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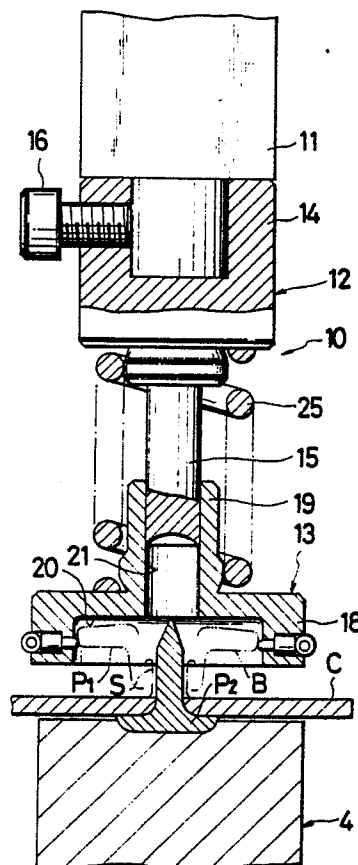
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# EUROPEAN PATENT APPLICATION

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**London WC2A 3LS(GB)**(54) **Button attaching apparatus.**

(57) A button attaching apparatus includes an upper or punch/holder unit (10) for joining a tiltable button (P1) with a tack member (P2) for attachment to a fabric (C) in cooperation with a lower or die unit (4). The upper unit includes a button holder (13) and a punch (15) reciprocally movably received in the holder. The punch (15) compresses a pointed end of the tack member (P2) after the latter is fully inserted into the button (P1).

## FIG. 2



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## BUTTON ATTACHING APPARATUS

The present invention relates to an apparatus for attaching buttons to a garment fabric, and more particularly a punch/holder unit for use in such attaching apparatus.

An attaching apparatus is known for applying buttons of a tiltable type to a substrate such as a garment fabric. The button has a button head loosely or tiltably mounted on a hub member and a tack member to be inserted into the hub. The tack member is clenched to deform by a punch acting directly on the pointed end of the tack through an aperture in the button head. To this end, the apparatus includes an integral punch/holder unit for holding therein the tiltable button with its integral punch disposed in the aperture of the button.

Figure 4 of the accompanying drawings shows an example of such known punch/holder unit, in which the tiltable button PI is joined with the tack member P2 which underlies a sheet of fabric C. More specifically, the integral punch/holder unit I holding the tiltable button PI is moved downwardly by a suitable drive means toward the tack member P2 supported on the die unit 4, until the pointed end of the tack member P2 begins to penetrate the fabric C set in place between the upper unit I and the lower unit 4, and moves into the hub member S of the button. During this movement of the tack member P2 relative to the button PI, the punch 2 squeezes the pointed end of the tack member to deform radially outwardly as shown in Figure 4.

Such prior art apparatus has a drawback in that the button PI would often fail to tilt due to such deformation of the hub member S as depicted in solid line which is caused by premature deformation of the tack in the hub member initially disposed in the position shown by a phantom line in Figure 4, in which the inner wall of the hub member is forced radially outwardly. By premature deformation is meant that the punch 2 begins to crush the pointed end of the tack member P2 before it is fully inserted into the hub member S on account of the fact that the punch and the button holder are built integral.

The present invention seeks to provide an apparatus for attaching a tiltable button with a tack member without impairing the tilting function of the button.

According to the present invention, there is provided a punch/holder unit in cooperation with a die unit for joining a tiltable button having a head aperture with a tack member for attachment to a fabric, said button having a hub member and a button head tiltably mounted on the hub member, said punch/holder unit comprising: a punch unit including a punch and a base integrally secured to

said punch and operatively connected to an actuator ram so as to reciprocate said punch; a button holder including a holder body defining a pocket for receiving the tiltable button, said holder having a guide defining therein a guide channel communicating with said pocket, in which channel said punch is reciprocably movable; and a compression spring extending between and secured to said base of said punch and said holder for normally urging said holder downwardly away from said punch.

Many other advantages and features of the present invention will become manifest to those versed in the art upon making reference to the detailed description and the accompanying sheets of drawings in which preferred structural embodiments incorporating the principles of the present invention are shown by way of illustrative example.

Figure 1 is a front view, partly in cross section, of a punch/holder unit of an attaching apparatus according to the invention;

Figures 2 and 3 are front views, partly in cross section, of the apparatus, showing a manner in which the punch/holder unit operates; and

Figure 4 is a cross-sectional view of a known attaching apparatus.

An apparatus for attaching a tiltable button PI with a tack member P2 to a fabric C includes an upper or punch/holder unit I0 and a lower or die unit 4 as shown in Figure 2. The punch/holder unit is suitable for use in applying a tiltable button to a mating tack across a substrate such as a garment fabric. The button has a hub member S and a button head B tiltably or loosely mounted thereon. The button head has a central aperture formed on its top. The upper unit includes a punch unit I2 and a button holder I3 physically separated from but functionally associated with each other.

As better shown in Figure 1, the punch unit I2 is operatively connected to a vertically movable ram II which is in turn connected to a drive (not shown). The punch unit I2 includes a base I4 secured by a screw I6 to the ram II, and a punch I5 extending integrally from the base I4. The punch I5 is in the form of a cylindrical rod and has a recessed or concaved lower end I7.

The button holder I3 is disposed beneath the punch unit I2 and includes a holder body I8 for holding therein the tiltable button. The holder body I8 has a horizontal circular wall and an annular peripheral wall extending circumferentially of the circular wall, thereby defining a pocket or space 20 downwardly opening for receiving the tiltable button PI (Figure 2).

The button holder 13 also includes a guide 19 extending coaxially upwardly from the circular wall of the holder body 18. The guide 19 and the circular wall jointly define a guide channel 23 extending vertically therethrough as shown in Figure 1, in which channel the punch 15 is reciprocally movable.

The button holder 13 further includes a pair of stoppers 22 loosely received respectively in guide pits or cavities 23 formed in the peripheral wall of the holder body 18. The guide pits 23 are disposed diametrically opposite to each other and each have a reduced-diameter bore opening into the pocket 20. The stopper 22 is loosely fit in the guide pit 23 and movable through the reduced-diameter bore of the guide pit 23 to protrude into the pocket 20 to an extent controlled. A coiled spring 24 extends throughout the circumference of the peripheral wall of the holder body 18, more specifically in and along an annular groove in the peripheral wall, such that the spring 24 normally urges the stoppers 22 to protrude into the pocket 20.

In this embodiment, two of these stoppers are provided but more of them may be provided at uniformly spaced angular intervals.

The punch unit 12 and the button holder 13 are resiliently connected to each other by a compression spring 25 extending between the base 14 of the punch unit and the button holder and connected to them at the opposite ends. The compression spring 25 normally urges the button holder 13 to move relatively away from the punch unit 12, more specifically, the pocket 20 to move away from the recessed lower end 17 of the punch 15 or vice versa.

The punch/holder unit 10 is in an uppermost or initial position where the lower end 17 of the punch 15 is held away from the pocket 20 under the force of the compression spring 25. The tiltable button PI is set in place in the pocket 20 while the tack member P2 is set in place on the die unit 4. The holding of the button PI by the button holder 13 is assured by the assistance of the stoppers 22, 22 which resiliently abut and engage sidewardly with the button head. The fabric C to which the button PI is to be attached is placed between the tiltable button PI and the tack member P2.

The ram 11 is actuated by means not shown to downwardly move the punch/holder unit 10, i.e. the punch unit 12 and the button holder 13 together, until the tack member P2 thrusts through the fabric C fully into the hub of the button PI as shown in Figure 2, in which instance the concaved lower end 17 of the punch 15 is held still remotely from the pocket 20.

With continued downward movement of the ram 11, the punch 15 begins to move downwardly in the guide channel 21 relative to the button holder 13 against the force of the compression spring 25. The punch 15 presses against the pointed end of the tack member P2 positioned in the central aperture of the button PI and compresses the same at its concaved end 17 thereby deforming the pointed end into a radially outwardly bulged shape as shown in Figure 3. Consequently, the tiltable button PI is jointed with the tack member P2 on the fabric C.

Importantly, the punch 15 acts on the pointed end of the tack member P2 only after the latter has been fully inserted into the button PI so that the pointed end of the tack member P2 is compressed to deform exteriorly of the hub of the button PI, thereby avoiding an undesirable deformation of the hub member S which deformation would cause a malfunction of the tiltable button.

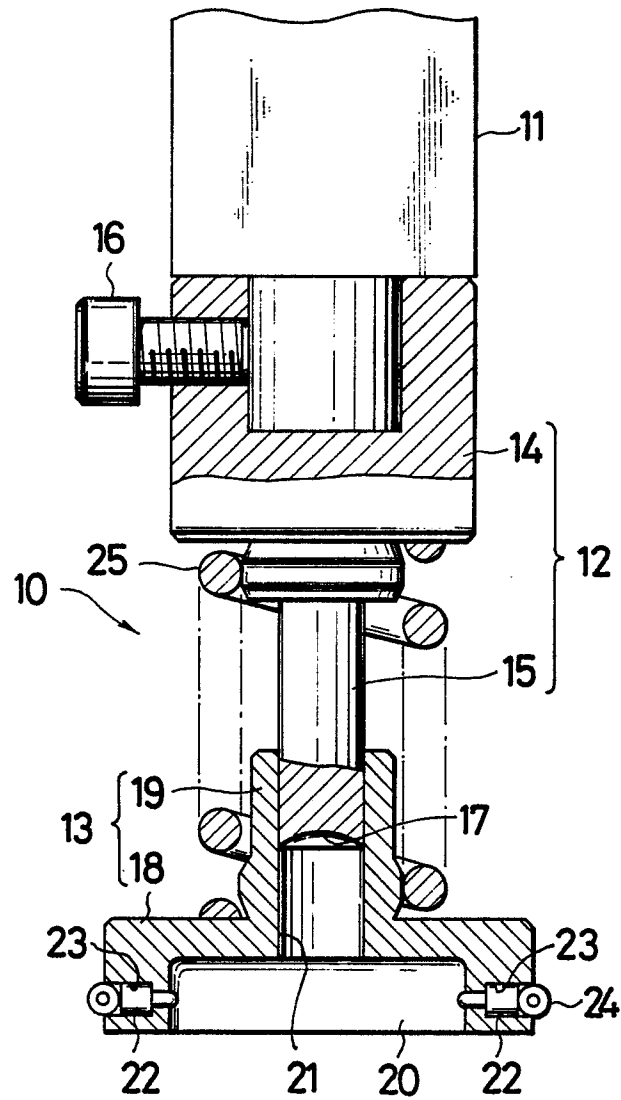
## Claims

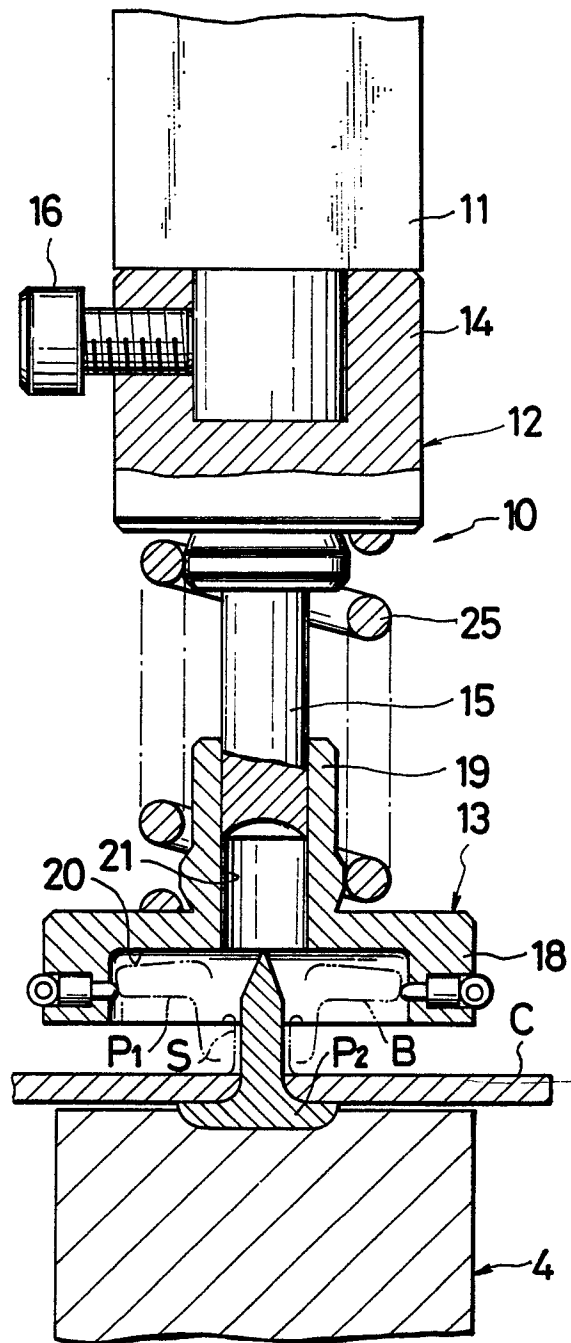
1. A punch/holder unit (10) in cooperation with a die unit for joining a tiltable button (PI) having a head aperture with a tack member (P2) for attachment to a fabric (C), said button having a hub member (S) and a button head (B) tiltable mounted on the hub member (S), said punch/holder unit comprising: a punch unit (12) including a punch (15) and a base (14) integrally secured to said punch and operatively connected to an actuator ram (11) so as to reciprocate said punch (15); a button holder (13) including a holder body (13) defining a pocket (20) for receiving the tiltable button (PI), said holder (13) having a guide (19) defining therein a guide channel (21) communicating with said pocket, in which channel said punch (15) is reciprocally movable; and a compression spring (25) extending between and secured to said base (14) of said punch (13) and said holder (13) for normally urging said holder downwardly away from said punch.

2. A punch/holder unit according to claim 1, said button holder (13) including a pair of stoppers (22) disposed in said holder body (18) in a diametrically opposing relation and normally urged by a coiled spring (24) extending circumferentially of said holder body (18) to slightly protrude into said pocket (20) for engaging with the tiltable button (PI) in said pocket.

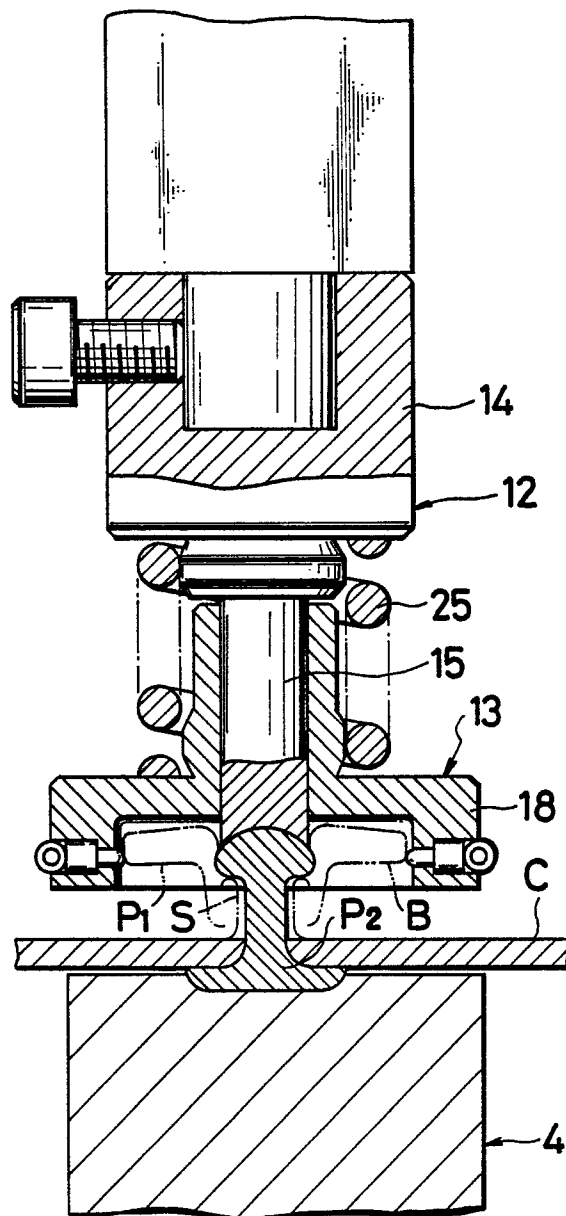
3. A punch/holder unit according to claim 1 or 2, said punch (15) having a concaved lower end (17).

**FIG. 1**



**FIG. 2**

**FIG. 3**



**FIG. 4**  
PRIOR ART

