

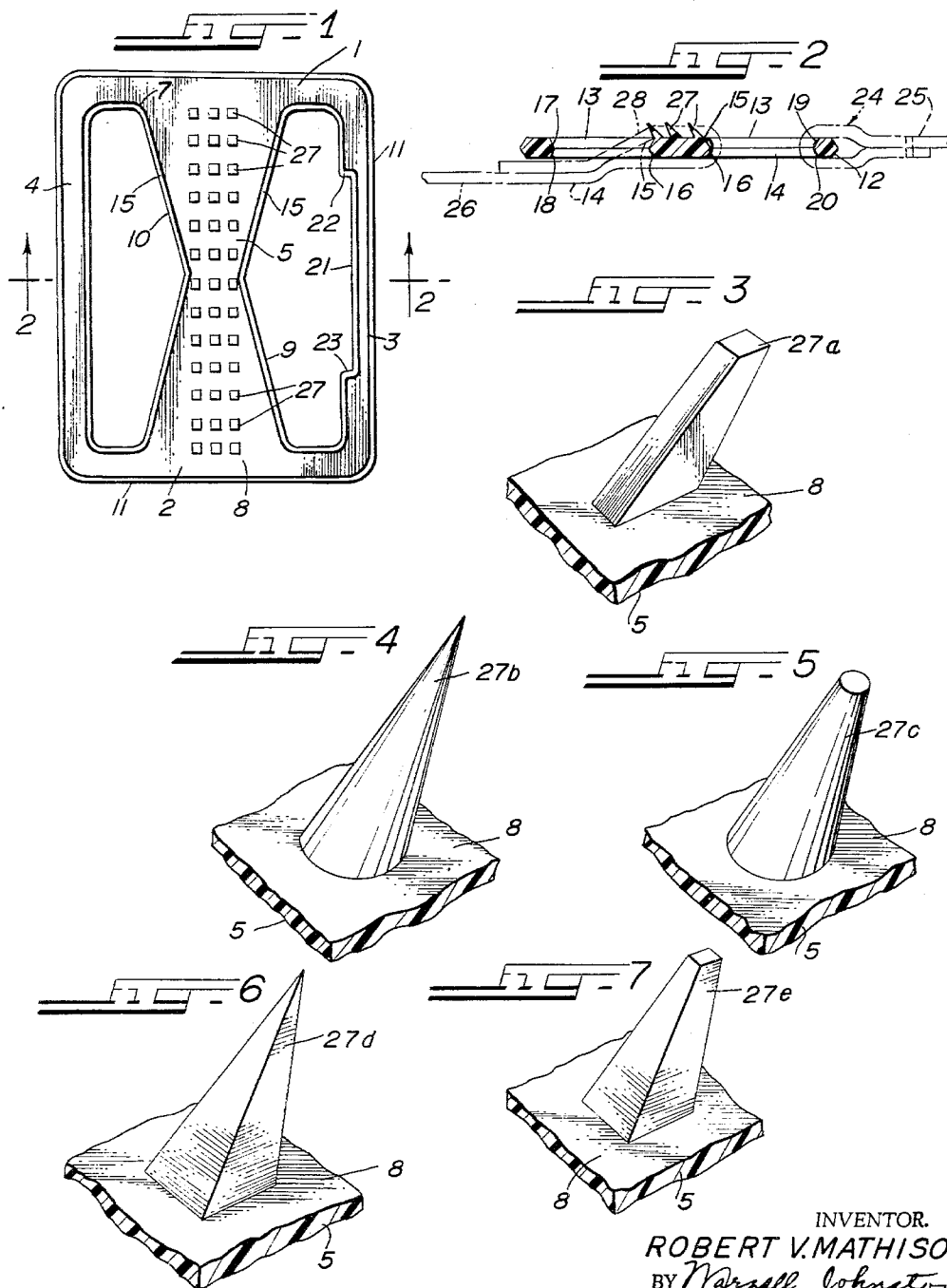
Nov. 2, 1965

R. V. MATHISON

3,214,815

BUCKLE-TYPE DEVICES

Filed Sept. 27, 1963



INVENTOR.
ROBERT V. MATHISON
BY *Marzell, Johnston*
Cook & Root
ATTY.

1

3,214,815

BUCKLE-TYPE DEVICES

Robert V. Mathison, 5 Woodcrest Road, Asheville, N.C.

Filed Sept. 27, 1963, Ser. No. 312,157

1 Claim. (Cl. 24—200)

This invention, in general, relates to gripping devices and more particularly pertains to buckle-type gripping devices especially useful in releasably gripping or holding fabric or like material.

Briefly, the gripping devices of the invention are buckle-type articles of manufacture. They comprise a pair of spaced, side bars, between at least one of the respective ends of which extends a cross bar. In the preferred form, there is a cross bar extending between each of the respective ends of the side bars. The gripping devices have an additional cross bar extending between the side bars and spaced from said other cross bar or bars. The additional cross bar has on at least one face thereof a relatively large number of tapered, obliquely-directed projections or teeth which are adapted to penetrate the interstices, loops or the like of a fabric and thus grip the latter. These projections or teeth may be oblique cones, oblique frusto-cones, oblique pyramids, oblique frusto-pyramids, oblique triangular prisms, truncated, oblique triangular prisms, and related shapes wherein there is a taper in the direction outwardly from the base of the projections and the projections are slanted relative to the plane of the face of the cross bar on which they appear.

The projections may be arranged in a single row although at least two rows thereof are generally more satisfactory. They preferably all slant or slope in the same direction, but in some cases may be arranged in groups which slant in different directions, e.g., opposite directions.

A preferred embodiment of the gripping devices generically embraced herein and several embodiments of different types of projections thereon are illustrated in the drawings wherein:

FIG. 1 is a plan view of the embodiment;

FIG. 2 is a sectional view taken on section 2—2 of FIG. 1, additionally with a fabric tab or strip held thereon and a loop of a fabric tab or strip mounted about a cross bar; and

FIGS. 3-7 are perspective views of a fragment of the projection-bearing cross bar of FIGS. 1 and 2 with alternative embodiments of a projection thereon, which embodiments may be used in lieu of the projections shown in FIGS. 1 and 2.

Referring to the drawings, the gripping device comprises a unit made up of a pair of parallel, spaced side bars 1, 2 connected at their respective, opposite ends by cross bars 3, 4. The side bars are further connected intermediate their ends by a third cross bar 5. The side bars and cross bars form an open, essentially rectangular framework with two essentially rectangular openings 6, 7 therein.

The edges 9, 10 of cross bar 5 may be straight and parallel or may be, as shown in FIG. 1, V-shaped. The outer edges of bars 1, 2, 3 and 4 may be beveled edges 11, 12 or any other suitable configuration. Similarly, the inner edges 13, 14 of bars 1, 2 and longitudinal edges 15, 16 of bar 5 may be beveled or any other suitable shape. The inner edge of bar 4 may be similarly beveled edges 17, 18.

The bar 3 may have beveled edges 19, 20 and may further have a notched or recessed portion 21 along its inner edge. The latter forms a seat section having side shoulders 22, 23. A loop 24 or the like of a fabric strip belt, etc., 25 may be attached to the buckle-type fastener as shown in FIG. 2. The bar 3 is useful only

2

as a means for attaching the buckle-type fastener to the article with which it is used. Should other fastening means be used, the bar 3 may be omitted.

Another strip 26 of fabric or the like (or the other end of strip, belt, etc., 25) is removably held in the fastener by looping it over center bar 5 and placing the free end between bar 4 and the underside of strip 26 (FIG. 2).

The strip 26 is securely held by the projections 27 on the face 8 of center bar 5. The projections 27 are of the aforescribed character, i.e., tapered projections which slope obliquely with reference to face 8. These projections penetrate the interstices of a woven fabric or the like and securely grip the fabric. In the illustration as oriented in FIG. 2, the projections slant outwardly and downwardly, the latter being opposite to the direction of pull on the segment 28 of strip 26 when a pulling force is exerted on strip 26. By virtue of the slanting relationship of the projections 26 against the direction of pull, the fabric strip becomes more embedded on or impaled by projections 26 under the pulling force to tightly seat the strip on the projections.

The face 8 may be substantially covered with said projections as shown in FIG. 1. They are preferably closely spaced in rows. There is at least one row of projections 27 on the face 8 in any case, but two or more closely spaced rows are preferred for better gripping function. The grip is released by raising segment 28 off the projections 27.

The projections 27 shown in FIGS. 1 and 2 are oblique, triangular prisms. Illustrations of alternative shapes suitable for use in the invention are shown in FIGS. 3-7, i.e., truncated, oblique, triangular prism projections 27a; oblique, conical projections 27b; oblique, frusto-conical projections 27c; oblique, pyramidal projections 27d; and oblique, frusto-pyridimal projections 27e. These projections have two common factors. They are tapered in an outward direction, and the underside of the slanting projections form an acute angle with surface 8 so that the fabric or other penetrable material seated thereon is drawn by virtue of the sloping undersides of the projections more tightly toward face 8 when the fabric or other material is pulled under tension in a direction opposite the direction of slant of the projections.

The entire buckle-type fasteners of the invention may be manufactured as a single molding of synthetic resin or polymer (including projections 27-27e) or the projections may be molded separately as a part of a thin sheet or bar of synthetic resin or polymer and attached as bar 5 to an open, substantially rectangular frame forming bars 1, 2, 3 and 4. The latter may be molded synthetic resin or polymer, metal or any other suitable or desired material.

The center lines of the tapered projections form an angle with face 8 of about 30° to 80°. The rows of projections are spaced closely enough, for the best gripping results, so that their tips or outer edges overlap or come close to overlapping the bases of projections of the adjacent row. Center-to-center spacing of the projections in the respective rows is in the order of 0.03 to 0.25 inch. The vertical distance between face 8 and the tips or outer ends of the projections is in the order of 0.03 to 0.15 inch.

As a typical example, the projections can be 0.050 inch in length and slanted at an angle of 45° with the supporting structure. The bases of these projections can be 0.030 inch in diameter and taper to a tip having a diameter of 0.010 inch. The supporting structure can be 0.014 inch in thickness at places where there are no projections and the overall thickness from the tips of the projections through the supporting structure can be

0.049 inch. There can be a projection tip every 0.050 inch or about 400 points per square inch.

As another example, the thickness of the supporting structure can be $\frac{1}{32}$ inch. The projections can be slanted at an angle of 55° . The projections are disposed in rows in two directions, the rows being $\frac{1}{16}$ inch apart and the projections being $\frac{1}{16}$ inch apart center-to-center in each row. The vertical height from the tips of the projections to the top of the supporting structure can be $\frac{1}{16}$ inch. Considering each projection as a cone, the base can be $\frac{1}{32}$ inch. The projections can overlap each other to the extent that a vertical line drawn from the tip of one projection will substantially intersect the mid point of the base of the preceding projection. Thus, a fastener of this type containing eight projections in each row longitudinally and seven rows laterally will occupy a space of approximately $\frac{1}{2}$ inch on each side allowing some room for margins.

The size and arrangement of the projections will vary to some extent depending upon the intended use but in most cases it is preferable that the projections be integrally formed or molded on a supporting sheet at an angle of 45 to 60° , that the adjacent projections be separated from each other center-to-center by a distance of from 0.060 to 0.150 inch, and that the vertical height from the tips of the projections to the surface of the supporting sheet be from 0.020 to 0.150 inch.

The synthetic polymer from which the fastener is formed can be a homo-polymer, such as a polymer of formaldehyde (e.g., Delrin), or a polymer of tetrafluoroethylene (e.g., Teflon), or polyethylene or polypropylene, or a copolymer (e.g., nylon). These polymers can also be described as synthetic resins.

In the most preferred forms of the invention, there are 100 to 500 projections per square inch of the areas on the face 8 covered by the projections. The bases of the projections are at least 0.015 inch in one dimension. They are spaced apart center-to-center in the range of 0.03 to 0.250 inch, preferably 0.06 to 0.15 inch, and the vertical height of the outer edges or tips from the face 8 is 0.015 to 0.15 inch, preferably 0.02 to 0.15 inch. For best results, the center lines of the projections intersect the plane of face 8 at 45 – 60° .

The fasteners herein disclosed can be used with many types of fabrics ranging from open weave fabrics such as gauze type fabrics to relatively tightly woven materials, knitted fabrics, loop pile fabrics, etc.

It will be recognized that the invention is subject to variation and that a number of modifications can be made without departing from the spirit of the invention. It is not absolutely essential that the projections all run in the same direction. This is usually desirable, however, because it facilitates detaching the fastening device without destroying the surface of the material to which it is fastened. In fact, one of the advantages of the present invention in the form herein described is the ease with which the fastener can be applied to a looped fabric or an open weave material or another porous material and withdrawn therefrom without damage.

It will be recognized that the invention herein described may take many forms, and modifications other than the specific embodiments herein described can be made within the spirit and scope of the generic invention.

The invention is hereby claimed as follows:

A buckle-type fastener device for use in releasably holding a fabric strip having projection-penetrable interstices between its threads, said device comprising a molded, synthetic polymer, open bar frame including a pair of spaced side bars, a main cross-bar joined at opposite ends thereof with a respective side bar, said main cross-bar having a substantially flat outer face, first bar means extending alongside, but spaced from one longitudinal edge of, said main cross-bar and joined at the respective ends thereof with a respective side bar, said first bar means adapted to be attached to a buckle-support member, second bar means joined at the respective ends thereof to said side bars and extending alongside, but spaced from the opposite longitudinal edge of, said main cross-bar; a plurality of synthetic polymer, small, tapered, blunted, slanting projections molded integrally with and emanating from said face of said main cross-bar, said projections being closely spaced and arranged in at least one row extending longitudinally along said face of said main cross-bar, all of said projections slanting in the same general direction outwardly from said face and transversely to said rows, the longitudinal axes and the shortest sides of said projections being disposed at acute angles relative to said face, and said projections being prisms, each with essentially parallel, opposite sides in the form of oblique, truncated triangles and each with a planar, blunt outer surface essentially parallel with said face, said projections being sufficiently small so that they penetrate the interstices between the threads of said fabric when said strip is in contact with said projections and under pulling tension across said face in a direction opposite to the direction of slope of said projections.

References Cited by the Examiner

UNITED STATES PATENTS

205,870	7/78	Kelsey	24—186
380,695	4/88	Quirin	24—35
506,494	10/93	Harrison	24—200
510,824	12/93	Southworth	24—176
529,364	11/94	Klusmeyer	24—186
599,542	2/98	Van Sickle	24—186
701,091	5/02	Sanders	24—186
779,279	1/05	Hastings	24—200
1,320,835	11/19	Braxton	24—176
1,509,500	9/24	Van Heusen	24—205.13
1,638,073	8/27	Van Heusen	24—205.13
2,473,209	6/49	Lombardi	24—200
2,828,522	4/58	Stein	24—198
2,935,434	5/60	Dawson	24—150
3,031,730	5/62	Morin	24—205.13—5

FOREIGN PATENTS

782,759	6/35	France.
482,119	9/29	Germany.
538,789	11/31	Germany.
746,082	3/56	Great Britain.

WILLIAM FELDMAN, *Primary Examiner*.

DONLEY J. STOCKING, BERNARD A. GELAK,
Examiners.