Sept. 5, 1961 E. PRETE, JR 2,998,626

STRAP BUCKLE

Filed Aug. 10, 1959

Fig. 1

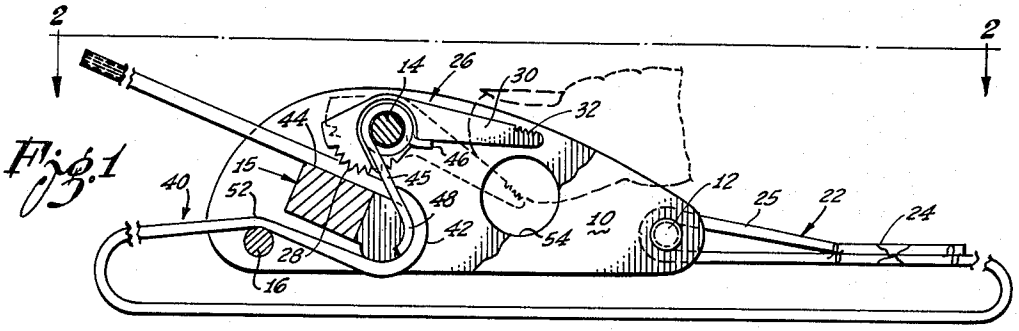


Fig. 2

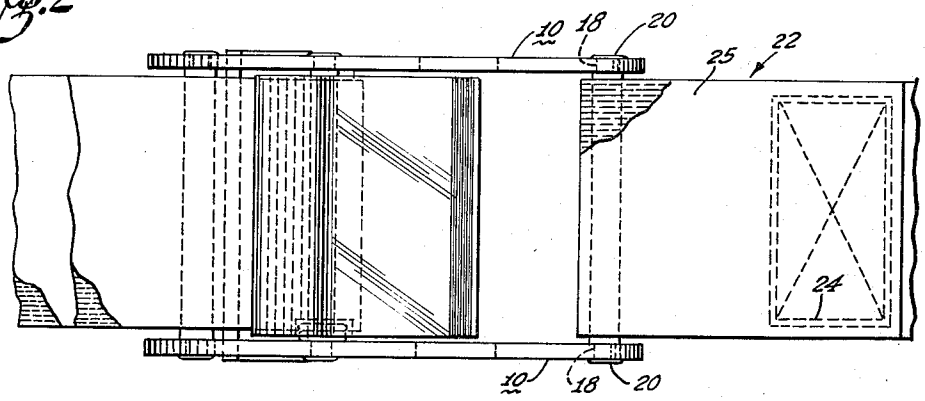


Fig. 4

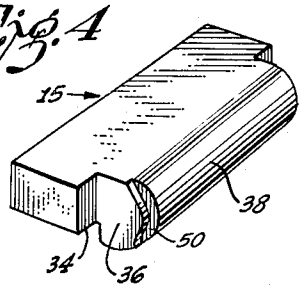


Fig. 3

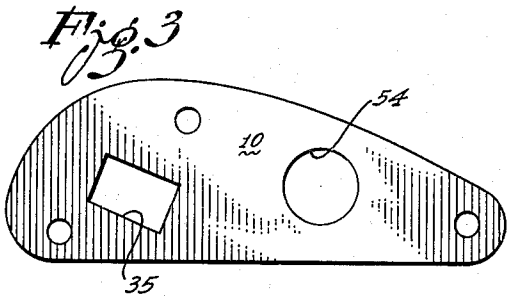


Fig. 5

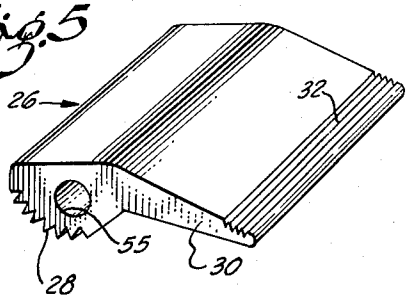
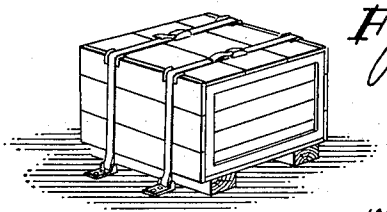


Fig. 6



INVENTOR:
Ernest Prete, Jr.

By Smyth & Roston

Attorneys.

United States Patent Office 2,998,626
Patented Sept. 5, 1961

2,998,626

STRAP BUCKLE

Ernest Prete, Jr., North Hollywood, Calif., assignor to Brown-Line Corporation, El Segundo, Calif., a corporation of California

Filed Aug. 10, 1959, Ser. No. 832,764
3 Claims. (Cl. 24—170)

This invention relates to a buckle for connection to one strap end and for releasable engagement with a second strap end, which buckle is particularly adapted for connecting the ends of cargo straps.

The invention refers to a buckle of the general type disclosed in the Elsner patent, No. 2,538,641. The Elsner buckle has a frame structure comprising a pair of longitudinal side members and a plurality of transverse members that rigidly interconnect the two side members. One of these transverse members is positioned at one end of the frame structure for permanent connection to one strap end. Usually the strap end is looped around this transverse member, the loop being permanently closed by sewing. The other strap end is looped around a freely rotatable roller on a second transverse member of the frame structure and passes between a third transverse member and an eccentric gripping member. Rotation of the gripping member in its gripping direction causes its eccentric gripping surface to cooperate with the third transverse member for gripping cooperation therewith. The eccentric gripping member has a release arm by means of which it may be manually manipulated to free the gripped strap. The frame structure further provides a transverse guard member that extends across this release arm to prevent accidental loosening of the strap.

The present invention is directed to certain problems that arise in the improving of a buckle of this type. One of these problems is to reduce the cost of such a buckle but at the same time to retain the required structural strength. A second problem is to reduce the weight of the buckle without sacrificing the required structural strength. A third problem is to provide a buckle that may be used effectively with straps of a wide range of thicknesses.

The reduction in cost is achieved in large part by simplification of the structure. This simplification consists in reducing the number of parts of the frame structure and involves constructing the frame structure in such manner that some of its parts have dual functions. Thus in the new construction, the pair of side members of the frame structure comprise a pair of upright plates having the additional function of serving as guard means for the release arm. This feature eliminates the necessity of adding the usual transverse guard member. The invention further reduces the number of parts by employing a single transverse member of the frame structure for the dual purpose of engaging the loop on the second end of the strap and of cooperating with the eccentric gripping means. In the Elsner construction, for example, two separate transverse frame members are employed for these two separate purposes.

Reduction in weight is accomplished by transferring part of the strap tension load from the eccentric gripping member to the transverse member that serves the same purpose as the transverse roller in the Elsner arrangement and thus reducing the load that is imposed on the eccentric gripping member. The invention teaches that the transverse member of the frame structure that engages the second loop of the strap may be a fixed member instead of a roller, the fixed member presenting a fixed surface for frictionally engaging the inner surface of the strap loop. This frictional engagement by the fixed surface is effective to share the load with the eccentric gripping member to such extent that aluminum may be

substituted for steel in the fabrication of the eccentric gripping member. Thus the invention makes it possible to make the whole buckle of light weight material such as aluminum. Making the buckle of aluminum provides additional savings in that it makes it possible to fabricate parts of the buckle by extrusion. An extruded aluminum bar of a special cross section may be cut into short lengths to form the eccentric gripping members of a production run and a second extruded bar of special cross section may be employed for fabricating the transverse frame member that cooperates with the eccentric gripping member.

The solution of the problem of making the buckle adaptable to straps of different thicknesses is achieved by giving the gripping member freedom for a substantial range of angular positions to cooperate with straps of a wide range of thicknesses. This range of angular positions of the gripping member lies wholly within the space defined by the side members of the frame structure so that in all instances the side frame members extend above the eccentric gripping member to guard the release arm of the gripping member.

The features and advantages of the invention may be understood from the following description considered with the accompanying drawing.

In the drawing, which is to be regarded as merely illustrative:

FIG. 1 is a longitudinal sectional view of the presently preferred embodiment of the buckle showing the buckle connected to one strap end and effectively engaging a second strap end;

FIG. 2 is a plan view of the structure as seen along the line 2—2 of FIG. 1;

FIG. 3 is a side elevation of one of the side plates of the frame structure;

FIG. 4 is a perspective view of the transverse frame member that engages the loop at the second end of the strap and that cooperates with the eccentric gripping member for gripping the second end of the strap;

FIG. 5 is a perspective view of the gripping member; and

FIG. 6 is a perspective view showing how the invention may be employed with cargo straps.

In the presently preferred embodiment of the invention shown in the drawings, the frame structure comprises a pair of upright side plates **10** and a plurality of transverse members **12**, **14**, **15** and **16** that rigidly interconnect the two side plates. The transverse member **12** is a cross pin that has reduced end portions **18** that extend through corresponding apertures in the side plates **10** and are peened at their outer ends, as indicated at **20**. The purpose of this cross member **12** is to form a permanent connection with a strap end that is generally designated by numeral **22**. The strap end is folded back on itself and sewn as indicated at **24** to form a loop **25** that passes around the cross pin **12**.

The second transverse member **14** is a second cross pin that is rigidly mounted in the two side plates **10** in the same manner as the pin **12**. This second cross pin **14** serves as a pivot means or axle on which an eccentric gripping member, generally designated **26**, is rotatably mounted. The eccentric gripping member **26** has a serrated eccentric gripping portion **28** and has an integral release arm **30**. The release arm **30** is intended to be operated by finger pressure as indicated in FIG. 1 and, for this purpose, may be formed with serrations **32**.

The transverse frame member **15** may be of the configuration shown in FIG. 4. This configuration provides a pair of rectangular end portions **34** to seat in corresponding rectangular apertures **35** in the two side plates **10** and further provides shoulders **36** for abutment against the inner surfaces of the two side plates. The trans-

verse member 15 has a rounded surface 38 at its inner edge for frictional engagement with a second strap end, which second strap end is generally designated by numeral 40. As shown in FIG. 1, the second strap end 40 passes under the transverse member 15, then forms a curved bend 42 over the rounded surface 38 and finally extends across the upper surface 44 of the transverse member. The serrated eccentric gripping portion 28 of the gripping member 26 cooperates with this upper surface 44 of the transverse member 15 to grip the strap in the manner shown in FIG. 1.

As shown in FIG. 1, a suitable torque spring 45 is wound around the cross pin 14 with one end 46 of the spring engaging the release arm 30 of the gripping member and with the other end 48 of the spring engaging the transverse member 15. As best shown in FIG. 4, the end of the transverse member 15 may be cut away to form a recess 50 to receive the spring end 48.

The transverse frame member 16 is a cross pin that is similar to the cross pin 12 and is mounted in the two side plates 10 in the same manner. As may be seen in FIG. 1, the purpose of this last cross pin 16 is to form a bend 52 in the second strap end 40. This bend orients the lower leg of the strap loop with the underside of the transverse frame member 15 and insures that the strap will make a full 180° turn over the rounded inner surface 38 of the transverse frame member. The canting or downward and inward inclination of the transverse frame member 15 is advantageous for cooperating with the cross pin 16 for this purpose.

In the present practice of the invention, the two side plates 10 and the transverse frame members 12, 14, 15 and 16 are all made of aluminum to minimize the weight of the buckle. The buckle structure may be further lightened by circular apertures 54 in the two side plates 10.

The manner in which the device serves its purpose may be readily understood. The second strap end 40 is engaged simply by passing the strap end over the cross pin 16 and under and over the transverse frame member 15 between the frame member and the eccentric gripping member 26. The torque spring 45 urges the eccentric gripping member 26 in its gripping direction which is counter-clockwise in FIG. 1 and thus causes the serrated eccentric gripping portion 28 of the gripping member to grip the strap in cooperation with the transverse member 15. The tendency for the strap to creep along the upper surface 44 of the transverse frame member 15 in response to the tension load on the strap merely tends to rotate the gripping member 26 further in its gripping direction for increasing the effectiveness of its engagement with the strap.

The eccentric gripping member 26 may be made of aluminum instead of steel because the transverse frame member 15 makes such effective frictional engagement with the strap that it carries a substantial share of the strap load to reduce the load imposed on the eccentric gripping member. In addition, the frictional contact of the cross pin 16 with the strap at the bend 52 resists the strap load. It is readily apparent in FIG. 1 that this arrangement forms the second strap end to a tortuous configuration that is conductive to effective frictional engagement of the strap by the two transverse members 15 and 16.

This strap end 40 may be tightened by simply pulling on the free end of the strap and at the same time pulling on the portion of the strap that leads to the buckle. The eccentric gripping member 26 will yield to such pulling force on the strap by release rotation but will automatically grip the strap when the free end of the strap is released.

When the strap end 40 is engaged in the manner shown in FIG. 1, it is a simple matter to release the strap simply by exerting finger pressure on the release arm 30. It is to be noted that the release arm 30 always extends below the upper edges of the two side plates 10 so that the two side plates serve as guards to prevent accidental release of the strap. It is also to be noted that the release arm 30 overhangs the space between the two transverse members 12 and 15 and thus overhangs the gap between the two strap ends 22 and 40. Thus neither of the two strap ends interferes with the freedom for release rotation of the gripping member. If a strap end thinner than the strap end 40 were substituted in FIG. 1, the position of the release arm 30 would be elevated but even if a strap of minimum practical thickness were substituted, the release arm 30 would still lie below the upper edges of the two side plates 10 to be guarded thereby. Thus the buckle is adaptable to strap ends of various thicknesses and when the buckle is in service, a defective strap end may be replaced by strap material of any available thickness.

The transverse member 15 is a multiple purpose member in that it serves, first, as a transverse frame member; second, as a member to form the 180° loop in the second strap; and, third, as a transverse pressure plate for gripping cooperation with the eccentric gripping member 26. The eccentric gripping member 26 may be formed by extruding an aluminum bar of the cross section shown, then cutting the bar into short lengths and drilling each of the short lengths to form the bore 55 shown in FIG. 5. In like manner, the transverse member 15 may be fabricated by extruding a bar of the desired cross-sectional configuration with the rounded surface 38, cutting the extruded bar into short lengths and then machining the bar to form the shoulders 26 and the recess 50.

My description in specific detail of the selected embodiment of the invention will suggest various changes, substitutions and other departures from my disclosure within the spirit and scope of the appended claims.

I claim:

1. A buckle for connection to one strap end and for releasable engagement with a second strap end, comprising: a frame structure including two longitudinal upright side plates and a plurality of transverse members rigidly interconnecting said side plates; a first transverse member of said plurality being at one end of said frame structure for connection to one strap end; a second transverse member of said plurality being near the other end of the frame structure, said second member being relatively wide and being formed with a substantially flat upper surface and being canted to incline said upper surface, said second member having its inner edge curved over an extent of approximately 180°, a third transverse member of said plurality being positioned between said second transverse member and said other end of the frame structure whereby the second strap end may be passed over said third transverse member and under said second transverse member and curved back 180° to pass over the upper surface of the third transverse member, said third transverse member being positioned with its upper surface positioned above the lowermost portion of said second member to orient the strap in an inclined direction conforming to the cant of the second transverse member; a gripping member pivotally mounted between said side plates above said second transverse member, said gripping member having an eccentric serrated gripping surface for rotation in one direction towards the upper surface of said second transverse member to grip said second strap end, said gripping member having an integral arm portion for manual rotation of the gripping member in its opposite release direction, said integral arm overhanging the space between said first and second transverse members in the gap between the two strap ends for freedom for release rotation without interference by either of the two strap ends, said side plates extending above the range of effective gripping positions of said gripping member to serve as guard means to avoid accidental release rotation of the gripping member.

2. A buckle for connection to one strap end and for

releasable engagement with a second strap end, comprising: a pair of substantially parallel upright side plates having matched apertures therein including a non-circular aperture near the forward end of each plate; a first transverse member having its ends fixedly mounted in matched apertures near the rear end of each of said plates for interconnecting the two plates and for permanent connection to said one strap end; a second transverse member to receive said second strap end with the second strap end looped upward and backward over the second member, said second member having its ends fixedly mounted in said non-circular apertures to resist rotation relative to the two plates, said second transverse member having a flat upper surface inclined upward towards the forward ends of the two plates; a third transverse member to extend under said second strap end and having its ends mounted in matched apertures in said plates, said last-mentioned apertures being forward of said non-circular apertures, the upper surface of said third member being positioned above the lowermost surface of said second member to change the direction of the second strap end to substantially parallel with said flat surface; a gripping member secured by matched apertures in said two plates, said gripping member being rotatable to cooperate with

said flat surface for gripping said second strap end, said gripping member having a serrated eccentric portion to engage the strap end and having a forwardly extending handle portion, said side plates extending above the range of effective gripping positions of said gripping member to serve as guard means to avoid accidental release rotation of the gripping member; and spring means rotatably biasing said gripping member towards said flat surface.

3. A buckle as set forth in claim 2 in which said second transverse member has flat shoulder surfaces abutting the inner surfaces of said two side plates, and in which said first and third transverse members are peened into engagement with the outer surfaces of the two side plates to hold the side plates firmly against said flat shoulder surfaces for rigidity of the buckle construction.

References Cited in the file of this patent

UNITED STATES PATENTS

1,190,449	Olson	July 11, 1916
2,538,641	Elsner	Jan. 16, 1951

FOREIGN PATENTS

97,645	Germany	June 9, 1898
330,808	Great Britain	June 19, 1930