Dec. 5, 1961 A. J. McNAMARA 3,011,459

SEWING MACHINE FOR CONCEALED SLIDE FASTENERS

Filed Nov. 18, 1958 3 Sheets-Sheet 1

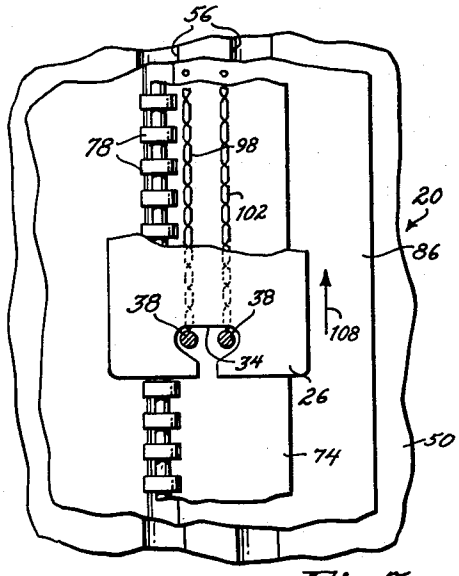


Fig. 3.

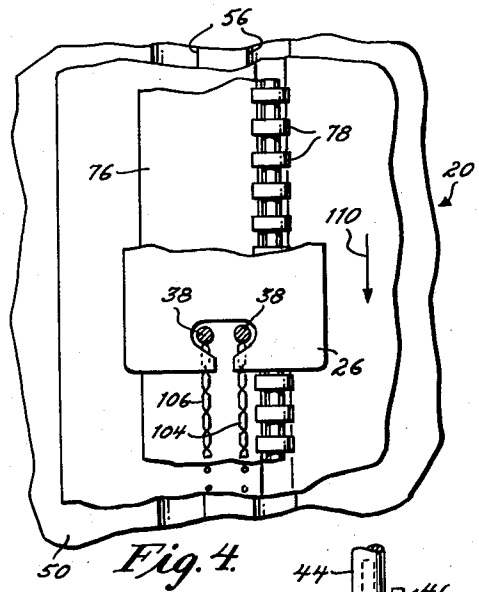


Fig. 4.

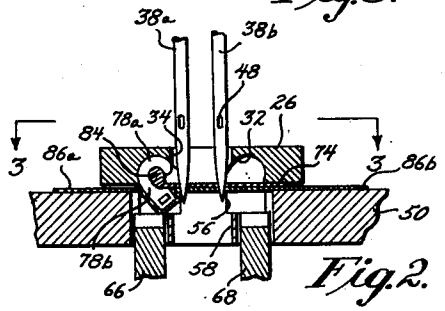


Fig. 2.

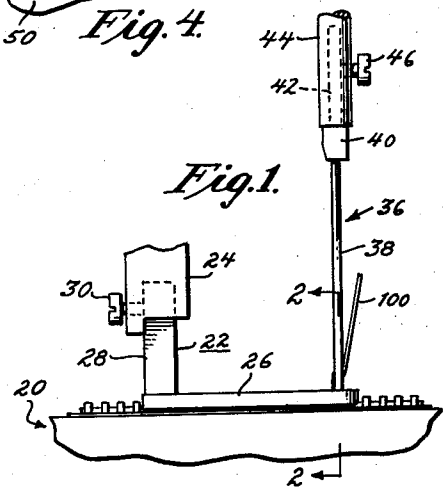


Fig. 1.

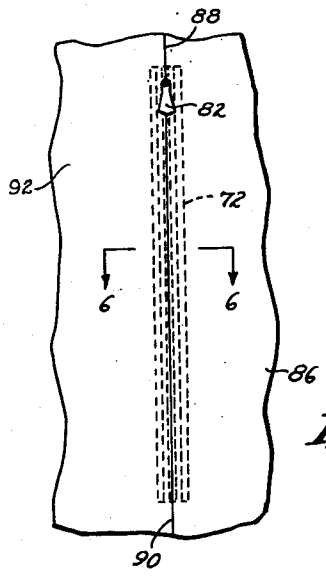


Fig. 5.

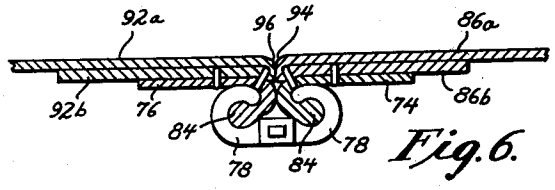


Fig. 6.

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SEWING MACHINE FOR CONCEALED SLIDE FASTENERS

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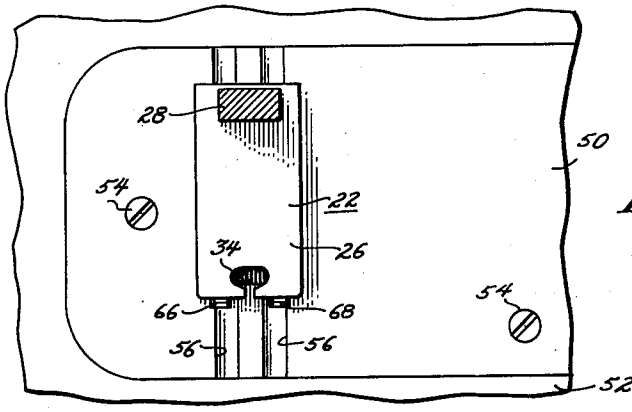


Fig.7.

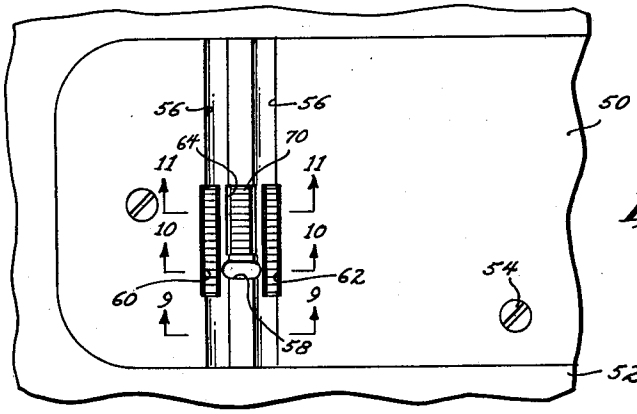


Fig.8.

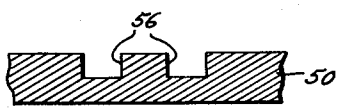


Fig.9.

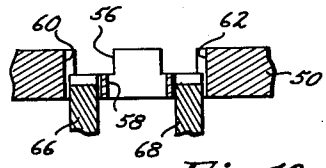


Fig.10.

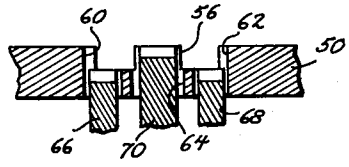


Fig.11.

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SEWING MACHINE FOR CONCEALED SLIDE FASTENERS

Filed Nov. 18, 1958 3 Sheets-Sheet 3

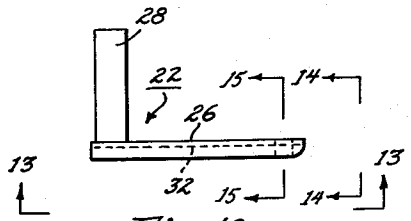


Fig. 12.

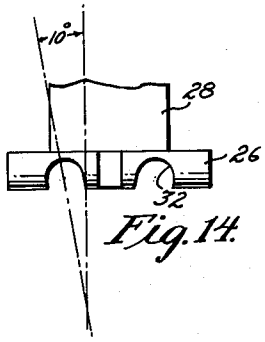


Fig. 14.

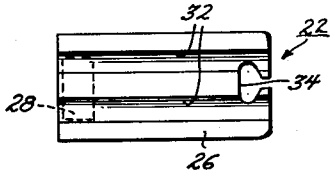


Fig. 13.

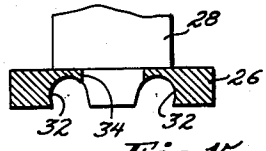


Fig. 15.

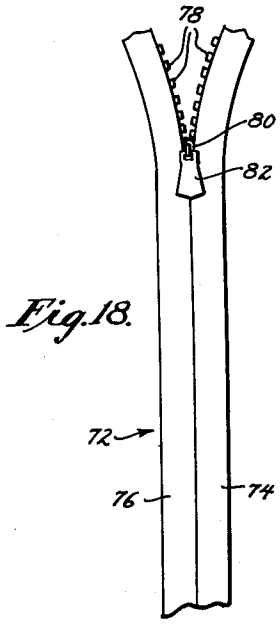


Fig. 18.

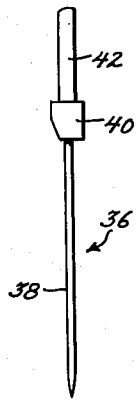


Fig. 16.

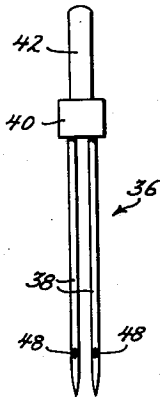


Fig. 17.

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United States Patent Office 3,011,459 Patented Dec. 5, 1961

3,011,459

SEWING MACHINE FOR CONCEALED SLIDE FASTENERS

Ambrose J. McNamara, White Plains, N.Y., assignor to Irving Constant, New York, N.Y.

Filed Nov. 18, 1958, Ser. No. 774,554
7 Claims. (Cl. 112—2)

The present invention relates to a machine for sewing concealed slide fasteners, and more particularly to a machine for sewing concealed slide fasteners wherein the sewn-in slide fastener closely resembles a seam when the slide fastener is closed, and wherein the stitching joining the slide fastener to the cloth to which it is attached is concealed.

In articles of wearing apparel where fashion is important, it has long been desirable to conceal slide fasteners, so that the same are not revealed when the garment is worn with the slide fastener in its closed disposition. In particular, it has long been desirable to provide garments, such as dresses, with a concealed slide fastener which in its closed disposition closely simulates a seam. For example, the concealed slide fastener may be colinear with a true seam in the garment and appear to be a potrion of such seam when the slide fastener is in its closed disposition.

The accomplishment of the aforesaid desiderata has been impeded by a number of problems. Thus, it is necessary to sew the tapes on which the slide fastener elements are carried onto the garment, and the concealment of the lines of stitching which are parallel to the simulated seam effected by the closed slide fastener has proven to be difficult. Moreover, to effect the optimum mounting of a concealed slide fastener it is necessary that the line of stitching joining the tape carrying the slide fastener elements and the juxtaposed cloth of the garment be as close as possible to the slide fastener elements. This has proved to be a most difficult problem since present day demands upon the clothing industry require the high speed installation of slide fasteners.

This invention has as an object the provision of a machine for sewing concealed slide fasteners onto a juxtaposed cloth.

This invention has as another object the provision of a machine which can sew concealed slide fasteners onto juxtaposed cloth at a rapid rate with a minimum of manual operation.

This invention has as yet another object the provision of a machine for sewing concealed slide fasteners onto a cloth so that the line of stitching joining the concealed slide fastener to the cloth is concealed.

This invention has as still another object the provision of a machine for sewing concealed slide fasteners onto cloth in such manner that when the concealed slide fasteners are in their closed disposition the appearance of the genuine seam is closely simulated.

This invention has as a further object the provision of a machine for sewing concealed slide fasteners onto a juxtaposed cloth in which the line of stitching joining the tape carrying the slide fastener elements and the juxtaposed cloth of the garment is as close as possible to the slide fastener elements.

Other objects will appear hereinafter.

For the purpose of illustrating the invention there is shown in the drawings a form which is presently preferred; it being understood, however, that this invention is not limited to the precise arrangements and instrumentalities shown.

Referring to the following drawings, wherein like reference characters refer to like parts:

FIGURE 1 is a side elevational view of the presser foot, needle plate portion, and contiguous bed portion

of the sewing machine of the present invention, and revealing the manner in which a tape bearing slide fastener elements is stitched to cloth by the machine of the present invention.

FIGURE 2 is a sectional view taken on line **2—2** of FIGURE 1

FIGURE 3 is a plan fragmentary view taken along line **3—3** of FIGURE 2.

FIGURE 4 is a view similar to that of FIGURE 3 but revealing the manner in which the other tape bearing slide fastener elements of the slide fastener is stitched to cloth.

FIGURE 5 is a view demonstrating the appearance of a concealed slide fastener when the same is in its closed disposition attached to cloth, such view demonstrating the seam-like appearance of such slide fastener.

FIGURE 6 is a view taken on line **6—6** of FIGURE 5.

FIGURE 7 is a plan fragmentary view, viewed from above, of the presser foot, needle plate portion, and contiguous bed portion of the sewing machine of the present invention.

FIGURE 8 is a plan view similar to that of FIGURE 7, except that the presser foot is removed in order that clarity of underlying parts may be had.

FIGURE 9 is a sectional view taken on line **9—9** of FIGURE 8.

FIGURE 10 is a sectional view taken on line **10—10** of FIGURE 8.

FIGURE 11 is a sectional view taken on line **11—11** of FIGURE 8.

FIGURE 12 is a side elevational view of the presser foot of the present invention.

FIGURE 13 is a plan view of the presser foot viewed from the direction of the arrows **13—13** in FIGURE 12.

FIGURE 14 is an enlarged front elevational view of the presser foot viewed from the direction of the arrows **14—14** in FIGURE 12.

FIGURE 15 is an enlarged sectional view taken on line **15—15** of FIGURE 12.

FIGURE 16 is a side elevational view of a needle unit which can be used in the sewing machine of the present invention.

FIGURE 17 is a front elevational view of the needle unit shown in FIGURE 16.

FIGURE 18 is a view revealing a concealed slide fastener of the type which may be utilized in connection with the present invention.

Referring to the drawings, and initially to FIGURES 1 through 4 inclusive, the machine of the present invention is designated generally as **20**. Such machine may comprise a flat bed sewing machine having a reversible feed. For the sake of simplicity and clarity of presentation, only those portions of the machine needed to comprehend the present invention will be described herein, it being understood that the remainder of the machine may be of conventional construction.

The machine **20** includes a presser foot **22**, which is retained in operative disposition by means of a presser bar **24** of conventional construction.

The presser foot **22** includes a foot **26**, and a shank **28** extending upwardly from the heel of the foot **26**. The upper end of shank **28** fits into a hole in the bottom of the presser bar **24** and is secured to the presser bar **24** by a setscrew **30**.

Foot **26** is provided with a pair of spaced, parallel grooves **32** in the bottom surface of the foot **26**. Grooves **32** extend longitudinally along the foot **26** for the entire length of the foot **26** (see FIGURE 13). As clearly shown in FIGURE 14, grooves **32** are tilted at a small angle, approximately ten degrees, with regard to the vertical, and away from each other, for reasons which

will be explained below. Foot 26 is provided with a needle hole 34 therethrough adjacent the toe of the foot 26. Needle hole 34 is positioned between the grooves 32, and is of a width wider than the distance between the grooves 32 so that the needle hole 34 opens into the grooves 32 (see FIGURES 13 and 15).

Referring to FIGURES 16 and 17, the needle unit of the present invention is designated generally as 36. Needle unit 36 comprises a pair of spaced, parallel needles 38 secured together at their upper ends by a head 40. A shank 42 extends upwardly from the head 40. As shown in FIGURE 1, shank 42 fits into a hole in the bottom of a needle bar 44 and is secured to the needle bar 44 by a set-screw 46. Each of the needles 38 of the present invention is provided with an eye 48 which extends from front to rear rather than from side to side. The significance of having the needles 38 provided with an eye 48 that is disposed in the front to rear disposition shown particularly in FIGURES 1 and 17 will be explained below. Needles 38 are spaced apart a distance such that the distance between the outer edges of the needles 38 is substantially equal to the width of the needle hole 34 in foot 26. Thus, as shown in FIGURE 2, the needles 38 pass through the needle hole 34 closely adjacent the sides of the needle hole 34, and thereby pass through the inner edges of the grooves 32.

The presser foot 22 is disposed above the needle plate 50 of the sewing machine 20. Such needle plate 50 is disposed upon the flat bed 52 on the sewing machine 20. Such bed 52 extends for an appreciable distance on all sides of the needle plate 50 and provides support for the cloth member undergoing stitching with the sewing machine 20 of the present invention. As shown in FIGURES 7 and 8, the needle plate 50 is threadably secured to the bed 52 by means of screws 54. Removal of the screws 54 will enable the needle plate 50 to be raised, thereby permitting access to the contents within the bed 52 of the sewing machine 20, such contents forming no part of the present invention.

Needle plate 50 comprises a planar plate which is disposed upon the bed 52 with the upper surface of the needle plate 50 being substantially flush with the surface of the bed 52.

Needle plate 50 has a pair of spaced, parallel grooves 56 in its upper surface. Grooves 56 extend from the front edge to the rear edge of needle plate 50 in the direction that the cloth is advanced across the needle plate 50. Grooves 56 are spaced apart a distance equal to the distance between the grooves 32 in the bottom of foot 26. The grooves 56 are positioned such that each groove 56 is parallel to and beneath a separate groove 32 in the bottom of foot 26.

Needle plate 50 has a needle hole 58 therethrough between the grooves 56. Needle hole 58 is wider than the distance between the grooves 56 so that the needle hole 58 opens into the grooves 56. Needle hole 58 is located directly under needle hole 34 in foot 26.

Needle plate 50 is provided with feed slots 60, 62, and 64 on each side of and to the rear of needle hole 58. Feed claws 66, 68, and 70 project through feed slots 60, 62, and 64 respectively, such feed claws 66, 68, and 70 being of conventional construction and serving the purpose of advancing the cloth undergoing stitching in the direction between the front edge and the rear edge of needle plate 50.

The operation of the sewing machine 20 of the present invention is as follows:

A form of concealed slide fastener which may be utilized in accordance with the present invention is shown in FIGURE 18. The precise construction of the concealed slide fastener forms no part of the present invention, a wide variety of such concealed slide fasteners being described in the art. A suitable example of a concealed slide fastener which may be utilized in the present invention is that disclosed in United States Letters Patent 2,738,560 issued March 20, 1956 to Jacques Hug entitled "Concealed Slide-Fasteners." The finished sewn article is shown in FIGURES 5 and 6, and by reference to FIGURES 2, 3, 4, 6, and 18 a sufficient understanding of the concealed slide fastener may be had.

The slide fastener 72 includes a pair of element supporting tapes 74 and 76 on which the elements 78 of the concealed slide fastener 72 are carried. The tapes 74 and 76 are permanently united together by means of a clip at the lowermost portion of the tapes 74 and 76. The concealed slide fastener 72 includes the slider 80 which carries the tab 82.

As seen particularly in FIGURE 6, the elements 78 are carried on folded-in inner edges of the tapes 74 and 76, the inner edges of the tapes 74 and 76 being welted at 84 to provide means for anchoring the elements 78. Since the elements 78 are disposed behind the inner edge portions of the tapes 74 and 76 and since the slider 80 rides on the inside and outside of the elements 78, when the concealed slide fastener 72 is closed (see FIGURE 5) substantially only the tab 82 is exposed to view.

FIGURES 2 and 3 reveal the joinder of tape 74 to cloth 86. The cloth 86 in the embodiment shown in FIGURE 5 includes a sewn seam 88 above the concealed slide fastener 72 and a sewn seam 90 below the concealed slide fastener 72. The seams 88 and 90 join the cloth 86 to the cloth 92 (see FIGURE 5). The cloth 86 is folded back along fold line 94 (see FIGURE 6) to form the exposed major portion of the cloth designated 86*a* and the folded-under portion of the cloth 86*b*, such folded-under portion 86*b* of the cloth being juxtaposed to the tape 74. Similarly, the cloth 92 is folded back along fold line 96 to form the exposed major portion designated 92*a* and the folded-under portion 92*b*, such folded-under portion 92*b* being juxtaposed to the tape 76.

Referring now particularly to FIGURES 2 and 3, the stitching of the tape 74 to cloth 86 is shown. It is essential if the slide fastener 72 is to be concealed from view as shown in FIGURE 5 that the line of stitching 98 be as close as possible to the slide fastener elements 78. Thus, the needle 38*a* which forms the line of stitching 98 should be positioned as close as possible to the elements 78, and even can be in rubbing contact with the elements 78.

The tape 74 and the cloth 86 are fed between the needle plate 50 and the foot 26 with the elements 78 passing through one pair of the opposed grooves 32 and 56 in the foot 26 and needle plate 50 respectively, and the tape 74 and the folded-under portion 86*b* of the cloth 86 extending across the needle holes 34 and 58. To permit the elements 78 to pass through the grooves 32 and 56, the elements 78 are tilted so that the inner ends 78*a* of the elements 78 fit into the groove 32 in the foot 26, and the outer ends 78*b* of the elements 78 fit into the groove 56 in the needle plate 50. Since the groove 32 in the foot 26 is tilted away from the needle hole 34, the elements 78 will be tilted to the extent that the outer end 78*b* of the elements 78 will be close to the needle 38*a*, or may in fact be in rubbing contact with the needle 38*a*. Thus, the portion of the tape 74 juxtaposed to the elements 78 will be exposed so that the line of stitching 98 can be placed very close to the elements 78.

If the elements 78 are tilted to such an extent that the outer ends 78*b* of the elements 78 extend into the path of the needle 38*a*, the needle 38*a* will be deflected slightly away from the elements 78 when the needle 38*a* hits the outer ends 78*b* of the elements 78. However, the needle 38*a* picks up the thread of the warp of the cloth 86 before it hits the element 78 so that if the needle 38*a* is deflected it moves the thread of the warp of the cloth 86 over and lays the stitch as close as possible to the elements 78. When the needle moves up out of the cloth 86, the deflected thread of the warp of the cloth 86 will by its own resiliency return to its normal position.

The disposition of the eye **48** of the needle **38**, which as above-indicated is from the front to the rear, enables the thread **100** to be passed through the eye **48** of the needle **38** without interfering with the positioning of the needle **38** closely adjacent to the elements **78**. Thus, where a needle having an eye extending from side to side is used, the thread will be interposed between the needle and the elements and will interfere with the positioning of the needle closely adjacent to the elements and/or will be broken when the needle is positioned closely adjacent the elements.

Since the line of stitching **98** must be as close as possible to the elements **78**, the major portion of the tape **74** would be free. It has been found that if the major portion of the tape **74** is left free, the tape **74** may curl up and either interfere with the proper operation of the slide fastener **72** and/or form an unsightly bulge in the garment. In the sewing machine of the present invention, the second needle **38***b* provides a second line of stitching **102** spaced from and parallel to the line of stitching **98**, to prevent the tape **74** from curling up. The second needle **38***b* serves an additional function which will be explained below.

Heretofore, in the sewing of concealed slide fasteners, when the stitching of one of the tapes of the slide fastener to the cloth was completed, it was necessary to turn the garment completely around in order to stitch the other tape of the slide fastener to the cloth. Also it was necessary that both tapes and their associated cloths be fed through the sewing machine in the same direction. These steps in the sewing of the slide fastener were time consuming so that they slowed down the operation of sewing the slide fastener.

In the sewing machine of the present invention, when the stitching of tape **74** to cloth **86** is completed, it is not necessary to turn the garment around, but the garment is merely moved over to bring the tape **76** and the cloth **92** over the needle plate **50**. The tape **76** and cloth **92** are then fed between the foot **26** and needle plate **50** with the elements **78** on the tape **76** passing through the other pair of opposed grooves **32** and **56** in the foot **26** and needle plate **50** respectively, as shown in FIGURE 4.

In the stitching of the tape **76** to the cloth **92**, the needle **38***b* provides the row of stitching **104** which is as close as possible to the elements **78**, and the needle **38***a* provides the second row of stitching **106**. Also since the sewing machine of the present invention is a reversible feed machine, tape **76** and cloth **92** can be fed under foot **26** in the direction opposite to the direction that tape **74** and cloth **86** were fed under foot **26**. Thus, if tape **74** and cloth **86** were fed under foot **26** in the direction of arrow **108** in FIGURE 3, tape **26** and cloth **92** can be fed under foot **26** in the direction of arrow **110** in FIGURE 4. Therefore, with the sewing machine of the present invention a concealed slide fastener can be sewn onto juxtaposed cloth at a more rapid rate and with a minimum of manual operation.

Although the needle unit **36** for the sewing machine of the present invention has been described as having two needles **38**, if the second row of stitching is not desired, a single needle which is laterally adjustable in the needle bar **44** can be used without substantially affecting the speed of operation of the sewing machine of the present invention. If a single needle is used, the needle is positioned next to one side of the needle hole **34** in the foot **26** to provide the row of stitching which is as close as possible to the elements **78** on the tape being sewn. The needle is then moved to the other side of the needle hole **34** to provide the row of stitching which is as close as possible to the elements **78** on the other tape being sewn.

The present invention may be embodied in other specific forms without departing from the spirit or essential attributes thereof and, accordingly, reference should be made to the appended claims, rather than to the foregoing specification as indicating the scope of the invention.

I claim:

1. In a sewing machine for sewing concealed slide fasteners, a needle plate having a pair of spaced, parallel grooves in the upper surface of the needle plate extending in the direction of feed across the needle plate, and a needle hole in the needle plate between said grooves, and a presser foot superposed above the needle plate, said presser foot having a pair of spaced grooves in its bottom surface and a needle hole between said grooves, each of the grooves in said presser foot being parallel to and superposed above a separate one of said grooves in said needle plate, and the needle hole in said presser foot being superposed above the needle hole in said needle plate.

2. A sewing machine in accordance with claim 1 in which each of said needle holes opens into the grooves on each side of the needle hole.

3. A sewing machine in accordance with claim 2 in which the grooves in said presser foot are tilted at an acute angle with respect to a plane perpendicular to said foot and away from each other.

4. A sewing machine in accordance with claim 3 including a needle unit mounted above said presser foot, said needle unit including at least one needle adapted to pass through the needle holes along one side of said needle holes.

5. A sewing machine in accordance with claim 3 including a needle unit mounted above said presser foot, said needle unit includes a pair of spaced parallel needles adapted to pass through the needle holes along opposite sides of said needle holes.

6. A presser foot for sewing concealed slide fasteners comprising a foot, a shank extending upright from the heel of the foot, a pair of spaced longitudinally parallel grooves in the bottom surface of said foot, said grooves being tilted at an acute angle with respect to the vertical away from each other, and a needle hole through said foot between said grooves, said grooves extending the full length of the foot.

7. A presser foot in accordance with claim 6 in which said needle hole is wider than the space between said grooves so that the needle hole opens into said grooves.

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