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ADJUSTABLE STRAP FASTENER

This invention relates to a strap fastener for adjustably connecting a strap, belt or band to a variety of articles.

Various adjustable strap fasteners or buckles
5 have been proposed which may be manipulated to adjust the effective length of a strap attached to for example a bag or a safety seat belt.

Modern such fasteners are made of a plastic material formed into an integrally molded structure
10 which generally comprises a pair of opposing side flanges, a grip end portion at one ends of the side flanges, an anchor end portion at the opposite ends of the side flanges and a plurality of parallel cross bars disposed in between the grip and anchor end portions
15 and extending transversely across and between the side flanges. In use, one end portion of a strap or the like is looped about one of the cross bars, passed under the anchor end of the fastener and secured in place as by revetting. The other end portion of the

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strap which is adapted for length adjustment is looped about another cross bar, passed under the grip end of the fastener and gripped therebetween against displacement. For ease of insertion of the strap between the cross bar and the grip end
5 portion, the gap therebetween is desirably the larger the better. Conversely, however, the larger the gap, the tendency will be greater for the strap to get loose under tension. Vice versa, this tendency is less the smaller the gap, but the insertion of the strap becomes more difficult.

10 A proposition has been made whereby the gap defining surfaces are inclined progressively toward the reverse side of the fastener, instead of enlarging the insertion gap, as disclosed in Japanese Patent Laid-open (Kokai) Publication 54-144244. Such an attempt is however still not satisfactory
15 in that the strap is more difficult to insert or otherwise manipulate.

According to the present invention, there is provided a strap fastener molded of a plastic material for adjustably connecting ends of a strap, according to each of claims 1 to 4,
20 and such a strap fastener in combination with a strap according to claim 5.

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It is believed possible by means of the present invention to provide an adjustable strap fastener which is capable of easy insertion of a strap or the like and highly resistant to stresses tending to loosen the strap, having multi-point stops to retain the strap in position against accidental movement even under heavy tensioning forces, and having a relatively wide opening or gap to permit insertion or adjustment of the strap with utmost ease.

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

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Figure 1 is a front plan view of an adjustable strap fastener embodying the present invention;

Figure 2 is a bottom plan view of the strap fastener of Figure 1;

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Figure 3 is a side elevational view of the strap fastener of Figure 1;

Figure 4 is a cross-sectional view on enlarged scale taken along line IV - IV of Figure 1; and

5 Figures 5, 6 and 7 are schematic views utilized to explain the operation of the fastener associated with the strap.

Figure 1 to 7 show an adjustable strap fastener generally designated 10 embodying the

present invention.

The strap fastener 10 is made of a plastic material formed into an integral molded construction generally rectangular in shape as shown in Figures 1 and 2. The strap fastener 10 comprises a grip head portion 11 at one end, a connecting portion 12 at the other end, a pair of opposed side flange portions 13, 14 extending longitudinally between opposite ends of the head portion 11 and the connecting portion 12, a first or strap turn-over cross bar 15 adjacent to the head portion 11 and a second or strap anchoring cross bar 16 adjacent to the connecting portion 12, the cross bars 15 and 16 extending in spaced parallel relation to each other between and connected to the opposed side flanges 13 and 14.

The head portion 11, as better shown in Figure 4, includes an apertured flared projecting tab 11a, and a strap retainer portion 11b extending therefrom downwardly substantially at a right angle to the plane of the fastener 10 adjacent the first cross bar 15, the retainer portion 11b terminating with a substantially flat bottom end surface 11c projecting a small distance D_1 beyond the bottom surfaces of the opposed side flanges 13, 14 for reasons hereafter to be described. The retainer portion 11b has a sharp corner 11d defined by the substantially flat bottom surface 11c and a flat side surface 11e which extend perpendicular to the general plane of the

fastener 10. The sharp corner 11d serves as a first strap stop as later described. The connecting portion 12 has a lowermost surface lying flush with the flat bottom surfaces 13a, 14a of the flange portions 13, 14.

5 The strap anchoring bar 16 is positioned slightly above the connecting portion 12, relative to the bottom surfaces 13a, 14a of flange portions 13, 14, as viewed from the side elevation or as seen in Figure 4. The strap turn-over bar 15 is positioned slightly above the
10 anchoring bar 16 (also relative to bottom surfaces 13a, 14a) and closer to the upper surface of the flanges 13, 14 so as to make the strap S between the turn-over bar 15 and the bottom end 11c run substantially parallel with the retainer portion 11b or at right angles to the
15 general plane of the fastener 10.

The turn-over bar 15, as better shown in Figure 4, includes a pair of integral top and bottom portions 15a, 15b displaced from one another in a direction parallel to the side flange portions 13 so as to provide a pair
20 of first and second projections 15a', 15b'. The first projection 15a' extends toward the grip head portion 11 and terminates in a second sharp corner edge 15e which is defined jointly by a flat bottom surface 15c and an arcuate top surface 15c', while the second projection
25 15b' extends toward the connecting portion 12 and terminates in a third sharp corner edge 15f which is defined jointly by a flat top surface 15d and an arcuate bottom surface 15d'. The flat bottom surface 15c of the first projection 15a'

and the flat top surface 15d of the second projection 15b' extend in opposite directions from substantially the midpoint of the thickness of the bar 15 and in a plane substantially parallel to the general plane of the fastener 10. The second sharp corner edge 15e is spaced from the surface 11e by a distance D_2 larger than the thickness of the strap S to facilitate insertion of the latter. The second and third sharp corner edges 15e, 15f serve respectively as second and third stops to retain the strap S thereof against unintentional movement. The turn-over bar 15 includes a plurality of elongated recesses 15g extending along the bottom portion 15b at longitudinal intervals for saving the amount of plastic material used.

Reference to Figures 5 - 7 shows the behavior of the strap or belt S with respect to the fastener 10, in which the strap S is inserted into the strap fastener 10, first with one of its ends S_1 looped about the anchoring bar 16 and passed underneath the connecting portion 12, the extension of the strap S at this end being secured in place as by revetting or stitching. The other end of the strap S_2 is looped about the turn-over bar 15 and passed underneath the retainer portion 11b of the head 11, in which instance the leading end portion of the strap S_2 is brought into contact with the substantially flat bottom surface 11c of the grip

head portion 11.

While the strap S_1 is held stationary, the strap end S_2 is adjustable in length to suit the particular application. This adjustment may be made by pulling
5 out the leading strap end S_2 to thereby shorten the effective length of the strap S, or by rotating the fastener 10 counter-clockwise about the connecting portion 12 as shown in Figure 7 to release the strap end S_2 and pulling the strap S out to thereby shorten,
10 or in to thereby lengthen, the effective length of the strap S as desired. This rotation can be done most conveniently by handling the flared tab 11a of the grip head 11.

It is to be noted that the strap fastener 10
15 thus constructed is, as shown in Figures 5 and 6, provided with multi-point stops, namely, at corners 11d, 15e and 15f along the path of the strap S_2 , so that the strap S is firmly held in place against shifting which would otherwise occur under the
20 influence of heavy stresses applied in use.

The relative positions, in which the turn-over bar 15 lies at a level above the anchoring bar 16 and the anchoring bar 16 above the connecting portion 12 in a cascade fashion, create a clockwise rotational force
25 upon the strap fastener 10 when in actual use as shown in Figure 6, such force growing greater the larger the tension and thus urging the retainer portion 11b to

firmly grip the strap S_2 at the first stop 11d.

At the same, this gripping is further enhanced by the fact that a run of the strap S between the projecting end 11c of the head 11 and the turn-over bar 5 15 is substantially parallel with the vertical retainer portion 11b, that is, substantially perpendicular to the general plane of the strap fastener 10, so that the strap S_2 is also caught and gripped by the second stop 15e. To further ensure firm retention of the strap S, 10 the bottom end surface 11c of the retainer portion 11b is corrugated to have a plurality of grooves 11f extending parallel to the flanges 13, 14, thereby imparting frictional grip upon the strap S.

The multi-point stop arrangement (11d, 15e and 15 15f) together with the presence of added length D_1 of the retainer portion 11b will permit an increase in the space D_2 for passage of the strap S whereby it is rendered extremely easy to thread the strap S through the fastener 10.

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CLAIMS

1. A strap fastener molded of a plastic material for adjustably connecting ends of a strap, comprising:

(a) a grip head portion;

5 (b) a pair of parallel spaced slide flanges extending from said grip head portion in a common direction and each having a respective bottom surface; respectively;

10 (c) a connecting portion extending between and interconnecting said side flanges at opposite ends of the side flanges from the grip head portion;

(d) a pair of parallel spaced first and second cross bars extending parallel to said connecting portion and connected to said side flange portions, said first cross bar being disposed closer to said grip head portion than
15 said second cross bar;

(e) a retainer portion extending integrally from said head portion perpendicularly to the plane of the fastener and projecting downwardly beyond said bottom
20 surfaces of said side flanges, said retainer portion having substantially a flat bottom surface and defining a first strap stop;

(f) said first cross bar having a first projection extending toward said grip head portion and defining a
25 second strap stop and further having a second projection extending toward said connecting portion and defining a third strap stop; and



(g) said first cross bar lying at a level above said second cross bar, relative to said bottom surfaces of said flanges; said second cross bar lying at a level above said connecting portion, relative to said bottom surfaces of said flanges; and said connecting portion having a lowermost surface lying flush with said bottom surfaces of said flanges.

2. A strap fastener according to claim 1, said bottom of said retainer portion having a plurality of grooves extending parallel to said flanges.

3. A strap fastener according to claim 1 and 2 wherein said bottom surfaces of said side flanges are flat.

4. A strap fastener substantially as described with reference to and as illustrated in the accompanying drawings.

5. A strap fastener according to any preceding claim in combination with a strap, said retainer portion and said second strap stop being spaced from one another by a distance larger than the thickness of the strap.

