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BUCKLE

(15)

This invention relates to a buckle for fastening loose ends of a belt or strap applied to garments, bags and the like.

There have been proposed many forms of buckle
5 designed to releasably connect loose ends of a belt, strap and the like.

A typical example of such known buckle comprises a male or plug member and a female or socket member, the male member having a locking part resiliently insert-
10 able into an opening in the female member, whereby the two members can be snapped into and out of engagement with each other. To effect this snapping engagement, the male member which is usually made of a plastic or other resilient material, has a slit or cutout defined between the body
15 and the locking part. This slit or cutout as embodied in a prior art buckle structure such as are disclosed in Japanese Utility Model Laid-Open Publication 55-20939 is exposed to view when the buckle members are coupled together with the results that threads, dust or other
20 foreign matters are prone to get into the female member through the slit, or the slit would often catch a garment

or the like and cause damage to the buckle. Such prior art structures are not only unsightly but have a drawback in that a special moulding technique is required to form the female member which is internally complexly contoured.

According to the invention, there is provided a buckle for fastening ends of a flat belt-like article, comprising:

A. a male member molded of synthetic resin as one piece including

- (1) a first belt-end retainer portion adapted to be connected to one end of the flat belt-like article, and
- (2) a plug part having
 - (a) a generally T-shaped stem, said stem having a transverse portion integral with said first retainer portion, and a longitudinal portion extending forwardly therefrom and perpendicular thereto,
 - (b) a pair of resilient arms extending rearwardly from opposite corners of the front end of said stem,
 - (c) a pair of gripping ears disposed outwardly of respective rear ends of said arms, and
 - (d) a pair of connecting portions connecting said gripping ears to said rear ends of said arms, said connecting portions having a thickness less than each of said stem, said arms and said gripping ears; and

B. a female member molded of synthetic resin as one piece including

- (1) a second belt-end retainer portion adapted to be connected to the other end of the flat belt-like article, and

(2) a socket part having

(a) means defining a socket opening at one end of said socket part receptive of said plug part,

(b) two pairs of inwardly directed flanges, disposed one pair at each side of said socket opening, each said pair of flanges defining a restricted slit therebetween respectively receptive of said connecting portions, and each said flange having a rearwardly facing abutment engageable with the rear end of one of said second arms.

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

Figure 1 is a plan view of a male or plug member which constitutes one part of a buckle embodying the invention;

20 Figure 2 is an end view of the male member;

Figure 3 is a partly sectional, plan view of a female or socket member which constitutes the other part of the buckle;

25 Figure 4 is a partly sectional, side elevation of the female member;

Figure 5 is an open end view of the female member;

Figures 6 and 7 each are a plan view of the male and female members of the buckle shown engaged or connected;

5 Figure 8 is a plan view of a modified form of male member;

Figure 9 is a plan view of a modified form of female member; and

Figure 10 is a plan view of the modified male and
10 female members of the buckle shown engaged or connected.

Like reference numerals refer to like parts throughout the several views.

Referring now to the drawings and Figure 6 or Figure 7 in particular, there is shown a buckle 10 embody-
15 ing the invention which is made of synthetic resin and generally comprises a male or plug member 11 and a female or socket member 12, the two members being releasably coupled.

The male member 11 as better shown in Figure 1
20 comprises a belt-end retainer 13 for retaining thereat one end of a belt-like article in the well known manner, and a plug part 14 integral with the retainer 13 and insertable into the socket member 12. The plug 14 has a generally T-shaped stem portion 15 including a transverse
25 portion 16 contiguous with a front end of the

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transverse portion 16, contiguous with the front end of the retainer 13, and a forwardly extending portion 17 which is perpendicular to transverse portion 16 and positioned centrally thereof.

The longitudinal portion 17 of T-shaped stem portion 15 includes longitudinally extending side ribs 19, 19', a longitudinally extending central rib 19'', webs 24, 24' therebetween and indents or recesses 23, 23' at the front, between the ribs 19, 19' and 19''. A pair of resilient arms 20, 20' extend rearwardly and divergently from the two opposite "corners" 20a, 20b, which are actually curved, of the said longitudinal portion 17, the arms 20, 20' terminating slightly short of the opposite ends of the transverse portion 16 defining with the portions 19, 19' triangular slits 21, 21'. For manipulation to release or disconnect the male member 11 from the female member 12, a pair of gripping ears 22, 22' are disposed outwardly of respective rear ends of the arms 20, 20' and are connected thereto by a pair of connecting portions 25, 25', respectively, of a thickness L_3 (Figure 2) smaller than the thickness of the gripping ears 22, 22'. Each arm 20, 20' has an upwardly obliquely extending outer surface on and along which a socket part 29 of socket member 12 is guided while the plug and socket parts 14, 29 are being coupled together. During that time pressure is exerted on the outer surfaces of the arms 20, 20', thus causing the latter to be elastically deformed as described below.

A pair of recesses 23, 23' are formed at the front of portion 17, between the ribs 19, 19' and 19''. A pair of elongated grooves 24, 24' are formed in both the top and bottom surfaces of the portion 17 in communication with the recesses 23, 23', between

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and parallel to the ribs 19, 19' and 19", and terminate adjacent to the transverse portion 16 of the T-shaped stem portion 15.

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As shown in Figure 2, the thickness L_2 of the T-shaped stem 15 (except for grooves 24, 24') and of the engaging portions 18, 18' are substantially equal; the gripping ears 22, 22' and the retainer 13 are substantially equal in thickness, being slightly thicker than the thickness L_2 . The connecting portions 25, 25' have a thickness L_3 smaller than the thickness L_2 and are disposed in the middle of the thickness of the gripping ears 22, 22' and the engaging portions 18, 18'. A rearward surface of each connecting portion 25, 25' is stepped and hence has a first surface section contiguous to the rear end 22a, 22b of a respective one of the arms 20, 20', and a second surface section rearward of the first surface section and contiguous to the upper end 26, 26' of the respective ear 22, 22'. The rear end 26, 26' of the ear 22, 22' is disposed close to the front end 13a of the retainer 13. The rearward surfaces of the portion 20, 20', of the connecting portion 25, 25' and of the gripping ear 22, 22' define with the front end 13a of the retainer 13 and the transverse portion 16 of the T-shaped stem 15 a restricted, generally S-shaped gap.

Referring now to Figure 3, there is shown a female or socket member 12 which comprises a belt-end retainer 28, for retaining thereat the other end of the belt-like article, and the socket part 29, which has an opening 30 for receiving the plug part 14 of the male member 11.

Two pairs of engaging lugs 31, 31' extend from the upper and lower inner walls of the socket 29 and are directed toward the open end 30a of the opening 30.

The engaging lugs 31, 31' are spaced to register in position with the two pairs of grooves 24, 24' respectively of the male member 11. The socket 29 has a pair of side slits 32, 32', one on each side, which are reduced in width at the open end 30a by the presence of flanges 33, 33'. The flanges 33, 33' each have an abutment 34, 34' facing rearwardly (i.e downwardly in Fig. 3) relative to the forward direction (i.e upwardly in Figs. 3, 6 and 7) of the socket member 12, for abutting engagement with the "rear" end 22a, 22b of a respective one of the arms 20, 20' of the male member 10 (the forward direction of which is downwards in Figs. 1, 6 and 7). The restricted side slit or spacing l_1 between the flanges 33, 33' on each side of the socket 29 is smaller than the thickness L_2 of the engaging portion 18, (19') of the male member 11 and is larger than the thickness L_3 of the connecting portion 25, (25') of the male member 11.

The width l_2 of the opening 30 is smaller than the spacing L_4 between opposite outer rear terminal edges 20c and 20d of the arms 20, 20' but is larger than the spacing L_5 between opposite outer front "edges" 20e and 20f of the arms 20, 20.

The transverse width l_3 of the flanges 33, (33') is smaller than the width L_6 of the connecting portion 25, (25').

With this construction, the buckle 10 may be operated in the manner in which the plug part 14 of the male member 11 is inserted into the socket part 29 of the female member 12.

In this instance, because of the dimensional arrangements of the various parts above described, the inner walls of the flanges 33, 33' of the female member 12 are brought into engagement first with

the outer edges of the arms 20,20' of the male member 11, whereupon the arms 20,20' are urged to flex resiliently about the "corners" 20a,20b inwardly toward the portion 17 as illustrated in Figure 6. Further
5 advancing the male member 11 causes the connecting portions 25,25' to move between and past the two flanges 33,33' of the socket 29. As the plug 14 moves in further, until the abutment 34,(34') of the flange 33,(33') is located above the rear end 22a,(22b) of the arm
10 20,(20'), it follows that the outer edge of the arm 20,(20') is disengaged from the inner wall of the flange, thus causing the plug part 14 to change to its original position as illustrated in Figure 7. In this position, because the width L_2 of the socket 29 is smaller
15 than the spacing L_4 of the arms 20,20', the upper end 22a,(22b) of the arm 20,(20') in the male member 11 is brought partially into abutting engagement with the abutment 34,(34') of the flange 33,(33') of the female member 12, thereby locking the male and female members
20 11,12 in coupled condition.

As shown in Figure 7 in particular, the gaps between the male and female members 11,12 when coupled together are substantially closed or minimized so that foreign matter is substantially prevented from entry through or deposit in
25 the slits 27,(27'). Also, advantageously, when the gripping ears are pressed by fingers, the extent to which each gripping ear is pressed is restricted at the position where the inner edge of the

gripping ear and the outer edge of the flange come into engagement with one another. Thus it is possible to minimize the extent to which the engaging portions and particularly the arms are to be deformed, thus preventing the arms
5 from being excessively deformed. Accordingly good durability of the plug member is guaranteed.

Further, the socket member has such a simple structure that it can be produced in a simple mold with ease.

10 Reference to Figures 8 through 10 inclusive shows a modified form of buckle embodying the invention. This modification is essentially characterized by the provision of a rearwardly projecting lug 35, (35') which extends from and behind the rear ~~end~~ end 22a, (22b) of the upturn 20, (20')
15 in the male member 11 to define with the connecting portion 25, (25') a recess 36, (36') dimensioned and contoured to receive a portion of the flange 33, (33') of the female member 12 during the coupling operation of the buckle 10. The lugs 35, 35' has a thickness equal to the thickness of the
20 arms 20, 20', and each lug 35, 35' extends from the inner section (near the stem 15) of the upper end 22a, (22b) of the arm - 20, (20'). This arrangement provides more assured lock of the male member 11 with the female member 12 as shown in Figure 10; the male and female members are
25 thus maintained coupled together without lateral displacement even when undue stress is exerted on the members. The embodiment thus illustrated in Figures 8 through 10 inclusive is exemplary of modifications and changes that



CLAIMS:

1. A buckle for fastening ends of a flat belt-like article, comprising:

A. a male member molded of synthetic resin as one piece including

(1) a first belt-end retainer portion adapted to be connected to one end of the flat belt-like article, and

(2) a plug part having

(a) a generally T-shaped stem, said stem having a transverse portion integral with said first retainer portion, and a longitudinal portion extending forwardly therefrom and perpendicular thereto,

(b) a pair of resilient arms extending rearwardly from opposite corners of the front end of said stem,

(c) a pair of gripping ears disposed outwardly of respective rear ends of said arms, and

(d) a pair of connecting portions connecting said gripping ears to said rear ends of said arms, said connecting portions having a thickness less than each of said stem, said arms and said gripping ears; and

B. a female member molded of synthetic resin as one piece including



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(1) a second belt-end retainer portion adapted to be connected to the other end of the flat belt-like article, and

(2) a socket part having

(a) means defining a socket opening at one end of said socket part receptive of said plug part,

(b) two pairs of inwardly directed flanges, disposed one pair at each side of said socket opening, each said pair of flanges defining a restricted slit therebetween respectively receptive of said connecting portions, and each said flange having a rearwardly facing

abutment engageable

with the rear end of one of said second arms.

2. A buckle according to claim 1, wherein said longitudinal portion of said stem has a pair of longitudinal side ribs extending forwardly from said transverse portion, and a longitudinal central rib disposed between said side ribs to define therebetween a pair of elongated grooves extending from the front end of said stem substantially to said transverse portion.

3. A buckle according to claim 2, wherein said grooves in said stem are receptive of two pairs of lugs within said socket part.

4. A buckle according to claim 1, wherein each of said arms has on its rear end a rearwardly projecting lug defining a recess receptive of a portion of a respective



one of said flanges when said male and female members are coupled together, said lug having a thickness equal to the thickness of each said arm.

5. A buckle according to any preceding claim, the rear ends of said arms, when said male and female members are coupled together, lying proximate to said transverse portion of said stem and substantially closing any gap therebetween.

6. A buckle according to any preceding claim, said transverse portion of said stem lying between said first belt-end retainer portion and said gripping ears.

7. A buckle according to claim 1, said resilient arms diverging from the distal end of said stem and being the most remote therefrom at the distal ends of said arms.

8. A buckle according to claim 1, the edge of each of said connecting portions facing said transverse portion having a stepped contour and defining an S-shaped gap therewith.

9. A buckle according to claim 1, the travel of said pair of gripping ears, when depressed to release the buckle, being limited by engagement between an inwardly facing surface on each said gripping ear with an oppositely facing surface on each of said two pairs of flanges on said socket part.

10. A buckle according to claim 1, a portion of the distal end of each said second arms, and a portion of the adjacent edge of said connecting portions jointly defining a pair of recesses being receptive of said two pairs of flanges of said socket part.



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11. A buckle substantially as described with reference to and as illustrated in the accompanying drawings.
