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M. J. McANENY
METAL STRAP FASTENING MEANS

2,870,503

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Fig. 1

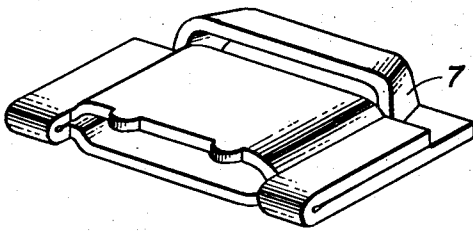


Fig. 2

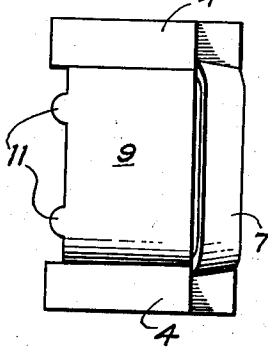


Fig. 3

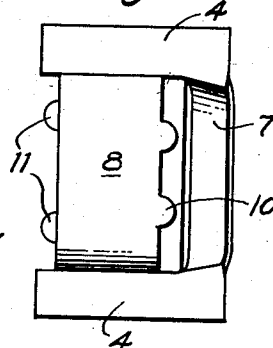


Fig. 6

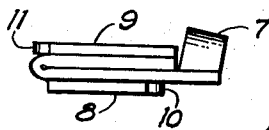
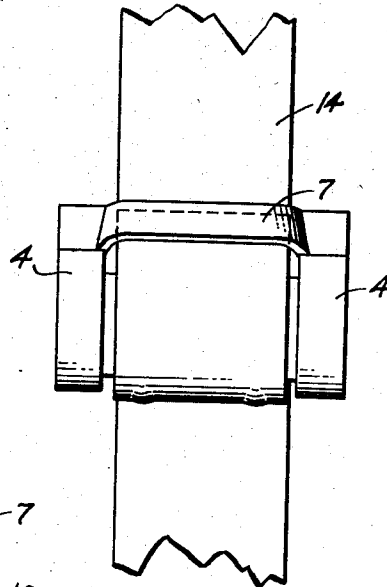


Fig. 7

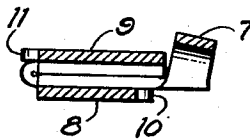


Fig. 5

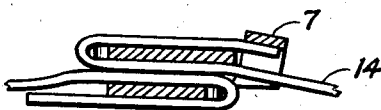
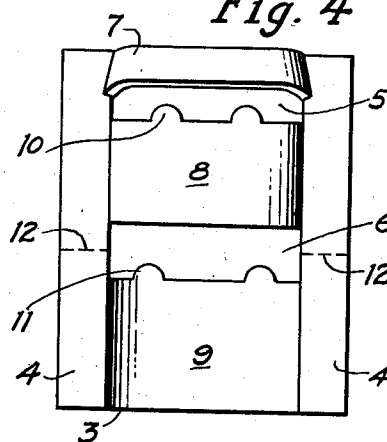


Fig. 8

Fig. 4



INVENTOR

Michael J. McAneny

BY

E. J. Hammond

ATTORNEY

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2,870,503

METAL STRAP FASTENING MEANS

Michael J. McAneny, New York, N. Y., assignor, by mesne assignments, to Lewis Schott

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10 Claims. (Cl. 24-23)

This invention relates to improvements in metal strap fastening means and more particularly to a metal buckle for use with strapping tools of the type described and claimed in my copending application Serial No. 177,430, filed August 3, 1950.

The invention has for one of its objects the provision of a buckle which will hold and bind metal strapping transversely from edge to edge without impairing strap strength.

A further object of the invention is the provision of a buckle of the fold over and tuck-in type which will positively prevent slippage of strap ends under tension when joined by the buckle.

Another object of the invention is the provision of a metal strap fastening means which will allow full utilization of maximum strength of associated strapping thus allowing use of much lighter binding bands for a given duty load.

A further object of the invention is to provide a fastening which is economical to manufacture and is provided with deformable means operable to grip and firmly hold associated strap ends under abnormal strain on strap ends fastened by the buckle.

Other objects will become apparent from the following detailed description and specification and by reference to the accompanying drawing wherein:

Figure 1 is a perspective view of one embodiment of the invention;

Figures 2 and 3 are top and bottom plan views respectively of the structure of Figure 1;

Figure 4 is a plan view of the metal blank before folding to the complete buckle forms of Figs. 1 to 3;

Figure 5 is a sectional view on line 5-5 of Fig. 1;

Figure 6 is a top plan view of a completed strap and buckle fastening with the strap being shown fragmentarily.

Figures 7 and 8, respectively, are side edge plan views of the buckle and the section view of Fig. 5 with strap attached.

Metal band strapping, when applied in the many uses thereof, must withstand different degrees of band tensioning up to the safe limits of strap strength but the safe limits of strap strength cannot be approached in fastenings which involve edge crimping, cutting or other deformation of the strapping to produce the fastening results. With the use of precision strapping tools of the type disclosed in the aforementioned copending application great tension may be applied to the metal band or strap in a binding and fastening operation and the full strength characteristic of the band may be approached only with the use of a fastening capable of utilizing the full band width without impairment of its strength at the fastening point. This is best accomplished by a fastening means which will bind the strap transversely from edge to edge without other deformation than folding the strap. Even with such fastenings, when maximum tension is applied to a band, there may be a tendency under severe strains and shocks for the metal strapping to loosen or roll about the edges or surfaces of a fastening.

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The present invention provides a structure operable under abnormal strains and shocks to prevent loosening of the band or strap ends held by the fastening, deformable means being provided to effect additional holding for the strap under abnormal strains thereon. This effect and the objects of the invention hereinbefore stated are accomplished by the structure hereinafter described.

The strap fastening means of the invention is preferably made from a single blanked out piece of relatively light sheet metal being formed from a single blank which is rectangular but relatively long as shown in Fig. 4. Having reference to Figs. 1 to 3 inclusive, the blank 1 is there shown formed into a completed buckle.

From a plain sheet or strip of metal the formed blank preferably results from the operation of a multiple station die in a press operation although it may be otherwise formed. In the operation, the blank has its longitudinal center portion 3 offset from the plane of the edge portions 4 to define a strap receiving channel bounded edgewise by the coplanar edge portions 4 adapted to form parallel side edge flanges of the buckle when the blank is folded. Portions of the blank intermediate the flange portions and across the channel are struck out closely adjacent one end of the blank and in an intermediate portion thereof to define transverse slits or apertures 5 and 6, a relative narrow transverse strap end receiving portion in the form of an arch 7, a bottom plate portion 8 for the buckle and a top plate portion 9 for the buckle. The transverse strap end receiving arch 7 is struck-up at one end of the blank in a direction opposed to the offsetting of the intermediate portion of the blank in formation of the strap receiving channel, and is struck-up in such manner that the top or transverse portion of the arch inclines downwardly and outwardly to the end of the buckle with the end of the supporting parts of the arch converging slightly in an outward direction so as to form guides for strap ends inserted under the arch. The transverse slits or apertures 5 and 6 are in reality substantially rectangular openings in the blank defined by parallel edge portions of the blank material except that in striking out the metal to form the openings, spaced parts of the blank metal are left to extend from the edge of the blank to form denticular extensions 10 in opening 5 and extensions 11 in opening 6, these denticular extensions or formations extending in the plane of the metal of the blank toward the arch end thereof when the blank is in its flat form before folding.

With the blank formed as hereinabove described the final operation thereon is the folding over the blank on the line 12-12 of Fig. 4 to bring the flanges or edge portions of the top buckle plate portion into abutting relationship with the edge portions of the bottom buckle plate portion. The top plate portion is so proportioned that, in the folded position, the edge thereof folds into reinforcing position or contact with the rear edge of the substantially vertical side walls of the strap receiving arch 7. The arch extends above the channel portion of the top plate at its rear edge so as to provide an entrance under the arch for a strap end folded over the top buckle plate. In the folding of a strap end over the top buckle plate and entering it under the arch, the strap end is guided by the side walls of the arch and the outwardly and downwardly inclined top portion of the arch deflects the end downwardly. As the result of this the strap end is centered in the buckle and with respect to the body of the strap passing through the buckle.

Top and bottom plates 8 and 9 define by their channel portions a strap passage 13 through the buckle. Denticular extensions 11 on the buckle plate project in the plane of the plate, and extensions 10 on the bottom buckle plate project forwardly or toward the arch end of the buckle. The number, form and edgewise disposi-

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tion of the denticular extensions on the respective plates may vary, the use of two curved projections on each plate being shown for purpose of illustration with the extensions on one plate being out of alignment with those of the other plate.

A completed strap and buckle fastening is illustrated in Figs. 6 and 8. This constitutes the buckle as described and the binding metal band 14 adapted to extend around an object to be bound with ends of the strap being connected by the buckle. End portions of the strap extend in opposite directions through the passageway 13, these ends being bent respectively downwardly and rearwardly around the front edge and small denticular extensions 10 of the bottom plate and upwardly over and around the rear edge and denticular extensions 11 of the top plate and over the top of the same with the strap end disposed under the arch 7. The fastenings are usually made with the aid of a strapping tool of the type disclosed in the identified copending application, and in making such fastenings the buckle is in reality connected with that end of the strap passing through the buckle and bent over and around the forward edge of the bottom plate. From the buckle connected end, the strap passes around the object to be bound and through the buckle in position to be drawn through the buckle in a tightening and tensioning operation by the tool or other means. It is in the desired position of tightening that the strap is cut and folded around and over the top plate and the end of the strap is forced under the arch.

In a normal fastening or strapping operation the respective strap ends to be fastened pass in opposite directions through the buckle and, being bent around the respective buckle plates firmly and frictionably engage the relatively small extensions 10 and 11 on the buckle plates, with the result that the extensions cause small spaced deformations of the strap in the form of spaced indentations in one side of the strap materials and attending protuberances out of the plane of the strap on the opposite side. However, in this condition of a normally completed fastening, the plate extensions usually remain positioned in the respective planes of the buckle material with the strap deformations at the edges of the buckle plates. Straps so deformed would not normally pass through the buckle at the points of deformation, the passageway through the buckle being designed to permit only such clearance therethrough as will permit free passage of normal strap ends. The denticular extensions at the plate edges are so designed, however, that abnormal shock or tension placed on the strap and fastening, which would tend to cause the strap to slip or roll around the edges of the plate, would cause the extensions to deflect inwardly of the buckle to bite and hold the strap against further slippage and thus maintain the fastening. Any tendency of the top plate of the buckle to lift is precluded by the overlying strap end anchored under the buckle arch. Moreover, the buckle is otherwise so designed and constructed that the upper and lower plates thereof mutually reinforce each other under great strain and against deformation of the buckle.

From the foregoing is made clear the provision of a navelly constructed buckle which attains the objects of the invention. While the invention has been described in connection with a preferred embodiment thereof, the words employed are those of description and not of limitation, and changes of construction are contemplated within the purview of the appended claims without departing from the spirit and scope of the invention.

I claim:

1. A metal strap fastening buckle comprising a metal blank having a transversely slotted central portion, said metal blank formed and folded on itself on a transverse line through said slotted portion to form two opposed upper and lower plate portions each having an intermediate portion thereof offset to define a depressed strap receiving channel transversely of the blank between side

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flanges, the side flanges of said plate portions being in abutting relationship in such manner as to define and provide a passage through the buckle defined by the offset portions of the plate portions, one of said plate portions having a struck-up strap end receiving arch the side and support portions of which converge toward the end of the buckle and the top portion of which is inclined downwardly and outwardly toward the end of the buckle.

2. A metal strap fastening comprising a metal blank having a transversely slotted central portion, said metal blank formed and folded on itself on a transverse line through said slotted portion thereof to form two opposed upper and lower plate portions each having an intermediate portion thereof offset to define a depressed strap receiving channel transversely of the blank between coplanar side flanges, the side flanges of said plate portions being in abutting relation in manner to define and provide a passage through the buckle defined by the offset portions of the plates, one of said plate portions having a struck-up strap end receiving arch the side and support portions of which converge toward the end of the buckle and the top portion of which is inclined downwardly and outwardly toward the end of the buckle, the other of said plate portions being in edgewise supporting engagement with the side and support portions of the arch.

3. A buckle for fastening ends of metal straps comprising, a metal blank having a central portion thereof transversely slotted intermediate ends of the blank and offset from the plane of side portions of the blank to define side flanges and a strap receiving channel portion, a strap receiving arch at an edge portion of the buckle blank formed by a transverse portion of the blank between side portions struck outwardly of the body of the blank in a direction opposite the offset channel, said arch having a flat top portion inclined downwardly and outwardly toward the end of the buckle and side wall portions converging inwardly, the buckle blank being folded on itself on a transverse line at the point of the slot with side flange portions in abutment and channel portions opposed and with an end portion of the blank in reinforcing engagement with rear edges of the arch side walls, said arch having a flat top portion extending above the fold line to provide entrance thereunder for a strap passing over the fold line.

4. A metal strap fastening buckle comprising a formed sheet metal blank slotted transversely between side portions and intermediate ends of the blank and folded on itself at the point of the slot to form upper and lower plate portions each having a central portion offset from the plane of the side portions thereof to define side flanges and a strap receiving channel, said flanges being in abutment and said channels being opposed to provide a passage through the buckle, said lower plate having an end edge portion between the side flanges struck outwardly in direction opposite the offset channel and above the upper plate portion to provide an arch for receiving a strap end above the upper plate portion.

5. A metal strap fastening buckle comprising upper and lower plates in opposed relationship, each plate having a central portion offset from the sides of plates to define side flanges and a strap receiving channel, said plates having the side flanges in abutment and channels opposed to define a strap receiving passage through the buckle, the lower plate having a transverse edgewise portion thereof between side flanges struck outwardly of the plate in direction opposite to the offset channel therein to provide a strap receiving arch above the upper plate, each plate having edgewise denticular extensions of the channel portion metal at one end to engage a metal strap bent around the edge of the plate to prevent slippage of the strap, and means joining fold line of the plates.

6. A metal strap fastening buckle comprising edge connected upper and lower plates each having a slotted

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central portion offset from the plane of side portions thereof to define opposed strap receiving channels and abutting side flanges, the offset channels defining a passage through the buckle, one of said plates having an end edge portion thereof struck outwardly of the plate to define an arch extending above the opposed plate for receiving the end of a strap, each of said plates having denticular extensions edgewise of the channel portions thereof to frictionally engage a strap passing through the buckle passage and trained around the edge of a plate, said denticular extensions being normally disposed in the plane of the buckle material at the channel portions but being so constructed and arranged as to be deformable under abnormal tension on a strap trained therearound to deflect from the normal plane to bind the strap in the buckle.

7. A metal strap fastening buckle comprising connected upper and lower plates, the lower plate having a central portion offset from the plane of side portions thereof to define side flanges and a strap receiving channel and a transverse end edge portion thereof between the side portions struck outwardly of the plate in a direction opposite to the offset channel to form an arch with side walls and a horizontal top portion inclined downwardly and outwardly toward the end of the plate, said plate having denticular extensions of the edge portion thereof adjacent the arch to frictionally engage a strap passing through the channel and bent over and around the edge of the plate, and a top plate having a central portion thereof offset from the plane of side portions in direction opposite to that in the lower plate, said top plate having edge portions in reinforcing contact with the rear edge portions of the side walls of the arch and having denticular extension of the opposite edge to frictionally engage a strap passing through the structure and bent around the edge of the upper plate.

8. A buckle for fastening the ends of metal straps comprising a metal blank having a central portion thereof offset from the plane of side portions of the blank to define side flanges and a strap receiving channel portion, a transverse portion at one end of the blank between the side flanges thereof being struck outwardly of the body of the blank in a direction opposite the offset channel to form a strap receiving arch at one end of the buckle, said blank being slotted transversely of the channel portion between flange portions and intermediate ends of the blank and folded on itself at the point of the

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slot with flange portions in abutment and channel portions opposed defining a strap receiving passage through the buckle.

9. A method of making a metal strap fastening which consists of forming a flat sheet metal blank, striking out spaced parallel portions thereof along parallel lines to define transverse openings in the blank between side edge portions, offsetting a central longitudinal portion of the blank from the plane of edge portions thereof to form marginal flanges and a strap receiving channel with openings in the blank disposed in the channel portion, offsetting one end portion of the blank to the edge of one opening in a direction opposite to the offsetting of the channel to provide a strap receiving arch, and folding the formed blank on itself on a transverse line of the other opening with marginal flange portions in abutment and channel portions opposed and with the folded end of the blank against the rear side edge portions of the offset arch.

10. A method of making a metal strap fastening which consists of forming a flat sheet metal blank, striking out spaced parallel portions thereof along parallel lines to define transverse openings in the blank between side edge portions and denticular edgewise extensions of the blank disposed in the openings in the plane of the metal of the blank, offsetting a central longitudinal portion of the blank from the plane of edge portions thereof to form marginal flanges and a strap receiving channel with openings in the blank disposed in the channel portion, offsetting one end portion of the blank between the flanges and back to the edge of one opening in a direction opposite to the offsetting of the channel to provide a strap receiving arch, and folding the formed blank on itself on a transverse line of the other opening with marginal flange portions in abutment and channel portions opposed and with the denticular extensions respectively disposed at opposite ends of the fastening on the upper and lower portions.

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