United States Patent

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[54] **PRESSER MECHANISM FOR SEWING MACHINES**
18 Claims, 18 Drawing Figs.

[52] **U.S. Cl.** **112/235**
[51] **Int. Cl.** **D05b 29/00**
[50] **Field of Search** 112/235, 240, 212

[56] **References Cited**

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ABSTRACT: This disclosure relates to a low-inertia adjustable stroke presser foot for sewing machines which is operable to feed the uppermost ply of superimposed plies being sewn to compensate for the drag exerted by the presser foot sole upon the upper ply. The presser foot is automatically driven through its cooperation with the feed dog and effects the feeding of the upper ply at the termination of the work feeding action of the feed dog. The presser mechanism is adjustable to vary the work feeding movement of the presser foot in accordance with the requirements of the fabric being sewn.

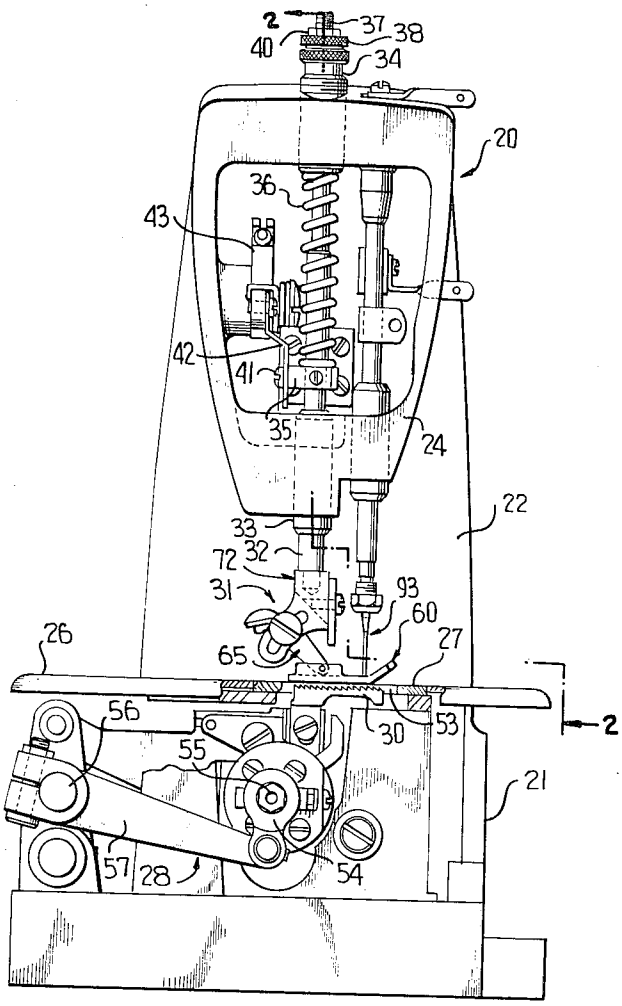
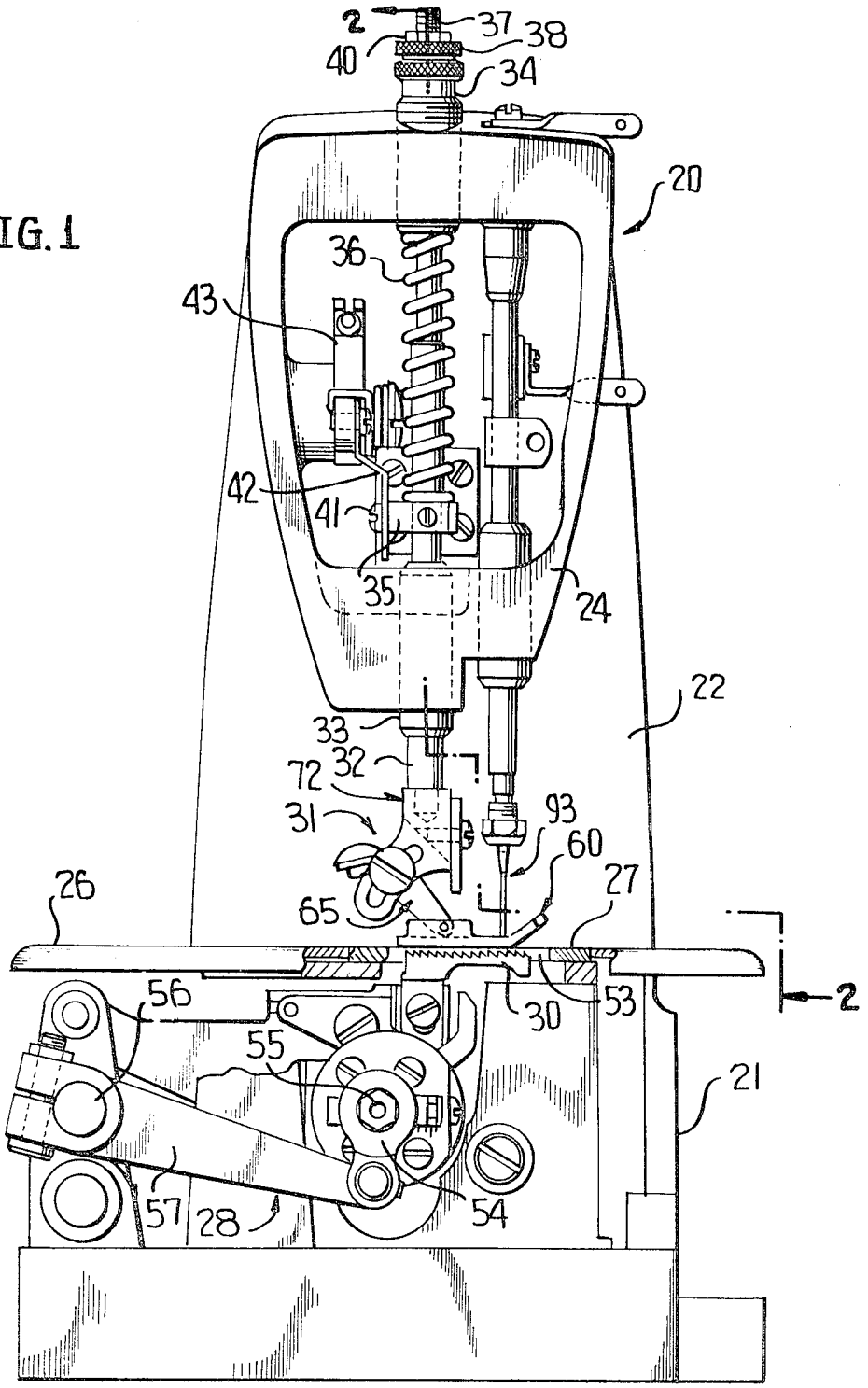


FIG. 1



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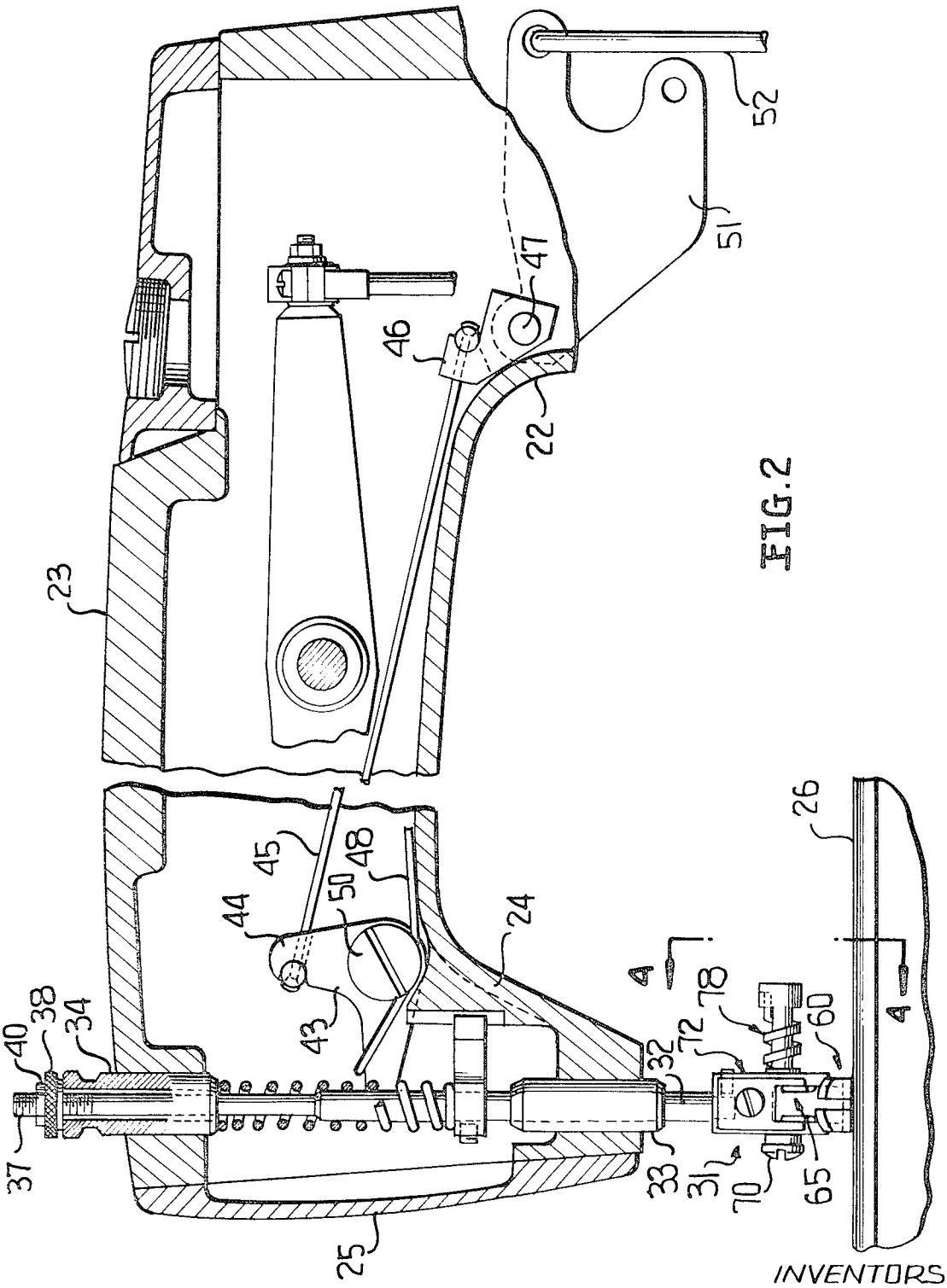


FIG. 2

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FIG.3

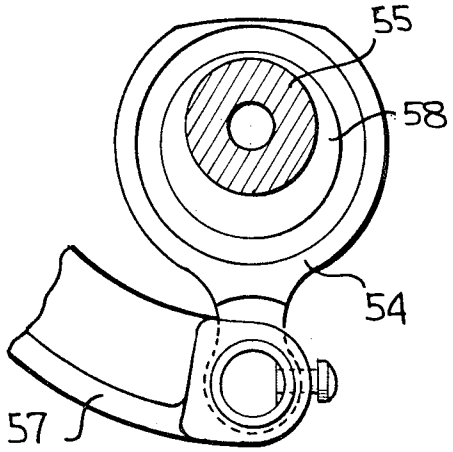


FIG.4

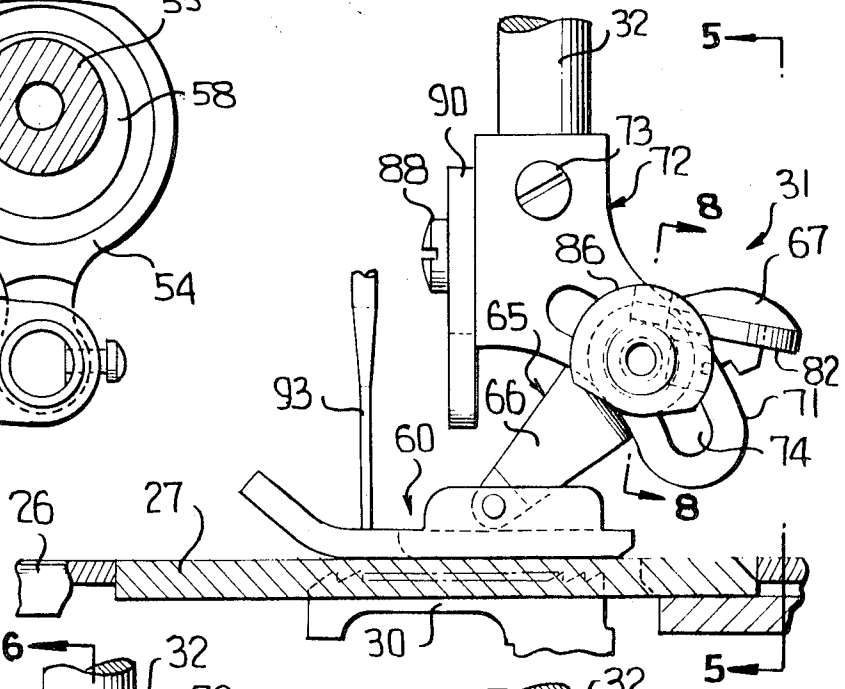


FIG.5

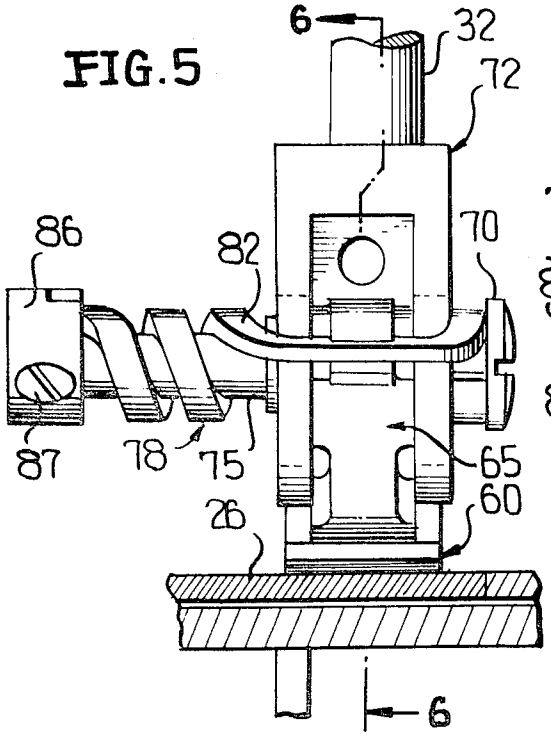
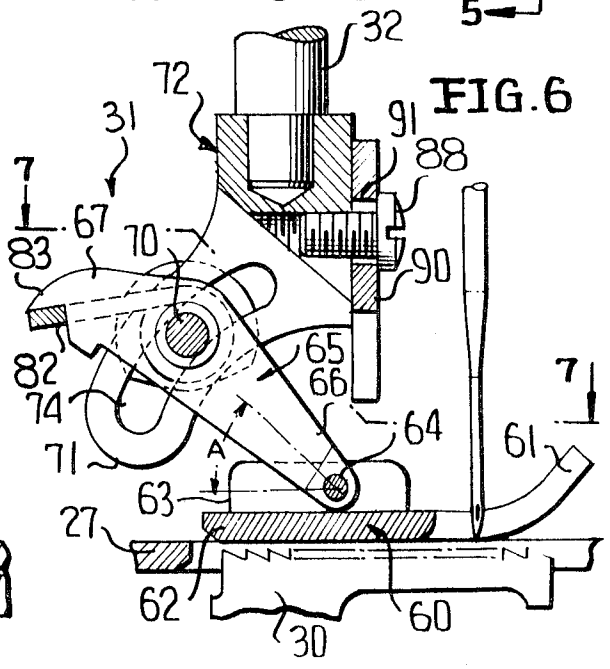


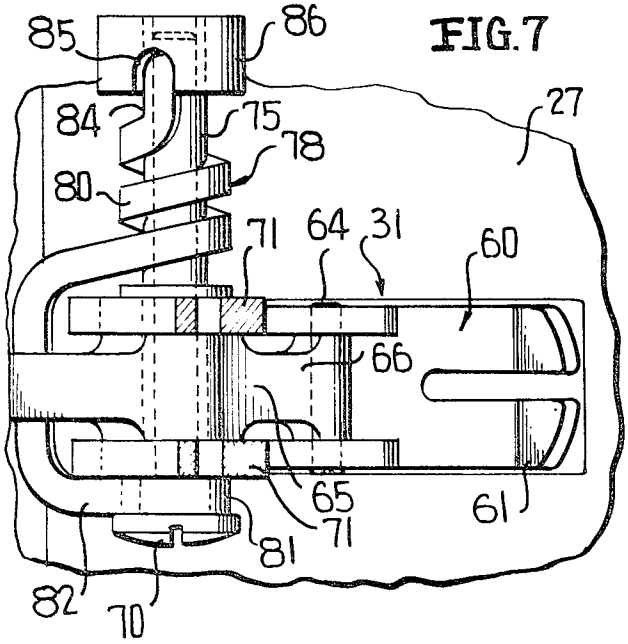
FIG.6



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FIG.7



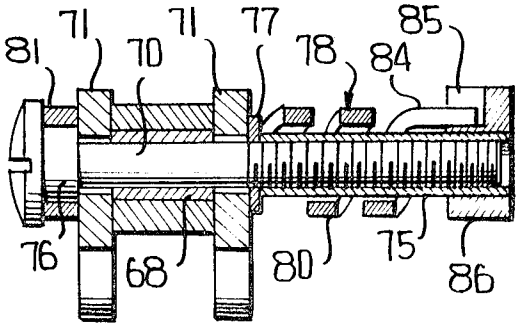
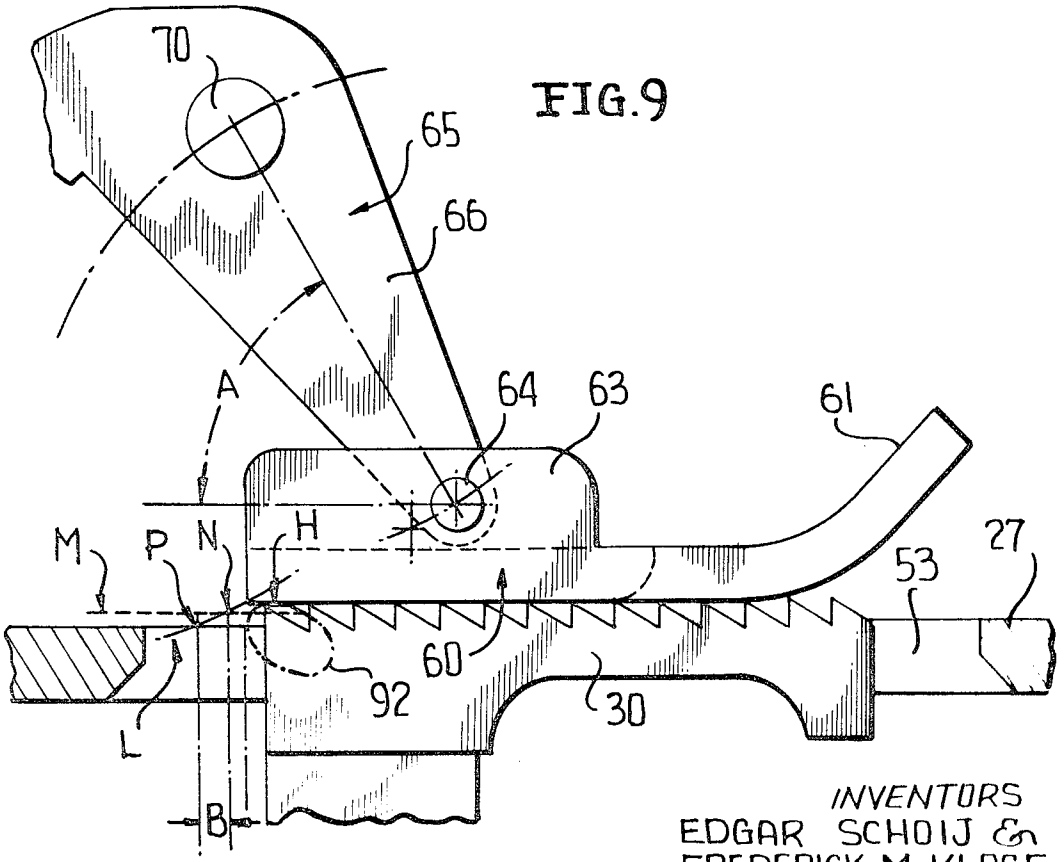


FIG.8

FIG.9



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FIG. 10

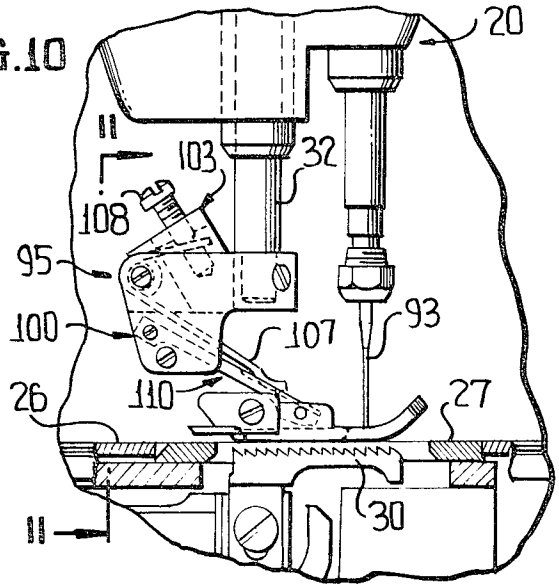


FIG. 11

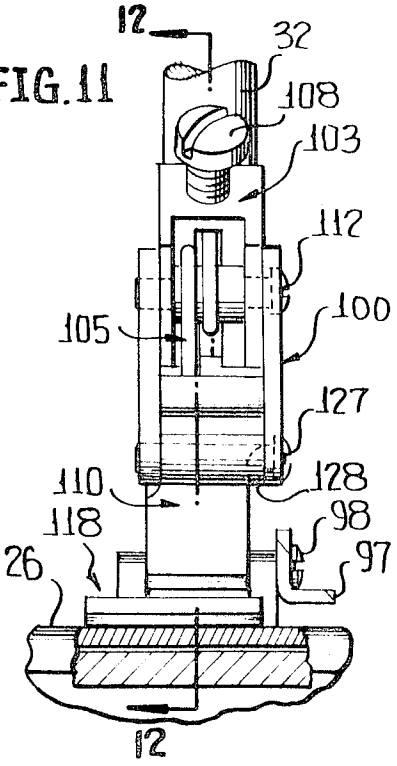


FIG. 12

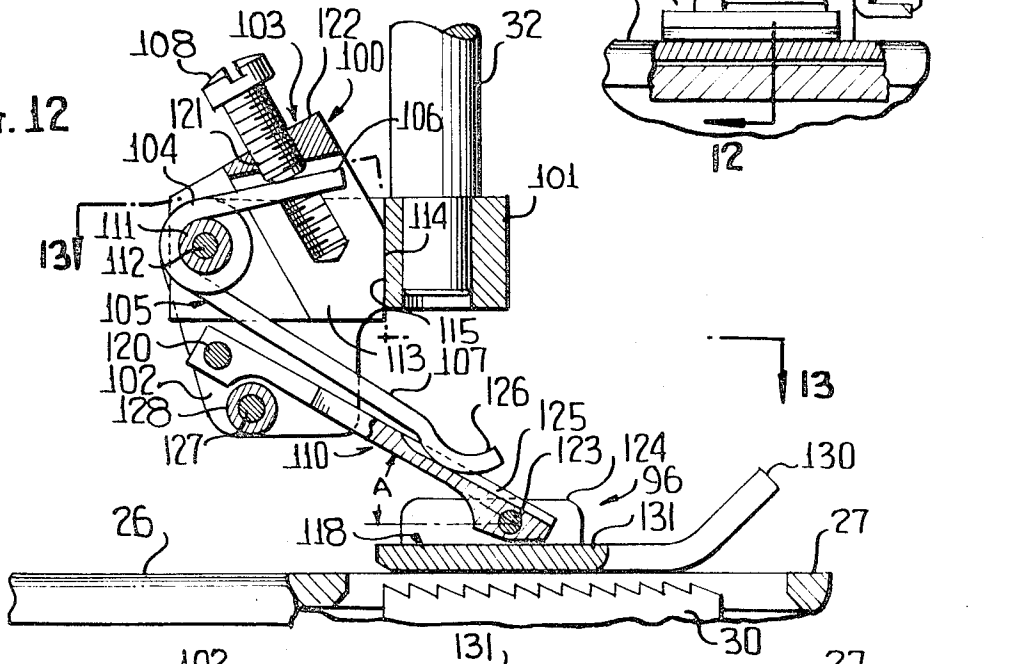
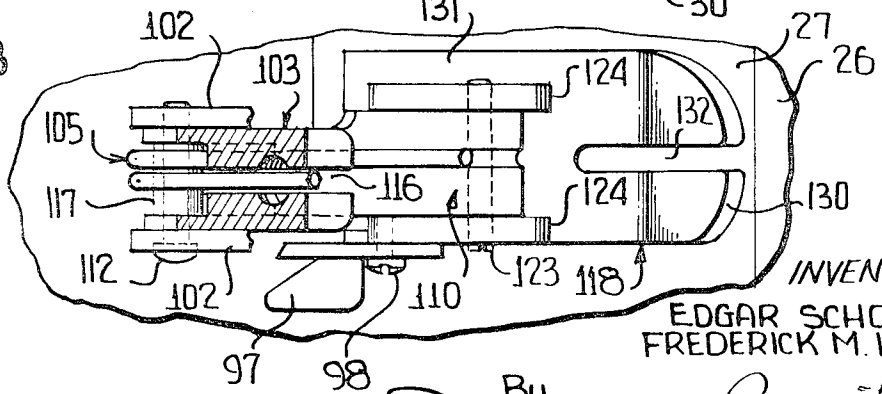


FIG. 13



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FIG. 14

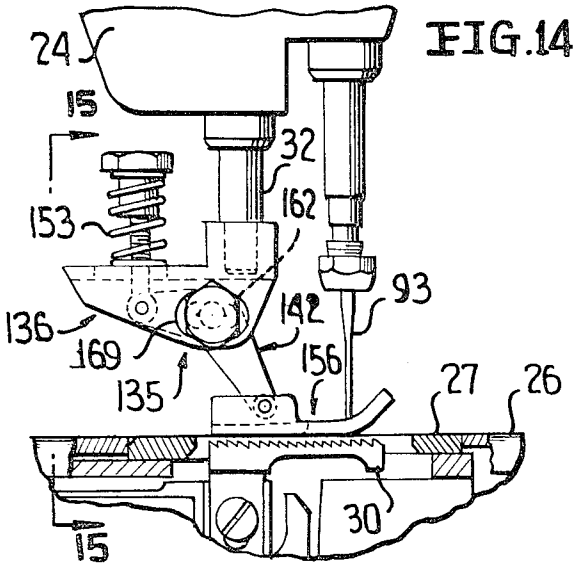


FIG. 15

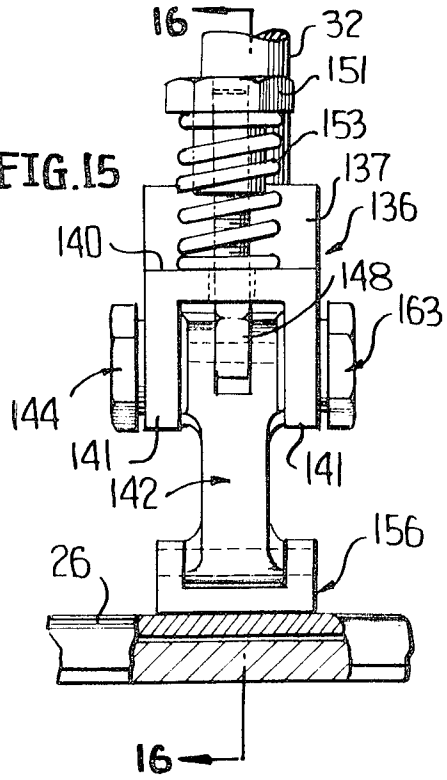


FIG. 16

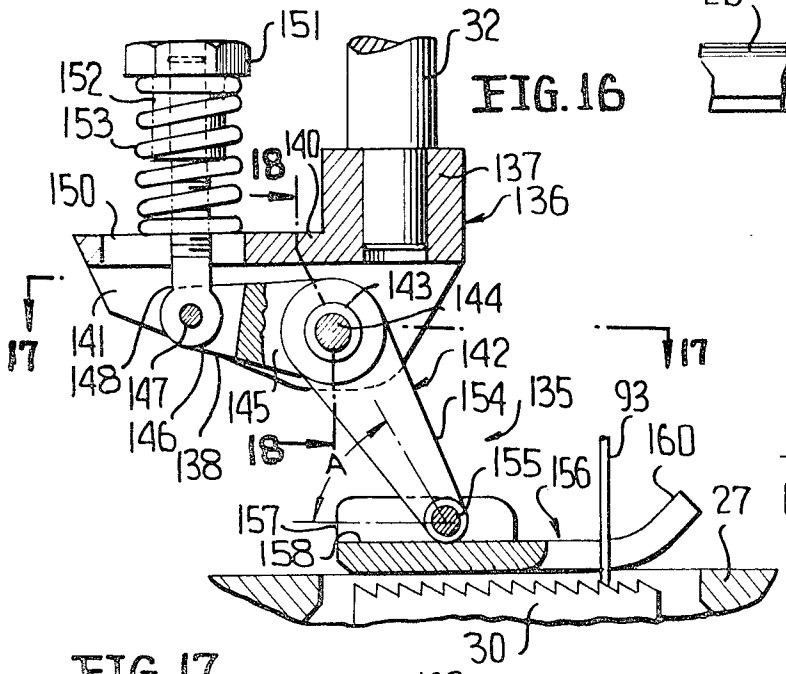


FIG. 18

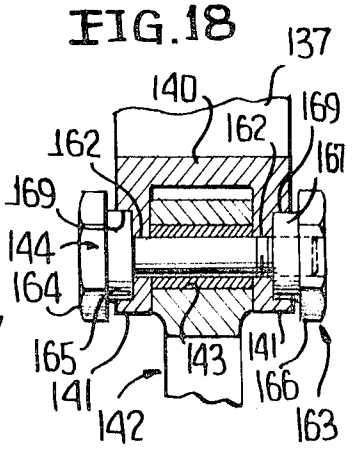
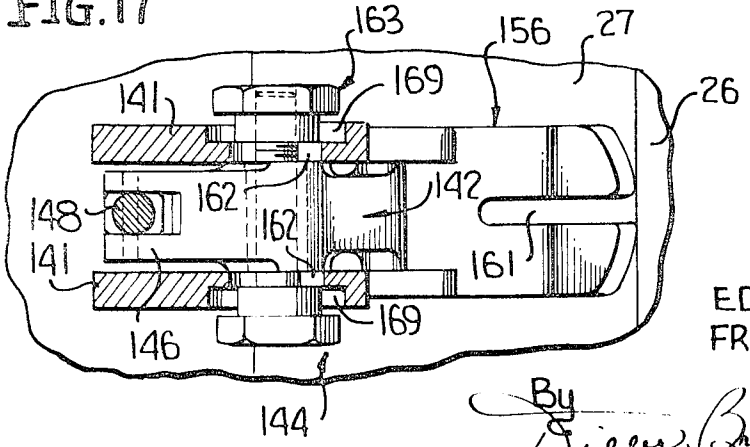


FIG. 17



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PRESSER MECHANISM FOR SEWING MACHINES

This invention relates in general to new and useful improvements in sewing machines, and more particularly to an improved construction of presser means for sewing machines of the type in which a presser foot is disposed on one side of the work and biased in opposition to a movable work feeding member disposed at the opposite side of the work.

In this type of sewing machine where the feeding movement of the work is solely derived from the movement of the feed member at one side of the work, the drag exerted by the presser foot sole upon the upper ply when stitching together superimposed plies, will influence the upper ply and retard it with respect to the movement of the bottom ply engaged by the feed member. In the past it has been a severe problem to match superimposed plies so that they would come out even at the end of the sewing operation. This deficiency was sought to be overcome by various schemes. Most commonly, only skilled operators were used with such operations where long pieces of fabric had to be stitched together because in such cases the operator had to hold back on the bottom ply just the right amount to match the plies at the end of the operation, and this required much experience. This, of course, demanded much accuracy and concentration from an operator. Also, there was involved a certain amount of additional physical effort. All this led oftentimes to an early tiring of the operator and thereby to a lower production rate.

Other efforts to solve the problem included providing a presser foot, the work engaging portion of which was given a flat, smooth and oftentimes a highly polished surface. This also did not solve the problem.

Others attempted to solve the problem by the use of the so-called inertia presser means. These presser means operate on the concept that the work-engaging portion of the presser foot is relatively independent from the rest of the presser mechanism, with respect to its operation, and it is biased against the feed member by a separate spring means. Thus, it is only a relatively small mass that will follow the feed member through its movement above the throat plate. This, in turn, will generate less inertia and allow the work engaging portion of the presser foot to follow the feed member in a much closer manner than ordinary presser means could do. The use of this type of presser means led only to partial success. It could not correct the problem of still occurring mismatch.

A still further way for overcoming the mismatch problem was seen in the use of feed mechanisms having top and bottom feed members. However, the provision of such feed mechanisms, which are well known in the art and absolutely imperative for the performance of certain operations, is oftentimes highly undesirable as machines equipped with such mechanisms are more cumbersome and, of course, more expensive.

The closest solution to a mismatch problem is found in the patent to Arthur M. Hale et al., U.S. Pat No. 3,044,428, granted July 17, 1962. This patent relates to a low-inertia presser mechanism. However, the presser foot sole thereof is mounted on a lever which, in turn, is pivotally mounted on a bracket carried by the presser bar. The presser mechanism of this patent not only functions in the desired manner of a low inertia presser mechanism, but also due to the mounting of the presser foot sole by means of a lever, effected a small degree of upper ply feeding near the termination of the fabric-feeding operation, although this was not recognized at the time. This small amount of upper ply feeding movement of the presser foot sole obviously did contribute to the workability of the Hale et al. presser mechanism.

Applicants, having recognized that the conventional presser foot, when properly mounted, could impart a work-feeding motion to the upper ply of superimposed plies being sewn, proceeded to devise suitable mounting means for the presser foot which would impart sufficient motion to the upper ply of various fabrics being sewn to compensate for the retarding of the movement of the upper ply by the drag of the presser foot sole thereon, and to provide means for controlling the amount of upper ply feed movement of the presser foot in accordance with the requirements of the particular fabric being sewn.

In view of the foregoing, it is the main object of this invention to provide an entirely new concept of presser means which makes it possible to overcome the deficiency of the present drop feed sewing machine with respect to sewing together superimposed layers of work.

It is a more specific object of this invention to provide presser means which makes it possible for the average operator to perform joining operations on superimposed layers of garments with a sewing machine equipped with a regular drop feed mechanism.

It is another object of this invention to provide new and improved presser foot means which, in conjunction with their lower full-motion feed means, generates a feeding action of its own whereby the top ply of multiple superimposed layer pieces is fed through the stitch forming zone with relatively the same rate of movement as the ply engaged directly by the feed means.

It is still another object of this invention to provide a new and improved presser foot having a presser foot shank connected with a presser bar, a presser foot sole for engagement with the work, and link means hingedly connected with said shank and with said sole whereby said link means is disposed at an angle and hinged in such relation to the shank means that the sole portion, upon upward movement or downward movement of the feed member of a drop feed mechanism, will be pivoted on an arcuate path about said hinge connection with the presser foot sole moving in a work feeding direction during the downward movement of the feed member.

It is a further object of this invention to provide means for adjusting the presser bar mechanism in such manner that its spring means will apply very little or no pressure to the sole of the presser foot, and to provide further spring means associated with the presser foot for biasing the presser foot sole in downward direction toward the feed member.

With the above and other objects in view that will hereinafter appear, the nature of the invention will be more clearly understood by reference to the following detailed description, the appended claimed subject matter, and the several views illustrated in the accompanying drawings.

In the drawings:

FIG. 1 is a front elevational view, with parts broken away, of a conventional chainstitch sewing machine incorporating the presser mechanism of this invention.

FIG. 2 is a fragmentary longitudinal sectional view taken along the line 2—2 of FIG. 1 and shows more specifically the details of the sewing machine and the presser mechanism.

FIG. 3 is an enlarged fragmentary sectional view showing the details of the lift eccentric of the sewing machine.

FIG. 4 is an enlarged fragmentary transverse sectional view taken along the line 4—4 of FIG. 2 and shows specifically the details of the presser mechanism and the relationship thereof to the throat plate and feed dog.

FIG. 5 is an enlarged fragmentary vertical sectional view taken along the line 5—5 of FIG. 4 and shows in rear elevation the details of the presser mechanism.

FIG. 6 is an enlarged fragmentary vertical sectional view taken along the line 6—6 of FIG. 5 and shows further the details of the presser mechanism.

FIG. 7 is an enlarged fragmentary horizontal sectional view taken along the line 7—7 of FIG. 6 and shows further the details of the presser mechanism.

FIG. 8 is an enlarged fragmentary sectional view taken along the line 8—8 of FIG. 4 and shows the specific details of the mounting of the pivot pin for the lever and the spring which reacts on the lever to effect a resilient biasing of the presser foot sole toward the throat plate.

FIG. 9 is an enlarged fragmentary schematic view showing the specific relationship of the presser foot sole and its associated lever with respect to the feed dog and throat plate as the feed dog approaches the terminal end of its work feeding movement.

FIG. 10 is a fragmentary front elevational view of the sewing machine of FIG. 1 incorporating a modified form of presser mechanism.

FIG. 11 is an enlarged elevational view of the presser mechanism taken along the line 11—11 of FIG. 10.

FIG. 12 is an enlarged fragmentary vertical sectional view taken along the line 12—12 of FIG. 11 and shows specifically the details of the presser mechanism.

FIG. 13 is a fragmentary horizontal sectional view taken along the line 13—13 of FIG. 12 and shows further the details of the presser mechanism.

FIG. 14 is a fragmentary front elevational view similar to FIG. 1 and shows still another form of presser mechanism.

FIG. 15 is a fragmentary elevational view on an enlarged scale of the presser mechanism of FIG. 14 taken along the line 15—15.

FIG. 16 is an enlarged fragmentary vertical sectional view taken along the line 16—16 of FIG. 15 and shows further the details of the presser mechanism.

FIG. 17 is a fragmentary horizontal sectional view taken along the line 17–17 of FIG. 16 and shows further the details of the presser mechanism.

FIG. 18 is an enlarged fragmentary vertical sectional view taken along the line 18—18 of FIG. 16 and shows the specific details of the mounting of the upper end of the lever.

Referring now to the drawings in detail, it will be seen that there is illustrated in FIGS. 1 and 2 a conventional type of chainstitch sewing machine, which is identified by the numeral 20. The sewing machine 20 is of the type specifically disclosed in the patent to George M. Reimer, U.S. Pat. No. 3,392,692, granted July 16, 1968.

The frame of the machine 20 includes a base portion 21 having a vertical standard 22 extending upwardly therefrom. The vertical standard 22 carries an overhanging arm 23 which terminates in a stitching head 24. The stitching head 24 is provided with a front cover 25 which is removed in FIG. 1 so as to permit the illustration of the presser mechanism which will be described in detail hereinafter.

The usual front cover (not shown) of the base portion 21 has been omitted and parts of the cloth plate 26 and throat plate 27 have been broken away to show part of the driving mechanism, which is generally identified by the numeral 28, for the feed dog 30. The feed dog 30 has associated therewith a presser foot 31.

For operating the presser foot 31 there is provided a presser mechanism which includes a presser bar 32, means for biasing the presser bar in a downward direction, means for limiting the downward movement of the presser bar, and means for shifting the presser bar upwardly if it is desired to lift the presser foot 31. The presser foot 31 is carried on the lower end of the presser bar 32 which is mounted for vertical movement within a pair of bearing sleeves 33 and 34 mounted in the stitching head 24. The bearing sleeve 33 is press fitted into the bottom portion of the head 24 while the bearing sleeve 34 is screw threaded into a suitable threaded bore in the upper portion of the head 24.

Within the head there is secured to the presser bar 32 a collar 35 which is engaged by the lower end of a coil spring 36 mounted on the presser bar 32 in surrounding relation. The upper end of the coil spring 36 abuts against the bottom of the sleeve 34 with the spring 36 downwardly biasing the presser bar 32 which is slidably received in the bearing sleeves 33 and 34.

The top end of the presser bar 32 is provided with a threaded portion 37 on which is received a knurled or like nut 38 which, when rotated on the threaded portion, will cause the presser bar 32 to be raised or lowered in the stitching head 24, always under the bias of the spring 36. Thus, the nut 38 will determine the lowermost position of the presser bar 32. A lock nut 40 is provided for retaining the nut 38 in an adjusted position.

As previously mentioned, the presser bar 32 is received with sliding movement in the bearing sleeves 33 and 34 and can be adjusted by rotation of the knurled nut 38 in such manner that the lift effect of the feed stroke of the feed dog 30 will be fully or partially absorbed by the presser foot 31 in a manner to be more fully explained hereinafter.

It is to be understood that the sewing machine 20 is equipped with suitable mechanism connected with a knee press or the like (not shown) for lifting the presser bar 32 against the action of the spring 36 when it is desired, for example, to insert a workpiece into the machine 20 or to move the work freely in the region of stitch formation, for example, for tacking the ends of a seam or the like. This mechanism includes a pin 41 extending laterally from the collar 35 and cooperating with a link 42 extending downwardly form an end of a lever 43. The lever 43 is of a bellcrank construction and has a vertically extending arm 44 (FIG. 2) which is connected by a rod or cable 45 with a lever-type plate 46 which, in turn, is secured to a rock shaft 47 within the vertical standard 22 of the sewing machine 20. A spring 48 normally urges the lever 27 in a counterclockwise direction about a pivot member 50 on which it is mounted. When it is desired to lift the presser foot 31, the shaft 47 may be rocked via a lever 51 which, in turn, is connected by suitable means, such as a rod 52 with the knee press or the like (not shown).

When the feed dog 30 is below the upper work supporting surface, and more particularly below the surface of the throat plate 27, the presser foot 31 will be urged into engagement with the throat plate 27 and to bear down on work (not shown) supported thereon by a spring associated with and forming an overall part of the presser mechanism, as will be explained hereinafter.

It is to be understood that in accordance with the usual sewing machine construction, the throat plate 27 is provided with several openings 53 through which the various sections of the feed dog 30 may be upwardly urged into engagement with the work. The throat plate 27 will also be provided with the customary needle opening (not shown).

The operation of the feed mechanism of the sewing machine 20 is clearly set forth in the aforementioned U. S. Pat. No. 3,392,692 to Reimer with particular reference to column 7, lines 10 through 45 thereof. Accordingly, the feed mechanism of the sewing machine 20 will not be described in further detail here except for two important features which relate particularly to this invention. These include, first, a short connecting rod or feed crank link 54 for connecting a main drive shaft 55 with a feed rocker arm 56 by way of a driving link 57, and secondly, the contour of the feed lift eccentric 58, which eccentric is best shown in FIG. 3. It is to be understood that these two features provide for the desired feed motion, that is one wherein the feed dog 30 moves along a slanted path and the dwell movement thereof is at the apex of the slanted path. This arrangement allows a more effective use of the feed motion of the presser foot construction of this invention. Inasmuch as the above listed components and their functions are fully described in the Reimer U. S. Pat. No. 3,392,692, further description is not necessary except for reference in the future to the specific path of movement of the feed dog 30.

Referring now specifically to the presser foot construction illustrated in FIGS. 1, 2 and 4 through 8, it will be seen that the presser foot 31 includes a sole 60 having an upturned toe portion 61 and a flat work engaging portion 62. The work-engaging portion 62 carries a pair of spaced upwardly extending walls 63 between which is pivotally secured by means of a pin 64 the lower end of a lower arm of a link member or lever 65. The lever 65 is formed in the fashion of a fulcrum lever and has a lower arm 66 and an upper arm 67. At its fulcrum, lever 65 is received for pivotal movement on a ferrule 68 (FIG. 8) which in turn, is received on a pivot stud 70 extending through and between two prongs 71 of a fork portion of a presser foot shank bracket 72. The shank bracket 72 is secured to the lower end of the presser bar 32 in the usual manner by a screw 73, (FIG. 4). The prongs 71 are provided with arcuate slots 74 which are preferably concentric with the axis of the pivot pin 64.

The angle at which the lever 65 extends with respect to the horizontal disposed presser foot sole 60 is identified as angle A. It will be apparent that the pivot stud 70 is adjustable along the slots 74 and that the angle A can be varied. Adjustment of pivot stud 70 in the slots 74 is brought about by first loosening

the threaded engagement of the pivot stud **70** with a sleeve **75** which is received on the threaded portion of the stud projecting laterally outwardly from the shank bracket **72**, next sliding the stud **70** to the desired position in the slots **74**, and finally retightening on the sleeve **75** on the stud. The sleeve **75** constrains the stud from endwise movement in the slots **74** in one direction, while a shoulder portion **76** of the stud **70** constrains the stud from endwise movement in the other direction. It is to be noted that there is inserted between the sleeve **75** and one of the prongs **71**, a washer **77**. The washer **77** simply serves to prevent the sleeve **75** from slipping through the wider openings of the slots **74**.

The stud **70** carries a spring **78**. The spring **78** has a coiled portion **80** which is telescoped over the sleeve **75**. The spring **78** is formed at one of its ends into a loop **81** which is pivotally seated on the shoulder **76** of the stud. An arcuate portion **82** of the spring **78** spans across the fork prongs **71**, in the back thereof, and engages medianly of its arc from below a nose portion **83** (FIG. **6**) at the extreme end of the lever arm **67**. The coil portion **80**, which is received on the sleeve **75**, has its end **84** extending into a cutout **85** provided in a collar **86** which is rigidly mounted on the extreme end of the sleeve **75** by means of a setscrew **87** (FIG. **5**).

It is to be noted that on the right-hand side of the shank bracket **72**, as seen in FIG. **6**, there is mounted by means of a screw **88** a plate member **90** to the shank bracket **72**. The member **90** serves as a stop for the upward movement of the presser foot sole **60** about the pivot **64** during the feed stroke phase of the feed dog **30**. The plate **90** may be adjusted slightly up or down by loosening the screw **88**, the screw **88** passing through an elongated hole **91** in the plate **90** to facilitate such adjustment.

It is also to be noted that the collar **86** is out of the round along one portion of its periphery. This merely serves to facilitate rotating the collar **86** on the sleeve **75** if it is desired to readjust the tension of the spring **78**.

Referring now to FIG. **9** in particular, it will be seen that there is schematically illustrated on a very large scale the relationship between the feed dog **30**, the presser foot sole **60** and the lever **65** carrying the presser foot sole **60**. In the illustrated position of the lever **65**, the angular relationship between the lever arm **66** and a plane parallel to the plane of work feed is identified as the aforementioned angle A. The feed dog **30** is illustrated in its position of highest elevation and at the end of the work feeding stroke while at such elevation. In order to fully appreciate the path of movement of the feed dog **30**, the path of movement of the left-hand tooth of the feed dog **30** is illustrated by way of a phantom line identified by the numeral **92**. It will be seen that when the feed mechanism of the sewing machine **20** effects a further movement of the feed dog **30**, it will move rapidly downwardly while still moving to the left and then continue to move downwardly while moving to the right to a retracted position, such as that shown in FIG. **6**, for example.

During the initial upward movement of the feed dog **30**, the presser foot sole **60** will be forced upwardly and since the movement thereof is controlled by the pivoting of the lever **65** about the axis of the stud **70**, the presser foot sole **60** will move to the right, as viewed in FIG. **9**. However, this will have no material effect on the fabric being sewn in that it is initially anchored by the needle, which needle is identified by the numeral **93** and is shown in FIG. **4**, for example. After the feed dog **30** becomes elevated above the throat plate **27**, it begins to feed the work to the left. However, it is effective primarily on the lowermost ply and the sole plate **60**, even though the undersurface thereof may be polished, effects a drag on the upper ply of the work. As a result, there is a tendency for the feed mechanism of the sewing machine **20** to feed the bottom ply in advance of the top ply.

The presser mechanism of this invention overcomes the tendency of the upper ply to feed behind the lower ply. This is accomplished by the sole **60** having a material movement component parallel to the path of work feed during the terminal portion of the feed stroke of the feed dog **30**. In FIG. **9**, the feed dog **30** has reached its highest level above the throat plate surface and has moved along that level in a horizontal direction during a short period. After the leading tooth thereof has reached the point H, its path will arch downwardly whereby its feed motion in a horizontal direction steadily decreases until it nears the surface of the throat plate **27** where a feed movement of work in a forward direction can no longer be registered. This is clearly apparent from the path of movement of the leading tooth as indicated by the line **92**.

An arcuate line L represents the path of movement of the leading lower corner of the sole **60** as it follows the feed dog **30** down toward its lower plate **27**. For all practical purposes, when the leading tooth of the feed dog **30** reaches the line M, the horizontal movement of the feed dog **30** reaches zero. At this time the leading lower corner of the sole **60** has its reached a point N. Thus during this initail part of the terminal portion of the feed movement of the feed dog **30**, the sole **60** is moving with the feed dog **30**. However, after the feed dog **30** reaches the level M, for all practical purposes, its horizontal movement ends. However, as it lowers down into the opening **53** in the throat plate **27**, the presser foot **31** continues to swing downwardly into the left with the corner of the sole **60** moving from point N to point P. Accordingly, there is a movement of the presser foot sole **60** relative to the feed dog **30** in advance of the feed dog **30** a distance B. This is a distance in a horizontal path between the points N AND P.

It will be readily apparent from FIG. **9** that the points N and P are governed by the angle A. When the angle A is decreased, the points N and P will move closer together. In like manner, when the angle A is increased, the points N and P will move further apart.

It must be recognized that there will be different slippages between plies of different fabrics. Further, there will be different frictional engagement of different fabrics with the undersurface of the sole **60**. As a result, the amount of feed of the upper ply by the presser foot **31** must be varied in accordance with the particular fabric being sewn. In other words, the distance B must be varied for the different fabrics. This is accomplished by adjusting the angle A. In accordance with experiments made with respect to this invention, the preferred range of the angle A is from 30° to 50° although the invention will function properly between 15° and 75°. When the angle A is less than 15°, the horizontal movement of the presser foot sole **60** is so slight that the feed of the fabric is minute and will not compensate for the drag of the sole on the fabric. On the other hand, when the angle exceeds 75°, a wedging position is being approached wherein the feed dog **30** cannot effectively lift the presser foot sole **60**.

It is to be understood that the angle A, with the presser mechanism of FIG. **1** through **9** may be varied by shifting the stud **70** within the slots **74** of the prongs **71**. When necessary, the angle A can also be adjusted by varying the elevation of the lower end of the presser bar **32** through the adjustment at the upper end thereof.

Reference is now made to FIGS. **10** through **13** where there is illustrated another form of presser mechanism in accordance with this invention. It will be seen that the machine **20** has been modified only in the substitution of a different type of presser mechanism, the presser mechanism being generally identified by the numeral **95**. Although the presser bar **32** is considered to be a part of the presser mechanism **95**, it remains unchanged from the arrangement shown in FIG. **1**. Also, it is to be understood that the feed dog **30** is actuated in the same manner described above and that the path of movement thereof corresponds to that schematically shown in FIG. **9**.

The feed mechanism **95** includes a presser foot which is identified by the numeral **96** and, for all practical purposes, is of the same construction as the presser foot **31**. However, it may be provided with a thread cutter **97** which is secured in place by means of a fastener **98** in the manner best shown in FIG. **13**.

The lower end of the presser bar 32 has mounted thereon a shank bracket 100 which is formed with a presser bar receiving socket portion 101 and a rearwardly and downwardly (as seen from the position of the operator) extending bifurcated fork portion 102. A block 103, which is also partially bifurcated, is received in the fork portion 102. Thus, the rearwardly extending portion of the block 103, or more particularly the portion extending toward the left, as seen in FIG. 12, is comprised to two walls which are spaced from each other far enough apart to receive therebetween coils 104 of a torsion spring 105. The ends of the torsion spring 105 are formed into substantially straight arms 106 and 107 which extend tangentially from the coils 104 at an adjustable angle relative to each other. The spring arm 106 is engaged with an adjustment screw 108 threadedly carried by the block 103 while the spring arm 107 engages a link or lever 110 to be described in more detail hereinafter.

It is to be noted that the coils 104 of the spring 105 are received on a ferrule 111 which is, in turn, mounted on a stud 112. The stud 112 is received in the rearwardly extending walls of the forked portions 102 of the bracket 100. It is also to be noted that the stud 112 extends through the bifurcated portions of the block 103, the bifurcated portions being identified by the numeral 113.

It will be readily apparent from FIG. 12 that the shape of the block 103 is such that a face 114 thereof abuts against a face 115 of the socket portion 101 of the bracket 100. This, in conjunction with the mounting of the block 103 to the bracket 100 by means of the stud 112 renders the block 103 immobile and rigidly connected with he presser bar 32 through the shank portion 101 of the bracket 100.

Referring now to FIG. 13 in particular, it will be seen that the bifurcated portion 113 of the block 103 is formed with two different spacings. A space 116 is just wide enough to loosely receive therebetween the arm 106 of the spring 105. A second space 117 is wider and serves to accommodate the ferrule 111 which is surrounded by the coils 104 of the spring 105.

The torsion spring 105 serves as a means for biasing in downward direction the link 110 which forms a pivotal connection foot 96. To this end, the link 110 is mounted for pivotal movement on a pin 120 which extends between the downwardly projecting prongs of the forked portion 102. The tension of spring 105 may be adjusted by the screw 108 which is threaded into an internally threaded bore 121 in the top portion 122 of the block 103. It is to be noted that the screw 108 extends down into the space 116 and bears on the arm 106 of the spring 105. It is to be further understood that the screw 108 by being rotated in the bore 121, is adapted to place more or less tension on the arm 106 and thereby cause the arm 107 to bear down on the link 110 under its tension.

At its bottom end, the link 110 is pivotally mounted to a hinge pin 123 which extends between the pair of upstanding sidewalls 124 of the presser foot sole 118. It is to be particularly noted that the link 110 is provided on its inclined upper face approximately from the middle down to the lower end thereof with a groove 125 in which is engaged a slightly arced end portion 126 of the spring arm 107. As is best shown in FIG. 12, the pivotal movement of the link 110 about the pin 120 in a clockwise direction is limited by a pin 127 carrying a ferrule 128.

It is to be noted that the presser foot sole 118 may be formed in the usual manner with an upturned toe portion 130 and a flat sole portion 131 carrying the walls 124. Also, a customary needle penetration alot 132 is provided.

It is to be noted that the angle of the link 110 to a plane disposed parallel to the plane of work feed is relatively steep and is identified as angle A. While no means are provided directly on the bracket 100 to effect the adjustment of the angle A, it is to be understood that in as much as the effective height of the presser bar 32 may be varied, the effective height of the bracket 100 may be varied and thereby the angle A varied. It will, of course, be necessary to vary the tension of the spring 105 when the bracket 100 is raised or lowered so as to adjust the angle A.

By adjusting the angle A of the link 110 with respect to the plane of work feed, it will be readily apparent that the amount of upper work ply feeding movement of the presser foot 96 may be selectively varied in accordance with the requirements on the fabric being sewn so as to assure that the upper and lower plied of the work are fed at the same rate. It is to be understood that the relationship of the presser foot 96 with respect to the the feed dog is the same as that set forth above with respect to the relationship of the presser foot 31 with respect to the feed dog 30.

At this time it is also pointed out that the presser foot 96, like the presser foot 31, is one of the type commonly referred to as a low inertia presser foot.

Reference is now made to FIGS. 14 through 18 wherein the third form of presser foot construction is illustrated. This presser foot is generally identified by the numeral 135 and is carried by the presser bar 32 in the manner very similar to the mounting of the presser foot 31.

The presser foot 135 includes a mounting bracket 136 which is carried on the lower end of the presser bar 32. To facilitate the mounting of the bracket 136 on the presser bar 32, the mounting bracket 136 includes a socket 137 in which the lower end of the presser bar 32 is received. The bracket also includes a rearwardly and downwardly extending portion 138 as seen from the position of the operator.

With particular reference to FIG. 16, it will be seen that the portion 138 of the bracket 136 is bifurcated and provides for a solid top portion 140 and two downwardly extending spaced walls 141. Between the two walls 141 is pivotally received as its fulcrum point a bellcrank-type lever 142. The lever 142 is received for pivotal movement on a ferrule or sleeve member 143 which, in turn is received on a stud 144 extending through the walls 141.

One arm 145 of the lever 142 extends horizontally to the left under the solid portion 140 of the bracket 136. The arm 145 is provided at its extreme end with a bifurcated portion 146. A pin 147 extends between the two prongs of the bifurcated portion 146 and has mounted thereon an eye bolt 148. The eye bolt 148 has the stem thereof extending vertically upwardly through a slot 150 provided in the solid portion 140. The stem portion of the eye bolt 148 is provided with a thread on which is received a nut 151 having a cylindrical shoulder portion 152.

A spring 153 is carried by the eye bolt 148 with the upper portion thereof telescoped over the cylindrical shoulder portion 152. The spring 153 is seated on the solid portion 140 and reacts against the nut 151 which can be adjusted to vary the compression force applied by the spring 153 to the eye bolt 148.

The spring 153 and the associated mechanism serve to bias the lever arm 145 upwardly and thereby bias the other arm 154 of the lever 142 in a downward direction, the lever arm 154 sloping downwardly from the pin 144 at an angle, which angle is identified as angle A.

It is to be understood that the lever arm 154 corresponds to the links or levers 65 and 110 and fulfills in essence the job thereof The lever arm 154 is pivotally connected at its extreme lower end by means of a pivot pin 155 to a presser foot sole 156. The pivot pin 155 is rigidly mounted in a pair of spaced parallel upstanding walls 157 of the presser foot sole which is of a customary construction having a flat portion 158 and an upturned toe portion 160. The toe portion 160 is provided with the customary needle slot 161.

In order to facilitate adjustment of the angle A of the lever arm 154, the fulcrum stud or pin 144 is slidably received in horizontally disposed slots 162 formed in the downwardly extending walls 141 of the bracket portion 138 (FIG. 18). It is to be noted that the fulcrum stud 144 is provided with a nut 163 which is threadedly engaged thereon and by loosening the nut 163, the stud 144 may be slid along the slots 162 to other positions in accordance with the desired angle A.

As is clearly shown in FIG 18, the stud 144 is provided with a hexagonal head 164 and a narrow cylindrical shoulder 165. The nut 163 is of a similar construction and includes a hex-

agonal head 166 and a narrow cylindrical shoulder 167. The shoulder portions 165 and 167 are received in recesses 169 surrounding the slots 162 so as to anchor the stud 144 against vertical movement Tightening of the nut 162 results in the clamping of the walls 141 by the stud 144 sufficiently to prevent accidental movement thereof within the slots 162.

It is to be understood that after the position of the lever 142 has been adjusted by shifting the stud 144, it may be necessary to adjust the pressure applied by the presser foot sole 156. This is accomplished by adjusting the nut 151 to adjust the compression of the spring 153. Since the lever 142 is of the bell crank type, the spring 153 will indirectly cause the lever arm 154 carrying the presser foot sole 156 to be biased downwardly against the feed dog 30 or the throat plate 27.

It is also to be understood that adjustment of the angle A may be accomplished by vertically adjusting the lowermost position of the presser bar 32. This will vertically adjust the position of the bracket 136 and cause the angle A to increase or decrease.

It is to be understood that the function of the presser foot 135 is the same as that described with respect to the schematic showing of FIG. 9 and that the presser foot sole 156 will function to apply a feeding force to the upper ply of the work being sewn, as previously described.

Although several preferred embodiments of the presser foot mechanism have been specifically illustrated and described herein, it is to be understood that further modifications may be made without departing from the spirit and scope of the invention, as defined by the appended claims.

We claim:

1. A presser mechanism for sewing machines comprising a presser bar, a presser foot sole, and means mounting said presser foot sole on said presser bar for cooperation with a feed dog, said mounting means including means for imparting to said presser foot sole a work-feeding movement during each work-feeding operation of sufficient magnitude to advance an upper work ply to substantially compensate for any holding back of such upper ply by said presser foot sole during the work-feeding operation, said mounting means including means for adjusting the amount of work advancing movement of said presser foot sole in accordance with he requirements of the work being sewn.

2. The presser mechanism of claim 1 wherein said means for adjusting the amount of work-advancing movement of said pressure foot sole in accordance with the requirements of the work being sewn are also in part carried by said presser bar.

3. A presser mechanism for sewing machines comprising a presser bar, a presser foot sole, and means mounting said presser foot sole on said presser bar for cooperation with a feed dog, said mounting means including means for imparting to said presser foot sole a work feeding movement during each work-feeding operation of sufficient magnitude to advance an upper work ply to substantially compensate for any holding back of such upper ply by said presser foot sole during the work-feeding operation, said mounting means being of a construction to effect a faster feeding movement of said presser foot sole than the feeding movement of an associated feed dog during the end portion of the feeding movement of such feed dog.

4. A presser mechanism for sewing machines comprising a presser bar, a presser foot sole, and means mounting said presser foot sole on said presser bar for cooperation with a feed dog, said mounting means including means for imparting to said presser foot sole a work-feeding movement during each work feeding operation of sufficient magnitude to advance an upper work ply to substantially compensate for any holding back of such upper ply by said presser foot sole during the work-feeding operation, said mounting means including a lever mounted for pivotal movement relative to said presser bar and having a pivotal connection with said presser foot sole, said lever sloping downwardly toward said presser foot sole, in a direction generally opposing the direction of work feed and at an angle including an appreciable component parallel to the plane of work feed.

5. The presser mechanism of claim 4 wherein the included angle between said lever and the plane of work feed is between 15° and b 75°.

6. The presser mechanism of claim 4 wherein the included angle between said lever and the plane of work feed is between 30° and 50 °.

7. The presser mechanism of claim 4 wherein said mounting means also includes a bracket carried by said presser bar, and said lever is mounted on a pin carried by said bracket, and said pin is adjustable relative to said bracket to vary said angle.

8. The presser mechanism of claim 7 wherein said pin adjustment has a component parallel to the plane of said work feed.

9. The presser mechanism of claim 7 wherein said pin adjustment has a component parallel to the plane of said work feed, and said presser bar is adjustable along a line generally normal to said plane,

10. The presser mechanism of claim 7 wherein said pin adjustment has components both normal to and parallel to the plane of said work feed.

11. The presser mechanism of claim 7 wherein said pin adjustment has components both normal to and parallel to the plane of said work feed, and said presser bar is adjustable along a line generally normal to said plane.

12. The presser mechanism of claim 4 wherein said mounting means also includes a bracket carried by said presser bar, and said lever is mounted on a pin carried by said bracket, and an adjustable spring member mounted on said pin reacting on said lever to resiliently urge said presser foot sole to an operative position.

13. The presser mechanism of claim 1 wherein said mounting means also includes a bracket carried by said presser bar, and said lever is mounted on a pin carried by said bracket, said lever being part of a bellcrank, and an adjustable spring mounted on said bracket and coupled to said bellcrank reacting on said lever to resiliently urge said presser foot sole to an operative position.

14. The presser mechanism of claim 4 wherein said mounting means also includes a bracket carried by said presser bar, and said lever is mounted on a pin carried by said bracket, a second pin carried by said bracket, a spring mounted on said second pin and adjustably connected to said bracket reacting on said lever to resiliently urge said presser foot sole to an operative position.

15. The presser mechanism of claim 4 wherein sad presser bar is constantly resiliently urged toward a lowermost position wherein said presser foot sole is operative, an adjustable stop cooperating with said presser bar to determine said lowermost position, and said adjustable stop being operative to vary the angle of said lever to the plane of work feed and thereby vary the work feeding movement of said presser foot sole.

16. The presser mechanism of claim 15 wherein said presser bar is guidedly mounted in an upper guide for axial movement therethrough with the upper end of said presser bar being exposed, and said adjustable stop being mounted on said presser bar upper end for engagement with said guide.

17. The presser mechanism of claim 4 wherein a feed dog is mounted in cooperation with said presser foot sole, means coupled with said feed dog for moving said feed do along an elevated work feeding path and thereafter along a rapidly changing path toward a retracted work releasing position wherein the component of feed dog movement parallel to the plane of work feed rapidly decreased toward zero, and the angle of said lever to the plane of work feed effecting at the same time an initail movement of said presser foot sole with said feed dog followed by a significant movement of said presser foot sole relative to said feed dog in a work-feeding direction.

18. The pressure mechanism of claim 17 wherein said mounting means includes means for adjusting the angle of said lever to the plane of work feed to thereby selectively adjust the amount of movement of said presser foot sole relative to said feed dog in a work feeding direction in accordance with the requirements of the work being sewn.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,623,441 Dated November 30, 1971

Inventor(s) EDGAR SCHOIJ and FREDERICK M. KLOSE

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Col. 2, line 48, read -- feed -- before "lift";
Col. 4, line 15, read "27" as -- 43 --;
Col. 5, line 5, cancel "on" (first occurrence);
Col. 6, line 13, cancel "its lower" and read -- the throat--;
Col. 6, line 23, cancel "into" and read -- and to --;
Col. 8, line 6, cancel "plied" and read -- plies -- ;
Col. 8, line 48, cancel "compression" and read --tension--
Col. 8, line 57, read a --.-- after "thereof";
Col. 8, line 64, after "the" (first occurrence) read --presser foot sole 156 relative to the throat plate 27 in accordance with the selected --; lines 64 and 65 cancel "of the lever arm 154";
Col. 9, line 4, read a --.-- after "movement -- ;
Col. 9, line 41, cancel "he" and read -- the -- ;
Col.10, line 59, cancel "do" and read -- dog -- ;

In the drawings, the following additional showings should be present: Fig. 4, a dash line showing the forward end of the feed dog slots. Fig. 13, the lead line from the reference numeral 117 should be shortened so as not to touch any component. Fig. 15 the reference numeral 144 should read 163 and reference numeral 163 should read 144. Fig. 16 the lead line from the reference numeral 138 should curve to the right instead of to the left to touch the adjacent component. Fig. 18, the reference numeral 144 should read 163; reference numeral 164 should read 166; reference numeral 165 should read 167; reference numeral 167 should read 165; reference numeral 166 should read 164 and reference numeral 163 should read 144. Further, stud 144 should be illustrated as having threads part of which are engaged by nut 163 and stud 144 should terminate within nut 163.

Signed and sealed this 5th day of September 1972.

(SEAL)
Attest:

EDWARD M.FLETCHER,JR.
Attesting Officer

ROBERT GOTTSCHALK
Commissioner of Patents