March 21, 1939. A. H. DEVOE 2,151,346

SEWING MACHINE

Filed Jan. 30, 1936 4 Sheets-Sheet 1

Fig. 1.

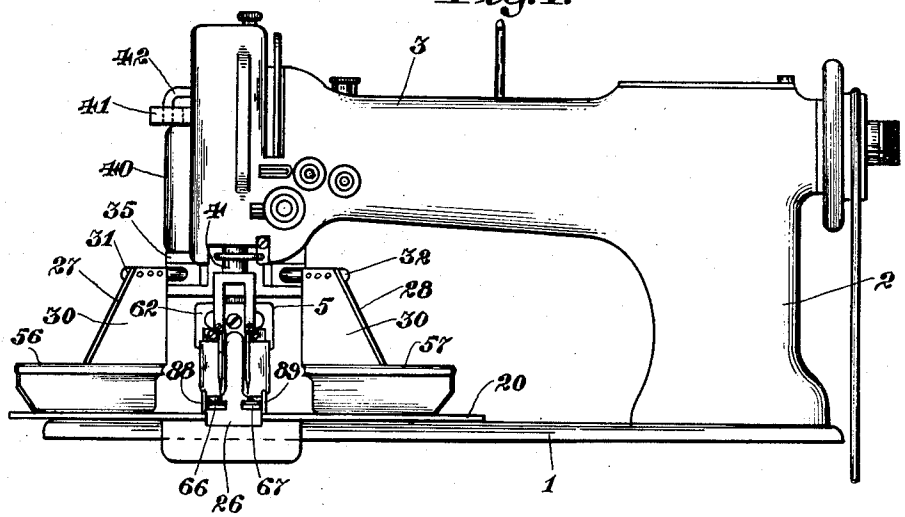
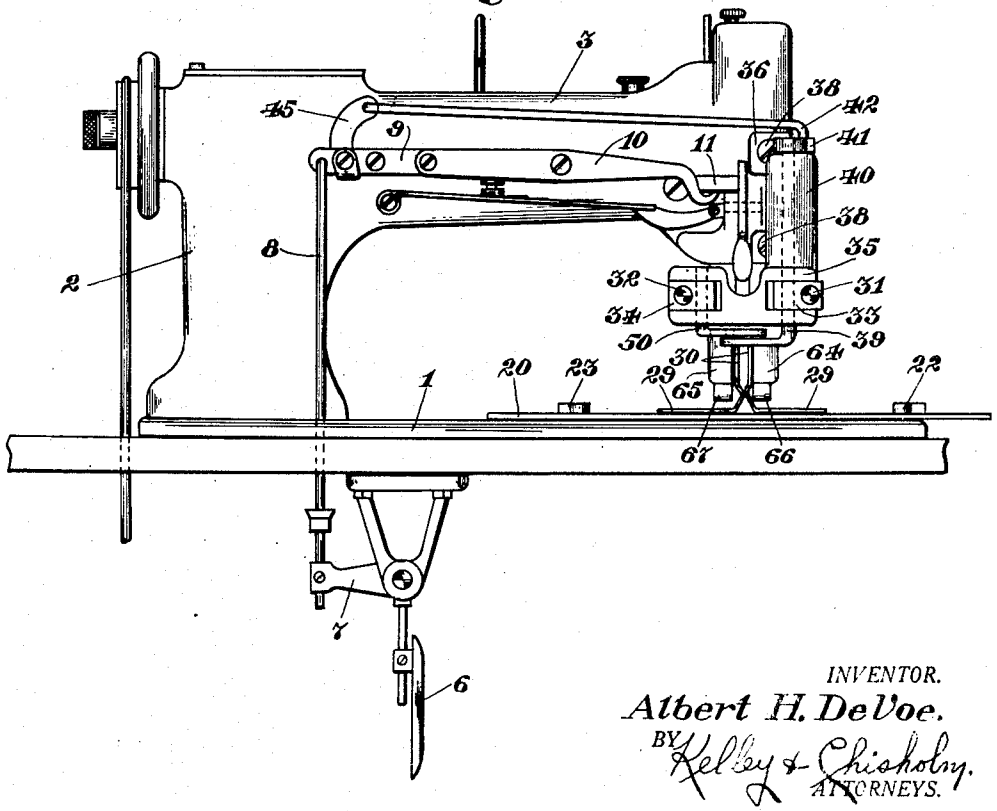


Fig. 2.



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SEWING MACHINE

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Fig. 3.

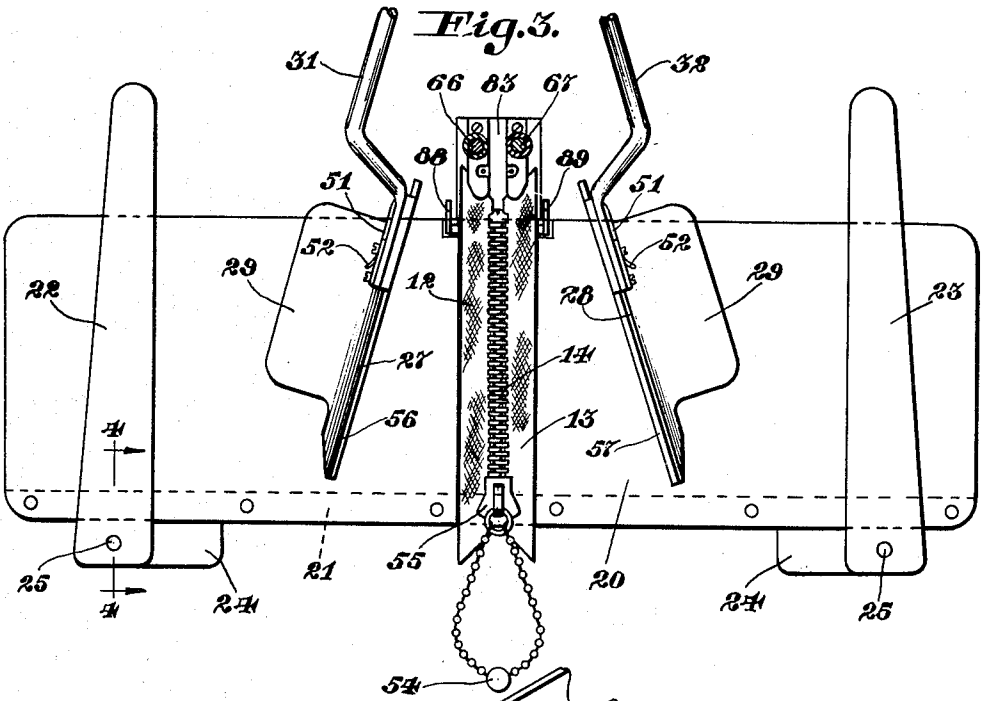


Fig. 5.

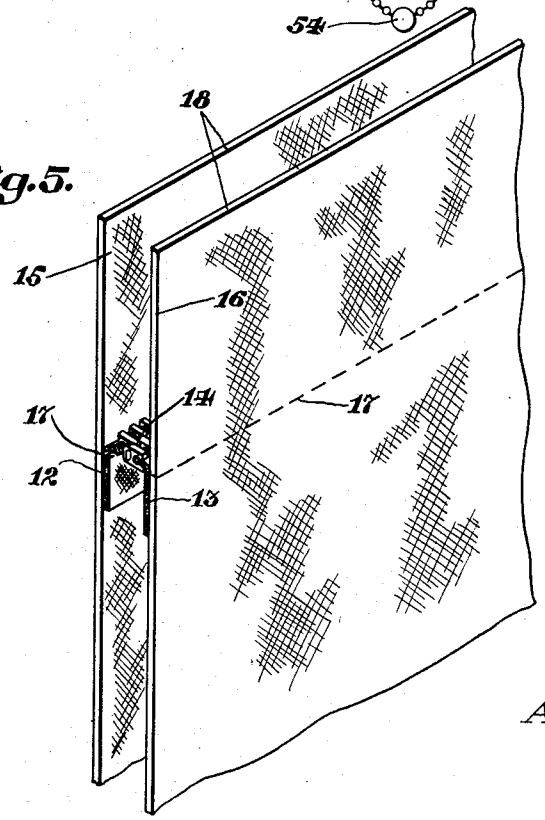
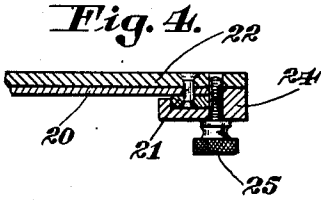


Fig. 4.



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Fig. 7.

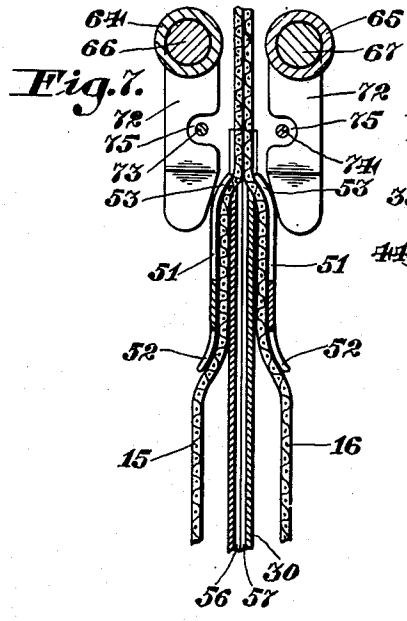


Fig. 9.

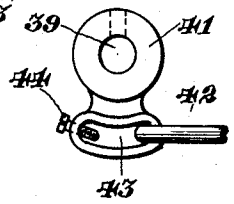


Fig. 6.

Fig. 8.

Fig. 13.

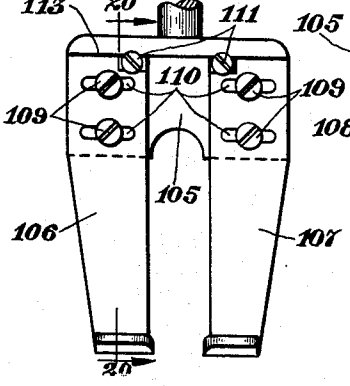
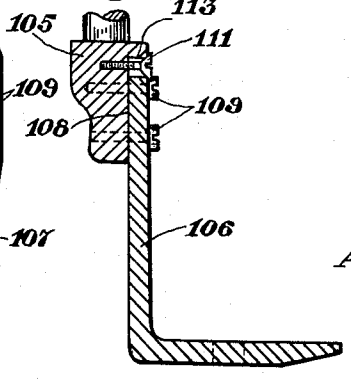


Fig. 20.



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SEWING MACHINE

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Fig.10.

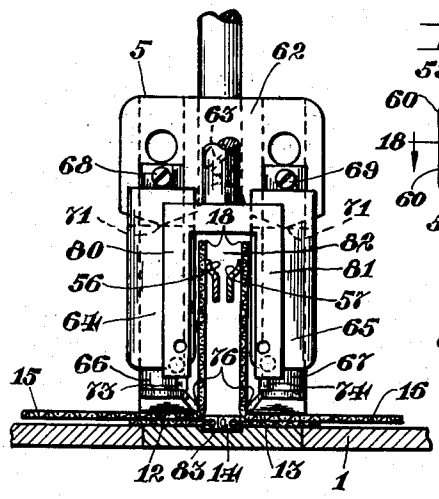


Fig.15.

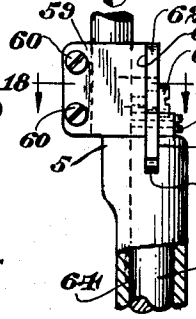
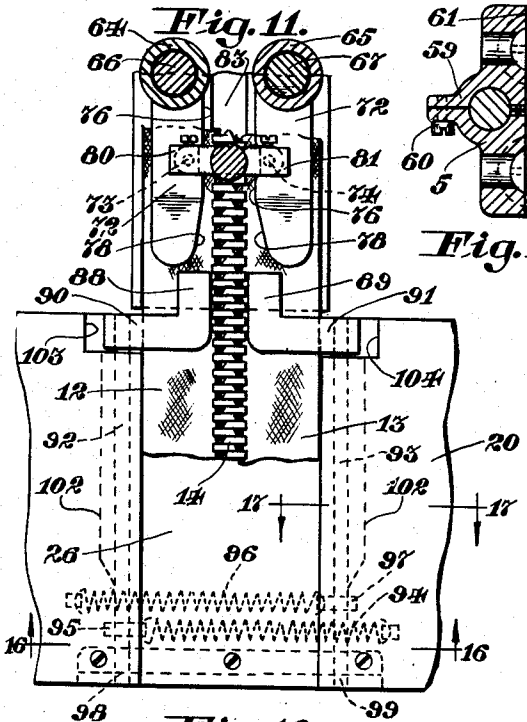


Fig.12.

Fig.11.



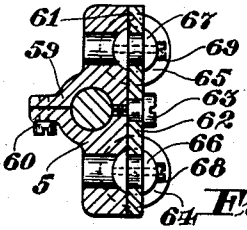


Fig.18.

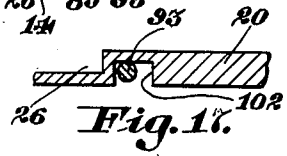


Fig.17.

Fig.14.

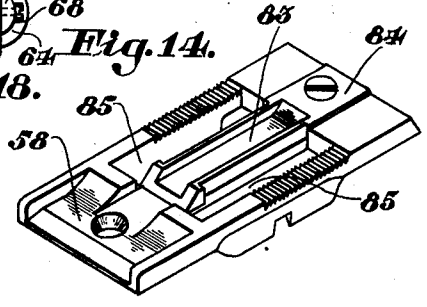


Fig.13.

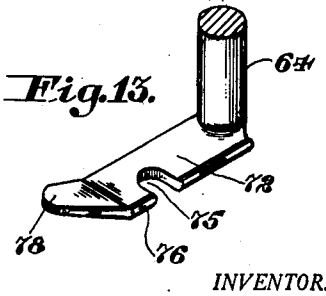
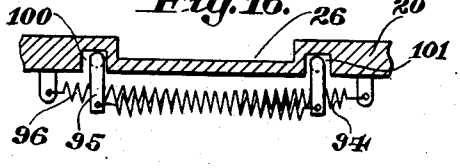


Fig.16.



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Patented Mar. 21, 1939 2,151,346

UNITED STATES PATENT OFFICE

2,151,346

SEWING MACHINE

Albert H. Devoe, Westfield, N. J., assignor to Talon, Inc., a corporation of Pennsylvania

Application January 30, 1936, Serial No. 61,559

12 Claims. (Cl. 112—2)

My invention relates to sewing machines and more particularly to improvements in sewing methods and machines for applying slide fasteners to various articles.

In my co-pending application, Serial No. 743,561, I have disclosed a form of machine suitable for sewing in slide fastener tapes both sides at the same time, to the opposed edges of the material to be held by the fastener.

My present invention has for its object to provide improvements in the machine of my above mentioned earlier application, some of the improvements being for the purpose of facilitating operation and improving the result in various kinds of work, while others of the improvements extend the usefulness of the machines and method to a different class of work, hereinafter described.

In applying slide fasteners to hand bags it is in many cases desirable to have the fastener positioned more or less below the upper edges of the bag material. This is sometimes termed a "hidden" or a "valley" application of the fastener. In such cases it is necessary to sew the opposite sides of the fastener tape to the bag material along lines spaced a considerable distance from the edges of the material.

The problem is not especially difficult if the fastener is separated and the opposite sides of the fastener are attached to their respective sides of the bag material in separate operations, but in my improved machine it is desirable to stitch both sides of the fastener to the opposite pieces of bag material at the same time in a single operation without separating the fastener.

My invention offers a solution to the problem just described and it further provides improvements in the mounting and operation of work guides in such a manner that the guides can be easily swung to a position to allow the operator an uninterrupted vision and affording sufficient space in front of the needles for free unrestricted movement of the hand in manipulating the fastener in such position as may be required, and under the presser foot; also freedom of movement for threading the needles.

It is a further object of my invention to provide improved tension applying means for the fastener tape which shall be automatically operable so that no attention is required by the operator.

Still another object is to provide improved guide means for the fastener assuring central positioning at all times and at the same time permitting uninterrupted passage of the slider through the machine. Preferably, the guide members are so designed that they constitute also the tension applying means.

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

Fig. 1 is a front elevation of a sewing machine embodying my invention;

Fig. 2 is a rear elevation of the same machine;

Fig. 3 is a plan view of portions of the machine adjacent the stitch forming mechanism;

Fig. 4 is a detail sectional view on line 4—4 of Fig. 3;

Fig. 5 illustrates one kind of sewing operation for which my improved machine is adapted;

Fig. 6 is a perspective view showing work guides and the devices for operating the same;

Fig. 7 is a horizontal sectional view on line 7—7 of Fig. 12;

Fig. 8 is a detailed perspective view showing the linkage which connects the workholder arms;

Fig. 9 is a plan view showing a detail of Fig. 6;

Fig. 10 is a vertical sectional view adjacent the presser feet of the machine;

Fig. 11 is a view partly in horizontal section and partly in plan showing the fastener guide and tensioning devices;

Fig. 12 is a vertical section through the work guides;

Fig. 13 is a perspective view showing one of the presser feet;

Fig. 14 is a perspective view of the throat plate;

Fig. 15 is a side elevation view partly in vertical section of Fig. 10;

Fig. 16 is a detail section on line 16—16 of Fig. 11;

Fig. 17 is detail sectional view on line 17—17 of Fig. 11;

Fig. 18 is a detail sectional view on line 18—18 of Fig. 15;

Fig. 19 is a front elevation of a modified form of presser foot; and

Fig. 20 is a sectional view on line 20—20 of Fig. 19.

In making my improved machine I preferably employ as many parts as possible of a standard sewing machine which may be easily obtained on the market. Such machine may comprise the usual work bed 1 and head 2, which has the overhanging arm 3. The machine embodies conventional work feeding and stitch formng mechanisms, not shown, together with suitable mecha-

nism for operating the same, which includes the vertical reciprocating needle bar holder 4. A conventional type of presser foot lifting mechanism by which the presser foot holder 5 is elevated, is shown, such mechanism embodying the operating lever 6, together with bell crank lever 7 and linkage 8, 9, 10 and 11.

Referring now to Fig. 5, one type of work for which the machine is adapted will be described. A slide fastener having a pair of tape stringers 12, 13 with the attached series of interengaged fastener elements 14 is placed between the pieces of material 15, 16, as desired to attach the fastener to the pieces of material by the lines of stitching 17, which lines of stitching must be spaced back from the edges 18 of the material. This operation is accomplished by bending the body portions of the material outwardly on an angle substantially parallel to the work bed and sewing the bent portion to the margin of the tapes very close to the bend. The pieces of material 15, 16 may be portions of the lining of a hand bag which resume their natural position shown in Fig. 5 and attached together along their bottom edges (not shown).

Preferably a sheet metal work bed extension plate 20 is attached to the work bed and this extends forwardly toward the operator from the stitch forming mechanism for the desired distance and laterally on the opposite sides of the lines of stitching. The work supporting plate carries on its under side and along the front edge a guide rail 21. A pair of edge guides 22, 23 are mounted, one on each end of the work supporting plate and they may be adjustably secured in any desired position on the guide rail 21 by means of the guide rail clamps 24 and clamping screws 25. The central portion of the work supporting plate is preferably provided with a groove or channel 26 to accommodate the entire width of the slide fastener.

Referring now to Figs. 3, 6 and 12 a pair of work guides 27, 28 are arranged opposite each other and between the lines of stitching. Each has the horizontal portion 29 which is parallel to and closely adjacent the work supporting plate 20, and a generally vertical portion 30. The work guides are secured to the swinging arms or brackets 31, 32 which are pivotally supported by blocks 33, 34 respectively, in the bracket 35. The bracket 35 is attached to the back of the head by means of the lug 36 which has the vertically elongated holes 37, through which pass the screws 38. The bracket may accordingly be adjusted vertically to vary the position of the work guides. A shaft 39 extends upwardly from the block 33 through the cylindrical bearing portion 40, and at its upper end carries the small operating lever 41, which has a lost motion connection with the link 42. The lever 41 is fixed in any suitable manner to the shaft 39 and has a slot 43 with which the bent end of the link 42 is engaged. The screw 44 is provided so as to adjust the length of the slot 43, and thus make the degree of the lost motion connection between the presser foot lift and work guides adjustable. The link 42 (see Fig. 2) is connected with the presser foot lift mechanism through the lever 45 which is fixed to the link 9. It will thus be seen that an initial movement of the presser foot lift will elevate the presser foot sufficiently to allow insertion of the work and upon further movement of the presser foot lift mechanism the lever 42 will engage the screw 44 swinging the arm 31 carrying one of the work guides around to the left, as viewed in Fig. 6. The other work guide is connected for movement to the right in unison with the movement of the first guide. The connection may be of any suitable form, for example, a lever 46 fixed to the shaft 39 having a pin 47 which is engaged in the slot 48 of the lever 49, the lever 49 being in turn fixed to the shaft 50 to which the block 34 is keyed.

Each of the work guides includes the depending guide bracket 51 in spaced relation to the vertical portion 30 of the work guide. The vertical portion of the work is fed between the guide 51 and the vertical portion 30 of the guides 27 and 28 and for the purpose the guide 51 is flared outwardly at its entrance, as indicated at 52, and inwardly at its delivery end 53, so that the upwardly extending material portions are forced inwardly toward one another as they approach the needles, as shown in Fig. 7. The vertical portions 30 of the work guide also preferably have means for guiding a depending pull lug such as the ball 54 attached to the slider 55 on the slide fastener. In the present instance, such guide means comprises guide channels 56, 57, in the vertical portions 30 of the work guides. These channels extend beyond the guides to a point closely adjacent the needles so as to provide a shelf which supports the ball and chain until the slider and pull have passed safely beyond the needles.

The needle and presser feet will now be described and these elements are believed to have certain novel and important features. The presser foot holder 5 is secured to the presser foot lifting rod by a suitable collar 59 and screws 60.

The presser foot holder comprises generally a cross-arm with a flat vertical surface 61 against which the balance arm 62 is mounted, the balance arm being fulcrumed centrally on the screw 63. The cross arm has a pair of spaced apart vertical cylindrical guides 64, 65 depending vertically in which are mounted the cylindrical portions of the presser feet 66, 67 respectively, connected to opposite ends of the balance arm 62 by screws 68, 69, respectively. The vertical portion of each presser foot is preferably cylindrical to fit the hollow bore of the guides, 64, 65. Each of the presser feet at its upper end has a slot 70 extending across the same for receiving the balance arm 62 and preferably the balance arm is cut in such a way as to make a point contact at the bottom of the slot as at 71. The downward pressure of the balance arm against the presser feet is borne by the contact point 71 so that the screws 68, 69 act merely to retain the parts in position and they may also be used for adjustment of the width of the slot to compensate for any wear. As seen in Fig. 18 the holes in the balance arm 62 through which pass the screws 68, 69 are larger than the screws so that a slight pivotal movement around the central screw 63 is permitted. By reason of the construction which has just been described, it will be seen that although the two presser feet are mounted on a common support an equal pressure is placed on each part to accommodate different thicknesses of material on opposite sides of the fastener.

While reference is made herein and in the claims to "presser feet", these elements are in fact more than presser feet. By reason of their construction, their relation to each other, and their relation to the other parts, they perform important functions in addition to the functions of presser feet, the horizontal portion of each presser foot comprises generally a flat rectangular shaped extension 72 which is of sufficient width

and in such relation to the needles 73, 74 that its inner edges are well inside the needles, that is, between the needles. Each of the presser feet has a notch 75 to accommodate the needle. As usual with presser feet the front end of each of the horizontal portions is turned up and the bottom surface of each presser foot functions in the usual manner in cooperation with the feeding elements below the presser feet.

The presser feet have on their inner opposed edges the vertical work engaging surfaces 76, which are parallel throughout the greater part of the length of the presser feet and which flare outwardly as at 78, at the forward ends. These surfaces perform the important function of bending the material to which the fastener is to be stitched closely adjacent the needles and guiding it very definitely with relation to the needles.

Instead of the usual single needle bar which may carry one or more needles, I have provided two needle bars 80, 81 having a space 82 between them which is of very substantial extent both horizontally and vertically. This space is for the purpose of amply accommodating extending edges 18 of the material. Each of the needle bars, of course, carries the needles 73, 74.

The type of feeding device and throat plate may be generally the same as that described in my above mentioned application. The throat plate is illustrated in Fig. 14. A groove 83 is provided in the spring tongue 84 to accommodate the metal part of the fastener, and the slots 85 are arranged sufficiently far apart to allow the feed dog to engage on opposite sides of the needles. The front end of the throat plate has a guide groove 58 corresponding to and aligned with groove 26 in the plate 20, to accommodate the full width of the fastener and the extending portions of the tension members 88 and 89.

Means is provided for applying tension to the slide fastener tapes so that they will be kept taut as they approach the needles and avoid crimping the fastener which is often responsible for a wavy application of the fastener in various articles. The fastener tapes pass under the combined tension and guide members 88, 89, respectively, just before they come to the presser feet. These members have the arms 90, 91 attached to rods 92, 93 respectively, which extend to the front of the work supporting plate. The guide member 88 is normally held in a vertical position by means of a spring 94 which connects to the lever 95 on the shaft 92, and similarly the guide member 89 is normally held in a vertical position by means of a spring 96 which connects to the lever 97 on the shaft 93 so as to allow the tapes to be easily placed in position.

The members 88 and 89 thus function in one capacity as tension plates in contact with the tapes of the slide fastener always automatically movable by their connected rods and springs to a vertical position when it is desired to put a fastener in place, and likewise automatically movable and held in proper position (as best seen in Figs. 12 and 13), by the horizontal portions 29 of the work guide members. The tension on the fastener tapes is adjustable by adjusting the vertical position of the bracket 40, which carries the work guide members 27 and 28.

Another very important function of the members 88 and 89 is that of guiding at all times the slide fastener so that it will be centrally between the lines of stitches which secure it to the article. The ends of the rods 92, 93 (see Figs. 11, 12 and 16) are journalled loosely in suitable bearings 98, 99 adjacent the front of the work plate 20, and pass through recess 100, 101 on the under side of the work plate, which widen out as indicated by the dotted lines 102, and permit always a yielding side movement of the rods 92, 93 and thus of the guide members 88, 89. They are, of course, normally held in their innermost position by reason of the tension applied by the springs 94 and 96. Their maximum outward swinging movement is preferably limited by the outside edges of the arms 90, 91 striking against the walls 103, 104 respectively, of the recesses in which the arms move. This inward and outward yielding movement of the guide members allows them to bear with their inner edges against the rows of metal elements of the slide fasteners, and when the slider itself approaches the guide members it does not stick but the guide members yield sufficiently to allow the slider to pass. Because the movement of each member is limited, it will be observed that both members must yield approximately in equal amount when the slider passes between them, which ensures that it will pass centrally into the proper position between the needles.

Likewise when the blank ends of the fastener tapes which have no metal elements pass between the guide members these blank ends will be guided centrally between the needles because the guide members will press against the cord edges of the tapes.

The modification illustrated in Figs. 19 and 20 omit the balance arm and the cross-head 105 supports directly the presser feet 106, 107. Instead of being cylindrical the vertical portions of the presser feet are flat and are secured directly to the flat surface 108 of the cross-arm, by means of screws 109 passing through horizontal elongated slots 110. This permits lateral adjustment of the presser feet with respect to one another to accommodate different widths of fasteners or any desired spacing of the lines of stitches. A slight vertical adjustment of the presser feet relative to one another by the conical head screws 111, bearing in a recess 112, of each presser foot and against the shoulder 113 of the cross-head 105. A presser foot mounting of this type is suitable for work which does not vary materially in thickness and has the advantage that it may be readily adjustable laterally.

As a result of my invention an improved method and apparatus have been produced whereby slide fasteners may be easily and cheaply applied to various articles of manufacture, both sides of the fastener in a single operation. In my improved machine the operator may easily shift the work guides to one side and clear the space under and in front of the presser feet. This enables an accurate quick positioning of the fastener and by further improved mechanism it is held in such accurate position during the placing of the opposite sides of the article to which the fastener is to be stitched.

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 purposes of illustration and description and that various other forms may be devised within the scope of my invention as set forth in the appended claims.

What I claim as my invention is:

1. In a sewing machine of the class described having a head, a work bed and stitch forming mechanism, a pair of work guides which are positioned in front of the stitch forming mecha-

nism when in operative position for guiding opposed edges of the work to said stitch forming mechanism, said work guides being pivotally mounted on said head for swinging movement in a plane parallel to said work bed in order to clear the space in front of said stitch forming mechanism, said work guides in their operative position being in close proximity to said stitch forming mechanism.

2. In a sewing machine of the class described, having a head, a work bed and stitch forming mechanism, a presser foot holding bar carried by said head, a pair of presser feet, and connecting means between said bar and presser feet which permits limited straight line vertical movement of one presser foot relative to the other, the vertical distance from said connecting means to the bottom of said presser feet being substantially greater than the horizontal distance between the presser feet.

3. In a sewing machine of the class described having a head, a work bed and stitch forming mechanism, a presser foot holding bar carried by said head, a cross arm on said bar, a balance arm fulcrumed on said cross arm, a pair of presser feet having a pivotal connection on opposite ends of said balance arm whereby said presser feet may accommodate different thicknesses of work while maintaining equal pressure on the presser foot.

4. In a sewing machine of the class described, stitch forming mechanism including a pair of laterally spaced needles, and a pair of laterally spaced presser feet having their opposed inner faces positioned to direct and guide work between said needles, said presser feet being laterally adjustable to vary the lateral position of the work guide surfaces on said presser feet in relation to the position of said needles.

5. In a sewing machine of the class described, a pair of laterally spaced apart needle bars, a needle carried by each of said needle bars, and work guiding means for directing the work under said needles including means for bending of the work at right angles so that one portion extends vertically into the space between said needle bars and another portion extends horizontally.

6. In a sewing machine of the class described, stitch forming mechanism including a pair of laterally spaced apart needle bars, a needle carried by each of said needle bars, a pair of laterally spaced apart presser feet with their opposed inner surfaces spaced apart less than the distance between said needles and formed to constitute guide surfaces and work guiding means for guiding opposite edges of the work to said stitch forming mechanism including means for folding upwardly between the needles at least the opposite edges of the work, said guide surfaces on said presser feet serving to guide said upturned edges into the space between said needles.

7. In a sewing machine of the class described the combination with a work bed, a stitch forming mechanism, of a guide on the work bed for a slide fastener, and a supplemental guide above the fastener guide leading to a point adjacent the stitch forming mechanism for guiding a loosely mounted pull device on said slide fastener to prevent interference of the same with said stitch forming mechanism.

8. In a sewing machine of the class described, stitch forming mechanism and a work bed, a guide for a slide fastener, said stitch forming mechanism including a pair of laterally spaced needles, and cooperating elements for stitching both sides of the slide fastener to opposed edges of the work, work guides for guiding the work to the stitch forming mechanism above the slide fastener, and supplemental guide means carried by said work guides for guiding a pull device attached to said slide fastener into position between the needles whereby the same will not interfere with said stitch forming mechanism.

9. In a sewing machine of the class described stitch forming mechanism and a work bed, a guide supported on said work bed for guiding a fastener tape to said stitch forming mechanism, a movably mounted work guide for guiding work to said stitch forming mechanism over said fastener tape, a tension device adjacent said fastener tape guide movable over said tape to apply tension thereto or movable to inoperative position to permit manual insertion and removal of the fastener tape, said tension device being automatically operable into tension applying position when said work guides are moved to operative position.

10. In a sewing machine of the class described having a head, stitch forming mechanism and a work bed, a presser foot and presser foot lifting mechanism, a pair of work guides pivotally mounted on said head for swinging movement in a plane parallel to the work bed into a position to clear the space in front of the stitch forming mechanism, and a lost motion connection between said presser foot lifting mechanism and said swinging work guides whereby after an initial lift of said presser foot further movement of said presser foot lifting mechanism will also impart outward swinging movement to said work guides.

11. The method of simultaneously sewing both sides of a separable slide fastener strip to the opposite pieces of material to be held to the fastener, which consists of bending the pieces of material at right angles to provide vertical and horizontal portions, guiding the vertical portions between a pair of stitch forming mechanisms and stitching both sides of a fastener tape to said pieces of material adjacent the bend line.

12. In a sewing machine of the class described, a head, a stitch forming mechanism and a work bed, guiding means for a slide fastener including guide members having means to press downwardly on the fastener tapes to flatten the same and also having lateral surfaces adapted to contact the metal elements on opposite sides thereof, or the cord edges of the blank portions of the slide fastener, said guide members being laterally movable to permit the slider of said slide fastener to pass between the same.

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