June 26, 1962 I. A. LESLIE 3,040,682

SEWING MACHINES

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FIG. 1.

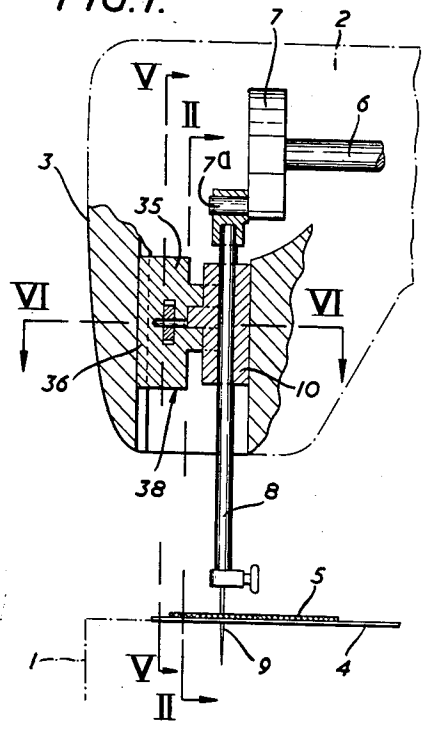


FIG. 2.

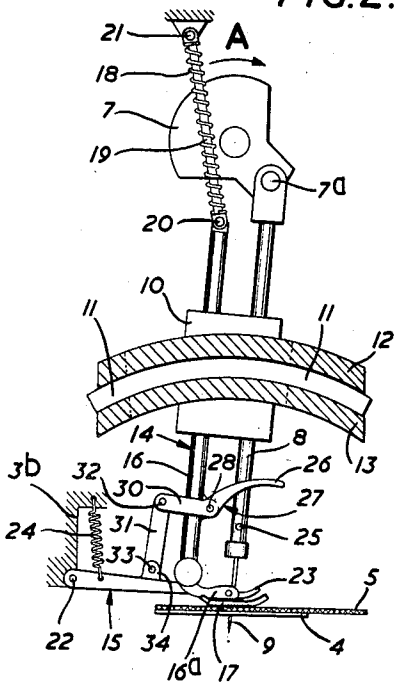


FIG. 3.

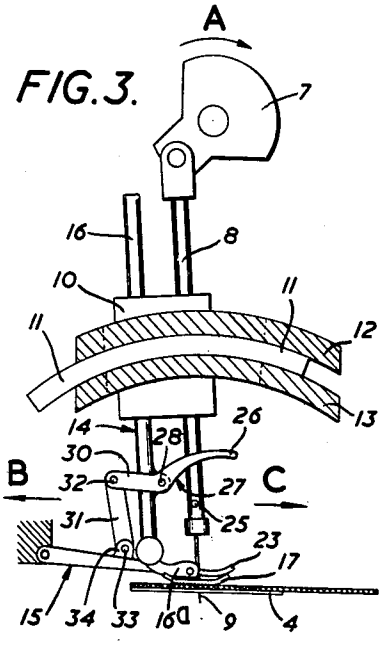
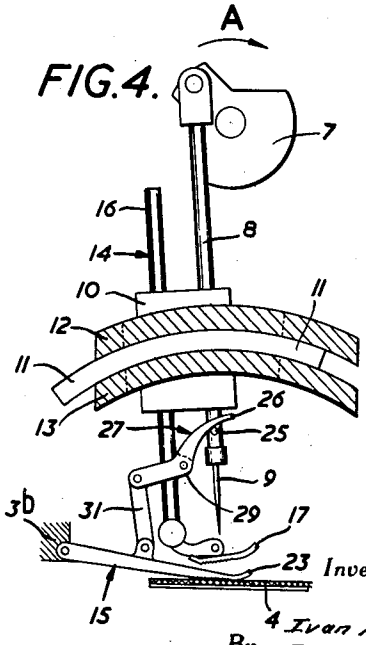


FIG. 4.



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FIG. 5.

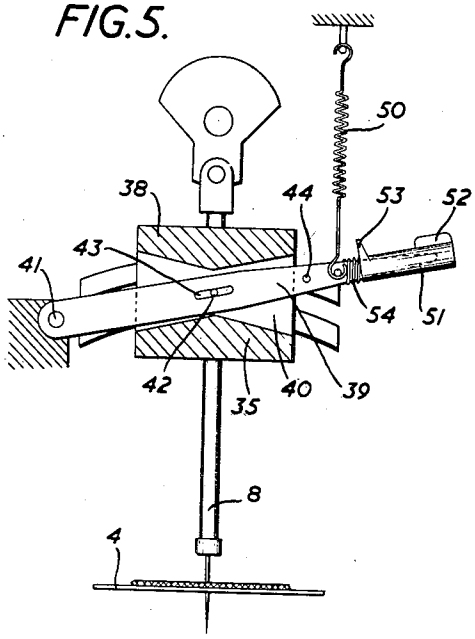


FIG. 6.

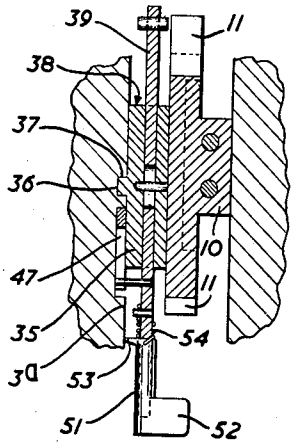


FIG. 7.

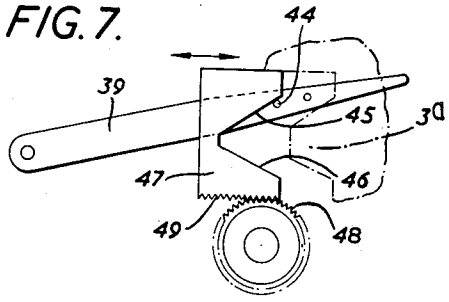


FIG. 8.

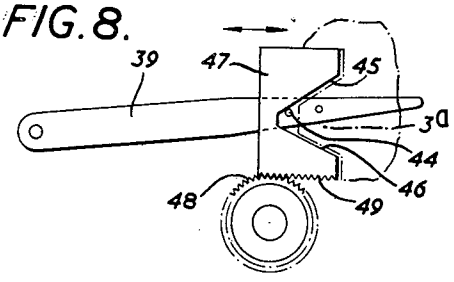


FIG. 9.

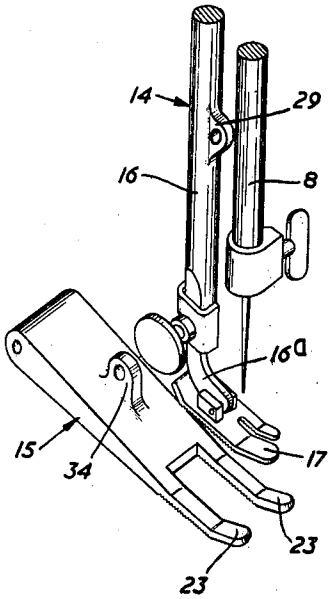
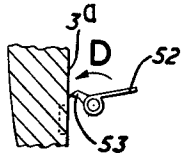


FIG. 10.



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SEWING MACHINES

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4 Claims. (Cl. 112—221)

This invention relates to sewing machines.

According to the invention, a sewing machine has a reciprocable needle carrier or needle bar which rocks to and fro in an upright plane when reciprocating, the said needle carrier or needle bar being slidably mounted in a bearing block or member which is supported so as to rock with the needle carrier or bar. The needle carrier or needle bar may be directly pivoted to, and driven by, a rotary drive crank. The rockable bearing block or member may rock about, or be adjustable to rock about, an axis which is offset above or below a work support disposed beneath the needle carrier or needle bar, and the machine may have presser mechanism comprising first and second presser members, the first presser member being mounted to rock with the reciprocable needle carrier or needle bar and being controlled through the movement of the said needle carrier or needle bar so as automatically to engage work on the work support during the time that a needle in position in the needle carrier or bar is in the work, this first presser member, when the bearing block or member is rocked about the aforesaid axis offset above or below the work support, acting as a feed member to feed the work over the work support, and the second presser member being carried by a relatively-fixed part of the machine and being controlled through the movement of the needle carrier or needle bar so as automatically to engage and hold stationary the work on the work support during the time that the needle is out of the work.

The accompanying drawings show, by way of example, and in a diagrammatic manner, mechanism of a domestic sewing machine constructed in accordance with the present invention.

FIGURE 1 of the said drawings is a vertical section showing a reciprocable needle bar of the machine, said needle bar being directly pivoted to a rotary drive crank and being mounted in a rockable heaving block carried by a vertically-movable slide.

FIGURE 2 is a vertical section on the line II—II, FIGURE 1, showing in addition presser mechanism omitted from view in FIGURE 1, the needle bar and presser mechanism being shown in a position in which a needle carried by the needle bar has entered the work and has executed part of a downward stroke.

FIGURE 3 is a section similar to FIGURE 2, but showing the bar and presser mechanism in a position in which the needle is still in the work but has executed part of an upward stroke.

FIGURE 4 is a section similar to FIGURES 2 and 3, but showing the bar and presser mechanism in a position in which the needle is out of the work.

FIGURE 5 is a vertical section on the line V—V, FIGURE 1, showing a lever for operating the slide, but omitting the presser mechanism from view.

FIGURE 6 is a horizontal section on the line VI—VI, FIGURE 1, also omitting the presser mechanism from view.

FIGURE 7 shows an adjustable stop device for co-acting with the lever, the said device being shown in one adjusted position.

FIGURE 8 shows the said stop device in another adjusted position.

FIGURE 9 is a fragmentary perspective view showing part of the needle bar and presser mechanism.

FIGURE 10 is a fragmentary view showing a locking catch on the lever.

Referring to the drawings, a domestic sewing machine comprises a base 1 carrying towards one end a vertical pillar (not shown) from which projects, in conventional manner, a tubular horizontal arm 2, the said arm overhanging the base and terminating at its outer end in an upright head or housing 3 the bottom end of which is spaced above an apertured plate 4, known in the art as a cover plate. The said cover plate 4 is mounted in the base 1 and forms a support for the work (shown at 5) to be sewn. The aforesaid horizontal arm 2 houses a drive shaft 6 carrying at its outer end a weighted drive crank 7 operatively connected to a reciprocable bar 8, known as a needle bar, carrying a needle 9 which, when the machine is in use, moves up and down through the work 5 and through an aperture in the cover plate 4. Suitable loop-forming mechanism (not shown), for co-operating with the needle, is provided beneath the cover plate 4 to enable stitches to be formed in a suitable manner. The said loop-forming mechanism may be of the oscillating-shuttle, central bobbin, or rotary hook type.

The upper end of the said reciprocable needle bar 8 is directly pivoted at 7^a to the rotary drive crank 7, there being no intermediate link between this bar 8 and the crank 7, and instead of the needle bar being mounted for vertical reciprocation in a stationary bearing as in hitherto known constructions, the needle bar 8 rocks to and fro in a vertical plane when being reciprocated by rotating the drive crank 7, and the said needle bar 8 is slidably mounted in a bearing block 10 which is supported so as to rock with the needle bar. In order to allow the block 10 to rock with the needle bar, the said block 10 is provided with a pair of laterally-directed arcuate extensions 11 which are integral with, and extend from opposite sides of, the block 10 and which each work between coaxial arcuate guides 12, 13.

When the rotary drive crank 7 is turned to reciprocate the needle bar 8, the latter slides up and down in the block 10 and at the same time rocks about the axis of curvature of the aforesaid arcuate guides 12, 13, block 10 being acted upon by the lateral thrust of the rocking needle bar 8 and rocking with the said bar 8 about the axis of curvature of the guides 12, 13, and the arcuate extensions 11 on the block 10 moving in an arcuate path between the guides 12, 13, during the rocking movement of the block 10. The arrangement is such that the needle bar 8 moves freely up and down in the block 10 notwithstanding the absence of an intermediate link between the said bar and the rotary drive crank, and the absence of such a link simplifies the construction of the machine. The arcuate guides 12, 13, are slotted to accommodate the rocking movement of the block 10.

The reciprocable needle bar 8 is operatively associated with presser mechanism comprising a first presser member 14 and a second presser member 15. The first presser member 14 is mounted to rock with the needle bar 8 and consists of a presser bar 16 having an adjustable lower extension 16^a, and a presser foot 17, the said presser bar 16 being slidably mounted, for movement parallel to the needle bar 8, in the rockable block 10, and the presser foot 17 (which is serrated on its underside) being pivotally connected to, and carried by, the extension 16^a of the presser bar 16 and being engageable with the upper face of the work 5. The presser member 14 is biased against upward movement by a compression spring 18 mounted on a link 19 pivoted at 20 to the upper end of the bar 16 and at 21 to a relatively-fixed part of the head 3. The second presser member 15 consists of a lever pivoted at

one end, at 22, to a relatively-fixed extension 3b of the head 3, and the other end of this lever 15 is forked, as shown in FIGURE 9, so as to terminate in a pair of spaced presser feet 23 engageable with the upper face of the work 5, the spacing between the said feet 23 (which are serrated on their undersides) being such as to allow the presser foot 17 of the first presser member 14 to pass between them when engaging the work. The said second pressure member 15 is biased against downward movement by a tension spring 24 connected between the member 15 and the extension 3b of the head 3. The needle bar 8 carries, below the block 10, a projection 25 engageable with one arm 26 of a bell-crank lever 27 carried by the lower part of the presser bar 16, the said bell-crank lever 27 being pivoted at 28 to a lug 29 on the said bar 16; and the other arm, shown at 30, of the lever 27 has its outer end connected through a link 31 to the second presser member 15, the said link being pivoted at 32 to the arm 30 and at 33 to a lug 34 on the member 15. The arrangement is such that when the needle 9 is in the work 5, the projection 25 is clear of the arm 26 of the bell crank lever so as to cause the foot 17 of the first presser member 14 to be pressed down, by the action of the bias spring 18, against the work, and so as to cause the second presser member 15 to be held up clear of the work by the action of the bias spring 24. When, however, the needle 9 leaves the work 5, the projection 25 engages the underside of the arm 26 of the lever 27 and acts through the said lever 27 to cause the first presser member 14 to slide upwards against its bias spring 18 so as to disengage the foot 17 from the work, and so as, at the same time, to cause the link 31 to move downwards to press down the second presser member 15, against its bias spring 24, so that the feet 23 engage the work. When the needle 9 again enters the work, the projection 25 moves down away from the lever arm 26, so that the respective bias springs 18, 24, act to cause the feet 23 to disengage from the work and the foot 17 to re-engage the work. In this way, the work is firmly held throughout a complete cycle of movement of the needle bar, the work being engaged by the foot 17 when the feet 23 are disengaged, and vice-versa. The guides 12, 13 for the arcuate extensions 11 on the rockable block 10 are carried by a block 35 having an integral rib 36 engaging a vertical slideway 37 in the head 3, and the block 35 and guides 12, 13 together form a slide 38 which is adjustable upwards and downwards relatively to the work-supporting plate 4, whereby the position of the axis of curvature of the arcuate guides 12, 13, that is, the position of the axis about which the block 10 rocks, can be varied between a position offset from and above the plane of the work-supporting plate 4, and a position offset from and below the said plane, and when it is required to use the machine it is arranged that the said axis of curvature of the guides 12, 13, is offset at a suitable position either above or below the work-supporting plate 4, with the result that when the drive crank 7 is rotated to rock the block 10, bar 8, and presser member 14, when the work 5 is in place, the consequent horizontal movement of the presser foot 17 during the time that it is pressed by the action of the bias spring 18 against the work, that is, during the time the needle 9 is in the work, causes the work to move over the work-supporting plate 4. The presser member 14 thus acts as a feed member to feed the work over the supporting plate 4 whilst the needle 9 is in the work and the needle 9 is thereby relieved from being subjected, when in the work, to lateral pressure which might otherwise cause it to bend.

A cycle of operation when the axis of curvature of the guides 12, 13 is offset below the work support 4 is illustrated by FIGURES 2 to 4, in which the direction of rotation of the crank 7 is taken as being that indicated by the arrow A. FIGURE 2 shows the needle 9 in the work and on its downward stroke, with the presser foot 17 held by the action of the bias spring 18 against the work, and with the presser feet 23 held by the action of the bias spring 24 in a disengaged position. FIGURE 3 represents another stage in the cycle and shows the needle 9 still in the work but on its return stroke, the presser foot 17 still being held against the work but having moved in the direction B causing the work also to move in the said direction B, and the feet 23 still being disengaged from the work. FIGURE 4 shows a further stage in the cycle in which the needle 9 has left the work and the projection 25 has lifted the arm 26 of the bell-crank 27, so as to cause the presser foot 17 to disengage from the work, and the presser feet 23 to engage, and hold stationary, the work until the needle has rocked back and the projection 25 has again moved down clear of the arm 26, the mechanism then being ready to undergo another cycle. If the axis of curvature of the guides 12, 13 is offset above, instead of below, the work supporting plate 4, then (assuming the direction of rotation of the crank 7 is still direction A) the cycle of operation will be modified in that the presser foot 17, when engaged with the work, will move the latter in the direction C, instead of in the direction B. The direction of feed is thus reversed by adjusting the slide 38 to move the axis of curvature of the guides 12, 13 from above the plate 4 to below the latter, or vice-versa.

It will be noted that no separate drive means are required for the feed member constituted by the presser member 14, the latter being rocked by reason of the motion of the needle bar 8. The construction of the machine is thereby simplified.

The slide 38 formed by the block 35 and guides 12, 13 is adjustable upwardly and downwardly by means of a lever 39 which passes through an aperture 40 in the block 35, the said lever being pivoted to the head 3 at 41 and being pivotally connected to the block 35 by a pin 42 passing through a slot 43 in the lever. The outer end of the lever 39 carries, externally of the block 35, a pin 44 which projects into the space between a pair of relatively-inclined upper and lower stop faces 45, 46 on a stop plate 47 which is mounted in the head 3 for movement in a direction bisecting the angle between the two stop faces 45, 46, the plate 47 being adjustable by means of a toothed wheel 48 engaging rack teeth 49. When the machine is in operation, it is arranged that the lever 39 is either in a raised position in which the pin 44 engages the upper stop face 45, or in a lowered position in which the pin 44 engages the lower stop face 46, according to whether the desired position of the axis of curvature of the guides 12, 13 is above or below the work-supporting plate 4, and when it is desired to reverse the direction of feed the lever 39 is turned so that the pin 44 leaves the one stop face of the plate 47 and engages the other stop face of the said plate. By adjusting the plate 47 by means of the toothed wheel 48, the amount of angular travel permitted to the lever 39 by the stop faces 45, 46 is varied, thereby varying the vertical distance of the axis of curvature of the guides 12, 13 from the work support 4 when the lever 39 is in a raised or lowered position with the pin 44 engaging one or other of the stop faces 45, 46 so that the stitch length is in turn varied. FIGURE 7 shows the plate 47 set in a position corresponding to a comparatively long stitch length, whilst FIGURE 8 shows the said plate moved to a position corresponding to a compartively short stitch length. The toothed wheel 48 may carry markings for indicating different settings of the plate 47.

The lever 39 is biased in an upward direction by a spring 50, and the said lever carries at its outer end a locking device for frictionally holding the lever in an adjusted position, the said locking device comprising a sleeve 51 carrying at one end a finger-piece 52, and at the other end a pointed locking projection 53, the said sleeve 51 being rotatably mounted on the lever 39 and being biased, for rotation in the direction shown by the arrow D, FIGURE 10, by a torsion spring 54. The locking projection 53 normally frictionally engages, under the action of the spring 54, a roughened surface of a part 3a

of the head 3, so as to hold the lever 39 against movement. The sleeve 51 is turned back aginst the action of the spring 54 when it is desired to free the lever 39 for angular movement.

The machine may be driven by a hand wheel. Or, a treadle, or a power unit, may be provided for driving the machine.

If desired, the machine may be constructed with the arcuate guides permanently fixed in one position, instead of being adjustable. The axis of curvature of the arcuate guides may if desired, instead of being offset, or adjustable to be offset, lie (in a machine with separately-driven feed means) in a position co-planar with the work-supporting cover plate. It is, however, preferred to provide guides which are offset, or adjustable to be offset, above or below the work support.

I claim:

1. A sewing machine comprising a work support, a head arranged above said work support in spaced relationship thereto, a needle carrier both reciprocable and oscillatable in an upright plane, drive means drivingly connected to said needle carrier for reciprocating and oscillating the same, an oscillatable bearing member having said needle carrier slidably mounted thereon and being oscillatable together with said needle carrier, a slide carrying said oscillatable bearing member and being mounted on said head so as to be adjustable thereon together with said oscillatable bearing member between an upper position in which the oscillation of said bearing member takes place about an axis above said work support and a lower position in which said oscillation of said bearing member takes place about an axis below said work support, manually operable lever means operatively connected to said slide for adjusting the same, said lever means being provided with a projection, and stop means having a pair of relatively inclined stop faces adapted respectively to engage and stop said lever means at its desired maximum tilting angle, said stop means being adjustable in a direction bisecting the angle between said stop faces to vary the amount of angular travel of said lever means as permitted by said stop faces.

2. A sewing machine according to claim 1, in which said lever means has its outer end provided with a spring-loaded locking device comprising a pointed locking projection normally frictionally engaging said head to hold said lever means stationary in a respective adjusted position, said projection being angularly movable about an axis in the direction of length of said lever means and against the thrust of said spring-loading to a release position for releasing said lever means for movement thereof.

3. A sewing machine which comprises: a work support, a head arranged above said work support in spaced relationship thereto, a reciprocable needle carrier rockable to and fro in an upright plane simultaneously with a reciprocation of said needle carrier, drive means operatively connected to said needle carrier for reciprocating and rocking the same, a rockable bearing member having said needle carrier slidably mounted thereon and rockable together with said needle carrier, and a slide carrying said rockable bearing member and adjustably mounted on said head so as to be slidable thereon together with said rockable bearing member between an upper position in which the rocking of said bearing member takes place about an axis located above and spaced from the plane of said work support and a lower position in which the rocking takes place about an axis located below and spaced from the plane of said work support.

4. A sewing machine according to claim 3, in which said drive means includes a rotary drive crank, and a crank pin carried by said drive crank and pivotally connecting said drive crank to said needle carrier for reciprocating and rocking the same back and forth.

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