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- (21) Application No. 25769/78
- (22) Filed 31 May 1978
- (61) Patent of addition to No. 1 474 241 dated 4 April 1974
- (31) Convention Application No. 812 875
- (32) Filed 5 July 1977 in
- (33) United States of America (US)
- (44) Complete Specification published 16 Dec. 1981
- (51) INT. CL.³ F16B 1/00
- (52) Index at acceptance E2A CXX



(54) IMPROVEMENTS IN AND RELATING TO FLEXIBLE FASTENER ATTACHMENTS

(71) We, DENNISON MANUFACTURING CO. LIMITED, a Company registered under the laws of England, of Colonial Way, Watford, Hertfordshire, 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:—

10 This invention relates to flexible fasteners, otherwise referred to as fastener attachments. The invention is an improvement in or a modification of the invention the subject of Patent No. 1 474 241 which

15 claims separable fastener stock for providing individual fasteners, the stock being made of plastics material and comprising two spaced continuous elongated side members that are joined by at least twelve evenly

20 spaced cross links, each cross link forming a flexible filament. The Complete Specification of this Patent will be referred to herein as the parent specification.

25 According to a first aspect of the present invention, separable fastener stock for providing individual fasteners is made of plastics material and comprises two spaced continuous side members that are joined by a plurality of evenly spaced cross links each

30 forming a flexible filament, each side member having between each pair of junctions with a cross link a portion of reduced cross-section. Preferably, each reduced portion has a cross-section less in area than that

35 of each cross link.

40 According to a second aspect of the present invention, fastener attachment stock comprises two continuous and elongated plastics side members that have cross coupling links; the stock being proportioned to be fed as a unit to a position where individual fasteners are separated therefrom within a machine; one of the side members being proportioned so that each separated fastener includes a bar formed from a portion

45 of the side member and is configured for feeding through the bore of a slotted hollow needle; the other of the side members being proportioned so that each separated fastener includes a head member formed from

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a portion of the side member; adjacent head members being joined by a connecting filament which is narrower than said head members and adjacent cross bars being joined by a connecting filament portion

55 which is narrower than said cross bars; and each cross link being foldable towards the associated end bar that is feedable through said hollow needle.

60 According to a third aspect of the present invention, a method of providing individual fasteners comprises providing fastener stock according to either the first aspect or the second aspect of the present invention and separating individual fasteners from the fastener stock by severing at the connecting

65 portions of both side members.

The invention may be carried into practice in various ways but separable fastener stock embodying the invention and its

70 method of manufacture will now be described by way of example with reference to the accompanying drawings, in which:

Figure 1 is a plan view of a length of a first form of continuous fastener stock;

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Figure 2 is a front view of an individual fastener formed from the stock of Figure 1;

Figures 3 and 4 are sectional views of the fastener of Figure 2 taken along lines 3-3 and 4-4;

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Figure 5 is a plan view of a length of another form of continuous fastener stock;

Figure 6 is a front view of an individual fastener formed from the stock of Figure 5;

Figures 7, 8 and 9 are sectional views of the fastener of Figure 6 taken along lines 7-7, 8-8 and 9-9;

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Figure 10 is a side view showing stock in accordance with the invention confined between two parallel planes;

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Figures 11 and 12 are diagrams illustrating alternative ways of storing continuous attachment stock in a canister;

Figures 13 and 14 illustrate a method of forming stock according to the invention;

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Figures 15 to 17 illustrate another method of forming stock according to the invention and then stretching it to strengthen its cross links; and

Figure 18 illustrates joiner of short 100

lengths of stock to form overall lengths.

Turning to the drawings, one type of fastener stock in accordance with the invention is illustrated in Figure 1. The stock 59 is formed by two elongated and continuously connected side members 60A and 60B, which are cross-coupled by plastics links or filaments 60C. The side member 60A is in the form of successively connected cross bars 61A which are joined to one another at approximately the central axis of the continuous side member 60A. The desired connection between adjoined cross bars is formed by opposite incisions on the member 60A to produce in effect a thin filamentary extension between the adjoined cross bars. The side members 60A form cross bars as stated and their cross-section thus has dimensions in two directions at right angles which are approximately equal. The side members 60B by contrast form paddles or tabs 61B and their cross-section thus has a height dimension which is substantially greater than the thickness dimension (see Figure 3). There is a filamentary extension between adjacent paddles in the same manner as between adjacent cross bars.

Although the paddles shown in Figures 1 to 3 are square or rectangular in front view as seen, for example, in Figure 2, it will be appreciated that they may have other shapes, such as semicircular, circular or triangular, so that the area of the paddle in front view (Figure 2) is substantially greater than its area in cross-section in planes containing the cross link (Figure 3).

The stock 59 is of a plastics material. The plastics material is flexible at least in part and is also sufficiently stiff in at least a portion thereof so that a portion thereof may easily be pushed through a needle slot.

The plastics material forming the side members should be easily separated or divided by, for example, rupturing, severing or cutting to provide a plurality of fastener attachment devices but not so easily separable into a plurality of attachment devices that it separates upon being fed into a dispensing apparatus and thus causes jamming of the apparatus.

As used herein and for convenience it is intended that the term plastics be given its broadest meaning as defining any flexible plastics or flexible polymer such as elastomeric materials, thermoplastics and flexible thermosetting resins which those skilled in the art will recognise as useful for the purpose disclosed herein.

Materials which may be used herein include conventional plastics such as nylon, polyurethane, polyethylene, polypropylene and polyvinyl chloride. Other plastics suitable for this purpose will be apparent to those skilled in the art. It should be understood that combinations of plastics materials

may be used as the stock.

In its preferred construction the two side members are parallel to each other and the cross links are parallel to each other. In addition, the cross links are spaced an equidistance "d" apart so they may easily be fed into a fastener attaching apparatus in a preset sequence necessary for the regular timed operation of most machines.

As shown in Figure 1 the side members extend beyond the first cross link 60C so that the first separation of a fastener attachment device shown in Figures 2 to 4 will from the beginning be useful for its intended purpose.

The cross links or the side members of the stock may also be stretched as described in Patents Nos. 1 145 455 and 1 162 928 to strengthen plastics materials such as nylon.

The stock 59 may be fabricated by punching or forming apertures 60D in an extruded sheet of plastics as will be seen later with reference to Figures 13 and 14.

In Figures 2 to 4 there is shown an individual fastener resulting from the separation of one device from the stock, e.g. by cutting the side members 60A and 60B between the first and second cross links at a^1 and a^2 in Figure 1.

The resulting fastener attachment device 61 comprises an end bar 61A and a paddle 61B of the same length coupled together by a filament member 61C. In this configuration the cross-section of the end bar is rectangular as is the cross-section of the filament member.

The filament member (as well as the cross link) has a thickness T^2 which is smaller than the thickness T of the end bar (side member) when viewed in the cross-sectional view (see Figure 3) to ensure secure travel through a needle as described in the parent specification and to enable the filament member to be foldable towards and against the cross bar 61A during insertion of the cross bar through a layer of cloth or other sheet material in the manner described in, for example, Patent No. 950 402.

A further embodiment of the fastener stock is shown in Figures 5 to 8. By contrast with the continuously connected side member 60A of Figure 1, the corresponding side member 64A has a circular cross-section, as indicated in Figure 7 except at the ends of each cross bar where there is a thin filamentary connection near the base of the side member as further illustrated in Figure 6 at position $b-1$ of Figure 5. The filamentary connection in the position $b-2$ for the adjoining head pieces of the upper side member, corresponding to the side member 60B of Figure 1, is at position $b-2$.

In Figure 5 the stock is made by moulding, for example as shown in Figure 15, in relatively small sections which are then

welded together at abutting ends of the side members as shown in Figure 18. In particular, the stock (shown as 59) in Figure 5 comprises side members 63A and 63B and cross links 63C separated from each other by apertures 63D. The stock is formed by welding together side members of moulded sections at points 63E. In this manner the continuous, undivided, elongated side members 63A and 63B are formed. Figures 7 to 9 illustrate a fastener attachment device separated from the stock of Figure 5 by severing the side members at points b^1 and b^2 .

The construction of the stock of Figure 5 is such that the end bars 64A and 64B are round in cross-section as is the filament 64C.

More particularly, the cross link 63C is moulded with a smaller diameter or thickness T^2 than the diameter or thickness T of the side members 63A and 63B to ensure that the resulting attachment device 64 will be securely retained within the needle of the fastener attachment apparatus.

It should be understood that the side members and the cross links as well as the resulting end bar and filament may take many shapes, as for example the filament may be round and the end bars rectangular or vice versa.

Reference should briefly be made to Figure 10 which illustrates the fastener stock 59 having round side members 69A and 69B and rectangular cross links 69C. Figure 10 illustrates in a front view stock 59 to illustrate that the stock is planar in construction and that in the most preferred construction the stock is entirely positionable between two parallel planes P_1 and P_2 defined by the top and bottom of the side members 69A and 69B. It should be understood that the side members or cross links may take various other shapes as oval, triangular or octagonal.

In Figures 11 and 12 there is shown a container, can or canister in two convenient shapes for storing the fastener attachment stock of this disclosure. Figure 11 illustrates at 65 a round canister for storing fastener attachment stock 59 in a roll as shown.

For use, the stock may first be rolled up and placed in the canister 65 by removing the press fit cover 66A from the canister body 66B and inserting the roll with a portion of the stock being passed through a feed opening 66C.

The stock 59 will travel as shown by the arrow when pulled from the canister. In Figure 12 there is shown a box-like container 67 in which fastener attachment stock folded back and forth over itself as shown may be stored. The container 67 comprises a removable cover 68A which is coupled to the main storage portion 68B thereof. The cover 68A is removed for loading of the

stock after the stock is folded, e.g. by removing screws (not shown) holding it in place, and is then replaced to hold the fan-folded stock in place. The stock is withdrawn from the container 67 via a slot or opening 68C and is pulled in the direction as shown by the arrow to feed a fastener attachment apparatus.

Reference may now be made to Figures 13 to 18 which illustrate various methods of fabricating the stock 59. Figures 13 and 14 show an inexpensive and convenient manner for fabricating the stock. The stock 59 is formed by providing an extruded continuous strip of plastics 252 from an extruder 250 and then punching out or forming apertures by applying a force to a punching member 255 to move it up and down to form the apertures (leaving the side members and cross links) as the strip moves in a direction to the right of Figure 13 while the strip 252 passes over the table 251. The punched out portions of the strip pass through an opening 253 in the table. Stock such as shown in Figure 1 is conveniently formed in this manner although obviously various other shaped stock may also be formed.

In Figure 15 there is shown a method of moulding the stock in a mould 260 by forcing into the mould plastics under pressure into channels formed in the mould top 262 and bottom 264 and then cooling or curing depending upon the plastics used. Stock 59 having side members 60A and 260B with cross links 60C is thus formable.

Smaller sections formed in this manner may be joined together by applying heat, e.g. from a laser, ultrasonic means or other conventional heating devices as shown in Figure 18, to butt weld the side members 63A and 63B of each section together, said side members supporting the cross links 63C.

In Figures 16 and 17 there is illustrated the stretching of the cross links 63C of the stock by puller members 265 and 266 having slots 265A and 265B to hold the side members and cross links during the stretching operation to strengthen as well as elongate stock made from materials such as nylon exhibiting a crystalline structure and which will be strengthened by stretching. Conveniently, such crystalline structure materials may be heated during stretching to facilitate stretching.

The continuous stock described may be used in the manner described in the parent specification and in particular it may be dispensed by the apparatus described and shown in Figures 13 to 22 of the patent specification GB 1,474,241 modified to employ only one needle or the apparatus described and shown in Figures 40 to 47 or in Figure 48 of the patent specification GB

1,474,241 to which reference should be made for further details. It will be understood that it will be necessary slightly to modify these forms of apparatus in order to accommodate the greater dimension of the paddles compared with a second cross bar as shown in the patent specification.

Attention is directed to Application No. 8 101 291 (Serial No. 1 604 779) which has been divided herefrom.

WHAT WE CLAIM IS:—

1. Separable fastener stock for providing individual fasteners, the stock being made of plastics material and comprising two spaced continuous side members that are joined by a plurality of evenly spaced cross links each forming a flexible filament, each side member having between each pair of junctions with a cross link a connecting portion of reduced cross-section.

2. Stock as claimed in Claim 1 in which each reduced portion has a cross-section less in area than that of each cross link.

3. A fastener attachment stock comprising two continuous and elongated plastics side members that have cross coupling links; the stock being proportioned to be fed as a unit to a position where individual fasteners are separated therefrom within a machine; one of the side members being proportioned so that each separated fastener includes a bar formed from a portion of the side member and is configured for feeding through the bore of a slotted hollow needle; the other of the side members being proportioned so that each separated fastener includes a head member formed from a portion of the side member; adjacent head members being joined by a connecting filament which is narrower than said head members and adjacent cross bars being joined by a connecting filament portion which is narrower than said cross bars; and each cross link being foldable towards the associated end bar that is feedable through

said hollow needle.

4. Stock as claimed in Claim 3 in which the cross links are uniformly spaced between the side members.

5. Stock as claimed in any of the preceding claims in which one of the side members is proportioned to form, in a separated fastener comprising one cross link and a part of each side member, a bar and the other side member is proportioned to form in a separated fastener a paddle which is generally flat and has a breadth and length substantially greater than its thickness.

6. Stock as claimed in any of Claims 1 to 4 in which the side members are of identical construction.

7. Stock as claimed in Claim 6 in which the side members have a circular cross section.

8. Stock as claimed in any one of the preceding claims in which the cross section of the cross links is less than that of the side members.

9. Stock as claimed in any of the preceding claims in which the cross links have their molecules reoriented by stretching to strengthen them with respect to at least one of said side members.

10. Stock as claimed in any of the preceding claims which is formed by moulding.

11. Separable fastener stock substantially as described herein with reference to Figures 1 to 4 or to Figures 5 to 10 of the accompanying drawings.

12. A method of producing individual fasteners which comprises providing fastener stock as claimed in any of the preceding claims and separating individual fasteners from the fastener stock by severing at the connecting portions of both side members.

KILBURN & STRODE,
Chartered Patent Agents,
Agents for the Applicants.

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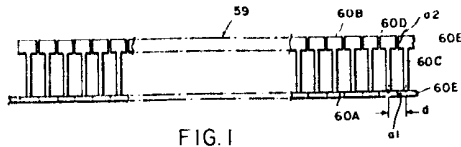


FIG. 1

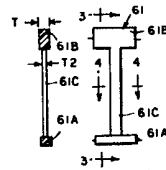


FIG. 2

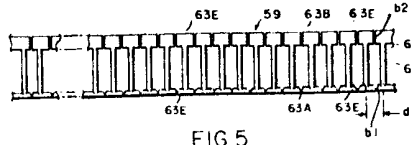


FIG. 5



FIG. 4

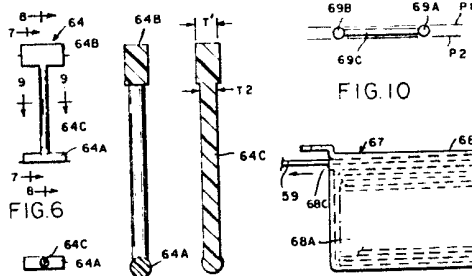


FIG. 6

FIG. 9

FIG. 7

FIG. 8

FIG. 10

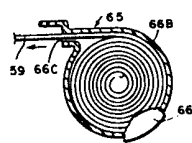


FIG. 11

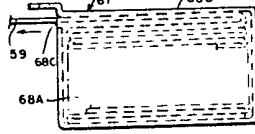


FIG. 12

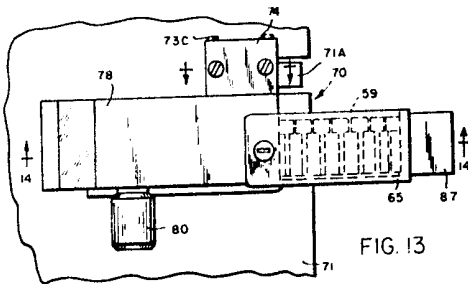


FIG. 13

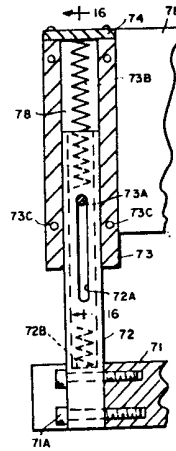


FIG. 15

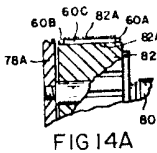


FIG. 14A

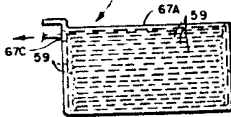


FIG. 14B

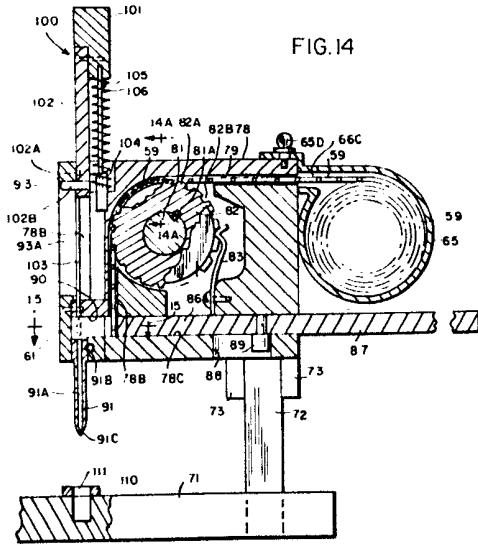


FIG. 14

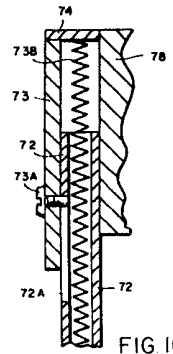


FIG. 16

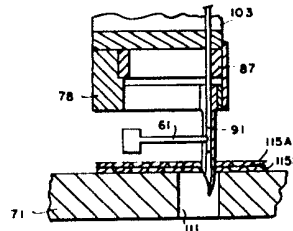


FIG. 17

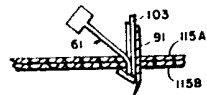


FIG. 18

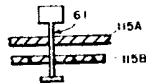


FIG. 19

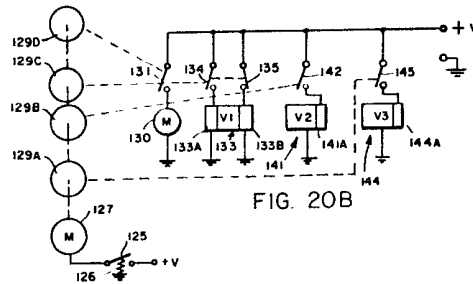


FIG. 20B

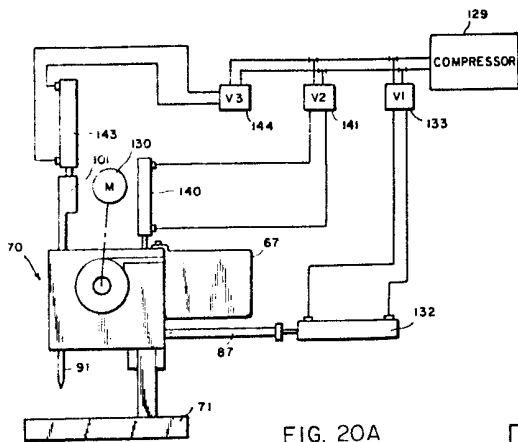


FIG. 20A

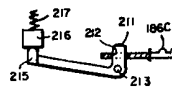


FIG. 26

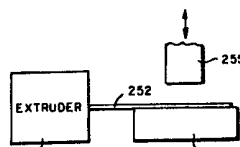


FIG. 29

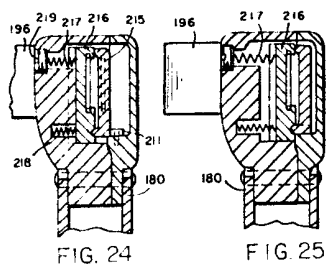


FIG. 24

FIG. 25

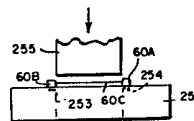


FIG. 30

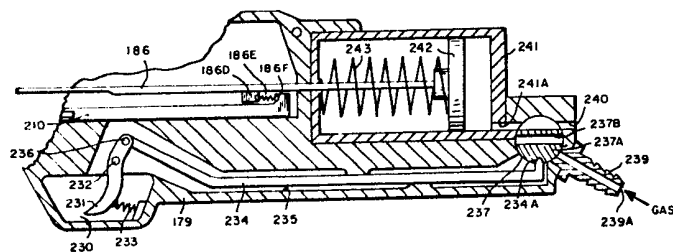


FIG. 28

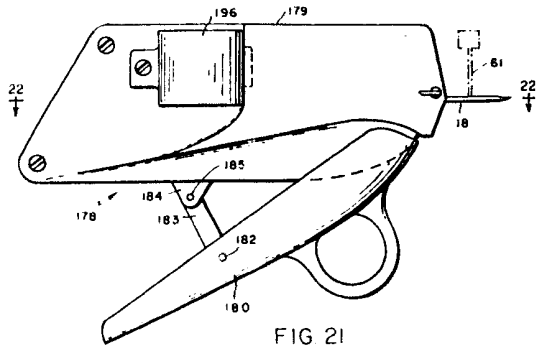


FIG. 21

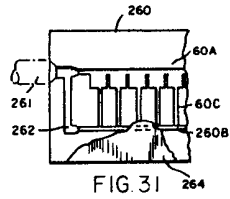


FIG. 31

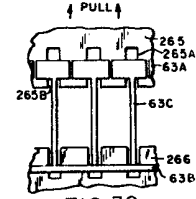


FIG. 32

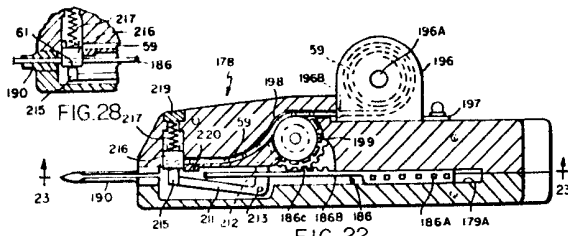


FIG. 22

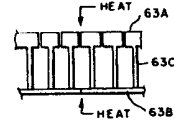


FIG. 34

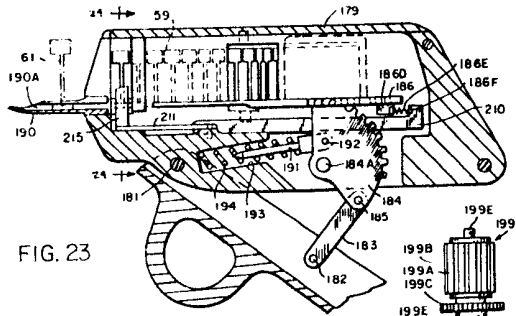


FIG. 23

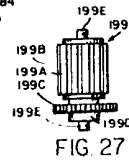


FIG. 27

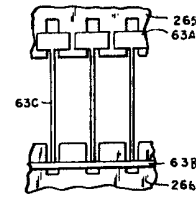


FIG. 33