

PATENT SPECIFICATION

(11)

1 421 501

1 421 501

(21) Application No. 36350/73

(22) Filed 31 July 1973

(31) Convention Application No.

79 005/72

(32) Filed 7 Aug. 1972 in

(33) Japan (JA)

(44) Complete Specification published 21 Jan. 1976

(51) INT. CL. A44B 19/12

(52) Index at acceptance

E2S 1A2B1



(54) A METHOD AND RELATED APPARATUS FOR FORMING AN ELEMENT-FREE GAP IN A CONTINUOUS SLIDING CLASP FASTENER STRINGER

(71) We, YOSHIDA KOGYO KABUSHIKI KAISHA, of No. 1, Kanda Izumi-cho, Chiyoda-ku, Tokyo, Japan; a corporation duly organized under the laws of Japan, 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 a method of and apparatus for producing element-free gaps or spaces in a continuous sliding-clasp fastener stringer of the type which comprises opposed stringer tapes each carrying along their adjacent longitudinal edges a row of continuous coupling elements.

Amongst a number of methods heretofore proposed for the production of gaps in a continuous sliding-clasp fastener stringer of the type described, there is disclosed in U.S. Patent 3,225,430 a method and related apparatus for gap production, which method comprises pulling the tapes laterally apart to expose the interengaged parts of the fastener elements and cutting the elements between the spread-apart adjacent edges of the tapes. While this prior art method had many intrinsic advantages, it suffered from the drawback that lateral pulling forces required to spread apart the adjacent tape edges widely enough to expose the interengaged parts of the elements must be intensified to overcome the tensioning of the stitches that secure the elements to the tapes, with the results that the tapes are marred and the stitches are displaced relative to the elements with laterally moving tapes, particularly those stitches adjacent the formed gaps becoming loosened up and thereby rendering the adjacent elements positionally unstable, which in turn often invites "rupture or crack opening" in the fastener stringer when in use.

With the above-noted drawback of the prior art in view, the primary object of the

invention is to provide an improved method of producing element-free gaps in a continuous length stringer of a sliding clasp fastener, which method will permit adjacent edges of the stringer tapes to be spread apart widely enough for exposure of the interengaged parts of the fastener elements that are to be cut, without imposing undue tension upon the tape fabric and particularly upon the element-securing stitches.

Another object of the invention is to provide an apparatus tailored to carry the above method into practice, which apparatus is relatively simple in construction and highly reliable in operation, including structural features to permit of gap production without damage to the tapes and without forcing the stitches to move relative to the elements.

According to one aspect, this invention consists in a method of forming an element-free gap in a continuous sliding clasp fastener stringer having a pair of oppositely disposed stringer tapes each carrying along their adjacent longitudinal edges a row of fastener elements whose coupling parts are interengaged, which method comprises gripping the stringer tapes at points opposite to the rows of coiled fastener elements, causing the interengaged parts of the fastener elements to pivot on themselves in a direction opposite to each other to spread apart the adjacent tape edges widely enough to expose therebetween said interengaged parts, and cutting the thus exposed interengaged parts off of the fastener elements along a length corresponding to a desired gap to be formed.

According to another aspect, this invention consists in an apparatus for forming an element-free gap in a continuous sliding clasp fastener stringer having a pair of oppositely disposed stringer tapes each carrying along their adjacent longitudinal edges a row of coiled fastener elements

(11)

whose coupling parts are interengaged, which apparatus comprises means for gripping the stringer tapes at points opposite to the row of fastener elements, means for pivoting the interengaged parts of the fastener elements on themselves in a direction opposite to each other to spread apart the adjacent tape edges widely enough to expose therebetween said interengaged parts, and means for cutting the thus exposed interengaged parts of the elements off of the fastener elements.

According to yet another aspect, this invention consists in an apparatus for forming an element-free gap in a continuous sliding clasp fastener stringer having a pair of oppositely disposed stringer tapes each carrying along their adjacent longitudinal edges a row of coiled fastener elements whose coupling parts are interengaged, which apparatus comprises a vertically movable punch carrying block, a base disposed in vertically spaced relation thereto, a die carrying block mounted on said base, a first pair of gripping means projecting downwardly from said punch block and a second pair of gripping means projecting upwardly from said die carrying block, said first and second pairs of gripping means gripping therebetween the stringer tapes at points opposite to the rows of fastener elements, a die means carried in and movable relative to said die carrying block, said die means having upwardly inclined or tapered top surfaces against which the stringer tapes bear when said die means is in an upper position and an element-receiving recess in the apex of said tapered surfaces, means for moving said die means upward to bear against said stringer tapes to pivot of the fastener elements on themselves in a direction opposite to each other to spread apart the adjacent tape edges widely enough to expose therebetween said interengaged parts, and a cutting means secured to said punch carrying block intermediate said first pair of gripping means, said cutting means cooperating with said die means to cut the exposed interengaged parts of the elements off of the fastener elements along a length corresponding to a desired gap to be formed.

These and other objects and features of the invention will be more apparent from the following detailed description of a preferred embodiment taken in conjunction with the accompanying drawings in which like reference characters or numerals refer to like or corresponding parts throughout the several views and in which:

Figure 1 is a front elevation of a gap forming apparatus employed in accordance with the invention;

Figure 2 is a sectional front elevation of the same;

Figure 3 is a fragmentary transverse cross section showing the relationship of the important parts of the apparatus, with the fastener stringer as at the beginning of a gap forming operation;

Figure 4 is a similar view but showing the stringer spread apart at its adjacent tape edges, with the coupled parts of fastener elements exposed thereat;

Figure 5 is a similar view but showing the coupled parts of the elements severed off; and

Figure 6 is a fragmentary plan view of a piece of sliding-clasp fastener stringer with an element-free gap formed therein.

The sliding-clasp fastener stringer which is to be processed for gap production according to the invention comprises a pair of oppositely disposed stringer tapes T, T' each carrying along their adjacent longitudinal edges a row of continuous fastener elements E of for example a coiled structure attached by stitches S to the tapes, as shown in FIG. 6.

Referring now to the drawings and FIGS. 1 and 2 in particular, there is shown a gap forming apparatus 10 of the invention which comprises a ram member 11, a punch carrying block 12 connected to and vertically reciprocable with said ram member and a base 13 disposed in vertically spaced relation to the block 12 and carrying various operating parts hereinafter described.

Designated at 14, 14' are a first pair of spaced apart means cooperating with a second pair of similar means later described to grip therebetween the fastener stringer F. The first pair of gripping means 14, 14' project downwardly from the punch block 12 and are movable relative thereto through the medium of respective spring members 15, 15' accommodated in the block 12.

The second pair of gripping means 16, 16' are formed for purposes of illustration, integrally with and projecting upwardly from a die carrying block 17 which is mounted on the base 13 and held in movable relation thereto by means later explained.

There is provided means 18 for cutting the fastener elements E in cooperation with a die means later described, said cutting means being secured to the block 12 intermediate the first pair of spaced gripping means 14 and 14'.

The die means or cutting anvil 19 coacting with the cutting means or punch 18 is carried in the block 17 and held in movable relation thereto by a pair of spring members 20, 20' accommodated in the block 17 and connecting opposite sides of the anvil 19 to the block 17, as best shown in FIG. 2.

The cutting anvil 19 has upwardly inclined or tapered top surfaces 21, 21' against which the fastener tapes adjacent the elements E are allowed to rest during the gap

forming operation herein after described. In the apex of the tapered top of the cutting anvil 19 is formed an element-receiving recess 22 dimensioned to accommodate therein a length of two opposed interengaged fastener elements E as better seen in FIGS. 3 to 5. Centrally of the recess 22 is formed a punch-receiving opening 23 positioned in registry with the path of the cutting punch 18 and dimensioned to fit the width thereof. More specifically, the recess 22 is defined by coacting bladed edges 24,24' which coact with the cutting punch 18 in severing the elements E off the fastener chain F as best depicted in FIG. 5.

Designated at 25 is a sliding cam block mounted on the base 13 and horizontally slidable relative thereto. The cam block 25 has a first flat horizontal surface 26 and a second flat horizontal surface 27 higher in level than the first surface 26, said first surface 26 normally engageable with the bottom portion of the cutting anvil 19 and an upwardly inclined cam surface 28 adjoining said first and second surfaces normally engageable with a corresponding cam surface 29 formed on one side or the right-hand half of the anvil 19 as viewed in FIG. 2, the term normally being used to denote a retracted position of the anvil 19 prior to the spreading apart of the tape edges.

The gap forming apparatus of the invention as above constructed will be described with respect to its operation, reference now being made to FIGS. 3 to 5 of the drawing which are provided to illustrate the sequential steps of gap production.

The fastener F is mounted on the apparatus 10 with its stringer tapes T,T' opposite to the elements E interposed between the first and second grippers 14,14' and 16,16' respectively and with the coil elements E received in the recess 22, whereupon the first grippers 14,14' descend into abutting engagement with the second grippers 16,16' thereby to grip the tape fabric of the opposed stringers hard enough to prevent the latter from moving during subsequent spreading-apart and cutting operations. In this instance, the spring members 15,15' serve to take up excess pressure of the first grippers 14,14' which would otherwise tend to impair the tapes T,T'.

The sliding cam block 25 is now moved horizontally toward the left as viewed in FIG. 2 until the cam surface 28 disengages from the corresponding surface 29 of the anvil 19 and the bottom portion of the anvil 19 rides on the second surface 27 of the cam block 25. This movement of the cam block 25 causes the cutting anvil 19 to move upwardly relative to the die block 17 against tension in the springs 20,20'.

Thus, raising the cutting anvil 19 causes the interengaged parts E' of the coiled elements E within the recess 22 to pivot on themselves in a direction opposite to each other, with opposed tapes T,T' adjacent the elements E deflected upwardly along the tapered surfaces 21,21' respectively to spread apart the adjacent tape edges for a distance corresponding to the interengaged part E' to be severed.

It will redound to the advantageous features of the invention to note that the pivotal movement of the opposed elements E relative to each other about their interengaged parts E' as rendered possible by the aforesaid arrangement will facilitate the spreading-apart of the adjacent tape edges without imposing undue tension upon the stitches S.

The spreading-apart operation is followed by the cutting operation in which the cutting punch 18 moves vertically down into the opening 23 and in so doing coacts with the bladed edges 24,24' of the cutting anvil 19 thereby cutting the interengaged parts E' along a length corresponding to a desired gap to be formed, as depicted in FIG. 5.

WHAT WE CLAIM IS:

1. A method of forming an element-free gap in a continuous sliding clasp fastener stringer having a pair of oppositely disposed stringer tapes each carrying along their adjacent longitudinal edges a row of fastener elements whose coupling parts are interengaged, which method comprises gripping the stringer tapes at points opposite to the rows of coiled fastener elements, causing the interengaged parts of the fastener elements to pivot on themselves in a direction opposite to each other to spread apart the adjacent tape edges widely enough to expose therebetween said interengaged parts, and cutting the thus exposed interengaged parts off of the fastener elements along a length corresponding to a desired gap to be formed.

2. An apparatus for forming an element-free gap in a continuous sliding clasp fastener stringer having a pair of oppositely disposed stringer tapes each carrying along their adjacent longitudinal edges a row of coiled fastener elements whose coupling parts are interengaged, which apparatus comprises means for gripping the stringer tapes at points opposite to the row of fastener elements, means for pivoting the interengaged parts of the fastener elements on themselves in a direction opposite to each other to spread apart the adjacent tape edges widely enough to expose therebetween said interengaged parts, and means for cutting the thus exposed interengaged parts of the elements off of the fastener element.



12

forming operation herein after described. In the apex of the tapered top of the cutting anvil 19 is formed an element-receiving recess 22, dimensioned to accommodate therein a length of two opposed interengaged fastener elements E as better seen in FIGS. 3 to 5. Centrally of the recess 22 is formed a punch-receiving opening 23 positioned in registry with the path of the cutting punch 18 and dimensioned to fit the width thereof. More specifically, the recess 22 is defined by coacting bladed edges 24,24' which coact with the cutting punch 18 in severing the elements E off the fastener chain F as best depicted in FIG. 5.

Designated at 25 is a sliding cam block mounted on the base 13 and horizontally slidable relative thereto. The cam block 25 has a first flat horizontal surface 26 and a second flat horizontal surface 27 higher in level than the first surface 26, said first surface 26 normally engageable with the bottom portion of the cutting anvil 19 and an upwardly inclined cam surface 28 adjoining said first and second surfaces normally engageable with a corresponding cam surface 29 formed on one side of the right-hand half of the anvil 19 as viewed in FIG. 2, the term normally being used to denote a retracted position of the anvil 19 prior to the spreading apart of the tape edges.

The gap forming apparatus of the invention as above constructed will be described with respect to its operation, reference now being made to FIGS. 3 to 5 of the drawing which are provided to illustrate the sequential steps of gap production.

The fastener F is mounted on the apparatus 10 with its stringer tapes T,T' opposite to the elements E interposed between the first and second grippers 14,14' and 16,16' respectively and with the coil elements E received in the recess 22, whereupon the first grippers 14,14' descend into abutting engagement with the second grippers 16,16' thereby to grip the tape fabric of the opposed stringers hard enough to prevent the latter from moving during subsequent spreading-apart and cutting operations. In this instance, the spring members 15,15' serve to take up excess pressure of the first grippers 14,14' which would otherwise tend to impair the tapes T,T'.

The sliding cam block 25 is now moved horizontally toward the left as viewed in FIG. 2 until the cam surface 28 disengages from the corresponding surface 29 of the anvil 19 and the bottom portion of the anvil 19 rides on the second surface 27 of the cam block 25. This movement of the cam block 25 causes the cutting anvil 19 to move upwardly relative to the die block 17 against tension in the springs 20,20'.

Thus, raising the cutting anvil 19 causes the interengaged parts E' of the coiled elements E within the recess 22 to pivot on themselves in a direction opposite to each other, with opposed tapes T,T' adjacent the elements E deflected upwardly along the tapered surfaces 21,21' respectively to spread apart the adjacent tape edges for a distance corresponding to the interengaged part E' to be severed.

It will redound to the advantageous features of the invention to note that the pivotal movement of the opposed elements E relative to each other about their interengaged parts E' as rendered possible by the aforesaid arrangement will facilitate the spreading-apart of the adjacent tape edges without imposing undue tension upon the stitches S.

The spreading-apart operation is followed by the cutting operation in which the cutting punch 18 moves vertically down into the opening 23 and in so doing coacts with the bladed edges 24,24' of the cutting anvil 19 thereby cutting the interengaged parts E' along a length corresponding to a desired gap to be formed, as depicted in FIG. 5.

WHAT WE CLAIM IS:

1. A method of forming an element-free gap in a continuous sliding clasp fastener stringer having a pair of oppositely disposed stringer tapes each carrying along their adjacent longitudinal edges a row of fastener elements whose coupling parts are interengaged, which method comprises gripping the stringer tapes at points opposite to the rows of coiled fastener elements, causing the interengaged parts of the fastener elements to pivot on themselves in a direction opposite to each other to spread apart the adjacent tape edges widely enough to expose therebetween said interengaged parts, and cutting the thus exposed interengaged parts off of the fastener elements along a length corresponding to a desired gap to be formed.

2. An apparatus for forming an element-free gap in a continuous sliding clasp fastener stringer having a pair of oppositely disposed stringer tapes each carrying along their adjacent longitudinal edges a row of coiled fastener elements whose coupling parts are interengaged, which apparatus comprises means for gripping the stringer tapes at points opposite to the row of fastener elements, means for pivoting the interengaged parts of the fastener elements on themselves in a direction opposite to each other to spread apart the adjacent tape edges widely enough to expose therebetween said interengaged parts, and means for cutting the thus exposed interengaged parts of the elements off of the fastener element.

13

3. An apparatus for forming an element-free gap in a continuous sliding clasp fastener stringer having a pair of oppositely disposed stringer tapes each carrying along their adjacent longitudinal edges a row of coiled fastener elements whose coupling parts are interengaged, which apparatus comprises a vertically movable punch carrying block, a base disposed in vertically spaced relation thereto, a die carrying block mounted on said base, a first pair of gripping means projecting downwardly from said punch block and a second pair of gripping means projecting upwardly from said die carrying block, said first and second pairs of gripping means gripping therebetween the stringer tapes at points opposite to the rows of fastener elements, a die means carried in and movable relative to said die carrying block, said die means having upwardly inclined or tapered top surfaces against which the stringer tapes bear when said die means is in an upper position and an element-receiving recess in the apex of said tapered surfaces, means for moving said die means upward to bear against said stringer tapes to pivot of the fastener elements on themselves in a direction opposite to each other to spread apart the adjacent tape edges widely enough to expose therebetween said interengaged parts, and a cutting means secured to said punch carrying block intermediate said first pair of gripping means, said cutting means cooperating with said die means to cut the exposed interengaged parts of the elements

off of the fastener elements along a length corresponding to a desired gap to be formed.

4. An apparatus as defined in claim 3 which further includes a spring member connecting said first pair of gripping means resiliently to said punch carrying block.

5. An apparatus as defined in claim 3 which further includes a spring member adapted to connect said die means resiliently to said die carrying block.

6. An apparatus as defined in claim 5 wherein said means for moving said die means upward comprises a sliding cam block to move said die means vertically into and away from the position in which the interengaged parts of the fastener elements pivot on themselves in a direction opposite to each other.

7. A method of forming an element-free gap in a continuous sliding clasp fastener stringer, substantially as herein described with reference to and as illustrated in the accompanying drawings.

8. An apparatus for forming an element-free gap in a continuous sliding clasp fastener stringer, substantially as herein described with reference to and as illustrated in the accompanying drawings.

For the Applicants,
G. E. REDFERN & CO.,
St. Martin's House,
177 Preston Road,
Brighton, Sussex,
BN1 6BB.

Printed for Her Majesty's Stationery Office by The Tweeddale Press Ltd., Berwick-upon-Tweed, 1973
Published at the Patent Office, 25 Southampton Buildings, London, WC2A 1AY, from which copies may be obtained.

