June 22, 1937. F. A. SCHAEFER 2,084,412

BUCKLE

Filed March 15, 1932

Fig. 1.

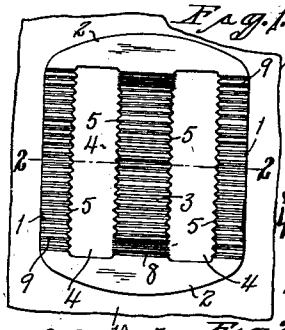


Fig. 3.

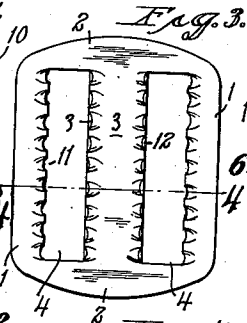


Fig. 5.

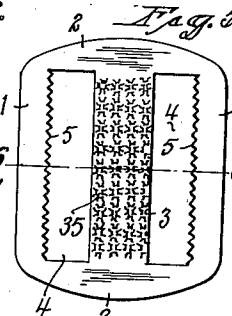


Fig. 7.

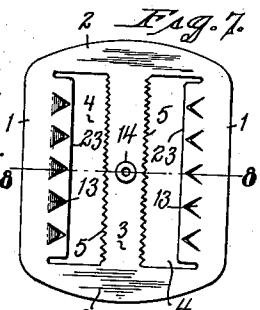
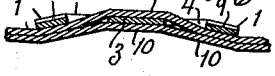


Fig. 2.



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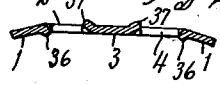

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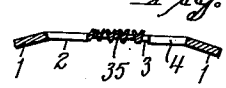

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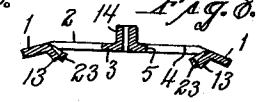


Fig. 9.

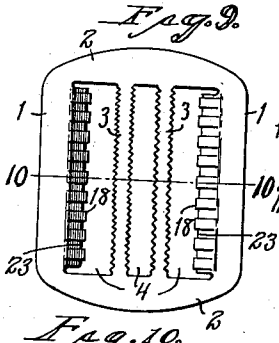


Fig. 11.

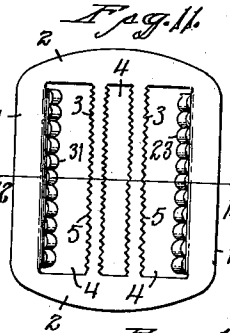


Fig. 13.

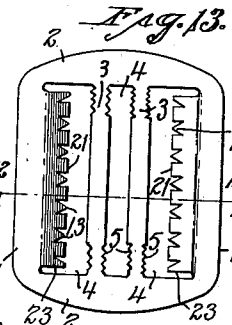


Fig. 15.

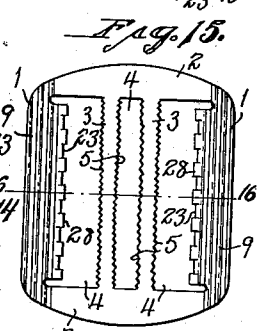


Fig. 10.

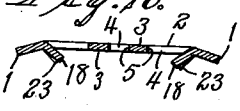


Fig. 12.

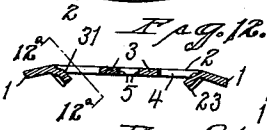


Fig. 14.

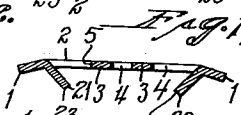


Fig. 16.

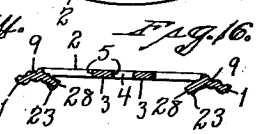


Fig. 17.

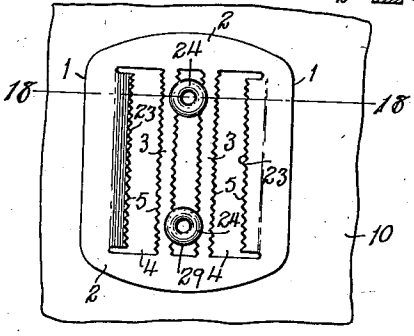


Fig. 21.

Fig. 19.

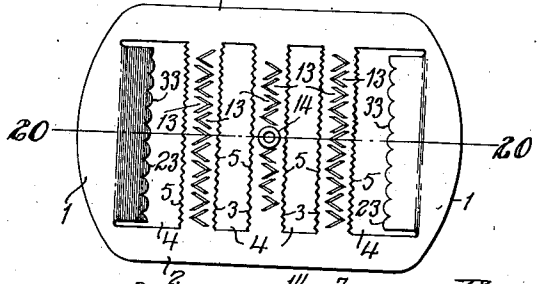


Fig. 18.

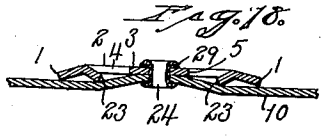
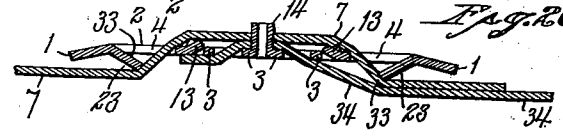


Fig. 20.



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ATTORNEY

Patented June 22, 1937 2,084,412

UNITED STATES PATENT OFFICE

2,084,412

BUCKLE

Ferdinand A. Schaefer, Baltimore, Md., assignor of one-half to Theodore H. Low, New Haven, Conn.

Application March 15, 1932, Serial No. 598,908

15 Claims. (Cl. 24—186)

My invention relates to one-piece buckles and more especially to those having means on the ends and crossbars for engaging straps, webbing, and the like.

This application is a continuation in part of my copending application No. 381,922 filed July 29, 1929, now Patent No. 1,934,951.

Heretofore integral means for holding straps in detachable, adjusted position on a wearer by a one-piece buckle have been by teeth placed on the narrow inner marginal edge of the buckle ends or lips. These teeth possess a number of disadvantages. They perforate the strap. This necessitates displacing the weave. When the strap is subjected to strain, the weft of the weave adjacent to the teeth is forced bodily to one side, until enough of the threads are jammed together to resist the pull on the strap. The resistance the weave offers is progressive increasing with the number of threads displaced. This results in considerable slip of the strap on the buckle especially in the case of loose weaves. Wear on the strap increases with the slip. Moreover since the strain is localized on a few threads of the weave, there is intensified wear and tear at the point of puncture. Moreover there is always the danger, when these buckles with teeth are used on garments, of their ends or points chafing the wearer.

By my invention, I overcome these defects. Indeed I do away with the necessity of using teeth; nor do I limit myself to roughening the inner edges of the ends, but dispose such means for engaging and holding the strap over the entire relatively broad upper and/or under surfaces of the sides of the ends and the crossbar wherever the strap, on being passed through the buckle, comes into close contact with such surfaces. I provide novel holding means by roughening in various ways these surfaces as well as the edges with which the strap comes in contact, and by so roughening have a substitute for teeth. I roughen the surfaces in such manner that the strap is not pierced through or perforated but is held by its threads catching on the roughened lower and upper surfaces of the ends and crossbar and/or the edges thereof. When strain is brought on the strap it is transmitted to the fibers of certain threads as well as in certain cases to the weave of the cloth, as explained hereinafter. These fibers of the threads offer at least initially greater resistance to being torn off or broken than does the weave offer to being displaced, by teeth. Furthermore by merely roughening the surfaces, the holding means is distributed over a larger part of the strap. The give or slip of the strap is lessened, since the fibers of the thread offer a maximum of resistance from the start.

My invention not only lessens the wear on the strap, but should the outer surface of the fabric become worn, the inner layers will remain intact. By my invention, the effective life of the strap is greatly increased. Moreover the roughened surfaces on my buckle catch on the strap much more readily than teeth.

My invention consists not only in the manner of roughening the surfaces, but also in the location of such roughened surfaces on the buckle.

By utilizing these hitherto unused surfaces of the crossbars and the ends, their greater area enables the holding means and consequent wear on the strap to be spread over a much greater portion of the strap than would be possible by the use of the narrow edges only as holding means. By roughening the surface in various ways, the strap is engaged and held without perforating the fabric. By making the height of the serrations along the narrow edges of the ends and cross bar less than the thickness of the fabric complete penetration is avoided. Thus the fabric not only furnishes a hold for the roughened surface but also a harbor, housing securely the roughened surfaces, and removing all danger of chafing the wearer. If desired all the inner narrow edges of the ends and cross bar may be serrated to assist in holding the strap. Formerly comparatively few serrations forming teeth were made on the inner edges of the ends. These teeth varying in number from two to nine had to be of substantial size since they bore all the strain divided between them. Moreover at first one piece buckles were made of metal of inferior quality, lacking the uniformity in gauge and high strength of the cold rolled steel of today. Moreover since the teeth were designed to pierce through the thickest fabrics, their length had to be considerably longer than the thickness of such fabric. To prevent their breaking or bending under the localized strain such teeth had to have a wide base.

By spreading the holding means over the buckle as already explained, I distribute the strain, one roughened surface coacting with another to hold the strap in detachable adjusted position on the buckle. I similarly distribute the strain along the strap. Furthermore I replace the teeth by a row of fine serrations so small that seventeen or more may be placed along an edge that would hold only half that number of teeth. Such small serrations catch on the surface of the fabric so readily that the lips on the ends of the buckle

can be bent down at a less angle than formerly. If the strap be of leather or other impervious smooth material, it may be held by the roughened surface merely indenting that portion of the strap with which it comes into close contact and thus increasing the frictional resistance.

I have described in general terms one method of roughening the smooth plane surfaces of the buckle blank by scoring, serrating or otherwise cutting into its narrow edges so as to raise short projections thereon which catch and partly pierce the strap, without perforating it. There is another method of roughening or breaking the broad smooth plane surfaces in order to enable them to hold or assist in holding the straps detachably in adjusted position. This method is by stamping or otherwise bending portions of the blank itself without cutting or scoring the surface. Thus one or more of the end lips or cross bars whose surfaces come into close contact with the strap may be corrugated and formed into a series of ridges and grooves. The resulting broken surfaces may be of various forms but in all the blank itself is bent and the strap is held by friction. Thus it is essential that the corrugations or series of small projections have angular corners to indent and hold the strap without penetrating or otherwise catching its surface.

The chief effectiveness of the corrugations, however, is at the edges adjacent the slots, where the bight of the strap takes a sudden turn in direction when threaded through the buckle. The sharper this turn is made, the greater the holding power. If the turn is sufficiently sharp, the uneven surface at the end of the corrugations act in a similar manner to blunt teeth, sharply indenting the strap and engaging the nap without, however, piercing the surface or displacing the weave.

By illustrating various ways of roughening, the special type and location that is best adapted for the material of which the strap is made can be chosen. If desired, all the edges of the buckle may be cut smooth and the roughened under-surface of the ends and/or the upper surface of the crossbar relied on to take a firm hold on the strap. However, if it is desirable for the edges to assist in holding the strap, these edges may be so serrated as already explained that they engage the strap without perforating it more than part way through.

By my invention the cost of the die is reduced and its life increased. Moreover, the length of time required for tumbling the buckles is diminished.

The accompanying drawing sets forth clearly my invention to those skilled in the art.

Figs. 1, 3, 5, and 7 are top plan views of one-bar buckles showing various ways of roughening the surface.

Figs. 2, 4, 6, and 8 are sections through **2—2—4—4—6—6—8—8** of Figs. 1, 3, 5, and 7 respectively.

Figs. 9, 11, 13, 15, 17 are top plan views of two-bar buckles showing various ways of roughening their surfaces.

Figs. 10, 12, 21, 14, 16 and 18 are sections through **10—10—12—12—14—14—16—16—18—18** of Figs. 9, 11, 13, 15 and 17 respectively.

Fig. 19 is a top plan view of a three-bar buckle.

Fig. 20 is a section through **20—20** of Fig. 19.

Throughout the description "longitudinal" means the direction from end to end, or that in which a strap-end is passed, and "transverse", "crosswise" or "lateral", the direction from side to side of the buckle. "Ends" are inclusive of lips, and "strap" includes any kind of webbing or strip of material adapted to be passed through the buckle. The upper and under surfaces of the sides of the ends and cross bars distinguishes from their edges. The description of the rough surfaces is made looking down on the buckle unless otherwise noted. The term corrugation includes any deformation of the blank which causes small projections bumps or other irregularities of surface which form a series whether the intervening portions of the blank are bent down or kept in their original plane. It does not include serrations or any other cutting of the blank.

It will be seen that in Figs. 1 to 4 I disclose the ends of two types of buckles, bent to roughen the broad outer and inner surfaces of the ends into irregularities which I broadly term corrugations, though differing greatly. In both these types of buckles there are no lips and the narrow inner edges of the ends are serrated more or less. In the three types illustrated in Figs. 9 to 12 and 15 and 16 lips are provided, which are bent into various other forms of corrugations, while the edges of the lips are kept straight. In these types friction, gained by deforming the flat contacting surfaces of the straps until they conform to the corrugations on the lips, is relied on to hold or assist the finely serrated edges of the crossbars in holding the strap detachably in adjusted position on the buckle.

It will also be seen that my disclosure in this and my co-pending application include not only friction means but also means of holding a strap by partially penetrating it. By breaking the smooth contacting surfaces by scoring or finely serrating them, small projections are formed thereon sufficiently numerous and sharp to catch on contacting surfaces of the strap readily and sufficiently small to pierce through the surface but penetrate part way only through the strap.

Since the fabrics of which strap are made consist of two or more thicknesses or series of threads or other flexible material, at least one of these series may be perforated without perforating the fabric or exposing the ends of the projections, which rest imbedded in the other series of threads.

Furthermore since straps especially of thin fabrics usually consist of several layers or plies of fabric these ends may completely perforate one or more layers of fabric and remain imbedded in an outer one. In the latter case the holding power of the scored surface is increased. For in addition to the resistance the fibers of the thread, in which the end is imbedded, offer to being pulled apart, the threads and weave of the perforated layer of fabric resist being displaced.

For practical reasons in making buckles out of sheet material on presses scoring or cutting of the surface is limited to the narrow marginal edges of the lips (ends) and cross-bars, whereas the corrugations are limited to the broad upper and lower surfaces thereof. Thus both these novel means of holding the strap, i. e. by partial penetration only and by friction, of the broad surfaces can easily be combined to coact as illustrated and described heretofore in this and my copending application. The corrugated broad surfaces are there disclosed as holding both with and without the assistance of fine serrations on the edges.

Both of these novel means of holding the strap are characterized by having irregularities or roughness of surface sufficiently sharp and angular to hold contacting portions of the strap, and

sufficiently small to house and conceal the roughness under the outer surface of the strap by penetrating if at all no more than part way through the strap.

The strap is shown only at 7 in Figs. 2 and 20. In the various types of one, two or three-bar buckles shown and illustrated in Figs. 1 to 20, the end of this strap is passed up through one end slot over all the cross bars and down through the other end slot and pulled taut, so that the upper surface of the strap is brought into close contact with the under surfaces as well as the edges of the ends, and the under surface of the strap is similarly brought into close contact with the roughened upper surface of the crossbars. A part or all of such surfaces is roughened for the purpose of engaging the strap in the manner already described.

The one-piece buckles illustrated in Figs. 1 to 20 have frames formed of the ends (1), and the sides (2). In Figs. 1 to 8 a single cross-bar (3) divides the interior of the buckle into two slots (4) extending from side to side. These one-bar buckles are fastened permanently to the body of the fabric by means of the loops (8) Figs. 1 and 2, sewed over the crossbar adjacent the sides of the buckle.

The two-bar buckles, Figs. 9 to 18, can be either permanently fastened by loops like the one-bar buckle, or rivets can be used as shown in Figs. 17 and 18.

The three-bar buckles, Figs. 19 and 20, are designed to be permanently fastened to a strap end without the need of sewing or riveting.

Figs. 7 to 20 show buckles provided with lips (23) extending from the inner edge of the end and bent downwards at varying angles. These figures show various ways of roughening the lips. These downwardly disposed lips deeply indent the strap passed up through the adjacent slots, when it is pulled taut, and thus create friction. If the smooth broad under surface of these lips is broken and corrugated this friction is increased. Since the lips are attached to the frame of the buckle on only one edge, they can be easily bent and contracted without changing the shape of the frame or drawing of metal, or excessive wear on the dies.

In Figs. 9 to 18 the two-bar buckles have all four edges of the crossbars indented with a row of fine serrations, (5), as already explained in my co-pending application No. 381,922. In tumbling the buckles, any sharp edges would be rounded off somewhat.

In this type of two cross-bar buckle the inner row of serrations grip the rivets (24) and prevent them from slipping sideways (sideslip).

In Figs. 1 and 2 not only is the center bar corrugated, as shown in my co-pending application No. 381,922, but the ends are similarly corrugated over their entire surfaces. These corrugations consist of a series of parallel V-shaped ribs or ridges alternating with parallel V-shaped furrows or grooves running across the ends and center bar from edge to edge. These corrugations (9) as already explained, hold or assist in holding a strap passed through the buckle in detachable, adjusted position thereon. The edges of the crossbar and the inner edge of the ends have a row of fine serrations (5) illustrated and described in my co-pending application No. 381,922, which coact with the corrugated surfaces in holding the free end of the strap (7). The corrugations on the sides of the crossbar also coact with its rows of fine serrations on the edges in preventing side-slip.

The buckle is permanently attached to the body of the fabric (10) by means of the loops (8) sewed or passed over the crossbar (3) near its ends and adjacent the sides of the buckle, in such manner that most of the roughened upper surface of the crossbar is left exposed to catch the under surface of the strap when brought into close contact, both with the corrugations on the upper surface and the row of fine serrations along the edges of the crossbar.

In Figs. 3 and 4 only that part of the surfaces adjacent the edges of the crossbar and the inner edge of the ends is roughened by a series of embossments and indentations respectively semi-teat-like in form on the edges at 12 and 11, disappearing as they run from the edges inwards. The edges of the crossbar (3) are turned up at 37, and the inner edge of the ends turned down at 36, the better to nip and hold the strap.

Figs. 5 and 6 show the entire upper surface of the crossbar pitted (35) from underneath like a nutmeg grater.

In Figs. 7 and 8 the lips are straight-edged and have teeth (13) cut from their surfaces to protrude slightly underneath. The pin or boss (14) is provided on the center of the crossbar (3) to engage a hole in the strap.

In Figs. 9 and 10 the broad upper and under surfaces of the lips are roughened by short, shallow, channel-shaped corrugations (18) extending across the lips to their edges. These corrugations form a series of alternate parallel and similarly shaped ridges and grooves, the grooves on one surface forming the ridges on the other with angular corners to sharply indent the strap. The ridges and grooves end flush with each other to form a straight edge for the lips as shown.

In Figs. 11 and 12 and 21 the lips are shown bent into similarly disposed corrugations forming a series of bulges or bumps (31) resembling artificial teeth, with the inner edge of the lips straight as shown in Fig. 21. The joinder of these teeth together form on the under surface ridges to indent the strap and increase the friction means as shown in Fig. 12. The V shaped grooves on the outer surface also serve the same purpose.

In Figs. 13 and 14 the lips along their edges are serrated by a novel arrangement of teeth, the customary sharp, V-shaped teeth (13) alternating with square-ended teeth (21). These square teeth serve to protect the sharp points of the adjacent teeth in tumbling. The row of fine points (5) on the edges of the crossbars extends only for a short distance along the end adjacent the sides of the buckle, so as to hold the loops or rivets against side-slip. The rest of the edges of the crossbars is straight, the strap being held by the teeth on the lips.

Figs. 15 and 16 show corrugations running along the ends and lips from side to side of the buckle. The edge of the lips is upset to form an alternate series along the straight edge of the lips of slightly raised notches 28 so short as to be burrlike along the margin of the broad inner surface corresponding to smaller indentations on the margin of the broad outer surface of the lips, with the edge of the lips straight as in Fig. 21.

Figs. 17 and 18 as explained show the manner of passing the rivet between the two cross-bars. The ends of the rivets are upset as at 29 so as to be almost flat.

In the three-bar, four-slotted buckle shown in Figs. 19 and 20, the lips (23) projecting down-

ward at an angle of approximately 30 degrees, have their edges scalloped at **33**. All the surfaces of the three cross-bars are provided with rows of sharp teeth (**13**) alternate teeth pointing towards or away from the buckle ends. The alternate teeth, pointing in the direction in which the fixed strap end **34** is passed, protrude slightly below the buckle, while the alternate teeth, pointing in the direction that the free strap end **7** is passed, protrude slightly above the buckle. A pin or boss **14** is provided in the middle of the center crossbar.

This buckle is attached permanently to the strap end **34**, without sewing or riveting. The strap end as shown in Fig. 20, is passed up through one of the center slots **4**, over the center crossbar **33**, so as to embrace the pin **14** and down through the other center slot with its end engaged by the downwardly protruding teeth on the outer crossbar **3**. Thus the buckle is held permanently fastened to the strap **34** by the row of points on each side of the two central slots, by the pin on the center crossbar and by the teeth on all three crossbars.

The free end of the loose strap **7**, when it is desired to fasten it in detachable adjusted position on the buckle, is passed up through an outer slot **4** over all three crossbars and down through the other outer slot. Its surface is then engaged and held by the scallops **33** on the edges of the lips, by the row of points along the outer edges of the outer crossbars, by the teeth on upper side of all three crossbars and by the pin fitting into one of the holes on the strap end.

This type of buckle is designed for shoes, belts and other leather goods.

Having described my invention, I claim:

1. A slotted buckle for detachably holding a strap in adjusted position thereon, comprising a frame of two ends and two sides, and having at least one cross bar dividing the buckle into a plurality of slots, and lips extending from each end downwardly into the slots, and having broad upper and lower surfaces, the lower broad surfaces being roughened with projections and depressions with angular corners to catch and at least assist in holding contacting portions of the strap when pulled taut through the buckle into close contact with said portions.

2. A buckle comprising a frame of two sides and two ends, with a cross bar dividing the buckle into slots, and having on its broad upper face an uneven broken surface of sufficient angularity to catch threads in close contact therewith, penetrating only part way through the cloth, and of sufficient area to catch and hold both the retentive means used to fasten the buckle permanently to a garment and the threads of a large part of the underside of a strap passed through the buckle into close contact with the cross bar.

3. In a buckle, a frame comprising a single piece of sheet metal having a slot bounded by a bar at one side thereof, said bar having a smooth uninterrupted surface area on each face thereof, and the metal at that edge of the bar defining one edge of the slot forming a substantially smooth and uninterrupted edge and being provided with a series of corrugations comprising ribs extending transversely out of the plane of the bar and extending backwardly from said edge, said corrugations merging with the smooth and uninterrupted surface on each face of the bar.

4. In a buckle, a frame comprising a single piece of sheet material having a slot enclosed within the frame, the portions of material adjacent one side of the slot and defining that edge of the slot being provided with a series of corrugations comprising ridges rectangular in cross section with two strongly defined corners sufficiently sharp to deeply indent only leaving its face unscarred and unbroken, a strap brought into close contact therewith leaving its surface unpierced, the ridges extending transversely out of the plane of the buckle.

5. In a buckle, a frame comprising a single piece of sheet metal having a slot bounded by metal at one side thereof having a smooth and uninterrupted surface area on each face thereof and the metal defining that edge of the slot forming a substantially smooth and uninterrupted edge and being provided with a series of corrugations comprising ribs extending transversely out of the plane of the frame and extending backwardly from said edge, said corrugations merging with the smooth and uninterrupted surface on each face of the frame.

6. In a buckle, a frame comprising a single piece of sheet metal having a slot bounded by a bar at one side thereof, said bar having a smooth uninterrupted surface area on each face thereof and the metal at that edge of the bar defining one edge of the slot forming a substantially smooth and uninterrupted edge and being provided with a series of corrugations comprising ribs extending transversely out of the plane of the frame and extending backwardly from said edge, said corrugations merging with the smooth and uninterrupted surfaces on each face of the bar, and additional means to assist at least in securing the free end of a web to the frame.

7. In a buckle, a frame comprising a single piece of sheet metal having a slot bounded by a bar at one side thereof, said bar having a flat smooth uninterrupted surface area on each face thereof and the metal at that edge of the bar defining one edge of the slot being provided with a series of corrugations extending transversely of the slot and merging with the flat smooth and uninterrupted surface on each face of the bar.

8. In a buckle, a frame comprising a single piece of sheet metal having a longitudinal slot, the portions of the frame on opposite sides of the slot having a flat smooth and uninterrupted surface area on each face thereof, and the metal of the frame defining each edge of the slot being provided with a series of corrugations extending transversely of the slot and merging with the flat smooth and uninterrupted surfaces on each face of the frame.

9. In a buckle, a central cross bar with substantially straight smooth edges dividing the buckle into two slots, with a smooth surface area on each face of the cross bar, and corrugations adjacent each slot extending backwardly therefrom and merging with the smooth surface on each face of the cross bar.

10. In a buckle, a frame with two ends and two sides and a cross bar dividing the interior of the buckle into two slots and a lip depending from the inner edge of each end, each end having a smooth and uninterrupted surface area on the face thereof, the broad surface on each face of the lips forming a series of corrugations extending backwardly from the edge of the lips and merging with the smooth surface on the face of the ends.

11. In a buckle, a frame, a cross bar dividing the interior of the buckle into two slots and two

oppositely disposed lips with substantially straight smooth edges depending from the inner edge of the frame and integral therewith, both faces of the lips having a smooth and uninterrupted area thereon, and that part of the lips adjacent the slots having a series of corrugations extending backwardly from the slots and merging with the smooth surface on each face of the lips.

12. In a buckle, a frame and two lips integral with and depending from the inner edge of opposite portions of the frame, and a cross bar dividing the buckle into two slots, the lips having substantially straight smooth edges, the edges of the lips along the slots being upset to form a row of irregular burrlike ridges.

13. In a buckle, a one piece frame enclosing a slot, having an integral lip with substantially straight smooth edges extending from the inner edge of the frame, the broad faces of the lip being roughened adjacent the slot to sharply indent only the surface of the strap passed through the slot into close contact with the roughened faces, the edge of said lip being substantially straight and smooth.

14. A buckle having a frame and a cross bar dividing the interior of the buckle into two slots and two oppositely disposed lips, each extending into different slots from the inner edge of the frame, the broad faces of each lip being roughened adjacent the slots to sharply indent only the surface of the strap passed through the slots into close contact with the roughened faces.

15. In a buckle, a frame with two ends and two sides, having a smooth uninterrupted surface area on each face thereof, and a lip projecting from the inner edge of each end, the broad surfaces forming the two faces of the lips having a series of corrugations extending over said surfaces of the lips and merging with said area on each face of the ends to assist at least in holding the buckle in adjusted position on a web.

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