

(7)

- 1 -

APPARATUS FOR ATTACHING PAIRS OF FASTENER
ELEMENTS ONTO GARMENT FABRICS

This invention relates generally to an apparatus for attaching pairs of fastener elements such as snap fasteners, buttons, rivets or the like onto a garment fabric, and more particularly to improvements in and
5 relating to fastener clamping means forming part of such attaching apparatus.

The term fastener elements as used herein generally designates a pair of mating elements that are attached onto a garment or sheet-like material from
10 opposite sides thereof. Setting of these elements properly on the garment requires the two elements to be held accurately in alignment with each other with their respective postures unchanged until they contact and grip the garment.

15 There have been proposed a number of fastener attaching machines. A common problem associated with those conventional machines is however that such fastener elements which are relatively small in size and light in weight tend to be displaced during

attachment and become misplaced on the garment fabric. Another problem of the prior art is that it is difficult or otherwise tedious to release the fastener elements for removal from the clamping jaws holding the elements therebetween when testing the flow of a supply of fastener elements or when shutting down for machine failures.

According to the present invention, there is provided an apparatus for attaching a pair of fastener elements onto a garment fabric which comprises an upper die unit including a vertically reciprocative cylindrical plunger a lower die unit including a stationary anvil a punch mounted in and movable relative to said plunger along a vertical path of movement toward and away from said anvil for pressing one of the fastener elements in said upper die unit against the other mating element in said lower die unit an upper block integral with said plunger and provided with a first recess extending across said vertical path of the punch, a pair of clamping jaws received in said first recess and normally resiliently urged toward each other for releasably clamping therebetween one of the elements, and a lower block secured to said upper block and provided with a bore coaxially aligned with said cylindrical plunger, characterized in that said upper block includes a second recess extending at a right angle to and in communication with said first recess

(19)

- 3 -

for receiving therein a pusher, said pusher being resiliently received in said second recess and adapted to engage and spread said pair of clamping jaws apart, and that said lower block has a pair of grooves and a ridge defined therebetween for guidedly receiving said pair of clamping jaws.

It is believed possible by means of the present invention to provide a fastener attaching apparatus incorporating means for ensuring proper positioning of a fastener element against displacement until it is applied to a garment.

It is also believed possible by means of the present invention to provide a fastener attaching apparatus incorporating means for facilitating removal of the fastener element from the apparatus when desired for testing the flow of a supply of elements, or for inspection of the parts during shut-down of the apparatus.

The invention will be described by way of example with reference to the accompanying drawings, in which like numerals refer to like or corresponding parts, and in which:-

Figure 1 is a front elevation of an apparatus constructed in accordance with the invention;

Figure 2 is an exploded perspective view of an upper unit of the apparatus;

Figure 3 is a perspective view on enlarged scale

of a clamping jaw forming part of the apparatus;

Figure 4 is a plan view of the upper unit of Figure 2;

Figure 5 is a cross-sectional view taken along
5 the lines V - V of Figure 4;

Figure 6 is a cross-sectional view taken along the lines VI - VI of Figure 4;

Figure 7 is a cross-sectional view taken along the lines VII - VII of Figure 5;

10 Figure 8 is a view similar to Figure 7 but illustrating the behavior of movable parts; and

Figures 9a, 9b and 9c inclusive are elevational, partially sectional views utilized to explain the operation of the apparatus.

15 Referring now to the drawings and Figure 1 in particular, there is shown a fastener attaching apparatus generally designated at 10 which comprises a cooperative pair of upper and lower die units 11 and 12 mounted in a housing (not shown) in vertically opposite
20 relation to each other. As shown in Figure 9a, the upper die unit 11 includes a support block 13 having a cylindrical bore 14 and a ram 15 reciprocable therein. The ram 15 has a reduced diameter portion 16 defining with the inner peripheral wall 17 of the support block
25 13 an annular clearance 18 for receiving a plunger 19 later described. A punch 20 is secured by a pin 21 to and extends coaxially from the reduced portion 16 of

the ram 15.

The plunger 19 has a cylindrical member 22 coaxially mounted in the block 13 between the inner periphery 17 and the reduced portion 16 and having a bore 23 for accommodating therein the punch 20 as better shown in Figure 9.

The plunger 19 also includes a pair of upper and lower square blocks or holders 24 and 25 for holding therein one of mating fastener elements, e.g. a tack T as in the illustrated embodiment, the upper block 24 being integral with the cylindrical member 22.

Turning to Figure 2 which shows the various parts of the plunger 19, the upper block 24 has a first recess 26 formed throughout in its bottom and extending diametrically across the cylinder bore 14 (Figure 9a) for receiving a pair of clamping jaws 27, 28, later described, from opposite sides of the block 24. There is formed a second recess 29 in the upper block 24, which recess 29 extends at right angles to and in communication with the first recess 26 for receiving a pusher 30 later described. The second recess 29 provides bifurcated end portions 31, 32 having a pair of aligned transverse grooves 31a, 32a, for receiving a wire spring 33.

The pair of clamping jaws 27, 28 are inserted in the first recess 26 of the upper block 24 from opposite sides thereof and normally urged inwardly toward each

other by the wire spring 33 having both of its ends 33a, 33b U-turned to be anchored in blind holes 27a, 28a of the respective clamping jaws 27, 28.

Conveniently, the wire spring 33 may be detached to
5 release and remove the clamping jaws 27, 28 so as to permit servicing of the interior of the upper die unit 11.

The lower block 25 has a central bore 34 communicating coaxially in alignment with the bore 23
10 of the cylindrical member 22 for accommodating the tack T until the latter is brought by the punch 20 into engagement with its mating grommet G.

The lower block 25 has alternate grooves 35, 36, 37 and ridges 38, 39, of which grooves 35, 36 and ridge
15 38 are each bifurcated by but aligned across the bore 34. The outermost groove 37 in the lower block 25 is adapted to engage with projections 31b and 32b extending downwardly from the upper block 24 for positioning one block relative to the other when
20 coupling the two blocks 24, 25 together by set screws 40 at the positions schematically shown in Figure 2.

The pusher 30, which is generally inverted-L shaped, consists of a vertical plate member 30a and a horizontal plate member 30b. The vertical member 30a
25 has an aperture 30c for receiving one end of a support pin 41, the other end of which is received in a blind hole 42 formed in an end wall of the lower block 25.

adjacent to the outermost groove 37. The support pin 41 is inserted through a compression coil spring 43 and retained at the other end in the aperture 30c by means of an E-ring 44. The horizontal member 30b has a tapered end 30d engageable with oppositely disposed clamping jaws 27, 28 for purposes to be hereafter described.

Referring now to Figure 3 which shows the reverse side of the clamping jaw 27, (28), each clamping jaw has an arcuate inner end 27b with a peripheral guide groove 27c for guidedly receiving the peripheral flange portion of the tack T, and a longitudinal recess 27d for sliding engagement with the ridge 38 of the lower block 25. On opposite sides of the longitudinal recess 27d and at an end opposite to the arcuate end 27b are identical downward projections 27e which serve to limit movement of the clamping jaw 27 toward the bore 34 of the lower block 25.

For mounting the tack T in place in the upper die unit 11, there are provided a through opening 45 (Figures 4 and 6) in the upper block 24 opposite to the second recess 29, which opening 45 guidedly receives the flange part of the tack T therethrough into the path of the punch 20 along the bore 23 of the plunger 19, and an opening 46 in the lower block 25 communicating with the opening 45 and merging with the bore 34 for freely receiving the pin part of the tack

- 8 -

T. To permit entry of the tack T, the clamping jaw 27, (28) has a tapered corner 27f.

Referring to Figures 9a - 9c, there is shown a lower die unit 12 which may be of any conventional form and construction for cooperating with the upper die unit 11 in clamping and attaching the fastener elements onto a garment fabric C. The lower die unit 12 includes a base 47 and a cylinder-type stationary anvil 48 fixedly mounted therein. A pair of support blocks 49, 50 movable relative to the anvil 48 are movably supported on a compression coil spring 51 secured to the base 47 and disposed in surrounding relation to the anvil 48. A sleeve 52 is slidably mounted on the anvil 48 and secured to the support blocks 49, 50.

A pair of clamping jaws 53 are pivotally connected by pins 54 via torsion springs 55 to the sleeve 52. The clamping jaws 53 are normally biased by the spring 55 toward each other to hold the grommet part G of the fastener against the top surface of the anvil 48 as shown in Figure 9a. As the lower die unit 12 does not form any positive part of the invention, no further description of the details of this unit construction will not be required. Figure 9b illustrates the first sequence of operation of the apparatus 10 in which the plunger 19 of the upper die unit 11 descends with the lower block 25 held in abutting engagement with the top surfaces of the

support blocks 49, 50 of the lower die unit across the garment fabric C. Figure 9c illustrates the second sequence of operation in which the punch 20 strikes and urges the tack T across the fabric C into clamping engagement with the grommet G, when the plunger 19 is also allowed to descend by a distance required to move the clamping jaws 53 pivotally apart thereby releasing the grommet G.

Turning back to the construction of the upper die unit 11 as shown in Figures 2 - 8, it is to be noted that when the tack T is mounted in position with its flange seated snugly in the peripheral guide grooves 27c of the clamping jaws 27, 28, the ridge 38 of the lower block 25 has an inner end wall 38' normally extending into the region of the guide groove 27c. This ensures that as the clamping jaws 27, 28 move apart in response to the pressure applied by the punch 20, the flange of the tack T is peripherally captured by the ridge 38, more precisely, by its end wall 38' so as to eliminate the possibility of the tack T becoming displaced as a result of departure from the clamping jaws 27, 28. The tack T is thus precisely targetted toward the mating grommet G.

While on reference to the same views of the drawings, there is another feature of the invention which resides in the provision of the pusher 30 which is adapted to engage and spread the opposed clamping

- 10 -

jaws 27, 28 apart to release the tack T that has been trapped in the upper die unit 11 in the event of failure of the apparatus.

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- 11 -

Claims:-

1. An apparatus for attaching a pair of fastener elements onto a garment fabric which comprises:

(a) an upper die unit including a vertically
5 reciprocative cylindrical plunger;

(b) a lower die unit including a stationary anvil;

(c) a punch mounted in and movable relative to said
plunger along a vertical path of movement toward and away
from said anvil for pressing one of the fastener elements
10 in said upper die unit against the other mating element in
said lower die unit;

(d) an upper block integral with said plunger and
provided with a first recess extending across said vertical
path of the punch and a second recess extending at a right
15 angle to and in communication with said first recess;

(e) a pair of clamping jaws received in said first
recess and normally resiliently urged toward each other for
releasably clamping therebetween one of the elements;

(f) a pusher resiliently received in said second
20 recess and adapted to engage and spread said pair of
clamping jaws apart; and

(g) a lower block secured to said upper block and
provided with a bore coaxially aligned with said
cylindrical plunger and with a pair of grooves and a ridge
25 defined between said groove for guidedly receiving said
pair of clamping jaws.

2. An apparatus according to claim 1 wherein each



of said clamping jaws is provided with an arcuate inner and with a peripheral guide groove formed therein for guidedly receiving one of said fastener elements and a longitudinal recess for sliding engagement with said ridge of said lower block, said ridge having an inner end wall normally extending into the region of said peripheral guide groove.

3. An apparatus according to claim 1 or 2 wherein said lower block includes a further groove extending parallel to said pairs of grooves and said upper block is provided with downwardly extending projections for engagement with said further groove in said lower block.

4. An apparatus according to claim 1, 2 or 3 wherein said pusher is generally inverted-L shaped, having a vertical plate member and a horizontal plate member, said horizontal member having a tapered and engageable with said clamping jaws to spread the latter apart.

5. An apparatus according to any one of claims 1 to 4 wherein said clamping jaws are held in position externally by a wire spring which is manually removable.

6. An apparatus substantially as described with reference to and as illustrated in the accompanying drawings.
