June 28, 1966 W. J. LITWIN 3,257,694

SELF-LOCKING TAMPER PROOF STRAP

Filed March 21, 1963

FIG. 1

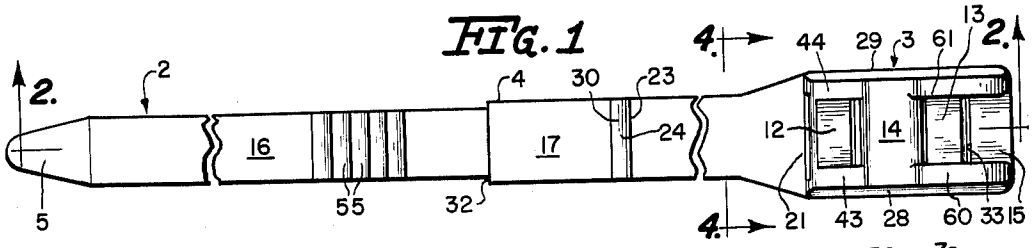


FIG. 2

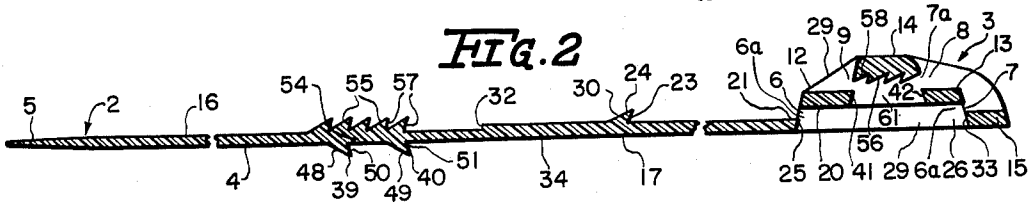


FIG. 3

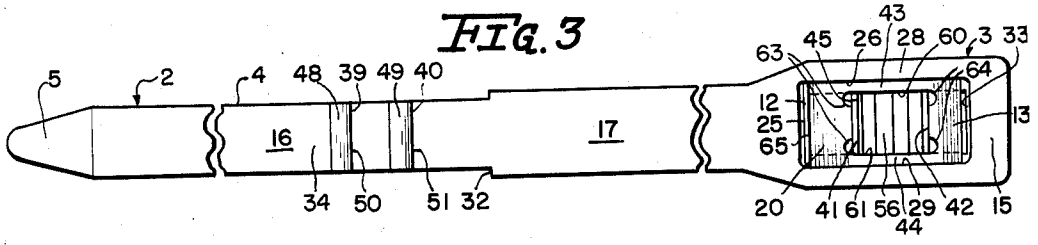


FIG. 4

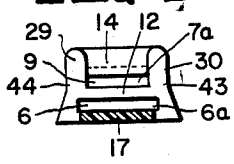


FIG. 5

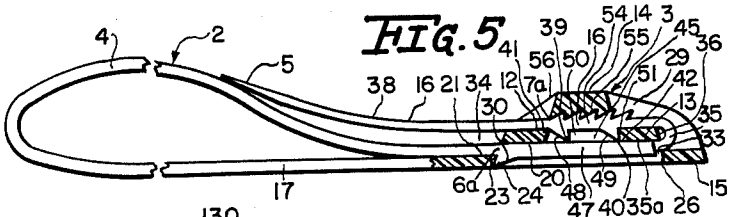


FIG. 6

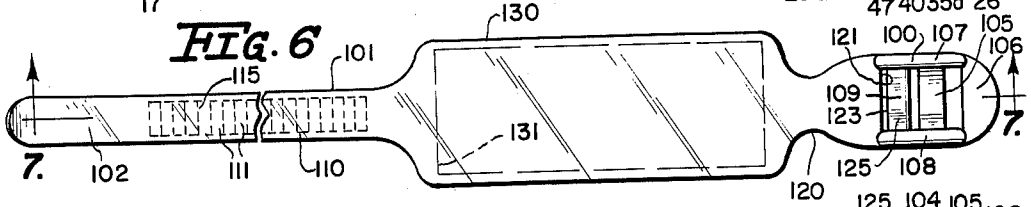


FIG. 7

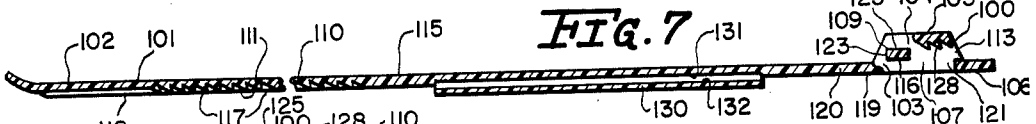
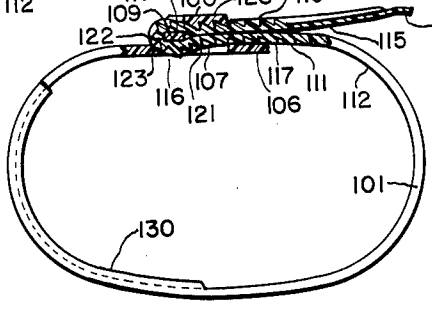


FIG. 8



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SELF-LOCKING TAMPER PROOF STRAP

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8 Claims. (Cl. 24—16)

This invention relates to flexible or plastic straps and the like which are formed of nylon or polyethylene or similar material and is particularly directed to a strap which upon being fastened cannot be unfastened without evidence of tampering.

It has been found to be convenient, if not necessary, in certain instances to provide a strap which cannot be reused. For example, in hospitals, the patient's statistics are attached to the patient and it is of utmost importance in certain instances as with infants that this not be removed. In sealing instruments or freight cars, a tamper proof seal is required which is inexpensive and easy to apply even by inexperienced personnel with minimum of effort and without requiring the use of tools. A further important consideration is to provide a strap which lends itself to mechanical production methods.

A general object of the invention is to provide a novel, simple and efficient self-locking strap.

A further object of the invention is to devise a novel strap which comprises a plurality of cooperative locking means which collectively and individually serve to secure the strap from unfastening.

Another object of the invention is to devise a strap having a buckle portion formed with reverse passages to admit reversely extending lengths of the strap tongue and wherein these passages are separated by reinforcing braces which function to prevent prying the buckle apart to withdraw the tongue from the buckle without causing the buckle to rupture and thus evidence that it has been tampered with.

More specifically the invention provides in one embodiment thereof a strap having a buckle having upper and lower tongue passages with tooth catching or engaging surfaces transverse to the passages and which cooperate with teeth disposed on opposite sides of a tongue portion of the strap to prevent withdrawal of the tongue portion from the passages.

These and other objects and advantages inherent in and encompassed by the invention will become more readily apparent from the specifications and the drawings wherein:

FIGURE 1 is a top plan view of one embodiment of the novel strap;

FIGURE 2 is a longitudinal section taken substantially on line 2—2 of FIGURE 1;

FIGURE 3 is a bottom view;

FIGURE 4 is a cross-sectional view taken generally on line 4—4 of FIGURE 1;

FIGURE 5 is a side elevational view of the strap partly in section shown in its fastened or locked position;

FIGURES 6–8 illustrate a further embodiment of the invention; FIGURE 6 being a top plan; FIGURE 7 being a longitudinal section taken substantially on line 7—7 of FIGURE 6 and FIGURE 8 a side elevational view partly in section showing the strap in fastened position.

Describing the invention in detail and having particular reference to FIGURES 1–5 of the drawings there is shown a flexible strap generally designated 2 formed of nylon or polyethylene or the like and having a buckle portion 3 at one end and an integral tongue portion 4 extending therefrom.

The tongue portion 4 has a tip end 5 which is formed to facilitate its entry through the buckle passages 6, 7, 8 and 9 of strap channels 6*a*, 7*a* which passages 6, 7, 8, 9 are developed between the horizontal combination reinforcing antitamper support bars 12, 13 which are generally rectangular in cross-section (FIGURE 2) and are positioned substantially medially between the top wall 14 of the buckle and the bottom wall portions or base portion 15 thereof.

The tongue 4 has an initial length 16 which is narrower and thinner than its inner end portion 17. The tongue 4 is looped on itself and is adapted to be laced into the buckle through the passage 6 between the underside 20 of the brace 12 and the side 21 of the inner end portion 17 of the tongue 4 and the tongue 4 engages the catch side 23 of a tooth 24 against the locking edge 25 formed on the inner edge of the inner end portion 17 of the tongue 4. The tooth 24, which holds the strap from withdrawing as it is laced through the buckle, projects into an aperture or opening 26 in the base portion 15 of the buckle 3, said opening 26 being defined between the portion 17, the bottom wall 15 which is connected with portion 17 and the interconnecting upright side walls 28, 29 of the buckle 3, said walls 28, 29 merging with respective extremities of the top wall 14 of the buckle 3 and the braces 12, 13 and the portions 15 and 17 and defining therewith the beforementioned passages.

The tooth 24 has a forward ramp side 30 which facilitates its entry into and through the passage 6 with attendant distortion or bending of the brace 12 upwardly or toward the wall 14. It will be realized that upon the tooth 24 being snapped behind the ledge or shoulder 25 it is difficult to withdraw the tongue from the buckle. The placement of tooth 24 from the juncture 32 between portions 16 and 17 of the tongue is dimensioned to be substantially equal to the distance from the shoulder 25 to the opposing edge 33 on the bottom wall portion 15 of the slot 26. The cross-sectional area of slot 6 and passageway 6*a* is dimensioned to snugly admit passage of portion 17 of the strap therethrough and the juncture 32 forms a shoulder which seats against the edge or wall portion 33 which is of a length equal to the width of the juncture shoulder 32 which prevents further movement of the strap portion 17 through the buckle channel 6*a*.

The thinner and narrower leading strap portion 16 is bighted at 35 about the outer edge 36 of the ledge 13 and reenters the buckle through the upper passages 8 and 9 and on its side 34 is provided with the outstanding teeth 39, 40 which are spaced a distance substantially equal to the transverse spacing between the adjacent edges or shoulders 41 and 42 of the coplanar ledges 12 and 13, said edges 41, 42 together with the adjacent upper thickened portions 43, 44 of the side walls 28 and 29 define an aperture or slot 45 which is in transverse or vertical registry with the opening 26 from which it is shielded by the outer end strap section 47 of the tongue portion 17.

The teeth 39 and 40 present ramps 48, 49 facing toward the free end of the tongue to facilitate entry of the locking means 39, 40 through passage 8 as the outer end portion 5 is pulled through and out of the buckle through passage 9. These teeth 39, 40 present locking faces 50, 51 and in the position of FIGURE 5, the face 51 engages shoulder or edge 42 of the ledge 13 while the ramp 48 wedges against edge 42 of the ledge 13 while the ramp 48 wedges against edge 41 urging the face or locking means 51 against the edge 42 and simultaneously urges the section 54 of the tongue between the teeth 39, 40 upwardly, said section 54 having on its obverse side a plurality of locking means in the form of teeth 55 which project upwardly and interengage with complementary teeth 56 on the underside of the top wall 14 of the buckle. The locking faces 57 of teeth 55 engage with and abut the locking faces 58

of teeth **56**. If a wedge should be applied against teeth **55** a downward force is exerted urging teeth **39, 40** into engagement against tongue section **47** and ledges **12** and **13**. If a force is applied to section **47** and/or teeth **39, 40** the teeth **55, 56** will hold.

It will be observed that the teeth **56** are in alignment with openings **45, 26** so that in the molding process of the buckle **3** the core die is adapted to be easily inserted and withdrawn. Opening **45** is smaller than opening **26** for the same reason and to form the ledges **12, 13** and the side ramps **60, 61** which narrow the passageway **7***a* codimensional with portion **16** of the strap.

It will be readily apparent that any attempt to pry the teeth apart or to forcibly withdraw the tongue from the buckle will rupture the parts or evidence tampering. Surface **20** extends under ramps **60, 61** and the ledge **13**. The ledges or bars **12** and **13** may be notched at **63, 64** to tear the bars from the walls **28, 29** to evidence tampering.

In considering the advantages of this tamper-proof strap, it is to noted that the cross-sectional area of the strap portion **17** is only slightly less than the cross-sectional area of the entrant passage **6***a* and the cross-sectional area of the strap portion **16** is only slightly less than the cross-sectional area of the entrant passage **7***a* to provide a snug in place fitting of the strap **4** in the buckle **3**, and the walls **28, 29** at each of their ends taper from the top wall **14** outwardly and downwardly toward the bars **12** and **13** and bottom wall **15** to add strength to the construction of the buckle **4**, the ends of the walls **28, 29** adjacent the opening or passage **7** and strain bar **13** being of sufficient height and lateral outward extent in the area of the bight **35** to enclose the strap thereat in such a manner as to shield or protect the strap at its bight **35** so that no grip or object could be forced therewith without damaging the side walls of the buckle to evidence tampering.

The embodiment of FIGURES 6, 7, and 8 illustrates a similar arrangement although simplified. The strap comprises a buckle **100** at one end of a tongue **101** which has a curved leading portion **102** to facilitate its passage through the lower and upper passageways **103** and **104** of the buckle, said passages being formed by top and bottom portions **105, 106**; side wall portions **107** and **108** and an intermediate ledge or locking bar **109**, said wall portions joining the ends of the parts **105, 106** and **109**. The tongue **101** has an outer end portion **110** formed with teeth **111** recessed in one side **112** thereof. The toothed outer end portion **110** passes over the bottom wall **106** and continues through the passage **103** with its flat side **115** engaging the underside **116** of the transverse support bar or ledge **109**. The teeth have their ramp sides **117** sliding over the bevel or tapered edge **119** on the inner end portion **120** of the tongue. Said edge **119** forms with the side walls and wall portion **106** a bottom opening or slot **121** which normally would be against the user's wrist. The strap is bighted at **122** about the outer edge **123** of the ledge **109** and then passes over the top side **125** of ledge **109** through passage **104** and under the top wall **105** and has several of its teeth **111** engaging with companion teeth **128** formed on the bottom of the top wall in vertical alignment with the bottom buckle aperture **121**. The upper exiting end portion of the strap passes over the lower entering outer end portion of the strap and bears thereagainst and exits through the passage **113**.

The strap has an intermediate portion **130** which in the present instance may be formed with an appropriate longitudinal rectangular slot **131** to admit an identity card therein which is visible through the outer window portion **132** of the portion **130**.

It will be observed that novel strap or loop safety devices have been disclosed and that in view of these disclosures various other forms of the invention will become readily apparent to those skilled in the art within the scope of the following appended claims.

I claim:

1. A flexible strap comprising a tongue portion having a free end and a buckle portion joined with the tongue portion, the buckle portion having a top wall, side walls, a bottom wall, and wall means disposed between the walls and defining a pair of tongue receiving channels, said top and bottom walls extending generally parallel to the plane of the tongue, said free end of the tongue having first and second sections being laceable back over on itself around the wall means through the channels to place a first section of the free end of the tongue in one channel and a second section of the tongue in the other channel in locked position and having means thereon interlocking with the top wall and forming a loop with the buckle portion in the locked position of the strap.

2. The invention according to claim **1** and said bottom wall having an aperture, said first section having a toothed element extendable into the bottom wall aperture for limited movement of the first section in the buckle.

3. The invention according to claim **1** and said wall means having an intermediate wall aperture **1** and said wall means having an intermediate wall aperture and the second section having locking structure extendable into the intermediate wall aperture for limiting movement of said section in the buckle.

4. A flexible tamper proof strap comprising a tongue and a buckle, said buckle having a top wall, a bottom wall and a pair of side walls, an intermediate wall between the top and bottom walls and connected with the side walls and defining a pair of generally parallel passages, said intermediate wall having an aperture aligned beneath said top wall, said bottom wall having an aperture in alignment with the aperture in the intermediate wall, said tongue having a first section connected with the bottom wall and extendable in one passage over the bottom wall aperture and having a bight section extendable around the intermediate wall and having a second section extendable in the other passage over the intermediate wall aperture and out of the buckle said second section and said top wall having interlocking means thereon for maintaining the strap in a locked tamper proof condition.

5. The invention according to claim **4** and the side walls having portions extending outwardly of the buckle portion and encaseable about the bight portion in shrouding tamper proof relation therewith.

6. The invention according to claim **4** and said first section being of greater cross sectional area than said second section limiting movement of the sections in the channels.

7. A flexible strap comprising a tongue portion and a buckle portion, said buckle portion having a top wall, side walls, and a bottom wall having an aperture, an intermediate wall connected with the side walls and between the top and bottom walls and in alignment with said aperture and defining a pair of upper and lower tongue passages, said top wall having an internal downwardly directed toothed segment to one side of the intermediate wall and in alignment with the aperture, said tongue portion being connected with the buckle and having a free end with a toothed portion extendable through the lower passage and about the other end of the intermediate wall through the upper passage and out the buckle portion for attendant interlocking of the toothed portion with the toothed segment.

8. A flexible tamper proof strap comprising interconnected tongue and buckle portion, said tongue portion having a free end portion having opposed top and bottom sides with teeth-like means projecting from each side, each of said teeth-like means being generally in alignment with one another, the buckle portion having side walls and an upper transverse wall and a pair of longitudinally spaced apart lower transverse walls spaced vertically from and generally parallel to the upper wall,

the upper and lower walls being connected to the side walls and defining a longitudinally extending tongue passage therebetween for reception of the free end portion of the tongue therein, each lower wall being spaced generally outwardly of the upper wall in pyramid fashion therewith and defining an aperture between the lower walls beneath the upper wall, the upper wall being provided on its inside with means for locking engagement with the teeth-like means on one side of the tongue free end portion with the teeth-like means on the other side of the tongue free end portion being received in the aperture for restricting movement of the tongue free end portion through the passage.

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