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SLIDING BAR BUCKLE

The present invention relates to a sliding bar buckle of synthetic resin for adjustably interconnecting strap or belt ends on, for example, a bag.

5 Various sliding bar buckles have been devised and used for adjustably joining belt or strap ends on, for example, a bag. Such sliding bar buckles principally comprise a hollow frame of a rectangular shape attached to a strap end and a crossbar fixed to or movably mounted on the hollow connector frame for frictionally
10 retaining another strap end.

With the bar fixedly mounted on the hollow frame, the force with which the strap frictionally engages the bar is relatively weak. Such a buckle cannot be used on heavy bags.

15 A buckle with a movable crossbar is costly to construct because of the manufacturing step needed for mounting the bar movably on the frame. The movable bar imposes a relatively small frictional resistance to a thin strap. Buckles made of synthetic resin are weak in
20 mechanical strength particularly at junctions between a base and a pair of legs of the hollow frame.

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According to the present invention, there is provided a buckle comprising:

(a) a frame of synthetic resin including

(1) a grip base having a strap bearing surface,

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(2) a pair of spaced legs extending

longitudinally from transversely opposite ends of said grip base and having a pair of transversely aligned slots, respectively, spaced from said grip base by a distance, and

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(3) a connecting bar extending between said legs; and

(b) a crossbar of synthetic resin located between the grip base and the connecting bar and including

(1) a central strap engagement portion, and

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(2) a pair of arms extending longitudinally

from transversely opposite ends of said central strap engagement portion and movably fitted in said slots, respectively, said central strap engagement portion

having a strap pressing surface for frictionally

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pressing a strap end portion against said strap bearing surface, said strap pressing surface being

longitudinally spaced from said arms, at least by said distance, characterised in that the pair of arms are

disposed out of coaxial alignment with the central strap engaging portion towards the connecting bar.

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It is believed possible by means of the present

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invention to provide a buckle made of synthetic resin which is simple in construction and mechanically strong.

5 It is also believed possible by means of the present invention to provide a buckle having a movable crossbar capable of imposing a relatively large frictional resistance to a strap regardless of the thickness of the strap.

10 It is also believed possible by means of the present invention to provide a buckle which can be manipulated with ease.

The invention will be described by way of examples with reference to the drawings, wherein:-

Figure 1 is a plan view of a buckle forming an embodiment of the present invention;

15 Figure 2 is a bottom view of the buckle shown in Figure 1;

Figure 3 is a side elevational view of the buckle of Figure 1;

20 Figure 4 is a front elevational view of the buckle of Figure 1;

Figure 5 is a cross-sectional view taken along line V-V of Figure 1;

Figure 6 is a cross-sectional view showing the manner in which the buckle is used;

25 Figure 7 is a fragmentary perspective view partly

in cross section, of a mold for molding a portion of the buckle illustrated in Figure 1;

Figure 8 is a plan view of a buckle forming another embodiment of the present invention;

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Figure 9 is a side elevational view of the buckle shown in Figure 8;

Figure 10 is a front elevational view of the buckle of Figure 8;

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Figure 11 is a bottom view of the buckle of Figure 8;

Figure 12 is a cross-section view taken along line XII - XII of Figure 8; and

Figure 13 is a view similar to Figure 12 showing the manner in which the buckle of Figure 8 is used.

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Figures 1 through 6 show a buckle, generally indicated by the reference numeral 10, forming the first embodiment of the present invention.

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The buckle 10 comprises a hollow frame 11 of a rectangular shape or a substantially square shape and a crossbar 12 movably mounted on the hollow frame 11. The hollow frame 11 and the bar 12 are molded of synthetic resin.

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The hollow frame 11 is of an integral molded construction composed of a grip base 13, a pair of spaced parallel legs 14, 15 extending longitudinally

from transversely opposite ends of the grip base 13, a transversely extending connecting bar 16 joining the ends of the legs 14, 15 which are remote from the grip base 13, and a strap connector 17 extending transversely between the legs 14, 15 and positioned more closely to the connecting bar 16 than to the grip base 13. The grip base 13 has a flat strap bearing surface 18 facing toward the strap connector 17 in a parallel relation thereto and a slanted surface 19 contiguous to the flat strap bearing surface 18 and blending into a face of the grip base 13. The grip base 13 also has on its back a plurality of parallel ridges 20, to bite into the strap or belt, not shown, the ridges 20 extending from the strap bearing surface 18 parallel to the legs 14, 15 away from the strap connector 17. Each of the ridges 20 has an end surface lying substantially flush with the strap bearing surface 18.

The legs 14, 15 have a pair of oblong (that is, circular-ended oblong) slots 21, 22, respectively defined transversely therethrough in transverse registry with each other. As shown in Figure 5, each oblong slot 21, 22 has its near longitudinal end spaced from the strap bearing surface 18 by a distance L1. Accordingly, the legs 14, 15 have substantial solid portions through which they are joined to the grip base 13. Each of the legs 14, 15 has a width greater than the individual widths of the grip base 13, the connecting bar 16, and

the strap connector 17, as illustrated in Figure 5.

As shown in Figures 1 and 2, the crossbar 12 is located between the grip base 13 and the connecting bar 16. The crossbar 12 is composed of an elongate central (that is, central relative to the crossbar 12 itself) strap engagement portion 23 and a pair of aligned arms 24, 25 extending integrally from transversely opposite ends of the central strap engagement portion 23, the arms 24, 25 having oblong cross section, such that they are loosely received in the respective oblong slots 21, 22 and slidably movable therein but are prevented from rotating in the respective slots 21, 22. As illustrated in Figures 5 and 6, the central strap engagement portion 23 includes a flat strap pressing surface 34 extending in confronting relation to the strap bearing surface 18 and an arcuately curved surface 35 extending parallel to the flat strap pressing surface 34 (that is, transversely with respect to the buckle) and blending into a face of the central strap engagement portion 23. In the illustrated embodiment, the central strap engagement portion 23 has a roughened surface similar to a stain finish, having a multiplicity of minute projections to give an increased co-efficient of friction to the central strap engagement portion 23. The central strap engagement portion 23 is thicker than the arms 24, 25, with the flat strap pressing surface 34 spaced longitudinally (with respect to the buckle)

from the arms 24, 25 at least by the distance L1 (Figure 5). The arms 24, 25 are slightly displaced out of coaxial alignment with the central strap engagement portion 23 toward the strap connector 17.

5 The arms 24, 25 are molded loosely in the slots 21, 22 in the legs 14, 15 using a pair of molds, respectively, at the same time that the hollow connector frame 11 and the strap retainer 12 are molded. One of such molds is shown in Figure 7, the mold being
10 designated generally at 26. The mold 26 comprises a sleeve portion 27 having a recess 28. In molding operation, the slot 21, 22 is formed by an outer peripheral surface of the sleeve portion 27 while the arm 24, 25 is formed by an inner peripheral surface of
15 the recess 28. These molds constitute part of an entire mold assembly for molding the hollow frame 11 and the crossbar 12 at the same time.

In use, a strap end portion 29 is threaded between the connecting bar 16 and the strap connector 17 from
20 the back to the face of the frame 11, and then between the strap connector 17 and the crossbar 12 from the face to the back of the frame 11. The strap end portion 29 is turned over to form a loop 30 around the bar 12 and sewn to itself with stitches 31 as shown in Figure 6.
25 However, the strap end portion 29 may be attached to the connecting bar 16 in the manner described above.

Another strap end portion 32 is threaded between the strap connector 17 and the bar 12 from the back to the face of the frame 11 and then between the crossbar 12 and the grip base 13 from the face to the back of the frame 11. The strap end portion 32 is frictionally held against the ridges 20 while forming a loop 33 around the strap retainer 33.

When the strap end portions 29, 32 thus attached are tensioned longitudinally, the crossbar 12 is displaced toward the grip base 13 to enable the strap pressing surface 34 to press the strap end portion 32 against the strap bearing surface 18. Then, the corners of the ends of the ridges 20 are kept in biting engagement with the strap end portion 32. The strap end portion 32 is now prevented from being loosened off the buckle 10. For adjusting the length of the strap end portion 32, the grip base 13 is gripped by the user, and the frame 11 is turned counterclockwise (Figure 6) through approximately 90° about the connecting bar 16 until the strap end portion 32 is released from engagement with the strap bearing surface 18 and the ridges 20. Then, the strap end portion 32 is longitudinally adjusted until a desired strap length is achieved.

The buckle 10 of the foregoing construction has many advantages: with the ends of the slots 21, 22

closer to the grip base 13 are spaced therefrom by the distance L1, the junctions between the grip base 13 and the legs 14, 15 are mechanically strong and resistant to forces tending to break the junctions, notwithstanding that the frame 11 is made of synthetic resin. The movable bar 12, with its strap pressing surface 34 projecting beyond the arms 24, 25 by the distance L1, can press the strap end portion forcibly and reliably against the strap bearing surface 18. A relatively thin strap can therefore be securely retained in place. Both the strap bearing surface 18 and the strap pressing surface 34 are flat, to provide a wider area of contact with the strap, producing a large frictional resistance against the strap sandwiched therebetween. The roughened surface of the central strap engagement portion 23 also serves to impose an increased frictional resistance to the strap. Because portion 23 is non-rotatable due to the non-rotatability of arms 24, 25 in slots 21, 22 the strap is also locked in place by the ridges 20 against being released or loosened off the strap adjustment assembly 10 unless the latter is turned counter-clockwise (Figure 6) through approximately 90° about the connecting bar 16. The slanted surface 19 and the arcuate surface 35 allow easy insertion of the strap between the grip base 13 and the crossbar 12 from the face to the back of the frame 11.

The legs 14, 15 are transversely spaced from each

other by a distance L2 slightly narrower than a strap used by 0.3 to 0.5 mm, for example. This is preferable in that the strap as retained on the bar 12 will not be released or loosened, due to frictional resistance
5 between lateral edges of the strap and the legs 14, 15 as when the strap becomes free of tensioning forces or the bag on which the strap adjustment assembly 10 is used is not carried by the user. Accordingly, there is no need for strap adjustment when the bag is carried by
10 the user again. If the distance L2 were larger than the width of a strap used, the strap would easily be loosened off the buckle 10 or the latter would move relatively to the strap when the strap is released of tensioning forces.

15 Figures 8 through 13 illustrate a buckle 39 forming another embodiment of the present invention. The buckle 39 is suitable for use, for example, as a male member of a buckle on each of a pair of suspenders.

The buckle 39 is of an integrally molded
20 construction composed of a male member 40 and a hollow frame 41, and a crossbar 42 movably mounted on the frame 41. The male member 40, the hollow frame 41, and the bar 42 are all made of synthetic resin. The frame 41 comprises a grip base 43, a pair of legs 44, 45
25 extending longitudinally from transversely opposite ends of the base 43, and a connecting bar 36 transversely

joining the legs 44, 45 at distal ends thereof remote from the grip base 43.

5 The grip base 43 has a flat strap bearing surface 46 facing toward the connector bar 46. The base 43 also has a plurality of ridges 47, 48 on its opposite surfaces, the ridges 47, 48 extending parallel to the legs 44, 45 from the strap bearing surface 46. The ridges 47, 48 have end surfaces lying flush with the strap bearing surface 46. The legs 44, 46 have a pair of oblong slots 49, 50 in transverse registry with each other, the oblong slots 49, 50 having ends spaced a distance L3 from the strap bearing surface 46 as shown in Figures 8 and 12, to provide a sufficient mechanical strength at the joints of the base 43 and the legs 44, 15 45.

The crossbar 42 is located between the grip base 43 and the connector bar 46. The crossbar 42 is composed of a central strap engagement portion 51 having a roughened surface similar to a stain finish and a pair of coaxial arms 52, 53 integrally formed with the strap engagement portion 51 at transversely opposite ends thereof. The arms 52, 53 have an oblong cross-section, and are loosely received in the oblong slots 49, 50, respectively for sliding movement therein but are 20 prevented (through being oblong) from rotating in oblong slots 49, 50. The central strap engagement portion 51 25

as a strap pressing surface 54 facing toward and lying parallel to the strap bearing surface 46. The strap pressing surface 54 is longitudinally spaced from the arms 52, 53 substantially by the distance L3. The arms 52, 53 are slightly displaced toward the connecting bar 36 off center with respect to the central strap engagement portion 51.

The male member 40 has a pair of resiliently flexible legs 55, 56 extending from the connecting bar 36 and a pair of grip feet 57, 58 mounted on the legs 55, 56, respectively. When the male member 40 is inserted in a female member (not shown), the grip feet 57, 58 are pressed against inner surfaces of the female member under the resilient force of the legs 55, 56 to thereby connect the male member 40 to the female member.

The strap retainer 42 can be molded at the same time that the frame 41 is molded so that they are molded in an assembled condition. Such molding operation can be accomplished by using the molds 26 shown in Figure 7.

The buckle 39 will be used as follows: A strap end portion 59 is threaded between the crossbar 42 and the connecting bar 36 from one side to the other of the frame 41 and then threaded back between the bar 42 and the base 43, thus providing a strap loop 60 around the bar 42, as shown in Figure 13. The male member 40 is

frictionally inserted into the female member. When the strap is tensioned longitudinally, the crossbar 42 is displaced toward the base 43 until the strap end portion 59 is pressed by the strap pressing surface 54 against the strap bearing surface 46. At this time, the strap end portion 59 is also engaged securely by corners of the ridges 48 against forces tending to loosen the strap end portion 59 off the frame 41. To adjust the length of the strap, the base 43 is gripped by the user and turned counterclockwise (Figure 13) about the connecting bar 36 through about 90° until the strap end portion 59 is disengaged from the ridges 48. The crossbar 42 is then displaced from the base 43, and the strap end portion 59 can be pulled in any direction for length adjustment.

The legs 44, 45 are transversely spaced from each other by a distance L4 slightly smaller than the width of the strap used so that the strap will frictionally be engaged edgewise by the legs 44, 45 when the strap is released of any tension. This prevents the strap from being loosened accidentally when not in use.



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Claims:-

1. A buckle comprising:

(a) a frame of synthetic resin including

(1) a grip base having a strap bearing surface,

(2) a pair of spaced legs extending

5 longitudinally from transversely opposite ends of said grip base and having a pair of transversely aligned slots, respectively, spaced from said grip base by a distance, and

(3) a connecting bar extending between said legs;

10 and

(b) a crossbar of synthetic resin located between the grip base and the connecting bar and including

(1) a central strap engagement portion, and

(2) a pair of arms extending longitudinally from

15 transversely opposite ends of said central strap engagement portion and movably fitted in said slots, respectively, said central strap engagement portion having a strap pressing surface for frictionally pressing a strap end portion against said strap bearing surface, said strap pressing surface being
20 longitudinally spaced from said arms, at least by said distance, characterised in that the pair of arms are disposed out of coaxial alignment with the central strap engaging portion towards the connecting bar.

25 2. A buckle according to claim 1, wherein said



frame includes a strap connector extending transversely between said legs parallel to said connecting bar for connection to another strap end.

5 3. A buckle according to claim 1 or 2, wherein said grip base has on one surface thereof a plurality of ridges extending parallel to said legs and having end surface lying substantially flush with said strap bearing surfaces, for biting into the strap.

10 4. A buckle according to claim 3, wherein said grip base has a slanted surface opposite to said one surface thereof, said slanted surface extending from said strap bearing surface, said central strap engagement portion having an arcuately curved surface extending from said strap pressing surface, said slanted surface and said 15 arcuately curved surface jointly providing a guide for introducing said strap end portion between said strap pressing surface and said strap bearing surface.

20 5. A buckle according to any preceding claim, wherein said strap bearing surface and said strap pressing surface extend flatwise substantially parallel to each other.

6. A buckle according to any preceding claim, wherein said central strap engagement portion has a roughened peripheral surface for frictional engagement



with said strap end portion.

- 5 7. A buckle according to any preceding claim, including a male member joined to said connecting bar for insertion into a female member, said male member having a pair of grip feet for frictionally engaging said female member under resilient forces.
- 10 8. A buckle according to any preceding claim wherein said grip base has a plurality of ridges on opposite surfaces thereof extending parallel to said legs and having end surfaces lying substantially flush with said strap bearing surface, for biting into the strap.
- 15 9. A buckle according to any preceding claim, wherein said frame is of an integrally molded construction, and said crossbar is of an integrally molded construction.
10. A buckle according to claim 9, wherein said frame and said crossbar are molded simultaneously in an assembled condition.
- 20 11. A buckle according to any preceding claim, wherein said slots have an oblong shape and said arms have an oblong cross-section whereby said arms are prevented from rotating in the respective slots.



12. A buckle substantially as described with reference to and as illustrated in Figures 1 through 6 of the accompanying drawings.

5 13. A buckle substantially as described with reference to and as illustrated in Figures 8 through 13 of the accompanying drawings.
