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BUTTON FOR GARMENT

The present invention relates to a button for attachment to a garment fabric, and more particularly to a button including a tack member having a shank provided with an end portion which is plastically
5 deformable under the influence of pressure applied thereto to fit into a button body of the button.

It is known that a metallic button, e.g. a button for blue jeans, is fastened to a garment fabric by a tack member adapted to be joined with a button body
10 of the button. This tack member generally comprises a head and a shank including a deformable tapered end portion. When the tack member is joined with the button body, the shank passes through the garment fabric and then undergoes deformation to some extent
15 upon engagement with the inner wall of the button body.

In one known tack member of this type, the shank has a pointed end portion which is adapted to be bent in free direction. The major drawback with this prior art is that the bending of the end portion causes an

undesired irregular deformation or bend in other portions of the shank and further of the button body, with the results that the button is attached improperly to the fabric in an inclined position.

5 Another known tack member, disclosed by Japanese Utility Model Publication (Kokoku) 44-5791, includes a shank having near its tapered end a transversely extending recess or groove which enables the same to bend easily in one direction about the recess upon
10 engagement of the tack member with the button body. This prior art, however, has a drawback in that the shank has reduced mechanical strength due to removal of the material thereof to form the recess. With this structural weakness of the shank, the tack member would
15 tend to be easily deformed or bent back so as to be removed from the button body when a relatively great pulling force is exerted on the button. There is also another drawback with this tack member in that the garment fabric positioned around the shank is
20 circumferentially disproportionally dragged into the hollow hub by an irregularly bent portion of the shank other than the tapered end portion during the insertion of the shank to the hollow hub. Thus the garment fabric yields to puckering in which yarns of the fabric
25 are partially brought into the hollow hub in an irregular manner at different sides of the shank.

According to the present invention, there is

provided a button for attachment to a garment fabric, comprising: (a) a capped button body including a hollow hub having a flanged free end; (b) a tack member having a head and a shank projecting perpendicularly and centrally from said head for being forced through the garment fabric into said hollow hub of said button body to thereby join said tack member with said button body; characterized in that said shank includes a cylindrical stem contiguous to said head, an end portion extending coaxially from said stem, and a cold-pressed recessed portion disposed circumferentially in said stem adjacent to said end portion and having a stiffness greater than the other portion of said shank, said recessed portion being disposed in such a position that the same is disposed adjacent to said flanged free end of said hollow hub when said shank is fully inserted through said hollow hub with the garment fabric sandwiched between said hollow hub and said head of said tack member, and that said end portion is plastically deformable about said recessed portion into an axially compressed and radially uniformly swelled configuration when said shank is forced into said button body.

It is believed possible by means of the invention to provide a button having a tack member which will overcome the foregoing difficulties of the prior art and which incorporates structural features to enable a neat and firm

attachment of the button to a garment fabric.

It is also believed possible by means of the invention to provide a button including a tack member having a shank which enables a stable and properly positioned attachment of a button body of the button to a garment fabric by allowing only an end portion of the shank to plastically deform into a certain configuration for thereby keeping the garment fabric free from puckering even when yarns of the latter are dragged into the button body by the shank being intruded therein.

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

Figure 1 is an elevational view of a tack member of a button embodying the present invention;

Figure 2 is a plan view of the tack member of Figure 1;

Figure 3 is a vertical cross-sectional view taken along line III - III of Figure 2;

Figure 4 is a horizontal cross-sectional view taken along line IV - IV of Figure 1;

Figure 5 is a vertical cross-sectional view of a button body;

Figure 6 is a vertical cross-sectional view of a button embodying the present invention, showing the same having been attached to a garment fabric; and

Figures 7 through 12 are elevational views showing respectively modified tack members of buttons embodying the invention.

Referring to Figures 1 to 5, a button comprises a button body B and a tack member A made of metal, such as aluminum, brass, or iron, and including a head 10 of disk shape and a shank 11 projecting perpendicularly centrally from one face of the head 10.

The head 10 has on said one face a plurality of small projections for thereby biting a garment fabric C when the face is pressed against the garment fabric during attachment of a button to the fabric. The shank preferably comprises mainly three portions; a stem 13 of circular cross-section contiguous to the head 10, an end portion 14 formed into a pyramidal configuration, and a recessed portion 20 disposed circumferentially in the stem 13 adjacent to the end portion 14, the apex 15 being coaxially aligned with the stem 13.

In this embodiment, the recessed portion 20 includes four recesses 17, and bulged portions or protuberances 18 each defining respective edges of the recesses 17. The recesses 17 are circumferentially spaced from each other at almost equal angular intervals and register in position with respective side faces which

jointly define the pyramid of the end portion 14.

The number of recesses is not limited to four and thus the recessed portion may have a plurality of recesses, or otherwise an annular groove as described
5 later on.

For manufacturing the recesses 17, the shank is punched all at once with four forming dies of almost prismoidal shape each having rounded corners at its punching end. With this punching process, each recess
10 17 is formed into an arcuate cross-sectional configuration, as shown in Figure 4. As a result, a portion of the shank indicated in phantom line F is deformed plastically into a configuration indicated in solid line in Figure 4, wherein a mass of material of
15 the shank 11 is displaced due to the plasticity thereof into the peripheral bulged portions 18.

The peripheral bulged portions 18 and a bottom portion 19 of the recess 17 are stiffened through strain hardening by punching for thereby being
20 restrained in their ductility.

As shown in Figure 5, the button body B adapted to be intruded by the tack member A comprises a button back 21 having a hollow hub 26, a cap 22 covering the button back on its one obverse side, and a circular
25 back plate 23 sandwiched between the button back 21 and the cap 22. The button back 21 includes a flanged head 24 composed of annular undulated fringe portions 24a

extending radially outwardly for being covered by the cap 22. The hollow hub 26 has inner and outer walls 26a, 26b merged with each other at lowermost portion 25 and a flanged free end 27 defined by an annular curled edge. The flange 27 is intended to engage a
5 plastically deformed end portion 14 of the shank 11 (as described hereafter).

In use of this tack member A, as shown in Figure 6, the shank 11 is forced through the garment fabric C
10 into the hollow hub 26 of the button body B for thereby compressing the pyramidal end portion 14 against the back plate 23. At this time, the end portion 14 is deformed plastically to swell radially uniformly while engaging peripherally with the flanged free end 27 for
15 attaching the button to the garment fabric C. This is partly because the compressing forces or pressures concentrate on the apex of the end portion and then work in a parallel direction with the axis 16 of the shank 11, and partly because the circumferentially
20 stiffened and less ductile recessed portion 20 resists being deformed and hinders the end portion 16 from deforming to bend only in one direction. If the shank has virtually uniform ductility all through the length, the linear pressing forces or stress will affect all
25 through the length of the shank 11 to thereby deform the stem portion 13 in an inclined relation with respect to the head 10. However, in this embodiment,

the stress is hindered from acting onto the stem portion 13 lower than the recessed portion 20. Thus the stem portion 13 is kept free from any deformation for thereby enabling the button to attach onto the fabric C in a proper position.

With this arrangement, the tack member A has an improved structure of the shank 11 which ensures and maintains a tight and sound engagement of the same with the button body B even when relatively great pulling forces are applied to the button. This is also true when the shank 11 is made of a relatively soft metal such as aluminium or brass. The tack member A thus keeps the garment fabric C free from puckering in attachment of the button thereto.

As described in the "Prior Art" section, in attachment of the button to a garment fabric, puckering is caused to occur in the fabric when the fabric or yarns thereof is brought into a hollow hub of the button body by a shank pierced through the fabric. However, the tack member's shank 11 according to the invention, provides peripherally bulged portions 18, which coact with the inner wall of the hollow hub 26 to shear yarns of the fabric C while moving along the wall. This is true even when the fabric C is relatively thin.

In other embodiments, an end portion of the shank 11 may have a flat or convex surface, or a


truncated pyramidal configuration as shown in Figures 7 through 9, or further a conical configuration as shown in Figure 10. All these embodiments of the invention have virtually the same function as the first embodiment A.

5 A tack member A shown in Figure 7 is similar to the tack member A shown in Figures 1 and 3, but the shank 11 of the former has a straight or non tapered end portion 14a having a flat top end surface 32 perpendicular to the axis 16 and remote from the head 10.

10 A tack member A in Figure 8 is similar to the tack member A in Figure 7 but the shank 11 of the former has a convex top end surface including an apex aligned with the axis 16 of the shank 11.

15 Figure 9 shows another tack member A including a shank 13 have a truncated pyramidal end portion 34 with a flat end surface extending perpendicularly to the shank axis. The recesses 17 are aligned with side faces 14c of the pyramidal end portion 34. This embodiment is also similar to the tack member A in Figure 1.

20 Figure 10 shows another tack member A similar to the first embodiment A in Figure 1, but the shank 11 of the former has a conical end portion 14d including its apex 15 aligned with the axis 16 of the shank 13, and a thinner head 10.

 Figure 11 shows a tack member A similar to the tack member A in Figure 1, but the recessed portion 20 includes an annular groove 37 extending round the

entire circumference of the stem 13 adjacent to the end portion 14 and a pair of lateral protuberances 38, 38 extending along the opposite side edges of the annular groove 37. When the stem 13 is punched radially inwardly with a suitable punching means, the annular groove 37 and the lateral protuberances 38 are formed all at once and deliberately have a stiffness greater than the other portion of the shank 11 as the four recesses 17 and the ^{peripheral} ~~peripheral~~ protuberances 18 do.

10 As shown in Figure 12, a tack member A, including the shank 11 with an end portion of a pyramidal or quasi-pyramidal configuration such as tack members A respectively shown in Figures 1 and 9, may have recesses 17 registered in position with respective 15 side ridges of the pyramid or of the quasi-pyramid.

Structure of the shank 11 may be further modified as follows:

As indicated in phantom lines 42, 44 in Figure 7 through Figure 9, respective shanks 11 may have a 20 coaxial blind hole or a hollow portion extending in and between the end portion 14 and the stem 13. The blind holes 42, 44 have an open end in the end portion 14.

For another modification, the shank 11 may have a hollow portion extending longitudinally through the 25 recessed portion 20 as indicated in phantom line 43, 46 respectively in Figures 8 and 11.

For still another modification, the entire shank

11 may be formed by cold drawing process into a hollow structure having a hollow portion opened through head 10 as indicated in phantom lines 45, 47 in Figure 10 and 12.

5 In these embodiments each having a hollow portion
42 - 47, the hollowed stem is provided with the recessed portion 20 in a similar manner with the foregoing other embodiments of the present invention,
10 with the result that a ribbed portion 50 is formed in the inner wall defining said hollow portion of the stem 13 corresponding in obverse-to-reverse relation with the recessed portion 20. When the recessed portion 20 includes an annular groove 37, the ribbed portion 50
15 provides an annular rib 52 projecting radially inwardly from said inner wall. Alternatively, the ribbed portion 50 provides a plurality of ribs 51 projected from the inner wall of the stem 13 when the recessed portion 20 includes a plurality of recesses 17. The
20 annular rib 52 or the ribs 51 correspond in number and position with the annular groove 37 and the recesses 17, respectively. Thus the shank 11 allows for an easy plastic deformation of its hollowed end portion in the attachment of the button to the garment fabric C, and
25 functions similarly with the recesses 17 or the groove 37 provided in the said shank 11 of solid structure in the above-described other embodiments.



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CLAIMS:

1. A button for attachment to a garment fabric, comprising:

(a) a capped button body including a hollow hub
5 having a flanged free end;

(b) a tack member having a head and a shank projecting perpendicularly and centrally from said head for being forced through the garment fabric into said hollow hub of said button body to thereby join said
10 tack member with said button body, said shank including

(1) a cylindrical stem contiguous to said head,
(2) an end portion extending coaxially from said stem, and

(3) a cold-pressed recessed portion disposed
15 circumferentially in said stem adjacent to said end portion and having a stiffness greater than the other portion of said shank, said recessed portion being disposed in such a position that the same is disposed adjacent to said flanged free end of said hollow hub
20 when said shank is fully inserted through said hollow hub with the garment fabric sandwiched between said hollow hub and said head of said tack member, said end portion being plastically deformable about said recessed portion into an axially compressed and
25 radially uniformly swelled configuration when said shank is forced into said button body.

2. A button according to claim 1, said end



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portion having a cylindrical shape having a diameter same as the diameter of said cylindrical stem.

3. A button according to claim 2, said cylindrical end portion having a flat end surface
5 extending perpendicularly to the axis of said shank.

4. A button according to claim 2, said cylindrical end portion having a convex end surface.

5. A button according to claim 1, said end portion being tapered off in a direction away from said
10 head.

6. A button according to claim 5, said tapered end portion having a pointed end aligned with the axis of said shank.

7. A button according to claim 6, said tapered
15 end portion having a pyramidal shape.

8. A button according to claim 6, said tapered end portion having a conical shape.

9. A button according to claim 5, said tapered end portion having a flat end surface extending
20 perpendicularly to the axis of said shank.

10. A button according to claim 9, said tapered end portion having a truncated pyramidal shape.

11. A button according to claim 1, said cold-pressed recessed portion including an annular
25 groove extending through the full circumference of said cylindrical stem.

12. A button according to claim 11, said



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cold-pressed recessed portion having a pair of stiffened protuberances extending along the opposite sides of said annular groove.

13. A button according to claim 1, said
5 cold-pressed recessed portion including a plurality of recesses circumferentially spaced at substantially equal intervals.

14. A button according to claim 13, said
cold-pressed recessed portion having a plurality of
10 stiffened protuberances each extending along the periphery of a corresponding one of said recesses.

15. A button according to claim 13, said end
portion having a pyramidal shape with its apex aligned with the axis of said shank, said recesses being
15 aligned with respective faces of said pyramidal end portion.

16. A button according to claim 13, said end
portion having a pyramidal shape with its apex aligned with the axis of said shank, said recesses being
20 aligned with respective side ridges of said pyramidal end portion.

17. A button according to claim 13, said end
portion having a truncated pyramidal shape having a flat end surface extending perpendicularly to the axis
25 of said shank, said recesses being aligned with respective side faces of said truncated pyramidal end portion.



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18. A button according to claim 1, said shank having a hollow portion extending axially in and between said end portion and said cylindrical stem, said hollow portion including a ribbed portion
5 projecting radially from an inner wall defining said hollow portion, said ribbed portion corresponding in position to said cold-pressed recessed portion.

19. A button according to claim 18, said cold-pressed recessed portion including an annular
10 groove extending through the full circumference of said cylindrical stem, said ribbed portion including an annular rib extending through the full circumference of said inner wall and being complementary in contour with said annular groove.

15 20. A button according to claim 18, said cold-pressed recessed portion including a plurality of recesses circumferentially spaced at substantially equal intervals, said ribbed portion including a plurality of ribs corresponding in position to and
20 complementary in contour with said recesses, respectively.

21. A button according to claim 18, said hollow portion including an axial blind hole having an open end disposed at a distal end of said shank.

25 22. A button according to claim 18, said hollow portion including an axial blind hole having an open end disposed in said head.



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23. A button according to claim 22, said shank being cold-drawn, said blind hole being provided in said shank when the latter is cold-drawn.

24. A button according to claim 18, said hollow
5 portion defining a fully closed axial hollow interior space.

25. A button substantially as described with reference to and as illustrated in Figures 1 to 6 of the accompanying drawings.

26. A button substantially as described with reference to and as illustrated in Figures 1 to 6 modified as in Figure 7 of the accompanying drawings.

27. A button substantially as described with reference to and as illustrated in Figures 1 to 6 modified as in Figure 8 of the accompanying drawings.

28. A button substantially as described with reference to and as illustrated in Figures 1 to 6 modified as in Figure 9 of the accompanying drawings.

29. A button substantially as described with reference to and as illustrated in Figures 1 to 6 modified as in Figure 10 of the accompanying drawings.

30. A button substantially as described with reference to and as illustrated in Figures 1 to 6 modified as in Figure 11 of the accompanying drawings.

31. A button as described with reference to and as illustrated in Figures 1 to 6 modified as in Figure 12 of the accompanying drawings.
