Nov. 24, 1942. C. G. JOHANNESMEYER 2,302,910

SLIDE FASTENER MACHINE

Filed July 1, 1940 4 Sheets-Sheet 1

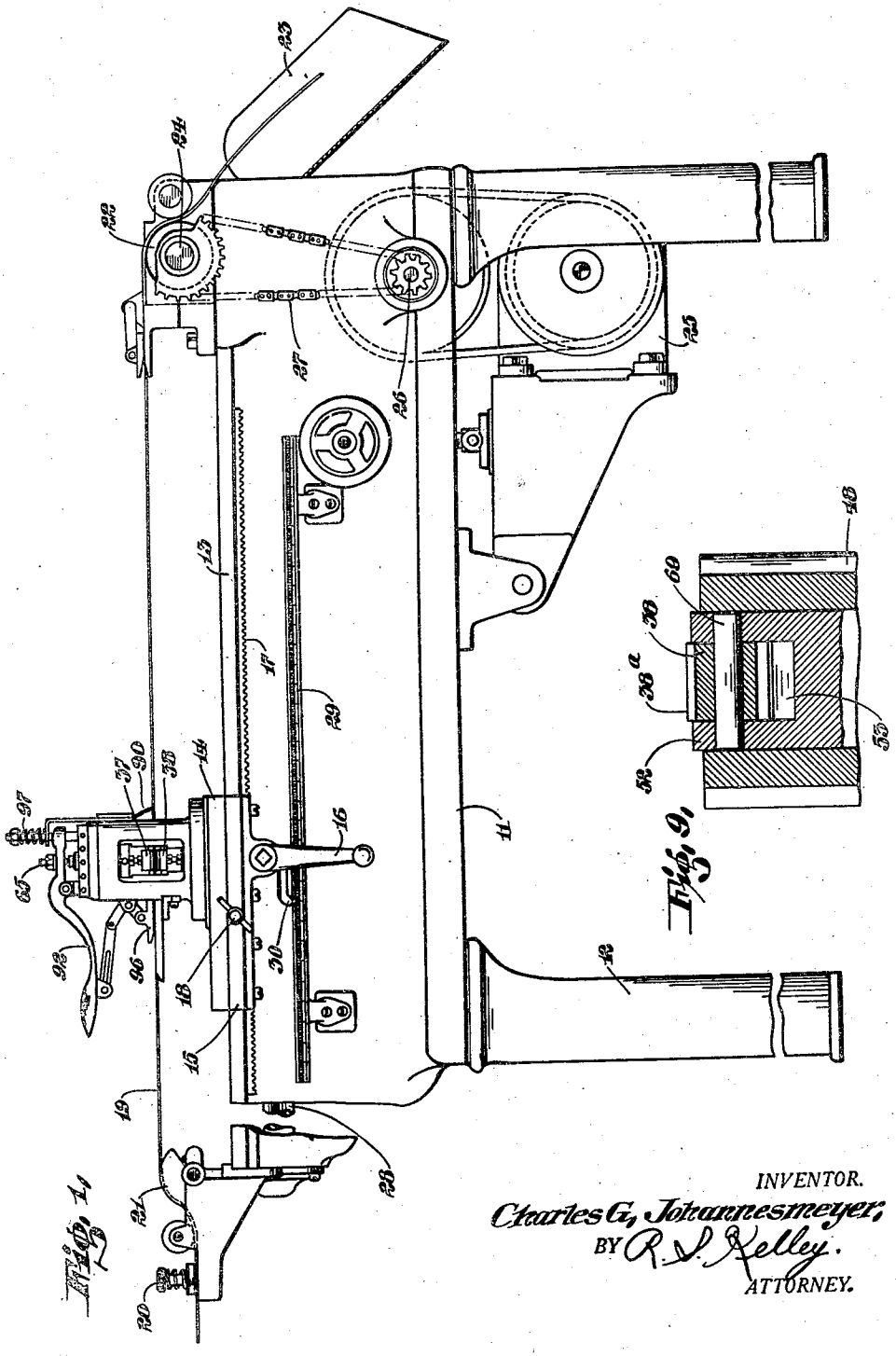


Fig. 9.

INVENTOR.
Charles G. Johannesmeyer,
BY R. L. Kelley.
ATTORNEY.

Nov. 24, 1942. C. G. JOHANNESMEYER 2,302,910

SLIDE FASTENER MACHINE

Filed July 1, 1940 4 Sheets-Sheet 2

Fig. 2.

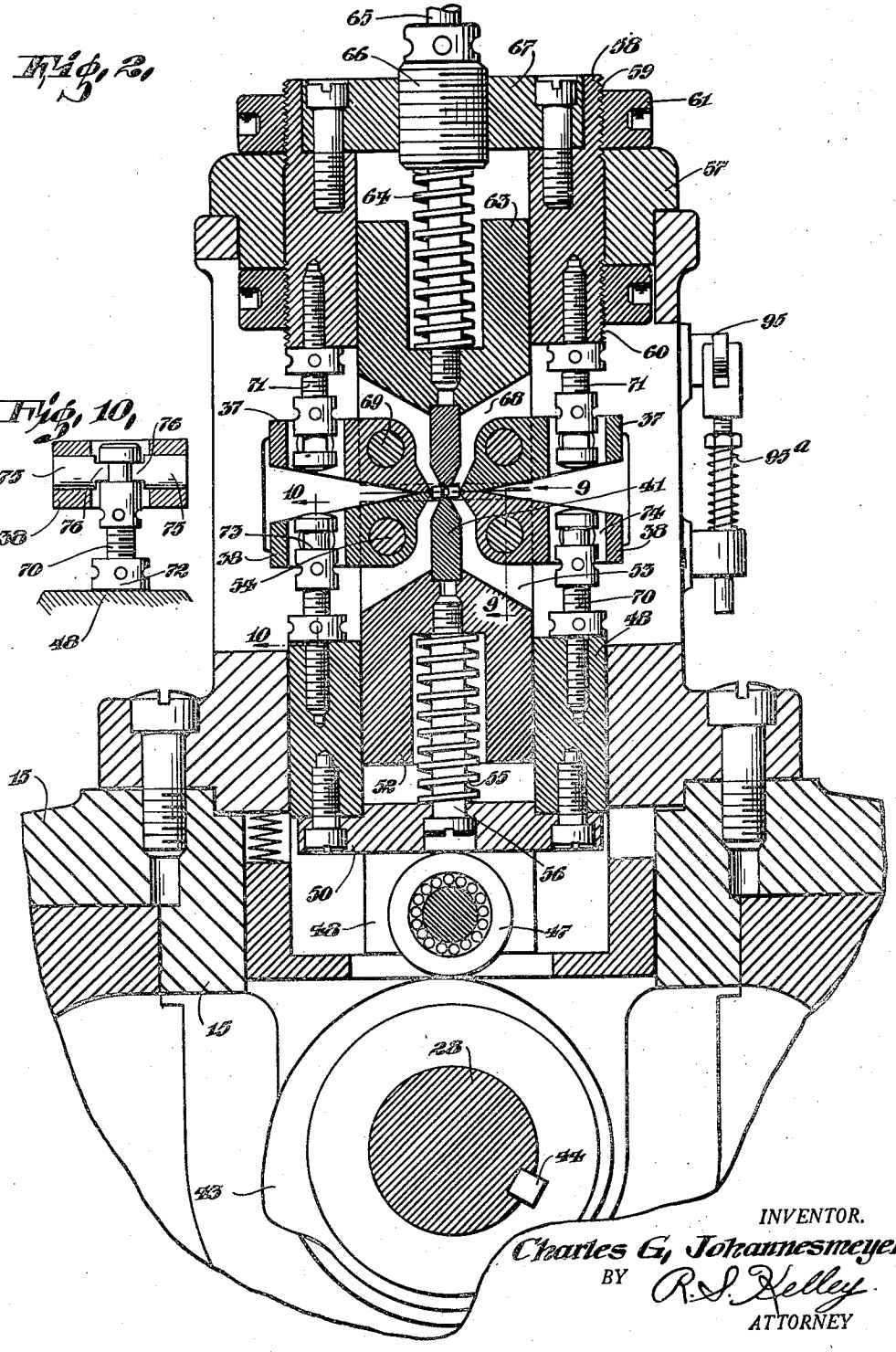


Fig. 10.

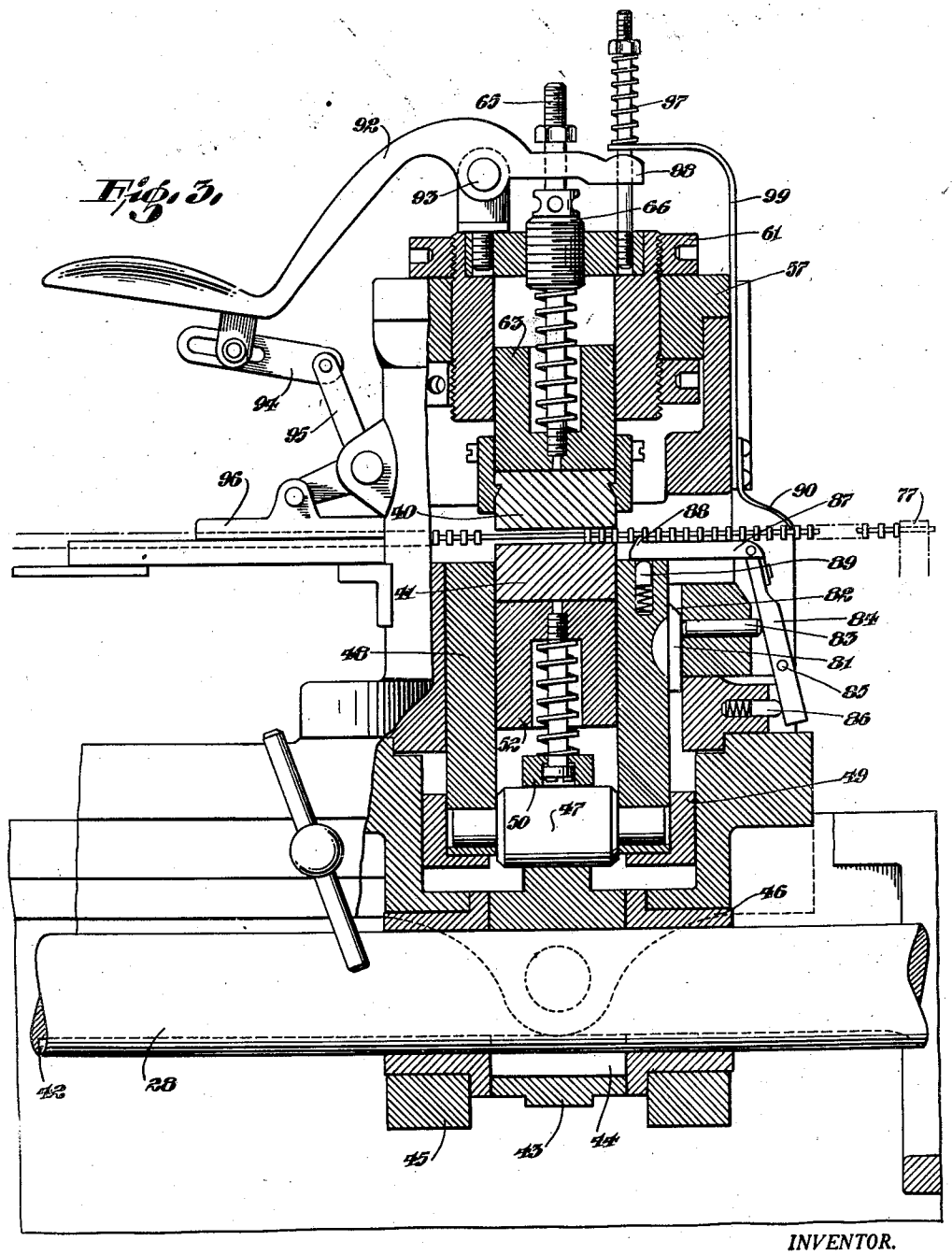
INVENTOR.
Charles G. Johannesmeyer,
BY R. S. Kelley
ATTORNEY

Nov. 24, 1942. C. G. JOHANNESMEYER 2,302,910

SLIDE FASTENER MACHINE

Filed July 1, 1940 4 Sheets-Sheet 3

Fig. 3.



INVENTOR.
Charles G. Johannesmeyer,
BY R. S. Kelley.
ATTORNEY.

Nov. 24, 1942. C. G. JOHANNESMEYER 2,302,910

SLIDE FASTENER MACHINE

Filed July 1, 1940 4 Sheets-Sheet 4

Fig. 4.

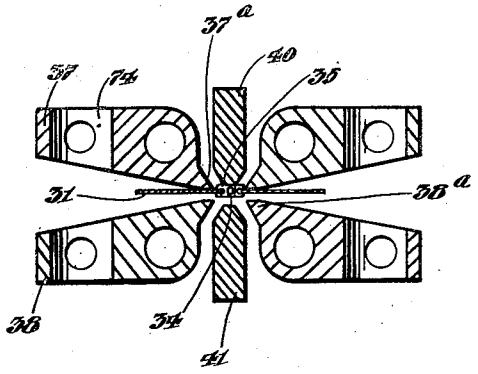


Fig. 5.

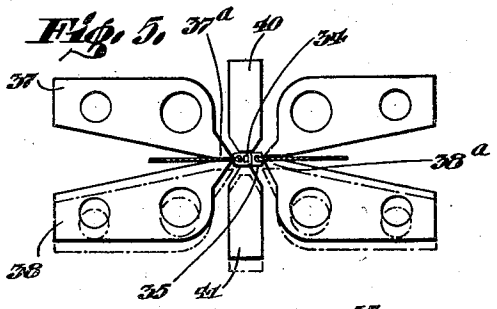


Fig. 6.

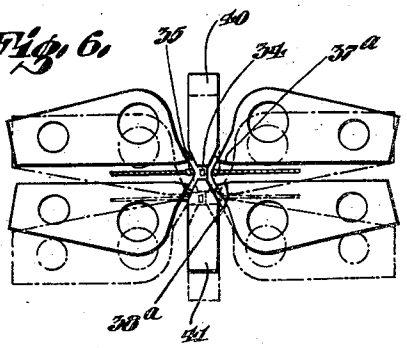


Fig. 7.

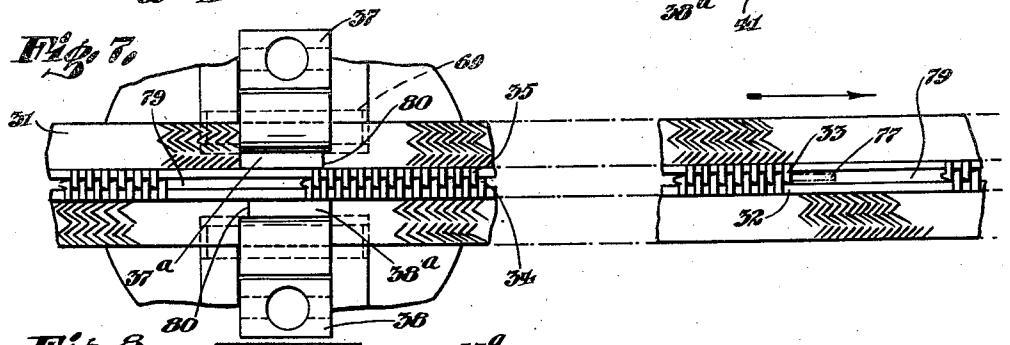
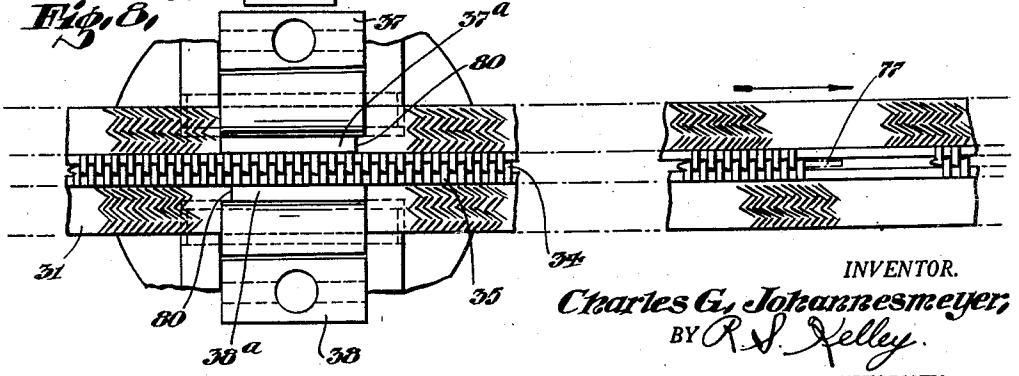


Fig. 8.



INVENTOR.
Charles G. Johannesmeyer,
BY R. S. Kelley.
ATTORNEY.

Patented Nov. 24, 1942 2,302,910

UNITED STATES PATENT OFFICE

2,302,910

SLIDE FASTENER MACHINE

Charles G. Johannesmeyer, Meadville, Pa., assignor to Talon, Inc., a corporation of Pennsylvania

Application July 1, 1940, Serial No. 343,415

12 Claims. (Cl. 153—1)

My invention relates to slide fastener manufacture and more particularly to an improved automatic machine for removing from slide fastener stringers certain of the fastener elements after they have been once attached to the tapes of the stringers.

In slide fastener manufacture it is customary to make long lengths of so-called stringers consisting usually of a beaded edge tape and groups of fastener elements attached to the beaded edge. The groups may be of almost any length from three inches to forty-eight inches or more, depending upon the length of fastener being manufactured. Between the groups there is a blank space on the tape where no elements are attached which provides, after the individual groups are cut apart, free tape ends necessary for a purpose well known in the art.

In one system of manufacture, the automatic machines which make these fastener stringers make the groups of the proper length as closely as possible, usually under the control of a gap spacing mechanism, which depends upon the actual number of fastener elements in the group. Due to various factors, however, including the stretchability and other characteristics of the fabric, weather conditions and tool conditions, there is a slight variation in the length of the groups of fastener elements and for that reason, it is often necessary to set the stringer making machine to make a slightly longer group than results in the finished fastener members to reduce the length to the specifications of the finished product.

In other slide fastener manufacturing methods, the stringer making machine instead of providing gaps between the groups, will make what is termed a solid chain of stringer, in which the fastener elements extend continuously along the edge of the tape. It is then necessary to remove some of the fastener elements to provide gaps or vacant spaces on the tape, thus providing spaced-apart groups of definite length.

The general object of my invention is to provide an improved automatic machine for removing attached fastener elements from slide fastener stringers for either of the purposes above set forth.

Another object of the invention is to provide a machine which will remove the fastener elements without injuring the beaded edge or other fabric portions of the tape.

Still another object of my invention is to provide a machine which will automatically and accurately locate the fastener stringer with respect to the fastener element removing tools so that the group of fastener members may be of the desired accurate length and so that there shall not remain upon the fabric any mutilated fastener members.

Another object of my invention is to provide a machine which is automatic and simple in operation, and in which the replacement cost of working tools is reduced to a minimum.

Other objects and advantages of my invention will hereinafter more fully appear.

In the accompanying drawings I have shown for purposes of illustration one embodiment which my invention may assume in practice. In the drawings:

Fig. 1 is a front elevational view of my improved machine for removing fastener elements from slide fastener stringers, parts of the machine being shown schematically;

Fig. 2 is a vertical cross-sectional view through the fastener element removing mechanism on the line transverse to Fig. 1;

Fig. 3 is a vertical central cross-sectional view at right angles to Fig. 2;

Figs. 4, 5 and 6 are fragmentary views showing different positions of the fastener element removing tools;

Fig. 7 is a plan view illustrating the use of my improved machine for the purpose of removing excess fastener elements at the end of a group along a slide fastener stringer;

Fig. 8 is a plan view illustrating the use of my improved machine to remove sufficient fastener elements from a solid chain or stringer to provide the required gap spacing; and

Figs. 9 and 10 are detailed sections taken on lines 9—9 and 10—10 respectively of Fig. 2.

The machine illustrated consists generally of a rather heavy frame or bed 11 supported on suitable legs 12. The top of the bed is formed with longitudinally extending carriage guideways 13. The carriage 14 carries the fastener element removing mechanism and has guides 15 cooperating with the guideways 13 and is moved along the guideways by means of a crank 16 which turns a small spur gear (not shown) meshing with the rack 17. The carriage may be locked in place at any desired position on the guideway by means of a thumb and set-screw 18. The slide fastener stringer generally designated 19, feeds into the machine through a spring tensioning device 20 over a drum 21 supported at one end of the frame of the machine. It is pulled through the fastener element removing mechanism by a power driven drum 22 and finally feeds out through a chute

23. A conventional adjustable friction clutch is interposed between the drum 22 and its supporting shaft 24 to maintain a uniform pull on the fastener stringers, so that when a certain resistance is offered to movement of the stringer, the clutch 22 will slip and allow the stringers to remain stationary until such resistance is removed.

A motor 25 is supported on the underside of the machine bed and is belt-connected to a cross-shaft 26. The drum shaft 24 is driven from the shaft 26 by suitable means including the chain 27. A longitudinally extending shaft 28 is driven from the shaft 24 by any suitable means including bevel gearing and a single revolution clutch which is of conventional design and therefore not shown in the drawing. A scale 29 is provided on the front of the machine and a pointer 30 supported on the carriage 14 indicates accurately the position of the carriage for a purpose which will be later explained.

While a machine may be built in accordance with my invention for removing the fastener elements from only one slide fastener stringer at a time, the preferred form provides means for removing fastener elements from two mated stringers. Referring to Fig. 7 showing a portion of the mated stringers on an enlarged scale each of the stringers comprises tapes 31 having beaded edges 32 and fastener elements 33 on the beaded edges. Each fastener element comprises a head 34 and legs 35 clamped around the beaded edge of the stringer. It will be noted that the fastener elements on one stringer are staggered with relation to those on the other stringer and the heads of the elements on the two stringers are interengaged and interlocked. Fig. 7 illustrates a condition wherein the group 36 of fastener elements is slightly longer than the desired length so that it is necessary to remove three fastener elements, two from one side and one from the other. The stringer is shown in Fig. 7 in position for having these fastener elements removed and the two upper fastener element removing tools 37 are shown with their claw or knife edges 37a in engagement with the ends of the legs of the fastener elements to be removed. Fig. 5 better illustrates these not only the upper removing tools 37 but also the lower removing tools 38 which are on the opposite side of the tape and having their claw or knife edges 38a in engagement with the ends of the legs of the fastener elements on the lower side of the tape.

The general principle of removing these fastener elements can now be seen from Figs. 5 and 6. Upper and lower holding tools 40 and 41, respectively, are firmly clamped on the central portions of the interengaged fastener elements, that is, the interlocked head portions. The removing or leg bending tools are now moved from the position of Fig. 5 to Fig. 6. The actual movement from the position of Fig. 5 to Fig. 6 can be understood only after the description of the operating mechanism which follows, but for purposes of understanding the broad principle of leg bending, it can be assumed that the clamping tools all swing about an axis through the larger of the two openings shown in each tool. In view of the fact that the axes of this swinging movement are spaced substantial distances on opposite sides of the tape away from the plane of the tape, the knife edge ends of the bending tools will first dig into or under the ends of the legs of the fastener elements thereby making a firm engagement with them. It is in this sense that the bending tools are referred to herein and in the appended claims, as engaging between the tape and the legs of the fastener elements. This is due to the fact that the knife edges swing in an arc about the above mentioned axes of pivoting, which arcs swing inwardly toward the heads and outwardly from the tape. This action serves to open the legs of the fastener elements to a spread or open position as shown in Fig. 6, where they may easily drop or be pushed away from the tapes. It will be observed that the portions of the bending tools adjacent the tapes are beveled off so that their knife edges will not dig into and injure the tapes.

Referring now to the operating mechanism for the leg opening or bending tools shown most clearly in Figs. 2 and 3, the main drive shaft 28 which extends longitudinally through the bed of the machine is provided with a keyway 42 and a plate cam 43 is keyed to this shaft by a key 44. This cam is mounted between two depending brackets 45 depending from the carriage 14, bushings 46 being placed between the holes in these brackets and the shaft 28 so that the shaft turns freely in the bushings and so that the cam 43 moves with the carriage along the drive shaft 28. The cam follower 47 is journalled at opposite ends in a housing 48 which moves up and down supported at its lower end by guides 49 positioned between the housing and the frame of the carriage 14. This follower bears against the bottom plate 50 attached by suitable screws to the vertical movable housing 48. Slidably mounted in this housing is the bottom tool carriage 52 which at its upper end is provided with slots 53 into which the bottom leg bending tools 38 are pivotally mounted on pins 54. The bottom fastener element holding tool 41 is fixed in any suitable manner in this tool carriage. This bottom tool carriage has a lost motion sliding connection in the housing 48 and is normally spring-pressed upwardly by a coil spring 55 mounted around the central adjusting screw 56.

The frame casting of the carriage 14 has upwardly extending brackets 57 in which the upper housing 58 is mounted. The periphery of this housing 58 is screw threaded at 59 and 60 so that the upper housing can be adjusted upwardly or downwardly by turning the rings 61, 62 which bear against suitable surfaces formed on the bracket 57 in the manner clearly shown in both Figs. 2 and 3. Inside this housing 58 is slidingly mounted the upper tool mounting 63 which is normally held in its downward position by the compression spring 64 mounted around the bolt 65. The compression on this spring is adjusted by screw threaded bushing 66 in the top plate 67 attached to the housing 58 and the compression of the upper spring 64 and lower spring 55 is adjusted so that the springs balance one another. The upper leg bending tools 37 are mounted in slots 68 similar to the slots 53 in the tool mounting, so that they can pivot on pins 69. This upper tool mounting also carries the upper fastener element holding tool 40 which is fixed in the tool mounting in any suitable manner. It will be noted that the engaging ends of both the upper and lower holding tools are tapered so that their grip is confined only to the central portions or heads of the interlocked fastener elements.

In the lower housing 51 are two screws 70 and in the upper housing are like screws 71 which may be adjusted in a vertical direction and held in adjusted position by lock nuts 72. The free

ends of these screws have peripheral grooves 73 and extend through vertical openings 74 in the outer ends of the leg bending tools. Pins 75 secured in the leg bending tools on opposite sides of these openings have reduced portions 76 extending into peripheral grooves 73 so that the outer ends of these lower bending tools move up and down with the housing 48 and the outer ends of the upper bending tools remaining stationary with the housing 58 except that they may be adjusted upwardly or downwardly as the housing 58 is adjusted.

The operation of this portion of the mechanism may now be explained. As the cam 43 operating through the follower 47 raises the housing 48 in which the follower 47 is journalled, the lower tool mounting 52 is moved upwardly through the spring 53 until the holding tool 41 strikes against the heads of the fastener elements, it being understood that the upper holding tool 40 is already being held downwardly against the upper surface of the fastener elements by compression spring 64. Then as the housing 51 moves further upwardly the lower tool mounting 52 will slip in the housing 51 but it will continue to move upwardly about one half as fast as the housing because at the same time the upper tool mounting 63 is moving upwardly against the compression of its spring 64 an amount equal to the slippage of the tool mounting 52 in its housing. This means that both the upper and lower tool mounting with their attached holding tools and the held portion of the slide fastener moves upwardly as a unit about one half as fast as the lower housing 48 continues to move. Therefore, the outer ends of the lower clamping tools will move upwardly with relation to the pivotal mountings of these tools in the tool mounting 52, thereby swinging the tools about their pivots. Likewise, as soon as the outer ends of the upper bending tools 37 are held stationary while their pivotal mountings move upwardly, the upper tools will swing about their pivots a like amount. This produces the action shown in Figs. 5 and 6, Fig. 6 showing the position of Fig. 5 in dotted lines and indicating the movement of the various portions of these tools and also the upward movement of the held portions of the slide fastener stringers. When the cam 43 completes its cycle and the follower drops off the high point of the cam the bending tools will return to the position indicated in Fig. 4.

The mechanism for stopping the fastener stringers at approximately the right position with reference to the fastener element removing mechanism does not constitute any part of my invention and is therefore not shown in detail. One suitable mechanism for accomplishing this purpose and for controlling the operation of the one revolution clutch on the drive shaft 28, is shown and described in the patent to Osgood 2,096,685, dated October 19, 1937. It is sufficient to say that a stop finger 77 (see Figs. 7 and 8) rides under the head portions of the fastener elements as the fastener stringers are fed through the machine, then when the top finger strikes a gap space, as indicated at 79, the stop finger springs up into the gap space between the edges of the tape. When the fastener elements of the next group strike this stop finger 77 an electric contact is operated which throws into operation the one revolution clutch and also drops the stop finger out of the way, until the next forward feeding action. A suitable mechanism for this purpose is shown in the aforementioned Osgood patent.

Assuming therefore that the general position of the stop finger is relatively fixed on the bed of the machine, the fastener length will depend upon the position between the stop finger and the position of the fastener element removing mechanism, which is adjustable as a whole along the carriage by means of the crank 16, and variations in length are measured on the scale 29. In view of the fact that the fastener elements on one side are staggered with relation to those on the other side, as shown in Figs. 7 and 8, the bending tools are provided with notches 80 on diagonally opposite sides so that when the fastener elements are in proper registry with the bending tools on one side they will be in proper registry on the other side.

In order to prevent a condition where the corner of the fastener element removing tools would be only partially engaged with a fastener element, the illustrated embodiment of my invention includes a device for accurately positioning the fastener elements as the leg bending tools are brought into play. For this purpose, there is attached to the housing 48 (see Fig. 3) a key 81 provided with a bevelled cam surface 82. When the housing is lifted upwardly, this cam 82 operates against pin 83 to swing the lever 84 about the pivot 85 against the action of the spring-pressed plunger 86. The upper end of the lever 84 has attached thereto link 87 carrying at its end the projection 88 adapted to engage between two adjacent fastener elements on the stringer. The end of this lever is normally pushed upwardly by a spring-pressed plunger 89 so that the projection 88 is in engagement between the fastener elements before the cam 82 strikes the pin 83. Therefore, the movement to the right of the projection 88 caused by the cam and lever mechanism will adjust the stringer so that the fastener element engaging tools will always cover the fastener elements to be removed from the stringer, and thus avoid a damaged fastener unit.

If desired, means can be provided for brushing off the fastener members after their legs have been bent open. For this purpose I have used a spring claw finger 90 which is attached to the frame of the machine in any suitable manner and bearing preferably against the heads of the fastener members to brush them off as they pass by this finger.

Whenever it is desired for inspection or access to the space between the bending tools, means is provided for manually raising the upper tool mounting. For this purpose the bolt 65 extends upwardly from the tool housing through one end of the hand lever 92 which is pivoted at 93. By means of a link 94 and a bell crank lever 95 connected to the lever 92, the cover portion 96 of the fastener stringer guide is at the same time lifted up so that the operator can feed in the fastener stringer or inspect the condition of the tools. This cover is normally held in a downward position over the fastener elements by a spring 95a. The hand lever is normally held in the position shown in Fig. 3 by means of a spring 97. The extreme end 98 of the lever may also be utilized to lift the claw finger 90 through a suitable connecting piece 99.

In view of the above explanation it will be already evident that the machine is useful for removing excess fastener elements at the end of a group as illustrated in Fig. 7, or if somewhat

wider bending tools are provided, as shown in Fig. 8, the machine may be utilized for removing a sufficient number of fastener elements for a complete gap space.

It will thus be observed that a machine has been devised which will operate continuously and automatically for the purpose desired. After the fastener stringers are once placed in feeding position they will be fed continuously by the drum 22 except when interrupted at intervals for the operation of the fastener element removing mechanism. Such interruption is caused whenever a resistance such as the stop finger 78 is placed in the path of the fastener elements and during that interval the friction clutch which drives the drum 22 will slip but will always be ready again to move the fastener stringers when the resistance to movement is taken away. As soon as the fastener stringer is thus halted, the main shaft 28 makes a single complete revolution thereby operating the fastener element removing mechanism for the desired purpose and when its cycle is completed, the fastener stringers are again fed forward to position the stringers for the next operation.

While I have shown and described in this application one embodiment which my invention may assume in practice, it will be understood that this embodiment is merely for the purpose of illustration and that various other forms may be devised within the scope of my invention.

What I claim as my invention is:

1. In a machine for removing from slide fastener stringers attached fastener elements each element having legs clamped around the edge of a tape and a head projecting from the tape, means for holding the heads of the fastener members to be removed, leg-opening means comprising a pivotally mounted member on each side of the tape having means engageable with the fastener element legs on opposite sides of the tape, and means for swinging said members about their pivots after engagement with said legs to bend the legs apart whereby the fastener elements may fall away from the tape.

2. In a machine for removing from slide fastener stringers attached fastener elements each having legs clamped around the edge of a tape and a head projecting from the tape, a guideway along which a fastener stringer may be moved, leg-bending means engageable between the tape and the legs of the fastener elements on opposite sides of the tape for bending the legs away from the tape, means for moving the fastener stringer along the guideway relative to said leg-bending means, and means for locating the fastener stringer with relation to the bending means.

3. In a machine for removing from slide fastener stringers attached fastener elements each having legs clamped around the edge of a tape and a head projecting from the tape, fastener element holding means engageable with the heads of the fastener elements to be removed, means for moving the fastener stringer to locate said fastener elements in the desired position with respect to said holding means, and leg bending means adjacent said holding means engageable between the tape and the legs of the held fastener elements for prying the legs apart and bending the legs away from the tape, whereby they may fall away from the tape.

4. In a machine for removing a section of the fastener elements on opposite sides of a pair of joined slide fastener stringers wherein the fastener elements on said stringers consist of head portions and legs clamped around the edges of a pair of tapes and wherein the head portions are interengaged between the tapes, means for clamping the head portions of the fastener elements for holding the same, leg bending tools located on opposite sides of the holding means and on opposite sides of the stringers, means for moving said leg bending tools into engagement with the legs of the fastener elements, and means for further moving said leg bending tools to bend the legs of the fastener elements away from the tape.

5. In a machine for removing fastener elements from slide fastener stringers after they have been attached to a tape wherein each of the fastener elements has legs clamped around the edge of the tape and a head projecting from the tape, means engageable with the legs on opposite sides of the tape for bending the legs away from the tape, comprising a pair of leg bending tools pivotally mounted on opposite sides of the tape, the pivotal axis of each tool being spaced a substantial distance away from the plane of the tape, said leg bending tools having sharp edges engageable with the legs of the fastener elements on opposite sides of the tape, and means for swinging said tools about their pivotal mountings whereby the sharp edges are moved apart and bend the legs of the fastener elements away from the tape.

6. In a machine for removing fastener elements from slide fastener stringers after they have been attached to a tape wherein each of the fastener elements has legs clamped around the edge of the tape and a head projecting from the tape, a fastener stringer guide, fastener element holding means comprising clamping tools movable into engagement with opposite sides of the heads of the fastener members to be removed, a head in which each of said holding means is mounted, prying tools, one pivotally mounted in one of such said heads and the other pivotally mounted in the other of such heads, the pivotal axes being located on opposite sides of the plane of the tape and at a substantial distance away from the plane of the tape, the prying tools having knife-edge ends which are moved against opposite sides of the tape when the holding means is moved to holding position, said knife edge ends also engaging the ends of the fastener element legs, and means for swinging said prying tools about their pivotal mountings to swing said knife-edge ends apart whereby the knife-edge ends move in arcs laterally toward the fastener elements and transversely to pry apart the legs of the fastener elements.

7. In a machine for removing from slide fastener stringers certain of the attached fastener elements, each element having a head and legs projecting from the head clamped around the edge of a tape, fastener element removing tools including portions engageable with the legs of the fastener elements to be removed, there being at least one of such tools on each side of the tape, tool mountings for said tools one on each side of the tape, said tools being pivotally secured in said mountings, fastener element clamping tools secured in said mountings adjacent said removing tools for clamping the heads of the fastener elements, means for moving said tool mountings together toward each other to clamp the fastener elements between the clamping tools and to bring said removing tools into position adjacent the legs of the fastener elements, and means for operating the removing tools about their pivotal axis in said mountings into firm engagement

with the legs of the fastener elements and for bending said legs apart.

8. In a machine for removing from slide fastener stringers attached fastener elements each of which has a head and legs for securing the elements to a tape, in combination, a machine bed, means for moving a slide fastener stringer along the bed, stop means for interrupting movement of the slide fastener stringer at intervals, a fastener element removing mechanism movable along said bed, and means for indicating the position of the fastener element removing mechanism with relation to said stop means.

9. In a machine for removing a pre-determined number of fastener elements from a pair of connected slide fastener stringers wherein the fastener elements on the opposite stringers are arranged in relatively staggered position and consist of interengaged head portions and legs projecting from the head portions and clamped around the edges of a pair of tapes, fastener element removing tools engageable between opposite sides of each tape and the legs of the fastener elements to be removed therefrom the functioning portion of the removing tool operating on one stringer being offset with reference to the functioning portion of the tool operating on the opposite stringer whereby said tools may be made to register with the relatively staggered fastener elements on the connected stringers, and means for operating said removing tools to remove the fastener elements engaged thereby.

10. In a machine for removing from slide fastener stringers certain of the attached fastener elements, each of which has a head and legs projecting from the head clamped around the edge of a tape, a machine bed and fastener element removing mechanism adjustably mounted on said bed, means for moving a fastener stringer along said bed through said removing mechanism, means for stopping the fastener stringer at intervals in approximately the proper position with reference to said removing mechanism, and means operated by said removing mechanism for accurately adjusting the position of the fastener stringers after each such stoppage.

11. In a machine for removing from slide fastener stringers certain of the attached fastener elements each of which has a head and legs projecting from the head clamped around the edge of a tape, leg bending tools engageable with the legs on opposite sides of the tape, means for moving the tape, means for operating said tools for bending the legs away from the tape, and means engageable with the fastener elements to brush away from the tape the fastener elements whose legs have been bent.

12. In a machine for removing from slide fastener stringers, attached fastener elements each having legs clamped around the edge of a tape and a head projecting from the tape, upper and lower holding tools for gripping the heads of the fastener elements to be removed, upper and lower leg bending tools adjacent said upper and lower holding tools respectively, vertically movable upper and lower tool mountings carrying said upper and lower holding and removing tools respectively, a vertically movable lower housing in which said lower tool mounting is slidably mounted, a compression spring normally urging said lower tool mounting upwardly, means for slidably mounting said upper tool mounting, a compression spring normally urging said upper tool mounting downwardly, and power means for operating said lower housing upwardly to force said lower tool mounting upwardly.

CHARLES G. JOHANNESMEYER.