Feb. 8, 1938. F. P. MILLER 2,108,008

PROCESS AND APPARATUS FOR MAKING SLIDE FASTENERS

Filed June 22, 1934

Fig. 1.

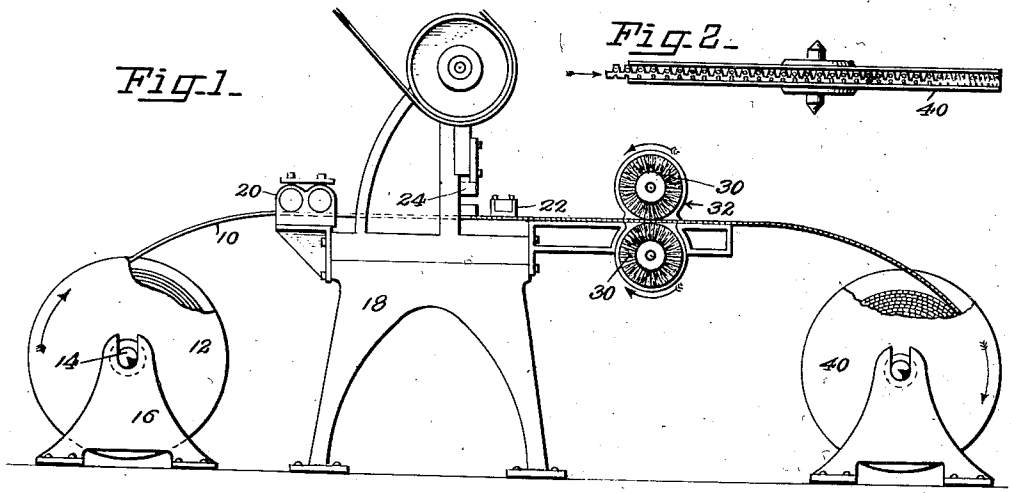


Fig. 2.

Fig. 3.

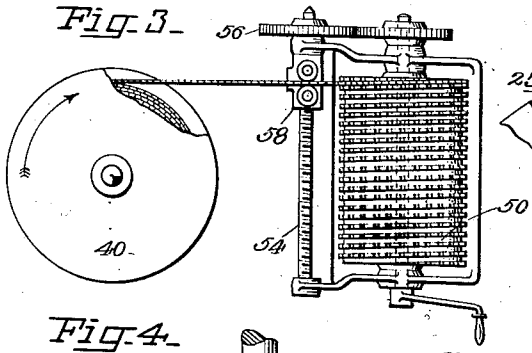


Fig. 6.

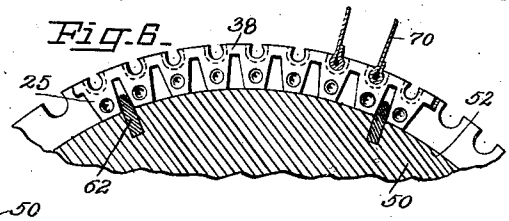


Fig. 7.

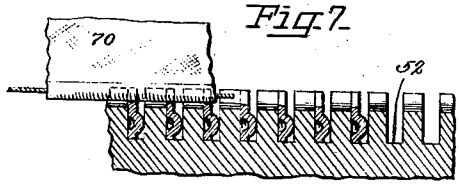


Fig. 4.

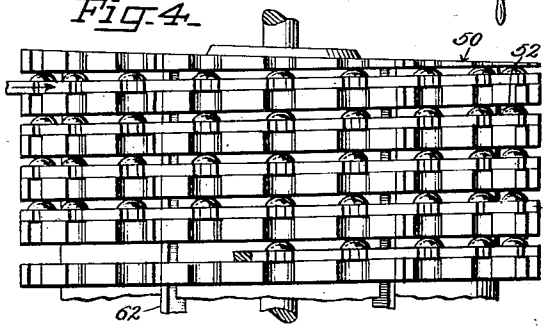


Fig. 8.

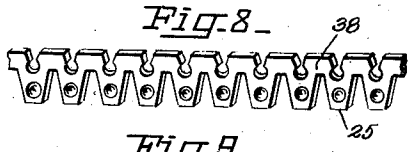


Fig. 9.

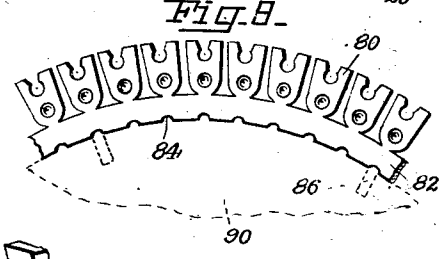
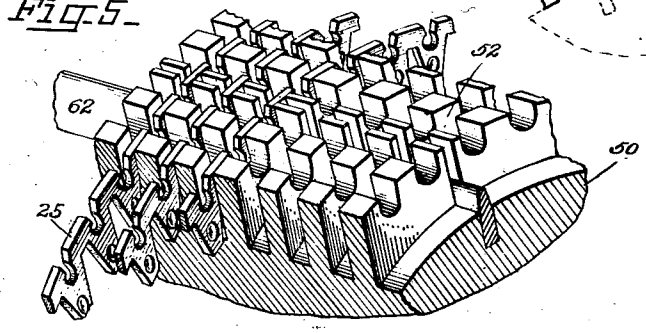


Fig. 5.



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PROCESS AND APPARATUS FOR MAKING SLIDE FASTENERS

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Application June 22, 1934, Serial No. 731,996

12 Claims. (Cl. 153—1)

This invention relates to a process and apparatus for making slide fasteners of the interdigitating type.

The production of fastener elements by a die stamping process almost invariably leaves the fastener elements with burs and sharp edges which later interfere with the smooth operation of an associated slider, and which frequently snag sheer and other fabrics with which the same come in contact; and due to the small size of the individual fastener elements, the removal of such burs and sharp edges is regarded by the industry as quite a problem.

With an appreciation of the foregoing and other considerations hereinafter described, the invention herein disclosed contemplates the substantially continuous production of fastener elements in strip form by a punching process and then, before delivering the newly formed fastener elements to a drum or other receiving means, buffing the same to remove the sharp edges and burs thereby gaining the advantage of the buffing process without separate handling of the fastener elements, and without the consumption of more time than is necessary for the punching operation, in addition to which there is to be considered the fact that the strip form of the newly stamped fastener elements provides for the expeditious and successive presentation of the fastener elements to the action of a buffing unit.

Another phase of the invention has to do with the helical winding of a strip of connected fastener elements upon a drum with the convolutions thus produced arranged in properly spaced relation to longitudinally align or register the fastener elements of the various convolutions and thus form rows of such fastener elements for connection with attaching tapes.

The helical winding of the fastener elements also has the effect of temporarily increasing the spaces between companion jaws of the individual fastener elements to provide temporarily enlarged entrance openings for the reception of attaching tapes.

In addition, it will be found that the invention is admirably suited to use in connection with fastener elements that are to be colored or dyed to harmonize with the garments or other articles to which the same are finally attached.

Other objects and advantages will be apparent during the course of the following description.

In the accompanying drawing, forming a part of this application, and in which like numerals are employed to designate like parts throughout the same,

Fig. 1 is a fragmentary side elevation illustrating a means for punching and buffing the fastener elements.

Fig. 2 is a plan view illustrating the manner in which a strip of fastener elements is transferred from a storage reel to an assembly mechanism.

Fig. 3 is a plan view of a storage reel with a strip of fastener elements wound thereon.

Fig. 4 is an enlarged fragmentary plan view of an assembly drum.

Fig. 5 is a fragmentary sectional perspective of the assembly drum with fragments of a strip of fastener elements.

Fig. 6 is a detail transverse sectional view through the assembly drum with a strip of fastener elements in place thereon.

Fig. 7 is a detail longitudinal sectional view through the assembly drum, and a row of fastener elements in longitudinal alignment for the reception of the fastening tape.

Fig. 8 is a fragmentary perspective of a strip of fastener elements.

Fig. 9 is a fragmentary side elevation of a modified form of strip in place upon an assembly drum.

In the drawing, the numeral 10 designates a length of metallic or other ribbon having a cross-sectional area suited to the production of the fastener elements to be manufactured. As shown in Figure 1, the ribbon 10 is initially mounted upon a support 12 preferably in the form of a reel having pintles 14 rotatably supported by standards 16. Of course, the reel 12 is detachably mounted on the standards 16 so that when the supply of ribbon has been exhausted, the reel may be removed in favor of a loaded one.

In practice, the blank ribbon 10 is threaded through a punch press 18. More particularly, the metallic ribbon is threaded through an automatic feeding and spacing device 20, and through an automatic stop 22, with the punching unit 24 positioned between the parts 20 and 22 and intermittently actuated, in any known fashion, to produce a plurality of initially connected fastener elements 25.

The fastener elements 25 may be of the form shown in Figure 8 or any other suitable form.

It is illustrated in Figure 1 that immediately after the punching operation, and as the next step in manufacture, the newly formed fastener elements, while still in strip form, are directed between the buffing elements 30 of a buffing unit 32. It will be seen that the buffing wheels 30

rotate in the direction of travel of the newly formed fastener elements and thus maintain taut the strip of such elements. Clearly, the purpose and nature of the buffing elements 30 is such that the same are required to rotate at a much faster peripheral speed than the speed of travel of the strip of fastener elements.

As brought out in the opening paragraphs of this specification, the punching operation leaves the fastener elements with rather sharp edges and numerous burs which, unless removed, interfere with the smooth operation of the slider by which complemental rows of fastener elements are brought into interdigitating relation. Also, such burs and sharps edges frequently snag the sheer and other fabrics with which the same come in contact.

The simple and inexpensive removal of these burs and sharp edges has always been a problem in this industry, and it has been found that the mounting of the buffing unit 32 as suggested in Figure 1, provides for the removal of these burs and sharp edges from the newly formed fastener elements coincident with the operation of the punch for the formation of additional fastener elements and without appreciably increasing the cost of manufacture.

The performance of the buffing operation immediately after the punching operation provides for the removal of burs and sharp edges while the fastener elements are in the most convenient form for presentation to the buffing wheels, and, of course, no separate handling of the elements is required for this buffing operation. This also avoids the need of special reeling and unreeling of the strip of fastener elements for buffing purposes.

The various fastener elements are shown in Figure 8 to be arranged in edge to edge relation with the major portions thereof, particularly the edges thereof, free for engagement by the buffing elements 30.

It is the outer longitudinal edges of the jaws of the various fastener elements that are initially joined by webs or feather-like connections 38. Of course, the webs 38 are removed as a subsequent step in manufacture and leave minor and negligible portions of the edges of the fastener elements without the benefit of the buffing operation.

Such minor and negligible portions of the fastener elements as are left without the benefit of the buffing operation are inconsequential and in no manner interfere with the freedom of operation of the slider on the completed fastener. Thus, I believe that I am the first to provide for the buffing of the fastener elements while still in strip form and mutually connected and to appreciate that the buffing operation may be advantageously performed while the fastener elements are still in strip form as distinguished from subjecting the same to an all-over buffing.

From the buffing unit 32, the strip of fastener elements is delivered to a reel 40. From Figure 2, it will be seen that the distance between the end walls of the reel 40 is only slightly greater than the width of the ribbon from which the fastener elements are formed. This requires that the strip of fastener element be coiled upon the reel with each succeeding coil or convolution arranged radially outward of the previously wound coil or convolution. This arrangement of the strip of fastener element avoids entanglement of the fastener elements. If the strip of fastener elements were wound upon the reel 40 in helical fashion, or side by side, as sewing thread is wound upon an ordinary spool, there would be likelihood of entanglement of the various fastener elements. This is to be avoided.

With the strip of newly formed and buffed fastener elements thus coiled upon the reel 40, such fastener elements may be colored or dyed to harmonize with the color of the garments or other articles to which the same are to be applied.

After the coloring or dyeing operation, as one step in the process of manufacture, the fastener elements, still in strip form, may be transferred from the reel 40 to an assembly drum or cylinder 50, this being shown in Figure 3.

The drum 50 is shown to be provided with a peripheral helical groove 52 extending from substantially one end of the drum to the other end thereof, and being of a width to snugly receive the fastener elements.

The member 50 may be rotated by hand or otherwise and has driving connection with a feed screw 54 through the intervention of a train of gears 56. It is illustrated in Figure 3 that the feed screw 54 has mounted thereon a guiding element 58 in operative relation to the strip of fastener elements so as to guide such strip onto the assembly drum 50. Of course, the pitch of the thread upon the feed screw 54 is the same as the pitch of the helical groove 52 to cause the member 58 to advance at the proper rate, always in the required feeding relation to the peripheral helical groove 52.

Referring now to Figure 6, it will be seen that the strip of fastener elements is wound upon the drum 50 with the nose portions of the various fastener elements presented radially inward. At spaced points about the periphery of the drum 50, there will be found aligning or registering strips 62 having somewhat tapered outer edge portions adapted to extend between the nose portions of certain of the fastener elements and thereby align the longitudinal rows of fastener elements. In other words, the strip of fastener elements is wound about the periphery of the drum 50, with the nose portions of the fastener elements presented radially inward with spaces between such nose portions for the random reception of the longitudinally extending aligning or registering strips 62.

More particularly, the jaw portions of the fastener elements are presented radially outward, and it will be seen that the employment of the strips 62 has the effect of establishing longitudinal alignment between the various longitudinal rows of fastener elements.

With the strip of connected fastener elements thus wound in the helical groove 52, the strip of fastener elements will be found to have the form of a number of connected helical convolutions. Such mounting of the strip of fastener elements upon the drum defines an annular series of parallel, circumferentially spaced, longitudinally extending rows of fastener elements with all the jaws of the fastener elements in each row in longitudinal alignment for the reception of mounting tapes 70.

By way of further reference to the strips 62, attention is invited to Figure 5 in which it is illustrated that such strips extend longitudinally of the drum 50 or parallel to the longitudinal axis of such drum, and project into the helical groove 52 therein for engagement with the edges of contiguous fastener elements.

The presence of the strips 62 and the engage-

ment of the same with certain of the fastener elements after the fashion suggested in Figures 5 and 6 has the effect of aligning or registering the fastener elements of a particular convolution with the fastener elements of the longitudinally adjacent convolutions. This arranges and thus prepares the longitudinal rows of fastener elements for reception of the tapes **70**, and in this connection, it is observed that the spaces or ribs between the convolutions of the helical groove **52** serve to establish proper longitudinal spaces between the fastener elements of each individual longitudinal row.

In reviewing the mounting of the fastener elements upon the drum **50**, it will be seen that the strip of such elements is arranged in the helical groove **52** so as to define a plurality of longitudinally spaced, circumferentially extending convolutions with the fastener elements of each convolution spaced from the longitudinally adjacent fastener elements by the ribs between the convolutions of the groove **52** to define, in effect, an annular series of circumferentially spaced, longitudinally extending rows of fastener elements in which the jaws thereof are presented radially outward and are aligned for connection with the fastener tapes **70**.

In Figures 6 and 7, it is illustrated that the fastener strips are snugly received in the helical groove **52** with the area of contact between the fastener elements and the side walls of the groove sufficient to hold the fastener elements securely in place while being associated with the tapes. In this connection, there is to be considered the fact that the still present web connection between the fastener elements serves as a mutual bracing arrangement for the fastener elements. At the same time, the strips **62**, while serving as aligning devices, offer material assistance in holding the fastener elements in position for engagement by the tapes **70**.

It should be noted that the mounting of the strip of fastener elements in helical form about the periphery of the drum **50** with the jaw portons of the fastener elements presented radially outward has the effect of temporarily increasing the space between complemental jaws of the fastener elements to provide temporarily enlarged entrance openings for the fastening tapes.

By reference to Figures 5 and 7, it will be seen that the ribs between the convolutions of the helical groove **52** are formed with registering longitudinally extending grooves with which the spaces between the jaws of the fasteners are in line. This allows of the easy connection of the tapes **70** with the jaws of the various fastener elements.

With the strip of fastener elements wound in helical form about the periphery of the drum and the tapes **70** initially and loosely connected to the longitudinally aligned fastener elements, the entire mass about the periphery of the cylinder **50** is subjected to a single longitudinal cut. This cut is made along one series of webs **38**. This allows the mass of fastener elements arranged about the periphery of the drum **50** to be removed and flattened out and subjected to an appropriate operation by which the jaws of the individual fastener elements are pressed into binding engagement with the adjacent portions of the attaching tapes, after which, the rows of fastener elements and the associated tapes are ready for final assembly in the finished slide fastener.

In the form of strip or blank shown in Figure 9, the various fastener elements **80** have featherlike connections at the nose portions thereof with a supporting strip **82**, such supporting strip constituting a temporary vehicle for the fastener elements, and at the same time, providing a means by which the fastener elements are spaced in the proper order about the periphery of the drum **90** with the jaw portions of the fastener elements presented radially outward for connection with the mounting tapes.

It is further illustrated in Figure 9, that the inner edge of the strip **82** is formed with spaced notches **84**, some of which receive the aligning or registering strips **86** corresponding to the strips **62**. Of course, these strips **86** extend longitudinally of the drum **90** at spaced points about the periphery of the drum and provide a means by which the fastener elements of a particular convolution of such fastener elements are accurately aligned with the fastener elements of the longitudinally adjacent convolutions for connection with the longitudinally extending mounting tapes.

The fastener elements **80** shown in Figure 9 may be colored, dyed or plated while in strip form and, of course, the entire surfaces of the fastener elements, except the extreme nose portions thereof will be so treated.

In case the fastener elements are not to be colored or coated, the drum **50** may be arranged at the delivery end of the punch press **18** to receive the fastener elements directly therefrom.

Having thus described the invention, what is claimed is:

1. In an apparatus for arranging a plurality of connected fastener elements in longitudinal alignment for connection with attaching tapes, a drum having a peripheral helical groove for the reception of a plurality of fastener elements in strip form, and a means associated with the drum to arrange the longitudinally adjacent fastener elements in longitudinal alignment.

2. In an apparatus for arranging a plurality of initially connected fastener elements in longitudinal rows for connection with attaching tapes, a drum having a helical peripheral groove for the reception of a length of connected fastener elements to arrange such length in the form of a plurality of longitudinally spaced convolutions, and means carried by the drum to engage the fastener elements and thus align the same lengthwise of the drum.

3. In an apparatus for arranging a plurality of initially connected slide fastener elements in row form for a connection with tapes, a drum having a helical peripheral groove of a width to snugly receive a plurality of slide fastener elements and thereby arrange the slide fastener elements in the form of an annular series of circumferentially spaced longitudinally extending rows, and means extending longitudinally of the drum and engaging the fastener elements to align the longitudinally spaced fastener elements.

4. In an apparatus for arranging initially connected fastener elements in row form for connection of the jaws of the fastener elements with mounting tapes, a drum having a peripheral helical groove of a depth and width to snugly receive a plurality of fastener elements with the jaw portions thereof presented radially outward and the nose portions of the fastener elements presented radially inward, and strips extending longitudinally of the drum and extending between the fastener elements in engagement therewith to align the longitudinally spaced fastener elements for connection with a mounting tape.

5. In an apparatus for arranging initially connected fastener elements in row form for connection of the jaws of the fastener elements with mounting tapes, a drum having a peripheral helical groove of a depth and width to snugly receive a plurality of fastener elements with the jaw portions thereof presented radially outward and the nose portions of the fastener elements presented radially inward, and strips extending longitudinally of the drum and extending between the fastener elements in engagement therewith to align the longitudinally spaced fastener elements for connection with a mounting tape, said drum being provided with a plurality of longitudinally extending circumferentially spaced grooves for the partial reception of mounting tapes.

6. The herein described method of attaching tapes to fastener elements in which the fastener elements are initially joined at the jaw portions thereof, which consists in arranging the jaw portions radially outward and bowing the connected fastener elements to temporarily spread the jaws to provide temporarily enlarged entrance openings for the reception of attaching tapes.

7. The method of assembling a plurality of fastener elements for connection with attaching tapes which consists in winding a strip of connected fastener elements about a common axis to form a plurality of initially connected convolutions, and aligning the fastener elements of a particular convolution with the fastener elements of contiguous convolutions.

8. The method of assembling a plurality of fastener elements for connection with attaching tapes which consists in winding a strip of connected fastener elements about a common axis to form a plurality of initially connected convolutions, and engaging the convolutions from the radially inner portions thereof at predetermined spaced points to align the fastener elements of a particular convolution with the fastener elements of contiguous convolutions.

9. The method of assembling a plurality of fastener elements for connection with attaching tapes which consists in arranging the fastener elements in the form of a plurality of axially aligned convolutions, and longitudinally aligning the fastener elements of each convolution with the fastener elements of the contiguous convolutions.

10. In a structure for arranging a plurality of initially connected fastener elements in rows for connection with attaching tapes, a drum having an outside peripheral surface portion provided with means mounting the said strip of initially connected fastener elements in the form of a plurality of convolutions with substantially uniform spaces between the convolutions, and aligning devices engaging the fastener elements to align the fastener elements of a particular convolution with those of the contiguous convolutions for connection with attaching tapes.

11. In a structure for arranging a plurality of initially connected fastener elements in rows for connection with attaching tapes, a drum having an outer peripheral surface portion provided with means mounting the said strip of initially connected fastener elements in the form of a plurality of convolutions with substantially uniform spaces between the convolutions, and aligning devices intersecting said means and engaging the fastener elements to align the fastener elements of a particular convolution with those of the contiguous convolutions for connection with attaching tapes.

12. In an apparatus for arranging a plurality of initially connected fastener elements in longitudinal rows for connection of the jaws of the fastener elements with attaching tapes, a drum having a peripheral helical groove of a depth and width to snugly receive a strip of connected fastener elements with the open jaw portions thereof presented radially outward and the nose portions of the fastener elements presented radially inward, and means associated with the drum to align the longitudinally spaced fastener elements for connection with attaching tapes, said drum being provided with a plurality of longitudinally extending, circumferentially spaced grooves registering with the spaces between the jaws of the longitudinally aligned fastener elements and adapted for the partial reception of attaching tapes.

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