

Description

The present invention relates to an apparatus for assembling a pair of fastener elements of a garment fastener with a garment fabric disposed therebetween, said apparatus comprising: a frame; a die supported by said frame for supporting one of the fastener elements; a vertically movable plunger supported by said frame and carrying a punch in confronting relation to said die for supporting the other fastener element; drive means for moving said plunger and hence said punch vertically toward and away from said die to join the two fastener elements together; and a safety device including a safe-confirmation member vertically movably supported by said frame between an uppermost position and a lowermost position in which a gap between said safe-confirmation member and said die is substantially equal to the thickness of the garment fabric, said safe-confirmation member being disposed in an upper position when an obstacle is inserted between said safe-confirmation member and said die, and a limit switch operable by said safe-confirmation member, said limit switch being closed to connect said drive means with a power source when said safe-confirmation member is disposed in said lowermost position, and said limit switch being open to disconnect the power source from said drive means when said safe-confirmation member is disposed in an upper position.

An apparatus of this type is disclosed in EP—A2—142 806. In this prior art apparatus the safety-confirmation member is movable by an air cylinder between an uppermost rest position in which the safe-confirmation member is disposed around the punch retracted from the die and a lowermost position in which the safe-confirmation is disposed around the die in the absence of any obstacle near the die. When the safe-confirmation member arrives at the lowermost position, a detecting means produces a command signal to start lowering of the punch toward the die. However, such prior art apparatus is disadvantageous in that since the safe-confirmation member is lowered ahead of the punch, high-speed attaching of the garment fasteners cannot be achieved.

The object of the present invention is to provide a fastener-assembling apparatus having a safety device which secures safety of the operator without the risk of reducing the speed of attaching the garment fasteners.

This object is realized by the basic concept of the invention set forth in the characterizing portion of claim 1.

Further developments of the invention are set forth in the depending claims.

The invention will now be described in more detail with reference to an exemplifying, non-limiting embodiment thereof illustrated in the accompanying drawings, in which

Figure 1 is a fragmentary side elevational

view, partly in cross section, of a fastener-assembling apparatus embodying the present invention;

Figure 2 is an enlarged perspective view of a guard of a safety device of Figure 1;

Figure 3 is a view similar to Figure 2, showing a modified guard;

Figure 4 is a schematic plan view of a garment to which a number of garment fasteners have been attached by the apparatus;

Figure 5 is a view similar to Figure 1, illustrating the manner in which a garment fastener is attached; and

Figure 6 is a view similar to Figure 1, illustrating the operation of the safety device.

Figure 1 shows an apparatus 1 for joining a pair of first and second fastener elements A, B (illustrated in phantom lines) together, with a garment fabric C (illustrated in phantom lines). The apparatus 1 generally comprises an upper or punch unit 2 and a lower or die unit 3, both supported by a frame (not shown) in confronting relation to each other. In the illustrated embodiment, the first and second fastener elements A, B comprise a button and a tack, respectively. The button A has a head and a shank projecting centrally therefrom, and the tack B has a head and a spike projecting centrally therefrom.

The lower unit 3 includes a base (not shown) fixedly supported by the non-illustrated frame, and a die 17 supported on the non-illustrated base for receiving on its upper end surface the head of the second fastener element B with the spike directed upwardly.

The upper unit 2 includes a support 4 integral with the non-illustrated frame and a vertical bore 21, and a plunger 20 of circular cross section operatively connected to a suitable drive (not shown) for reciprocating movement within the vertical bore 21 in the support 4. The upper unit 2 also includes a pair of grip members 6, 6 carried on a lower end of the plunger 20 for clamping the first fastener element A with the shank directed downwardly, and a punch 5 secured to the lower end of the plunger 20 and movable toward and away from the die 17, in response to the reciprocating movement the plunger 20, for forcing the first fastener element A against the second fastener element B.

Most importantly, the apparatus 1 has a safety device including a safe-confirmation member 7 (Figures 1, 2, 5 and 6) which is vertically movably mounted on the support 4 and which is normally urged by a first compression spring 13 to its lowermost position (Figures 1 and 5).

The safe-confirmation member 7 includes a slide 9 having a first flange 8 at its upper end, and a fabric presser 10 attached to the slide 9.

The slide 9 is vertically slidably supported on the support 4 and is normally urged downwardly by the first compression spring 13. The downward movement of the slide 9 is limited by a stop 19 to such an extent that the gap between the lower end of the slide 9 and the

upper end surface of the lower unit 3 is substantially equal to the thickness of the garment fabric, the stop 19 being fixed to the support 4. A pusher 11 in the form of a screw is adjustably mounted on the first flange 8 of the slide 9 for depressing an actuator 12a of the limit switch 12 while the slide 9 is in its lowermost position (Figures 1 and 5). With the actuator 12a depressed, the limit switch 12 is closed to continue a power supply to a drive (not shown) for lowering the plunger 20; in this condition, when a foot pedal (not shown) is stepped to actuate the drive of the plunger 20, the punch 5 is lowered to join the first and second fastener members A, B together with the garment fabric C sandwiched therebetween.

The fabric presser 10 has a lower end surface horizontally aligned with the lower end of the slide 9 for pressing the garment fabric C against the upper end surface of the lower unit 3 while the slide 9 is in its lowermost position. The fabric presser 10 has a generally C-shaped cross section defining a hollow so as not to hinder the vertical movement of the punch 5 and the grip members 6, 6. Preferably, at least a front wall of the fabric presser 10 is transparent so that the operator can observe the garment fastener being attached to the garment fabric C. Alternatively, the front wall of the fabric presser 10 may be opaque and may have a slit 10a as indicated in phantom lines in Figure 2.

With the safeconfirmation member 7 in its lowermost position (Figures 1 and 5), if the operator's finger, for example, is inadvertently inserted into the gap between the safeconfirmation member 7 and the lower unit 3, as shown in Figure 6, the slide 9 together with the fabric presser 10 is raised against the bias of the first compression spring 13, thus bringing the pusher 11 off the actuator 12a of the limit switch 12. As a result, the limit switch 12 has been opened to cut off the power supply to the non-illustrated drive of the plunger 20. In this condition, even if the non-illustrated foot pedal is stepped, the drive of the plunger 20 cannot be actuated, that is, lowering of the punch 5 cannot take place.

The open side (remote from the slide 9) of the fabric presser 10 is normally covered by a cover 14 (Figures 1, 2, 5 and 6) for preventing the operator's finger from inadvertently entering the hollow of the fabric presser 10 and hence from being hit by the punch 5. The cover 14 is pivotally connected at its upper end portion to the support 4 by a pin 15 and has at its upper end a second flange 14a on which a second compression spring 16 acts to normally urge the cover 14 to pivot counterclockwise about the pin 15. The second compression spring 16 is relatively weak so that the cover 14 can pivot clockwise about the pin 15 against the bias of the second compression spring 16 as the garment fabric C is drawn leftwardly in Figure 5 after the garment fastener has been attached to the garment fabric C. Thus the cover 14 does not impair the rate of production in the manufacture of a garment such as

shown in Figure 4 in which a number of fastener elements are to be attached successively to the garment fabric C.

Figure 3 shows a modified safeconfirmation member 7' in which the slide 9', the fabric presser 10' and the cover 14' are integral with one another, the cover 14' having at its lower portion an opening 18' for the passage of the first fastener member A.

In operation, a garment fabric C is placed between the safeconfirmation member 7 and the lower unit 3 as shown in Figure 1, at which time the slide 9 together with the fabric presser 10 is maintained in its lowermost position under the bias of the first compression spring 13. While the slide 9 is thus in its lowermost position, the pusher 11 mounted on the first flange 8 of the slide 14 depresses the actuator 12a of the limit switch 12 to continue the power supply to the non-illustrated drive of the plunger 20. In this condition, when the non-illustrated foot pedal is stepped to actuate the drive (not shown) of the plunger 20, the punch 5 is lowered to join the first and second fastener members A, B together in clinched form, with the garment fabric C sandwiched therebetween.

After the garment fastener has thus been attached to the garment fabric C, when the garment fabric C is drawn leftwardly in the cover 14 pivots clockwise about the pin 15 against the bias of the second compression spring 16 as the lower end of the cover 14 is pushed by the head of the attached first fastener element A. Since the cover 14 thus does not prevent the first fastener member A to pass, the apparatus 1 enables an adequate rate of production when used in the manufacture of a garment (Figure 4) such as of denim, in which a number of garment fasteners are to be attached successively to the garment fabric C.

With the safeconfirmation member 7 in its lowermost position (Figures 1 and 5), if the operator's finger, for example, is inadvertently inserted into the gap between the safeconfirmation member 7 and the lower unit 3 as shown in Figure 6, the slide 9 together with the fabric presser 10 is raised against the bias of the first compression spring 13, thus bringing the pusher 11 off the actuator 12a of the limit switch 12. As a result, the limit switch 12 has been opened to cut off the power supply to the drive (not shown) of the plunger 20. In this condition, even if the foot pedal (not shown) is stepped, the drive of the plunger 20 cannot be actuated, that is, lowering of the punch 5 cannot take place, thus avoiding any accident that the operator's finger (or a tool) inadvertently inserted could be hit by the punch 5.

Claims

1. An apparatus (1) for assembling a pair of fastener elements (A), (B) of a garment fastener with a garment fabric (C) disposed therebetween, said apparatus (1) comprising:
 - (a) a frame;



upper end surface of the lower unit 3 is substantially equal to the thickness of the garment fabric, the stop 19 being fixed to the support 4. A pusher 11 in the form of a screw is adjustably mounted on the first flange 8 of the slide 9 for depressing an actuator 12a of the limit switch 12 while the slide 9 is in its lowermost position (Figures 1 and 5). With the actuator 12a depressed, the limit switch 12 is closed to continue a power supply to a drive (not shown) for lowering the plunger 20; in this condition, when a foot pedal (not shown) is stepped to actuate the drive of the plunger 20, the punch 5 is lowered to join the first and second fastener members A, B together with the garment fabric C sandwiched therebetween.

The fabric presser 10 has a lower end surface horizontally aligned with the lower end of the slide 9 for pressing the garment fabric C against the upper end surface of the lower unit 3 while the slide 9 is in its lowermost position. The fabric presser 10 has a generally C-shaped cross section defining a hollow so as not to hinder the vertical movement of the punch 5 and the grip members 6, 6. Preferably, at least a front wall of the fabric presser 10 is transparent so that the operator can observe the garment fastener being attached to the garment fabric C. Alternatively, the front wall of the fabric presser 10 may be opaque and may have a slit 10a as indicated in phantom lines in Figure 2.

With the safeconfirmation member 7 in its lowermost position (Figures 1 and 5), if the operator's finger, for example, is inadvertently inserted into the gap between the safeconfirmation member 7 and the lower unit 3, as shown in Figure 6, the slide 9 together with the fabric presser 10 is raised against the bias of the first compression spring 13, thus bringing the pusher 11 off the actuator 12a of the limit switch 12. As a result, the limit switch 12 has been opened to cut off the power supply to the non-illustrated drive of the plunger 20. In this condition, even if the non-illustrated foot pedal is stepped, the drive of the plunger 20 cannot be actuated, that is, lowering of the punch 5 cannot take place.

The open side (remote from the slide 9) of the fabric presser 10 is normally covered by a cover 14 (Figures 1, 2, 5 and 6) for preventing the operator's finger from inadvertently entering the hollow of the fabric presser 10 and hence from being hit by the punch 5. The cover 14 is pivotally connected at its upper end portion to the support 4 by a pin 15 and has at its upper end a second flange 14a on which a second compression spring 16 acts to normally urge the cover 14 to pivot counterclockwise about the pin 15. The second compression spring 16 is relatively weak so that the cover 14 can pivot clockwise about the pin 15 against the bias of the second compression spring 16 as the garment fabric C is drawn leftwardly in Figure 5 after the garment fastener has been attached to the garment fabric C. Thus the cover 14 does not impair the rate of production in the manufacture of a garment such as

shown in Figure 4 in which a number of fastener elements are to be attached successively to the garment fabric C.

Figure 3 shows a modified safeconfirmation member 7' in which the slide 9', the fabric presser 10' and the cover 14' are integral with one another, the cover 14' having at its lower portion an opening 18' for the passage of the first fastener member A.

In operation, a garment fabric C is placed between the safeconfirmation member 7 and the lower unit 3 as shown in Figure 1, at which time the slide 9 together with the fabric presser 10 is maintained in its lowermost position under the bias of the first compression spring 13. While the slide 9 is thus in its lowermost position, the pusher 11 mounted on the first flange 8 of the slide 14 depresses the actuator 12a of the limit switch 12 to continue the power supply to the non-illustrated drive of the plunger 20. In this condition, when the non-illustrated foot pedal is stepped to actuate the drive (not shown) of the plunger 20, the punch 5 is lowered to join the first and second fastener members A, B together in clinched form, with the garment fabric C sandwiched therebetween.

After the garment fastener has thus been attached to the garment fabric C, when the garment fabric C is drawn leftwardly in the cover 14 pivots clockwise about the pin 15 against the bias of the second compression spring 16 as the lower end of the cover 14 is pushed by the head of the attached first fastener element A. Since the cover 14 thus does not prevent the first fastener member A to pass, the apparatus 1 enables an adequate rate of production when used in the manufacture of a garment (Figure 4) such as of denim, in which a number of garment fasteners are to be attached successively to the garment fabric C.

With the safeconfirmation member 7 in its lowermost position (Figures 1 and 5), if the operator's finger, for example, is inadvertently inserted into the gap between the safeconfirmation member 7 and the lower unit 3 as shown in Figure 6, the slide 9 together with the fabric presser 10 is raised against the bias of the first compression spring 13, thus bringing the pusher 11 off the actuator 12a of the limit switch 12. As a result, the limit switch 12 has been opened to cut off the power supply to the drive (not shown) of the plunger 20. In this condition, even if the foot pedal (not shown) is stepped, the drive of the plunger 20 cannot be actuated, that is, lowering of the punch 5 cannot take place, thus avoiding any accident that the operator's finger (or a tool) inadvertently inserted could be hit by the punch 5.

Claims

1. An apparatus (1) for assembling a pair of fastener elements (A), (B) of a garment fastener with a garment fabric (C) disposed therebetween, said apparatus (1) comprising:

(a) a frame;



(b) a die (17) supported by said frame for supporting one of the fastener elements (B);

(c) a vertically movable plunger (20) supported by said frame and carrying a punch (5) in confronting relation to said die (17) for supporting the other fastener element (A);

(d) drive means for moving said plunger (20) and hence said punch (5) vertically toward and away from said die (17) to join the two fastener elements (A), (B) together; and

(e) a safety device including

(1) a safe-confirmation member (7) vertically movably supported by said frame between an uppermost position and a lowermost position in which a gap between said safe-confirmation member (7) and said die (17) is substantially equal to the thickness of the garment fabric (C), said safe-confirmation member (7) being disposed in an upper position when an obstacle is inserted between said safe-confirmation member and said die, and

(2) a limit switch operable by said safe-confirmation member, said limit switch being closed to connect said drive means with a power source when said safe-confirmation member is disposed in said lowermost position, and said limit switch being open to disconnect the power source from said drive means when said safe-confirmation member is disposed in an upper position;

characterized in that said safe-confirmation member includes a slide vertically movably supported by said frame and normally urged downwardly to said lowermost position by a first compression spring, said slide carrying a pusher for depressing an actuator of said limit switch to close said limit switch, while said slide is disposed in said lowermost position.

2. An apparatus according to claim 1, said safe-confirmation member including a fabric presser defining a hollow for the passage of said punch and having a lower end surface horizontally aligned with a lower end of said slide, said fabric presser being vertically movable with said slide for pressing the garment fabric against said die while said slide is disposed in said lowermost position.

3. An apparatus according to claim 2, said fabric presser having a generally C-shaped horizontal cross section with one vertical side opening for the passage of one fastener element when the garment fabric is drawn after the garment fastener has been attached to the garment fabric, said safety device further including a cover for normally closing said one vertical side opening and for opening the same when said cover is pushed outwardly by the one fastener element as the garment fabric is drawn.

4. An apparatus according to claim 3, said cover being pivotally supported by said frame and being normally urged against said fabric presser by a second compression spring.

5. An apparatus according to claim 2, said fabric presser being transparent at least at its front wall.

6. An apparatus according to claim 2, said fabric presser having a slit at least in its front wall.

7. An apparatus according to claim 2, said slide and said fabric presser being integral with each other, said fabric presser having an opening in a lower portion of its one side wall remote from said slide.

Patentansprüche

1. Vorrichtung (1) zum Anbringen von zwei Verschlüsselementen (A, B) eines Kleiderverschlusses an einem dazwischen angeordneten Kleiderstoff (C), wobei diese Vorrichtung (1) umfaßt:

(a) einen Rahmen;

(b) ein durch diesen Rahmen abgestütztes Gesenk (17) zum Abstützen des einen Verschlüsselementes (B);

(c) einen von diesem Rahmen abgestützten vertikal beweglichen Stößel (20), der einen dem besagten Gesenk (17) gegenüberliegenden Stempel (5) zum Abstützen des anderen Verschlüsselementes (A) trägt;

(d) eine Antriebseinrichtung zum vertikalen Bewegen des besagten Stößels (20) und damit des Stempels (5) zu dem besagten Gesenk (17) hin und von diesem weg, um die beiden Verschlüsselemente (A, B) zu vereinigen; und

(e) eine Sicherheitseinrichtung, umfassend

(1) ein Überwachungsteil (7), das von dem besagten Rahmen vertikal beweglich abgestützt ist zwischen einer oberen Stellung und einer unteren Stellung, in der ein Spalt zwischen dem Überwachungsteil (7) und dem besagten Gesenk (17) im wesentlichen der Dicke des Kleiderstoffs (C) entspricht, wobei das Überwachungsteil (7) in einer oberen Stellung angeordnet ist, wenn sich zwischen dem Bestätigungsteil und dem Gesenk ein Hindernis befindet, und

(2) einen durch das Überwachungsteil betätigbaren Grenzlagenschalter, wobei dieser Grenzlagenschalter geschlossen ist, um die besagte Antriebseinrichtung mit einer Antriebsquelle zu verbinden, wenn das Überwachungsteil in der untersten Stellung angeordnet ist, und wobei dieser Grenzlagenschalter offen ist, um die Antriebsquelle von der besagten Antriebseinrichtung zu trennen, wenn das Überwachungsteil in einer oberen Stellung angeordnet ist;

dadurch gekennzeichnet, daß das Überwachungsteil einen von dem besagten Rahmen vertikal beweglich abgestützten Schlitten aufweist, der von einer ersten Druckfeder normalerweise in die besagte untere Stellung vorgespannt ist, wobei dieser Schlitten ein Druckstück trägt, um ein Betätigungsteil des Grenzlagenschalters zum Schließen desselben nach unten zu drücken, wenn dieser Schlitten in der besagten unteren Stellung angeordnet ist.

2. Vorrichtung nach Anspruch 1, wobei das Überwachungsteil einen Stoffdrücker aufweist, der einen Hohlraum für den Durchgang des Stempels begrenzt und der eine mit einem unteren Ende des besagten Schlittens horizontal fluchtende untere Endfläche hat, wobei dieser Stoffdrücker mit dem Schlitten vertikal beweglich ist,



um den Kleiderstoff an das Gesenk anzudrücken, während der Schlitten in der unteren Stellung angeordnet ist.

3. Vorrichtung nach Anspruch 2, wobei der Stoffdrücker einen im allgemeinen C-förmigen horizontalen Querschnitt hat, wobei eine vertikale Seite für den Durchgang eines Verschlusselementes offen ist, wenn der Kleiderstoff nach dem Anbringen des Verschlusses herausgezogen wird, wobei die Sicherheitseinrichtung ferner eine Abdeckung umfaßt, um diese eine vertikale seitliche Öffnung normalerweise zu verschließen, und um diese zu öffnen, wenn diese Abdeckung beim Herausziehen des Kleiderstoffs von dem einen Verschlusselement nach außen gedrückt wird.

4. Vorrichtung nach Anspruch 3, wobei diese Abdeckung an den Rahmen schwenkbar abgestützt und von einer zweiten Druckfeder normalerweise gegen den Stoffdrücker vorgespannt ist.

5. Vorrichtung nach Anspruch 2, wobei der Stoffdrücker zumindest an seiner Frontwand transparent ist.

6. Vorrichtung nach Anspruch 2, wobei der Stoffdrücker zumindest in seiner Frontwand einen Schlitz hat.

7. Vorrichtung nach Anspruch 2, wobei der Schlitten und der Stoffdrücker einstückig ausgebildet sind und wobei der Stoffdrücker in einem unteren Bereich seiner von dem Schlitten abliegenden Seitenwand eine Öffnung hat.

Revendications

1. Appareil (1) pour assembler une paire d'éléments d'attache (A), (B) d'une attache de vêtement avec un tissu (C) placé entre eux, ledit appareil (1) comprenant:

(a) un bâti;

(b) une matrice (17) supportée par ledit bâti pour supporter l'un des éléments d'attache (B);

(c) un piston (20) mobile verticalement, supporté par ledit bâti et portant un poinçon (5) en face de ladite matrice (17) pour supporter l'autre élément d'attache (A);

(d) un moyen d'entraînement pour déplacer ledit piston (20) et donc ledit poinçon (5) verticalement vers ladite matrice (17) et en sens opposé à celle-ci pour réunir les deux éléments d'attache (A), (B) ensemble; et

(e) un dispositif de sécurité comprenant

(1) un élément de confirmation de sécurité (7) supporté en pouvant se déplacer verticalement par ledit bâti entre une position haute et une position basse dans laquelle un espace entre ledit élément de confirmation de sécurité (7) et ladite matrice (17) est sensiblement égal à l'épaisseur du tissu (C), ledit élément de confirmation de sécurité (7) étant disposé dans une position supérieure lorsqu'un obstacle est inséré

entre ledit élément de confirmation de sécurité et ladite matrice, et

(2) un interrupteur-limiteur pouvant être actionné par ledit élément de confirmation de sécurité, ledit interrupteur-limiteur étant fermé pour connecter ledit moyen d'entraînement à une source de courant lorsque ledit élément de confirmation de sécurité est disposé dans ladite position la plus basse, et ledit interrupteur-limiteur étant ouvert pour déconnecter la source de courant dudit moyen d'entraînement lorsque ledit élément de confirmation de sécurité est disposé dans une position supérieure;

caractérisé en ce que ledit élément de confirmation de sécurité comprend un coulisseau supporté de façon mobile verticalement par ledit bâti et poussé normalement vers le bas dans ladite position basse par un premier ressort à compression, ledit coulisseau portant un poussoir pour appuyer sur un actionneur dudit interrupteur-limiteur pour fermer ledit interrupteur-limiteur, tandis que ledit coulisseau est disposé dans ladite position la plus basse.

2. Appareil selon la revendication 1, ledit élément de confirmation de sécurité comprenant un presseur de tissu définissant une cavité pour le passage dudit poinçon et ayant une surface terminale inférieure alignée horizontalement avec une extrémité inférieure dudit coulisseau, ledit presseur de tissu étant mobile verticalement avec ledit coulisseau pour serrer le tissu contre ladite matrice tandis que ledit coulisseau est dans ladite position la plus basse.

3. Appareil selon la revendication 2, ledit presseur de tissu ayant une section horizontale en forme générale de C avec une ouverture latérale verticale pour le passage d'un élément d'attache lorsque le tissu est tiré après que l'attache de vêtement a été fixée au tissu, ledit dispositif de sécurité comprenant en outre un couvercle pour fermer normalement ladite ouverture latérale verticale et pour ouvrir cette dernière lorsque ledit couvercle est poussé vers l'extérieur par l'élément d'attache alors que le tissu est tiré.

4. Appareil selon la revendication 3, ledit couvercle étant supporté de façon pivotante par ledit bâti et étant normalement poussé contre ledit presseur de tissu par un second ressort à compression.

5. Appareil selon la revendication 2, ledit presseur de tissu étant transparent au moins dans sa paroi avant.

6. Appareil selon la revendication 2, ledit presseur de tissu ayant une fente au moins dans sa paroi avant.

7. Appareil selon la revendication 2, ledit coulisseau et ledit presseur de tissu faisant partie intégrante l'un de l'autre, ledit presseur de tissu ayant une ouverture dans une partie inférieure de sa paroi latérale éloignée dudit coulisseau.