March 28, 1961 H. HACKLANDER 2,976,831

SEWING MACHINES

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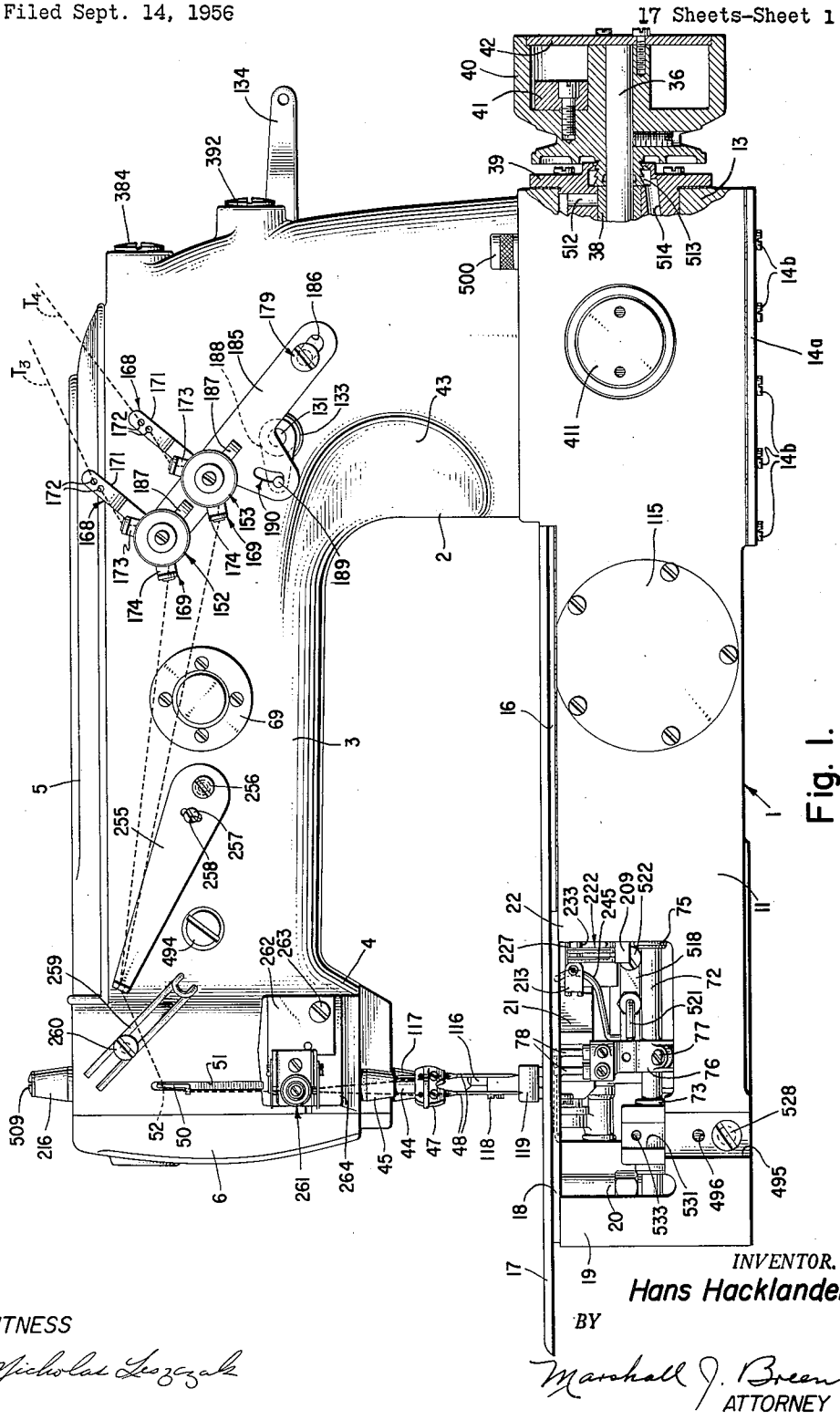


Fig. 1.

INVENTOR.
Hans Hacklander

WITNESS
Nicholas Leszczak

BY
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ATTORNEY

March 28, 1961 H. HACKLANDER 2,976,831

SEWING MACHINES

Filed Sept. 14, 1956 17 Sheets-Sheet 2

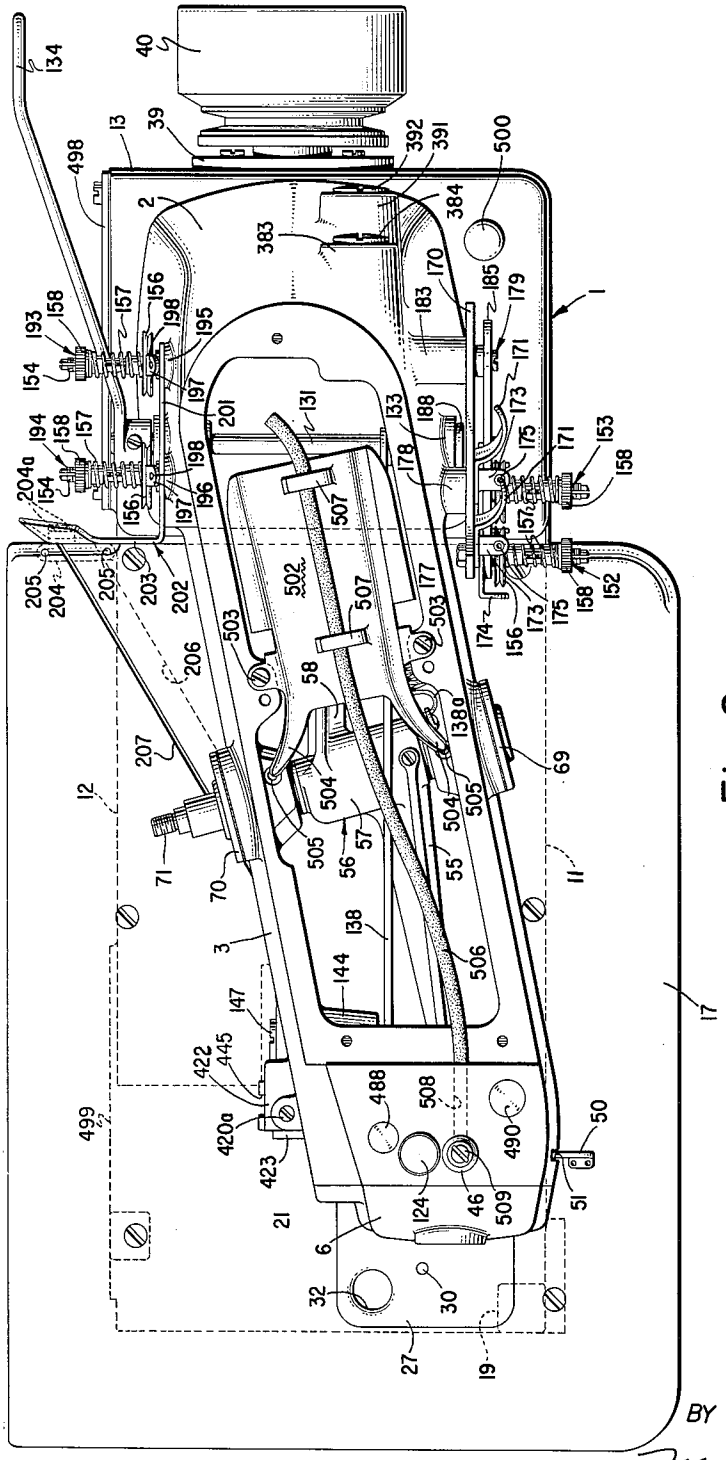


Fig. 2.

INVENTOR.
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SEWING MACHINES

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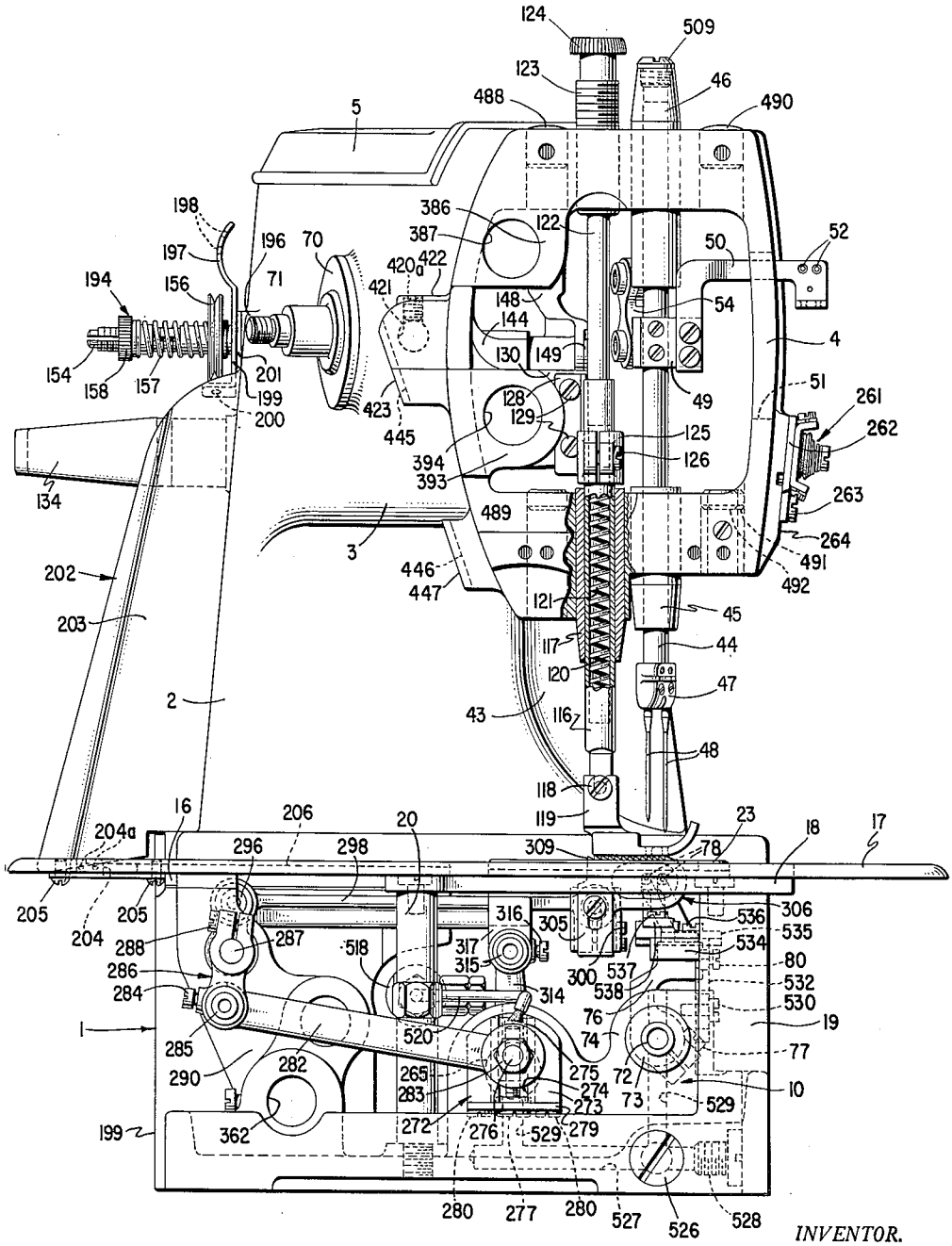


Fig. 3.

INVENTOR.
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March 28, 1961 H. HACKLANDER 2,976,831

SEWING MACHINES

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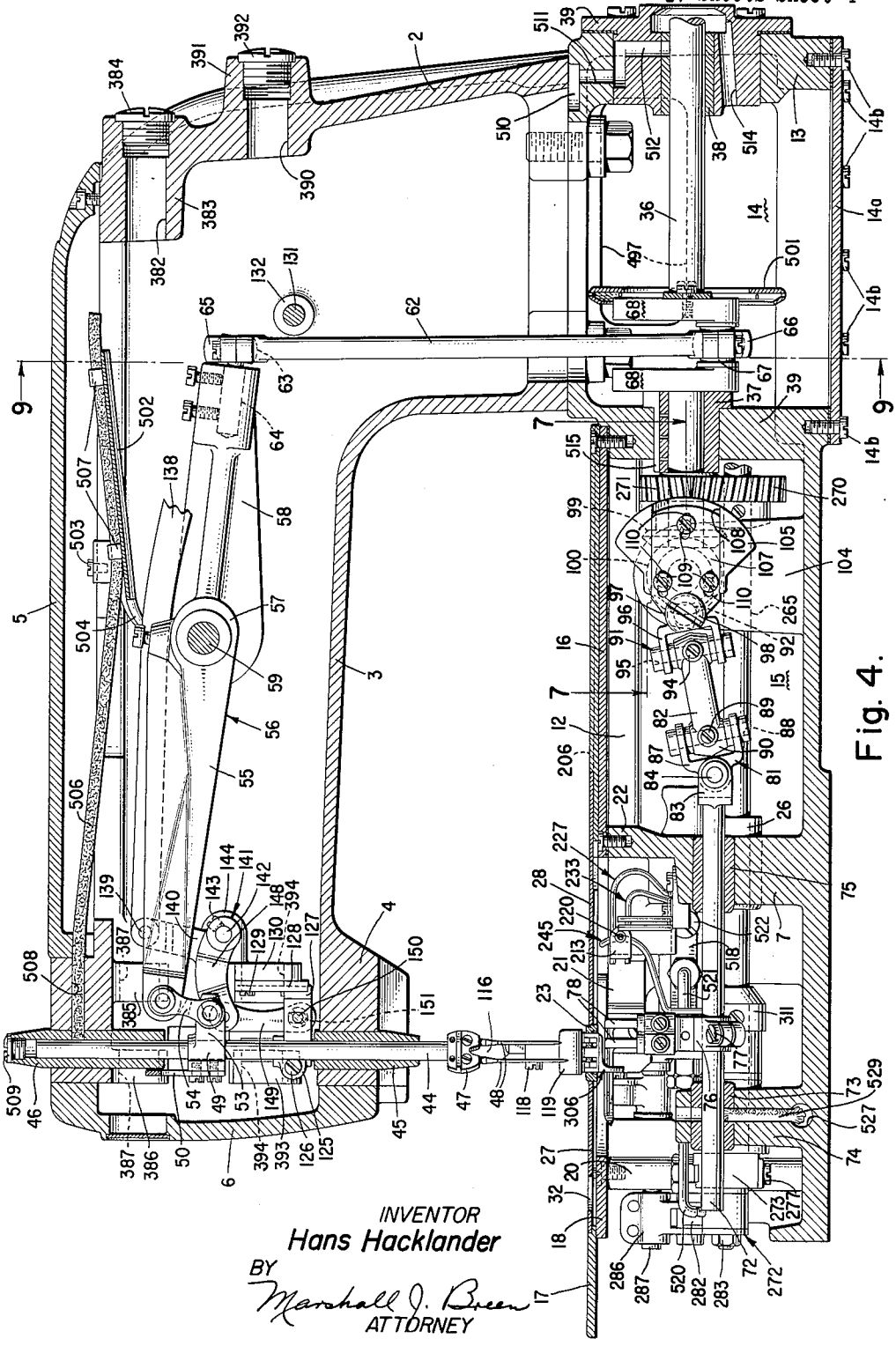


Fig. 4.

INVENTOR
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March 28, 1961 H. HACKLANDER 2,976,831

SEWING MACHINES

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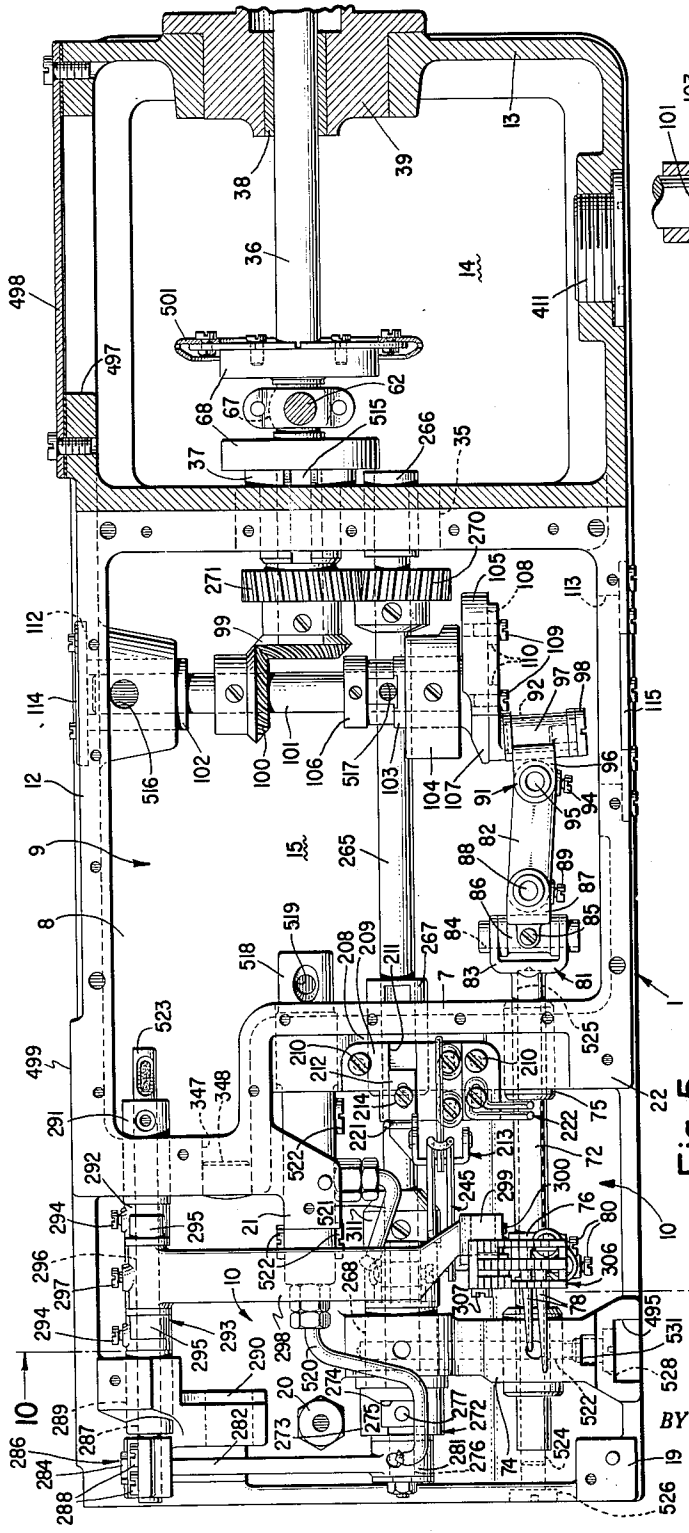


Fig. 5

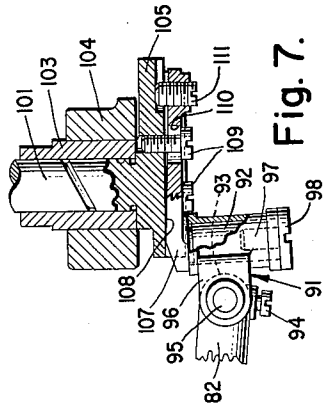


Fig. 7.

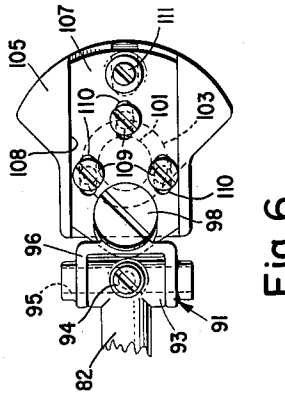


Fig. 6.

INVENTOR.
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SEWING MACHINES

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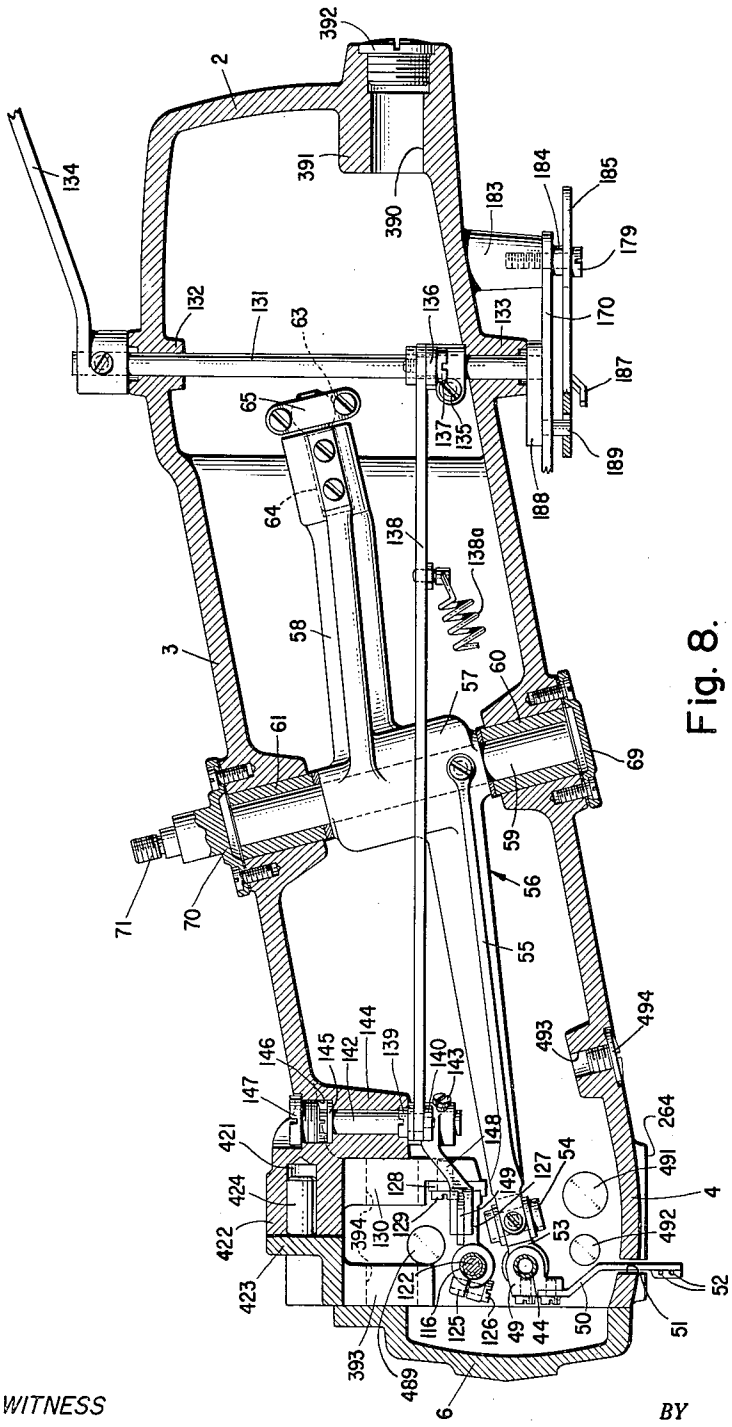


Fig. 8.

INVENTOR.
Hans Hacklander

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March 28, 1961 H. HACKLANDER 2,976,831

SEWING MACHINES

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17 Sheets-Sheet 7

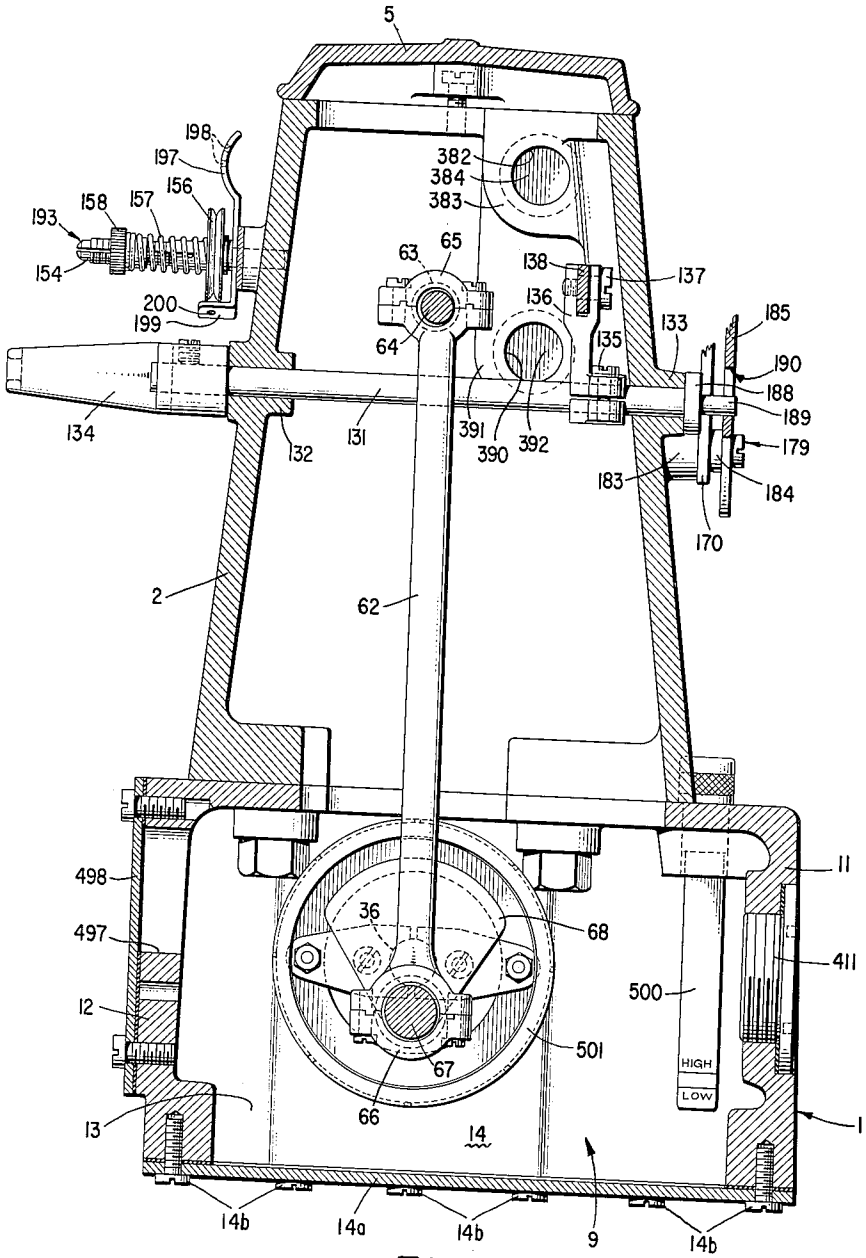


Fig. 9.

WITNESS

Nicholas Leszczak

INVENTOR.

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March 28, 1961 H. HACKLANDER 2,976,831

SEWING MACHINES

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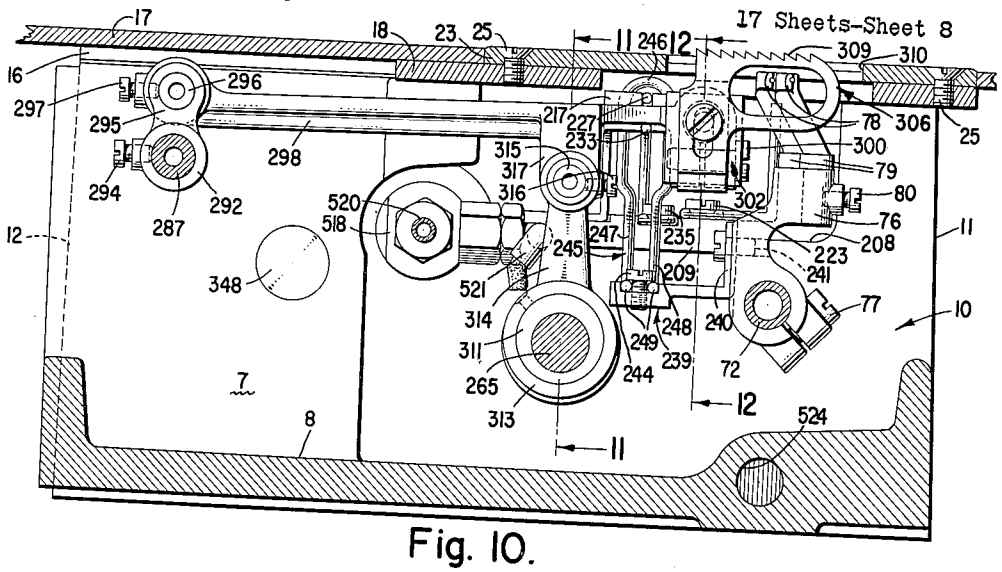


Fig. 10.

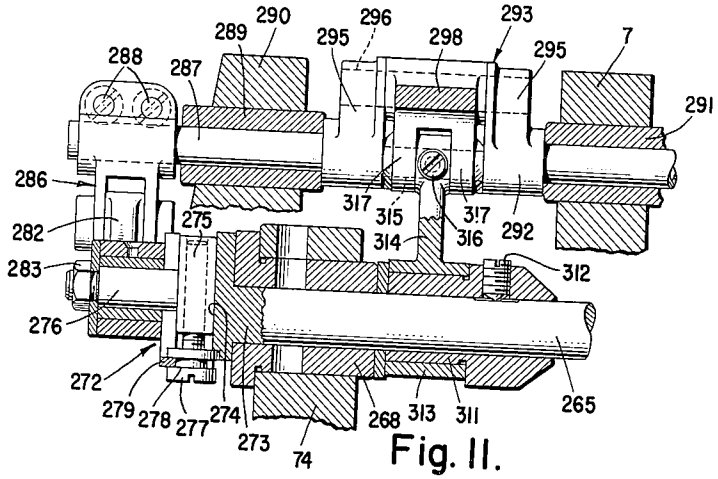


Fig. 11.

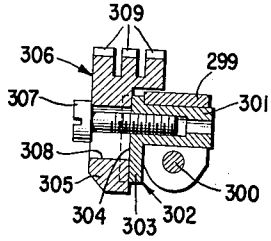


Fig. 12.

WITNESS

Nicholas Leszczak

INVENTOR.

Hans Hacklander

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March 28, 1961 H. HACKLANDER 2,976,831

SEWING MACHINES

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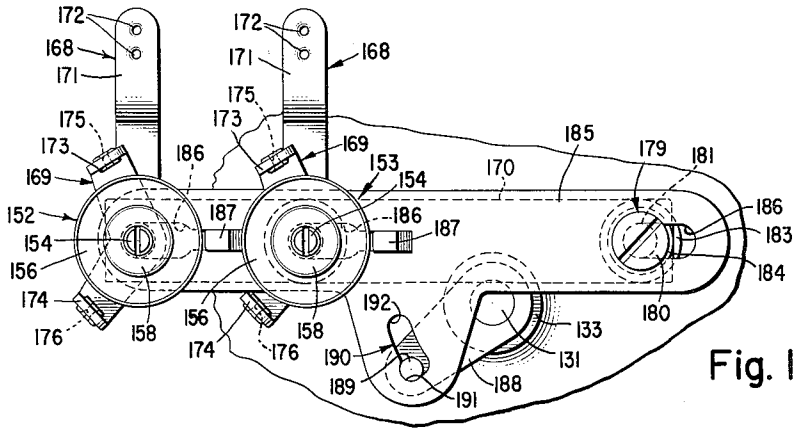


Fig. 13.

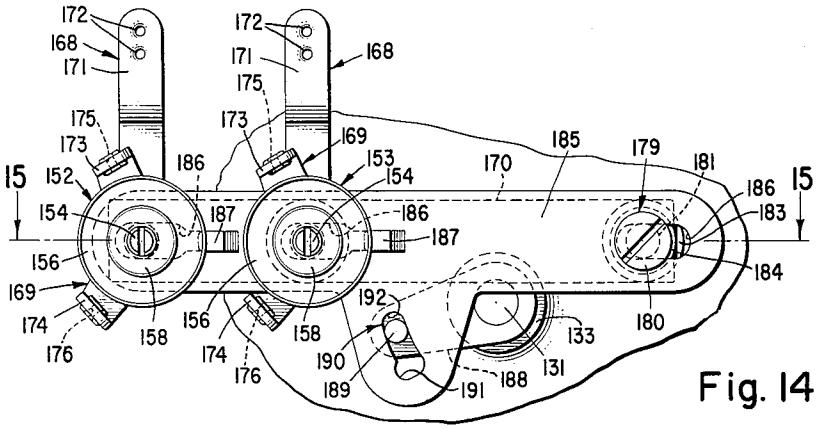


Fig. 14.

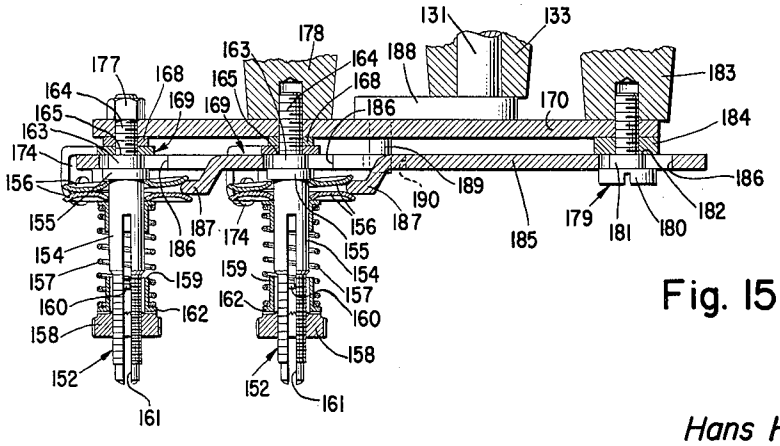


Fig. 15.

INVENTOR.
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March 28, 1961 H. HACKLANDER 2,976,831

SEWING MACHINES

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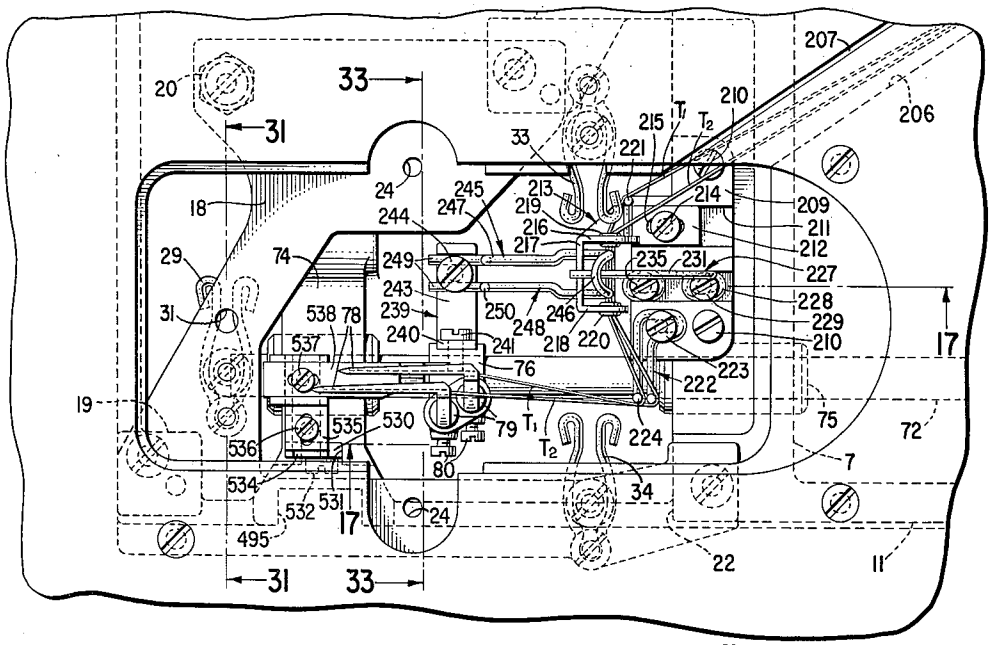


Fig. 16.

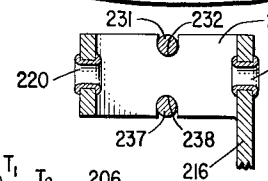


Fig. 32

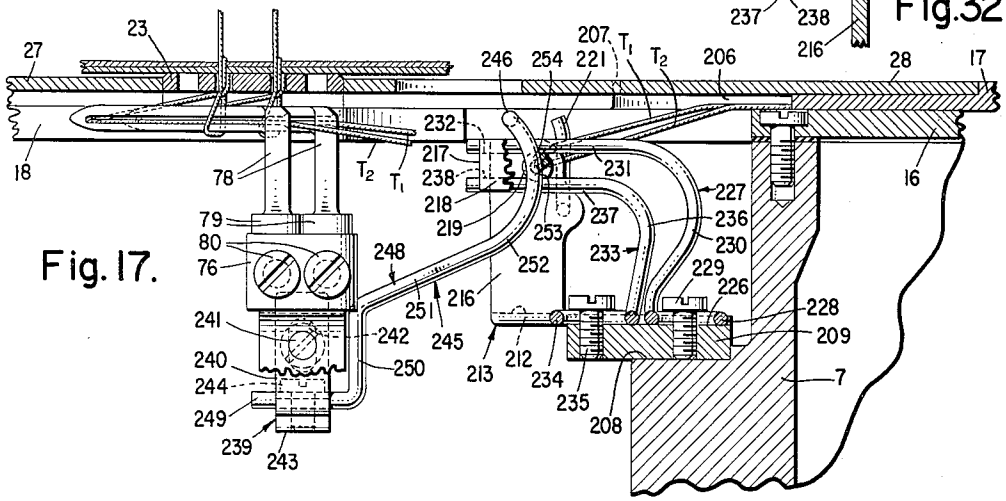


Fig. 17.

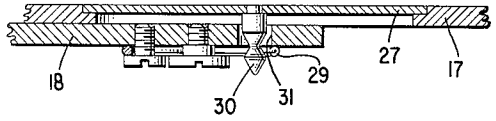


Fig. 31.

WITNESS

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SEWING MACHINES

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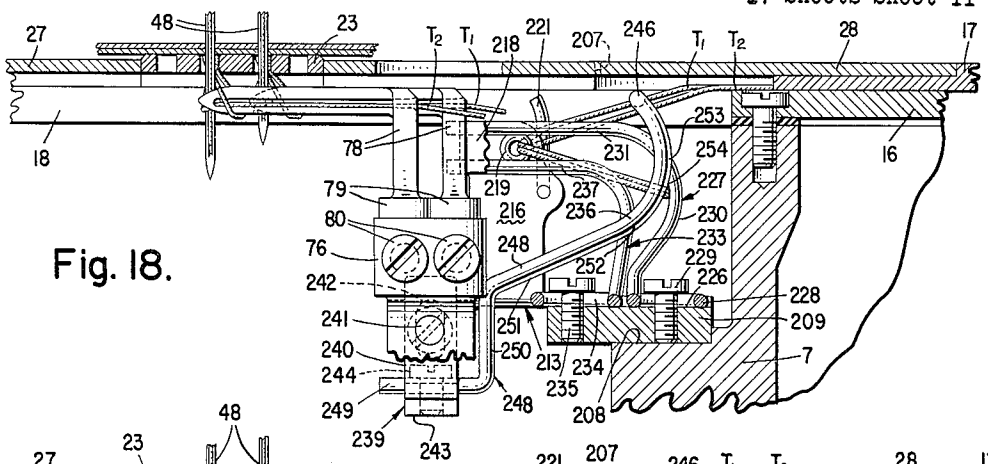


Fig. 18.

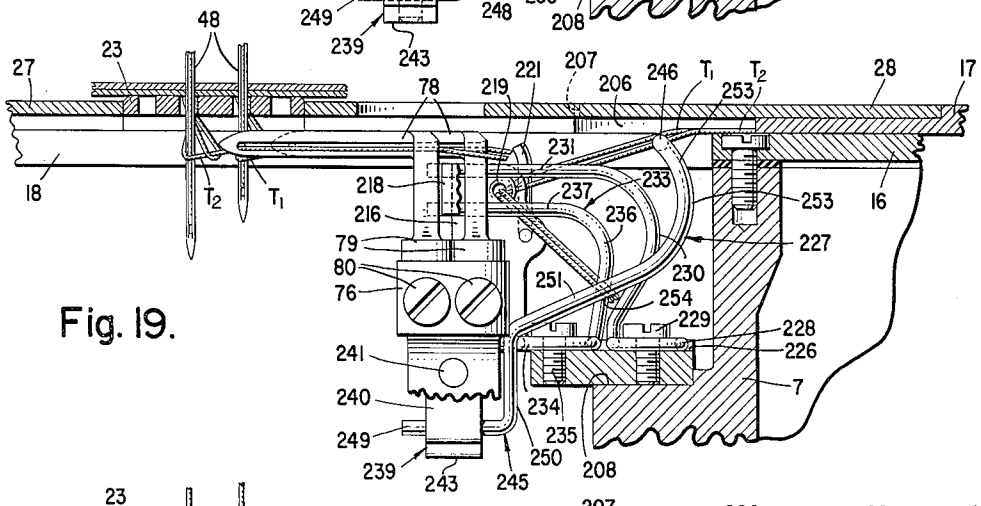


Fig. 19.

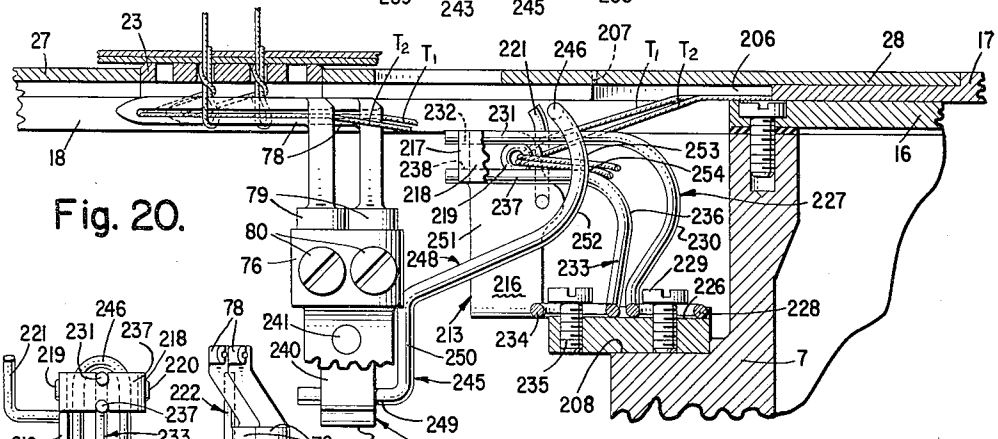


Fig. 20.

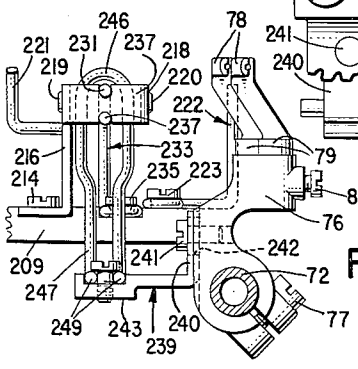


Fig. 33.

INVENTOR.
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March 28, 1961 H. HACKLANDER 2,976,831

SEWING MACHINES

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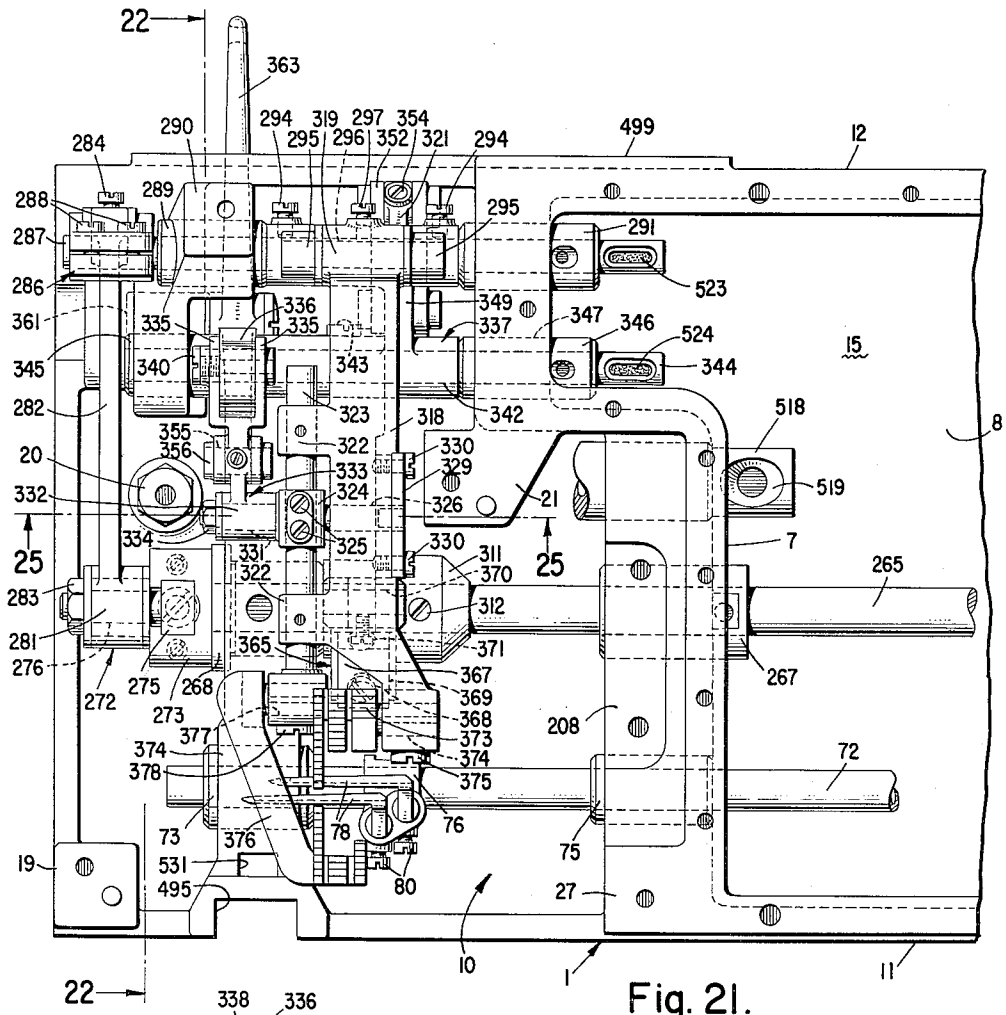


Fig. 21.

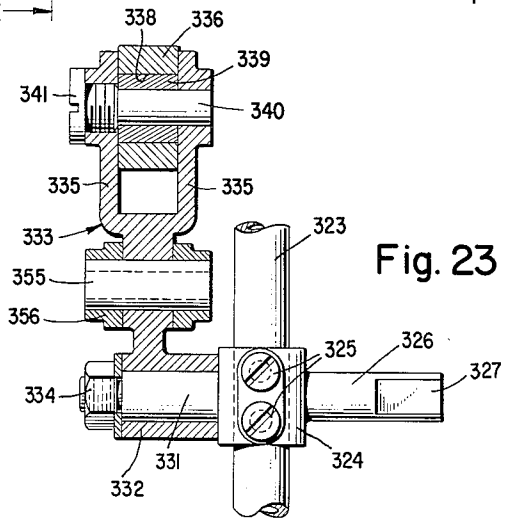


Fig. 23

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March 28, 1961 H. HACKLANDER 2,976,831

SEWING MACHINES

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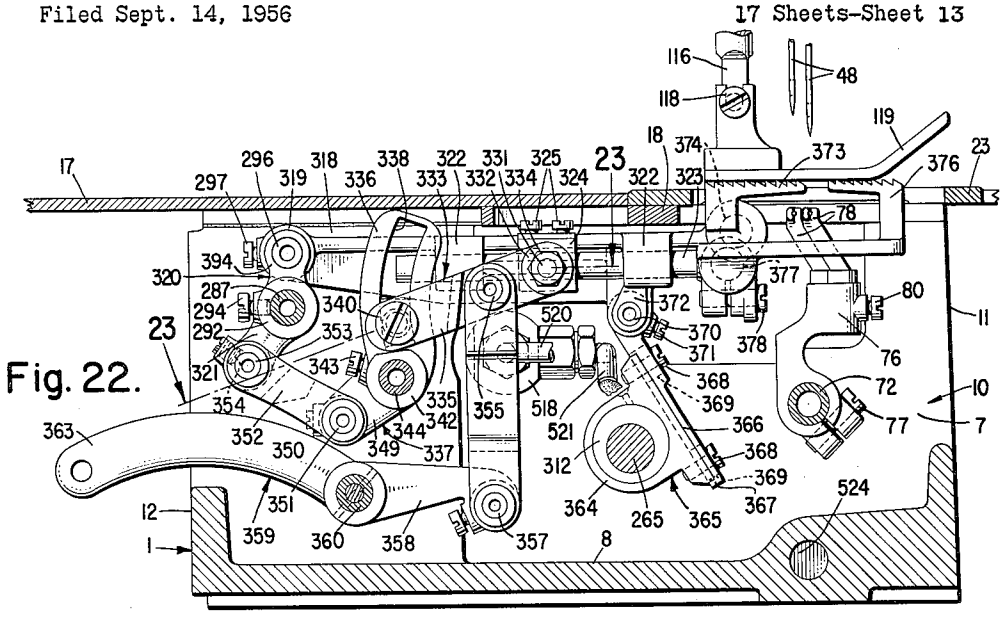


Fig. 22.

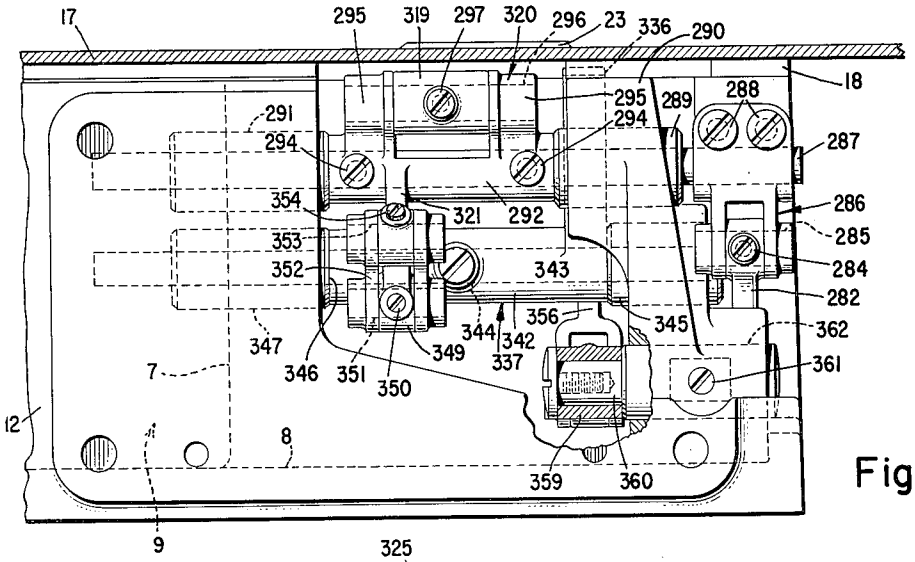


Fig. 24.

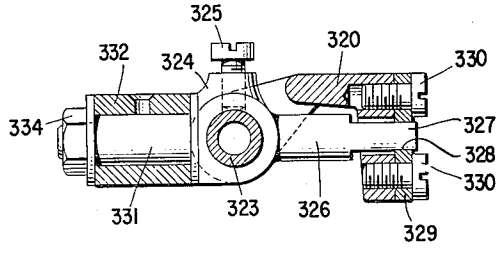


Fig. 25.

INVENTOR.
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Nicholas Leszczak

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March 28, 1961 H. HACKLANDER 2,976,831

SEWING MACHINES

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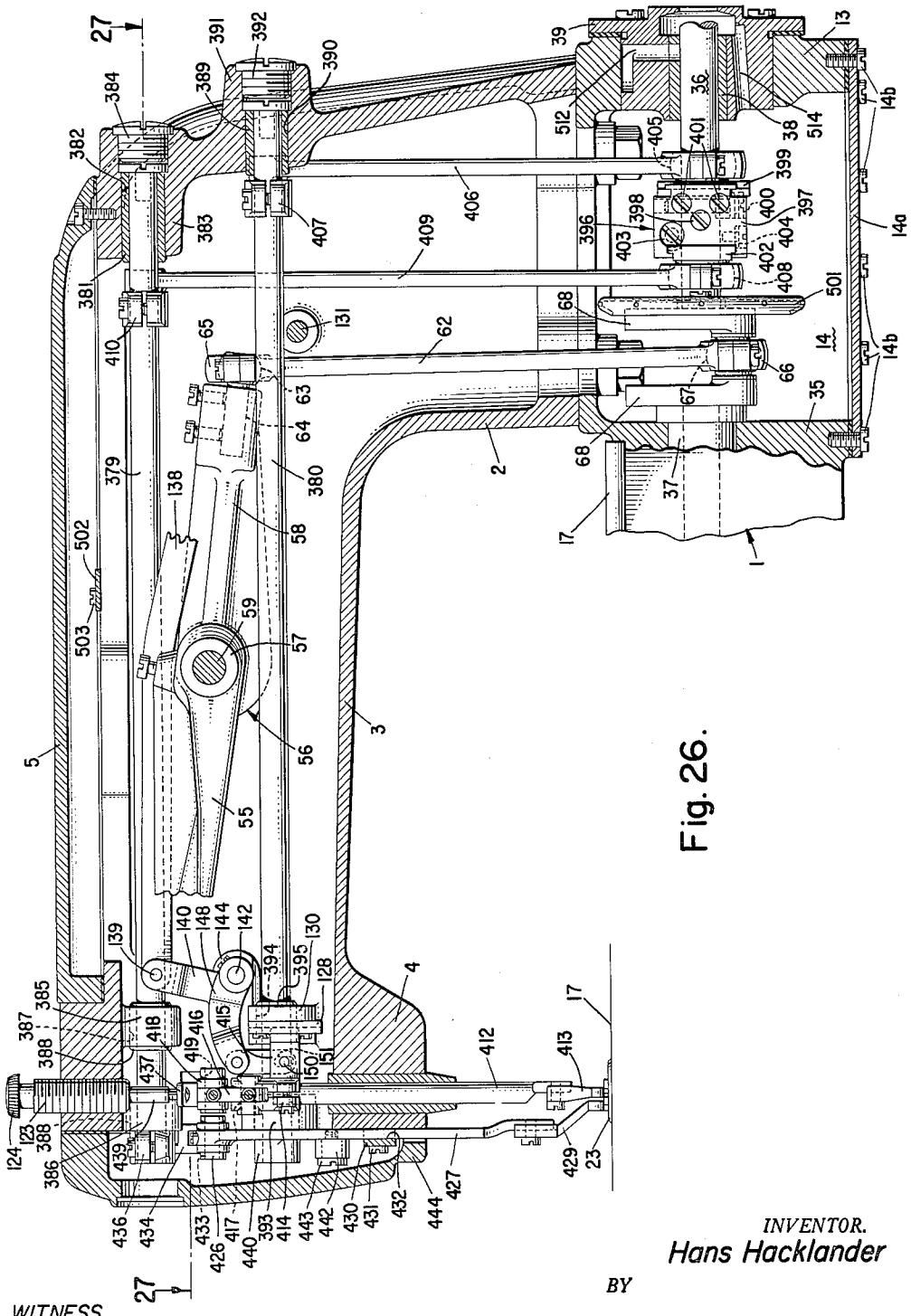


Fig. 26.

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March 28, 1961 H. HACKLANDER 2,976,831

SEWING MACHINES

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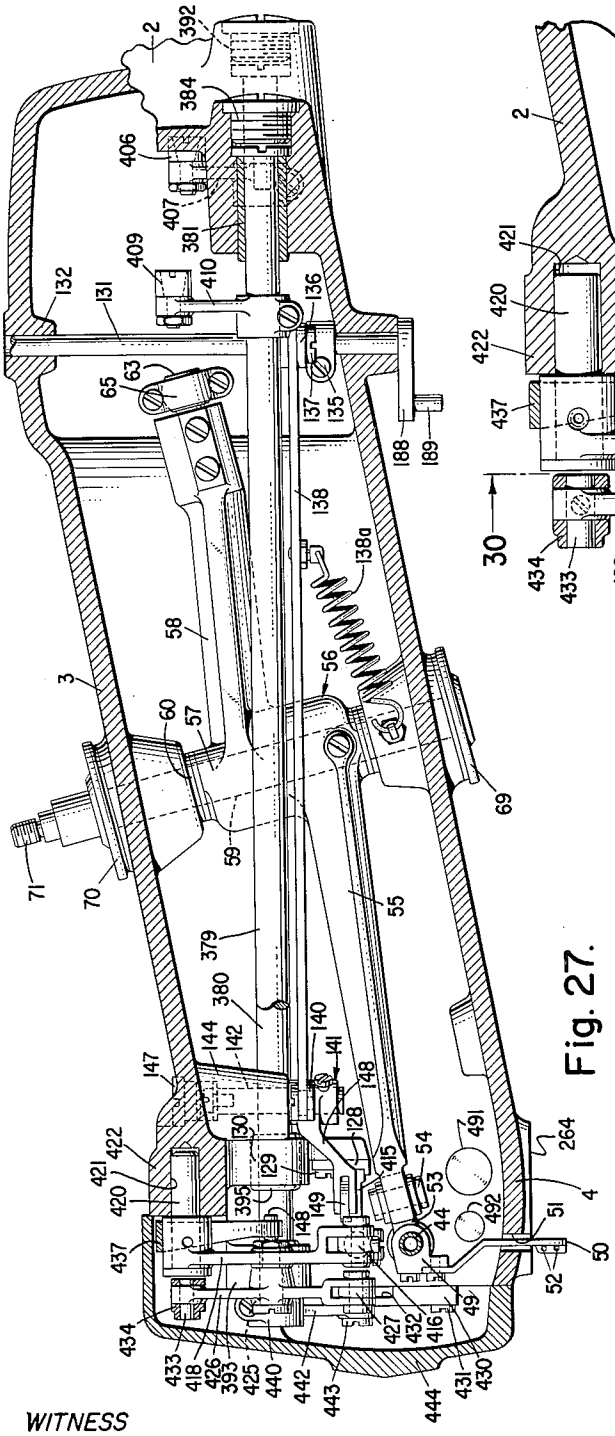


Fig. 27.

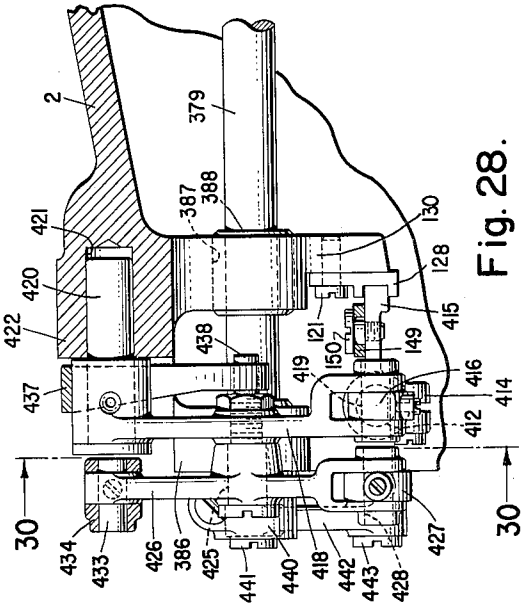


Fig. 28.

WITNESS

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March 28, 1961 H. HACKLANDER 2,976,831

SEWING MACHINES

Filed Sept. 14, 1956 17 Sheets-Sheet 16

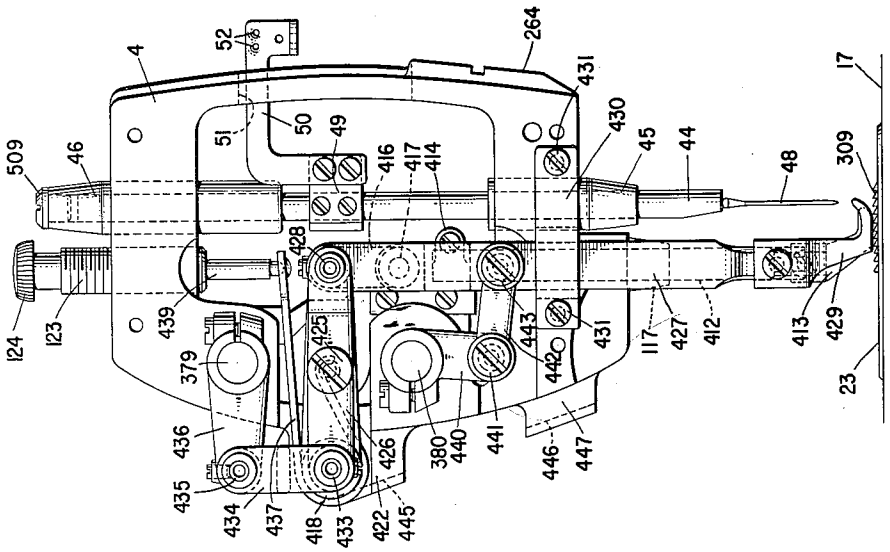


Fig. 29.

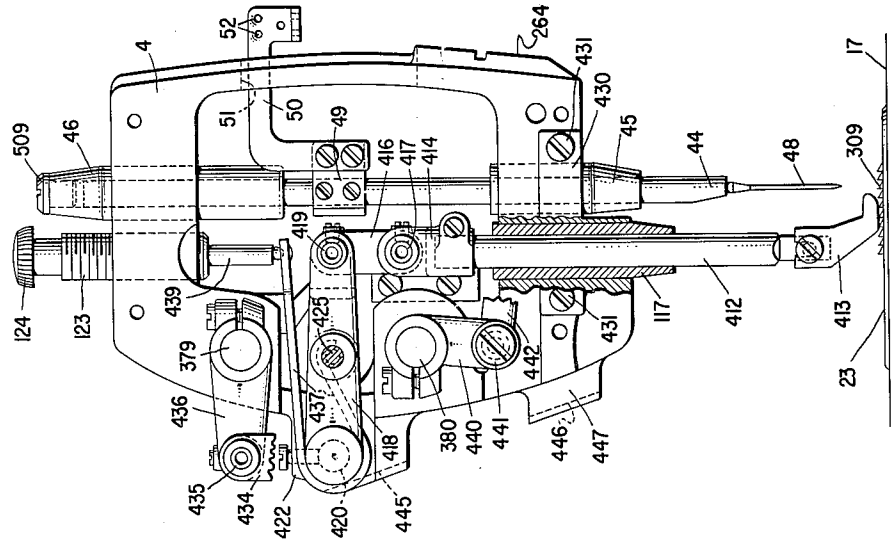


Fig. 30.

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March 28, 1961 H. HACKLANDER 2,976,831

SEWING MACHINES

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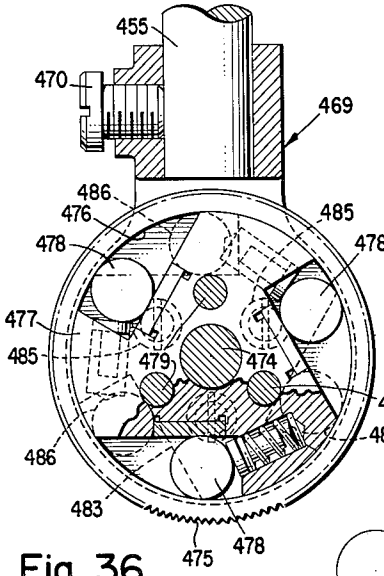


Fig. 36.

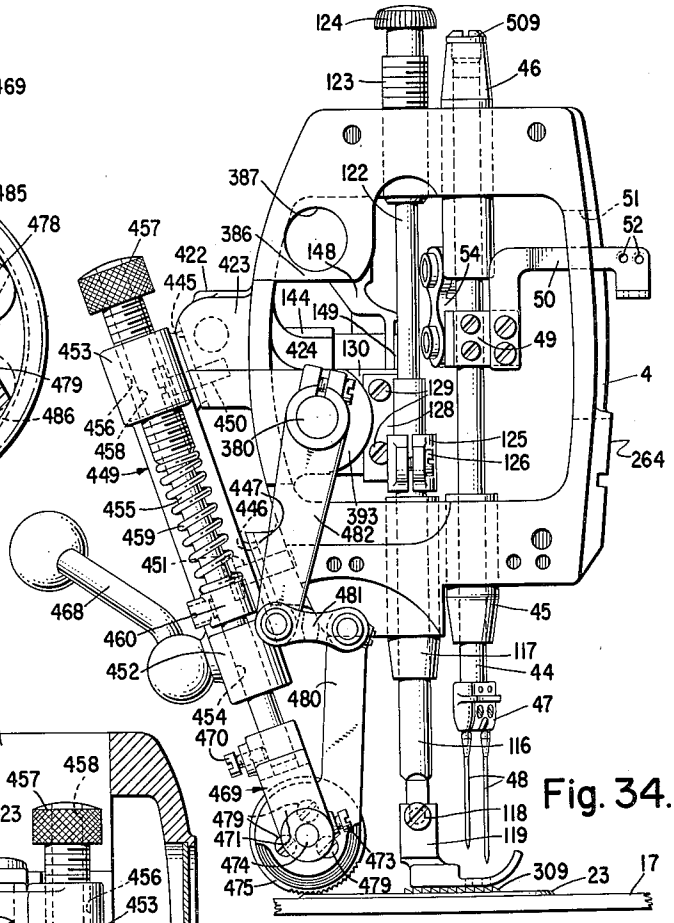


Fig. 34.

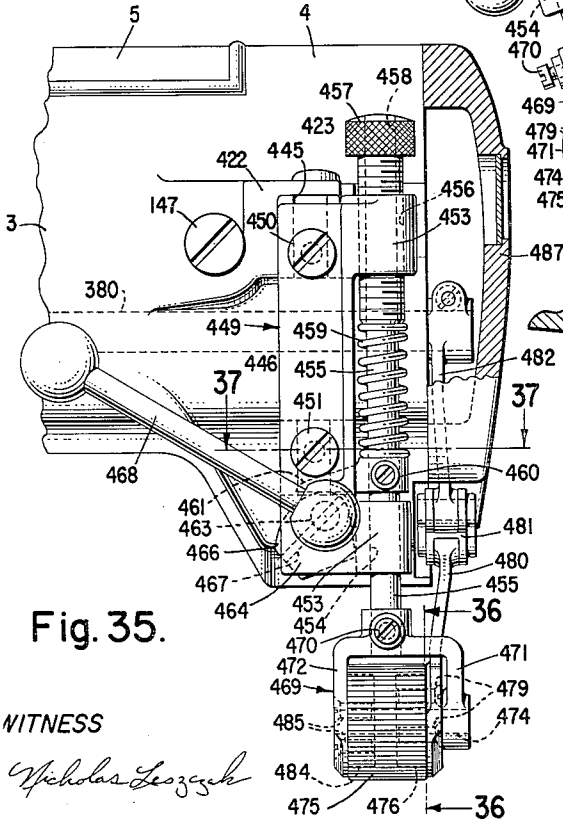


Fig. 35.

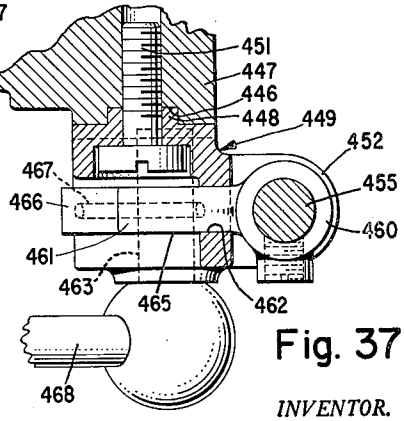


Fig. 37

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WITNESS
Nicholas Leszczuk

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Marshall J. Breen
ATTORNEY

United States Patent Office 2,976,831 Patented Mar. 28, 1961

2,976,831

SEWING MACHINES

Hans Hacklander, Warren Township, N.J., assignor to The Singer Manufacturing Company, Elizabeth, N.J., a corporation of New Jersey

Filed Sept. 14, 1956, Ser. No. 609,836

13 Claims. (Cl. 112—220)

The present invention relates to sewing machines and particularly to high speed automatically lubricated industrial sewing machines which operate at speeds upwardly of 5000 stitches per minute, and at such speeds, will form perfect stitching, will be efficient and durable and quieter and vibration free, and which also will be neat and attractive.

One of the principal objects of this invention is to provide a sewing machine in which a single basic machine is designed to be conveniently modified and/or fitted with various attachment mechanisms to adapt the machine for a large number of different specific sewing operations. Accordingly, it is an object of this invention to provide a new and improved universal attachment drive mechanism which can be used to actuate any one of a number of specific attachment mechanisms, which drive mechanism will be efficient and durable when used to drive any selected one of the various attachment mechanisms, and which drive mechanism is designed into the machine, for purpose of appearance as well as safety, in combination with a bracket-arm that is angled relative to the bed to improve visibility at the point of stitch formation and a needle-bar actuating rock lever arranged in an optimum manner longitudinally of the bracket-arm.

It is a further object of this invention to provide a new and improved alternating presser mechanism and specifically one adapted for use with a novel drive mechanism that is designed to be used to actuate any one of a number of other attachments, and which at the same time will be economical, dependable, durable and efficient.

It is a further object of this invention to provide an improved looper mechanism for a chain stitch sewing machine the mechanics of which will adapt it for high speed operation and to provide a looper mechanism in which the only motions imparted to the looper bar are axial reciprocation and oscillation, thereby facilitating making an oil-tight bearing and thus adapting it for use in an automatically lubricated sewing machine, as well as to provide a looper mechanism which can be quickly and easily assembled and adjusted. At the same time, it is an object of this invention to provide a looper mechanism which can be readily converted from one in which the looper motion is transverse to the line of feed to one in which the looper motion is parallel to the line of feed.

It is a further object of this invention to provide an improved feeding mechanism that is adapted for high speed operation and which can be readily modified from a plain to a differential feed, and in which, as a differential feeding mechanism, the elevation of the parts is substantially reduced, having in mind the end that the feed bar should be substantially horizontal and that the path of the feed dog above the cloth plate should also be substantially horizontal. It is also an object of this invention to provide a new and improved feed-dog height adjusting means which is particularly useful in a differential feeding mechanism wherein the height of the main and auxiliary feed dogs will be adjusted simultaneously.

It is a further object of this invention to provide a thread tension mechanism having a pair of opposed thread tension discs that are released by means of a releasing pin projected between the discs, which mechanism is constructed and arranged to prevent the shank of the releasing pin from being forced against the periphery of the discs, and to provide a tension releasing mechanism combined with the presser lifter mechanism and that is constructed and arranged to effect complete release of the tension mechanism during the initial actuation of the presser lifter.

Fig. 1 is a front elevational view of a sewing machine embodying the present invention, partly broken away and in section.

Fig. 2 is a top plan view of the sewing machine of Fig. 1 with the top cover plate removed.

Fig. 3 is a head end elevation view of the sewing machine of Fig. 1 with the face plate removed.

Fig. 4 is a vertical sectional view longitudinally of the sewing machine of Fig. 1.

Fig. 5 is a horizontal sectional view of the sewing machine of Fig. 1 with the cloth plate and its supporting bracket and the bed cover plate removed.

Fig. 6 is a fragmentary detail view in elevation of a modification of the looper drive crank.

Fig. 7 is a fragmentary horizontal sectional view taken substantially on the line 7—7 of Fig. 4 and illustrating the modified looper drive crank of Fig. 6.

Fig. 8 is a horizontal sectional view through the bracket-arm of the sewing machine illustrated in Fig. 1.

Fig. 9 is a vertical sectional view through the standard of the sewing machine illustrated in Fig. 1 and taken substantially on the line 9—9 of Fig. 4.

Fig. 10 is a sectional view taken substantially on the line 10—10 of Fig. 5.

Fig. 11 is a fragmentary sectional view taken substantially on the line 11—11 of Fig. 10.

Fig. 12 is a fragmentary detail sectional view of the feed-dog mounting taken substantially on the line 12—12 of Fig. 10.

Fig. 13 is a fragmentary elevational view of the needle thread tension device of the machine illustrated in Fig. 1.

Fig. 14 is a view similar to Fig. 13 but illustrating the parts in a different position.

Fig. 15 is a sectional view taken substantially on the line 15—15 of Fig. 14.

Fig. 16 is a fragmentary plan view of the bed of the machine illustrated in Fig. 1, with the cloth plate removed, showing the looper thread take-up mechanism.

Fig. 17 is an enlarged fragmentary sectional view taken substantially on the line 17—17 of Fig. 16.

Figs. 18, 19 and 20 are sectional views similar to Fig. 17 but illustrating the parts in different positions of operation.

Fig. 21 is a fragmentary plan view of the bed with the cloth plate and the supporting bracket removed and illustrating a differential feeding mechanism in place of the plain feeding mechanism of Fig. 1.

Fig. 22 is a sectional view taken substantially on the line 22—22 of Fig. 21.

Fig. 23 is a fragmentary detail sectional view taken substantially on the line 23—23 of Fig. 22.

Fig. 24 is a rear elevational view, partly broken away, of the mechanism illustrated in Fig. 21.

Fig. 25 is a fragmentary detail sectional view taken substantially on the line 25—25 of Fig. 21.

Fig. 26 is a fragmentary vertical sectional view longitudinally of the machine of Fig. 1 and illustrating an alternating presser mechanism applied thereto.

Fig. 27 is a horizontal sectional view taken substantially on the line 27—27 of Fig. 26.

Fig. 28 is a fragmentary horizontal sectional view on

an enlarged scale of the head end of the machine as illustrated in Fig. 27.

Fig. 29 is a fragmentary head end elevational view of the alternating presser mechanism as illustrated in Fig. 27.

Fig. 30 is a sectional view taken on the line 30—30 of Fig. 28.

Fig. 31 is a detail sectional view taken substantially on the line 31—31 of Fig. 16.

Fig. 32 is a detail view in elevation of a portion of the looper thread take-up mechanism.

Fig. 33 is a fragmentary sectional view taken substantially on the line 33—33 of Fig. 16.

Fig. 34 is a head end elevational view of the sewing machine of Fig. 1 and illustrating a close coupled top puller feed mechanism applied thereto.

Fig. 35 is a fragmentary rear elevational view of the head of the sewing machine illustrated in Fig. 34.

Fig. 36 is a detail sectional view taken substantially on the line 36—36 of Fig. 35.

Fig. 37 is a detail sectional view taken substantially on the line 37—37 of Fig. 35.

In the drawings there is illustrated a sewing machine having a bed 1 from one end of which rises a vertical hollow standard 2 that carries a hollow bracket-arm 3 terminating in a head 4. The top of the bracket-arm 3 is open to provide access to the mechanism therein and is adapted to be closed by a cover plate 5. A face plate 6 is provided to close the open end of the head 4.

With reference to Figs. 4 and 5, the bed 1 is divided by a transverse vertical wall 7 upstanding from a bottom wall 8 into a closed splash-lubricated compartment 9, which is to the right of the wall 7 in Fig. 4, and a space 10 outside the closed compartment 9 for accommodating the lower feed and looper mechanisms of the machine. The closed splash-lubricated compartment 9 is surrounded by a front wall 11, a rear wall 12, and an end wall 13. For convenience, that portion of the compartment 9 which is below the standard 2 is referred to as a standard section 14, and the remainder of the compartment 9 is referred to as a bed section 15.

The standard section 14 of the bed compartment 9 is open at the bottom for access and is normally closed by an oil-tight gasketed plate 14*a* secured in place by screws 14*b*. The standard section 14 is also open at the top within the confines of the standard 2 and thus communicates with the hollow interior of the standard 2. The bed section 15 is open at the top and is closed by a gasketed oil-tight cover plate 16. A work-supporting cloth plate 17 extends over the bed section 15 and the space 10 and is mounted on the cover plate 16 and, above the space 10, is supported by a bracket 18. Fig. 16, which is in turn mounted at the left front corner upon the top of a support 19 upstanding from the bottom wall 8, at the left rear corner on a post 20 screwed into the bottom wall 8, at the right front and rear corners on bosses 21 and 22 respectively extending laterally from the wall 7. The bracket 18 supports the throat plate 23 and for this purpose is provided with two threaded apertures 24 for receiving throat plate fastening screws 25. The cloth plate 17 is provided with an aperture 26 to accommodate the throat plate 23 and a pair of plates 27 and 28. The plate 27 is removably secured in place by a snap connector comprising a resilient spring wire clip 29, Figs. 16 and 31, secured to the underside of the bracket 18 and cooperating with a necked portion on a stud 30 that extends downwardly from the plate 27 and through a hole 31 in the bracket 18. Removal of the plate 27 is facilitated by a finger hole 32, Fig. 2. The plate 28 is also adapted to be secured in place by a pair of snap fasteners similar to the one for the plate 27 and including spring wire clips 33 and 34, the clip 33 being secured to the underside of the cloth plate 17 and the clip 34 being secured to the underside of the bracket 18.

Disposed between the bed section 15 and the standard section 14 is a short, transverse upstanding bearing boss 35, Fig. 4. The main shaft 36 of the machine is arranged longitudinally of the bed 1 in a bearing bushing 37 in the boss 35 and in a bearing bushing 38 carried by an insert 39 in the end wall 13. Mounted upon the exposed end of the main shaft 36 is a combined hand wheel and belt pulley 40, Fig. 1, which is hollow to receive a counterweight 41 and is closed by a cover plate 42.

As best seen in Figs. 2 and 9, the standard 2 is mounted to the rear of the bed 1 and rises vertically therefrom with the hollow interior of the standard open to the interior of the standard section 14 of the bed compartment 9. As seen in Fig. 2, the bracket-arm 3, which is mounted upon the top of the standard 2, extends diagonally across the bed, or in other words, is angled forwardly relative to the bed 1 and main shaft 36 so that the head 4 is disposed adjacent to the front of the machine. This arrangement places the point of stitch formation very close to the front of the machine and thereby increases the visibility of the operator and facilitates manipulation of the work. It is also many times necessary for the operator to reach behind the head for manipulation or handling of the work which is facilitated by having the head 4 arranged forwardly of the standard 2. Also to facilitate reaching behind the head 4, the standard 2 has a cutaway portion 43, Figs. 1 and 3, located at the front corner adjacent to the working surface of the machine. The angled arm is also advantageous in the combination thereof in the present machine with a stepped or offset needle-bar drive rock lever and a pair of attachment drive shafts journaled in the bracket-arm, as hereinafter discussed.

Needle mechanism

The needle mechanism of the present machine is best shown in Figs. 3, 4, 8 and 9, and comprises a needle-bar 44 mounted for endwise reciprocation in bearing bushings 45 and 46 in the head 4. The illustrated machine is adapted to sew a double seam, i.e., two two-thread chain stitch lines of stitches, so there is secured to the lower end of the needle bar 44, by a needle clamp 47, a pair of needles 48. Within the head 4, there is secured to the needle-bar 44 a collar 49 having a needle thread take-up arm 50 secured thereto. The take-up arm 50 extends through a slot 51 in the head 4 and is provided with two thread eyes 52. The collar 49 is also provided with an arm 53 that is connected by a pivoted link 54 to one arm 55 of a needle-bar drive rock lever, designated generally at 56, which is arranged longitudinally of the bracket-arm 3. In addition to the arm 55, the rock lever 56 includes a hub 57 and a second arm 58 extending from the hub 57 in the opposite direction from the arm 55. The hub 57 has a bore that receives a pivot shaft 59 journaled for oscillation on a horizontal axis transversely of the bracket-arm 3 in bearing bushings 60 and 61. The free end of the arm 58 is secured to a connecting rod 62 by a ball and socket joint including a ball 63 upon the end of a stud 64 that is secured in a longitudinal bore in the end of the arm 58 and a two-part socket including a separable element 65. The lower end of the connecting rod 62 has a two-part strap including a separable element 66, which strap surrounds a crank 67 formed on the main shaft 36 and having counterbalances 68. Thus, upon rotation of the main shaft 36, oscillation will be imparted to the rock lever 56, which will in turn impart oscillation to the needle-bar 44.

The assembly openings in the bracket-arm 3 for the pivot shaft 59 are closed at the front by a plate 69 and at the rear by a plate 70 having a stud 71 with a threaded end and upon which a sewing light (not shown) is adapted to be secured.

The specific construction and arrangement of the needle-bar rock lever 56, particularly with relation to a

pair of attachment driving shafts, is hereafter more fully discussed.

Looper mechanism

The herein described looper mechanism has been divided from this application and now forms the subject matter of divisional application Serial No. 734,182, filed May 9, 1958.

The looper mechanism of the present machine is disclosed in Figs. 4, 5 and 10 and comprises a looper bar **72** disposed in the space **10** in the bed **1** and mounted for oscillation and for axial sliding movement in a direction parallel to the axis of the main shaft **36** in a bearing bushing **73** carried by a boss **74** extending upwardly from the bottom plate **8** of the bed and a bearing bushing **75** carried by the wall **7**. A looper carrier **76** is mounted on the looper bar **72** by means of a split-ring connection having a clamping screw **77**. A pair of straight-line type threaded chain stitch loopers **78** are mounted on the looper carrier **76**, the loopers having cylindrical shanks **79** that are received within vertical bores in the looper carrier **76** and locked in adjusted position by set screws **80**. Each of the loopers **78** is adapted to cooperate individually with one of the needles **48** in the formation of a two thread chain stitch line of stitching, axial reciprocation of the looper bar **72** imparting loop-seizing or advance and loop-shedding or return motions to the loopers **78**, and oscillation of the looper bar **72** imparting the loop-spreading or needle-avoiding motions to the loopers. The loopers are universally adjustable to obtain the desired setting relative to the needles **48** in that the looper carrier **76** can be adjusted axially and angularly of the looper bar **72** and the shanks **79** of the loopers **78** can be adjusted axially and angularly relative to the looper carrier **76**.

The looper bar **72** extends through the bearing **75** into the bed section **15** of the closed bed compartment **9** and the end thereof is secured by a universal joint **81** to one end of a connecting rod **82**. The universal joint **81** comprises a yoke **83** on the end of the looper bar **72**, the yoke being apertured to receive pivotally a pin **84**. Mounted on the pin **84** between the arms of the yoke **83** and secured thereto by a set screw **85** is a sleeve **86** having integral therewith a yoke **87** apertured transversely to the axis of the sleeve **86** to receive pivotally a pin **88**. Mounted on the pin **88** between the arms of the yoke **87** and secured thereto by a set screw **89** is a sleeve **90** formed upon the end of the connecting rod **82**.

The opposite end of the connecting rod **82** is secured by a universal joint **91** to a crank pin **92**, the universal joint **91** comprising a sleeve **93** mounted upon and secured by a set screw **94** to a pin **95** that is pivotally mounted in the arms of a yoke **96** having integral therewith a hub or sleeve **97** that is in turn pivotally mounted upon the crank pin **92**. The sleeve **97** is held on the crank pin **92** by a screw **98**.

The drive for the looper mechanism comprises a bevel gear **99** secured upon the end of the main shaft **36** which extends through the bearing bushing **37** into the bed section **15** of the closed bed compartment **9**. The gear **99** meshes with a similar gear **100** on a looper drive shaft **101** journaled for rotation transversely of the bed in a bearing bushing **102** in the rear wall **12** and in a bearing bushing **103** in a boss **104** rising from the bottom wall **8** of the bed at a point spaced from the front wall **11**. Mounted upon the end of the shaft **101** is a counterbalanced crank plate **105**. Endwise sliding motion of the shaft **101** is prevented by the crank plate **105** and a collar **106** which are arranged upon opposite sides of the bearing bushing **104**.

The crank pin **92** is integral with a mounting plate **107** and is formed with the axis thereof skewed rather than normal to the plane of the plate **107**. The plate **107** is mounted in a groove **108** in the face of the crank plate **105**, which groove provides for adjustment of the plate **107** in a direction radially of the axis of the looper drive shaft **101**, and it is secured in adjusted position by screws **109** that extend through elongated slots **110** in the plate **107** and screwed into the crank plate **105**.

In Figs. 6 and 7 there is illustrated a modification of the looper drive mechanism including means for effecting adjustment of the axis of the crank pin **92** toward and away from a position parallel to the axis of the shaft **101**, which means comprises an adjusting screw **111** threaded through one end of the mounting plate **107** and abutting against the crank plate **105** so that when the screws **109** are tightened, the mounting plate **107** will abut against the crank plate **105** only at the screw **111** and at the forward edge, thereby tilting the plate.

In operation, upon rotation of the main shaft **36**, rotation will be imparted to the looper drive shaft **101**, which carries the crank pin **92** and will therefore rotate the crank pin **92** about the axis of the shaft **101**. The throw of the crank pin **92** will, through the connecting rod **82** and the universal joints **81** and **91**, impart axial sliding to the looper bar **72**, which will effect advance and return motions of the loopers **78**. At the same time, because of the skewed axis of the crank pin **92**, it will gyrate as it rotatse about the axis of the shaft **101**, which gyration will be transmitted to the looper bar **72** to impart oscillation thereto that will effect the loop spreading or needle avoiding motions of the loopers **78**. Adjustment of the advance and return motion of the loopers is provided by the screws **109** and the slots **110**, and adjustment of the loop spreading motion of the loopers may be provided by the adjusting screw **111**.

As seen in Fig. 4 the looper drive shaft **101** is disposed above the level of the looper bar **72**. The mechanics of this construction will produce the desired rapid loop-seizing motion of the looper and a retarded loop-shedding motion.

For assembly purposes, there is provided an aperture **112** in the rear wall **12** and an aperture **113** in the front wall **11** in axial alignment with the looper drive shaft **101**, which apertures are closed by cover plates **114** and **115** respectively. The aperture **113** is large enough to permit passage therethrough of the looper drive shaft **101** with crank plate **105** and the mounting plate **107** assembled thereon.

In the above construction in which the looper motion is longitudinally of the bed, the number of needles and cooperating loopers is limited to two or three and they are limited to narrow gauges. One of the basic objectives of the present invention is to provide a universal machine which can be readily modified and fitted for different specific sewing operations. Accordingly, one of the primary advantages of the present looper mechanism is that there can be readily substituted therefor a looper mechanism having loopers movable transversely of the bed, thus providing for a larger number of needles or for wider gauges. In such a construction, the crank pin **92** is arranged normal to the mounting plate **107** and is made with a small throw to impart only a small axial movement to the looper bar **72**, which movement is now the needle-avoiding motion. For the advance and return movement, the looper drive shaft **101** is journaled only in the boss **104** to provide clearance for extending the main shaft **36** through the bed section **15** of the compartment **9**, and an eccentric is mounted on the extension and is connected by a pitman and crank to the looper bar to oscillate the same.

Presser mechanism

The presser mechanism of the machine is illustrated in Figs. 3, 4, 8 and 9, and comprises a short hollow presser bar **116** mounted in the head **4** for vertical sliding movement in a bearing bushing **117** in the bottom of the head. At its lower end, the presser bar **116** has secured thereto by a screw **118** a presser foot **119**. The presser bar **116** has an axial bore **120** extending inward-

ly from the upper end thereof, in which bore is mounted a coil spring **121** that bears at its lower end against the bottom of the bore **120** to bias the presser bar downwardly. At its upper end, the spring **121** bears against an adjustable abutment for varying the compression thereof comprising a rod **122** extending into the bore **120** and integral with a threaded bushing or shank **123** that is screwed into a threaded bore in the top of the head **4** and including a knurled head **124** for manually turning the same.

A collar **125** is secured to the presser bar **116** near the top thereof by a split ring connection having a clamping screw **126**. The collar **125** has a laterally extending arm **127** the free end of which slides in a vertical groove in a wear plate **128** secured by screws **129** to a lug **130** in the head **4**, to prevent turning of the presser bar.

The presser lifter mechanism comprises a shaft **131** journaled transversely of the machine through the upper part of the standard **2** in bearing bosses **132** and **133**. The shaft **131** projects through the rear wall of the standard and on the ends thereof has secured a presser-lifter lever **134** which may be connected in the usual manner to a foot treadle (not shown). Adjacent to the front wall of the standard **2** the presser lifter shaft **131** has secured thereto by a split ring connection including a clamping screw **135**, a vertically-arranged bifurcated crank arm **136** the upper end of which is pivotally secured by a pivot screw **137** to one end of a horizontally disposed link **138** arranged longitudinally of the bracket-arm **3**. A coil tension spring **138***a* is connected at one end to the link **138** and at the other end to the bracket-arm **3**, see Fig. 2, to bias the link to its normal position. The other end of the link **138** is connected by a pivot screw **139** to a bifurcated vertical arm **140** of a bell crank lever **141** secured at its hub to a pivot stud **142** by a set screw **143**. The stud **142** is pivotally mounted in a horizontal bore in a boss **144** in the head **4** and is held against axial movement by the hub of the bell crank lever **141** and a washer **145** secured to the end of the stud **142** by a screw **146**. The opening in the head through which the stud is inserted is closed by a cap screw **147**.

The bell crank lever **141** has a second arm **148** which is arranged horizontally. The free end of the arm **148** is pivotally connected to the upper end of a link **149** which is connected at its lower end to the arm **127** on the collar **125** by means of a screw **150** passing loosely through a vertically elongated slot **151**, Fig. 4, in the link **149** and threaded into the arm **127**. The screw **150** and slot **151** provide a lost motion connection permitting rising and falling motion of the presser bar **116** as the thickness of the work varies without transmitting the motion to the presser lifter mechanism.

Thread tension mechanism

The herein described thread tension mechanism has been divided from this application and forms the subject matter of divisional application Serial No. 694,682, filed November 5, 1957, now Patent No. 2,902,959, September 8, 1959.

The needle thread tension mechanism is shown in Figs. 1, 2, 8, 9, 13, 14 and 15, and comprises a pair of thread tension devices **152** and **153** each of which has a central mounting stud **154**. Each of the studs **154** has an integral collar **155** intermediate its ends and a pair of opposed tension discs **156** mounted on the stud and biased into operative engagement with each other by a coil spring **157** surrounding the stud and acting on the outer one of the discs **156** with the inner one of the discs **156** abutting against the collar **155**. At its outer end, the spring **157** abuts against a nut **158** cooperating with threads on the outer end of the stud and providing for adjustment of the compression of the spring **157**. In the usual manner, there is provided a sleeve **159** having a finger **160** disposed in an axially arranged slot **161** extending inwardly from the free end of the stud **154** that prevents rotation of the sleeve relative to the stud, and having a flange **162** disposed between the end of the spring **157** and the nut **158**, which flange has a serrated face in engagement with the inner face of the nut **158** to resist rotation of the nut relative thereto. The inner end of the stud **154** has a neck **163** and a reduced threaded terminal portion **164** with a shoulder **165** at the juncture of the two.

Each of the studs **154** has the threaded portion **164** thereof extending loosely through apertures in a pair of thread guides **168** and **169** and clamped between the shoulder **165** and the surface of a mounting plate **170**, the mounting plate **170** having an aperture through which the threaded portion **164** of the stud **154** loosely extends. The thread guide **168** includes an upstanding arm **171** having two thread eyes **172** and the thread guide **169** includes a pair of diverging arms **173** and **174** having thread eyes **175** and **176** respectively.

The stud **154** of the tension device **152** is secured to the mounting plate **170** by a nut **177** while the stud **154** of the tension device **153** is threaded into a boss **178** on the standard **2** to secure the mounting plate **170** to the standard. Also, to secure the mounting plate **170** to the standard, there is provided a screw **179** having a head **180** and a neck **181** which is of a larger diameter than the threaded shank of the screw to provide a shoulder **182**. The screw **179** is threaded into a boss **183** on the standard with a spacer **184** disposed between the shoulder **182** and the mounting plate **170**, the spacer **184** being equal in thickness to the combined thicknesses of the thread guides **168** and **169**.

The tension releasing mechanism comprises a slide plate **185** having longitudinally elongated slots **186**. The slide plate **185** is arranged between the spacer **184** and the head **180** of the screw **179** and between the thread guides **169** and the collars **155** on the studs **154** with the neck **181** on the screw **179** and the necks **163** on the studs **154** disposed in the slots **186**. The necks **181** and **163** are long enough to accommodate the slide plate **185** for longitudinal sliding movement as provided by the slots **186** and are of a diameter only slightly less than the width of the slots **186** to guide the slide plate **185** in sliding.

A releasing pin **187** is struck out of the slide plate **185** adjacent to both of the tension devices **152** and **153** and is arranged to enter between the tension discs **156** when the slide plate **185** is actuated. To move the slide plate **185**, there is provided on the end of the presser lifter shaft **131** a crank arm **188** having a crank pin **189** at the end thereof. The crank pin **189** extends into a slot **190** in the slide plate **185**, which slot includes a first portion **191** having a radial displacement relative to the axis of the shaft **131** and a second portion **192** formed concentrically relative to the axis of the shaft **131**.

Because of the lost motion connection in the presser lifter mechanism between the link **149** and arm **127**, which is designed to permit rising and falling of the presser bar **116** in accordance with variations in the thickness of the work without transmitting this motion to the presser lifter mechanism, the initial actuation of the lever **134** will rotate the shaft **131** to take up the lost motion in the presser lifter mechanism and will not raise the presser foot **119** from the work. It is this initial rotation of the shaft **131** that is used to effect release of the needle thread tension mechanism. Thus, upon the initial rotation of the shaft **131**, the crank pin **189** cooperates with the radial displacement portion **191** of the slot **190** to effect a cam action upon the slide plate **185** to force the plate from its normal position as seen in Fig. 13 to the left as seen in Figs. 14 and 15. This motion of the slide plate **185** forces the releasing pins **187** between the tension discs **156** to move them out of cooperative engagement to release the tension placed thereby upon the needle threads. Upon continued rotation of

the shaft 131 to life the presser mechanism, the crank pin 189 cooperates with the concentric portion 192 of the slot 190 to hold the slide 185 with the releasing pins 187 in tension-releasing position without effecting any further penetration of the pins 187 between the discs 156. The primary advantage of this construction is that the tension mechanism is completely released independently of the amount that the presser foot 119 is raised from the work, which varies considerably with the operator and the work or operation being performed. At the same time, there is no danger that the releasing pins 187 will be forced against the periphery of the discs 156 with the consequent stressing and warping of the parts.

The looper thread tension comprises a pair of tension devices 193 and 194 which are constructed the same as the needle thread tension devices 152 and 153 and the parts thereof are designated by the same reference numerals as used for the corresponding parts of the tension devices 152 and 153. In the looper thread tension devices 193 and 194, the studs 154 are threaded into bosses 195 and 196 respectively on the back of the standard 2 with a thread guide having an upstanding arm 197 with a pair of thread eyes 198 and a depending arm 199, Fig. 9, with a thread eye 200, and a fastening arm 201 of a guard 202 clamped by the studs 154 to the standard 2. The guard 202 includes a vertically disposed apron 203, see Figs. 2 and 3, which extends transversely of the machine and rises from the edge of the cloth plate 17 at the rear of the standard. A plate 204 underlying the cloth plate and secured thereto by screws 205, and having thread eyes 204*a* directs the looper threads into the usual looper thread passage 206 extending diagonally across the cloth plate 17 from the edge thereof adjacent to the guard 202 to a point within the space 10 of the bed, see Figs. 16 and 17, and having a threading slot 207.

Looper thread take-up

The looper thread take-up is illustrated in Figs. 10, 16, 17, 18, 19, 20 and 32 of the drawings. This mechanism forms the subject matter of U. S. patent application Serial No. 611,600, filed September 24, 1956, now Patent No. 2,910,950, granted November 3, 1959, but is herein described in order to provide a complete understanding of the construction and operation of the present machine.

In the space 10 of the bed, there is provided a flat 208 on the wall 7 on which flat is secured a mounting plate 209 by means of screws 210. The mounting plate 209 has a channel or groove 211 which receives a base plate 212 of a sheet metal bracket 213, which base plate is adjustably secured to the mounting plate 209 by a screw 214 passing through an elongated slot 215 in the base plate 212 and threaded into the mounting plate 209. The base plate 212 has an integral upstanding arm 216 arranged longitudinally of the machine and carrying a laterally extending supporting arm 217 that is bent to provide an ear 218 arranged parallel to the arm 216. Aligned thread eyes 219 and 220 are formed in the arm 216 and ear 218 respectively. The bracket 213 is disposed adjacent to the discharge of the looper thread passage 206 with the looper threads, designated T_1 and T_2 in Figs. 16–20 running from the passage 206, through the thread eye 219, and then through the thread eye 220. A wire separator finger 221 is carried by the arm 216 and extends upwardly between the threads T_1 and T_2. On the opposite side of the mounting plate 209 from the bracket 213 is a wire thread guide 222 adjustably secured by a screw 223 passing between two parallel portions of the wire to the plate 209. The guide 222 has two upstanding fingers 224 and 225. The looper thread T_1 is directed around the finger 224 toward the inner one of the loopers 78 and the thread T_2 is directed around the finger 225 toward the outer one of the loopers 78.

Formed in the mounting plate 209 is a groove 226 arranged longitudinally of the machine. A stationary wire thread controlling element 227, formed with an elliptical base portion 228 seated in the groove 226 and in effect defining an elongated slot through which passes a screw 229 that adjustably secures the element 227 to the plate 209. The element 227 has a vertically arranged arcuate portion 230 and a straight horizontal portion 231 which extends toward the lateral arm 217 of the bracket 213, and passes through a notch 232 in the arm 217 with the free end of the element 227 disposed beyond the arm 217. A second stationary wire thread controlling element 233, formed with an elliptical base 23 is seated in the groove 226 forwardly of the element 227 and is adjustably secured in the groove 226 by a screw 235. The element 233 includes a substantially straight generally vertical portion 236 disposed forwardly of the vertical portion 230 of the element 227 and a straight horizontal portion 237 arranged in spaced parallel relation vertically below the horizontal portion 231 of the element 227. The horizontal portion 237 of the element 233 also passes through a notch 238 in the arm 217 with the free end thereof disposed beyond the arm 217.

The looper thread take-up mechanism acts upon the leads of the looper threads between the thread eyes 219 and 220, and comprises an angle bracket 239, Fig. 10, including a vertical arm 240 that is adjustably secured to the looper carrier 76 by a screw 241 passing through an elongated slot 242 in the arm 240 and threaded into the looper carrier. The bracket 239 also includes a horizontal arm 243 to the outer end of which is secured by a screw 244 a take-up finger 245 formed from a continuous piece of wire that is bent back upon itself at substantially its mid point, as at 246, to provide two spaced arms 247 and 248, the free end portions 249 of which are parallel and underlie the head of the screw 244 on opposite sides thereof and which can be adjusted relative to the head of the screw 244 for adjustably securing the take-up finger 245 to the arm 243. The arms 247 and 248 of the take-up finger 245 are similar and include, in addition to the free end portion 249, a vertical portion 250 rising from the portion 249, and a forwardly and upwardly extending portion 251 that terminates in a generally vertical arcuate portion 252 presenting a convex edge to the threads and having the most advanced point thereof, designated 253 disposed adjacent to the horizontal portion 237 of the stationary element 233 so that upwardly from the point 253, the portion 252 is rounded toward the loopers to define a throat 254 with the stationary element 227.

Since the take-up finger 245 is mounted upon the looper carrier 76 it will have the same motion as the loopers 78, and to accommodate the needle avoiding motion of the loopers, the arcuate portions 252 of the arms 247 and 248 are spaced from the stationary elements 227 and 233 and from the arm 216 and ear 218 of the bracket 213. The lead of the threads T_1 and T_2 between the thread eyes 219 and 220 is through the space between the stationary thread guiding elements 227 and 233 and to the right of the take-up finger 245. The successive actions of the take-up mechanism are illustrated in Figs. 17, 18, 19 and 20. In Fig. 17 the loopers 78 have completed the loop seizing or advancing motion and have begun the loop shedding or return motion. Upon the initial return motion of the loopers 78, the take-up finger 245 moves to the right in Fig. 17 and the threads T_1 and T_2 are moved into the throat 254. Upon the continued return motion of the loopers, the threads will be held in the throat 254 as it moves to the right and the threads will slide along the lower edge of the horizontal portion 231 of the element 227, thus effecting the take-up action. When the points on the arcuate portions 252 of the take-up arms 247 and 248 which are at the same elevation as the horizontal portion 231 of the stationary element 227, which are the points that have been pushing the threads T_1 and T_2, pass beyond the end of the horizontal portion 231, the threads will be cammed downwardly by the cooperation of the arcuate portions 230 and 252, Fig.

18. To obtain this action, the arcuate portions 252 are arranged slightly higher than the arcuate portion 230 so that as the points along the arcuate portions 252 successively pass the corresponding points of the arcuate portion 230 the throat formed between the element 47 and finger 65, in which throat the threads are held, is moved progressively downward and carries the threads downward. During this time, there is a reduced take-up action effected upon the threads T_1 and T_2 since the arcuate portion 230 is formed on an arc that approaches an arc drawn from a center defined by the line between the thread eyes 219 and 220, and the limbs of the threads T_1 and T_2 are thus swung around the thread eyes 219 and 220 as well as expanded. This is in accordance with the thread requirements of the looper since while reversing directions at the end of its return stroke, there is only a small motion of the looper and thus only a little thread given up.

Cast-off of the looper threads preferably occurs immediately after the needle has entered the loop of looper thread and the looper has released the loop of needle thread from the previous stitch, which is near the end of the return motion of the loopers 78 at cast off. The arcuate portions 252 of the take-up arm 247 and 248 have completely passed beyond the arcuate portion 230 of the element 227, and the threads slide onto the inclined portions 251, Fig. 19. At this time the radius from the eyes 219 and 220 to the take-up arms 247 and 248 decrease along the length of the arms and the threads are free to fall toward the element 233. Thereafter, as the loopers advance and require thread, the take-up finger 245 advances and gives up thread. There is a certain amount of slack thread and the stationary thread controlling element 233 is designed to control this slack.

Needle thread handling mechanism

The needle threads, designated T_3 and T_4, from a supply are threaded individually, as seen in Fig. 1, through the eyes 172 of the arms 171, the eyes 175 of the arms 173, the tensions 152 and 153, the eyes 176 of the arms 174, and then through the eyes of an adjustable thread guide 255 secured to the bracket-arm 3 by a screw 256 and a screw 257 that extends through an elongated slot 258 in the guide 255 which provides for angular adjustment of the guide about the axis of the screw 256. From the guide 255 the needle threads T_3 and T_4 pass a thread-engaging finger 259 adjustably secured to the bracket-arm 3 by a screw 260, and then through the eyes 52 of the take-up arm 50, and a slack-thread controlling tension device 261 mounted on a plate 262 that is secured by a screw 263 to a flat 264 at the front on the bottom of the head 4.

The needle thread handling mechanism and the stitch formation employed in the illustrated embodiment of the invention are old and well known being similar to that of prior art constructions, and it is not believed to be necessary to disclose the same further in this application.

Lower four-motion feeding mechanism

The herein described feeding mechanism has been divided from this application and forms the subject matter of divisional application Serial No. 693, 927, filed November 1, 1957.

With reference to Figs. 3, 5, 10, 11 and 12, the feeding mechanism comprises a feed shaft 265 arranged longitudinally of the bed and extending through the bed section 15 and the space 10. The shaft 265 is journaled in a bearing bushing 266 in the boss 35, a bearing bushing 267 in the wall 7, and a bearing bushing 268 in the boss 74. Adjacent the boss 35, there is mounted on the shaft 265 a gear 270 that meshes with a similar gear 271 on the main shaft 36. The shaft 265 extends through the bushing 268 and on the cantilevered end thereof is mounted a conventional adjustable crank 272 comprising a crank plate 273, see Fig. 11, having a diametrically arranged slot 274 in which is mounted for sliding movement a slide block 275 having a crank pin 276. Adjustment of the slide block 275 is accomplished by means of a screw 277 threaded into the block and having a circumferential groove 278 in the head thereof which cooperates with a detainer 279 secured to the crank plate 273 by screws 280 to provide for rotation of the screw 277 while holding it against axial movement.

The strap end 281 of a pitman 282 is mounted on the crank pin 276 and held thereon by a nut 283 threaded onto the end of the pin. The other end of the pitman 282 is secured by a screw 284 to a pivot pin 285 which is journaled in the tines on the bifurcated end of a crank 286. The crank 286 is secured to a feed advance shaft 287 by a split ring connection including clamping screws 288. The shaft 287 is arranged parallel to the feed shaft 265 and is journaled in a bearing bushing 289 in a boss 290 extending upwardly from the bottom wall 8 of the bed and in a bearing bushing 291 in the wall 7. The hub 292 of a feed advance rocker 293 is secured to the shaft 287 by screws 294. The rocker 293 has a pair of upstanding arms 295 between which is journaled a pin 296 secured by a screw 297 in the strap end of a horizontally disposed feed bar 298.

The free end of the feed bar 298 is provided with a split strap 299, see Fig. 12, having a bore that is arranged on an axis parallel to the axis of the feed shaft 265 and in which is secured by a clamping screw 300 a lateral stud 301 of an adapter 302. The adapter 302 has a thread 303 with a diametrical groove 304 that receives the shank 305 of a feed dog 306 which is adjustably secured to the adapter by means of a screw 307 extending through an elongated slot 308 in the shank 305 and threading into the adapter. In the usual manner, the feed dog 306 has work engaging teeth 309 that are extended through a slot 310 in the throat plate 23 to engage the work.

The feed lift comprises an eccentric 311, Fig. 11, mounted on the feed shaft 265 and secured by a screw 312. A strap 313 at one end of a pitman 314 surrounds the eccentric 311, and at its other end, the pitman 314 carries a pivot pin 315 secured thereto by a screw 316 and having the ends thereof journaled in lugs 317 integral with the feed bar 298.

The lower four-motion feeding mechanism operates in a somewhat conventional manner. Upon rotation of the main shaft 36, rotation will be imparted to the feed shaft 265 in the ratio of one-to-one, which will effect rotation of the feed lift eccentric 311 and the feed advance crank 272. Rotation of the eccentric 311 will, through the pitman 314, raise and lower the feed bar 298. The feed bar 298 is advanced while raised to effect feeding of the work and returned while lowered by the crank 272 through the pitman 282, crank 286, feed advance shaft 287 and rocker 293. Adjustment of the feed advance to vary the stitch length is accomplished in the crank 272.

The feed dog 306 can be adjusted vertically relative to the adapter 302 by means of the connection comprising the slot 308 and screw 307, and can be adjusted laterally and can be tilted about a transverse axis by means of the stud 301.

Another desirable feature of a sewing machine feeding mechanism is that the feed dog should remain parallel to the work supporting surface during the feeding stroke. This end has been accomplished in the present construction by arranging the feed advance shaft close to the cloth plate 17 and by designing the feed rocker 293 to be very short. Thus, upon oscillation of the feed rocker 293 about the axis of the feed advance shaft 287, there is an appreciable vertical displacement of the end of the feed bar 298 connected thereto which is designed to coincide with the actuation of the feed lift mechanism. As the feed lift mechanism raises the feed dog, the feed advance motion of the rocker 293 acting

upon the other end of the feed bar 298 will not only advance the feed bar but will also raise the end of the feed bar 298 connected thereto to offset the front to back tilting of the feed bar during the feeding stroke by the feed lift mechanism.

Differential feeding mechanism

In Figs. 21–25 there is illustrated a differential feeding mechanism which comprises a modification of the above feeding mechanism. In this construction, the feed advance rock shaft 287 and the mechanism for oscillating it are the same as in the plain lower four motion feeding mechanism and are designated by the same reference numerals.

There is provided a modified main feed bar 318 having a strap end 319 in which is secured the pin 296 by a screw 297. The opposite ends of the pin 296 are journaled in the upstanding arms 295 of a modified feed advance rocker 320 having a hub 292 mounted on the shaft 287 and secured by screws 294. The rocker 320 is the same as the rocker 293 except that it also includes a depending crank arm 321.

The main feed bar 318 has a pair of laterally extending lugs 322 in which is slidably mounted an auxiliary feed bar 323 in the form of a rod that is arranged generally parallel to the main feed bar 318. Mounted on the auxiliary feed bar 323 is a collar 324 which is secured thereon in adjusted position by screws 325. Extending laterally from the collar 324 is an arm 326, Figs. 23 and 25, having the free end 327 thereof slabbed and extending through a slot 328 in a wear plate 329 secured to the main feed bar 318 by screws 330, which arm 326 holds the auxiliary feed bar 323 against turning while providing for axial sliding relative to the main feed bar 318. Also extending laterally from the collar 324 is a stud 331 upon which is pivotally mounted the strap end 332 of a link 333 secured thereon by a nut 334 screwed onto the end of the stud 331. The other end of the link 333 is bifurcated to provide tines 335 that embrace the opposite faces of a vertical arm 336 of a bell chank lever 337. The arm 336 has a substantially radial slot 338 in which rides a slide block 339, Fig. 23, that is pivotally mounted upon a headed pin 340 extending through the tines 335 of the link 333 and secured therein by threads 341 formed upon the head end of the pin 340 and screwed into the adjacent one of the tines 335. The bell chank lever 337 has a hub 342 secured by a screw 343 to a pivot shaft 344 that is arranged parallel to the feed advance rock shaft 287 and journaled for oscillation in a bearing bushing 345 in the boss 290 and in a bearing bushing 346 fitting into an aperture 347 in the wall 7, which aperture 347, when the machine is provided without a differential feed, may be closed by a plug 348, Fig. 5. A second arm 349 on the bell chank lever 337 has secured thereto by a screw 350 a pivot pin 351 upon the ends of which are pivotally mounted the tines on the bifurcated end of a connecting link 352. The opposite end of the connecting link 352 is also bifurcated and the opposed tines are pivotally mounted upon the ends of a pivot pin 353 secured by a screw 354 in the end of the crank arm 321 on the feed advance rocker 320.

Intermediate its ends, the link 333 is connected by means of a pivot pin 355 to the bifurcated end of a link 356, the opposite end of which is connected by a pivot pin 357 to an arm 358 of a control lever 359 pivoted intermediate its ends on the reduced end of a stud 360 secured by a screw 361 in an aperture 362, Fig. 3, in the boss 290. The lever 359 has a control arm 363 extending from the rear of the bed 1 and being adapted to be secured to an operator controlled means (not shown) such as a foot treadle.

By means of the control lever 359 the operator can move the slide block 339 on the end of the link 333 in the slot 338 toward and away from the pivot shaft 344, thus varying the operative relation between the bell crank lever 337 and the auxiliary feed bar 323. In operation, feed advance motions are imparted to the main feed bar 318 in the same manner as for the feed bar 298 in the plain feeding mechanism, i.e., from the adjustable crank 272, through the pitman 282, crank 286, feed advance rock shaft 287 and feed rocker 320. Feed advance motions are imparted to the auxiliary feed bar 323 by the crank 321, connecting link 352, bell crank lever 337 and link 333. The feed stroke of the auxiliary feed bar 323 is determined by the positioning of the end of the link 333 along the arm 336 of the bell crank lever 337, which in turn is determined by the actuation of the control lever 359, the mechanics being made so that the stroke of the auxilary feed will be the same as the stroke of the main feed when the end of the link 333 is substantially at the mid point along the slot 338 in the arm 336, will be greater when beyond the mid point, and will be less when closer to the pivot shaft 344.

There is provided an adjustable feed lift mechanism comprising the eccentric 311 secured to the feed shaft 265 by the screw 312. Surrounding the eccentric 311 is a strap portion 364 of a block 365 having a grooved flat face 366 to which is adjustably secured an arm 367 by means of screws 368 extending through elongated slots 369 in the arm 367 and threaded into the block 365. A pivot pin 370 is secured in the end of the arm 367 by means of a screw 371, which pin 370 is journaled in lugs 372 integral with and depending from the main feed bar 318.

A main feed dog 373 has a lateral stud 374 secured in the end of the main feed bar 318 by a screw 375. An auxiliary feed dog 376 is mounted on the end of the auxiliary feed bar 323 by means of a lateral stud 377 secured in the end of the feed bar 323 by a screw 378. In this construction, lateral and angular or tilting adjustment of the feed dogs is provided by the studs 374 and 377 whereas vertical adjustment of the feed dogs is provided by the adjustable arm 367 of the feed lift mechanism. This feed dog height adjustment is particularly useful with the differential feeding mechanism since it will simultaneously effect an adjustment of both the main feed dog 373 and the auxiliary feed dog 376, and eliminates the need for two separate adjustment means such as provided by the adapter 302 for the feed dog 306.

Attachment mechanism

One of the primary features of the present invention is that there is provided a sewing machine that is adapted to receive any selected one or a combination of various attachments. Toward this end, there is provided a pair of attachment shafts, Figs. 26 and 27, arranged parallel longitudinally of the bracket-arm and comprising an upper attachment shaft 379 and a lower attachment shaft 380. The upper attachment shaft 379 is journaled at the standard end of the bracket-arm in a bearing bushing 381 seated in a bore 382 in a boss 383 on the bracket-arm, the open end of which bore is closed by a cap screw 384. At the head end of the machine, the upper attachment shaft 379 is journaled in a pair of lugs 385 and 386, each having a bore 387 and a bearing bushing 388 seated therein.

The lower attachment shaft 380 is journaled at the standard end of the bracket-arm 3 in a bearing bushing 389 seated in a bore 390 in a boss 391 on the bracket-arm, the open end of which bore 390 is closed by a cap screw 392. At the head end, the shaft 380 is journaled in a pair of lugs including the lug 130 and a lug 393, each having a bore 394 and a bearing bushing 395 seated therein.

To avoid complex and uneconomical driving connections for the attachment shafts 379 and 380, they are arranged parallel to the main shaft 36. Thus, the shafts 379 and 380 are arranged angularly through the bracket-arm 3 with the ends at the head 4 disposed to the rear

of the bracket-arm and the ends at the standard 2 disposed to the front. This arrangement simplifies the construction in that, at the head end of the machine, the ends of the shafts 379 and 380 which are to be connected to the attachment actuating mechanism are disposed in back of the presser bar and the needle bar thereby avoiding complications in the needle mechanism and the presser mechanism and simplifying the design of the attachment mechanisms. In addition, the upper attachment shaft 379 is arranged vertically above the lower attachment shaft 380, and they are spaced apart a distance adequate to accommodate the hub 57 of the needle bar rock lever, with the upper shaft 379 passing over the hub 57 and the lower shaft 380 passing under the hub 57. With the pivot shaft 59 disposed at substantially the mid point longitudinally of the bracket-arm 3, the shafts 379 and 380 pass over and under the mid point of the pivot shaft 59.

To avoid twisting and binding, the pivot shaft 59 is arranged normal to the longitudinal axis of the bracket-arm 3 and the opposite ends of the rock lever 56 are disposed on a line normal to the axis of the pivot shaft 59. At the same time, the connection to the connecting rod 62 at the ball joint 63 at the end of the lever arm 58 is located vertically above the main shaft 36, Fig. 9. To provide the necessary clearance for the attachment shafts 379 and 380, the arms 55 and 58 of the rock lever 56 are offset axially of the hub 57 so that the arm 58 joins the hub 57 at the rear of the bracket-arm behind the shafts 379 and 380 and the arm 55 joins the hub 57 at the front of the bracket-arm in front of the shafts 379 and 380. Since the needlebar 44 is located in front of the head end of the attachment shafts 379 and 380, the arm 55 is disposed wholly in front of the shafts and is free to oscillate clear of the shafts. Also, since the connection at the ball joint 63 is located behind the shafts 379 and 380, the arm 58 is disposed wholly behind the shafts and is free to oscillate clear of the shafts.

To illustrate the use of the attachment shafts 379 and 380 there is hereinafter disclosed two attachments, i.e., an alternating presser mechanism, Figs. 26–30, which employs both shafts, and a close-coupled puller feed, Figs. 34–37, which employs only the lower attachment shaft 380.

Alternating presser mechanism

When an alternating presser mechanism is desired, both of the attachment shafts 379 and 380 are used. The drive means for the shafts comprise an adjustable double eccentric 396 mounted on the main shaft 36. The eccentric 396 is of somewhat conventional construction and includes a hub 397 secured to the main shaft 36 by a screw 398 and having a first slide 399 that is adjustable diametrically of the shaft 36 by a screw 400 and held in adjusted position by screws 401, and a second slide 402 that is also adjustable diametrically of the main shaft 36 by a screw 403 and is held in adjusted position by screws 404. The slide 399 carries an eccentric 405 that is surrounded by the strap end of a pitman 406 which is pivotally connected at its upper end to the free end of a crank 407 secured on the lower attachment shaft 380. The slide 402 carries an eccentric 408 that is surrounded by the strap end of a pitman 409 which is pivotally connected at its upper end to the free end of a crank 410 secured on the upper attachment shaft 379. To effect an adjustment of the eccentric 396, there is provided an aperture in the front wall 11 of the bed that is closed by a gasketed oil-tight screw plug 411, Figs. 5 and 9.

Mounted in the presser bar bushing 117 in the head 4 is a main presser bar 412 having a presser foot 413 secured to the lower end thereof. A collar 414 is secured to the upper end of the presser bar 412, which collar includes an arm 415 that extends into the vertical groove in the wear plate 128 to hold the presser bar 412 against turning. The presser lifter mechanism, which is the same as for the regular presser bar 116 hereinabove described includes the link 149 that has a lost-motion connection with the arm 415 through the pin 150 which is carried by the arm 415 and the slot 151 in the link 149.

The collar 414 is pivotally connected to the lower end of a link 416 by means of a pivot pin 417, which link, at its other end, is pivotally connected to the free end of a lever 418 by means of a pivot pin 419. The other end of the lever 418 is pivotally mounted on a pin 420 secured by a set screw 420*a*, Fig. 2, in a bore 421 in a boss 422 at the back of the head 4. When an alternating presser mechanism is not provided on the machine, an L-shaped cover 423, Figs. 3 and 8, having a shank 424 secured in the bore 421 by the screw 420*a* covers the machined side surface of the boss 422 and the opening in the rear wall of the head 4 for the lever 418.

Intermediate its ends, the lever 418 carries a transverse pivot pin 425 which comprises a floating pivot or fulcrum for a rock lever 426 that is pivoted thereon intermediate its ends. The forward end of the rock lever 426 is pivotally connected to a feed bar 427 by means of a pivot pin 428 carried by the feed bar, the feed bar 427 having a feeding foot 429 secured to the lower end thereof. The feed bar 427 is guided to prevent turning while providing for orcillation thereof in the line of feed by a bracket 430 secured to the lower portion of the head 4 by screws 431 and having a channel that is closed by the end of the head to define a slot 432 through which the feed bar 427 extends.

The rear end of the rock lever 426 is pivotally connected by a pivot pin 433 carried thereby to the lower end of a link 434, which, at its upper end is pivotally mounted by means of a pivot pin 435 to the free end of a crank 436 that is secured to the upper attachment shaft 379. While any suitable means may be used for biasing the mechanism, such as the pneumatic device forming the subject matter of the U.S. Patent of Odermann et al., No. 2,750,908, for simplicity there is employed in the disclosed machine a spring biasing means comprising a leaf spring 437 that is bent around the hub of the lever 418 at the pivot stud 420. The one end of the spring 437 overlies a lateral extension 438 of the floating fulcrum pin 425 while the other end of the spring is engaged by an adjustable abutment comprising a rod 439, similar to the rod 122, and carried by the threaded bushing 123.

Connected to the free end of the lower attachment shaft 380 is a crank 440 that is pivotally connected by a pivot pin 441 at its free end to one end of a link 442. The other end of the link 442 is connected by a pivot screw 443 to an intermediate point on the feed bar 427.

A modified cover plate 444 closes the open end of the head 4.

In operation, with the presser foot 413 in engagement with the work, as the upper attachment shaft 379 is turned clockwise in Figs. 29 and 30, it will, through the crank 436 and link 434, lift the rear end of the rock lever 426, causing it to pivot about the floating fulcrum pin 425 and thus lowering the feed bar 427. When the feeding foot 429 contacts the work, the pivot pin 428 becomes a stationary pivot for the lever 426 so that further lifting of the other end of the lever 426 by continued rotation of the upper attachment shaft 379, will lift the floating fulcrum pin 425 against the action of the spring 427. The feed bar 427 is thereby biased downwardly into engagement with the work by the spring 437. As the fulcrum pin 425 is lifted, it will cause the lever 418 to pivot about the pin 420 thereby lifting the presser bar 412. The timing is synchronized with the lower feeding mechanism so that the feeding foot engages the work while the lower feeding mechanism is operating, and while engaging the work, it is oscillated about the pivot

pin 428 to feed the work by the lower attachment shaft 380 through the crank 440 and link 442.

As the upper attachment shaft 379 is turned counterclockwise, the end of the rock lever 426 is lowered, which permits the spring 437 to lower the fulcrum pin 425 and thus through pivoting of the lever 418 about the pin 420 lowers the presser bar 412. When the presser foot 413 engages the work, the spring 437 then biases the presser foot 413 against the work and further turning of the upper attachment shaft 379 will pivot the rock lever 426 about the fulcrum pin 425 to raise the feed bar 427, whereupon counterclockwise rotation of the lower attachment shaft will effect the return of the feed bar 427.

Close-coupled puller feed mechanism

In Figs. 34–37 there is disclosed a close-coupled top puller feed mechanism which may be applied to the machine when desired and with which only the lower attachment shaft 380 is used.

To secure the top puller feed mechanism to the head 4, there is provided a groove 445 in the boss 422, and a groove 446 in a boss 447 disposed at the bottom of the head 4, which grooves receive tongues as at 448, Fig. 37, on a bracket 449, the bracket 449 being secured to the head 4 by screws 450 and 451 which extend through the bracket 449 and are threaded respectively into the bosses 422 and 447. The bracket 449 is provided with two laterally extending lugs 452 and 453, the lug 452 having a bore 454 for slidably receiving a presser bar 455 and the lug 453 having a threaded bore 456 axially aligned with the bore 454 for receiving a threaded bushing 457 which in turn has an axial bore 458 that slidably receives the top of the presser bar 455. The presser bar 455 is biased downwardly by a spring 459 coiled about the bar and bearing at its lower end against a collar 460 secured to the presser bar while the bushing 457 comprises an adjustable abutment for the upper end of the spring 459.

For raising and lowering the pressure bar 455, the collar 460 has a laterally extending arm 461 which extends through a vertically elongated slot 462 in the bracket 449 that, at the same time, prevents rotation of the presser bar 455. A shaft 463, arranged at a right angle relative to the presser bar 455, is journaled in the bracket 449 and in an arm 464 integral with the bracket 449 and disposed in spaced parallel relation with the lower portion of the bracket to define a slot 465. A presser lifter cam 466 is mounted on the shaft 463 within the slot 465 and is secured thereon by a pin 467. Upon the free outer end of the shaft 463 there is an operating handle 468 for manually rotating the shaft 463 whereupon the cam 466 will cooperate with the arm 461 to lift the presser bar 455.

A yoke 469 is secured to the lower end of the presser bar 455 by a set screw 470. The yoke 469 has a pair of spaced arms 471 and 472 in which is secured by a set screw 473 in the arm 471 an axle 474. Mounted for rotation on the axle 474 is a feed wheel or roller 475 having a ridged periphery that engages the work directly behind the presser foot 119. Adjacent the arm 471, the feed roller 475 has a clutch cavity 476 in which is fitted a conventional oneway clutch comprising a clutch disk or spider 477 having portions on the periphery thereof cutaway to receive spring-pressed clutch balls 478. The clutch disk 477 is secured by screws 479 to the end of an actuating arm 480 that is connected by a link 481 to the free end of a crank 482 on the lower attachment shaft 380. Thus, upon oscillation of the lower attachment shaft 380, oscillation will be imparted to the arm 380, which will in turn, impart intermittent one-way rotation to the feed roller 475. To prevent backward rotation of the feed roller 475 there is provided an anchor means comprising a clutch disk 483 and seated in a clutch cavity 484 adjacent to the arm 472 of the yoke 469 and secured to the arm 472 by screws 485. The clutch disk 483 is provided with clutch balls 486 seated in the cutaways in the periphery thereof, which clutch balls are designed to permit free rotation of the feed roller 475 under the driving action of the arm 480 and clutch balls 478 but will prevent rotation in the reverse direction.

A modified face plate 487 which provides for the passage of the connections from the lower attachment shaft 380 to the arm 480 is used to close the end of the head 4.

Miscellaneous attachment mechanisms

The other attachment mechanisms which the present machine is designed to accommodate include the independent top four-motion feed mechanism which forms the subject matter of U.S. patent application Serial No. 664,385, filed June 7, 1957, now Patent No. 2,905,120, September 22, 1959, and the differential ruffling mechanism which forms the subject matter of U.S. patent application Serial No. 671,913, filed July 15, 1957. In the independent top four-motion feed mechanism both the upper and lower attachment shafts 379 and 380 are used, and the feeding foot is carried directly by the shafts. The differential ruffling mechanism is carried by a mounting plate that is adapted to be secured to the flat 264 in place of the slack thread controlling device 261, and is driven by the lower attachment shaft 380 while the upper attachment shaft 379 is replaced by a pair of coaxial control shafts which are used independently for adjusting simultaneously the stroke of the ruffling blades and for adjusting independently the stroke of the differential blade relative to the regular blade.

The present machine is adapted to be fitted with a trimming mechanism that is driven from the needle bar rock lever 56, which mechanism forms the subject matter of U.S. patent application Serial No. 648,053, filed March 25, 1957, now Patent No. 2,903,986, September 15, 1959. The machine is also adapted to be fitted with a thread laying mechanism. To accommodate the oscillating rod of the thread laying mechanism, the head 4 has a pair of vertical axially aligned bores including a bore 488 in the top and a bore 489 in the bottom. The head 4 has vertically aligned bores 490 and 491 in the top and bottom respectively for receiving a trimmer bar, and a second bore 492 in the bottom for a stationary pin for preventing turning of the trimmer bar. All of these bores are closed by plugs when the thread laying mechanism and/or trimming mechanism are not used to preserve the oil-tight character of the interior of the frame. There is also provided a bore 493 in the front wall of the bracket arm 3 for a pivot pin for the trimmer actuating mechanism, which bore 493 is designed to be closed by a cap screw 494. A vertical groove 495 having a threaded hole 496 is provided in the bed for receiving the ledger blade of the trimming mechanism.

The present machine is also adapted to be fitted with a puller feed mechanism in accordance with U.S. patent application Serial No. 648,051, filed March 25, 1957, and toward this end there is provided an opening 497 in the rear wall 12 of the bed 1 directly behind the standard 2, which opening is designed to be closed by a gasketed oil-tight plate 498. When a lower puller feed mechanism is to be used, the plate 498 is removed and a housing is substituted therefor, the housing being in communication through the opening 497 with the interior of the closed compartment 9 and accommodates the puller feed drive elements that are actuated from the eccentric 396 on the main shaft 36 by a pitman extending through the opening 497. At the rear of the head end of the bed 1, there is provided a machined flat surface 499 to which the feed roller end of the puller feed mechanism is mounted.

Lubrication

The present machine is designed to be completely lubricated automatically and toward this end, the lower

portion of the closed compartment 9 of the bed 1 is filled with oil and thus comprises an oil reservoir. The level of the lubricant in the compartment 9 is indicated by a dip stick 500, Fig. 9, while the aperture closed by the screw plug 411 may be used for a filling aperture. The level of the lubricant is designed to be at a height so that the gear 270 and the counterweight 105 will contact the same and generate a lubricant mist within the bed section 15 of the closed bed compartment 9. The hollow interior of the standard 2, bracket-arm 3 and head 4 are in open communication with the closed compartment 9 of the head and filled with an oil mist by an oil sling 501 mounted on the main shaft 36 within the standard section 14 of the compartment 9. The oil sling 501 may be of any suitable construction, for example as illustrated may be the same as disclosed and claimed in United States patent application Serial No. 648,579, filed March 26, 1957, now Patent No. 2,942,566, granted June 28, 1960, a division of U.S. patent application Serial No. 553,806, filed Dec. 19, 1955. Thus, all the mechanism in the bed compartment 9, standard 2, bracket-arm 3 and head 4 are splash lubricated. There is, however, provided additional means for lubricating the bearings 60 and 61 for the pivot shaft 59 of the needle bar rock lever 56, which, as seen in Figs. 2 and 4, comprises an oil plate 502 secured by screws 503 in the top of the bracket-arm 3 and upon which plate oil thrown by the sling 501 is deposited. The plate 502 has two spouts 504 one of which is directed to each of the oiling holes 505 in the bearings 60 and 61. A wick 506 has one end thereof secured on the top of the plate 502 by punched out cleats 507 so that it will become saturated with oil. The other end of the wick 506 extends through a bore 508 in the head 4 and a mating bore in the side of the needle bar bushing 46 to lubricate the same. A cap screw 509 is threaded into the top of the bushing 46 to prevent the pumping of oil by the needle bar 44.

As seen in Fig. 4, the bottom of the interior of the head 4 and bracket-arm 3 are formed with a smooth slope toward the standard 2 so that the excess of oil delivered to the head will automatically drain back to the reservoir in the bed 1.

Lubrication for the bearing 38 of the main shaft 36, Figs. 1 and 4, is provided by a cavity 510 in the bed which collects oil and delivers it to the shaft 36 by means of a bore 511 in the bed and a communicating bore 512 in the insert 39 and the bearing bushing 38. The excess oil is prevented from escaping outwardly of the shaft 36 to the hand wheel 40 by an oil sling 513 on the hand wheel and is returned to the reservoir by a bore 514. The bearing 37 of the main shaft 36, Figs. 4 and 5, is lubricated by oil caught in a cavity 515 in the bearing bushing 37 and delivered by bores in the bushing to the bearing surface. The bearings 102 and 103 of the looper drive shaft 101 are lubricated by means of oil collecting cavities 516 and 517 which are formed in the top of the bushings 102 and 103 respectively.

Lubrication of the mechanism within the space 10 of the bed is provided by means including an oiler 518 in the form of a cylindrical plug extending through the wall 7 into the closed compartment 9 and having an oil collecting cavity 519 within the compartment 9. The oiler 518 has a wick-filled axial bore that communicates with each of a plurality of wick-filled tubes such as the tube 520 which conducts lubricant from the oiler 518 to the crank pin 276 of the feed advance mechanism and the tube 521 which conducts lubricant to the feed lift eccentric 311. The oiler 518, as seen in Fig. 5, has additional openings that are closed by cap screws 522 which are used in the lubrication of other points in the bed mechanism and particularly of the differential feed mechanism. The feed advance shaft 287 extends into the bed compartment 9 where it is provided with an oil collecting cavity 523 that communicates with the wick-filled hollow of the shaft. Lubricant is thus conducted to the bushings 289 and 291 and outwardly to the pivot pin 285 such as by a wick (not shown). The pivot shaft 344 is lubricated in a similar manner and toward this end is provided with an oil collecting cavity 524, Fig. 21, within the compartment 9.

For lubrication of the bearing 73 for the looper bar 72 and the bearing 268 for the feed shaft 265, there is provided a bore 524 in the bottom of the bed through the space 10 opening at 525 in the compartment 9 and closed at the outer end by a screw 526. A wick-filled cross bore 527 in the boss 74 closed at the end by a cap screw 528 communicates with the bore 524 and with wick-filled vertical bores 529 that in turn communicates with the bearing surfaces of the bushings 73 and 268.

While the illustration has herein been omitted, the pivot pins, such as the pin at the connecting link 54 in the needle bar mechanism and the pin 295 in the feed advance mechanism, are hollow and adapted to be filled with a wick that will become saturated by oil deposited or seeping thereon for lubrication of the respective bearing surfaces. Also, while it does not from any part of the present invention and therefore has not been illustrated on the drawings, the present machine is designed with means for automatically returning to the reservior in the compartment 9, the excess lubricant which is collected at the bottom of the space 10.

Needle guide

To insure the proper cooperation of the needle and the looper in stitch formation there is provided a needle guide, Figs. 3 and 16, comprising a bracket having a vertical leg 530 seated in a groove 531 in the boss 74 and secured therein for vertical adjustment by means of a screw 532 passing through an elongated slot in the leg 530 and threaded into an aperture 533 in the boss 74. The bracket also has a horizontal leg 534 to which is secured for adjustment laterally of the bed an arm 535 by means of a screw 536 passing through an elongated slot in the leg 534. The arm 535 has adjustably secured thereto by means of the screw 537, the needle guide 538 having the usual beveled engaging faces for guiding and positioning the needles 48 relative to the loopers 78.

Numerous alterations of the structure herein disclosed will suggest themselves to those skilled in the art. However, it is to be understood that the present disclosure relates to a preferred embodiment of my invention which is for purposes of illustration only and not to be construed as a limitation of the invention. All such modifications which do not depart from the spirit of the invention are intended to be included within the scope of the appended claims.

Having thus set forth the nature of the invention, what I claim herein is:

1. In a sewing machine having a bed, a standard rising from one end of said bed, a bracket-arm carried by said standard and terminating in a head overhanging said bed, a main shaft journaled longitudinally in said bed, said bracket-arm having two sets of aligned bearings therein arranged on axes parallel to said main shaft, a pair of attachment shafts journaled in said bearings internally of said bracket arm and extending from said head to a point above said standard, means connecting said attachment shafts at the head ends thereof to an attachment actuating mechanism, a pair of actuating elements on said main shaft, and means operatively connecting said actuating elements and said attachment shafts and including actuating elements for said attachment shafts extending through said standard for imparting oscillation individually to said attachment shafts upon rotation of said main shaft.

2. In a sewing machine having a bed, a standard rising from one end of said bed, a bracket-arm carried by said standard and terminating in a head overhanging said bed, a main shaft journaled longitudinally in said bed, stitching mehcanism including a needle bar mounted in said head for endwise sliding movement, a rock lever ar-

ranged longitudinally of said bracket-arm and pivoted intermediate its ends on a horizontal axis, means connecting one end of said rock lever to said needle bar for imparting endwise reciprocation to said needle bar upon oscillation of said rock lever and operative connections between said rock lever and said main shaft for imparting oscillation to said rock lever upon rotation of said main shaft, said bracket-arm and head having two sets of aligned bearings therein and arranged on an axis parallel to said main shaft, a pair of attachment shafts journaled in said bearings, means connecting said attachment shafts at the head ends thereof to an attachment actuating mechanism, a pair of actuating elements on said main shaft, and operative connections between said actuating elements and said attachment shafts for imparting oscillation individually to said attachment shafts upon rotation of said main shaft.

3. In a sewing machine having a bed, a main shaft journaled longitudinally in said bed, a standard rising from one end of said bed and arranged directly above said main shaft, a bracket-arm carried by said standard and terminating in a head overhanging said bed, said bracket-arm being angled relative to said main shaft to position said head forwardly of said standard with respect to said main shaft, stitching mechanism including a needle bar mounted in said head for axial sliding movement, a rock lever arranged longitudinally of said bracket-arm and including a hub pivoted in said bracket-arm on an axis perpendicular to the longitudinal axis of said bracket-arm and a pair of rock arms extending in opposite directions from said hub, the first one of said rock arms extending from said hub at the rear of the bracket-arm to a position adjacent to the top of said standard and the second one of said rock arms extending from said hub at the front of the said bracket-arm to a position adjacent to said head, said rock arms being angled so that the ends thereof define a line perpendicular to the pivot axis of said rock lever, means connecting the end of said first rock arm to said main shaft and means connecting the end of said second rock arm to said needle bar to impart reciprocation to said needle bar upon rotation of said main shaft, an attachment shaft journaled in said bracket arm and arranged parallel to said main shaft and forwardly of said first rock arm and rearwardly of said second rock arm, means connecting said attachment shaft at the head end thereof to an attachment actuating mechanism, an actuating element on said main shaft, and operative connections between said actuating element and said attachment shaft for imparting actuation to said attachment shaft upon rotation of said main shaft.

4. In a sewing machine having a bed, a main shaft journaled longitudinally in said bed, a standard rising from one end of said bed and arranged directly above said main shaft, a bracket-arm carried by said standard and terminating in a head overhanging said bed, said bracket-arm being angled relative to said main shaft to position said head forwardly of said standard with respect to said main shaft, an attachment shaft journaled in said bracket-arm and arranged parallel to said main shaft with one end of said attachment shaft being arranged adjacent to the front of said standard and the other end of said attachment shaft being arranged adjacent to the rear of said head, an actuating element on said main shaft and operative connections between said actuating element and said attachment shaft for imparting actuation to said attachment shaft upon rotation of said main shaft, a needle bar actuating mechanism including a rock lever arranged longitudinally of said bracket-arm, and comprising a hub and a pair of rock arms extending in opposite directions from said hub, means for pivoting said hub on a horizontal axis transversely of said bracket-arm and spaced vertically from said attachment shaft, the first one of said rock arms being arranged wholly at the rear of said attachment shaft and extending from said hub to a position adjacent to the top of said standard and the second one of said rock arms being arranged wholly in front of said attachment shaft and extending from said hub to a position adjacent to said head, and means operatively connecting the end of said first rock arm to said main shaft for imparting oscillation to said rock lever upon rotation of said main shaft.

5. In a sewing machine having a bed, a main shaft journaled longitudinally in said bed, a standard rising from one end of said bed and arranged directly above said main shaft, a bracket-arm carried by said standard and terminating in a head overhanging said bed, said bracket-arm being angled relative to said main shaft to position said head forwardly of said standard with respect to said main shaft, a pair of attachment shafts journaled in said bracket-arm and arranged parallel to said main shaft with the one end of said attachment shafts being arranged adjacent to the front of said standard and the other ends of said attachment shafts being arranged adjacent to the rear of said head, a pair of actuating elements on said main shaft and operative connections between said actuating element and said attachment shafts for imparting actuation to said attachment shafts upon rotation of said main shaft, a needle bar actuating mechanism including a rock lever arranged longitudinally of said bracket-arm and comprising a hub and a pair of rock arms extending in opposite directions from said hub, means for pivoting said hub on a horizontal axis perpendicular to the longitudinal axis of said bracket-arm and spaced vertically from said attachment shafts, the first one of said rock arms being arranged wholly at the rear of said attachment shafts and extending from said hub to a position adjacent to the top of said standard and the second one of said rock arms being arranged wholly in front of said attachment shafts and extending from said hub to a position adjacent to said head, said rock arms being angled so that the ends thereof define a line perpendicular to the pivot axis of said rock lever, and means operatively connecting the end of said first rock lever to said main shaft for imparting oscillation to said rock lever upon rotation of said main shaft.

6. In a sewing machine having a frame including a bed, a standard rising from one end of said bed and a bracket-arm carried by said standard and terminating in a head overhanging said bed, a main shaft journaled longitudinally of said bed, a pair of attachment rock shafts journaled in and longitudinally of said bracket-arm, a needle bar mounted in said head for endwise sliding movement, individual drive elements on main shaft, individual drive connections between said drive elements and said attachment rock shafts and said needle bar for imparting actuation to the latter upon rotation of said main shaft, a feed bar mounted in said head for axial movement toward said bed and for oscillation about an axis parallel to said main shaft, operative connections between said feed bar and a first one of said rock shafts for imparting endwise movement to said feed bar upon oscillation of said first rock shaft, and operative connections between said feed bar and the second one of said rock shafts for imparting oscillation to said feed bar upon oscillation of said second rock shaft.

7. In a sewing machine having a frame including a bed, a standard rising from one end of said bed, and a bracket-arm carried by said standard and terminating in a head overhanging said bed, a main shaft journaled longitudinally of said bed, a pair of attachment rock shafts journaled longitudinally of said bracket-arm and arranged parallel to said main shaft, a needle bar mounted in said head for endwise sliding movement, drive connections between said main shaft and said needle bar for imparting actuation to said needle bar upon rotation of said main shaft, drive connections between a first one of said rock shafts and said main shaft for imparting oscillation to said first rock shaft upon rotation of said main shaft, drive connections including an adjustment means between the second of said rock shafts and said

main shaft for imparting selectively variable oscillation to said second rock shaft upon rotation of said main shaft, a feed bar mounted in said head for axial movement toward said bed and for oscillation about an axis parallel to said main shaft, operative connections between said first rock shaft and said feed bar for imparting endwise movement to said feed bar upon oscillation of said first rock shaft, and operative connections between said feed bar and said second rock shaft for imparting oscillation to said feed bar upon oscillation of said second rock shaft.

8. In a sewing machine having a frame including a bed, a standard rising from one end of said bed, and a bracket-arm carried by said standard and terminating in a head overhanging said bed, a main shaft journaled longitudinally of said bed, a pair of attachment rock shafts journaled longitudinally of said bracket-arm, a needle bar mounted in said head for endwise sliding movement, drive connections between said main shaft and said needle bar for imparting actuation to said needle bar upon rotation of said main shaft, an eccentric on said main shaft, operative connections between said eccentric and a first one of said rock shafts for imparting oscillation to said first rock shaft upon rotation of said main shaft, an adjustable eccentric on said main shaft, operative connections between said adjustable eccentric and the second of said rock shafts for imparting selectively variable oscillation to said second rock shaft upon rotation of said main shaft, a rock lever pivotally mounted in said head, a feed bar pivotally connected to the free end of said rock lever lupon an axis parallel to said main shaft and mounted in said head for axial movement and for oscillation about the pivotal connection with said rock lever, operative connections between said first rock shaft and said lever for imparting axial movement to said feed bar upon oscillation of said first rock shaft, and operative connections between said second rock shaft and said feed bar for imparting oscillation to said feed bar upon oscillation of said second rock shaft.

9. In a sewing machine having a frame including a bed, a standard rising from one end of said bed, and a bracket-arm carried by said standard and terminating in a head overhanging said bed, a main shaft journaled longitudinally of said bed, and an alternating presser mechanism comprising a presser bar mounted in said head for endwise movement toward said bed, means for biasing said presser bar toward said bed, a feed bar mounted in said head for endwise movement toward said bed and for oscillation about a pivot axis remote from said bed, a pair of levers, means for pivotally connecting the end of one of said levers to said presser bar and means for pivotally connecting the end of the other of said levers to said feed bar, means comprising a fulcrum pin for pivotally interconnecting the intermediate portions of said levers, means for pivotally mounting the opposite end of one of said levers in said head, a pair of attachment rock shafts journaled longitudinally in said bracket-arm, individual operative connections between said main shaft and said rock shafts for oscillating the latter upon rotation of said main shaft, means for operatively connecting one end of a first one of said rock shafts to the opposite end of the other of said levers for oscillating said lever upon oscillation of said first rock shaft, and means for connecting the second one of said rock shafts to said feed bar for oscillating said feed bar upon oscillation of said second rock shaft.

10. In a sewing machine having a frame including a bed, a standard rising from one end of said bed, and a bracket-arm carried by said standard and terminating in a head overhanging said bed, a main shaft journaled longitudinally of said bed, and an alternating presser mechanism comprising a presser bar mounted in said head for endwise movement toward said bed, a lever pivotally mounted in said head and operatively connected at the free end thereof to said presser bar, a fulcrum pin carried by said lever interemdiate the ends thereof, a rock lever pivoted intermediate its ends on said fulcrum pin, a feed bar pivotally connected to one end of said rock lever, means for biasing said presser bar toward said bed, a pair of attachment rock shafts journaled longitudinally of said bracket-arm, individual operative connections between said main shaft and said rock shafts for oscillating the latter upon rotation of said main shaft, operative connections between a first one of said attachment rock shafts and the end of said rock lever opposite from the end connected to said feed bar for oscillating said rock lever upon oscillation of said first rock shaft, and operative connections between said feed bar and the second one of said attachment rock shafts for oscillating said feed bar upon oscillation of said second rock shaft.

11. In a sewing machine having a frame including a bed, a standard rising from one end of said bed and a bracket arm carried by said standard and terminating in a head overhanging said bed, a main shaft jouranled longitudinally in said bed, said bracket arm having two sets of aligned bearings therein arranged on axes parallel to said main shaft, a pair of attachment shafts journaled in said bearings, a needle bar mounted in said head for endwise sliding movement, three individual actuating elements on said main shaft, and individual operative connections between said actuating elements and said attachment shafts and needle bar respectively for imparting actuation individually to said attachment shafts and said needle bar upon rotation of said main shaft.

12. In a sewing machine in accordance with claim 11 in which said actuating elements are arranged on said main shaft beneath said standard and said operative connections include connecting elements arranged internally of said standard.

13. In a sewing machine in accordance with claim 11 in which said bushings include one bushing in each set formed in the end wall of said frame at the standard end thereof and at least one of said bushings opening through the end wall.

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