of the superposed band strap portions to be coupled within the loop, one of said stretches having an opening therethrough extending from face to face, and the opposite stretch having a recess formed for receiving therein a portion of a metallic ball, the portion of said opposite stretch forming said recess, having an aperture therethrough, said recess and aperture aligned with said opening, a U-shaped member disposed within said loop

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and the cross arm of said member having a hole there-through aligned with said ball, said aperture and said opening, said hole smaller than said ball, said cross arm approximately abutting the interior wall of said opposite stretch and the side arms of said member tightly abutting the inner walls of said loop joining said stretches thereby confining said ball between said opposite stretch and said cross arm whereby an indenting element may be employed to move the ball and said opposite stretch toward said one stretch, thereby indenting the superposed band strap layers

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and confining said ball there against to resist relative movement of said band strap layers out of said loop and relative to each other.

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