May 12, 1959 A. N. HALE 2,885,982

LOCKSTITCH SEWING MACHINE

Filed July 15, 1955 8 Sheets-Sheet 1

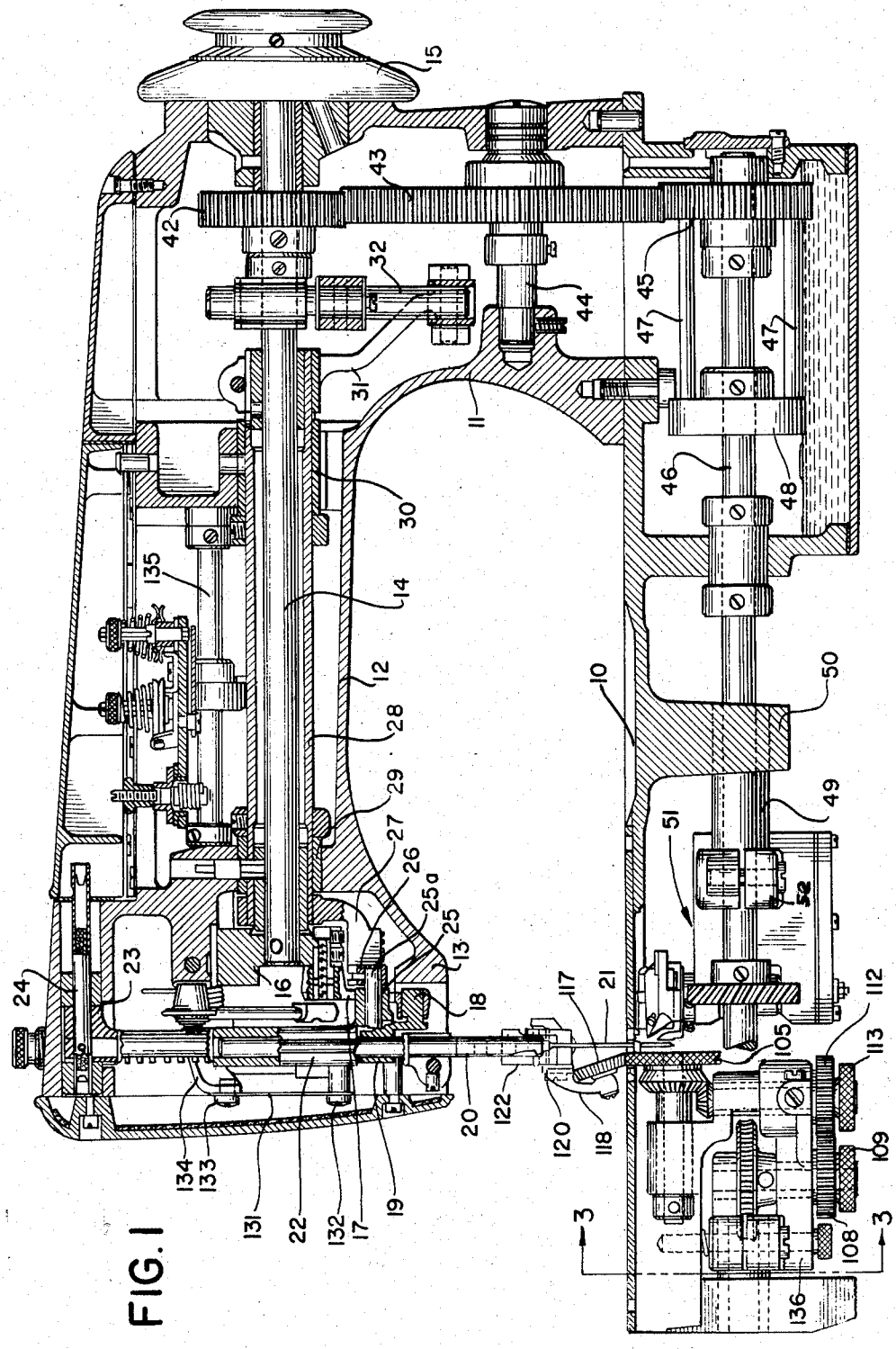


FIG. 1

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LOCKSTITCH SEWING MACHINE

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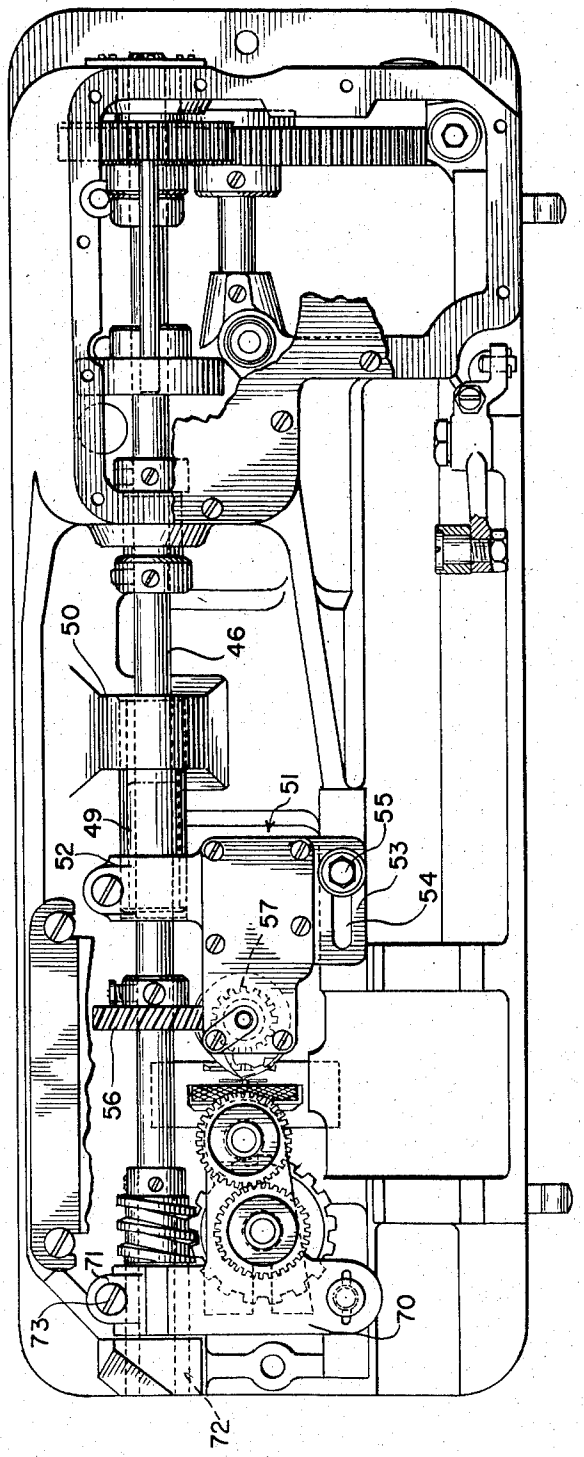


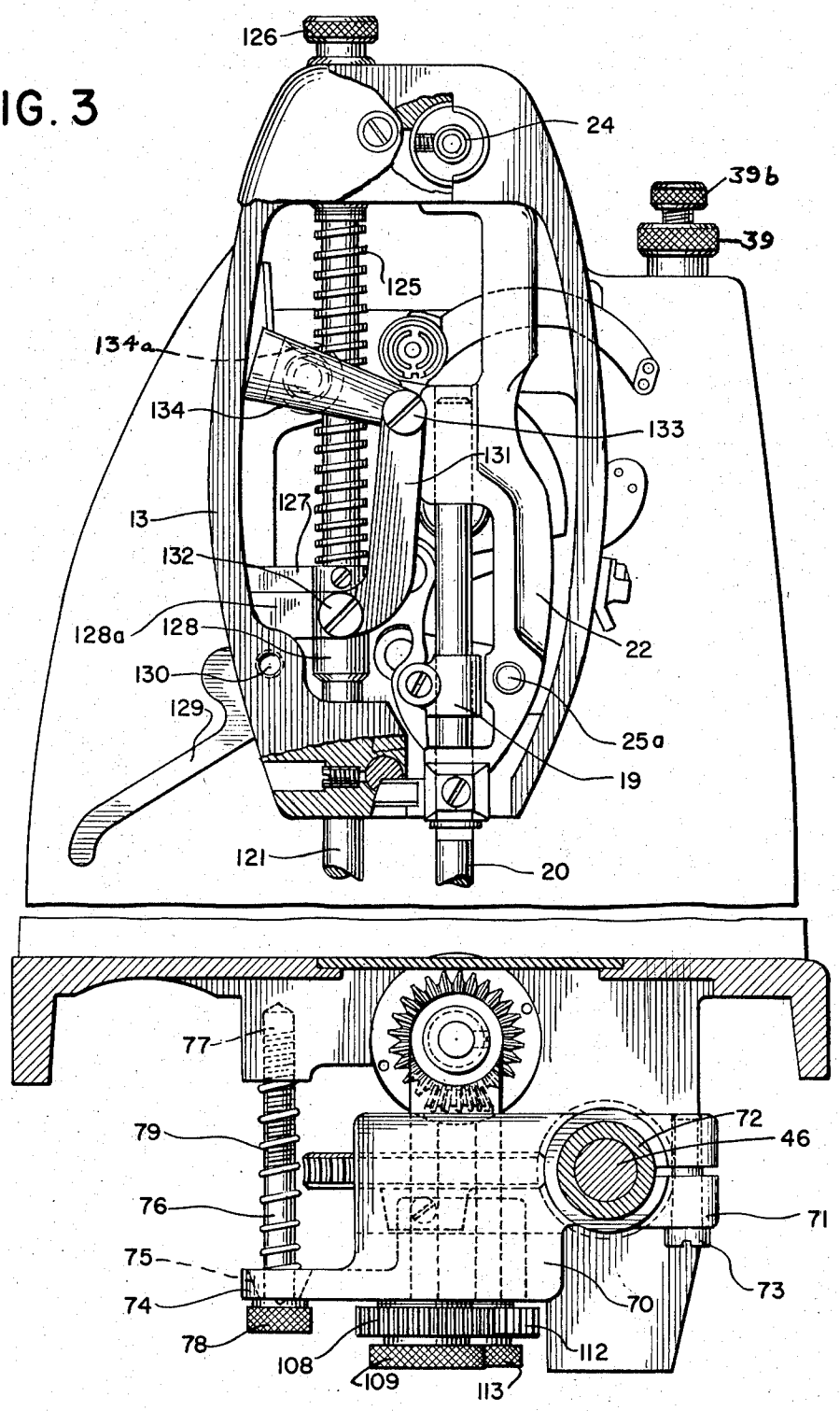
FIG. 2

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LOCKSTITCH SEWING MACHINE

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FIG. 3



LOCKSTITCH SEWING MACHINE

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FIG. 4

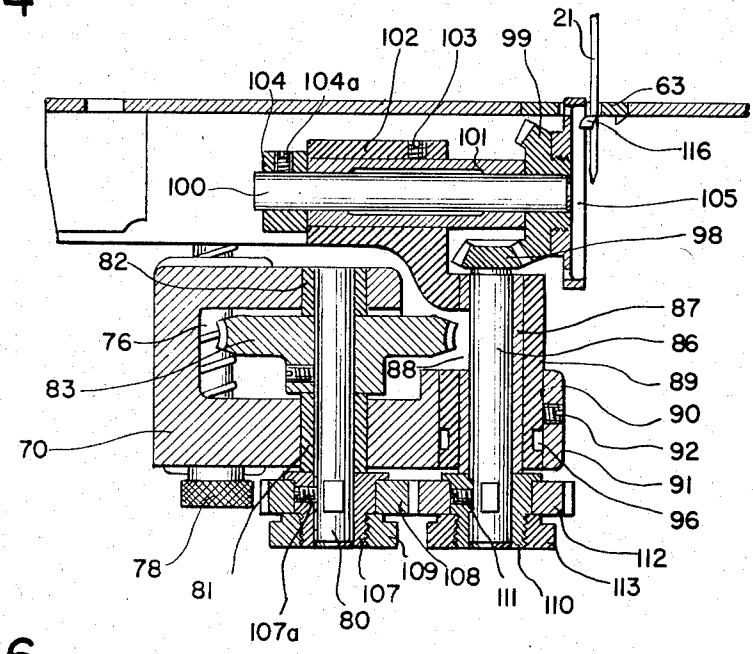
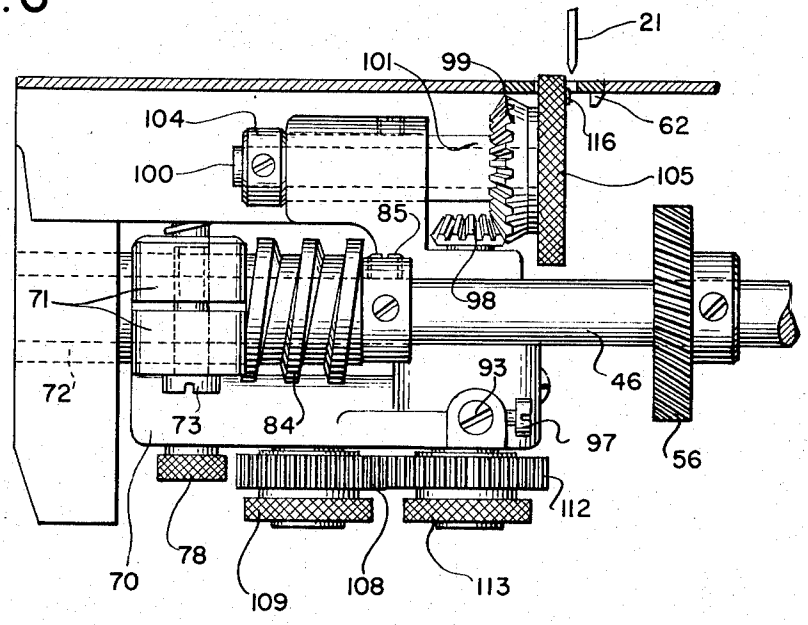


FIG. 6

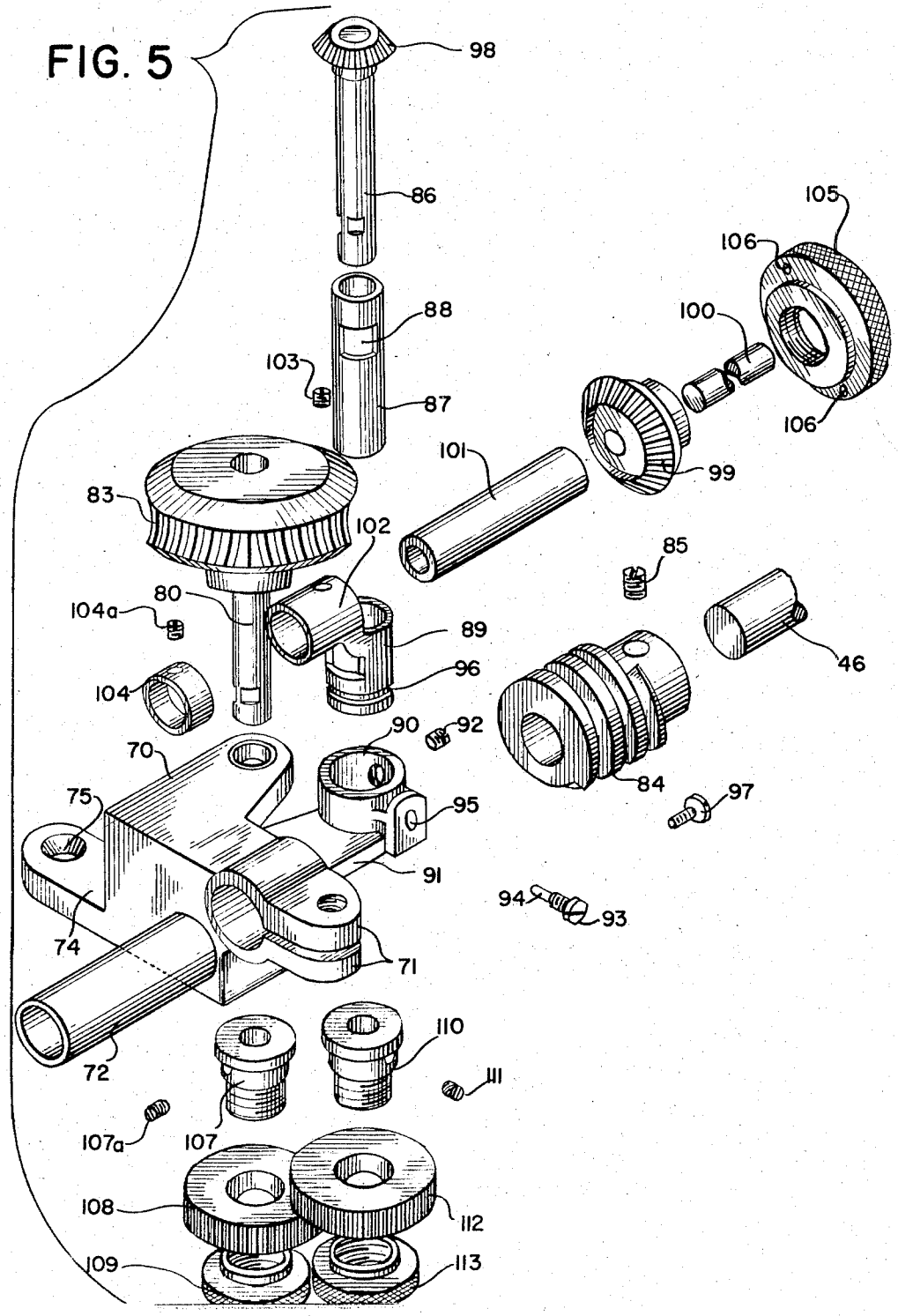


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LOCKSTITCH SEWING MACHINE

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FIG. 5



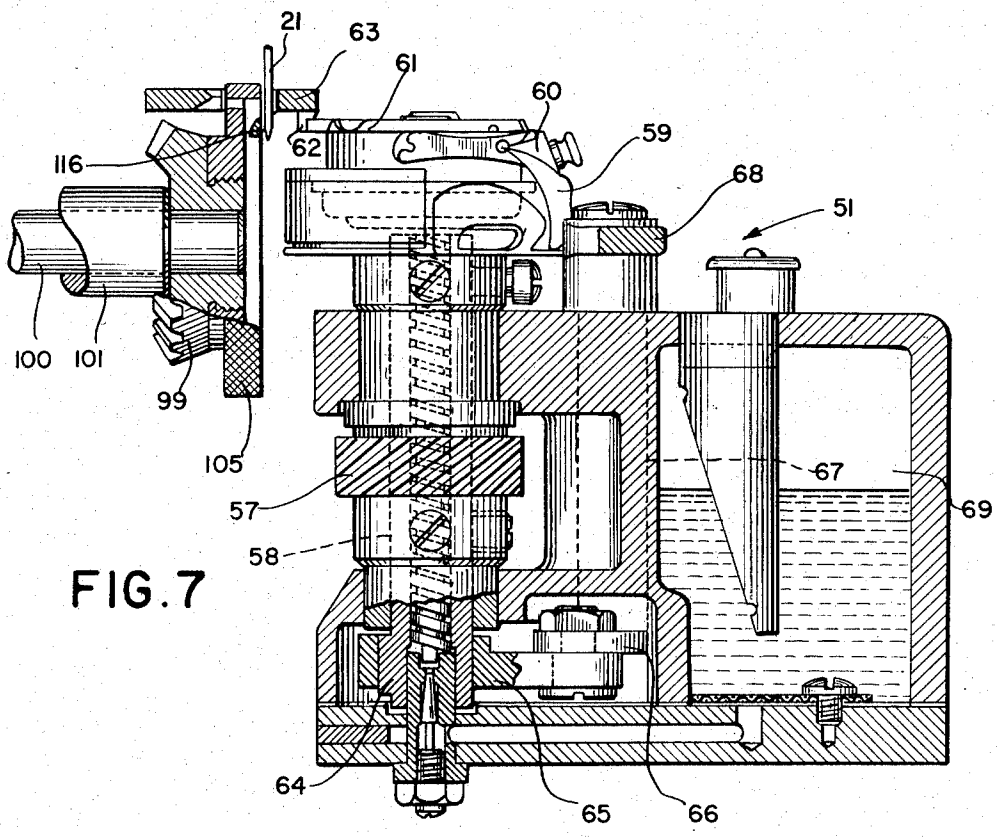


FIG. 7

FIG. 9

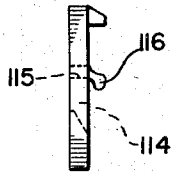
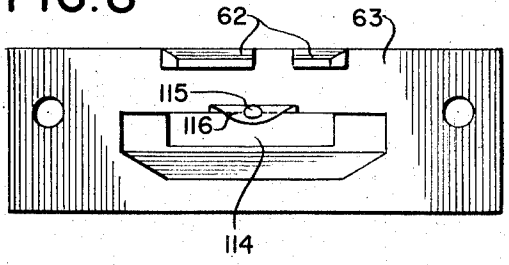


FIG. 8



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LOCKSTITCH SEWING MACHINE

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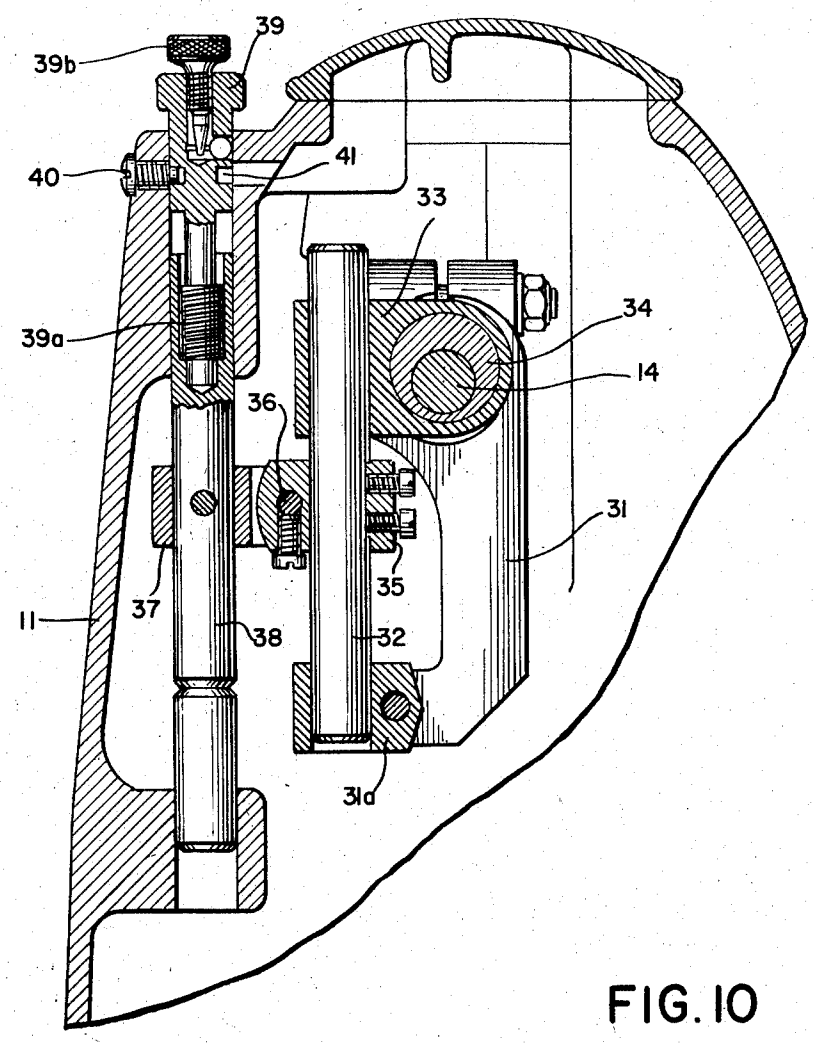


FIG. 10

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LOCKSTITCH SEWING MACHINE

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FIG.11

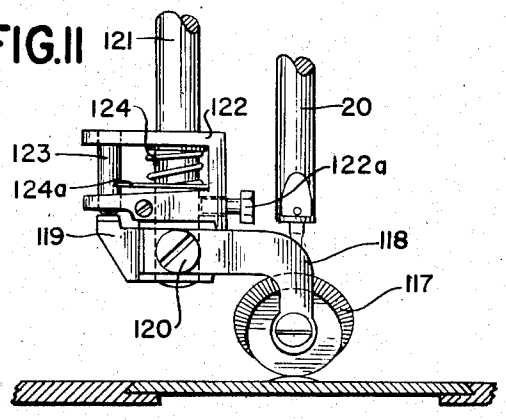


FIG.12

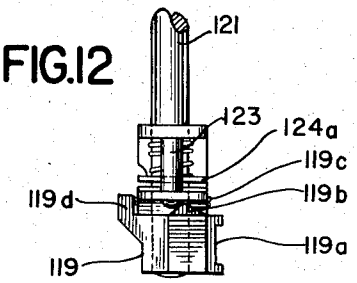


FIG.13

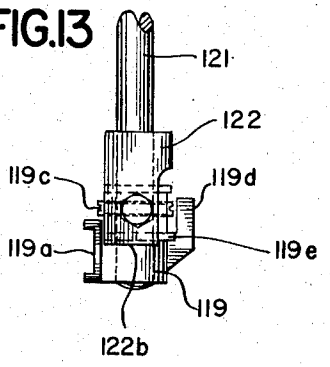


FIG.14

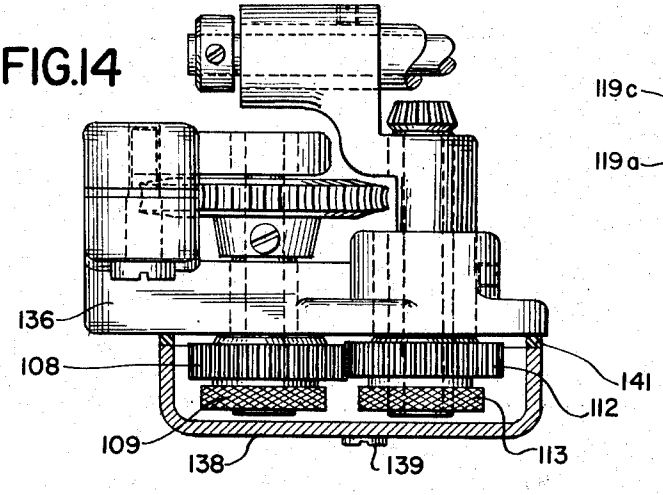
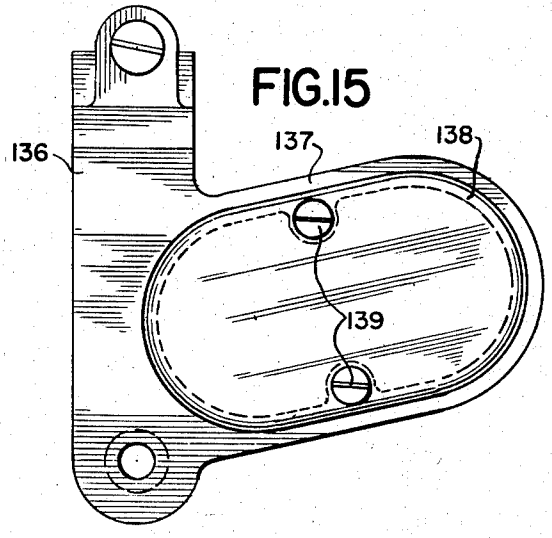


FIG.15



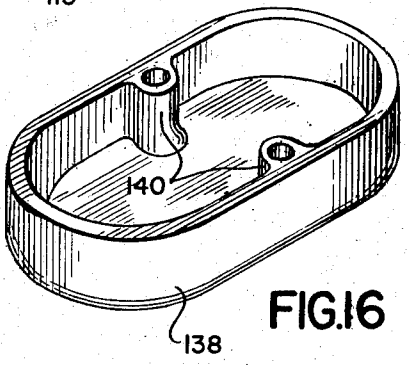


FIG.16

United States Patent Office 2,885,982 Patented May 12, 1959

2,885,982

LOCKSTITCH SEWING MACHINE

Arthur N. Hale, Park Ridge, Ill., assignor to Union Special Machine Company, Chicago, Ill., a corporation of Illinois

Application July 15, 1955, Serial No. 522,270

9 Claims. (Cl. 112—211)

This invention relates to lockstitch sewing machines and particularly machines of this character provided with a rotary hook arranged for revolution about a vertical axis at an angular speed which is twice that of the main rotary drive shaft. The machine is adapted for the stitching of a variety of types of work including light, heavy and medium work; it is particularly suited for use in the sewing of shoe uppers, linings, and the like.

The machine constructed in accordance with the invention is provided with a continuously driven lower feed wheel for cooperation with the work at a point adjacent and substantially transversely in line with the point of stitch formation. A needle cooperating with the vertical axis hook in the formation of a line of stitching is arranged for vertical reciprocation and also for lateral swinging movement in the line of feed so that the needle will be advanced in the direction of feed so long as it penetrates the work and will thus impart a needle feed action to the work.

A primary object of the invention has been to provide a machine of the general character indicated which is of simple construction, requires a minimum of fine tolerances in the production of the various parts, is easy to adjust and service, and is capable of producing uniform lines of stitching at relatively high speeds.

An important feature of the invention, toward the foregoing ends, is the provision of a single rotary shaft extending longitudinally of the base portion of the frame from a region beneath a vertical standard to the region of stitch formation. This shaft is arranged to drive the vertical axis hook and also a continuously driven feed wheel. The vertical hook and the feed wheel are mounted in their own independent saddle units which are adjustably mounted on the base portion of the frame and are supported in part from bushings or bearing sleeves in which the main drive shaft is journaled. Two parallel, and preferably vertical, shafts are provided in the feed wheel unit as a part of the connection from the main drive shaft in the base of the machine to the feed wheel. The driving connections from the main drive shaft to the hook unit are such that the rotary component of the hook is driven at twice the angular speed of the main shaft while the driving connections from this shaft to the feed wheel unit are such that a substantial reduction in angular speed of the first of the two parallel driven shafts of this unit is brought about. Further reductions in angular speed of the feed wheel are provided through the connections from the first driven shaft mentioned to the feed wheel.

A further important feature of the invention is the provision for adjustment of the feed wheel in a plurality of different ways to permit it to be shifted slightly in three dimensions to suit the requirements of the work and to bring about the desired relationship between the feed wheel and an opening in the throat plate of the machine. For this purpose the entire feed wheel unit is mounted for longitudinal adjustment along the main drive shaft and for angular adjustment about the axis of the main drive shaft; also provision is made for bodily vertical adjustment of a separate support element in relation to the main frame of the unit, the support element carrying the feed wheel itself. By these three separate adjustments it is possible to vary the position of the feed wheel firstly in a direction longitudinal of the base, i.e. transversely of the line of feed, secondly in the direction of the line of feed, to position the feed wheel either directly opposite the line of action of the needle or slightly forwardly or rearwardly of such line of action and in proper relation to the opening in the throat plate, and thirdly vertically to position the upper surface of the feed wheel in the desired relation to the top of the throat plate. Two of the adjustments mentioned combine in their action to bring about the desired elevation of the feed wheel in relation to the throat plate. By virtue of this capability of adjustment in three dimensions, the need for fine tolerances in the construction of the various parts is avoided and provision is made not only for the location of the feed wheel in the preferred relation to the stitch forming devices and throat plate, but also for compensation for wear of the feed wheel.

Another feature of the invention is the provision of readily accessible and interchangeable gearing in the feed wheel unit which enables a change to be made in the length of stitch produced by the machine in a simple and effective manner, whenever desired. Provision is also made for changing readily the extent of the needle feed swinging movement of the needle bar to conform with the stitch length determined by the driving connections for the continuously rotating feed wheel. Normally the extent of feed action imparted by the needle will be made to coincide substantially with the feed action of the feed wheels during the interval in which the work is engaged by the needle, but the needle feed action may be somewhat greater or less than this depending upon the character of the work being done.

Other objects, features, and advantages of the invention will appear from the detailed description of an illustrative embodiment of the same which will now be given in conjunction with the accompanying drawings, in which:

Fig. 1 is a longitudinal vertical sectional view through a sewing machine embodying the invention;

Fig. 2 is a bottom plan view of the machine with certain cover plates and the like broken away to show concealed parts;

Fig. 3 is a view partly in end elevation as seen from the left in Fig. 1 and partly in vertical section, portions of the cover plate for the needle bar carrying head, the vertical standard and other parts being broken away;

Fig. 4 is a vertical sectional view through the feed wheel unit and the work supporting portion of the frame of the machine;

Fig. 5 is an exploded perspective view showing the parts of the feed wheel unit in disassembled position but ready for assembly;

Fig. 6 is a detail view, in elevation, showing a portion of the main drive shaft in the base of the frame and the feed wheel unit driven by the shaft, a portion of the work supporting surface being shown in section;

Fig. 7 is a vertical sectional view through a rotary hook unit of the machine and shows the feed wheel in cooperative relation thereto;

Fig. 8 is a bottom plan view of the throat plate of the machine;

Fig. 9 is an end view of the throat plate, as seen from the left in Fig. 8;

Fig. 10 is a detail view, partly in elevation and partly in vertical section, illustrating the devices for imparting a needle feed movement to the needle bar and for adjusting the feed stroke thereof;

Fig. 11 is a detail view, taken from the left in Fig. 1, showing the lower portions of the presser bar and the

needle bar and means for mounting a presser roller on the presser bar;

Figs. 12 and 13 are detail views showing the lower portion of the presser bar and the means for mounting the presser roller thereon, as seen from the left and right, respectively, of Fig. 11;

Fig. 14 is a view, partly in elevation and partly in vertical section, showing a modified form of feed roller unit;

Fig. 15 is a bottom view of the modified unit; and

Fig. 16 is a perspective view of a detachable cover provided on the modified unit.

Referring now particularly to Fig. 1, the illustrative machine has a main frame which is of conventional form and provided with a work supporting base 10, a vertical standard 11, and an overhanging arm 12 terminating in a head 13. A main drive shaft 14 is mounted in suitable bearings carried by partition walls within the overhanging arm. This shaft extends into the head 13 and at its opposite end extends outwardly of the frame of the machine and carries a combined handwheel and pulley 15 through which power may be supplied to the machine. Within the head 13 the shaft 14 carries a crank element 16 having a crank pin connected by a link 17 with a pin or stud 18 extending laterally from an arm 19 clamped upon a needle bar 20. The latter carries at its lower end a needle 21 arranged to be reciprocated from a point above the work support 10, through the latter, to a point below the work supporting surface. Needle bar 20 is mounted for reciprocation in a frame 22 having spaced bearing portions cooperating with the needle bar and having a boss or hub 23 at its upper end mounted upon a pin 24 carried by the main frame of the machine at the top of the head 13. Frame 22 is thus mounted for swinging movements about the axis of the pin 24. Such swinging movements are imparted to frame 22 by connections comprising a boss 25 projecting laterally from the swinging frame and carrying a pin 25*a* for pivotal connection of the frame with a link 26. The opposite end of this link is pivotally connected with an arm 27 clamped upon or otherwise secured to a sleeve or hollow shaft 28 which is journaled in suitable bearings 29 and 30 carried by the partition walls of the overhanging arm. The sleeve or hollow shaft, in turn, carries bushings within its interior which provide suitable bearings for the shaft 14. At its right end (Fig. 1) which extends into the top of the vertical standard, the sleeve 28 has secured thereto a split clamping portion of a bracket arm 31 (see also Fig. 10). This bracket arm has a bearing member 31*a* pivotally connected thereto at its lower end provided with a vertical opening which slidably receives a rod or pin 32. The upper end of the latter is slidably received by a strap 33 which cooperates with an eccentric 34 secured to the shaft 14. Intermediate the bearing member 31*a* and the strap 33, there is secured to the rod 32 a block 35 having a pivotal connection at 36 with a block 37 secured to a rod 38 mounted for vertical adjustment in bosses extending inwardly from a wall of the vertical standard 11. The upper end of rod 38 is provided with a screw threaded bore which cooperates with a threaded portion 39*a* of a screw stud having a knurled head 39 by which the stud may be turned. This stud is held against axial movement by the cooperation of the reduced end of a screw 40 with an annular groove 41 around the periphery of the stud. The arrangement is such that by turning the knurled head 39 in the proper direction the screw threaded portion 39*a* of the stud will serve to lift or lower the rod 38 and its connected block 37. A screw 39*b* having a knurled head and a tapered lower end may be turned to lock and unlock the stud. Lifting and lowering movements are imparted to the rod 32 corresponding with those imparted to the rod 38. This serves to vary the location of the pivot 36 about which the pin 32 is rocked by the action of the eccentric 34. As a result the extent of rocking movement of the arm 31 and sleeve 28 will be varied. This rocking movement will be increased as the blocks 35 and 37 are raised and decreased as these blocks are lowered. Corresponding increase and decrease in the extent of swinging movement imparted to the frame 22 will result so that the needle feed action imparted to the needle may be varied accordingly. The mechanism for reciprocating the needle bar and imparting needle feed movements thereto is similar to that disclosed in the patent to Quist No. 2,329,484, granted September 14, 1953. Reference may be had to that patent for further details as to the construction.

To the shaft 14 and within the vertical standard there is secured a pinion 42 which meshes with an idler gear 43 mounted for rotation upon a stationary stub-shaft 44 carried by the standard. Gear 43 meshes with a pinion 45 freely mounted on a drive shaft 46 which extends longitudinally of the base of the frame. A plurality of spring rods 47 serve to connect the pinion 45 with a disc 48 secured to the shaft 46. These spring rods transmit the rotational movements of pinion 45 yieldingly to the disc 48 and to the shaft 46. As explained in the pending application of Attwood, et al. Serial No. 326,498, filed December 17, 1952, now Patent No. 2,765,759, this arrangement serves to suppress the torsional vibrations which would otherwise be transmitted to the shaft 46 as a result of the periodic reversals of force imparted to the shaft 14 due to the reciprocation of the needle bar. Shaft 46 is journaled in a plurality of bearings carried by the base portion of the machine frame including a bearing sleeve 49 carried by a downwardly extending partition wall 50 of the frame. A vertical axis hook unit 51 (Figs. 1, 2, and 7) is in part carried by the sleeve 49. For this purpose the frame of the hook unit has a split collar portion 52 adapted to be clamped about the sleeve 49, the arrangement being such that the position of the unit axially of the sleeve may be varied to present the rotary hook in proper relation to the needle 21. A flange 53 extending laterally from the frame of the hook unit has an elongated slot 54 arranged to receive a screw 55 threaded into an opening in the frame. This permits the axial adjustment of the hook unit, referred to above, and serves to retain it in adjusted position on the machine frame.

The rotary hook is driven from a spiral gear 56 secured to the shaft 46 which meshes with a spiral gear 57 secured to a vertically disposed shaft 58 mounted in the hook unit. Gears 56 and 57 are such that two revolutions will be imparted to the shaft 58 for one revolution of the shaft 46. At the upper end of the shaft 58 there is mounted a rotary component 59 of the hook unit, this component having a thread seizing beak 60. Within the rotary component there is mounted a stationary bobbin case 61 having the usual rib formation cooperating with a raceway in the rotary component. The bobbin case is held against turning with the rotary component by means of a projection adjacent the top of the bobbin case cooperating with an opening or notch in a downward projection 62 formed on a throat plate 63 through an opening in which the needle 21 passes. An eccentric 64 on the shaft 58, adjacent its lower end, cooperates with a strap portion of a pitman 65 which is pivotally connected with an arm 66 extending laterally from a vertically disposed rock shaft 67. The latter, at its upper end, carries a laterally extending arm 68 on which is mounted a hook opening finger of well known form arranged to cooperate with a projection on the bobbin case to shift this slightly at the appropriate time counter to the direction in which it is normally urged by the friction between the bobbin case and the rotary component 59. For further details as to the construction of the hook unit, reference may be had to the patent to Norman V. Christensen No. 2,609,770, granted September 9, 1952. The hook unit or saddle is provided with a lubricant reservoir 69 which, through the means disclosed in said Christensen patent, serves to lubricate the raceway and other parts of the rotary hook.

Referring now particularly to Figs. 1 to 6 inclusive,

there is disclosed a work feeding unit involving a continuous-rotated feed wheel. This unit has a frame or saddle **70** provided with a lateral extension **71** which is split and arranged to be clamped upon a bearing sleeve **72** carried by the base portion of the frame of the machine. This bearing sleeve receives the left end (Fig. 2) of the rotary drive shaft **46** in the base. A screw **73** when tightened serves to clamp the frame **70** firmly in relation to the sleeve **72**. As best shown in Fig. 6 the arrangement is such that the frame **70** may be adjusted to a limited extent axially of the sleeve for the purpose of varying the position of the feed wheel, to be described, in a transverse direction in relation to the line of feed. The frame **70** may also be adjusted angularly to a limited extent about the sleeve **72** to provide a further adjustment of the feed wheel in two other dimensions. To facilitate such adjustment the frame **70** is provided with an extension **74** having an opening **75** through which extends a screw threaded stud **76**. The upper end of this stud is received by an internally threaded opening **77** in the under face of a portion of the base of the machine. By turning a knurled head **78** at the lower end of the stud, the extension **74** may be lifted or lowered to effect the desired angular adjustment of the frame **70** about the bearing sleeve **72**. It will be understood that when this adjustment is being made the screw **73** will be loosened. A spring **79** surrounding the stud **76** serves to urge the extension **74** downwardly against a shoulder provided at the top of the knurled head **78**. When the proper adjustment has been effected the clamping screw **73** will be tightened to retain the frame **70** in its adjusted position.

As best shown in Figs. 4 and 5, the frame **70** carries a vertically disposed shaft **80** which is journaled in bushings **81** and **82** carried by spaced portions of the frame. Between these bushings there is secured to the shaft **80** a worm wheel **83** which is arranged to mesh with and be driven by a worm **84** secured to the shaft **46**. The worm **84** is positioned adjacent the inner end of the bearing sleeve **72** and is secured to the shaft **46** by means of a set screw **85**. In a typical machine embodying the invention the relation between the worm wheel **83** and worm **84** may be such that 37 revolutions of the shaft **46** are required to impart a single revolution to the shaft **80**.

The frame **70** carries a second vertically disposed shaft **86** which is journaled in a bushing **87** having a cut away portion **88** at one side to provide clearance for the worm wheel **83**. Bushing **87** has a tight fit within a vertically disposed sleeve portion **89** of a bracket member having a sliding fit within an opening through a collar or sleeve **90** carried by a lateral extension **91** of the frame **70**. Sleeve **89** is secured against axial movement within the opening in collar **90** by means of a set screw **92**. However, when it is desired to effect vertical adjustment of the bracket, including the sleeve **89**, the set screw **92** may be loosened and suitable limited vertical adjustment may be effected by means of a screw **93** (Fig. 5). This has an eccentrically disposed inwardly extending end or stem **94**. Screw **93** has screw threaded engagement with an opening **95** in a lateral extension of the collar **90**. Stem **94** of the screw **93** cooperates with an annular groove **96** extending around the sleeve **89**. It will be seen that upon turning the screw **93** the eccentric stem **94** will lift or lower the sleeve **89** to a limited extent, as desired. When the sleeve **89** has been appropriately adjusted it may be locked in set position by tightening of the set screw **92**. A set screw **97** may also be provided to lock the screw **93** against turning after it is once set.

At its upper end, the shaft **86** carries a bevel pinion **98** which meshes with a bevel gear **99** secured to a horizontally disposed shaft **100**. Any suitable means, such as a tight press fit, may be provided to secure the bevel gear **99** to the shaft **100**. The latter is journaled in a bearing sleeve **101** carried by a horizontally disposed sleeve-like portion **102** of the bracket member having the downwardly extending sleeve **89**. A set screw **103** serves to

retain the bearing sleeve **101** within the portion **102** of the bracket. To retain the shaft **100** against axial movement toward the right a collar **104** is secured thereto adjacent its left end (Fig. 4) by a set screw **104*a***. Axial movement of the shaft toward the left is prevented by the gear **99**. This gear has a threaded hub arranged to receive an internally threaded hub of a feed wheel **105**. The cooperating threads between the gear and feed wheel are of lefthand so as to tend to tighten the feed wheel on the gear rather than loosen it as the feed wheel imparts a feeding movement to the work. Openings **106** (Fig. 5) may be provided through the feed wheel to receive a tool for tightening the same on the hub of the gear **99**.

Shafts **80** and **86** are intergeared as follows: A screw threaded collar **107** is secured to the shaft **80** by means of a set screw **107*a***. A gear **108** is mounted on a shoulder of the collar **107** for rotation therewith. This gear is held firmly on the collar by means of a nut **109** having screw threaded engagement with a downward extension of collar **107** and having a knurled head to facilitate turning. If desired a key may be provided between the collar **107** and gear **108** to prevent slippage between these parts. A similar arrangement is provided for shaft **86**. This carries at its lower end a collar **110** which is secured by a set screw **111**. On a shoulder of collar **110** is mounted a gear **112** which is held firmly on the collar by means of a nut **113** having a knurled head. A key may also be provided between collar **110** and gear **112** to prevent relative turning of these parts.

In a typical machine the gears **108** and **112** may have a like number of teeth while the pinion **98** may have half the number of teeth provided on the gear **99**. With this arrangement, and assuming a 37 to 1 relationship between the worm wheel **83** and worm **84**, the shaft **100** will be given one revolution for each 74 revolutions of the shaft **46**. Should it be desired to vary this relationship in order to provide a different stitch length, the gears **108** and **112** may be replaced by gears having different relative diameters. These gears may be removed readily by removing the nuts **109** and **113**. Gears having any desired relative number of teeth to bring about the desired relationship between the number of revolutions of shaft **46** required to produce a single revolution of the shaft **100** may be substituted for the gears shown. If the number of teeth on gear **108** are reduced and the number in gear **112** are increased a greater number of revolutions of shaft **46** will be required to produce a single revolution of the shaft **100** and the stitch length will be correspondingly reduced. It is simply necessary in substituting new gears that their combined radii be such as to permit them to mesh properly.

An important advantage of the feed wheel unit described above, in addition to those already mentioned, is that it permits the employment of a feed wheel of relatively small diameter as compared with prior feed wheel arrangements provided in vertical hook, lockstitch machines. The small wheel facilitates sewing around small diameter curves and is desirable from other standpoints.

In Figs. 8 and 9 there is illustrated the form of the throat plate **63** which is preferably employed in the new machine. This is provided with an elongated rectangular opening **114** through which the feed wheel **105** may project upwardly to or slightly above the work supporting surface of the throat plate. The under surface of the throat plate is preferably cut away in the region of opening **114** and sloped upwardly toward the opening in the manner illustrated. Adjacent one of the longitudinal edges of the opening **114** there is provided a needle aperture **115** which is sufficiently elongated lengthwise of the throat plate to permit the needle **21** to partake of the needle feed movements described. Around one side of the opening **115** the throat plate is provided with a downward projection **116** which is bent transversely across the line of stitch formation and extends into the cavity formed by the flange of the feed wheel **105**. This pro-

jection serves as a guide for the needle and maintains the latter in the proper position transversely of the line of feed, when it is beneath the work supporting surface and is cooperating with the rotary hook. Projection **116** also insures the proper formation of the needle thread loop for seizure by the hook.

By virtue of the three adjustments incorporated in the feed wheel unit, as described above, it is possible to insure correct positioning of the feed wheel in relation to the opening **114** in the throat plate without the necessity of observing fine tolerances in the construction of the various parts. Thus, as previously indicated, the mounting of the frame **70** of the feed wheel unit on the base of the main frame of the machine is such as to permit slight adjustment in the direction of the axis of the shaft **100**. This permits location of the feed wheel properly between the longitudinal edges of the opening **114** in the throat plate. The adjustability of the frame **70** angularly about the axis of the shaft **46**, under the regulation of the stud screw **76**, permits slight elevation or lowering of the feed wheel in relation to the top surface of the throat plate. Also because of the location of the feed wheel in relation to the shaft **46** about which the frame **70** is angularly adjusted, the location of the feed wheel from front to rear of the work supporting surface, i.e. in the direction of the longitudinal axis of the opening **114** in the throat plate, may be varied to a certain extent. This feature of the adjustment enables proper location of the feed wheel in relation to the front and rear edges of the opening **114** and also, if desired, may be utilized to shift the axis of the feed wheel slightly forwardly of the vertical plane transverse to the line of feed which contains the axis of the needle at the midpoint in its needle feed movement, or slightly rearwardly of such plane, to provide the preferred condition for certain types of work. In the event that the pivotal movement of the frame **70** about the shaft **46** to bring about the proper location of the feed wheel along the longitudinal axis of the opening **114** in the throat plate should not bring about proper location of the top of the feed wheel in relation to the top of the throat plate, adjustment of the elevation of the feed wheel may be accomplished through the adjustment, hereinbefore described, of the bracket **89, 102**. Thus it will be seen that by appropriate utilization of the three adjustments incorporated in the feed wheel unit the correct positioning of the feed wheel may be effected in three dimensions.

Cooperating with the feed wheel in advancing the work is a presser wheel **117** (Figs. 1 and 11) preferably having a beveled, grooved or serrated face and being mounted on an axis inclined to the horizontal. This presser wheel may be mounted in any suitable way on a presser bar. Preferably it is mounted on an arm **118** attached to a block **119** by a screw **120**. A portion of the arm **118** fits into channel **119***a* provided in the block **119**. This block is swivelly or turnably mounted on the lower end of a presser bar **121** (Figs. 3, 11, 12, and 13). The block **119** is held against axial movement along the presser bar by a suitable connection with a block **122** rigidly secured to the presser bar by means of a set screw **122***a*. A rib **119***e* formed on the block **119** extending through an arc of about 90° around a cylindrical surface on the block cooperates with a complementary groove provided in a downwardly extending portion **122***b* of the block **122** (Fig. 13). The block **122** is provided with spaced arms having aligned openings which receive a pin **123** for vertical sliding movement. This pin is normally urged downwardly by a spring **124** surrounding the presser bar. At its lower end this spring engages a thin spring metal plate **124***a* having an opening surrounding the presser bar and having its outer end fitted into a transverse groove in the pin **123**. The lower end of the pin is arranged to cooperate with a cam projection **119***b* extending upwardly from a portion of the block **119**. The arrangement is such that when the block **119** is turned into the position shown in Fig. 12, it will be held firmly in that position by the coaction of the pin **123** with projection **119***b* and at this time the presser roller **117** will be in the active position shown in Fig. 1. The presser wheel may, however, be swung outwardly toward the left (Fig. 1) through an angle of about 90° to facilitate threading of the needle. Such threading must take place from the left side of the needle (Fig. 1). To swing the presser wheel outwardly in this manner about the axis of the presser bar the block **119** may simply be grasped after the presser bar has been lifted, in the manner to be explained, to disengage the presser wheel from the feed wheel and the block may then be turned about the axis of the presser bar. Sufficient force must be applied to cause the projection **119***b* to cam the pin **123** upwardly against the action of spring **124**. When it is desired to restore the presser wheel to its active position, the block **119** may be turned in the opposite direction about the axis of the presser bar which again cams the pin **123** upwardly and then permits it to assume the position shown in Fig. 12 in relation to projection **119***b*. A screw **119***c* extending through the block **119** and preferably having a slot across each of its ends, to receive a screw driver or the like, may be adjusted to insure the proper positioning of the presser roller when in its active condition. One end of screw **119***c* cooperates with an upward projection **119***d* of block **119** at this time, as shown in Figs. 12 and 13.

The presser bar **121** is urged downwardly by a spring **125** (Fig. 3) which surrounds the bar and has its upper end in engagement with the lower end of a threaded sleeve having a knurled head **126** by which the elevation of the sleeve may be readily adjusted to vary the force of the spring. At its lower end the spring engages an arm **127** secured to the presser bar and through the latter urges the presser bar downwardly until the presser wheel engages the lower feed wheel. The arm **127** also prevents turning of the presser bar by cooperation with a vertical slot or guide channel in the wall of the head **13**. Beneath the arm **127**, and normally spaced slightly therefrom when the presser wheel is in its active position, is a member having a sleeve **128** freely slidable upon the presser bar **121**. This member also has a laterally extending arm **128***a* arranged to cooperate with a vertical slot or guide channel in the wall of the head **13** to prevent turning of the member. A manually operable lever **129** pivotally mounted at **130** on the head **13** has a camming portion arranged to engage the arm **128***a* and lift the same into engagement with arm **127** and through the latter to lift the presser bar against the action of spring **125**. This serves to lift the presser wheel from the work and it may be held in elevated position as long as desired by leaving the lever **129** in its raised position.

Provision is also made for lifting the presser bar under control of a treadle or knee-press. For this purpose a link **131** is pivotally connected with the sleeve **128** by means of a screw stud **132**. At its upper end the link **131** is pivotally connected by means of a screw stud **133** with an arm **134** which extends toward the rear of the head **13** and adjacent the rear wall of the latter has a laterally extending portion and then a forwardly extending portion **134***a* which is secured to the end of a rock shaft **135** suitably journaled in the overhanging arm of the machine frame. The double bending of the arm **134** serves to eliminate interference with the presser bar and its spring. At its opposite end the shaft **135** carries an arm which projects outwardly through the rear wall of the frame of the machine adjacent the vertical standard and is arranged for connection by a rod or the like with devices adapted to be rocked by means of a treadle or knee-press in a manner generally similar to that disclosed in the Christensen Patent No. 2,609,770, granted September 9, 1952. It will be understood that through these connections the presser bar and its con-

nected presser wheel may be lifted to permit the introduction and removal of the work.

In Figs. 14, 15 and 16, there is disclosed a modified form of the main frame of the feed wheel unit or saddle. This frame **136** differs from the frame **70** of the feed wheel unit already described in that it has a laterally and angularly extending portion **137** which is broader than the corresponding portion of the frame **70**. It is of such contour as to overlie completely and extend a slight distance beyond the outer faces of the gears **108** and **112** and the knurled heads of the nuts **109** and **113**. This permits the application of a cover member **138** which completely encloses the gears and knurled heads mentioned. Cover member **138** is cupped, as best shown in Fig. 16, and arranged for attachment to the bottom of the frame **136** by means of screws **139**. The latter pass through suitable openings in bosses **140** provided on the cover and are threaded into openings in the bottom of the frame **136**. A gasket **141** is preferably provided between the top edge of the cover **138** and the bottom face of the frame **136**. This arrangement serves to provide a lubricant tight housing for the gears **108** and **112** so that, if desired, any suitable form of lubricant may be provided for these gears. Also the cover serves to protect the operator of the machine against possible injury by the revolving gears.

It will be understood that the machine constructed in accordance with the present invention is provided with the usual accessories such as thread tensioning, guiding and takeup means, lubrication means, and the like. Various removable covers are provided for portions of the machine frame to provide ready access to the interior of the frame. These features are in part illustrated in the drawings but it is believed unnecessary to describe them.

While an illustrative embodiment of the invention has been disclosed in considerable detail, it should be understood that various changes in the construction and arrangement of the several parts may be made within the scope of the appended claims.

What is claimed is:

1. A lockstitch sewing machine having a frame provided with a vertically extending portion and a horizontal work supporting base and an overhanging arm extending toward the left from said portion interconnected rotary drive shafts extending longitudinally of said base and arm, said shafts being driven at the same angular speed, a needle bar carried by said arm, a needle carried by said bar, connections from the drive shaft in said arm for reciprocating said needle bar longitudinally and for imparting movements thereto to carry the needle in the direction of feed of the work, a rotary hook in said base mounted for rotation about an axis perpendicular to the work supporting surface of said base, said drive shaft in the base extending toward the left to a point beyond said rotary hook, connections from said drive shaft in the base for rotating said hook about said axis, a feed wheel unit forming an independent assembly mounted in said base adjacent said hook, said unit having a frame and a feed wheel carried by said frame for rotation about an axis at right angles to the axis of said hook and out of the vertical plane of the axis of said drive shaft in the base, and connections from said drive shaft in the base extending from a point on said shaft adjacent said feed wheel and to the left of said rotary hook, for continuously rotating the said wheel, said last mentioned connections comprising a worm on said drive shaft in the base, a cooperating worm wheel mounted on the frame of said unit, and gearing and shafts carried by said frame of the unit for connecting said worm wheel with said feed wheel.

2. A lockstitch sewing machine having a frame provided with a work supporting base and an overhanging arm, interconnected rotary drive shafts extending longitudinally of said base and arm, said shafts being driven at the same angular speed, a needle bar carried by said arm, a needle carried by said bar, connections from the drive shaft in said arm for reciprocating said needle bar longitudinally and for imparting movements thereto to carry the needle in a vertical plane in the direction of feed of the work, said drive shaft in the base extending through said vertical plane, a rotary hook in said base mounted at one side of said vertical plane for rotation about an axis perpendicular to the work supporting surface of said base, connections from said drive shaft in the base for rotating said hook about said axis, a feed wheel unit forming an independent assembly mounted in said base adjacent said hook and at the opposite side of said plane, said unit carrying a feed wheel arranged for rotation about an axis at right angles to the axis of said hook, and connections from said drive shaft in the base from a point on said drive shaft at said opposite side of said plane to said feed wheel for continuously rotating the latter, said last mentioned connections comprising a plurality of shafts journaled in said unit and gearing interconnecting said shafts of said unit and connecting one of said shafts with said drive shaft in the base and another of said shafts of said unit with said feed wheel, said shafts of said unit being disposed in parallel relation and extending in a direction transverse to the axis of said drive shaft in the base, said gearing interconnecting said shafts involving change gears and being disposed adjacent one of the ends of said shafts in readily accessible position.

3. A lockstitch sewing machine having a frame provided with a work supporting base and an overhanging arm, interconnected rotary drive shafts extending longitudinally of said base and arm, said shafts being driven at the same angular speed, a needle bar carried by said arm, a needle carried by said bar, connections from the drive shaft in said arm for reciprocating said needle bar longitudinally and for imparting movements thereto to carry the needle in a vertical plane in the direction of feed of the work, said drive shaft in the base extending through said vertical plane, a plurality of saddle units each forming an independent assembly mounted in said base, one of said units being disposed at one side of said vertical plane and another at the opposite side thereof, said units being mounted for relative adjustment longitudinally of said base, one of said units carrying a rotary hook for rotation about an axis perpendicular to the work supporting surface of said base, a gear on said drive shaft in the base at one side of said vertical plane for rotating said hook about said axis, a feed wheel mounted in the other of said saddle units adjacent said hook for rotation about an axis at right angles to the axis of said hook, and connections including a worm on said drive shaft in the base at a point adjacent said feed wheel and at the opposite side of said vertical plane meshing with a worm wheel carried by said other saddle unit for continuously rotating the feed wheel.

4. A lockstitch sewing machine having a frame provided with a work supporting base and an overhanging arm, interconnected rotary drive shafts extending longitudinally of said base and arm, said shafts being driven at the same angular speed, a plurality of spaced bearing sleeves in which said drive shaft in the base is journaled, a needle bar carried by said arm, a needle carried by said bar, connections from the drive shaft in said arm for reciprocating said needle bar longitudinally and for imparting movements thereto to carry the needle in a vertical plane in the direction of feed of the work, said drive shaft in the base extending through said vertical plane, a plurality of saddle units in said base each forming an independent assembly mounted on a related one of said bearing sleeves and adjustable longitudinally thereof, said units being disposed on opposite sides of said vertical plane, a rotary hook in one of said units mounted for rotation about an axis perpendicular to the work supporting surface of said base, a gear on said drive shaft in the base adjacent one of said bearing sleeves

for rotating said hook about said axis, a feed wheel mounted in the other of said saddle units adjacent said hook for rotation about an axis at right angles to the axis of said hook and parallel with the axis of said drive shaft in the base but removed from the vertical plane containing said axis, means for adjusting the angular position of said other of said saddle units in relation to the bearing sleeve on which it is mounted, and connections including a worm on said drive shaft in the base adjacent the bearing sleeve on which said other unit is mounted meshing with a worm wheel carried by said other saddle unit for continuously rotating the feed wheel.

5. In a sewing machine having a work supporting base provided with a throat plate having a feed wheel opening therein, a main rotary drive shaft journaled in said base and arranged to be given a single revolution during each stitch forming cycle, a feed wheel unit forming an independent assembly mounted on said base, said unit having a main frame arranged for pivotal adjustment about the axis of said drive shaft, a feed wheel carried by said unit arranged for rotation about an axis parallel with said drive shaft and above the same, means for supporting said feed wheel and for vertically adjusting said feed wheel relative to said main frame, and connections from said drive shaft to said feed wheel for rotating the latter, said connections comprising gearing carried by said main frame and a driving element for said gearing mounted on said drive shaft adjacent said unit.

6. In a sewing machine having a work supporting base provided with a throat plate having a feed wheel opening therein, a main rotary drive shaft journaled in said base and arranged to be given a single revolution during each stitch forming cycle, a feed wheel unit forming an independent assembly mounted on said base, said unit having a main frame arranged for pivotal adjustment about the axis of said drive shaft, a feed wheel carried by said unit arranged for rotation about an axis parallel with said drive shaft and above the same, means for supporting said feed wheel and for vertically adjusting said feed wheel relative to said main frame, and connections from said drive shaft to said feed wheel for rotating the latter, said connections comprising a worm on said drive shaft, a worm wheel carried by said unit meshing with said worm and connections from said worm wheel to said feed wheel.

7. In a sewing machine having a work supporting base provided with a throat plate having a feed wheel opening therein, a main rotary drive shaft journaled in said base and arranged to be given a single revolution during each stitch forming cycle, a feed wheel unit mounted on said base, said unit having a main frame arranged for pivotal movement about the axis of said drive shaft, a feed wheel carried by said unit arranged for rotation about an axis parallel with said drive shaft and above the same, means for supporting said feed wheel and mounted for vertical adjustment on said main frame, and connections from said drive shaft to said feed wheel for rotating the latter, said connections comprising a pair of vertically disposed shafts journaled in said unit, a pair of readily accessible and interchangeable gears adjacent the lower ends of said pair of shafts connecting said pair of shafts for rotation in unison and gearing connecting one of said pair of shafts with said drive shaft and the other of said pair of shafts with said feed wheel.

8. In a sewing machine having a work supporting base provided with a throat plate having a feed wheel opening therein, a main rotary drive shaft journaled in said base and arranged to be given a single revolution during each stitch forming cycle, a feed wheel unit mounted on said base, said unit having a main frame arranged for pivotal movement about the axis of said drive shaft, a feed wheel carried by said unit arranged for rotation about an axis parallel with said drive shaft and above the same, means for supporting said feed wheel and mounted for vertical adjustment on said main frame, and connections from said drive shaft to said feed wheel for rotating the latter, said connections comprising a pair of vertically disposed shafts journaled in said unit, one of said pair of shafts being journaled in said main frame and the other in said means for supporting said feed wheel, a pair of readily accessible and interchangeable gears adjacent the lower ends of said pair of shafts connecting said pair of shafts for rotation in unison and gearing connecting said one of said pair of shafts with said drive shaft and the other of said pair of shafts with said feed wheel.

9. In a sewing machine having a work supporting base provided with a throat plate having a feed wheel opening therein, a main rotary drive shaft journaled in said base and arranged to be given a single revolution during each stitch forming cycle, a feed wheel unit forming an independent assembly mounted on said base, said unit having a main frame arranged for pivotal movement about the axis of said drive shaft, a feed wheel shaft carried by said unit, a feed wheel carried by said feed wheel shaft and arranged for rotation about an axis parallel with said drive shaft and above the same, means for supporting said feed wheel shaft and for vertically adjusting said feed wheel relative to said main frame, and connections from said drive shaft to said feed wheel for rotating the latter, said connections comprising a pair of parallel shafts journaled in said unit, readily accessible and interchangeable gears adjacent one end of said parallel shafts connecting said pair of shafts for rotation in unison, gearing connecting one of said pair of shafts with said drive shaft and gearing connecting the other of said pair of shafts with said feed wheel shaft.

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CERTIFICATE OF CORRECTION

Patent No. 2,885,982 May 12, 1959

Arthur N. Hale

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 4, lines 9 and 10, for "patent to Quist No. 2,329,484, granted September 14, 1953." read -- patent to Quist No. 2,329,484, granted September 14, 1943.--; column 9, line 44, after "portion" insert a comma.

Signed and sealed this 10th day of November 1959.

(SEAL)

Attest:

KARL H. AXLINE
Attesting Officer

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