United States Patent [19]

Ketterer

[11] **3,877,403**

[45] **Apr. 15, 1975**

[54] **PRESSER DEVICES FOR SEWING BUTTONHOLES**

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[73] Assignee: **The Singer Company,** New York, N.Y.

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[52] **U.S. Cl.** **112/77**

[51] **Int. Cl.** **D05b 3/24**

[58] **Field of Search** ..... 112/77, 70, 73, 75, 76, 112/158 B, 158 R, 235

[56] **References Cited**

UNITED STATES PATENTS

3,421,463	1/1969	Happe et al.	112/77
3,656,443	4/1972	Ross	112/77

FOREIGN PATENTS OR APPLICATIONS

1,360,144	6/1963	France	112/77

Primary Examiner—H. Hampton Hunter

Attorney, Agent, or Firm—Robert E. Smith; Marshall J. Breen; Edward L. Bell

[57] **ABSTRACT**

A work engaging plate is provided for use with the slidable work engaging shoe of a buttonhole making presser foot for a sewing machine. In combination with a sewing machine feed dog that is covered with resilient material, the work engaging plate may take the form of a thin planar metallic member which will not detract appreciably from the limited space available for work fabrics beneath the presser foot. A novel coupling between the work engaging plate and the traveling shoe maintains the plate properly oriented relatively to the shoe but with the capacity for accommodating thickness variation of work fabrics as well as unevenness in thickness in any direction.

5 Claims, 10 Drawing Figures

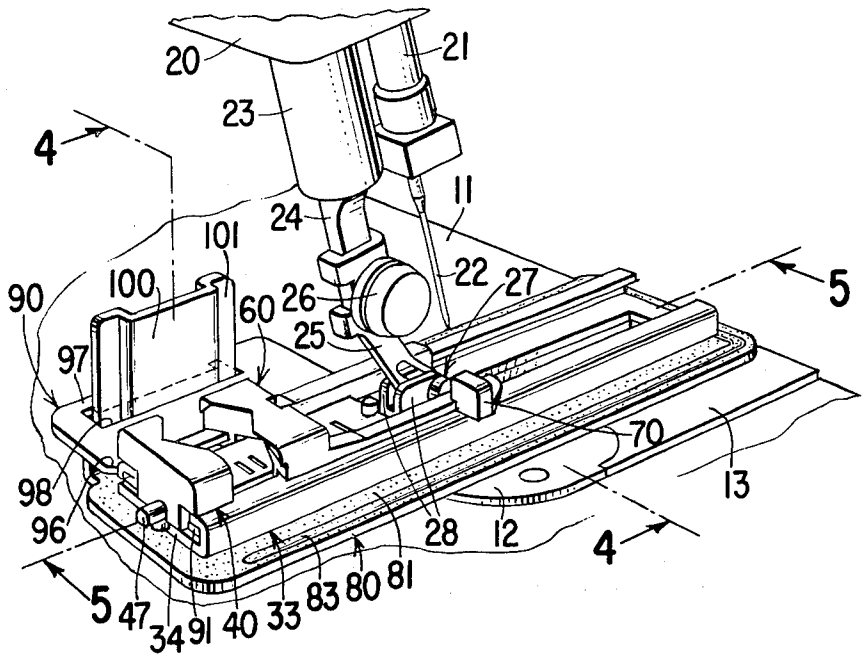
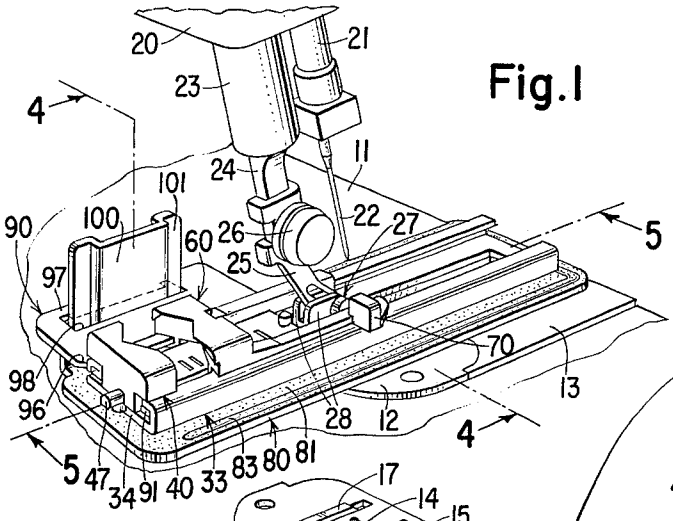


Fig.1



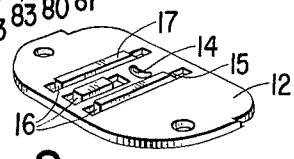


Fig.2

Fig.3

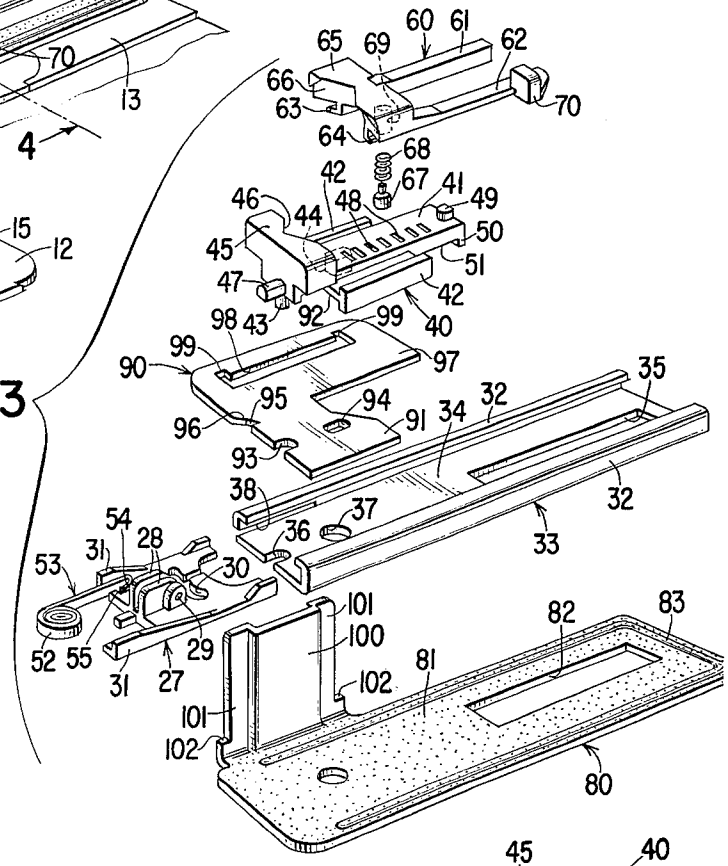
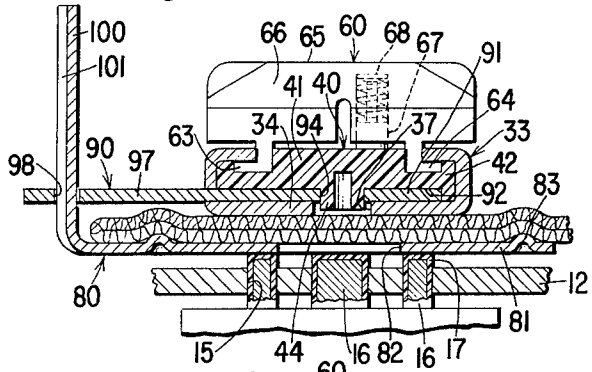


Fig.4



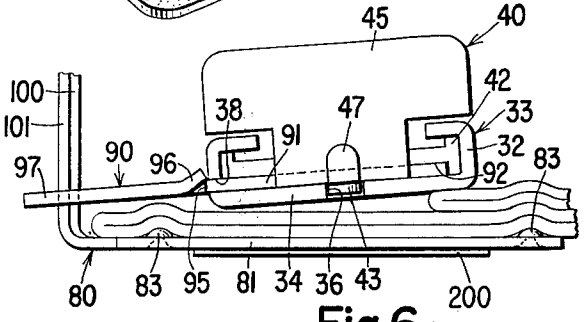


Fig.6

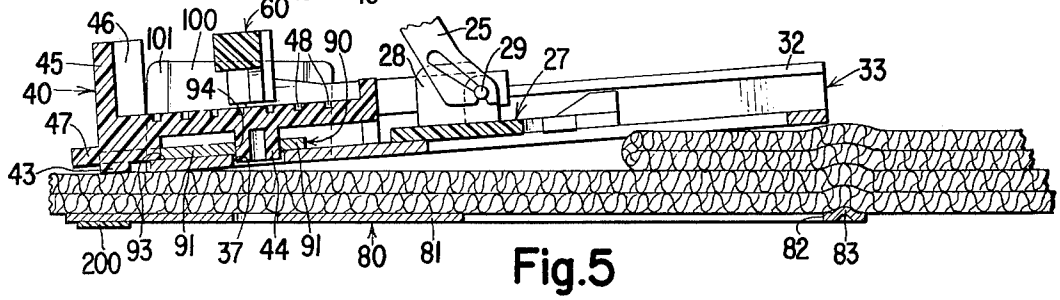


Fig.5

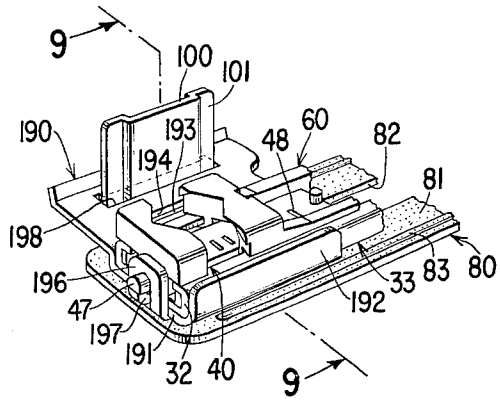


Fig.7

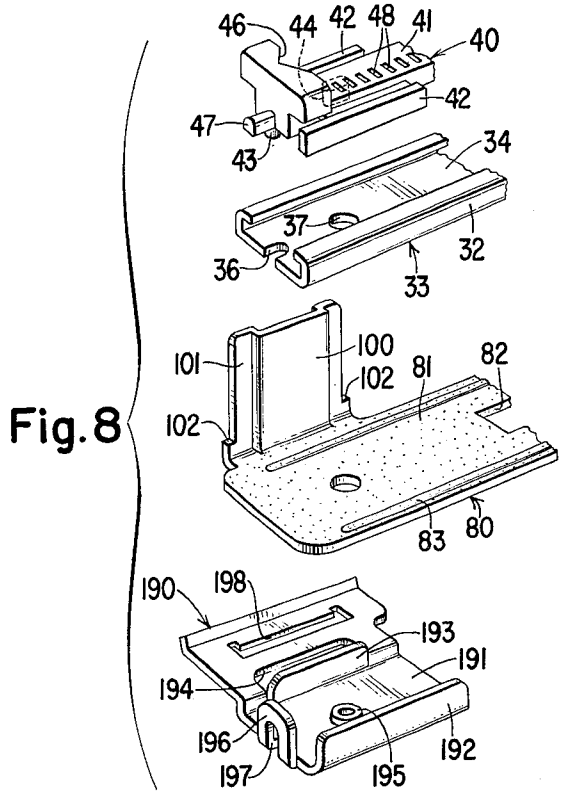


Fig.8

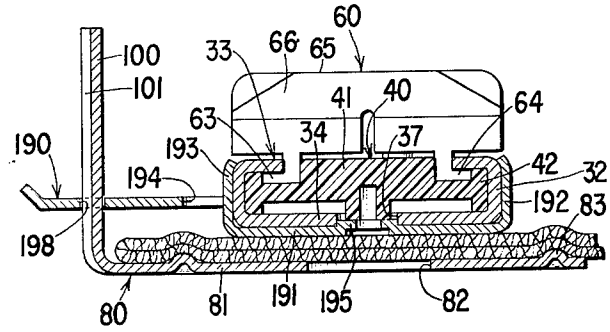


Fig.9

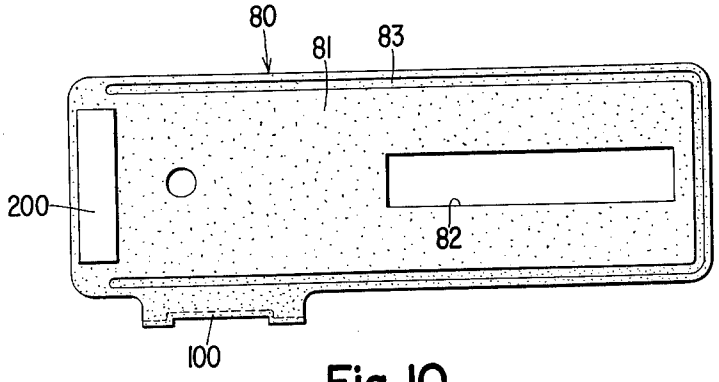


Fig.10

PRESSER DEVICES FOR SEWING BUTTONHOLES

BACKGROUND OF THE DISCLOSURE

Traveling work engaging shoes are well known in association with sewing machine presser feet for facilitating buttonhole production, as shown, for instance, in the U.S. Pat. No. 3,656,443 dated Apr. 18, 1972 of R. J. Ross. With this known construction, the work feeding instrumentality of the sewing machine by contacting the work fabrics moves the shoe. Since the characteristics of work fabrics can differ widely, appreciable variation can arise in the effectiveness of the transport of the work and the traveling shoe along the length of the buttonhole when using the patented construction.

A French Pat. No. 1,360,144, dated June 20, 1963 discloses a work engaging plate arranged beneath the traveling shoe of a buttonhole making presser device, but this patented arrangement can accommodate only a small fraction of the work fabric thickness which the sewing machine might ordinarily accept because a layer of resilient material is required to be added beneath the work engaging plate capable of gripping coaction with the teeth of the sewing machine feed dog. In the construction disclosed in this French patent, moreover, the coupling between the work engaging plate and the traveling shoe does not provide accommodation for any appreciable thickness variation of the work fabrics beneath the traveling shoe lengthwise along the buttonhole. This is a serious limitation since buttonholes are commonly placed along the fly edges of garments where hem folds are frequently utilized giving rise to fabric thickness variation along the buttonhole length.

BRIEF SUMMARY OF THE INVENTION

It is an object of this invention to provide the traveling shoe of a buttonhole making presser device with means for responding favorably to the sewing machine work feed regardless of the characteristics of the work fabric being sewn and without materially limiting the work thickness capacity of the presser device. This object of the invention is attained by the use of a thin planar metallic work engaging plate arranged beneath the traveling shoe and cooperating in combination with a work feed dog surmounted with resilient material.

A further object of this invention is the provision of a novel coupling between the traveling shoe of the presser device and the work engaging plate which will readily accommodate different thicknesses of work fabric as well as work thickness variation either side-to-side or front-to-back. This object of the invention is attained by the provision on one of the members to be coupled of a bracket having a flat planar portion which is parallel to the sole plate of the traveling shoe and which is formed with a narrow slot through which extends a blade projecting from the other of the members to be coupled.

DESCRIPTION OF THE DRAWINGS

With the above and additional objects and advantages in view as will hereinafter appear, this invention will now be described with reference to the accompanying drawings in which:

FIG. 1 represents an assembled perspective view of a buttonhole making presser device to which a preferred embodiment of this invention is applied with the presser device shown in operative position on a sewing machine but in the interest of clarity without work fabrics;

FIG. 2 is a perspective view of the throat plate of the sewing machine of FIG. 1 showing the feed dog of the sewing machine protruding therethrough;

FIG. 3 is a disassembled perspective view of the presser device of FIG. 1;

FIG. 4 is a cross-section view taken substantially along line 4—4 through the presser device and the sewing machine throat plate of FIG. 1, but with work fabrics included,

FIG. 5 is a cross-sectional view taken substantially along line 5—5 through only the presser device of FIG. 1, but including work fabrics of exaggerated uneven thickness lenthwise of the presser device;

FIG. 6 is an end elevational view of the presser device of FIG. 1 shown with work fabrics which are of uneven thickness laterally across the presser device;

FIG. 7 represents a perspective view of a portion of buttonhole making presser device showing a modified form of this invention applied thereto,

FIG. 8 is a disassembled perspective view of the presser device of FIG. 7,

FIG. 9 is a cross-sectional view taken substantially along line 9—9 of FIG. 7, and

FIG. 10 is a bottom plan view of the work engaging plate member of this invention.

Referring to the drawings, 11 indicates the work supporting bed of the sewing machine which carries a throat plate 12 and a slide cover plate 13 on which work fabrics are also adapted to be supported. As shown in FIGS. 2 and 4, the throat plate 12 is formed with a needle aperture 14 and with feed dog slots 15 through which the limbs of a feed dog 16 project upwardly. Preferably in this invention, the feed dog limbs, and particularly the tops thereof, are covered with a layer 17 of resilient material such as synthetic rubber or the like.

In FIG. 1 a fragment of the sewing machine head 20 is shown in which the needle bar 21 is endwise reciprocable with capacity for lateral jogging movement. A thread carrying needle 22 clamped to the needle bar transverses the needle aperture 14 in the throat plate in the formation of the stitches defining the button hole.

Also carried in a bushing 23 in the sewing head is a presser bar 24 to which a presser foot shank 25 is clamped by a thumb screw 26. A presser foot 27 formed with cheek pieces 28 and a pivot pin 29 may be exchangeably secured to the shank 25 as disclosed in the U.S. Pat. No. 3,489,114 issued Jan. 13, 1970 which is incorporated herein by reference.

The presser foot 27 as best shown in FIG. 3, is provided with a needle accommodating aperture 30 and is formed at each side with upstanding guide projections 31 which fit into inturned guide channels 32 formed at each side of a traveling work engaging shoe 33.

The work engaging shoe 33 includes a flat sole portion 34 which underlies the presser foot 27 and overlies the feed dog limbs 16 as shown, for instance, in FIG. 4. The sole portion 34 is formed with a central elongated aperture 35 to provide clearance for needle reciprocation during buttonhole stitching. The sole portion is also formed with a notch 36 at one end and with a small aperture 37 adjacent to the notch for the purpose of locating thereon a button gauging device as will be de-

scribed hereinbelow. One of the guide channels **32**, moveover, is formed adjacent to the notched end of the sole portion with a lengthwise slot **38**.

The presser foot **27** is slidably arranged within the guide channels **32** of the work engaging shoe **33** and can move therein over the range in which the needle hole **30** in the presser foot overlies the needle hole **35** in the shoe **33**.

An anchor element **40** of the button gauging device is formed with a base **41** having guide projections **42** at each side adapted to fit between the guide channels **32** of the work engaging shoe **33**. Depending from the base **41** are two projections **43** and **44** adapted to enter into the notch **36** and small aperture **35**, respectively, of the shoe **33** to lock the anchor element firmly in place at one end of the shoe.

The anchor element **40** also includes an upwardly extending abutment **45** formed with a "V" notch **46** adapted to engage and center one side of a round button. A horizontal peg **47** projects from the abutment **45** on the side opposite the "V" notch **46**.

The top surface of the anchor element base **41** is formed with evenly spaced lateral indentations **48** and an upstanding post **49** is formed at the free extremity of the base portion remote from the "V" notch.

The under surface of the anchor element base **41** beneath the post **49** is formed with a depending flange **50** defining a shallow cavity **51** loosely accommodating the convoluted extremity **52** of a coil flat spring **53** of which the other extremity is formed into a hook **54** engaged in a seat **55** formed in the presser foot **27**.

The anchor element **40** is adapted to be locked in place at one extremity of the work engaging shoe **33**. Preferably, the assembly being accomplished by slight deformation of the anchor element **40** until the projections **43** and **44** enter and lock into the switch **36** and the aperture **37** respectively.

A button gauging element **60** is constrained in the guide channels **32** of the work engaging shoe **33** between the anchor element **40** and the presser foot **27**. To this end, the button gauging element is formed with spaced guide rails **61** and **62** each shaped to overlie one of the guide channels **32** of the work engaging shoe and, as shown in FIG. **4**, each also being formed with an inturned lip **63** and **64**, respectively, adapted to engage slidably in the guide channels **32** and inside of both the guide projections **31** on the presser foot and the guide projections **42** on the anchor element. The button gauging element **60** may be shifted away from the anchor element **40** to the extent permitted by the post **49** engaging the abutment **65**.

The button guaging element **60** includes an upstanding element **65** formed with "V" notch **66** complemental to the "V" notch **46** in the abutment element **40** in centering and locating a button therebetween. A detent plunger **67** biased by a small spring **68** arranged in a cavity **69** in the button gauging element **60** works against the indentation **48** in the anchor element base **41** to define a series of positions of adjustment for the gauging element.

Projecting laterally from the guide rail **62** of the button gauging element is an actuating tab **70** adapted to serve the purpose similar to that of the cam element **130** of the referenced U.S. Pat. No. 3,656,433 Apr. 18, 1972 in signaling completion of the proper length of buttonhole sides stitching to accommodate a round button which is placed between the abutments **45** and **65**. The devices of this invention may also be used on any zigzag sewing machine even if the sewing machine does not include linkages for automatically responding to the tab **70** in forming the buttonhole ends. Where such automatic linkages are not present, the tab **70** or a similar projection may be utilized as an indicia by which the operator may gauge the length of the buttonhole and manually regulate the change of machine controls to effect sewing of the buttonhole ends.

The device as thus far described constitutes an operative unit capable of performing quite satisfactorily when certain fabrics are inserted between the shoe **33** and the sewing machine throat plate **12**. When used in this fashion, however, the sewing machine feed dog **16** will engage the work fabrics and move the shoe **33** by way of the work fabrics. The results may differ depending upon the particular characteristics of the fabrics being sewn.

In order to eliminate the effect of the variation in feed of the work and of the work engaging shoe **33** because of variation in the characteristics of the work fabric, a work engaging plate member **80** is employed in this invention.

Preferably the work engaging plate member **80** is formed with a thin metallic portion **81** which is arranged beneath and substantially parallel to the sole portion **34** of the work engaging shoe **33**. Beneath the work engaging shoe, the portion **81** of the plate member **80** is formed substantially planar so as to utilize only a minimum of the space available between the shoe **33** and throat plate **12**. In combination with a sewing machine feed dog with limbs covered with resilient material **17**, a thin hardened metallic work engaging plate can cooperate successfully without the requirement of a space consuming layer of cushioning material which might be required for use with a feed dog with serrated or knurled metallic work engaging limbs.

The portion **81** of the work engaging plate is preferably formed with a clearance aperture **82** and beyond the vertical projection of the work engaging shoe **33**, a raised stiffening rib **83** may be formed which as shown in FIG. **4**, will not detract from the space for work fabrics.

The provision will now be described for supporting the work engaging plate **80** beneath the shoe **33** in such a way that the work engaging plate will partake of translatory movement with the shoe **33** with the aperture **82** in the plate remaining always oriented substantially in alignment with the aperture **35** in the shoe **33**. The support will also provide for wide variation of the spacing between the plate **80** and the shoe **33** as well as for freedom of the work engaging plate **80** to tilt either lengthwise or from side to side to accommodate uneven work thicknesses.

To support the work engaging plate **80** in the manner described above, a support bracket **90** is provided fixed to the work engaging shoe **33**. While the support bracket **90** may be fixed in any of a variety of ways to the shoe **33** as by welding or by being formed integrally therewith when the shoe is manufactured, the support bracket in the preferred embodiment of FIGS. **1** to **6** is formed as a separate piece which is fixed to the shoe in the following fashion.

The support bracket **90** is formed with an extension **91** adapted to fit through the slot **38** in the guide channel **32**. A recess **92** is formed beneath the anchor element **40** to accommodate the extension **91**, as shown

in FIG. 4 and the extension 91 is formed with a notch 93 and an aperture 94 to accommodate the projections 43 and 44, respectively depending from the anchor element. In addition, the support bracket 90 adjacent to the extension 91 is formed with a small slit 95 defining a corner 96 which is struck up slightly to abut the guide channel 34 and prevent twisting of support bracket 90 relatively to the shoe 33.

The support bracket 90 is formed with a substantial planar portion 97 extending to one side of the shoe 33 when the parts are assembled and arranged substantially parallel to the sole portion 34 of the shoe. A noncircular aperture 98 is formed in the planar portion 97, the aperture 98 preferably taking the form of a narrow straight slot elongated in the direction parallel to the guide channel 32 of the shoe 33. The slot may be formed with a small laterally extending branch 99 at each extremity and this is done solely to facilitate the design of a punch to produce the aperture in such a way that burrs may be eliminated at the extremities of the slot.

Cooperating with the aperture 98 in the support bracket 90 is a projection 100 bent upwardly at a substantially right angle to the flat planar portion 81 of the work engaging plate 80. The projection 100 is preferably formed with lateral offsets 101 at each side so that the overall thickness of the projection can match closely the width of the aperture 98 and this overall width may exceed the thickness of the sheet metal of which the work supporting plate 80 is formed.

Near the juncture of the projection 100 with the work engaging plate, the projection is formed at each side with a step 102 below which the projection is larger in dimension than the length of the aperture 98. This arrangement limits movement of the projection 100 upwardly through the aperture and prevents the work engaging plate 80 from becoming wedged in an abnormal canted position relatively to the support bracket in which case permanent deformation of the parts might result.

When the buttonholing presser device of this invention is utilized, the presser foot shank 25 of the sewing machine is snapped onto the pivot pin 29 of the buttonhole presser foot 27 and with the presser foot raised, work fabrics are placed between the work engaging shoe 33 and the work engaging plate 80. Because the aperture 98 is formed in a thin substantially planar portion 97 of the support bracket, very slight clearances between the projection 100 and the aperture 98 in width and length of the projection, provide for appreciable capacity for tilting of the work engaging plate 80 in lateral as well as lengthwise directions. The coiled spring 53 serves always to bias the work engaging shoe 33 toward the left as viewed in FIGS. 1 and 3, and, therefore, the shoe 33 will be biased into an extreme position by the spring 53 whenever the presser bar of the sewing machine is raised so that each successive buttonhole can be started with the shoe 33 in the same extreme position. By setting the gauging element 60 to grip a button between the "V" notches (45–66) the tab 70 will be located in an appropriate position along the shoe 33 to influence mechanism on the sewing machine such as is disclosed in the above referred to U.S. Pat. No. 3,565,433 to cause a buttonhole to be formed of appropriate length to accommodate that button, or the tab can provide a visual indication to assist the operator.

Shown in FIGS. 7, 8, and 9 is a modified form of this invention differing from the form disclosed above with reference to FIGS. 1 to 6 only as to the manner in which a support bracket 190 is formed and arranged for ready attachment and removal from the work engaging shoe 33.

As shown in FIG. 8, the support bracket 190 is formed with a downwardly offset exterior 191 adapted to extend beneath the work engaging shoe 33. The free extremity of the extension 191 is formed with an upturned and slightly inturned jaw 192 adapted to cooperate with a similarly inturned jaw 193 which is struck out from an incised section 194 of the support bracket. The jaws 192 and 193 grip the guide channels 32 of the work engaging shoe 33 as shown in FIG. 9 to constrain the support bracket 190 thereon. To locate the support bracket 190 lengthwise along the shoe 33, the extension 191 may be formed with a small circular land 195 struck upwardly and adapted to fit into the aperture 37 in the sole portion 34 of the shoe 33. An upturned tab 196 may also be provided on the extension 191 and formed with an aperture 197 adapted to accommodate the horizontal peg 47 projecting from the anchor element 47 thus to lock the support bracket firmly in place on the shoe 33. The form of construction of the support bracket 190 shown in the modification of FIGS. 7, 8, and 9 is thus particularly well suited for adaptation of this invention to existing presser devices which were not manufactured with special provision for accommodation in this invention. The support bracket 190 may be simply clipped in place on the work engaging shoe 33. The support bracket 190 is formed with a noncircular aperture 198 preferably shaped identical to that of the aperture 98 in the support bracket 90 so that the same work engaging plate 80 may be utilized exchangeably with either of the support brackets 90 or 190.

As shown in FIG. 10, which illustrates a bottom plan view of the work engaging plate 80, the under surface thereof and particularly an area surrounding the clearance aperture 82, may be formed with a roughened texture as, for instance, by a sand blasting operation or the like. The roughened surface can thus cooperate in a uniform manner with the sewing machine feed dog. In addition, a small strip 200 of antifriction material such as synthetic plastic or the like may be adhered adjacent to the back edge of the work engaging plate 80. Since this poriton of the plate overlies the sewing machine bed 11 rearwardly of the throat plate 12 as shown in FIG. 1, the antifriction material will serve to protect the finish of the sewing machine bed 11 from abrasion.

Having set forth the nature of this invention, what is claimed herein is:

1. A sewing machine having a slotted work supporting throat plate, a feed dog including a work engaging bar surmounted with resilient material shiftable through said throat plate slot, and a presser foot arranged in opposition to said throat plate, in combination with a shoe member slidably supported relatively to said presser foot for translatory movement in the direction of said throat plate slot and including a bottom web portion arranged in opposition to the work engaging bar of said feed dog, a work engaging plate member having a thin substantially planar metallic portion arranged in operative position transposed between the web portion of said shoe member and the resilient work engaging bar of said feed dog, means for sustaining said work engaging plate member for translatory movement

with said shoe member and in substantial congruity therebeneath, and means for interconnecting said shoe member with said work engaging plate member with capacity for movement of said work engaging plate member relatively toward and away from said shoe member.

2. The combination as set forth in claim 1 in which said work engaging plate member projects laterally beyond said shoe member, an in which said work engaging plate member laterally beyond said shoe member is formed with a reinforcing rib struck out of the plane of said substantially planar portion and in a direction toward said shoe member.

3. A presser device for use with a sewing machine having a buttonhole producing mechanism therein comprising a presser foot formed with a shank adapted to be secured to said sewing machine, and a sole plate formed with a laterally elongated needle aperture, a shoe member slidably supported relatively to said presser foot sole plate for movement in a direction transversely of said elongated needle aperture, a work engaging plate member having an operative position beneath said shoe member, and means for interconnecting said members in a position of substantial congruity so as to partake of said sliding movement together relatively to the presser foot but with capacity for universal tipping of said work engaging plate member relatively to said shoe member, said interconnecting means comprising a laterally extending bracket carried by one of said members, said bracket including a thin substantially planar portion arranged substantially parallel to the presser foot sole plate in the assembled position of said parts, a single non-circular aperture formed in said planar bracket portion, a projection carried by the other of said members, said projection having a crosssectional configuration corresponding closely to that of said single non-circular aperture in said bracket, and said projection extending substantially perpendicularly through said bracket aperture when said work engaging plate occupies an operative position beneath said presser foot sole plate.

4. A presser device as set forth in claim 2 in which said bracket comprises a detachable element formed with surfaces complimental to said shoe member for exchangeable attachment to said shoe member.

5. A presser device as set forth in claim 2 in which said bracket is carried by said shoe member and in which said non-circular aperture is a substantially straight slot elongate in a direction perpendicular to the needle aperture in said presser foot sole plate, and in which said projection is carried by said work engaging plate and comprises an upstanding blade laterally offset therefrom.

* * * * *