July 22, 1969 G. WASKO 3,456,328

METHOD AND APPARATUS FOR GAPPING SLIDE FASTENER CHAIN

Filed Feb. 28, 1967

Fig. 1

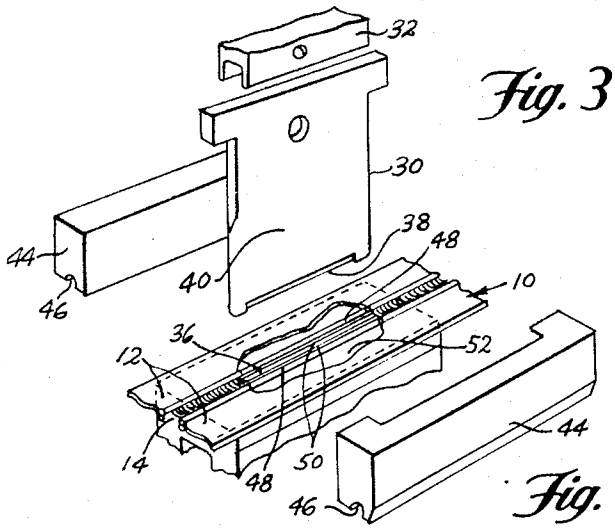


Fig. 3

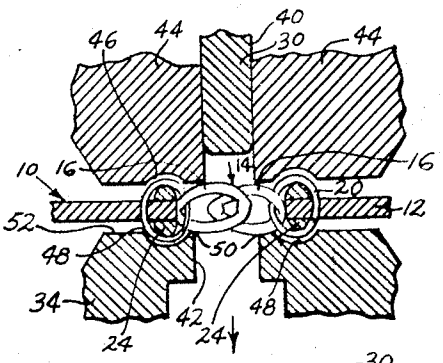


Fig. 4

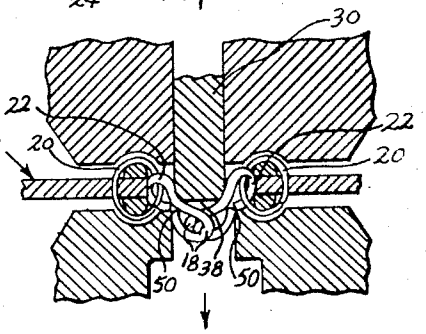


Fig. 2

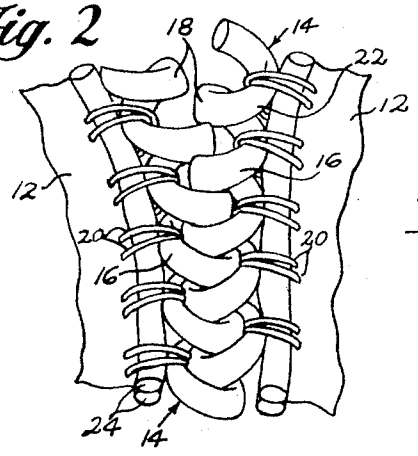


Fig. 5

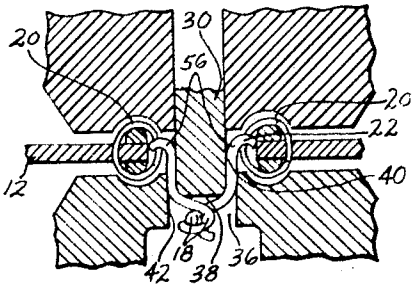


Fig. 7

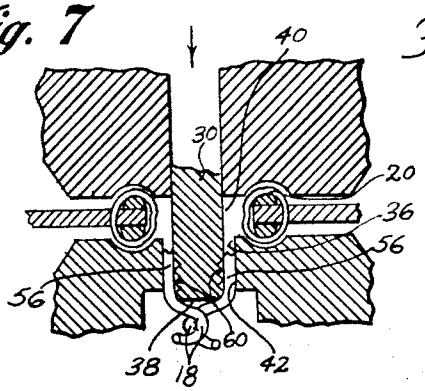
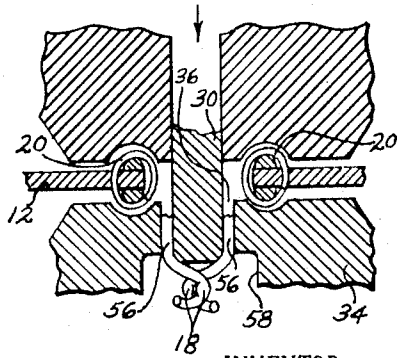


Fig. 6



INVENTOR.
GEORGE WASKO

BY
MEECH AND FIELD
ATTORNEYS.

United States Patent Office 3,456,328 Patented July 22, 1969

3,456,328

METHOD AND APPARATUS FOR GAPPING SLIDE FASTENER CHAIN

George Wasko, Meadville, Pa., assignor, by mesne assignments, to Textron Inc., Providence, R.I., a corporation of Delaware

Filed Feb. 28, 1967, Ser. No. 619,450
Int. Cl. B21f 45/18; A41h 37/06; B21d 53/50
U.S. Cl. 29—408 2 Claims

ABSTRACT OF THE DISCLOSURE

Apparatus and method for clean gapping a given length of helical coil type filament slide fastener chain where each interengaged convolution is secured to its respective tape by threads. A dull punch advances to first drive each convolution onto the cutting edges of a die to sever each convolution transversely, and then move the interengaged elements of each severed convolution ahead of it to withdraw the now severed trailer ends of each convolution from their attaching threads, after which the severed convolutions are ejected from the apparatus.

This invention relates to improvements in apparatus and methods for making slide fasteners and more particularly to improved apparatus and methods for making filament coil-type slide fasteners of predetermined lengths.

A manufacturer of garments such as trousers prefers to purchase continuous slide fastener chain of the filament type wound upon reels for the purpose of having an adequate inventory to supply his needs rather than carrying a large inventory of individual filament type fasteners of various lengths. To convert continuous slide fastener chain to finished individual slide fasteners suitable for application to a garment, it is first necessary for the manufacturer to have apparatus with which he can readily cut away a given length of interengaged coiled filament fastener elements at desired intervals to provide an element free gap in the continuous chain. Once the gap is made in the continuous chain, the chain can be severed across the gap to provide individual fasteners with element free tape ends so that the fastener can be readily attached to the garment.

Generally, filament fasteners have a continuous substantially helical coil of filamentary material sewn or woven to the edge of a tape in a manner such that one or more individual threads pass around each convolution to secure the filamentary coil to the tape. The filamentary coil is manufactured of a plastic material, such as nylon, held in place to the tape edge by the threads, which are composed of cotton or nylon, with the filamentary material being of considerably greater cross sectional area and tensile strength than the threads.

In the prior art, such as disclosed generally in Burbank U.S. Patent No. 2,877,844, dated Mar. 17, 1959, or Fasciano, U.S. Patent No. 3,225,430, dated Dec. 28, 1965, apparatus has been used for severing the convolutions of the coils by means of a punch corresponding to substantially the desired gap length. In theory, the punch initially severs at least one leg of each convolution, after which the punch in its continued advancement grasps the filamentary material between the cutting blade and a resiliently mounted pressure pad to remove each convolution from its attaching thread and eject the cut portions from the apparatus. In actual practice this type of apparatus has been entirely unsatisfactory for several reasons, namely: (1) the punch very often severs both legs of each convolution from the tapes and thus leaves a portion of each convolution secured to the tape by the threads, or; (2) the punch requires close tolerances thus

becoming costly to manufacture and operate as well as one that requires exceptionally sharp edges which are difficult to maintain so as to efficiently sever the nylon filament for any period of time, or; (3) those portions of the filament overlying the marginal portions of the tape are not properly withdrawn by the punch from their attaching threads resulting in small elements of nylon not being efficiently ejected from the apparatus thereby making the apparatus ineffective, or; (4) residue of filamentary material is left on the tape thus requiring removal thereof by hand.

The present invention is directed to a method of and apparatus for producing element free gaps at selected intervals in continuous filament slide fastener chain. More particularly the invention is directed to a method and apparatus for severing a given length of interengaged filament fastener elements from a tape and completely removing all residue therefrom so as to obtain an element free gap at given intervals in the continuous chain. The cutting and removing operation can be accomplished and preferably is accomplished with a dull punch member which cooperates with a female die having an opening whose edges are cutting edges. The distance between the opposed side walls of the opening in the female die is greater than the thickness of the punch to be inserted therein, but less than the thickness of the punch plus twice the thickness of the filamentary material.

It is the general object of the present invention to provide an improved method of and apparatus for gapping and cleaning a given length of filamentary coil from slide fastener chain.

Another object is to provide improved means for severing the interengaged coils of filamentary type slide fastener chain and substantially simultaneously therewith removing the severed coils from the threads holding the now severed coils to the tape.

Still another object of this invention is to provide apparatus for cutting filamentary coil from continuous chain in such a manner that one leg of each individual convolution is severed after which each severed coil is pulled and removed by the same cutting apparatus from their attaching threads.

Still another object of this invention is to provide a method of severing and removing individual convolutions from a filamentary type continuous slide fastener chain requiring a simple, inexpensive apparatus which can easily be maintained.

Other objects and a fuller understanding of the invention can be had by referring to the following description and claims taken in conjunction with the accompanying drawings in which:

FIG. 1 is a partially exploded perspective view of the essential parts of the apparatus employed in the present invention;

FIG. 2 is an enlarged view of a filamentary coil fastener showing a portion of the fastener elements in the open position and a portion in the closed or interengaged position;

FIGS. 3 to 6 are diagrammatic views of a transverse section of the apparatus showing the sequential steps of the method and the relation between the essential parts of the apparatus; and

FIG. 7 is a view similar to FIG. 5 showing a modification of the apparatus for removing the filamentary material from the attaching threads.

Referring to FIGS. 1 and 2 of the drawings, there is shown a length of coiled filament type slide fastener chain **10** which includes a pair of tapes **12** each having secured thereto along their adjacent edges a continuous helically wound coil filament **14**. The filament is wound on a winding machine, which provides the substantially helical configuration, with the outer free end of each convolution

16 thereof deformed to provide suitable interlocking elements 18. The continuous helical coil filament 14 is then secured to the edge of a slide fastener tape 12 by threads 20 passing about the heel portion 22 of each convolution 16. Threads 20 are placed there either: by coil filament 14 being fed into a loom and woven simultaneously with the manufacture of tape 12; or, by being secured along the edge of a previously woven slide fastener tape. Preferably, the fastener also includes bead cords 24, stationed on each side of tape 12, about which threads 20 will pass, and which are used for guiding a slider, not shown, along the coil as is well known in the prior art.

The apparatus for removing all of the filamentary material along a given length of slide fastener chain is shown in FIGS. 1 and 3 to 6. An elongated punch 30 is secured to the reciprocally movable punch carrier 32 of a punch press (not shown) and is adapted to cooperate with a die member 34 having a slot 36 therein, as is well known in the prior art. Punch 30 has a rounded or dull edged bottom end 38. Punch 30 will readily be accepted in slot 36 as the clearance between either side wall 40 of punch 30 and its respective adjacent side wall 42 of slot 36 is slightly less than the thickness of the filamentary material making up coil filament 14 so that the filamentary material will be nipped therebetween in a manner to be described below. A guide block 44 is stationed on either side of reciprocally movable punch 30 with each guide block 44 having a recess 46 located in its bottom surface for accepting cord 24 located on the upper surface of tape 12. The top surface 52 of die 34 has recesses 48 located therein on either side of slot 36 for accepting cords 24 located on the bottom surface of tape 12. Guide blocks 44 are spaced above die member 34 a distance which will permit slide fastener chain 10 to be freely advanced, with recesses 46 and 48, respectively, cooperating to channel cords 24 in a given path whereby interlocking elements 18 will be centered beneath punch 30 and over slot 36. The edges 50 formed by the intersection of top surface 52 of die 34 and the side walls 42 of slot 36 provide sharp cutting edges which can transversely cut the filamentary material making up coil filament 14 in a manner to be disclosed.

A method for producing the fastener element free gap in the described slide fastener chain is best illustrated in FIGS. 3 to 6 of the drawings. The slide fastener chain 10 is threaded between guide blocks 44 and die member 34 with cords 24 cooperating with recesses 46 and 48 to center interlocking elements 18 beneath punch 30 and over slot 36 in die 34.

The maximum length of element free gap to be produced in slide fastener chain 10 is determined by the number of elements removed by one cycle of punch 30. If a longer gap is called for, chain 10 can be progressively advanced and punch 30 actuated after each advancement to obtain the desired length of gap. In any given cycle, punch 28 advances in a downward direction so that rounded end 38 engages the pair of interengaged coil filaments 14 of which each convolution 16 overlies its respective cutting edge 50. Continued downward movement of punch 30 drives each convolution 16 onto edge 50 to sever the bottom member of each convolution 16 at a point substantially intermediate its interlocking element 18 and heel portion 22.

As best shown in FIG. 5, the series of interlocking elements 18, extending the length of the gap space, can sustain the transverse force generated by punch 30 so that they continue to be interengaged. Thus elements 18 continue to maintain each convolution in an interengaged relationship with each of its adjacent convolutions so that the now severed convolutions extending the length of the gap on each of the tapes 12 remain interlocked with each other. A knife edge at each end of punch 30 severs the filament at each end substantially as is known in the prior art so as not to interfere with the method described. Elements 18 of each of convolutions 16 are now positioned ahead of end 38 of punch 30 and driven further into slot 36. This continued further movement of punch 30 nips the trailing portion 56, which includes heel portions 22 of each severed convolution, between the respective side walls 40 of punch 30 and their respective side walls 42 of slot 36. In nipping the filamentary material, the individual trailing portions 56 are deformed and squeezed between walls 40 and side walls 42. As punch 28 further descends, each cut trailing portions 56 is withdrawn from its attaching thread 20, until, as shown in FIG. 6, each cut convolution is fully withdrawn and moved to an enlarged area 58 in die member 34. The direction of movement of punch 30 is reversed and withdrawn from slot 36 whereby each trailer portions 56 of each cut convolutions is released. Each convolution is then ejected from the bottom of die 34 substantially simultaneously with the return of punch 30 to its initial position, as shown in FIG. 3.

A modification of the apparatus is shown in FIG. 7 wherein the lower portion of each side wall 40 of punch 30 located adjacent to rounded end 38 is modified to include a roughened surface 60. For purposes of illustration only, the roughened surface 60 is shown as plurality of serrations, but for all practical purposes surface 60 can be formed to have several surface configurations. On the downward stroke of punch 30, roughened surface 60 will frictionally engage and grasp the filamentary material and carry the same along with it, whereas side wall 42 of slot 36 is relatively smooth to permit the filamentary material to slide across. The operation of the apparatus shown in FIG. 7 is substantially the same as that shown and described with reference to FIGS. 3 to 6 except that the apparatus operates more efficiently to clean gap slide fastener chain.

The invention has been described in detail with particular reference to embodiments thereof, but it will be understood that variations and modifications can be effected within the spirit and scope of the invention as described hereinabove and as defined in the appended claims.

I claim:

1. A method of gapping slide fastener chain in which a plurality of fastener elements of the coiled filamentary type are attached along the adjacent edges of a pair of tapes by thread means extending transversely around the filamentary material of each convolution of said filamentary coil and with the fastener elements interengaged, comprising the steps of:

positioning a group of said interengaged fastener elements over an elongated slot, located in a female die with the longitudinal edges of said slot being cutting edges, and a punch adapted to reciprocally move into and out of said slot, with said punch having a dull edge and with the clearance between the side face walls of said punch and the side walls of said slot being slightly less than the thickness of said filamentary material;

initially moving said punch into said slot;

severing the lowermost leg of each individual convolution of a group of said interengaged elements on said cutting edges by the action of said punch as it moves into said slot;

maintaining said fastener elements in their interengaged condition while simultaneously moving said punch farther into said slot;

positively engaging the interengaged elements of said severed convolutions with the dull edge of said punch for moving the same thereahead;

nipping the leg portions of said severed convolution between the side face of said moving punch and the adjacent stationary side wall of said slot to move said interengaged elements and their now trailing leg portions therealong in response to movement of said punch and thereby remove each of said convolutions

from said thread means holding it to its respective tape; and

further moving said punch to eject all of said severed convolutions from said slot of said female die.

2. Apparatus for producing a fastener element free gap in a continuous filament slide fastener chain having a pair of stringers, each stringer including a helically wound fastener coil secured by threads to an edge of a slide fastener tape, with the respective convolutions having elements that are interengaged, the combination comprising:

a first means having an elongated open slot therein of a given depth and of a length substantially equal to the length of the gap to be made in said stringer, the upper edges of said slot being cutting edges underlying the respective stringers for severing the lowermost leg of each convolution of said stringer facing said edges;

a punch member reciprocally movable into and out of said slot for forcing the lowermost leg of each of said convolutions onto said cutting edges to sever the lowermost leg, said punch member having a blunt end that engages and carries said interengaged elements with it, and with each of the side walls of said punch member movable within said slot and spaced from the adjacent respective side face walls of said slot immediately adjacent said cutting edges a distance which permits the severed convolutions to be nipped between said side walls of said punch member and said side walls of said slot; and

a plurality of elongated serrations located adjacent the

lowermost edge of said punch member and parallel to each other with the bottommost serration located adjacent said blunt end of said punch member and adapted to extend in a direction transverse to the direction of reciprocal movement of said punch member for initially nipping said filamentary material between said side walls of said slot and said reciprocally movable punch member, with said blunt end of said punch member engaging and carrying said interengaged elements before it as said punch member moves through said slot;

said blunt end and said serrations of said punch member moving each of said interengaged elements out of the bottom of said slot and releasing the same;

whereby said severed convolutions of said filamentary coils are moved transversely relative to the plane of said tapes and detached from said threads securing the filamentary material to said tapes.

References Cited

UNITED STATES PATENTS

3,128,543	4/1964	Fasciano	29—408
3,225,430	12/1965	Fasciano	29—408
3,273,229	9/1966	Taylor.	
3,368,269	2/1968	Perlman.	

THOMAS H. EAGER, Primary Examiner

U.S. Cl. X.R.

29—207.5; 83—921