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HOOK FOR A HOOK-AND-EYE FASTENER

The present invention relates to a hook for a hook-and-eye fastener for fastening two pieces of a garment such as a trouser or a skirt.

Known hooks for hook-and-eye fasteners generally include a hook body having a plurality of prongs on a hook base that penetrate a garment fabric and have bent end portions retained on a retainer for attaching the hook to the garment fabric. The hook body further has a locking tongue lying substantially parallel to the base and an intermediate bent portion extending between the base and the locking tongue. This hook body is relatively weak and hence is likely to be crushed or permanently deformed at the bent portion when subjected to a force tending to compress the base and the locking tongue during, for instance, the ironing of the garment fabric. With the hook body thus crushed, a smooth insertion of the locking tongue into the companion loop or eye is difficult to achieve.

One attempt made heretofore to overcome the

foregoing drawback is disclosed in British Patent No. 821459 wherein a hook body has a plurality of elongated reinforcing ribs projecting on the outer surface of the hook body and extending from a base through a bent portion to a locking tongue, there being defined in the inner surface of the hook body a corresponding number of grooves complementary in contour to the projections. The disclosed hook body having such outwardly projecting ribs is defective from an aesthetic view and rough to touch. Further, since the ribs and the grooves are formed by stamping, the hook body is likely to be damaged or broken at the bent portion due to cracks created during the formation of the ribs and grooves.

According to the invention, there is provided a hook for a hook-and-eye fastener, comprising: a one-piece hook body including a base, a locking tongue lying substantially parallel to said base, an intermediate arcuate portion extending between said base and said locking tongue so as to define therebetween an eye-receiving channel, said base having at least one pair of prongs projecting substantially perpendicularly therefrom in a direction away from said locking tongue, said hook body having an inner surface facing said eye-receiving channel, and a retainer having at least one pair of openings through which said prongs extend, respectively, characterized in that said hook body includes a plurality of cold-pressed elongated recesses defined in said inner surface and extending from said base through said arcuate portion to said locking tongue, a region adjacent said recesses having a cold pressed modulus large enough to afford increased resiliency and strength to said arcuate portion; and that said openings are spaced from one another at their nearest edges by a distance which is smaller than the distance between the insides of said pair of prongs and at

their furthest edges by a distance which is larger than the distance between the outsides of said pair of prongs, each said prong having when assembled a bent end portion retained on said retainer with a space defined therebetween, the spacings of said openings at their nearest and furthest edges, relative to the distances between the insides and outsides respectively of said prongs, and the space defined between the bent end portion of each said prong when assembled and said retainer, being such that the hook body is tiltable about the distal ends of the prongs.

It is believed possible by means of the present invention to provide a hook for a hook-and-eye fastener which is strong enough to withstand forces tending to crush or permanently deform the hook at an arcuately bent portion thereof.

It is further believed possible by means of the present invention to provide a hood for a hook-and-eye fastener which is slightly in appearance and smooth to touch.

The invention will be described by way of example with reference to the accompanying drawings, wherein like references refer to like parts unless stated otherwise, and wherein:-

Figure 1 is a front elevational view of a hook body of a hook embodying the present invention;

Figure 2 is a plan view of the hook body shown in Figure 1;

Figure 3 is a bottom view of Figure 2;

Figure 4 is a right side elevational view of the hook body;

Figure 5 is a cross-sectional view taken along line V - V of Figure 2;

Figure 6 is a plan view of a retainer of the hook embodying the present invention;

Figure 7 is a bottom view of Figure 6;

Figure 8 is a cross-sectional view taken along line VIII - VIII of Figure 6

Figure 9 is a front elevational view, partly in cross section, of an assembled hook; and

Figure 10 is a cross-sectional view taken along line X - X of Figure 9.

Figures 1 to 5 show a hook body A of a hook for a hook-and-eye fastener for fastening two pieces of a garment. The hook body A is press-formed from sheet metal and includes an upper locking tongue 11, a lower base 12 lying substantially parallel to the locking tongue 11, and an intermediate arcuate portion 13 extending between the locking tongue 11 and the base 12 for defining therebetween an eye-receiving channel 13a for receiving a portion of the companion loop or eye of the hook-and-eye fastener. A pair of prongs 14, 14 is disposed on opposite edges of the base 12 and

projects substantially perpendicularly therefrom in a direction away from the locking tongue 11.

The hook body A further has a plurality of elongated recesses 15 (three in the illustrated embodiment) formed by cold pressing and extending from the base 12 through the arcuate portion 13 to the locking tongue 11. The cold-pressed elongated recesses 15 are defined in an inner surface of the hook body A facing the eye-receiving channel 13a. As best shown in Figure 5, each of the recesses 15 has opposite end portions progressively reducing in depth and terminating in a plane in which the longitudinal central axes 16 of the prongs 14 extend. The hook body A is thus of a high cold pressed modulus in a region adjacent the elongated recesses 15 for facilitating the bending of the blank of the hook body and at the same time affording increased resilience and strength to the arcuate portion 13. Since the recesses 15 are formed by cold pressing, the hook body A is free from cracks which would be created in a comparative prior hook body having stamped ribs. The number of the grooves 15 is not limited to three in the illustrated embodiment. Further, the outer surface of the hook body 25 is neither ribbed nor grooved so that the hook body A as a whole is slightly in appearance and smooth to touch.

As shown in Figure 1, the prongs 14 are located such that the longitudinal central axes 16 of the

prongs 14 extend in a plane which is spaced from the vertex of the arcuate portion by a distance 11 substantially equal to one-fourth of the entire length 12 of the hook body A, the length 12 corresponding to the distance between the vertex of the arcuate portion 13 and the free end of the locking tongue 11. Each of the prongs 14 has in its outer side surface an elongated recess 17 formed by cold pressing and extending along the longitudinal central axis 16 of the prong 14 so that a region adjacent the recess 17 is harder than the other region of the prong 14. Although not shown, the base 12 may have an additional prong located at either the free end or the proximal end of the base 12.

15 The free end of the base 12 has a sloped guide surface 18 facing away from the arcuate portion 13 to provide a wide entrance for the companion eye to be introduced into the eye-receiving channel 13a. In the illustrated embodiment, the sloped guide surface 18 is formed by chamfering the free end of the base 12. Such guide surface may be formed by bending the free end of the base 12 in a direction away from the locking tongue 1. The locking tongue 11 projects beyond the free end of the base 12 by a distance 14 which is one and half times to two times as large as the distance 13 between the vertex of the arcuate portion 13 and the free end of the base 12.

As shown in Figures 6-8, an oblong retainer 8 is press-formed from sheet metal and includes a central raised portion 20 extending throughout the width of the retainer 20, an upwardly bent rear portion 21 extending rearwardly from the central raised portion 20, and a flat front portion 22 extending forwardly from the central raised portion 20. As shown in Figure 8, the bent rear portion 21 has a bottom surface lying flush with the bottom surface of the flat front portion 22, and a free end lying flush with the top surface of the central raised portion 20.

The retainer has a pair of transversely spaced rectangular openings 23, 23 defined in the central raised portion 20 for receiving the prongs 14, 14, respectively. The openings 23, 23 are spaced from one another at their nearest edges by a distance L1 (Figure 6) which is less than the distance 15 (Figure 4) between the insides of the prongs 14, 14 and at their furthest edges by a distance L4 which is larger than the distance 18 between the outsides of the prongs 14, 14. Each of the rectangular openings 23 has a width of an extent L2 (Figure 6) in the longitudinal direction of the retainer 8, which extent L2 is larger than the width 16 (Figure 1) of the prongs 14.

Further, the free end of the flat front portion 22 is spaced from a central line of the openings 23 by a distance L3 (Figure 6) which is smaller than the distance 17 (Figure 1) between the free end of the locking tongue 11 and the plane in which the longitudinal central axes 16 of the prongs 14, 14 lie.

The hook body A and the retainer B are assembled together into a clinched condition as shown in Figures 9 and 10. For assembling, the prongs 14, 14 of the hook body A penetrate a garment fabric D and extend through the openings 23, 23 in the retainer B. Then, end portions of the prongs 14 are deformed by a punch-and-die unit (not shown) into inwardly axially bent ends until respective distal ends engage the retainer B with spaces 24 (Figure 10) defined between the bend end portions and the retainer B. The hook body A and the retainer B thus attached together with the garment fabric D disposed therebetween, constitute a hook engageable with a loop or eye C (Figure 9) attached to another garment fabric, not shown. In this assembled condition, the free end of the upwardly bent rear portion 21 and the central raised portion 20 bite into the garment fabric D to prevent the relative movement between the retainer B and the garment fabric D. Partly because the distance l5 (Figure 4) is greater than the distance L1 (Figure 6), and partly because of the clearances 24, the hook body A is tiltable about the distal ends of the prongs 14 in the directions indicated by the arrowheads 25 in Figure 9. Furthermore, since the width L2 of the openings 23 is larger than the width of the prongs 14, the hook body A is movable in a plane parallel to the retainer B. Such relative movement between the hook body A and the

retainer and the increased resiliency and strength of the arcuate portion 13 jointly serve to take up or accomodate forces tending to depress the locking tongue 11 toward the retainer B, thereby preventing the hook
5 body A from being crushed or permanently deformed at the arcuate portion 13.

Another advantage of the hook lies in that the prongs 14 are located near the arcuate portion 13; the distance 11 between the vertex of the arcuate portion
10 13 and the axes 16 of the prongs 14 approximately equals one-fourth of the entire length 12 of the hook body A. The smallness of the distance 11 enables the upwardly bent rear portion 21 to be reduced in length, providing a large area for sewing threads running along
15 edges of the garment fabric D. Furthermore, the locking tongue 11 projects beyond the distal end of the flat front portion 22 of the retainer B so that a relatively large entrance to the eye-receiving channel 13a can be provided between the free end of the locking
20 tongue 11 and the garment fabric D when the latter is bent downwardly over the free end of the flat front portion 22 as indicated by broken lines in Figure 9. Thus, when the hook body A and the eye C are brought into interlocking engagement with each other, a portion
25 of the eye C can easily be introduced from such wide entrance into a space between the locking tongue 11 and the garment fabric D, and thence it is introduced into

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the eye-receiving channel 13a. During that time, the sloped guide surface 18 allows a smooth insertion of the portion of the eye C into the channel 13a.

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CLAIMS:-

1. A hook for a hook-and-eye fastener, comprising:

(a) a one-piece hook body including a base, a locking tongue lying substantially parallel to said base, an intermediate arcuate portion extending between said base and said locking tongue so as to define therebetween an eye-receiving channel, said base having at least one pair of prongs projecting substantially perpendicularly therefrom in a direction away from said locking tongue, said hook body having an inner surface facing said eye-receiving channel, and a plurality of cold-pressed elongated recesses defined in said inner surface and extending from said base through said arcuate portion to said locking tongue, a region adjacent said recesses having a cold pressed modulus large enough to afford increased resiliency and strength to said arcuate portion; and

(b) a retainer having at least one pair of openings through which said prongs extend, respectively, said openings being spaced from one another at their nearest edges by a distance which is smaller than the distance between the insides of said pair of prongs and at their furthest edges by a distance which is larger than the distance between the outsides of said pair of prongs, each said prong when assembled having a bent end portion retained on said retainer with a space defined therebetween, the spacings of said openings at their nearest and furthest edges, relative to the distances between the insides and outsides respectively of said prongs, and the space defined between the bent end portion of each said prong when assembled and said retainer, being such that the hook body is tiltable about the distal ends of the prongs.

2. A hook according to claim 1, said prongs being located on opposite edges of said base such that the longitudinal central axes



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of said prongs extend in a plane which is spaced from the vertex of said arcuate portion by a distance approximately equal to one-fourth of the entire length of said hook body.

3. A hook according to claim 2, each said recess having opposite
5 end portion terminating adjacent to a plane in which the longitudinal central axes of said prongs extend.

4. A hook according to claim 1, 2 or 3, each said recess having opposite end portions progressively reducing in depth.

5. A hook according to any preceding claim, said base having a
10 free end and a sloped guide surface on said free end facing in a direction away from said arcuate portion.

6. A hook according to any preceding claim, said retainer having one end terminating short of a free end of said locking tongue.

7. A hook according to any preceding claim, each said opening
15 having a width larger than the width of said prongs.

8. A hook for a hook-and-eye fastener substantially as described with reference to and as illustrated in Figures of the accompanying drawings.
