Sept. 20, 1955 J. ARMENTI 2,718,203

TILTABLE PRESSER FOOT SHANK

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Fig. 1.

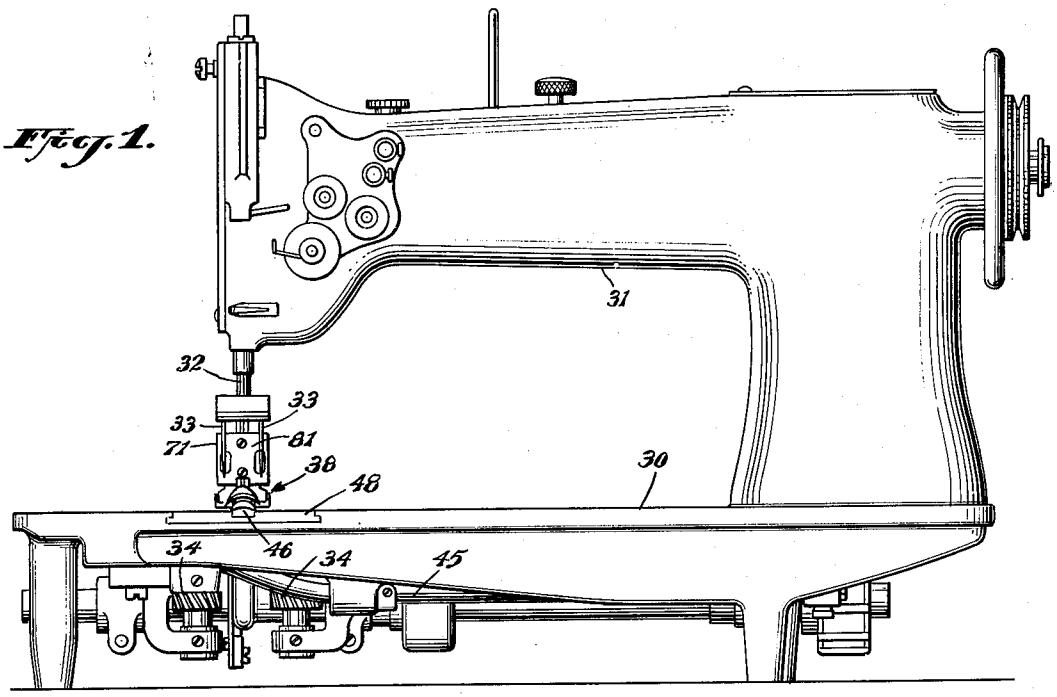


Fig. 2.

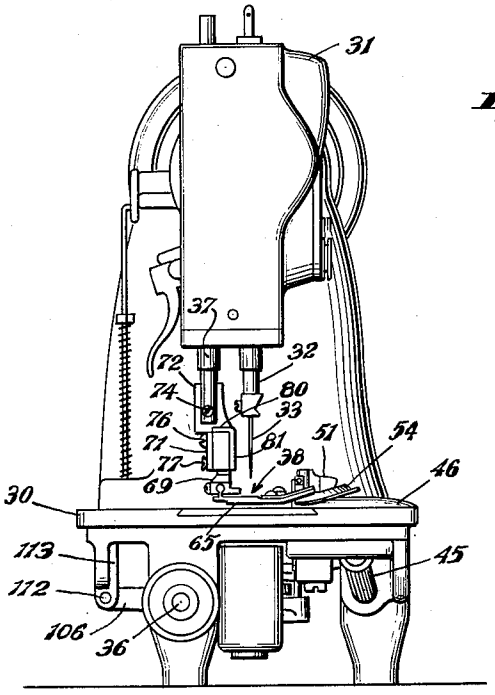
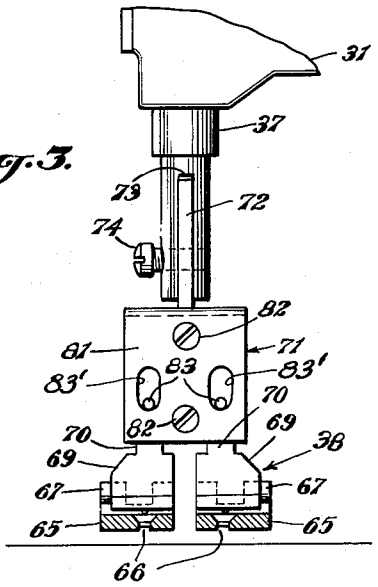


Fig. 3.



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Fig. 5.

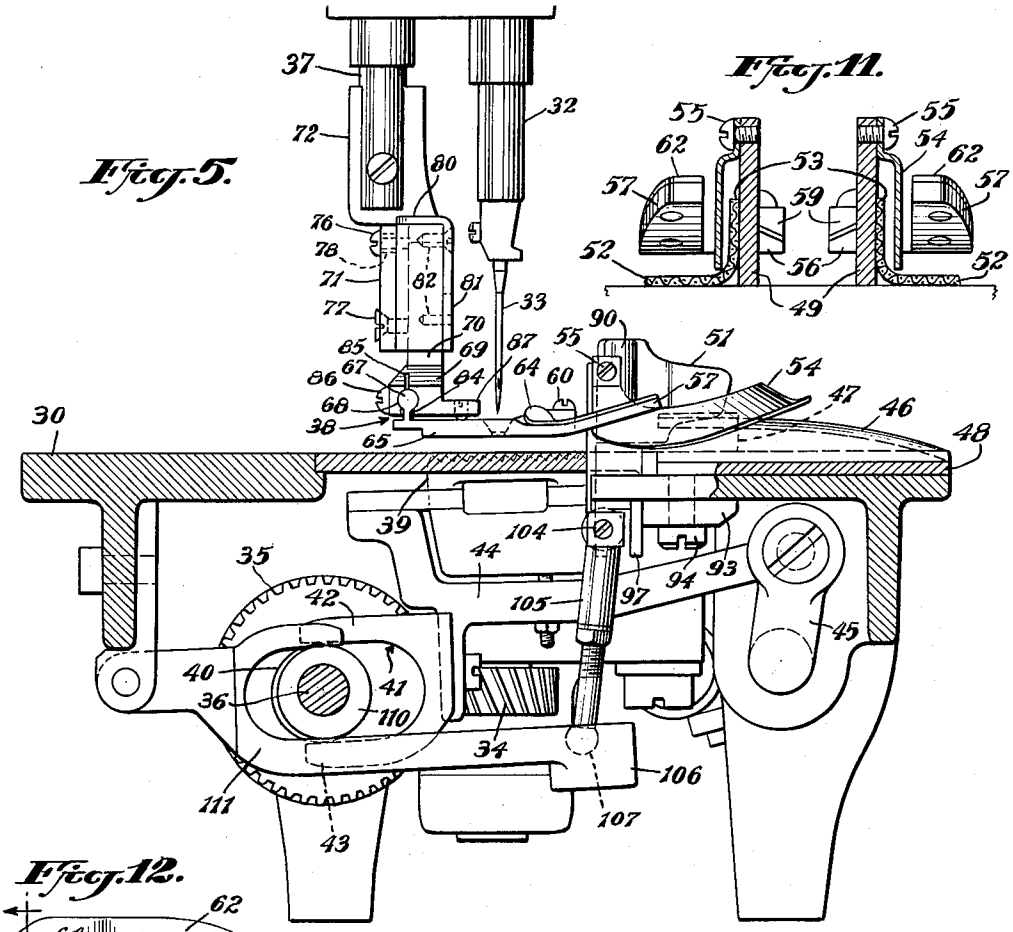


Fig. 11.

Fig. 12.

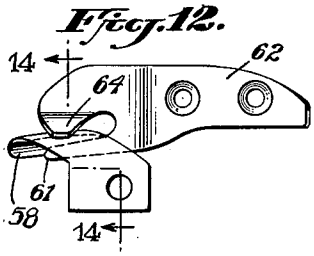


Fig. 10.

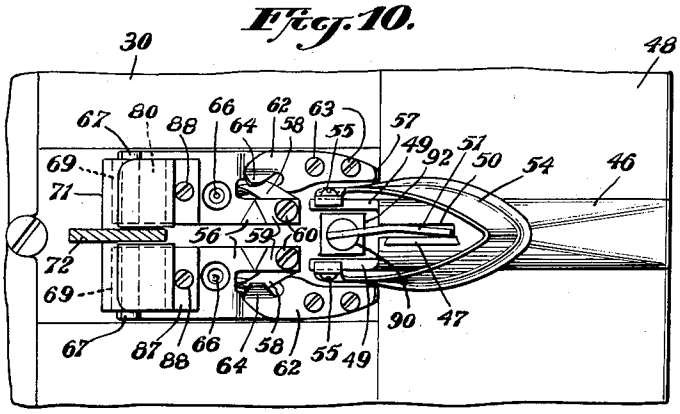


Fig. 13.

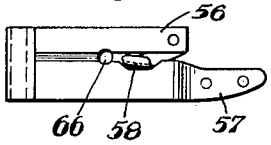


Fig. 14.

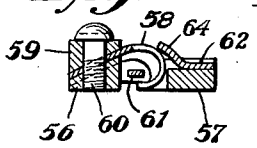


Fig. 15.

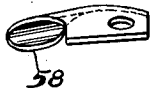
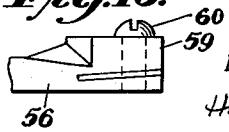


Fig. 16.



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Fig. 7.

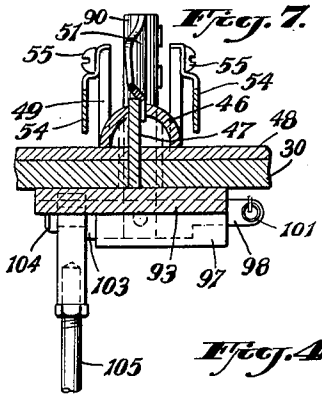


Fig. 8.

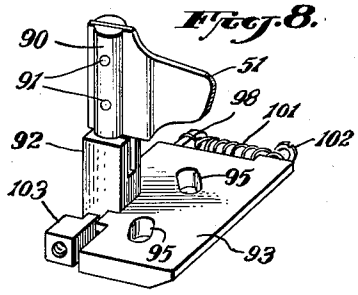


Fig. 4.

Fig. 9.

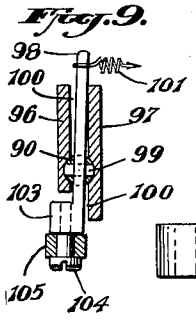
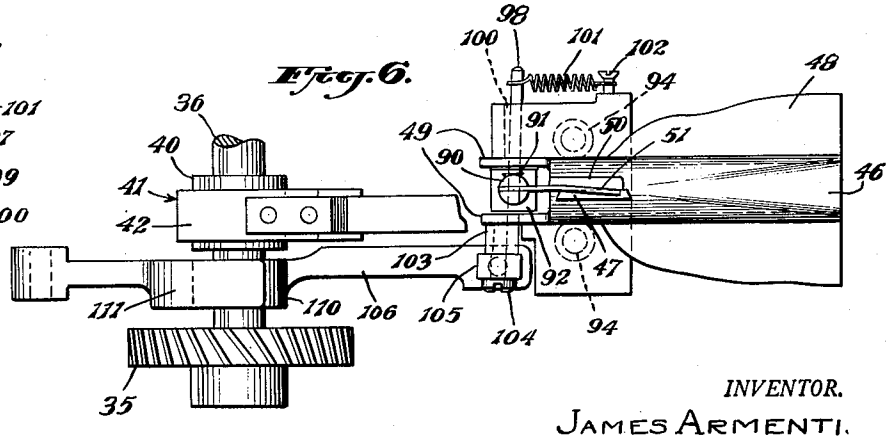


Fig. 6.



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TILTABLE PRESSER FOOT SHANK

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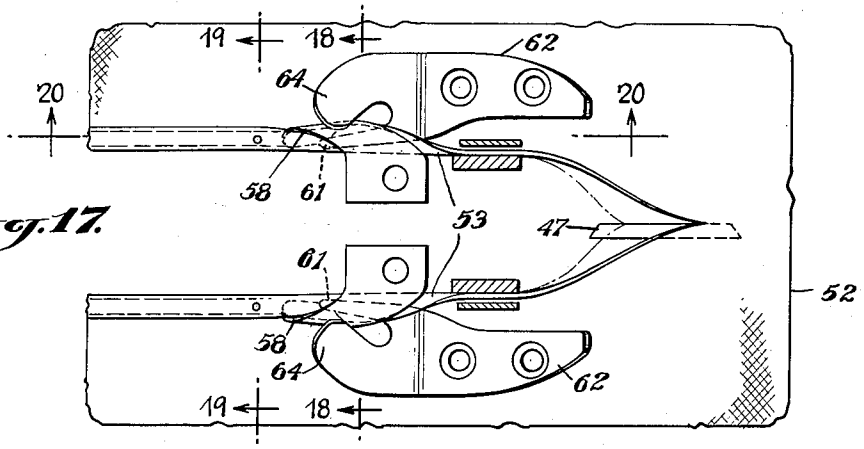


Fig. 17.

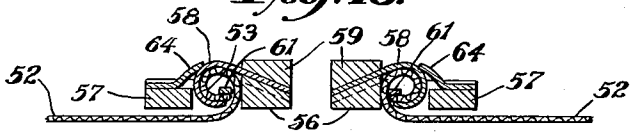


Fig. 18.



Fig. 19.

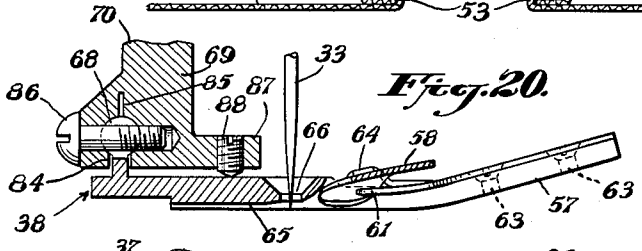


Fig. 20.

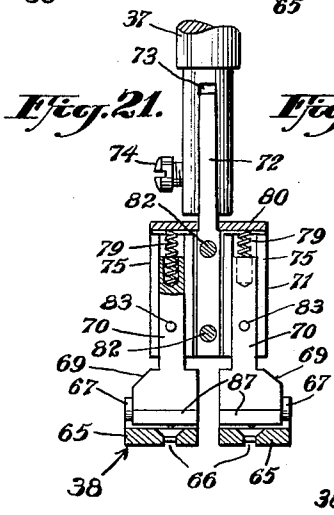


Fig. 21.

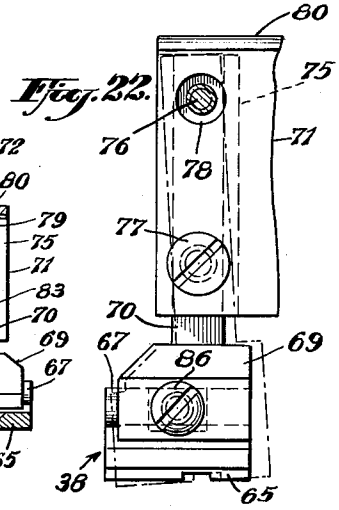


Fig. 22.

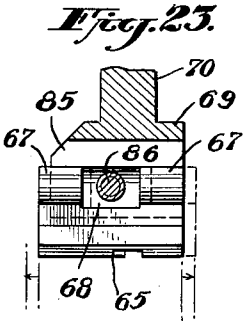


Fig. 23.

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United States Patent Office 2,718,203 Patented Sept. 20, 1955

2,718,203

TILTABLE PRESSER FOOT SHANK

James Armenti, Maplewood, N. J.

Application March 28, 1951, Serial No. 217,991

7 Claims. (Cl. 112—235)

This invention relates to sewing machines and more particularly to attachments therefor which perform operations upon the material being sewn in addition to the actual stitching of the material.

Sewing machines, particularly when used in commercial production of articles of cloth, have heretofore been constructed with two needles and bobbins and appropriate mechanism for operation thereof. According to the present invention, I fulfill the objective of both cutting the material between the line of stitching in advance of the needles, and turning a hem at each of the severed edges whereby the two needles stitch the hems on both edges, all as a continuing operation of the cloth in a single passage thereof under the pressure foot, and provide an improved machine overcoming inadequacies of prior art devices.

More specifically, an object of the invention is to adapt a usual construction of double-needle sewing machine obtainable on the market to the accomplishment of the above-recited objective.

In somewhat more detail, the invention proposes improved cutting mechanism, inclusive of the drive therefor, attachable to a prior art sewing machine with minimum alteration to such machine.

In conjunction with the material-cutting mechanism, the invention also provides an improved hem-folding means featuring a novel construction which will fold-in loose threads from the cutting operation.

An important object of the invention resides in coordination of the cutter and feed dog and avoidance of pull of the material tending to distort and/or ravel the same during the cutting cycle.

Another major object of the invention is to provide an improved foot, applying equalized pressure on both of the severed portions or hems.

A further object of the invention is to provide a structure of a character readily repaired by replacement of any single part that may become worn or damaged.

Other objects of the invention will appear to those skilled in the art to which it appertains as the description proceeds, both by direct recitation thereof and by implication from the context.

Referring to the accompanying drawings, in which like numerals of reference indicate similar parts throughout the several views:

Fig. 1 is a front elevation of a double-needle sewing machine to which my invention is applied;

Fig. 2 is an end elevation thereof;

Fig. 3 is a front elevation, partially in section on the plane of the needles, and on somewhat larger scale than shown in Fig. 1, and confined to a showing of the foot and its mounting;

Figs. 4 and 5 are cross-sectional views of the machine approximately on the plane of the cutter and midway between the needles, showing respectively in Fig. 4 the raised or non-cutting position of the knife blade and raised and material-feeding position of the feed-dog, and

in Fig. 5 the lowered cutting position of the blade and lowered and non-feeding position of the feed-dog;

Fig. 6 is a plan of the cutting mechanism and of the drive connections therefor and for the feed-dog;

Fig. 7 is a sectional view on line 7—7 of Fig. 4, showing portions of the cutting and folding devices;

Fig. 8 is a perspective view of the movable blade and the means by which it is mounted and spring-loaded for bearing against the fixed blade;

Fig. 9 is a detail sectional view showing the swivel means for effectuating the spring-loading of the movable blade;

Fig. 10 is a sectional plan above the cutting and folding mechanism and horizontally traversing the needles and foot-supporting bar;

Fig. 11 is a vertical section taken approximately on a plane at the front or toe end of the foot showing the folding mechanism in section and showing the initial right-angle fold of the material;

Fig. 12 is a plan of the curling mechanism of one foot section;

Fig. 13 is an underneath plan, on smaller scale, of the foot section having the mechanism of Fig. 12;

Fig. 14 is a sectional view approximately on line 14—14 of Fig. 12;

Fig. 15 is an edge view of the curler blade;

Fig. 16 is an edge view of the portion of the foot section providing the mounting slit for said curler blade;

Fig. 17 is a sectional plan of the curling mechanism with a piece of material shown therewith and being folded thereby;

Figs. 18, 19 and 20 are sectional views on lines 18—18, 19—19 and 20—20 respectively of Fig. 17;

Fig. 21 is a sectional elevation of the foot-section mountings with spring-loading thereof;

Fig. 22 is a side elevation of the mounting and showing leveling construction thereof; and

Fig. 23 is a detail sectional view showing the lateral adjustment provided for the foot section.

In the specific embodiment of the invention illustrated in said drawings, the reference numeral 30 designates the table or bed portion of a sewing machine having the usual gooseneck 31 thereabove for mounting a needle bar 32 therein to reciprocate vertically above the bed and to carry needles 33 for stitching purposes as usual. Since the showing is of a two-needle machine, there are, of course, two bobbins (not shown) which are rotated by horizontal spiral gears 34 beneath the bed and they in turn by vertical spiral gears 35 meshing each with one of the horizontal spiral gears. The vertical spiral gears are both fixed upon a continuously rotating main shaft 36 extending longitudinally beneath the bed.

Usual construction of sewing machines also includes, as will be found on the drawings, a vertically movable bar 37. A feature of the present invention is directed to the mounting of pressure feet 38, 38 at the lower end of said bar 37, one for each needle and through which the needles pass. Feed dogs 39 project through the bed beneath the pressure feet, and an orbital movement is imparted to said feed dogs such that they intermittently engage the material under the feet and move the material away from the operator, or reawardly, an increment between each stitch.

Mechanism for applying the orbital movement to said feed dogs is provided beneath the bed, and in the sewing machine here shown, comprises a cam or eccentric 40 on the aforementioned main shaft 36 at a location between the shuttle-operating vertical gears 35. A follower 41 shown with jaws 42, 43 above and below the eccentric 40 rises and falls in repeating succession as the eccentric rotates, and is part of or attached to a dog lever 44 extending toward the front of the machine.

Said dogs 39 are adjustably mounted above said dog lever 44, and thus rise and fall in consequence of the rotation of the eccentric. Longitudinal movement of the dogs is obtained by imparting a longitudinal motion to the dog lever 44. For that purpose, in the particular sewing machine here shown, the forward end of said dog lever is trunnioned or otherwise pivotally connected to an eccentric portion of a rocker bar 45 which extends longitudinally under a front part of the bed.

In the region included in part between and in part projecting forwardly from the location of the pressure feet, I provide a member 46 for supporting a fixed blade 47 of my improved cutter and for feeding the severed edges of the cloth to the hem-folding devices. Said member 46 is an elongated metallic bar extending in a forward-rearward direction and partially embedded throughout its length in a groove in the upper face of a slidably removable plate 48 carried in a prepared depression for the purpose at the upper side of the machine bed. Said member and plate are retained in fixed position in operation of the machine, but are removable for access to mechanism thereunder for repair or other purposes. The forward and side top edges of the blade-supporting member 46 are substantially even with the top edges of the plate thereat, but the longitudinal middle of said member progressively bulges upward as it approaches the rear end so as to both tend to draw the cloth tight thereacross as the cloth feeds over said member and under the feet, and also tends to curl the severed edges upward.

The rear end of said member 46 is bifurcated, providing widely separated vertical parallel extensions 49, and for a distance forwardly of these widely separated extensions, the member is more narrowly bifurcated by a vertical slot 50 with a fixed blade 47, previously mentioned, mounted, as by dovetail engagement, in one side wall of the slot. The slot is of adequate width to also admit a vertically reciprocating movable blade 51 more detail reference to which will follow shortly. Suffice it to say for the moment, that the material is severed by cooperation of said blades 47 and 51, and fed immediately to the edge or hem folding mechanism.

The edge or hem folding mechanism constitutes one of the features of the present invention and is shown in detail in Figures 10 to 20, inclusive. A piece of fabric or other material 52, as illustrated in Fig. 17, is cut or severed by the blades, whereupon the severed margins 53 tend to assume upright positions in juxtaposition to the outside vertical faces of extensions 49 of member 46 as clearly shown in Fig. 11. This vertical positioning of the said severed margins is augmented and enforced by a guide or prow 54 having a looped front end overlying said member 46 and curving over and downward at the sides of said member toward the rear thereof so the heel ends of said prow will be in spaced parallelism to and at the outsides of said extensions 49 of said member. Both the extensions 49 and the heel-ends of the prow project upwardly to afford opportunity for the heel ends to be attached to the extensions, as by screws 55, at sufficient elevation to not interfere with the free passage of the margins of the material. Passage of the severed margins between the prow and member 49 smooths out any fraying that has occurred on the material and sweeps any loose threads of the severed edge into longitudinal juxtaposition to said edge so as to be completely folded into the hem in the subsequent folding operations.

The further portions of the folding mechanism are carried by the presser feet, and since they are in reversed duplicate, description of parts on one foot will be deemed adequate for understanding of both. It is emphasized at this point, however, that the duplication of parts is to be understood as contemplating the opposite formations necessary for right and left folding of the two margins of the material. I furthermore wish to point out that the folding mechanisms are all removable from the feet for purposes of exchange, repair or extensive adjustment.

Each foot of the pair of presser feet has a short toe 56 and a long toe 57, both of which project toward the front of the machine. The short toe extends substantially to the rear end of member extension 49 and what may be termed the inside face of that toe, namely, the face toward the longer toe, is substantially in alignment with the outside face of said extension. The end portion of said short toe has an upper face sloping inwardly upward so as to angularly mount a curler 58 thereon by means of a correspondingly sloped overlying portion or block 59 and screw 60. Said curler, as viewed edgewise from the front of the machine, curls downwardly and then inwardly toward the attached end, thereby having approximately a semi-cylindrical configuration. In addition to curling, the said curler also spirals toward the rear of the machine so that the final free lip or end of the curler remote from its mounted end is considerably closer to the needles and is preferably substantially at the basal end of the short toe and at the level of the bottom face of said toe.

The cut margin of the material passes from its upstanding position next member extensions 49, as shown in Fig. 11, to the concave interior face of the curler 58 and is curled to substantially double on itself as shown in Fig. 18, and then passes under the foot which exerts a progressive pressing action thereby folding the curled material into a flat juxtaposition of three plies of the material for the hem, as shown in Fig. 19. In that condition, the three plies of material are longitudinally stitched thereby completing the hem.

In transition of the material within the curler, it is desirable to also guide the curled material at the inside of the curl and assure that the folded-in edge of the said material shall proceed in a straight line under the foot and that the folds produced by the progressive pressing action of the foot shall be parallel to each other and to said folded-in edge. To accomplish this desideratum, a mandrel or finger 61 is provided, extending longitudinally of the semi-cylindrical and spiraling curler, that is, substantially parallel to the axis of the curl, said mandrel overlying the free or lip end of the curler with appropriate clearance to pass a thickness of the material beneath the mandrel and above said lip, this relation of those parts being illustrated in Figs. 12, 14 and 18 more especially. The free end of the mandrel is directed rearwardly of the machine substantially in line with the location of the needle. The front end of the mandrel is shown integral with a face-plate 62 secured, as by screws 63, on the upper side of the long toe 57 of the foot and having a shape corresponding to the front part of said toe. The end of said mandrel joined to said face-plate curves into the space defined by the curl of the curler in appropriate spaced relation to admit the material and permit curling of said material around the mandrel.

Said face plate 62 is also utilized to provide a reenforcing tongue 64 in engagement with a forward part of the spiraling curler, substantially opposite the free end of the mandrel. Said tongue, as well as the curler are both resilient, permitting a desirable momentary expansion which may be required to pass a cross-seam in the material through the curler, and yet return the curler to its normal configuration immediately thereafter. Since the spiral configuration of the curler exposes it to extraneous deforming forces, said tongue has the further function of protection to the said curler and of maintenance of the proper alignment of the curler. The removability of the curler and of the face plate from the respective toes of the foot on which mounted, is conducive to easy replacement and adjustment, and avoids need to substitute an entire new foot when a change of curler or mandrel is found necessary.

One difficulty encountered with multi-needle sewing

machines is the fact that one foot seats on the material more firmly than another and introduces a tendency for one margin of the severed material to feed more rapidly than the other side, resulting in a twisting and deformation of the material that in turn causes improper severing and folding of the material. A feature of the present invention resides in novel construction of the feet of sewing machines, both to overcome the mentioned difficulty and to render the feet individually replaceable. The invention also proposes a construction which enables the feet to be leveled laterally, and furthermore provides for unequal rise of either foot when encountering a greater thickness of material than the other foot.

For an understanding of the novel construction of feet and mounting means therefor, reference is made more particularly to Figures 3, 4 and 20 to 23. There are two pressure feet, one for each needle of the two-needle machine disclosed, said feet being designated in general by numeral **38** and each having a substantially horizontally disposed skid **65** terminating at its end toward the front of the machine with the above-described toes **56**, **57**. Somewhat rearwardly from the toes, the skid **65** is provided with a vertical hole **66** for passage of the needle **33** therethrough. The end of the skid toward the rear of the machine turns upwardly and has a hinge bead **67** thereacross extending in a direction transverse to the said skid. The hinge bead is retentively seated in a cylindrical socket **68** of a heel member **69** constituting the lower end termination of a vertically disposed shank **70**. Said shank at its upper part slidably enters the lower end of a housing **71** supported from the bottom end of the usual liftable and spring loaded vertical bar **37** of the machine.

The general organization of feet and mounting means therefore recited above provides, as will be clarified in the following detail description, a means enabling the skid of each foot to teeter up and down in contact with the material being stitched, besides admitting a leveling of the feet with a sidewise swing, and also an adjustment of the skid sidewise to register the needle hole **66** therein with the needle.

Aforementioned housing **71** constitutes means for both slidable and lateral tilting mounting for both feet and is shown of box-like configuration with a flat tongue projecting medially of the top edge in an upward direction for reception in a corresponding slot **73** in the lower end of the machine foot-mounting bar **37**, which has a set screw **74** for retention of the tongue in said slot. Said tongue is shown, for instance in Fig. 21, extending to the bottom of the housing and dividing the interior thereof midway between the sides of the said housing and constitutes a fixed part and partition of said housing. The slidable shanks of the two feet are located on opposite sides of said partitioning tongue.

Vertically extending channel members are mounted in said housing, one said member at one side of the partitioning tongue and the other said member at the other side thereof. Each channel member is substantially the same length as the housing and has its web portion in juxtaposition to the back wall of the housing. Two screws for each channel enter through said back wall, one, as **76** near the top and the other **77** near the bottom thereof, said screws also threading into the web wall of the channel thereat. The lower one of these screws acts as a pivot during adjustment and both screws serve to lock the channel in desired position to the said housing after adjustment for tilt of the channel is made. The upper one of said screws is shown as round headed and passing through a hole **78** larger than the shank of the screw for permitting tilting adjustment of the channel while the screw is loose. Since the same arrangement of parts is provided for both channels, the tilting and clamping of each is accomplished independently of the other.

The foot shanks **70** are slidable longitudinally one within one said channel and the other in the other said channel. Said shanks **70** are urged downward each by a compression spring **79** seated in a hollow provided in said shank at its upper end, said spring also bearing against the underside of a top wall **80** for the housing, said top wall being here shown as a turned-in edge of a removable front wall **81**. Screws **82** through said front wall into the partition tongue **72** retain the combined top and front wall assembled on the housing. The shanks **70** of the said feet have sliding fit with the channels, thereby permitting each shank to both be adjusted for tilting and to slide as individually required independent of tilting and sliding of the other. Each shank is limited in downward displacement or movement with respect to the housing by a forwardly directed stop pin **83** projecting into a wide slot **83'** in the front wall **81**, the extra width of said slot being provided to avoid interference with the tilting and sliding of the shanks as explained above.

Each heel member **69** is shown as an integral part with a bottom terminal for a respective one of said shanks **70**, and are, with some space between, arranged in side-by-side disposition with the cylindrical hinge sockets extending likewise from side to side and located next the part of said member toward the rear of the machine. Each heel member has a bottom slot opening **84** longitudinal of the cylindrical hinge socket admitting the rear upturned end of the skid to enter and be connected to the cylinder-engaging hinge bead **67**. A further saw slit **85** at the top or opposite side of said socket enables the socket to be either clamped tight on the hinge bead or loosened for adjustment.

Said hinge bead is bifurcated so as to leave a gap midway of its length, and a clamping screw **86** in the heel passing through said gap as well as diametrically across the hinge socket provides a clamping means for the hinge attachment of the skid to the heel. Said gap in the bead is greater than the diameter of the clamping screw thereby permitting the bead to be slid toward either side of the heel and thus adjust the skid laterally to bring the needle hole of the skid in registration with the needle. Thus the attachment of the skid to the heel enables the skid to be adjusted either sideways or by teetering up or down, and then locked by set screw **86**.

As the leverage is considerable, tending to lift the front of the skid, additional means may be employed for maintaining the skid in its desired horizontal position. For this purpose, I have shown a forwardly projecting flange **87** at the front of the heel and a vertically positioned set screw **88** therein directed downward into engagement with the top of said skid.

A further and important feature of the present invention exists in the construction, mounting and actuation of the movable blade **51**. Attention is directed for full understanding of this feature to Figs. 4 to 10, inclusive. In its assembled relationship in the machine, the blade, which is preferably of resilient sheet steel, is positioned vertically and mounted at its rear margin by means and in a manner which reciprocates said blade vertically and flexes it somewhat laterally for tight shearing engagement with the fixed blade. The forwardly directed lower edge of said blade, which preferably slopes a few degrees from horizontal toward its front unobstructed end, constitutes the cutting or shearing edge of the blade. Adjacent the rear vertical edge of the blade is provided a vertical slot **89** which is preferably open at its bottom for enabling said blade to be slid into place in a vertically bifurcated post **90** and pass clamping screws **91** which cross through the split of the post for clamping the bifurcations thereof into frictionally gripping engagement with the said blade. Parts of the blades continuously inter-engage.

Said post **90** is vertically slidable in a bearing block **92** which stands vertically as an integral part of and at the rear of a plate **93** which lies horizontally and bolted, as by screws **94** to the under face of the machine table or bed **30**, said plate having slots **95** therein for passage

of said screws and permitting desired adjustment in assembly of the plate and its said block in securing the same in place. Two vertical flanges **96**, **97** are provided underneath said plate **93** integral therewith and crosswise thereof and are in part, in a vertical direction, continuations of the front and back faces of said block. While the block stands above the plate substantially midway between the side edges of the plate, said flanges project laterally to one of the said side edges as clearly seen in Fig. 7, augmented by the showing of said flanges in Fig. 9. In assembled relation, said post projects above the machine bed or table and is located between the extensions **49** of member **46**.

Extending crosswise of said post and plate and longitudinally between said flanges is a horizontal post-oscillating bar **98** which passes through a bottom notch in said post and secured to the post by any suitable means such as rivet **99**. Clearance space **100** is provided to the front and rear of said post-oscillating bar between it and said flanges for permitting horizontal swing of said bar to a limited extent and consequently a limited oscillation of said post about its axis. A tension spring **101** from one end of said post-oscillating bar to a screw or other attaching means **102** on the plate applies a normal rotational moment to the post in a direction tending to press the movable blade laterally toward the fixed blade. The oscillating bar rises and falls with and in equal amount as the post, but said flanges **96**, **97** are deep enough to always include said bar therebetween.

The end of said post-oscillating bar opposite from that to which said spring **101** is attached, is provided with an enlargement or terminating boss **103** of adequate dimensions to receive and retain a stud **104** therein, said stud extending axially parallel to the longitudinal direction of said bar in general. The stud holds the end of the boss in flat engagement against the side face of a link **105** by which the said bar is moved up and down but always retaining its substantially horizontal direction. Said link is shown suitably adjustable for length, and its lower end is appropriately attached to a lever **106** to apply the desired up-and-down motion to the said link. A ball and socket attachment between the lever and link will conveniently serve the purpose of affording the desired compound driving motion and twisting motion introduced by oscillation of the afore-mentioned post and post-oscillating bar. Thus a ball terminal **107** is shown on the lower end of said link, and said lever is shown providing a socket **108** therefor and as having a threaded retainer plug **109** for completing the socket at the underside of the ball terminal.

Lever **106** is appropriately swung vertically in synchronism with operation of the feed dogs and needles so the cutting operation will not unnecessarily introduce a drag on the material in being fed by the said dogs. It is therefore desirable to have the lever and blade depressed approximately with, though lagging a little behind, the dog and needle depression. An eccentric **110** on the same shaft with the dog-operating eccentric **40** operates in a follower **111** shown integral with said lever **106** and the blade-operating eccentric is timed a few degrees in operation behind the dog-operating eccentric. It may also be mentioned that said blade-operating lever is pivoted at **112** to a bracket **113** supplied for the purpose and in turn attached to the bed or table at the underside thereof.

I claim:

1. A sewing machine having two needles, comprising a foot for each needle, each said foot having an upwardly directed shank, a tiltable channel for each said shank, said shank being slidable in said channel, a housing common to and receiving both of said channels, slot-and-pin connection between each foot and said housing permitting movement of each foot in the housing independent of movement of the other, said slots being wider than said pins thereby accommodating tilting of the shanks, and a spring for each said foot tending to project each foot from the housing to the limit permitted by said slot-and-pin connection and at the angle determined by said channel.

2. A sewing machine having a foot and including a shank as part thereof, a housing both slidably and tiltably receiving the shank of said foot, and means for adjusting angular relation of said shank in its direction of projection from said housing thereby enabling the foot to be leveled on the machine.

3. A sewing machine having a foot, said foot comprising a shank and a forwardly extending skid therefrom, a hinged connection between said shank and heel of said skid, said shank having a coupling terminus providing one portion of said hinged connection and providing a forwardly extending flange above said skid, and an adjustable stop between said forwardly extending flange and a portion of said skid forward of the shank, and said coupling terminus having means for clamping said skid against swing in either direction on said hinged connection.

4. A sewing machine having a base, a foot hinged for longitudinal leveling adjustment with respect to the base, and mounting means for said foot comprising a shank extending longitudinally substantially vertically upward from said foot, said shank being longitudinally slidable and the foot and shank being tiltable laterally as a unit for providing transverse leveling adjustment for said foot with respect to the base.

5. A sewing machine having a foot and including a shank as part thereof, a housing both slidably and tiltably receiving the shank with the foot located below said housing, means for adjustably altering the angular relation of said shank in its direction of projection from said housing, and a spring tending to slide said shank from said housing with the shank and foot at an adjusted angular position.

6. A sewing machine having a base, a foot hinged for longitudinal leveling adjustment with respect to the base, mounting means for said foot comprising a shank extending longitudinally substantially vertically upward from said foot, said shank being longitudinally slidable and the foot and shank being tiltable laterally as a unit for providing transverse leveling adjustment for said foot with respect to the base, and a spring at the upper end of said shank pressing against said shank in a direction toward said base, thereby tending to slide said shank and foot longitudinally downward toward said base at any position of tilting of said shank.

7. A sewing machine having a vertically positioned needle and a horizontally disposed foot, said foot having an upwardly directed shank, a tiltable channel for said shank, said shank being slidable in said channel, a housing carrying said channel, slot-and-pin connection between the housing and shank with the slot wider than the pin thereby accommodating tilting of the shank, and spring loading for said shank tending to project said shank from the housing to the limit permitted by said slot-and-pin connection and at the angle determined by said channel.

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