Nov. 3, 1942. B. MEITNER 2,301,064

APPARATUS FOR USE IN THE MANUFACTURE OF SLIDING CLASP FASTENERS

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Fig. 1.

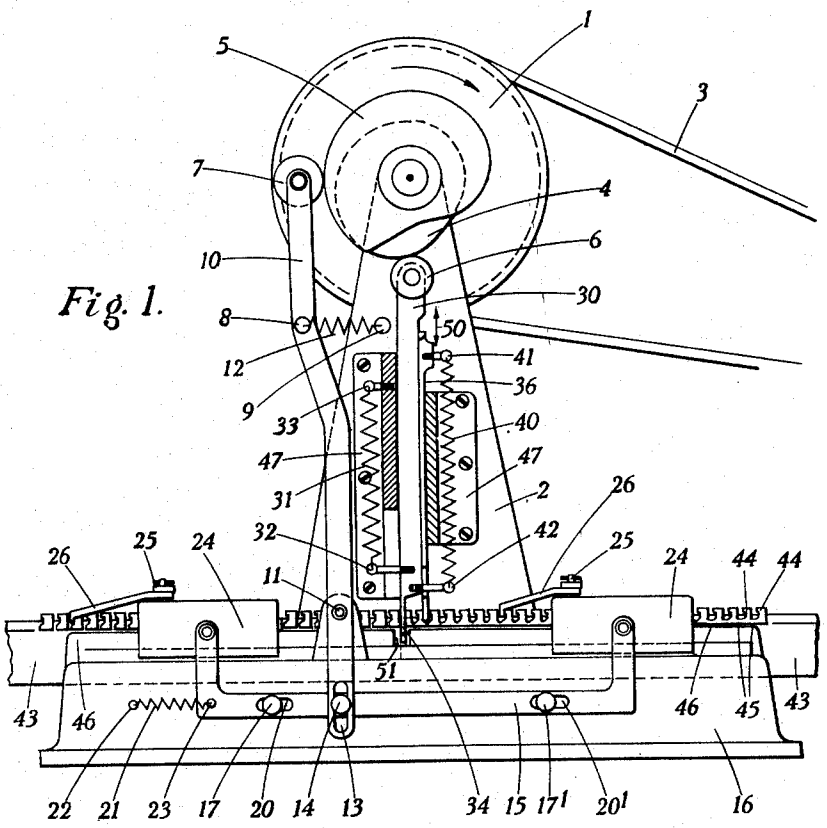

Fig. 2.

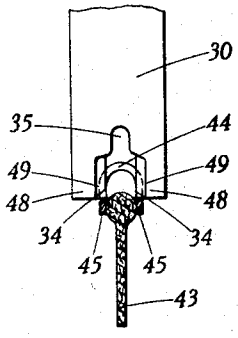

Fig. 3.

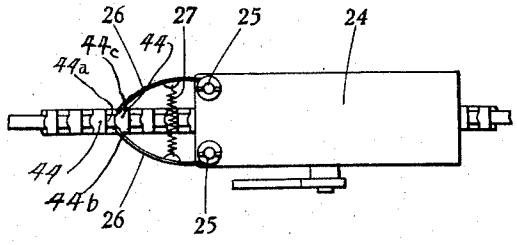

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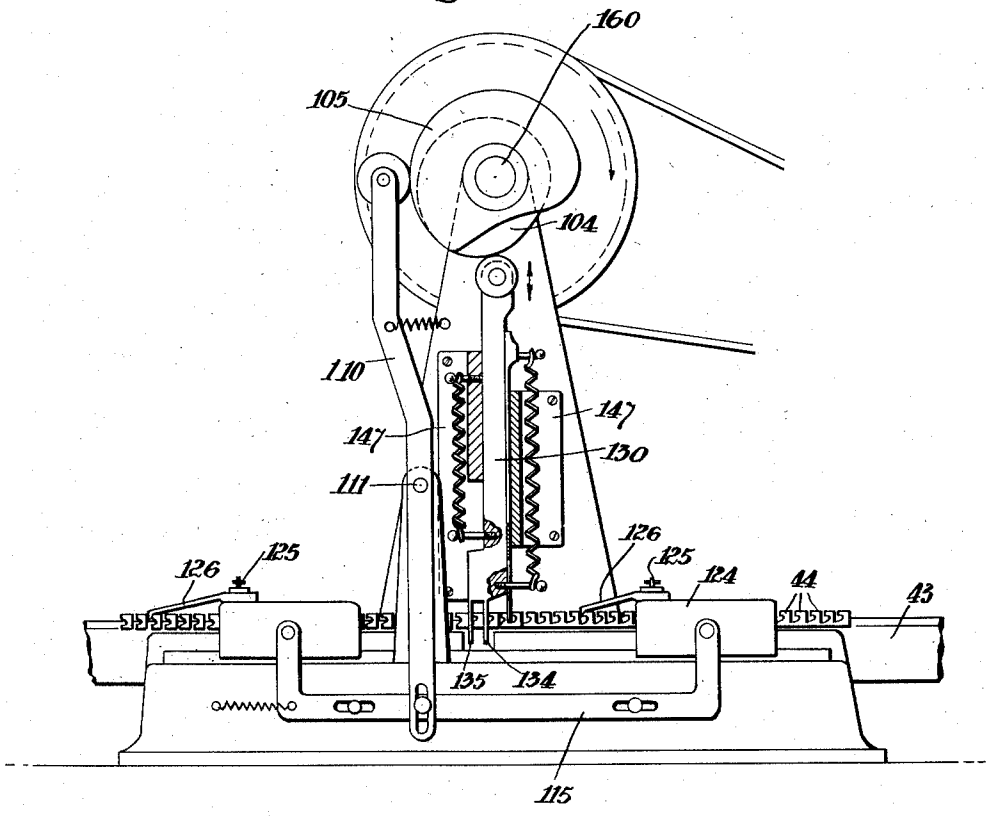
Fig. 4



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APPARATUS FOR USE IN THE MANUFACTURE OF SLIDING CLASP FASTENERS

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In Great Britain September 23, 1939

15 Claims. (Cl. 164—48)

My invention relates to the manufacture of sliding clasp fasteners, and more particularly to an apparatus for separating fastener elements attached in a connected row to a pliable tape.

An object of my invention is to provide an inexpensive and practical apparatus of above described type, by means of which an automatic, accurate and fast separation of the connected fastener elements may be obtained.

In order to carry out my invention in practice, I provide an apparatus for use in the manufacture of sliding clasp fasteners for separating fastener elements attached in a connected row to a pliable carrier, comprising a carrier-feeding device, means for actuating said feeding device intermittently to advance said carrier a distance of a predetermined number of fastener elements at a time, a cutter provided with pairs of cutting edges, the number of said pairs being equal to the number of fastener elements being fed, said cutter being arranged to engage and sever a number of connections between adjacent fastener elements equal to the number of fastener elements being fed, a positioning device arranged to engage and position with respect to said cutter unseparated elements in the vicinity of said cutter, and means for actuating said cutter and said positioning device in timed relationship to the feeding movements of said feeding device so as to render said cutter and positioning device operable in the intervals between successive feeding movements.

Embodiments of the invention are illustrated by way of example in the accompanying diagrammatic drawings wherein:

Fig. 1 is a side elevation of the apparatus,

Fig. 2 is a view of the cutter of the apparatus taken at right angles to Fig. 1,

Fig. 3 is a fragmentary plan view showing details of the carrier feeding device, and

Fig. 4 is a side elevation of a different embodiment of the apparatus.

Referring to Figs. 1–3, a driving pulley 1 journalled on a bracket for rotation by a belt 3 has two cam discs 4 and 5 fixed on the shaft of the pulley 1 or otherwise mounted so as to rotate therewith. A lever 10 pivoted intermediate its ends at 11 carries at one end a roller 7 which is held in engagement with the edge of the cam 5 by a spring 12 attached to the lever 10 at 8 and to the bracket 2 at 9. The other end of the lever is slotted at 13 and engages a stud 14 on a slide bar 15 which is mounted on the base 16 of the apparatus by means of studs 17 and 17' on the base 16 engaging in slots 20 and 20' in the bar 15. The bar 15 is normally urged towards the left in Fig. 1 by the pull of the spring 12 on the lever 10. A spring 21 fixed to the base 16 at 22 and to the bar 15 at 23 may, if desired, be provided to assist the action of the spring 12.

The base 16 has a narrow channel shaped guide 46 to receive and support a sliding clasp fastener tape or other carrier 43 on which a row of fastener elements 44 straddling the tape is tightly mounted. Said row of fastener elements 44 has connecting portions 45 between the legs of the fastener elements gripping the edge of the tape 43. The bar 15 has upturned ends to each of which is secured an inverted channel member 24 which straddles the guide 46 to allow free passage for the tape 43. As shown more clearly in Fig. 3, each member 24 has secured thereto as at 25 a pair of pawls in the form of leaf springs 26, which are normally urged towards each other by their own resiliency, or preferably by a spring 27. The pawls 26 are arranged in such a way, that they abut against the surface 44a of a fastener element for feeding the carrier through the medium of the tightly mounted fastener element during an active stroke of the member 24 to the left as viewed in Fig. 3, and that they slide along opposite side surfaces 44b and 44c of a fastener element during a return movement of the member 24 to the right as viewed in Fig. 3. In other words, the fastener elements act like ratchet teeth in their cooperation with the pawls 26.

Slidably mounted in suitable guides 47 on the bracket 2 are a cutter 30 and a positioning rod 36. The cutter 30 carries a roller 6 at its upper end which is held in engagement with the edge of the cam 4 by means of a spring 31 attached to the cutter 30 at 32 and to the guide 47 at 33. As more clearly shown in Fig. 2, the lower end of the cutter 30 is bifurcated at 35 in such a fashion as to permit it to pass between adjacent fastener elements 44, while the bifurcated ends 48 are reduced in thickness by shoulders 49 to provide thinner portions 34 which are made into cutting edges.

The positioning rod 36 is supported by a spring 40 attached at one end to the rod at 41 and at the other end to the cutter 30 at 42, this arrangement allowing the rod a limited sliding movement relatively to the cutter 30, as indicated by the arrow 50.

The operation of the described apparatus is as follows:

The pulley 1 is rotated in a clockwise direction as seen in Fig. 1 so as similarly to rotate the

cams 4 and 5. Under control of the cam 5 the lever 10 is moved and thus moves the slide bar 15 towards the left a distance of one fastener element and thus advance the tape 43 by this amount. After this feeding movement has taken place the lever 10 is returned under the control of the cam 5 and the action of the spring 12, thus retracting the pawls 26 to engage the next fastener element in readiness for the next feeding movement. The timing of the cams 4 and 5 is such that between successive feeding movements of the pawls 26 under control of the cam 5, the cutter 30 and positioning rod 36 are operated and retracted under control of the cam 4. The cutter 30 and positioning rod 36 are first moved bodily downwards, their arrangement being such that the positioning rod 36 engages between adjacent unseparated fastener elements in the immediate vicinity of the cutter before the cutter reaches its cutting position. The purpose of the rod 36 is to position accurately the fastener elements immediately in the vicinity of the cutter so as to ensure that the cutter operates at the correct place on the row of connected fastener elements. In the specific embodiment being described the positioning rod 36 engages the row of elements two elements behind the cutter as viewed in the direction of feed of the tape. After the rod 36 has been brought into operative position the cam 4 causes the straddling cutter 30 to move downwards relatively to the rod 36 and into operative position where the cutting edges 34 engage and sever the connecting portions 45 between two adjacent fastener elements on each side of the tape 43, and at the same time the shoulders 49, which together constitute a gauge, press the sides of the element being severed to the correct width that the elements should have. The tape guide 46 is slotted at 51 to accommodate the downward travel of the cutter 30 during the actual severing movement. After the severing of an element has been completed, the cutter 30 is raised under control of the cam 4 and the action of the spring 31, the first movement of the cutter being to raise the cutting edges 34 free from the severed connections 45 while the rod 36 remains in operative position, the cutter 30 and rod 36 subsequently being lifted bodily clear of the row of elements. With the disengagement of the cutter and positioning rod from the fastener elements completed, the tape is ready to be advanced again preparatory to the severing of the next fastener element. Thus, the feeding device 10, 15, 24 is intermittently advanced by the actuating means 5 to advance the tape or pliable carrier 43 step by step.

In addition to its prime function of correctly locating the fastener element to be operated upon by the cutter, the rod 36 also assists in holding the tape in position while the pawls 26 are retracted. The rod 36 keeps in position that part of the tape to the right of the rod, while the stiffness of the tape combined with the narrowness of the guide 46 retains in position that part of the tape to the left of the rod 36. The tape may in known manner be tensioned towards the left for example, by rollers, (not shown), which will additionally assist in retaining in position that part of the tape to the left of the rod 36 during retracting of the left-hand pair of pawls 26. It will be appreciated that two sets of pawls 26 are required in order to provide for continuity of feed of the tape through the apparatus. When the tape is first inserted at the right of Fig. 1, the right-hand pair of pawls 26 will effect the feeding movement and when the tape reaches the left-hand pair of pawls 26 both sets of pawls will feed together. When the tape has left the right-hand pair of pawls the left-hand pair will work alone until the end of the tape is reached. It may be mentioned that the fastener elements 44 are mounted tightly enough on the tape 43, that a single element 44 severed from adjacent elements 44 will carry the feed stroke and advance the tape 43 without slipping when such a single element is engaged by the left-hand pair of pawls 26.

While a specific embodiment of apparatus has been described for the purpose of more fully explaining and illustrating the invention, many modifications of construction may be made therein without departing from the invention. For example, instead of equipping the cutter with a single pair of cutting edges 34 and arranging for the carrier feed to advance the carrier a distance of one fastener element at a time as shown in Fig. 1, the cutter may be equipped with a plurality of pairs of cutting edges, for example two pairs of cutting edges 134, 135 as shown in Fig. 4, and the feed adapted to advance the carrier a corresponding number of elements at a time. In this case, the elements would be severed successively in groups instead of individually as in the former case. Again, instead of arranging for the carrier feed and coacting cutter and positioning device to be actuated once per revolution of the driving pulley of the apparatus, the cams controlling the actuation of these parts may be contoured so that these parts are actuated a number of times, say twice, per revolution of the driving pulley. Also, instead of employing a carrier feed of the shuttle or reciprocating character described, any other suitable step-by-step feeding device may be used; for instance, by means of one or more toothed wheels meshing with the fastener elements and rotated step-by-step a tooth or a given number of teeth at a time.

According to Fig. 4, the cutter 130 slidably arranged in guides 147 has two pairs of cutting edges 134 and 135 for a simultaneous cutting of two connections between adjacent fastener elements 44 attached in a connected row to the pliable tape 43. The cutter 130 is reciprocated by the cam 104 keyed to the main shaft 160. The feeding device 115, 124, 125, 126 is actuated by the lever 110 controlled by the cam 105 keyed to the main shaft 160. The distance between the pivot point 111 and the stud 114 is of such a length, that during each stroke of the feeding device 115, 124, 125, 126 to the left the tape or carrier 43 is advanced through a distance equal to two fastener elements 44. All the other elements of the apparatus shown in Fig. 4 are similar to the corresponding elements of the apparatus shown in Fig. 1 and do not need to be described further.

Apparatus embodying the invention is particularly suitable for use in the manufacture of sliding clasp fasteners which have their fastener elements made of non-metallic materials such as celluloid or other cellulosic substances, synthetic resins and analogous substances, all now commonly embraced in the term "plastics" as well as being suitable also for the manufacture of fasteners having metallic fastener elements.

It will be appreciated from the foregoing description that the invention provides an apparatus with which the separation of the fastener elements may be effected with greater speed and

precision than was attainable with the devices hitherto used in the manufacture of sliding clasp fasteners, by reason of the automaticity, continuity and regularity afforded by the apparatus to the feeding of the carrier and the severing of the elements.

I claim:

1. Apparatus for use in the manufacture of sliding clasp fasteners for separating fastener elements attached in a connected row to a pliable carrier, comprising a carrier-feeding device, means for actuating said feeding device intermittently to advance said carrier step by step, a cutter arranged to engage and sever the connexions between adjacent fastener elements, a positioning device arranged to engage and position with respect to said cutter unseparated elements in the vicinity of said cutter, means for actuating said cutter and said positioning device in timed relationship to the feeding movements of said feeding device so as to render said cutter and positioning device operable in the intervals between successive feeding movements, and a gauge adapted to bear against the sides of the fastener elements and to press them to a predetermined width.

2. Apparatus for use in the manufacture of sliding clasp fasteners for separating fastener elements attached in a connected row to a pliable carrier, comprising a carrier-feeding device, means for actuating said feeding device intermittently to advance said carrier step by step, a cutter arranged to engage and sever the connexions between adjacent fastener elements, a positioning device arranged to engage and position with respect to said cutter unseparated elements in the vicinity of said cutter, means for actuating said cutter and said positioning device in timed relationship to the feeding movements of said feeding device so as to render said cutter and positioning device operable in the intervals between successive feeding movements, said cutter being bifurcated at its cutting end, the bifurcated parts being formed with a pair of cutting edges and a pair of shoulders adjacent said edges which define a gauge adapted to bear against the sides of the fastener elements and to press them to a predetermined width.

3. Apparatus for use in the manufacture of sliding clasp fasteners for separating fastener elements attached in a connected row to a pliable carrier, comprising a carrier-feeding device, means for actuating said feeding device intermittently to advance said carrier step by step, guiding means, a cutter slidably mounted in said guiding means and adapted for reciprocating movement to engage and sever the connexions between adjacent fastener elements, a positioning device slidably mounted in said guiding means and adapted for reciprocating movement to engage and position with respect to said cutter unseparated elements in the vicinity of said cutter, said cutter and said positioning device being arranged for bodily movement together and such that the said positioning device reaches its operative position in advance of said cutter, said positioning device and said cutter having a limited movement relatively to each other so as to allow movement of the cutter while the positioning device is arrested, and means for actuating said cutter and said positioning device in timed relationship to the feeding movements of said feeding device so as to render said cutter and positioning device operable in the intervals between successive feeding movements.

4. Apparatus for use in the manufacture of sliding clasp fasteners for separating fastener elements attached in a connected row to a pliable carrier, comprising a channel-shaped guide for receiving and supporting said carrier, a feeding device actuated intermittently for advancing said carrier step by step along said guide, a cutter and a positioning rod slidably mounted laterally with respect to said guide and adapted to be reciprocated towards and away from said guide, said positioning rod being mounted on said cutter so as to have a limited longitudinal movement relatively to said cutter, said cutter having at its extremity adjacent said guide a pair of cutting edges adapted to engage and sever the connexions of a fastener element to the next element on said carrier, and the extremity of the positioning rod adjacent the guide being adapted to engage between adjacent fastener elements in the vicinity of said carrier and behind the same in the direction of the carrier feed.

5. Apparatus as defined in claim 4, wherein said feeding device comprises a reciprocatable member and a pair of pawls carried by said member, said pawls being arranged with respect to said carrier guide so as to engage opposite sides of the fastener elements on the carrier in sidewise direction such that said elements cooperate with said pawls in the manner of ratchet teeth.

6. Apparatus as defined in claim 4, and comprising a driving shaft, and cams mounted on said shaft for actuating said carrier feeding device, said cutter and said positioning device.

7. Apparatus as defined in claim 4, and comprising a driving shaft and cams mounted on said shaft for actuating said carrier feeding device, said cutter and said positioning device, said cams being contoured to provide for one feeding movement and cutting operation per revolution of the cams.

8. An apparatus for use in the manufacture of sliding clasp fasteners for separating fastener elements attached in a connected row to a pliable carrier, comprising: a drive, a carrier-feeding means, a first actuating member for actuating said feeding means intermittently to advance said carrier a distance of a predetermined number of fastener elements at a time, a cutter provided with pairs of cutting edges, the number of said pairs being equal to the number of fastener elements being fed, said cutter being arranged to engage and sever a number of connections between adjacent fastener elements equal to the number of fastener elements being fed, a positioning device arranged to engage and position with respect to said cutter unseparated elements in the vicinity of said cutter, and a second actuating member for actuating said cutter and said positioning device in timed relationship to the feeding movements of said feeding means so as to render said cutter and positioning device operable in the intervals between successive feeding movements, said drive being arranged to actuate said two actuating members.

9. In an apparatus for use in the manufacture of sliding clasp fasteners for separating fastener elements, a pliable carrier having the fastener elements attached thereto in a connected row, a carrier feeding device, means for actuating said feeding device intermittently to advance said carrier a distance of a predetermined number of fastener elements at a time, a cutter arranged to engage and sever a number of connections between adjacent fastener elements equal to the number of fastener elements being fed, a posi-

tioning device arranged to engage and position with respect to said cutter unseparated elements in the vicinity of said cutter, means for actuating said cutter and said positioning device in timed relationship to the feeding movements of said feeding device so as to render said cutter and positioning device operable in the intervals between successive feeding movements, and carrier feeding means, said carrier guiding means being arranged on each side of the cutter.

10. In an apparatus for use in the manufacture of sliding clasp fasteners for separating fastener elements, a pliable carrier having the fastener elements attached thereto in a connected row, a driving shaft, carrier-feeding means, a first actuating member for actuating said feeding means intermittently to advance said carrier a distance of a predetermined number of fastener elements at a time, a cutter provided with pairs of cutting edges, the number of said pairs being equal to the number of fastener elements being fed, said cutter being arranged to engage and sever a number of connections between adjacent fastener elements equal to the number of fastener elements being fed, a positioning device arranged to engage and position with respect to said cutter unseparated elements in the vicinity of said cutter, a second actuating member for actuating said cutter and said positioning device in timed relationship to the feeding movements of said feeding means so as to render said cutter and positioning device operable in the intervals between successive feeding movements, and cams mounted on said driving shaft for actuating said two actuating members.

11. An apparatus as claimed in claim 10, said cams being contoured to provide for one feeding movement and cutting operation per revolution of the cams.

12. An apparatus for use in the manufacture of sliding clasp fasteners for separating fastener elements attached in a connected row to a pliable carrier, comprising a carrier-feeding device, means for actuating said feeding device intermittently to advance said carrier a distance of a predetermined number of fastener elements at a time, a cutter provided with pairs of cutting edges, the number of said pairs being equal to the number of fastener elements being fed, said cutter being arranged to engage and sever a number of connections between adjacent fastener elements equal to the number of fastener elements being fed, a positioning device arranged to engage and position with respect to said cutter unseparated elements in the vicinity of said cutter, and means for actuating said cutter and said positioning device in timed relationship to the feeding movements of said feeding device so as to render said cutter and positioning device operable in the intervals between successive feeding movements.

13. An apparatus for use in the manufacture of sliding clasp fasteners for separating fastener elements attached to a pliable carrier in a row having connecting portions between the gripping legs of the fastener elements, comprising a carrier-feeding device, means for actuating said feeding device intermittently to advance said carrier a distance of one fastener element at a time, a straddling cutter provided with a single pair of bifurcated cutting edges, said cutter being arranged to engage and sever the connecting portions between the gripping legs of two adjacent fastener elements, a positioning device arranged to engage and position with respect to said cutter unseparated elements in the vicinity of said cutter, and means for actuating said cutter and said positioning device in timed relationship to the feeding movements of said feeding device so as to render said cutter and positioning device operable in the intervals between successive feeding movements.

14. An apparatus as claimed in claim 12, wherein said carrier-feeding device comprises a reciprocable member, and a pair of pawls carried by said member, and said pawls being arranged to engage opposite sides of the fastener elements on the carrier in sidewise direction such that said elements cooperate with said pawls in the manner of ratchet teeth.

15. In an apparatus for use in the manufacture of sliding clasp fasteners for separating fastener elements, a pliable carrier having the fastener elements attached thereto in a row with connecting portions between the gripping legs of the fastener elements, a carrier feeding device, means for actuating said feeding device intermittently to advance said carrier a distance of a predetermined number of fastener elements at a time, a straddling cutter provided with pairs of bifurcated cutting edges, the number of said pairs being equal to the number of fastener elements being fed, said cutter being arranged to engage and sever the connecting portions between the gripping legs of adjacent fastener elements being fed, a positioning device arranged to engage and position with respect to said cutter unseparated elements in the vicinity of said cutter, and means for actuating said cutter and said positioning device in timed relationship to the feeding movements of said feeding device so as to render said cutter and positioning device operable in the intervals between successive feeding movements.

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