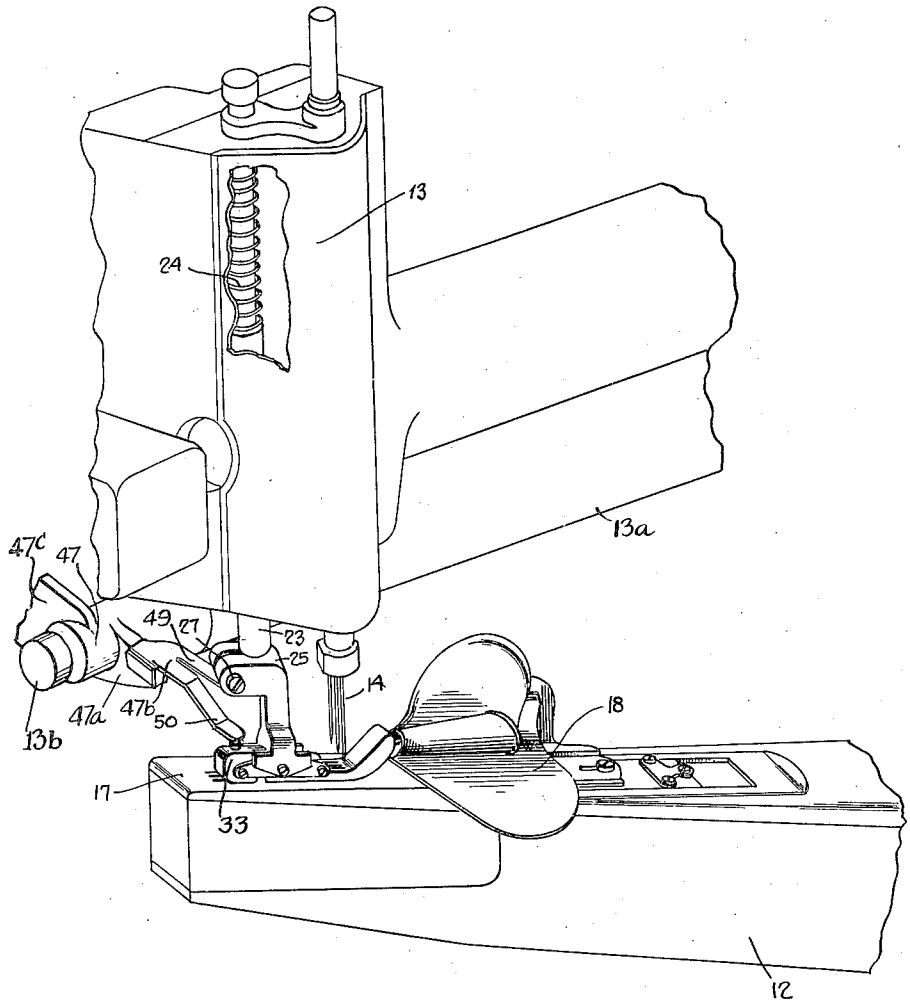
Sept. 6, 1949. F. P. TAMBURRO 2,481,175

PRESSER FOOT

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Fig. 1



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Fig. 2

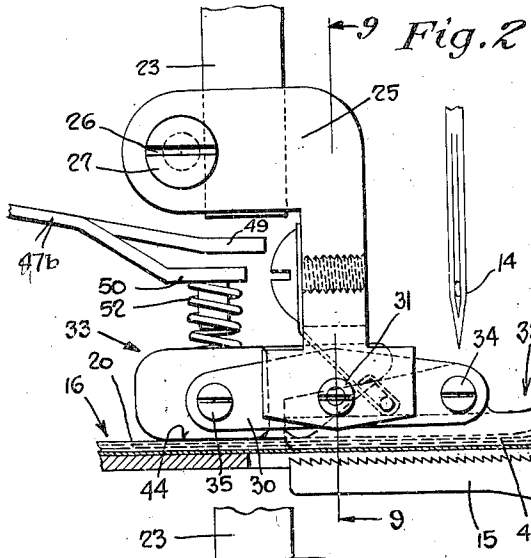


Fig. 9

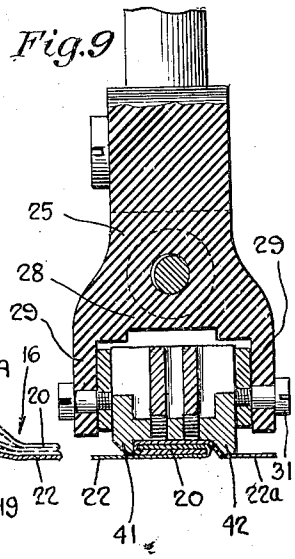


Fig. 3

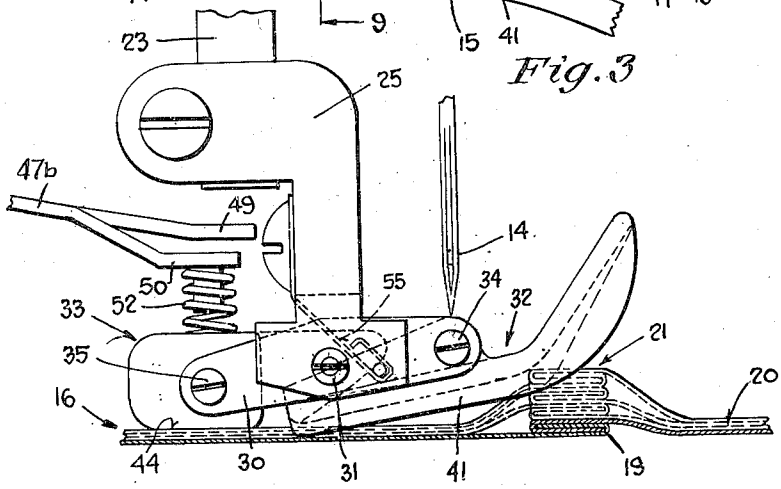
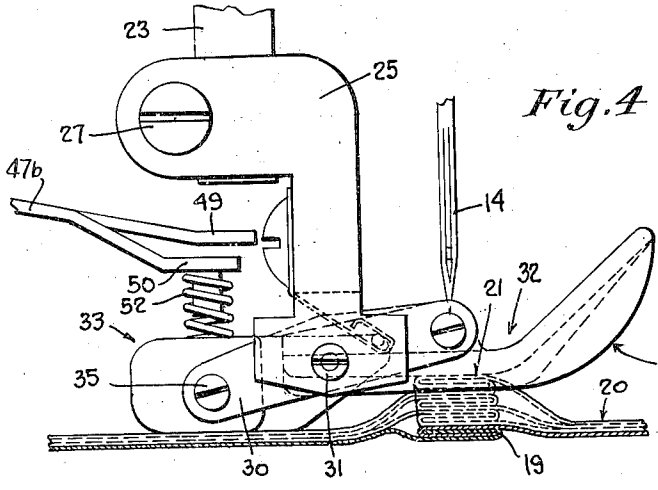


Fig. 4



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Fig. 5

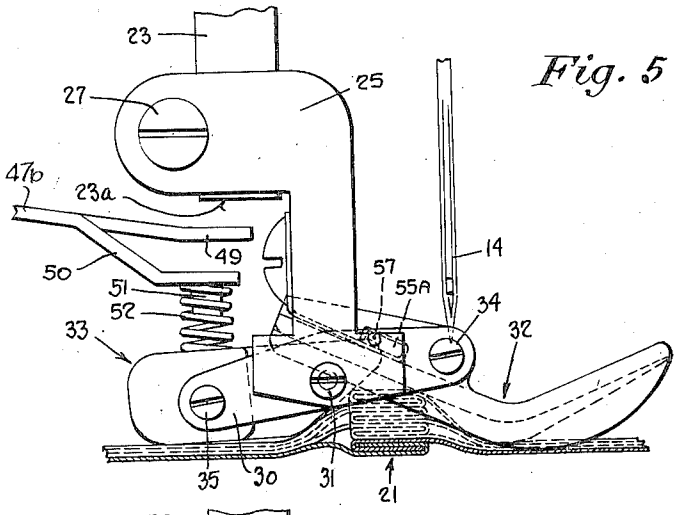


Fig. 7

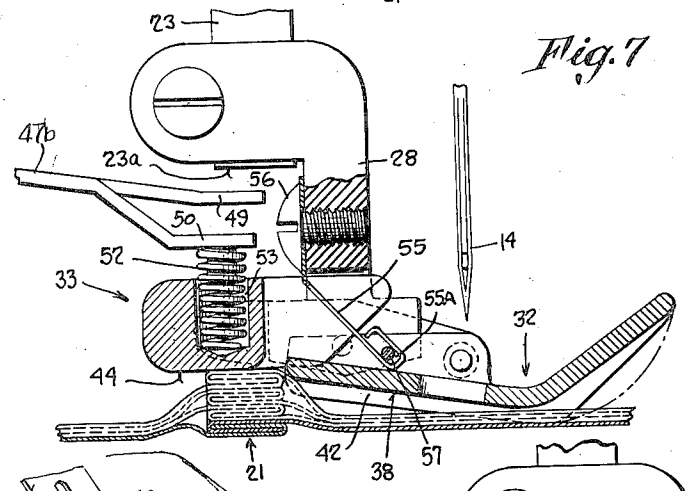


Fig. 6

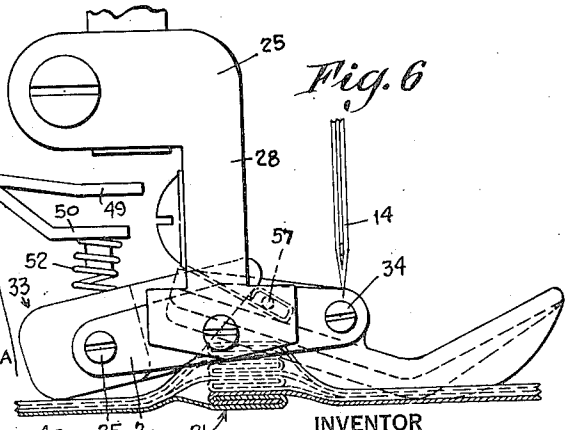
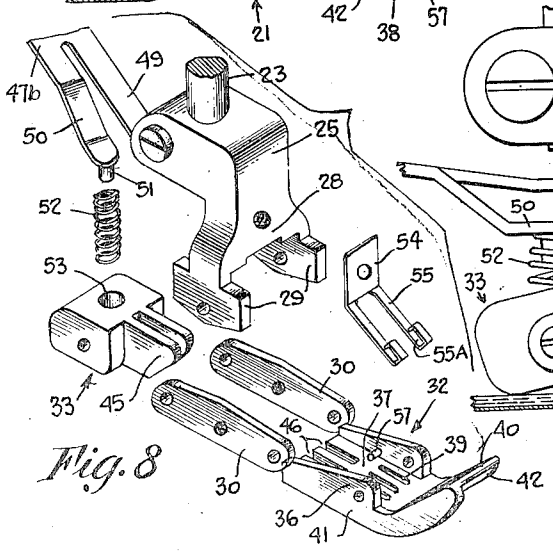


Fig. 8



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Patented Sept. 6, 1949 2,481,175

UNITED STATES PATENT OFFICE

2,481,175

PRESSER FOOT

Francis P. Tamburro, Ozone Park, N. Y., assignor to Willcox & Gibbs Sewing Machine Company, New York, N. Y., a corporation of New York

Application February 28, 1944, Serial No. 524,159

8 Claims. (Cl. 112—235)

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This invention relates to sewing machines, and more particularly to machines adapted to stitch together the edges of fabric sections and the like to form felled seams.

An object of this invention is to provide an improved presser device which is so articulated and controlled that it functions to maintain a close control of the material at the felled seam regardless of wide variations in the thickness and size of said seam, as caused by the meeting and interfolding of cross-seams in the material.

This is accomplished by a novel mounting of a front presser foot and a rear presser foot in tandem for pivotal and translational movement whereby the pivots are so located with respect to each other and to the work that movement of the presser feet in riding over cross-seams in the work is in a direction which has no component opposing the feeding movement of the work. As a result, a uniform and positive work feed is obtained.

When joining fabric sections which have felled cross-seams by sewing the sections together using a felled seam, I have found that the most difficult condition for feeding and sewing arises when the fabric sections are arranged so that the leading roll of the cross-seams is on the top of the sections where it will contact the front presser foot ahead of the rest of the cross-seam, such contact usually being abrupt and having a certain amount of impact, especially when the speed of the work feed is substantial.

It is another object of the present invention to provide an improved presser device which functions to effect a positive work feed regardless of whether the roll of the cross-seams on the top surface of the work is leading or trailing as the seam approaches the presser feet.

This is accomplished by providing an auxiliary pressure means associated with the rear presser foot and functioning independently of the pressure of the presser bar of the machine but augmenting the latter whereby the pressure on the work of the front foot and the rear foot, has a relation which results in a uniform feeding of the cross-seams past the sewing means of the machine.

A feature of the invention is the provision of an improved material control means as above which may be readily adapted to existing machines with but little change being required.

Another feature of the invention is the provision of means as above which are simple to manufacture and reliable in operation.

Other features and advantages will hereinafter appear.

In the accompanying drawings—

Figure 1 is a fragmentary side elevation of a machine embodying the invention.

Fig. 2 is a fragmentary side elevation of the material control means of the invention, showing the tandem-arranged presser feet in lowered position, and showing felled cross-seams approaching same.

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Fig. 3 is a similar view showing the action of the presser feet as the cross-seams begin to engage the forward foot.

Fig. 4 shows the action of the presser feet as the cross-seams reach the pivot point of the forward foot.

Fig. 5 shows the position of the feet when the cross-seams are just past the pivot point of the forward foot, and beginning to engage the rear foot.

Fig. 6 shows the position of the feet when the cross-seams are raising the front part of the rear foot.

Fig. 7 is a view like Fig. 2 but partly in section, and showing the relative positions of the feet as the cross-seams reach the pivot point of the rear foot.

Fig. 8 is an exploded view of the improved tandem presser-feet control.

Fig. 9 is a vertical section taken on the line 9—9 of Fig. 2.

Referring to Fig. 1, a sewing machine embodying the present invention is shown as having a supporting arm 12 extending in a lateral direction to cooperate with a sewing head 13 which supports the presser bar and needle operating mechanisms of the machine. Needles 14 are mounted for reciprocating movement in the usual manner, and cooperate with loopers (not shown) in the work-supporting arm 12 for stitching work, which may comprise fabric sections and the like, fed over the arm. As shown in Fig. 2, feed dogs 15 are provided to feed the work 16 past the needles 14, said dogs being mounted for four-motion movement in the arm 12 and having teeth extending through apertures in a throat-plate 17.

A feller or interfolder 18, Fig. 1, is located on the arm 12 ahead of the needles 14 for automatically interfolding the edges of the fabric sections in advance of the needles to be joined by the stitching. As shown, the feller 18 is of the type adapted to handle sections having felled cross-seams whereby the latter as they are made to meet or align are interfolded at their ends in the same manner as the rest of the edges making up the seam.

The machine shown may be of the type commercially well known as the Willcox and Gibbs Sewing Machine Company's "Feldlock Machine," as illustrated in Patent No. 1,796,111, issued to G. M. Lewis March 10, 1931.

According to the present invention, for controlling the felled edges of the work 16 after they leave the feller 18, there is provided an improved presser means cooperating with the feed dogs 15 and throat-plate 17 so as to cause the felled

seam to feed past the needles 14 with a uniform and positive movement even though two felled cross-seams are included in superposed relation in the seam now being felled. The variation in the thickness of the seam may be of considerable magnitude, since as shown in Figs. 2 through 7, the thickness of the seam 20 at the point 21 where the two felled cross-seams 19 meet and are interfolded is equal to sixteen times the thickness of a single fabric section 22, whereas the thickness of the seam 20 where there are no cross-seams, is only four times that of a single section. This improved presser means, in the embodiment shown, includes tandem-connected feet pivotally mounted in an improved advantageous manner, and yieldably held in engagement with the work in a novel way whereby they function to insure uniform feeding of the work past the needles 14.

As shown in Figs. 1 and 2, the head 13 has axially movable therein between extended and retracted positions, a presser bar 23 which is non-rotatable and yieldably urged toward the work-supporting arm 12 to extended position by a helical coil spring 24. The lower portion of the bar 23 extends adjacent to the needles 14, and carries at its end a bracket 25 having a split-collar 26 and draft screw 27 by means of which the bracket is secured to the bar. Referring to Figs. 8 and 9, the body of the bracket 25 constitutes a yoke 28 having a pair of depending lugs 29 which are apertured to pivotally carry a pair of rocker arms 30 at the centers thereof, said arms being pierced and threaded to receive shouldered pivot screws 31 for this purpose. The rocker arms 30 pivotally carry at their forward ends a front presser foot 32, and at their rear ends a rear presser foot 33, said ends of the arms being apertured to receive respectively shouldered pivot screws 34 and 35 which are in turn threaded into upstanding ears 36 of the front foot and the body of the rear foot.

The front presser foot 32 has a body 37, the underside 38 of which constitutes a substantially planar work-engaging surface, said body having needle apertures 39 and an upturned toe 40, the latter being adapted to guide the foot over irregularities, such as cross-seams and the like, in the work.

For the purpose of guiding the felled seam 20 which is being sewed, the body 37 of the front presser foot has along its sides depending flanges 41 and 42 respectively, which preferably extend to a depth the equivalent of three thicknesses of a single fabric section. Thus, as shown in Fig. 2, when a portion of the felled seam 20 which has no cross-seams is passing between the foot 32 and the throat plate 17 the flange 41 extends past the side of the roll comprising the upper three thicknesses of the seam, and engages and guides said side and the fabric section 22. The flange 42 on the other side of the foot depresses the top fabric section 22*a* at points alongside the seam 20, as seen in Fig. 9, so that the latter is accurately guided and prevented from having side movement while being sewed. The flange 42 is continued along the underside of the toe 40 but tapers off toward the tip, as shown by the dotted line 42*a* in Fig. 2. The flange 41 is also continued along the toe 40 to taper off at the tip, but it first deepens at the point 43 in order to adequately guide the seam 20 where a deep roll occurs, as at the point 21, showing two cross-seams interfolded.

The underside 44 of the rear presser foot 33 constitutes a planar work-engaging surface also adapted to press against the seam 20, and the front end of said foot has a pair of spaced toes 45 extending forwardly thereof into slots 46 in the rear portion of the foot 32, the under edge of the toes sloping upward as shown to cause the foot to rise above obstructions such as cross-seams and the like. Spacing is provided between the adjacent interfitting portions of the feet 32 and 33 so that each of the latter is independently pivotally movable on the rocker arms 30 with respect to the other within a predetermined range. This range is such that the feet do not interfere with each other as they pivot and bodily move in individually following irregularities in the work.

As thus pivotally mounted, the presser feet 32 and 33 are adapted to engage and guide the felled seam 20 as it is being sewed by the needles 14, said feet being made to press firmly against the seam by the spring 24 acting on the presser bar 23.

It will be noted that the three pivot points of each rocker arm are located substantially in a straight line, equi-spaced from the seams 20, the intermediate pivot being preferably substantially midway between the end pivots to divide the pressure of the spring 24 equally between the feet. This results in an important advantage when joining seamed fabric sections, or sections having other irregularities which might interfere with uniform feeding of the sections past the needles. Referring to Fig. 2, when a felled seam is being sewed at a point removed from cross-seams so that the latter do not engage the presser feet 32 and 33, no feeding problem is encountered since the work-engaging surfaces 38 and 44 of the feet are in alignment and the three pivot points of the rocker arms are equispaced from the seam.

When cross-seams 19 approach the needles 14, as seen in Fig. 3, they first engage the front presser foot 32 causing it to pivot and also bodily lift, and causing a canting of the rocker arms 30, accompanied by a retracting of the pivot 31 and presser bar 23. This increases the pressure exerted by the spring 24, and as a result the pressure exerted by the feet 32 and 33 on the work. Due to the fact that the pivots of the rocker arms 30 are initially equispaced from the seam 20, the initial retracting movement of the front foot 32 is substantially perpendicular to the line of feed of the seam, and the subsequent retracting movement of the foot is in such a direction that there is no component opposing the feed of the seam, nor the feeding movement of the feed dogs 15. As a result, feeding of the work proceeds with the least amount of interference from the front foot. If the center pivot 31 of the rocker arms were spaced further from the work than the corresponding spacing of the two end pivots, so that it was higher than same, the initial retracting movement of the front presser foot would not be perpendicular to the line of feed of the seam 20, but would have a component opposing the feed of same and the feeding movement of the feed dogs 15.

Similarly, the location of the center pivot 31, in line with the end pivots so that all three are equispaced from the seam 20, reduces the amount of feed-opposing movement of the rear foot which takes place during the retracting movement of the front foot. By thus eliminating and reducing the forces opposing the feeding movement of the seam 20 during the interval that the front

foot 32 is riding up and over an obstruction such as cross-seams 19 interfolded as at 21, a more positive and uniform feed is assured during said interval. It is during this interval that the sewing of the interfolded cross-seams take place, as seen in Figs. 2 through 5.

As seen in Fig. 4, the front presser foot 32 has entirely mounted the interfolding 21 of the cross-seams 19, and the needles 14 are stitching at the center of said interfolding. In Fig. 5, the needles are completing the stitching of the interfolding 21, the front foot 32 being canted at a comparatively sharp angle, and the rear foot 33 beginning to cant as it starts to mount the cross-seams. At this position the center pivot 31 is comparatively high and its spacing from the work is greater than the spacing in Figs. 2 and 3. Now, as the interfolding 21 of the cross-seams leaves the front foot 32 and passes completely under the rear foot 33, Figs. 6 and 7, the latter foot in mounting over the seams moves in a direction which again has no component opposing the feed of the seam. Thus, the action of the presser feet and rocker arms, as provided above by the invention, is such as to not interfere with the continued feeding and sewing of the seam 20, yet these individually and collectively function to maintain a pressure on the fabric sections and seam thereof whereby the feed dogs 15 uniformly feed the work past the needles.

Where particularly heavy fabric sections having felled cross-seams are to be joined, and especially if the cross-seams are fed with the leading roll of the seam on the top of the work where it will contact the presser feet, as shown in the figures, the invention provides novel means further regulating the action of the presser feet 32 and 33 to insure a positive and uniform feeding of the seam 20. In the embodiment shown, this embraces a mechanism for providing the rear presser foot with a pressure component, to be transmitted to the work, that is independent of the pressure supplied by the bar 23 and functions to supplement said latter pressure in a manner to maintain control at all times of the seam 20 being sewed.

Referring to Fig. 1, the bridge portion 13*a* of the machine is provided with a stud 13*b* on which is mounted a rocker 47 having an arm 47*a*. Secured to the arm 47*a* is an extension 47*b* projecting toward the presser bar 23 and terminating between the end of the latter and the rear presser foot 33. The end portion of the extension 47*b* is divided into two fingers 49 and 50, the finger 49 extending closely against the face 23*a* of the end of the bar and being adapted to engage same, and the finger 50 being located adjacent the upper surface of the rear foot 33 and having a depending boss 51 carrying a helical coil spring 52 extending into a recess 53 in said foot, see Fig. 7. When the presser feet 32 and 33 are in extended position engaging the work 16, and the extension 47*b* is in lowered position, as in Fig. 2, the finger 49 is spaced an extent from the end face 23*a* of the bar, and the spring 52 is compressed and presses down on the rear foot 33 at a point below the pivot thereof to yieldably hold same horizontally and evenly in engagement with the work. Thus the pressure exerted by the rear presser foot 33, as supplied by the spring 24 of the presser bar is augmented by the independent pressure of the spring 52. In Figs. 3 and 4, showing progressive stages in the advance of the work 16, the spring 52 does not change appreciably from the setting of Fig. 2, but acts continuously to press down on the rear foot 33 for supplementing the pressure of the presser bar spring 24. In Fig. 5, where the felled ends 21 of the cross-seams begin to engage and move the rear foot 33, the spring 52 is compressed a slightly greater extent. Figs. 6 and 7 illustrate still further compression of the spring 52 as the rear foot mounts and rises over the felled ends 21 of the cross-seams, the latter figure showing the spring being compressed a maximum amount. As the spring 52 is compressed it exerts a greater pressure on the foot 33, and the latter on the seam 20, so that the feed dogs 15 encounter greater pressure and bite more deeply for these conditions, and therefore the likelihood of slippage occurring is reduced. As a result, this further regulation of the presser feet as accomplished by the spring 52 effects a more uniform and positive feeding of the work.

When the presser feet 32 and 33 are to be raised from the work 16 the rocker 47 is turned slightly in a counterclockwise direction by an arm 47*c*, thus raising the arm 47*a* and extension 47*b* an extent. After the extension 47*b* has moved a short distance the finger 49 thereof engages the end face 23*a* of the bar 23, and further movement of the extension carries the bar, and the feet 32 and 33 to their retracted position. The extension 47*b* and bar 23 may be locked in their raised or retracted positions until the new work is inserted in the machine and the latter is ready for sewing.

For the purpose of preventing the front foot 32, when raised or retracted, from canting in a clockwise direction whereby the toe 40 thereof would be lowered and would hamper insertion of new work, a flat spring 54 having a pair of arms 55 is mounted by means of a screw 56 on the rear face of the yoke 28, the ends of the arms 55 being formed into elongate eyes 55*a*, Fig. 7, which encircle and engage pins 57 respectively carried by the ears 36 of said front foot. The spring 54 is arranged to maintain the front foot 32 in a substantially horizontal position when the latter is retracted, free from the work.

Variations and modifications may be made within the scope of this invention and portions of the improvements may be used without others.

I claim:

1. A sewing machine having a throat plate; a presser bar; a front presser foot and a rear presser foot; means for mounting the presser feet in tandem on the presser bar to be bodily movable therewith and between limits relatively thereto whereby they are positioned under pressure supplied from the presser bar to engage and move independently of one another to follow variations in the thickness of a workpiece passing over the throat plate; and means independent of the presser bar and applying pressure to the rear foot, yieldably holding the latter in work-engaging position and providing a force thereon in addition to that supplied by the presser bar.

2. A sewing machine having a frame; a throat plate; a presser bar; a front presser foot and a rear presser foot; means mounting the presser feet in tandem, and so that each is pivotally mounted to turn independently of the other; means for pivotally mounting the mounting means on the presser bar whereby the presser feet are bodily movable relatively thereto between limits and are positioned by pressure supplied from the presser bar to engage and move independently of one another to follow variations in the thickness of a workpiece passing over the throat plate; and yieldable means mounted on the frame and bear-

ing upon the rear presser foot, operating independently of the presser bar, for yieldably holding the foot in work-engaging position whereby the total feeding pressure exerted on the workpiece has a component independent of the pressure variations resulting from movement of the presser bar due to rising and falling of the front foot in traversing a cross-seam.

3. The invention as defined in claim 2 in which the independent yieldable holding means for the rear foot comprises a spring pressing on the foot at a point between its pivotal axis and its work-engaging surface along a line normal to said surface when the foot is engaging a workpiece whereby the pressure of said foot on the workpiece due to the spring tends to distribute itself evenly over the work-engaging surface.

4. A sewing machine having a throat plate; a presser bar movably mounted on the machine frame adjacent the throat plate to have a predetermined line of movement intersecting the plane of feed of the work, and being yieldably urged toward an extended position close to the throat plate; a front presser foot and a rear presser foot each having planar work-engaging surfaces; a link mounting the presser feet in tandem by pivots located substantially equidistant from their respective work-engaging surfaces, said feet having their juxtaposed portions disconnected and provided with clearance therebetween whereby the feet are free for independent purely rotative movement with respect to one another, and the link being pivoted on the presser bar at a point aligned with and intermediate the pivots of the presser feet whereby when the presser bar is in extended position said feet under yielding pressure supplied from the bar so engage a workpiece that all the pivots of the link are substantially equi-spaced from the line of feed, and whereby movement of the front foot away from the surface of the throat plate due to engagement of said foot with a cross-seam has no component opposing the feed of the work; and yieldable means independent of the presser bar, engaging the rear foot to yieldably hold the latter in work-engaging position and exert a force thereon in addition to that supplied by the presser bar.

5. A sewing machine having a throat plate; a presser bar; a front presser foot and a rear presser foot; means for mounting the presser feet in tandem on the presser bar to be bodily movable therewith and between limits relatively thereto whereby they are positioned by pressure supplied from the presser bar to engage and individually move to follow variations in the thickness of a workpiece passing over the throat plate; means functioning independently of the presser bar and bearing upon the rear foot for yieldably holding the latter in work-engaging position whereby the total feeding pressure exerted on the workpiece has a component independent of the pressure variations resulting from movement of the presser bar due to rising and falling of the front foot in traversing a cross-seam; and means for releasing the independent yieldable holding means for the rear foot, and for moving the presser bar to retract the presser feet whereby a workpiece may be removed from under same.

6. A sewing machine having a throat plate; a presser bar; a front presser foot and a rear presser foot; means for mounting the presser feet in tandem on the presser bar to be bodily movable therewith and between limits relatively thereto whereby they are positioned by pressure supplied from the presser bar to engage and individually move to follow variations in the thickness of a workpiece passing over the throat plate; means functioning independently of the presser bar and engaging the rear foot for yieldably holding the latter in work-engaging position whereby the total feeding pressure exerted on the workpiece has a component independent of the pressure variations resulting from movement of the presser bar due to rising and falling of the front foot in traversing a cross-seam; and means for releasing the independent yieldable holding means for the rear foot and for moving the presser bar to retract the presser feet whereby a workpiece may be removed from under same, said first-named means including a lever connected to the holding means and a lug adapted to engage the presser bar, and connected with said lever.

7. In a sewing machine, the combination of a work table; a presser bar mounted adjacent the machine needle for predetermined extending and retracting movement with respect to the work table, the line of said movement extending at an angle with respect to the line of feed of the work; means for yieldably holding the presser bar in extended position; a front presser foot and a rear presser foot each having planar work-engaging surfaces; a link having pivots at its ends for mounting the presser feet in tandem, said pivots being located substantially equidistant from the respective work-engaging surfaces of the feet, said feet being rotatable independently of each other, said link being pivoted at its center on the presser bar so that all pivots are in alignment, and so that the presser feet, under pressure supplied by said yielding means, engage a workpiece whereby all pivots of the link are substantially equispaced from the line of feed, and whereby movement of the front foot away from the surface of the worktable due to engagement of said foot with a cross-seam has no component opposing the feed of the work; means cooperable with both planar work-engaging surfaces of the feet for feeding a workpiece past the machine needle; a spring functioning independently of the presser bar disposed between an arm mounted on the machine and the rear presser foot and engaging the latter at a point between the pivot and work-engaging surface thereof, for yieldably holding said foot in work-engaging position; and means for releasing the spring and retracting the presser bar to move both presser feet away from the work table whereby a workpiece may be removed from between said feeding means and feet.

8. A sewing machine having a frame; a throat plate; a presser bar; a front presser foot and a rear presser foot; means pivotally mounting the presser feet in tandem, and so that each is mounted to turn independently of the other; means for pivotally mounting the mounting means on the presser bar whereby the presser feet are bodily movable relatively thereto between limits and are positioned by pressure supplied from the presser bar to engage and move independently of one another to follow variations in the thickness of a workpiece passing over the throat plate; and yieldable means mounted on the frame and applying pressure to the rear presser foot, operating independently of the presser bar, for yieldably holding the foot in work-engaging position whereby the total feeding pressure exerted on the workpiece has a component independent of the pressure variations re-

sulting from movement of the presser bar due to rising and falling of the front foot in traversing a cross-seam, the pivotal mounting of the rear presser foot being located substantially vertically above the point of application of pressure to said rear foot by the yieldable means.

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