

PATENT SPECIFICATION

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(54) APPARATUS FOR DISPENSING FASTENERS

(71) We, DENNISON MANUFACTURING COMPANY, a Corporation organised under the Laws of the State of Nevada, United States of America, of 300 Howard Street, Framingham, Massachusetts 01701, United States of America, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to apparatus for dispensing fasteners.

The apparatus is useful for anchoring tags to clothing, connecting layers of material together, and fastening buttons to clothing.

According to the present invention, apparatus for dispensing fastener attachment members one at a time includes a body; a hollow needle which has an elongate slot along one side, is supported by the body and extends therefrom; an ejector supported by the body for driving a head of a fastener attachment member through the needle with a filament of the fastener attachment member coupled to the head projecting through the slot; a slide to which the ejector is coupled for movement therewith, the slide having a plurality of holes therethrough from the bottom surface to the top surface, each hole being such that the walls of the slide surrounding the holes are adapted to receive gear teeth; and drive means for moving the slide back and forth, the drive means including gear means having gear teeth positionable in the holes of the slide. Because the holes extend right through the slide, any foreign matter which enters the holes can easily be pushed out again by the gear teeth of the gear means.

In a preferred arrangement, the drive means comprises a handle pivotally coupled to the body and the gear means comprises gear segment means pivotally coupled to

the body and to the handle, and the apparatus includes return means supported by the body and pivotally coupled to the gear segment means, and resilient biasing means supported by the body and coupled to the return means for urging the gear segment means in one direction.

The apparatus may also include indexing means arranged to position fastener attachment members one at a time to be ejected through the needle. The indexing means may include a toothed wheel and a pawl arranged to index the toothed wheel. Thus, when the apparatus is used with fastener attachment members which are connected by necks to an elongate carrier with a single carrier carrying a plurality of fastener attachment members, the toothed wheel may mesh with the necks. The body may be provided with guide means for guiding fastener attachment members carried by a carrier into position at the rear of the needle.

The indexing means may include a link, and the slide may include a projection for moving the link backwards and forwards. The link preferably includes a cutout having stops on either end, and the projection extends into the cutout and is adapted to move the link back and forth by engaging the stops to operate the indexing means. The apparatus may also include means for moving the link to such a position that the pawl is disengaged from the toothed wheel. This arrangement allows a carrier to be removed from the apparatus even though some of the fastener attachment members carried by the carrier have not been used.

The invention may be carried into practice in various ways but one embodiment and several modifications will now be described by way of example with reference to the accompanying drawings, of which:—

Figure 1 is a side view of the apparatus;

Figure 2 is a view of the opposite side

of the apparatus of Figure 1;

Figure 3 is a top plan view of a portion of the apparatus;

Figure 4 is a side view of the apparatus with parts broken away and removed to show the operating mechanism of the apparatus;

Figure 5 is a section on the line 5-5 of Figure 4;

Figure 6 is a section on the line 6-6 of Figure 4;

Figure 7 is a section on the line 7-7 of Figure 4;

Figure 8 is a plan view of a slide for use with the apparatus of Figures 1 to 7;

Figure 9 is a side view of the slide of Figure 8;

Figure 10 is a section on the line 10-10 of Figure 9;

Figure 11 is a side view of a link for use with the apparatus of Figures 1 to 7;

Figure 12 is a plan view of the link of Figure 11;

Figure 13 is a section on the line 13-13 of Figure 4;

Figure 14 is a section on the line 14-14 of Figure 4;

Figure 15 is an enlarged side view of an indexing mechanism for use with the apparatus of Figures 1 to 7;

Figure 16 is a side view of a feed pawl shown in Figure 15;

Figure 17 is a view of a plate carrying a detent shown in Figure 15;

Figure 18 is a section on the line 18-18 of Figure 15;

Figure 19 is a section on the line 19-19 of Figure 15;

Figures 20-22 illustrate successive stages in the operation of the feed mechanism;

Figure 23 is a front view of a part of the operating mechanism shown in Figure 4;

Figure 24 is a section on the line 24-24 of Figure 23;

Figure 25 is a back view of the part shown in Figure 23;

Figure 26 is a front view of a fastener attachment member supported by a carrier;

Figure 27 is a side view of a number of fastener attachment members supported by a carrier;

Figures 28-32 illustrate in side view, top view and bottom view with parts broken away, and end view respectively of a needle suitable for use with the apparatus of Figures 1 to 7;

Figure 33 shows another needle for use with the apparatus of Figures 1 to 7;

Figure 34 is a front view taken from the left and looking towards the right of Figure 21;

Figures 35 and 36 illustrate in top and side views one form of pawl for use with the apparatus of Figures 1 to 7;

Figure 37 shows a link for use with the

apparatus of Figures 1 to 7; and

Figures 38 and 39 illustrate in front and side views another form of link.

Figures 26 and 27 show fastener attachment members 30 which may be dispensed by the apparatus described herein. Each attachment member includes a filament 31 and heads 32 and 33. A carrier 34 has connecting necks 35 for coupling the attachment members 30 to the carrier. When the attachment members 30 are dispensed through a needle to be described herein they are separated from the carrier by cutting the connecting necks as will be disclosed hereafter.

Reference should now be made to Figures 1 to 33 for a brief description of the apparatus. The apparatus is shown at 38 and comprises an outer casing or body 40 having two halves 41a and 41b and a handle 42 pivotally coupled thereto by a coupling member 43. The body includes a nose portion 40a in which is formed guide portions 40b, 40c and 40d for receiving respectively a carrier 34, the necks 35 by which a number of fastener attachment members are connected to the carrier, and the heads 32 of the fastener attachment members. The guide guides the fastener attachment members, together with the carrier and the necks into the apparatus and then guides the carrier and the necks out of the apparatus after the fastener attachment members have been dispensed.

In the nose 40a, there is mounted a hollow needle 45 having an elongate slot 45a along one side. Thus the head 32 of a fastener attachment member can pass through the bore of the needle 45 while the filament 31 between the heads 32 and 33 projects sideways through the slot 45a. The needle includes a rear cutting edge 45b for cutting the necks 35 and a second slot 45c for permitting the head 32 of the fastener attachment members to be fed into the bore of the needle.

The construction of the needle for use in the apparatus is more fully shown in Figures 28 to 33 and will be described hereinafter.

The needle 45 is locked in place in the nose 40a by a locking pin 46 (Figure 4) which includes a handle 46a (Figure 1) and a slot (not shown) to permit a needle mounting portion 45f to be inserted into a bore 47 provided in the nose 40a.

In order to force or feed fastener attachment members into the needle bore, the handle 42 is pivotally connected to a member 48 which is connected to gear means comprising a pair of gear segments 49 and 50, each having gear teeth 49a and 50a. The member 48 is pivotally connected at 51 to the gear segments as shown in Figure 6. The gear segments 49 and 50 are in turn pivotally coupled to the body 40

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of the apparatus as also shown more particularly in Figure 6. A slide 60 (see in particular Figures 4, 6, 7 and 8 to 10) is provided which is arranged to slide back and forth in guide slots 60g and 60h formed in the body halves 41a and 41b respectively.

The slide 60 has formed therein a plurality of holes 60a (Figure 8) which extend from a bottom surface 60b to a top surface 60c and are formed in two rows as shown to receive the gear teeth 49a and 50a of the gear segments. In this manner lint or other foreign matter is prevented from clogging the combined operation of the slide and gear segments since the lint will be pushed out of the holes 60a by the gear teeth. As the gear segments pivot back and forth the slide 60 moves forwards and backwards.

The slide 60 also includes a hole 60d and a cavity 60e which are constructed to receive an ejector or plunger 61 having a joggled end 61a (see Figure 4). The ejector end 61a is supported by the slide for movement therewith to permit the ejector to move back and forth to expel fastener attachment members through the needle.

The ejector 61 is supported at its forward end by a guide member 62 (Figure 4 and Figure 13) and a separator or cover plate 90 held between the body halves (Figures 13, 14 and 17).

The rotation of the handle 42 causes the gear segments (Figure 4) to rotate counter-clockwise to move the ejector forward in a timed manner to force the head 32 of a fastener attachment member 30 through the needle to dispense it. As the ejector moves forward it causes the neck 35 to be severed by the rear cutting edge 45b of the needle. In order to return the ejector for the next sequence of operations to expel the next one of a plurality of fastener attachment members, there is provided a resilient return means 70 comprising a cavity 71 formed in the body to accommodate the movement of a telescoping member 72. The telescoping member 72 is pivotally connected to the gear segments 49 and 50 at 73 (Figures 4 and 6) to rotate the cam segments clockwise by the action of resilient biasing means such as a spring 74 positioned in the cavity 71. Thus after the handle 42 is rotated or moved towards the body and then released, the return means will cause the handle to move away from the body to the extended position shown in Figure 4.

The apparatus also includes an indexing mechanism 80 for positioning fastener attachment members one at a time at the rear of the needle in order to be dispensed by the ejector. The indexing mechanism 80 comprises an indexing wheel or indexing gear 81 supported for rotation by a shaft 82 coupled thereto which in turn is sup-

ported by a bore 83 in the body (Figures 4, 14 and 15).

The indexing gear is positioned in a space between the cover 90 and a shelf 41c (Figures 14 and 15) provided in body half 41b. Clearance exists between the gear 81 and the cover 90 and shelf 41c so that the gear can rotate freely.

The gear 81 has a plurality of teeth 81a mounted on the circumference thereof and which are adapted to engage the necks 35 to move the carrier 34 and the fastener attachment members through the apparatus.

The indexing gear is rotated counter-clockwise as shown in Figures 4 and 15 by the provision of a pawl 84 which is constructed with a slotted pivot hole 84a supported by the shaft 82 coupled to the indexing gear 81. The pawl 84 is adapted to rock back and forth over the shaft 82 as the result of the movement of a link 85 to which the pawl is pivotally connected at 86. The pawl includes a pusher in the form of a hook-like end 84b having a pointed tip 84c to engage one tooth of the indexing gear at a time in order to rotate it (Figures 4 and 16).

The end 84b is bent at 84d so that a portion 84e of the pawl will lie against the cover 90 (Figure 18) thus providing a space between the pawl and the gear to provide free movement of the slotted portion of the pawl so the pawl is rocked back and forth. The tip 84c of the pawl also extends above the teeth 81a as shown in Figure 15. The pawl thus has a portion that is in a parallel plane with the gear and has another portion which lies within the plane of the wheel. The pawl is held in place by a resiliently biased member 87 which is positioned within a cavity 88 and urged towards the pawl by a resilient biasing means in the form of a spring 89 (Figure 14).

The member 87 urges the pawl 84 against the cover 90 to frictionally hold the portion 84e against the cover (Figure 18) as the pawl is rocked back and forth on the shaft. The pawl 84 will therefor tend to pivot about the region of the tip 84c, if possible, rather than about any other point. If the hole 84a were arranged along part of a circle centred at the tip 84c, such a pivoting motion would be possible, but in fact the hole 84a has upper and lower walls 84aa which make an acute angle α with a line extending from the tip 84c through the hole 84a. Thus whenever the pawl is rocked so that the hole 84a moves on the shaft 82, this rocking movement will be accompanied by a radial movement of the tip 84c; this radial movement will bring the pawl into engagement with the indexing wheel 81 when the link 85 moves to the right in Figure 4, and will move the pawl away from the wheel when the link 85 moves to the

left.

In order to prevent the gear 81 from rotating in a reverse direction as the pawl is rocked back and forth for indexing the wheel, the cover plate 90 is provided with a resilient member 91 extending therefrom which has a projection or detent 91a.

The detent 91a is adapted to be positioned in a space 92 between the teeth 81a (Figure 19) to prevent the wheel from rotating. The detent 91a is adapted to slide over the side of the teeth 81a when sufficient force is applied to rotate the wheel, as, for example, by the action of the pawl 84. Thus the detent 91a acts as a stop which can be overridden by the forcible movement of the gear 81. The provision of the detent also provides positive control of the carrier for the fastener attachment members.

The drive means for rocking the pawl back and forth comprises the link 85 which is mounted on the body 40 and is supported for slidable movement (Figures 7, 11, 12 and 20 to 22). The link 85 includes a cutout having stop means 85a and 85b at opposite ends of the cutout. The stop means are adapted to engage a projection 60f extending downwardly from the slide 60 (Figures 8, 9 and 20 to 22). Thus as the slide 60 moves back and forth, the link 85 will be moved therewith to cause the link to slide back and forth to rock the pawl back and forth to index the indexing gear. The link 85 is supported at its rearward end by a member 95 positioned in a cavity 96 (Figures 4 and 7) formed in the body and which is resiliently biased against the link 85 by a spring 97. The upward movement of the link 85 is restricted by a projection 98 extending from the body (Figures 4 and 7), and the sideways movement of the link 85 in one direction is restricted by a pin 99 coupled to the body (Figure 7). The projection 98 may also act as a rear stop for stop means 85b if desired (Figure 37 shows the preferred construction and relationship between members 85b and 98).

The link 85 also includes a projection 85c extending sideways as shown in Figures 11 and 12. The projection is coupled to a release control member 100 (Figures 23-25, and Figure 1) having a recess 100a into which the projection 85c extends and is held thereby. The member 100 includes a finger projection 100b which extends through a window 101 formed in the body (Figure 1).

The projection 100b can be manually moved downwards and sideways. This will cause the link 85 to move to the position shown in Figure 22 to pull the pawl 84 away from the teeth of the indexing gear 81 and thus permit a carrier 34 with fastener attachment members coupled thereto to be pulled out therefrom by rotating the gear 81

while overriding the action of the detent 91a.

The arrangement of the indexing mechanism forms the subject of Application No. 36125/72 (Serial No. 1401501), from which this application has been divided.

Briefly, the operation of the apparatus is as follows: fastener attachment members and a carrier therefor are fed into the apparatus by inserting the carrier with the fastener attachment members coupled thereto through guides in the nose; the handle 42 is then closed to move the link to the left as shown in Figure 20 to cause the ejector 61 to force a fastener attachment head through the needle while at the same time causing the neck to be severed by the cutting edge 45b; the movement of the link to the left also rocks the pawl 84 to the right as shown in Figure 20; when the handle 42 is released, the resiliently biased member 72 moves towards the right to cause the slide 60 to move rearwards thus moving the link 85 to the right; this also causes the ejector to be retracted from the needle and causes the pawl 84 to be rocked forward to rotate the indexing gear counter-clockwise to move the next fastener attachment member into a position to be dispensed from the needle.

In Figures 28-31 there is shown the preferred construction of the needle 45 shown in Figure 1. The needle comprises two parts which are mechanically locked together, one part being shown at 45e and a mounting portion being shown at 45f. The mounting portion is constructed of a hard or rigid plastics while the part 45e is constructed of metal. The needle includes the slot 45a, the rear cutting edge 45b, and the second slot 45c as described above. The rear cutting edge is shaped as a "V" with the bottom of the "V" having a small radius of curvature to facilitate cutting of materials such as polyurethane.

In Figure 33 there is shown a slightly different needle construction. This needle is made from one piece of metal and has the slots and cutting edge as described above. Such needles are also described in Patent Application No. 30792/72 (Serial No. 1393954).

Figures 34-36 illustrate the construction of the pawl 84. The pawl 84 in the construction shown includes a retainer or projection 84e which extends beyond the tip 84c. The retainer or projection 84e is provided to ensure that the pawl 84 does not slip out of contact with the member 87 when it is drawn back when the projection 85c is depressed.

Figure 37 illustrates the preferred construction of the link 85, and shows the stop means 85b in its at rest condition illustrated

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in Figure 4. In this Figure the stop means 85b is shortened so that it does not engage the projection 98 in any condition and thus the projection 98 will not act as a stop.

- 5 In Figures 38 and 39 there is illustrated the preferred construction of the link 85 which has a finger or member 85e formed or bent therefrom and which is positioned within a second hole 84f provided in the
- 10 pawl 84. In this manner the pawl is rocked back and forth with the link 85.

WHAT WE CLAIM IS:—

1. Apparatus for dispensing fastener attachment members one at a time, the
- 15 apparatus including: a body; a hollow needle which has an elongate slot along one side, is supported by the body and extends therefrom; an ejector supported by the body for driving a head of a fastener
- 20 attachment member through the needle with a filament of the fastener attachment member coupled to the head projecting through the slot; a slide to which the ejector is coupled for movement therewith, the slide
- 25 having a plurality of holes therethrough from the bottom surface to the top surface, each hole being such that the walls of the slide surrounding the holes are adapted to receive gear teeth; and drive means for
- 30 moving the slide back and forth, the drive means including gear means having gear teeth positionable in the holes of the slide.
2. Apparatus as claimed in Claim 1 in which the drive means comprises a handle
- 35 pivotally coupled to the body, and in which the gear means comprises gear segment means pivotally coupled to the body and to the handle, and which includes return
- 40 means supported by the body and pivotally coupled to the gear segment means, and resilient biasing means supported by the body and coupled to the return means for urging the gear segment means in one direc-
- 45 3. Apparatus as claimed in Claim 2 in which the gear segment means comprises two gear segments each having gear teeth and in which the slide includes two rows of holes, each row of holes constructed to
- 50 receive the gear teeth of one of the segments.
4. Apparatus as claimed in Claim 1 or Claim 2 or Claim 3 in which the ejector
- 55 includes a joggled portion which extends through a hole in the slide from the bottom thereof and in which a part of the joggled

portion fits in a groove provided in the top surface of the slide.

5. Apparatus as claimed in any of the preceding claims including indexing means 60 arranged to position fastener attachment members one at a time to be ejected through the needle.

6. Apparatus as claimed in Claim 5 in which the indexing means includes a 65 toothed wheel and a pawl arranged to index the toothed wheel.

7. Apparatus as claimed in Claim 5 or Claim 6 in which the indexing means includes a link, and in which the slide includes 70 a projection for moving the link backwards and forwards.

8. Apparatus as claimed in Claim 6 and Claim 7 in which the link is coupled to the 75 pawl.

9. Apparatus as claimed in Claim 8 which includes means for moving the link to such a position that the pawl is disengaged from the toothed wheel.

10. Apparatus as claimed in Claim 7 80 or Claim 8 or Claim 9 in which the link includes a cutout having stops on either end, and in which the projection extends into the cutout and is adapted to move the link back and forth by engaging the stops to 85 operate the indexing means.

11. Apparatus as claimed in any of Claims 7 to 10 including means for resiliently urging the link in one direction.

12. Apparatus as claimed in any of the 90 preceding claims in which the body is provided with guide means for guiding fastener attachment members carried by a carrier into position at the rear of the needle.

13. Apparatus as claimed in any of the 95 preceding claims in which the needle has a cutting edge at the rear and a second slot in the rear thereof for permitting the entry of the head end of the fastener attachment member. 100

14. Apparatus for dispensing fastener attachment members substantially as described herein with reference to Figures 1 to 32, 34 to 37 or Figures 1 to 27, 33 to 37 of the accompanying drawings. 105

15. Apparatus as claimed in Claim 14 modified as described herein with reference to Figures 38 and 39 of the accompanying drawings.

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in Figure 4. In this Figure the stop means 85b is shortened so that it does not engage the projection 98 in any condition and thus the projection 98 will not act as a stop.

- 5 In Figures 38 and 39 there is illustrated the preferred construction of the link 85 which has a finger or member 85e formed or bent therefrom and which is positioned within a second hole 84f provided in the
10 pawl 84. In this manner the pawl is rocked back and forth with the link 85.

WHAT WE CLAIM IS:—

1. Apparatus for dispensing fastener attachment members one at a time, the
15 apparatus including: a body; a hollow needle which has an elongate slot along one side, is supported by the body and extends therefrom; an ejector supported by the body for driving a head of a fastener attachment member through the needle with
20 a filament of the fastener attachment member coupled to the head projecting through the slot; a slide to which the ejector is coupled for movement therewith, the slide
25 having a plurality of holes therethrough from the bottom surface to the top surface, each hole being such that the walls of the slide surrounding the holes are adapted to receive gear teeth; and drive means for
30 moving the slide back and forth, the drive means including gear means having gear teeth positionable in the holes of the slide.

2. Apparatus as claimed in Claim 1 in which the drive means comprises a handle
35 pivotally coupled to the body, and in which the gear means comprises gear segment means pivotally coupled to the body and to the handle, and which includes return means supported by the body and pivotally
40 coupled to the gear segment means, and resilient biasing means supported by the body and coupled to the return means for urging the gear segment means in one direction.

- 45 3. Apparatus as claimed in Claim 2 in which the gear segment means comprises two gear segments each having gear teeth and in which the slide includes two rows of holes, each row of holes constructed to
50 receive the gear teeth of one of the segments.

4. Apparatus as claimed in Claim 1 or Claim 2 or Claim 3 in which the ejector includes a joggled portion which extends
55 through a hole in the slide from the bottom thereof and in which a part of the joggled

portion fits in a groove provided in the top surface of the slide.

5. Apparatus as claimed in any of the preceding claims including indexing means
60 arranged to position fastener attachment members one at a time to be ejected through the needle.

6. Apparatus as claimed in Claim 5 in which the indexing means includes a
65 toothed wheel and a pawl arranged to index the toothed wheel.

7. Apparatus as claimed in Claim 5 or Claim 6 in which the indexing means includes a link, and in which the slide includes
70 a projection for moving the link backwards and forwards.

8. Apparatus as claimed in Claim 6 and Claim 7 in which the link is coupled to the
75 pawl.

9. Apparatus as claimed in Claim 8 which includes means for moving the link to such a position that the pawl is disengaged from the toothed wheel.

10. Apparatus as claimed in Claim 7
80 or Claim 8 or Claim 9 in which the link includes a cutout having stops on either end, and in which the projection extends into the cutout and is adapted to move the link back and forth by engaging the stops to
85 operate the indexing means.

11. Apparatus as claimed in any of Claims 7 to 10 including means for resiliently urging the link in one direction.

12. Apparatus as claimed in any of the
90 preceding claims in which the body is provided with guide means for guiding fastener attachment members carried by a carrier into position at the rear of the needle.

13. Apparatus as claimed in any of the
95 preceding claims in which the needle has a cutting edge at the rear and a second slot in the rear thereof for permitting the entry of the head end of the fastener attachment member.

14. Apparatus for dispensing fastener attachment members substantially as described herein with reference to Figures
105 1 to 32, 34 to 37 or Figures 1 to 27, 33 to 37 of the accompanying drawings.

15. Apparatus as claimed in Claim 14 modified as described herein with reference to Figures 38 and 39 of the accompanying drawings.

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