Jan. 7, 1969 R. E. JOHNSON 3,420,200

MODULAR SEWING MACHINES

Filed Feb. 3, 1966 Sheet 1 of 5

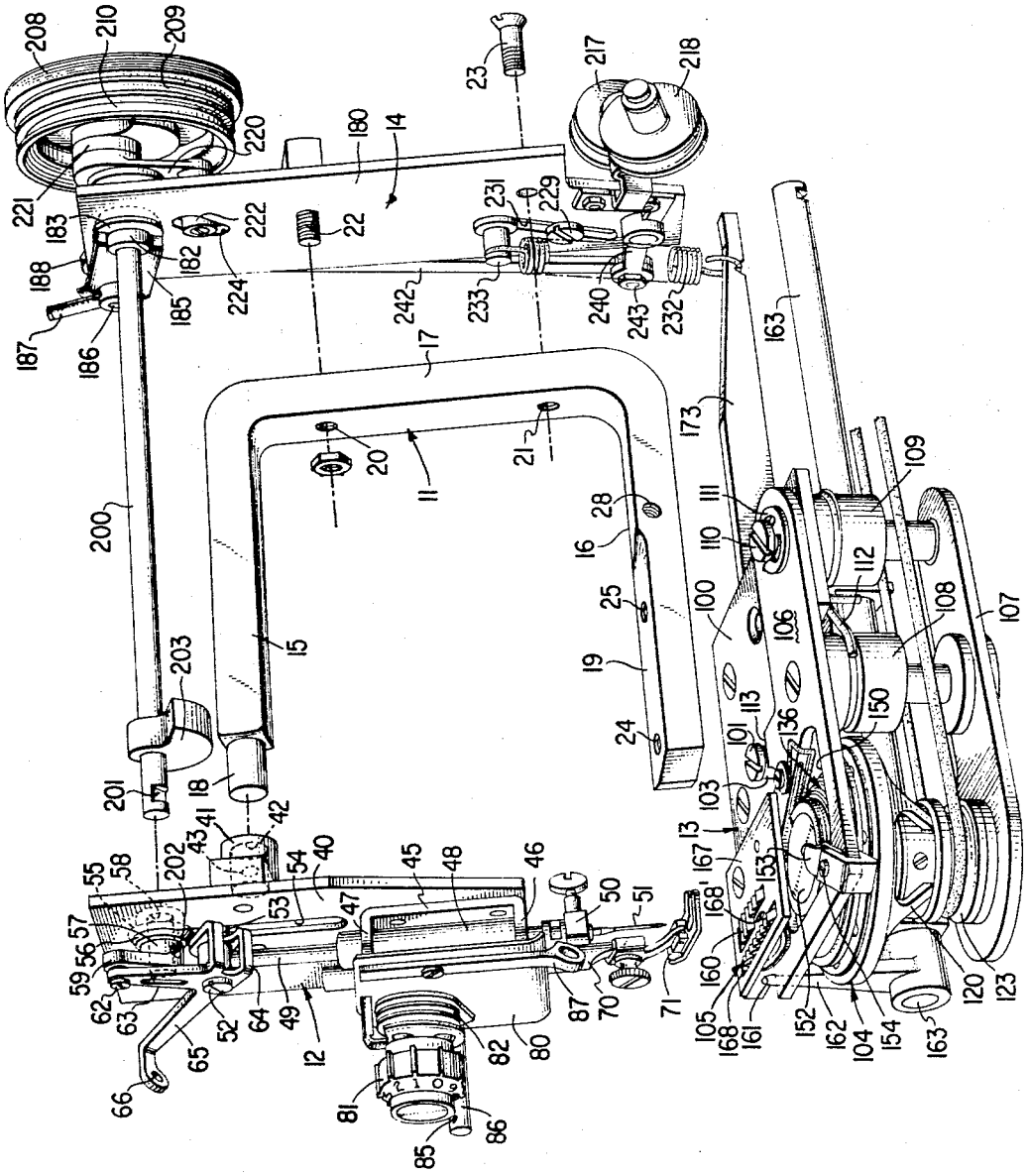


Fig. 1.

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MODULAR SEWING MACHINES

Filed Feb. 3, 1966 Sheet 2 of 5

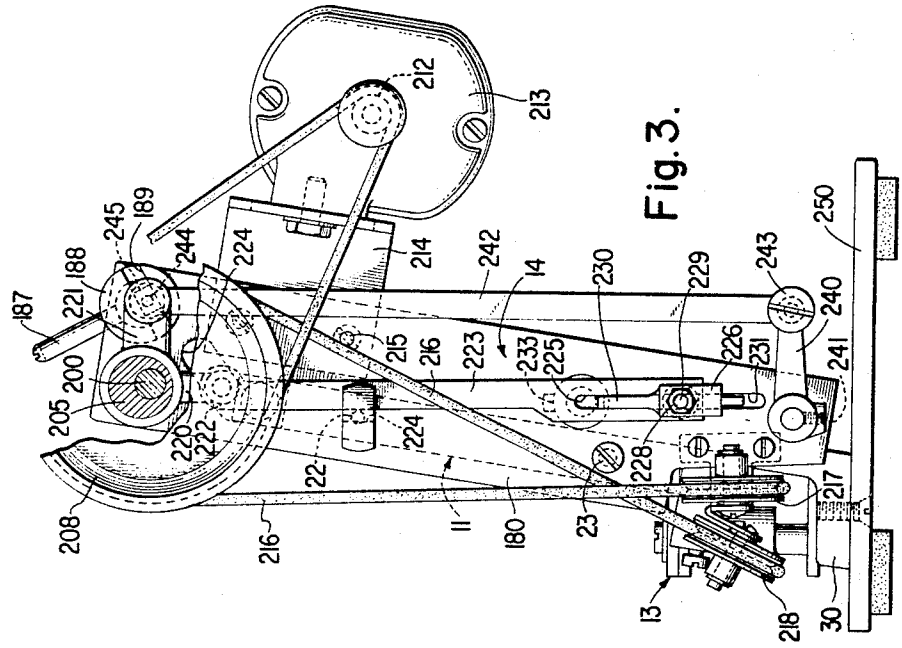


Fig. 3.

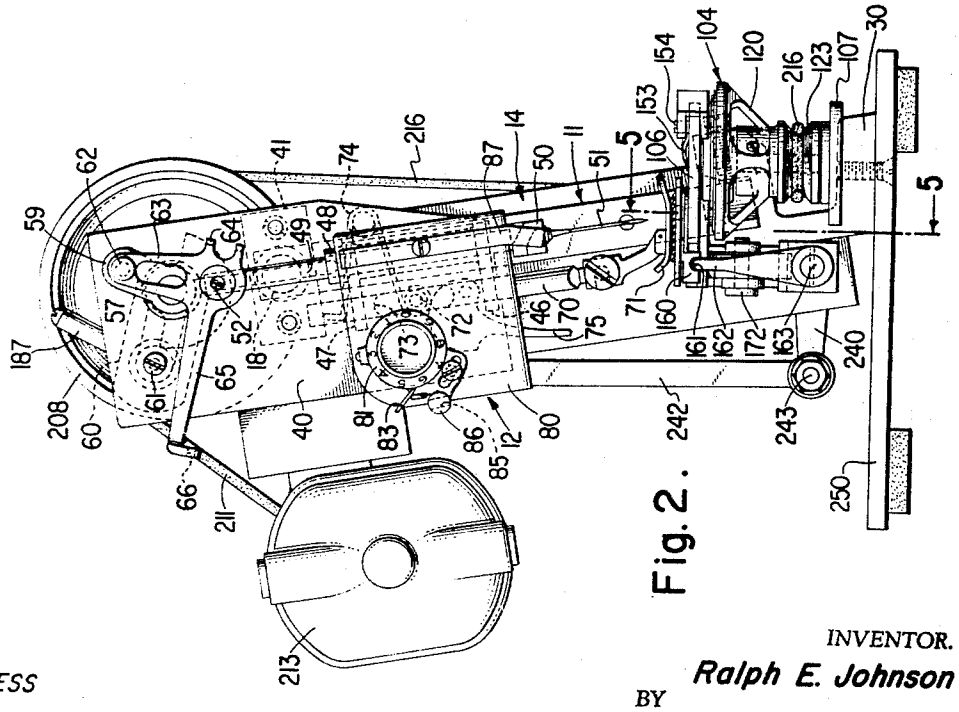


Fig. 2.

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MODULAR SEWING MACHINES

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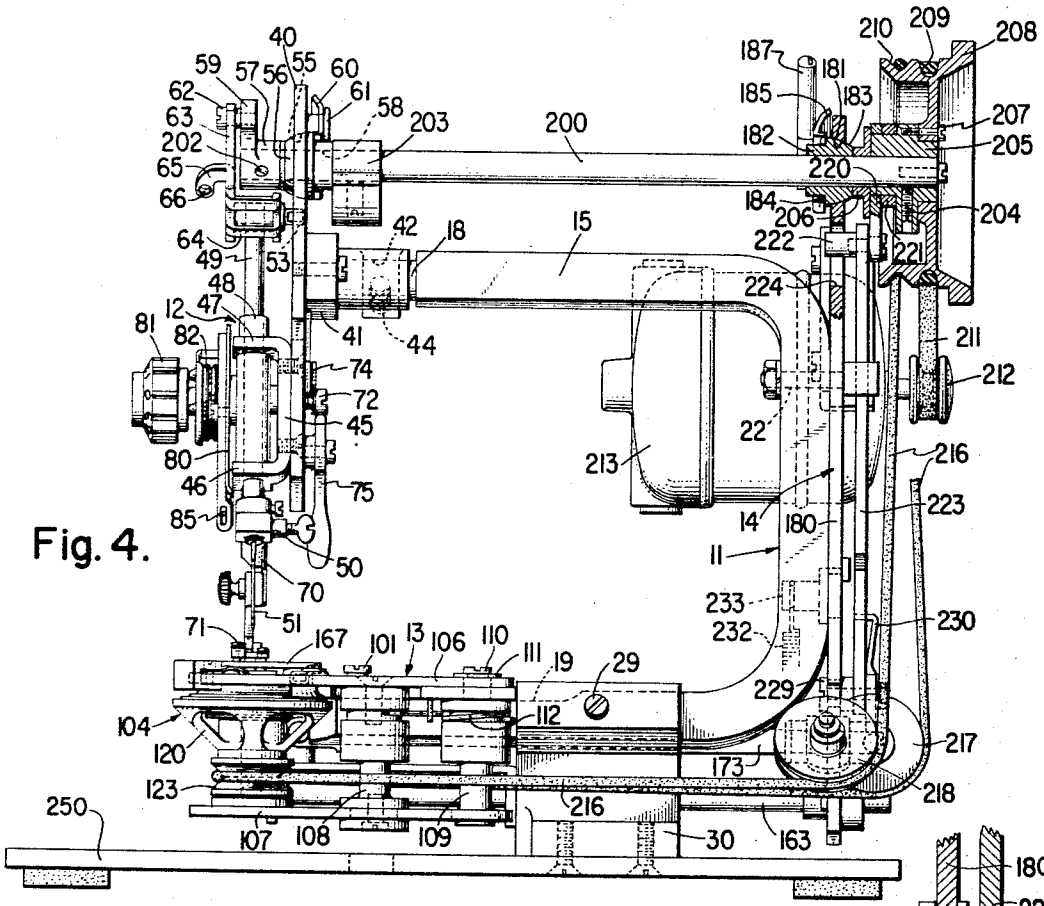


Fig. 4.

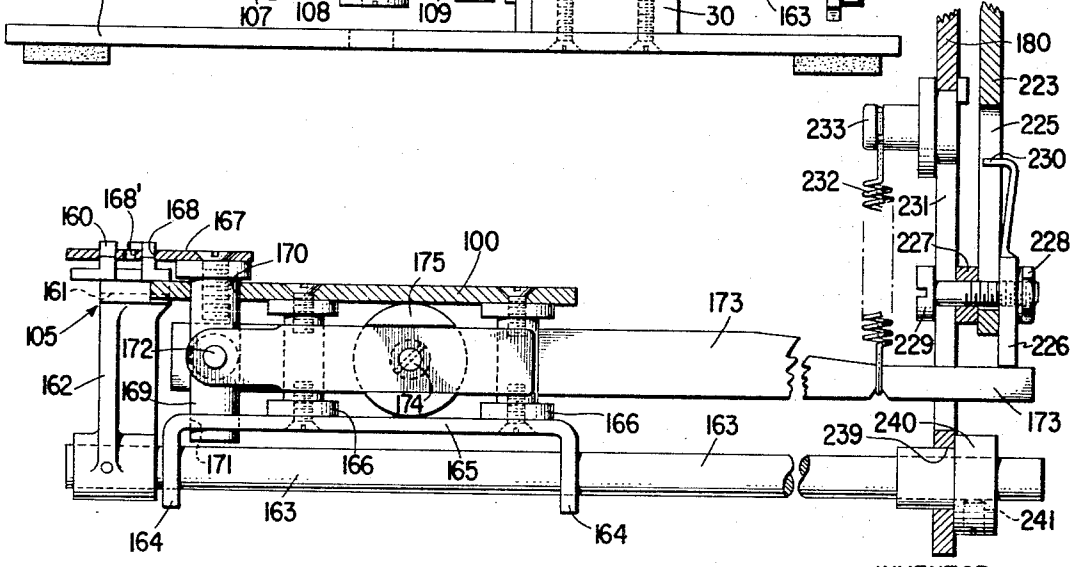


Fig. 5.

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MODULAR SEWING MACHINES

Filed Feb. 3, 1966 Sheet 4 of 5

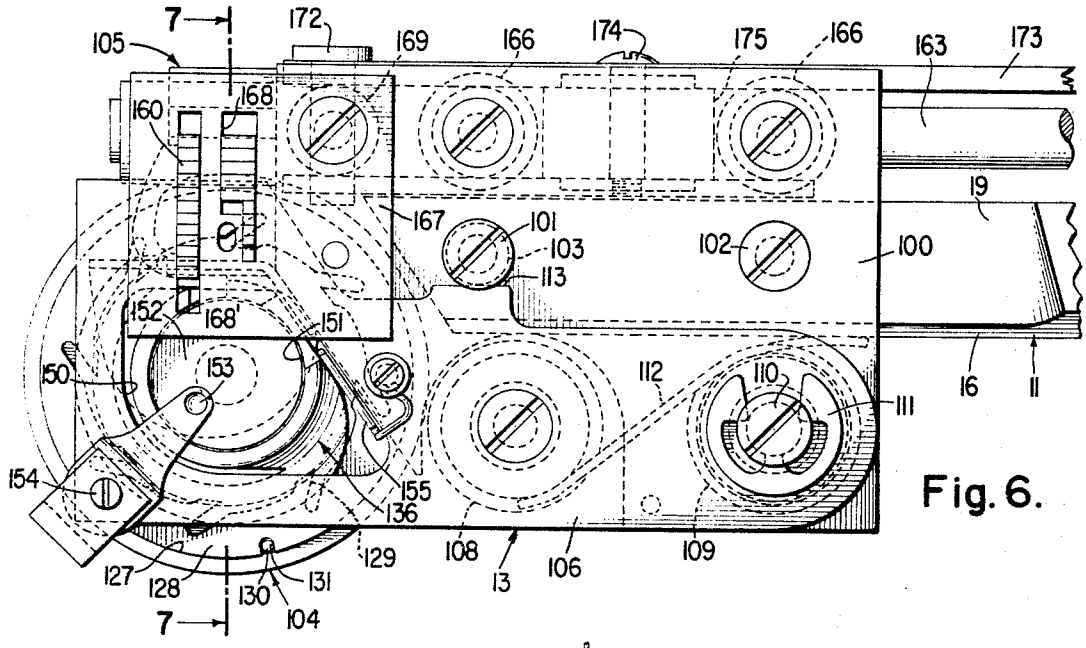


Fig. 6.

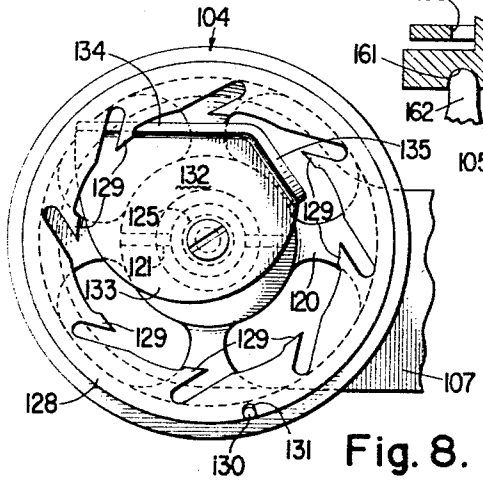


Fig. 8.

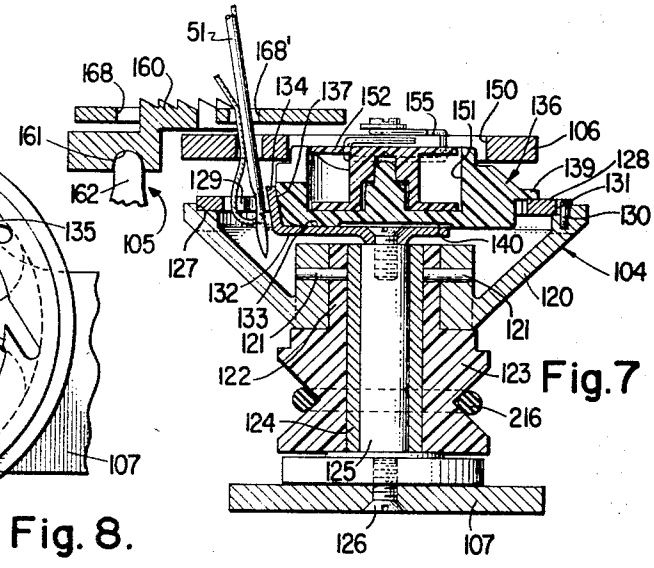


Fig. 7

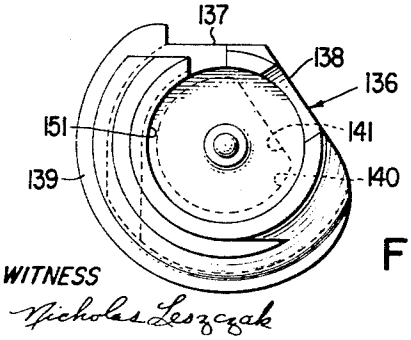


Fig. 9.

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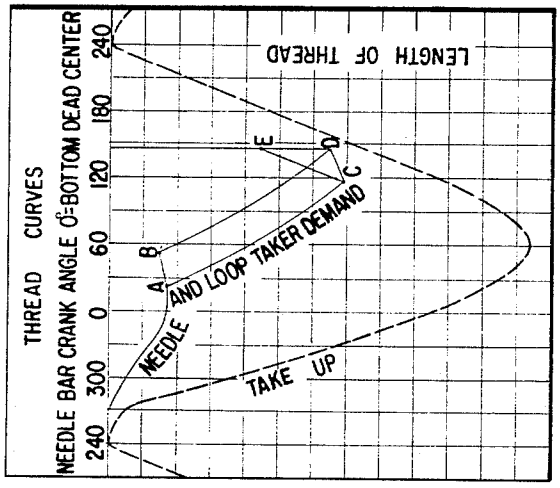


Fig.11.

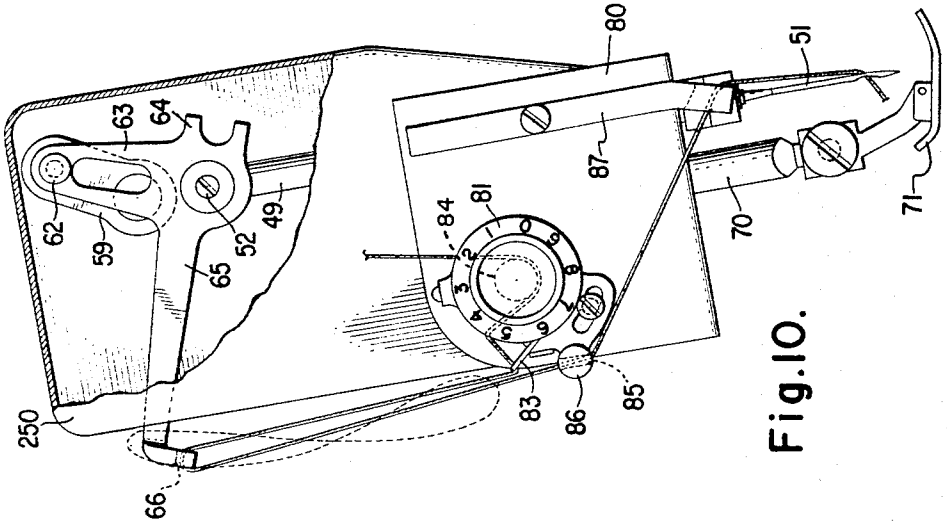


Fig.10.

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United States Patent Office 3,420,200
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3,420,200

MODULAR SEWING MACHINES

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Filed Feb. 3, 1966, Ser. No. 524,949
U.S. Cl. 112—258 1 Claim
Int. Cl. D05b 75/00

ABSTRACT OF THE DISCLOSURE

A modular lockstitch sewing machine construction is disclosed in which a frame member having only two accurately machined surfaces supports all of the parts of the sewing machine. A needle module including a needle thread take-up is located and secured on one of the accurately machined surfaces and a loop taker module is carried on the other accurately machined surface. A drive module including a rotary drive shaft is secured on a portion of the frame which is not accurately machined. The rotary drive shaft which is operatively connected to reciprocate the needle and actuate the take-up is supported in self-aligning bearings in the needle drive modules. Wide variations in the alignment of the rotary drive shaft can be accommodated because the take-up is formed as an extension of the needle bar drive link.

This invention relates to sewing machines, and more particularly to a novel and improved organization and arrangement of parts in a sewing machine.

It is an object of this invention to provide a sewing machine in which the various instrumentalities are subassembled as separate modules which may be fixed in cooperative relation on a simple supporting element.

In the conventional construction of a sewing machine, the sewing machine frame is constructed so as to accommodate the individual relatively movable elements of the stitch forming instrumentalities as well as the individual elements of the actuating and control means therefor.

The manufacture of the conventional sewing machine frame, therefore, requires a large number of separate machining operations each involving a high degree of accuracy. Since an error in any of the many machining operations can jeopardize the usefulness of the entire conventional machine frame, this mode of sewing machine organization is relatively expensive; and moreover, the complexity of the conventional sewing machine frame is a deterrent to the ready substitution of one instrumentality for another in a conventional sewing machine as might be desirable, for instance, to ready the machine for different types of sewing operations.

It is an object of this invention to provide a sewing machine construction in which none of the relatively movable elements of the stitch forming instrumentalities nor of the actuating and control means therefor are accommodated directly in the machine frame. This arrangement makes possible a sewing machine frame which requires only two accurately machined locating surfaces; one upon which the sewing needle module is fixed, and the other upon which the loop taker module is located. Over and above these two accurately machined surfaces only fastening means requiring a relatively low order of accuracy are required in order to accept the actuating mechanism module, supporting legs, and the like.

Apart from the advantages of simplicity and economy of manufacture, the modular organization of the sewing machine of the present invention provides an advantage of increased versatility, in that any of the modules may

be readily removed and exchanged for modules particularly arranged for different specific sewing operations.

It is also an object of this invention to provide novel combinations of thread manipulating instrumentalities, actuating mechanism, and control means therefor which make possible advantageous organization of the sewing machine parts in modular arrangement.

These novel combinations and the manner in which they contribute to the novel modular organization of a sewing machine in accordance with this invention will now be described with regard to a preferred embodiment illustrated in the accompanying drawings in which:

FIG. 1 represents a perspective view of the sewing machine frame together with the stitch forming instrumentalities, actuating mechanism, and control means therefor in modular form in accordance with this invention with each module shown detached from the sewing machine frame,

FIG. 2 represents a head end elevational view of an assembled sewing machine of the type illustrated in FIG. 1 and including a supporting base and an electric drive motor,

FIG. 3 represents a hand wheel end elevational view of the assembled sewing machine of FIG. 2, with a portion of the hand wheel broken away exposing the stitch length adjusting means,

FIG. 4 represents a front elevational view of the assembled sewing machine of FIG. 2 with portions of the actuating mechanism illustrated in vertical cross section,

FIG. 5 is an enlarged cross sectional view taken substantially along line 5—5 of FIG. 2 illustrating the work feeding mechanism,

FIG. 6 represents a top plan view of the loop taker module of this invention as secured in place on the sewing machine frame,

FIG. 7 is a cross sectional view taken substantially along line 7—7 of FIG. 6 illustrating the loop taker,

FIG. 8 is a top plan view of the loop taker of this invention,

FIG. 9 is a top plan view of the bobbin case,

FIG. 10 represents a head end elevational view of an assembled sewing machine of the type illustrated in FIG. 1 and including a portion of an end cover plate applied thereto together with a representation of the path of motion of the needle thread take-up eyelet, and

FIG. 11 is a graph indicating the thread demand of the stitch forming instrumentalities as compared with the thread control attained by the take-up.

Referring particularly to FIG. 1, the machine frame is indicated generally at **11**; the sewing needle module at **12**; the loop taker module at **13**; and the actuating and control module at **14**.

The frame **11** comprises a C-shaped member which may be of uniform cross section and includes a pair of substantially parallel free extremities **15** and **16** joined by a connecting portion **17**. The frame may be fabricated in this shape by a bending or forging operation or it may be cast in this shape. Only two accurately machined surfaces are required on the frame **11** and in the preferred embodiment illustrated in the drawings these surfaces are a cylindrical portion **18** turned on the free extremity of the arm **15** to accept the sewing needle module **12**, and a slabbed portion **19** milled on the free extremity of the arm **16** upon which the loop taker module **13** is located. The axis of the cylindrical portion **18** is preferably parallel to the plane defined by the slatted portion **19** and the distance there between is preferably formed to an accurate predetermined dimension. The frame **11** may also be formed with provision for fastenings, such as the tapped holes **20** and **21** illustrated in FIG. 1, to accommodate fastening screws **22** and **23** for the actuating

and control module 14, the tapped holes 24 and 25 to accommodate fastening screws 26 and 27 for the loop taker module 13, and the tapped hole 28 to accommodate the fastening screw 29 for a supporting block 30 illustrated in FIG. 4. It will be appreciated, however, that other known types of fasteners such as clamps might be used in place of these threaded fasteners which would not require any machining of the frame 11 for the fasteners, and the tapped holes 20, 21, 24, 25, and 28 need not be located with a high degree of accuracy.

The needle module 12 comprises a support plate 40 to the inside surface of which is secured a block 41 formed with a bore 42 which may be accommodated on the cylindrical machined surface 18 of the frame arm 15. The block 41 is drilled and tapped, as at 43, for a set screw 44 by which the needle module 12 may be secured relatively to cylindrical machined surface 18 in selected axial and angular position thereon.

To the outside surface of the support plate 40 is secured a bracket 45 between the out turned arms 46 and 47 for endwise reciprocatory motion is a needle bar 49 carrying at its lower extremity a needle clamp 50 in which an eye-pointed thread-carrying sewing machine needle 51 is secured. The upper extremity of the needle bar is transversely apertured to accommodate a pivot screw 52 which carries a roller 53 which rides in a guide slot 54 in the support plate 40 to prevent turning of the needle bar.

The support plate 40 above the guide slot 54 is formed with concave bearing seat 55 having the shape of a spherical section. Accommodated in the bearing seat 55 is the spherically shaped collar portion 56 of a stud shaft 57 formed with an axial bore 58. The stud shaft 15 formed integrally with a crank arm 59 at one side of the collar portion 56 and adjacent to the other side of the collar portion, the stud shaft is externally shouldered and accommodates a bifurcated leaf spring 60 secured by a fastening screw 61 to the support plate 40, yieldingly constraining the collar portion against the bearing seat.

Pivotally connected to the crank arm 59 by a pivot pin 62 is the upper extremity of a needle bar drive link 63 which is formed at the lower extremity with an inturned clevis 64 straddling the upper extremity of the needle bar 49 and pivotally connected thereto by the pivot screw 52. The needle bar drive link 63 is formed opposite the clevis 64 with a rearwardly extending take-up arm 65 terminating in a thread accommodating eyelet 66 which, as will be described hereinbelow, controls and meters the thread which is directed to the eye of the needle.

Also endwise slidable in the out-turned arms 46 and 47 is a presser bar 70 having a conventional presser foot 71 secured to its lower extremity. A lateral stud 72 secured to the presser bar extends through a guide slot 73 in the support plate 40 to prevent the presser bar from turning. The lateral stud 72 is engaged by one arm of a coil spring 74 of which the other arm abuts beneath the block 41 so as to bias the presser foot downwardly. A presser lifting cam member 75 pivoted on the support plate 40 may also be disposed beneath the lateral stud 72 by which the presser foot may be elevated.

The out-turned arm 46 and 47 of the bracket 45 may support a sheet metal guard plate 80 to which is secured a conventional thread tensioning device 81 which includes thread tensioning friction disks 82, a conventional check spring 83 and a thread guiding post 84. Thread from a source of supply (not shown) is directed to the friction disks 82 of the thread tensioning device 81 looped about the check spring 83 and thence to the take-up eyelet 66. From the take-up eyelet the thread is directed through a thread guiding eyelet 85 formed in a pin 86 adjacent to the thread tensioning device 81, next to a thread guide 87 secured to the guard plate 80, and then to the needle eye.

The loop taker module 13 is assembled on a plate 100, which is drilled to accommodate fastening screws 101 and 102 threaded into the tapped holes 24 and 25, respectively, in the frame 11 by which the plate 100 is secured on the surface 19. Preferably, the screw 101 is formed with a shouldered head 103 serving to locate the loop taker in sewing position as will be described hereinbelow. Assembled on the plate 100 and sustained in cooperating relation as a unitary module therewith are the loop taker, indicated generally as 104, and the work feeding instrumentalities, indicated generally as 105.

The loop taker is carried by a swinging frame hinged to the plate 100. The swinging frame comprises an upper arm 106 which extends above the plate 106, and a lower arm 107 rigidly secured to the upper arm by a spacer 108. A second spacer 109 secured to the lower arm 107 is drilled and tapped for a headed hinge screw 110 which is extended through both the plate 100 and the upper arm 106 and bears against the upper arm by way of a spring washer 111. Encircling the second spacer 109 is a two armed wire spring 112 of which one arm bears against the frame arm 16 and the other bears against the spacer 108 to bias the swinging frame toward the plate 100. An abutment 113 formed on the upper arm 106 of the swinging frame engages the shouldered head 103 of the fastening screw 101 to locate the swinging frame in a predetermined operative position relatively to the path of reciprocation of the needle 51.

The loop taker 104, as illustrated in the drawings, is carried by the swinging frame and is so disposed thereon as to occupy a position cooperative with the needle 51 in the formation of stitches when the swinging frame abutment 113 is seated against the shouldered head 103 of the fastening screw 101. The loop taker may be of any known or conventional type suitable for the formation of either chain or lock stitches as may be desired. Indeed the novel organization of the sewing machine of this invention provides for the ready exchange of loop taker modules 13 to substitute one type of loop taker for another. The loop taker illustrated on the accompanying drawings is a lock stitch forming loop taker which operates in accordance with the principles set forth in my co-pending United States patent application Ser. No. 439,420 filed Mar. 12, 1965, to which reference may be had, which does not require that the loop taker be driven in any predetermined timed relationship with the needle reciprocation. Moreover, the specific features of construction of the loop taker illustrated in the accompanying drawings also forms the subject of my co-pending United States patent application Ser. No. 537,065 filed Mar. 24, 1966 to which reference may be had, and therefore, only that brief description of the loop taker will be set forth hereinbelow as will provide an understanding of the operation of the sewing machine of this invention.

Referring particularly to FIGS. 7 and 8, the loop taker 104 takes the form of a rotary hook and includes an inverted conical basket 120 secured by pins 121 to the upstanding collar portion 122 of a belt pulley 123. The pulley 123 is freely journaled on a bushing 124 surrounding a stationary cylindrical post 125 which is secured, as by a screw 126, to the lower arm 107 of the swinging frame. Secured, as by a force fit into a shallow counterbore 127 in the rim of the basket 120, is a flat annular ring 128 formed with a plurality of internally extending thread seizing beaks 129. A pin 130 set into the basket in a notch 131 in the ring 128 serves to lock the ring for rotation with the basket.

A bobbin case supporting tray 132 is fixed to the top of the stationary post 125 within the rotary hook basket 120. The stationary tray is formed with a flat bottom 133 and with two angularly arranged upstanding sidewalls 134 and 135 which support and locate a bobbin case, indicated generally at 136. The bobbin case 136 is formed with angularly arranged side surfaces 137 and 138 which abut the tray sidewalls and with a flange 139 which overlies the flat annular ring 128 of the rotary hook. The underside of the bobbin case rests upon the flat bottom 133 of the tray except where the bobbin case is formed with a

shallow recess **140** shaped generally circular but with a chord **141** extending across one side.

The upper arm **106** of the swinging frame is formed with an opening **150** above the rotary hook which exposes a cavity **151** in the bobbin case adapted rotatably to accommodate a thread carrying bobbin **152**. A spring finger **153** secured by a pivot screw **154** to the upper arm **106** of the swinging frame overlies and bears downwardly against the bobbin **152** and thus also biases the bobbin thread case upon the stationary tray **132**. A leaf spring **155** carried on the upper arm **106** also engages the bobbin case side surface **138** serving to constrain the bobbin case yieldingly in position within the rotary hook.

The loop taker module may also carry the work feeding instrumentalities of the sewing machine particularly wherein a drop feed is desired such as that illustrated particularly in FIGS. 5, 6 and 7. It is pointed out, however, that using the module concept of construction as taught by this invention, other forms of work feed mechanism might be used as, for instance, a top feed mechanism carried by the needle module **12** might be employed.

Referring to FIGS. 5, 6, and 7, the drop feed mechanism **105** includes a feed dog **160** arranged beneath the presser foot **71**. The forward extremity of the feed dog rests upon the plate **100** and in the rearward extremity is formed with a notch **161** embracing the upper portion of a rock arm **162** which is fast on a rock shaft **163**. The rock shaft **163** is journaled in spaced bearing lugs **164** downturned from a bar **165** which is supported beneath the plate **100** by two spacers **166**. A throat plate **167** formed with slots **168** accommodating the feed dog and with a needle aperture **168'** is secured to a vertical stud **169** which is slidable vertically in a hole **170** in the plate **100** and a hole **171** in the bar **165**. Pivoted to the stud **169** on a pin **172** is a lever **173** to which is pivoted, as at **174**, a fulcrum roller **175** which snuggly fits between the underside of the plate **100** and the bar **165**. Movement of the lever **173** causes the throat plate to rise and fall alternately to cover and to expose the feed dog through the throat plate slots. Oscillation of the rock shaft **163** serves to reciprocate the feed dog along the throat plate slots. Operation of the feed mechanism, therefore, requires simply that rocking movement be imparted to the lever **173** and that related oscillatory movement be imparted to the rock shaft **163**.

The means for imparting such related operative movement to the feed mechanism as well as for imparting turning movement to the loop taker and to the needle bar driving crank are provided in the actuating module **14** which will now be described.

The actuating module **14** is assembled on a supporting plate **180** which is affixed to the connecting limb **17** of the frame **11** by the aforementioned fastening screws **22** and **23**. As illustrated in FIG. 4, the supporting plate **180** is formed near the top with a concave bearing seat **181** having the shape of a spherical section.

A bushing **182** having a spherically shaped peripheral portion **183** accommodated in the bearing seat **181** is formed with an external shoulder **184** upon which a bifurcated spring **185** engages to hold the bushing resiliently in the bearing seat **181**. The spring **185** is secured to the plate **180** by a headed adjusting pin **186** which passes through the plate **180**. A finger grip **187** projects from the headed pin **186** so that the machine operator may at will change the angular position of the pin **186**, and at the opposite side of the plate **180** the pin **186** has secured to it a collar **188** formed with a diametrical slot **189** for regulating the feed stroke of the work feeding mechanism.

Journaled in the bushing **182** is a shaft **200** adapted at the free extremity to be accommodated in the axial bore **58** of the stud shaft **57** on the needle module **12**. A flat **201** formed on the shaft **200** may be used in cooperation with a set screw **212** threaded into the stud shaft **57** to secure the stud shaft onto the shaft **200**. A counterweight **203** may also be provided fast on the shaft **200** to minimize vibration of the sewing machine.

Secured to the shaft **200** by a set screw **204** is a feed driving eccentric **205** which in the assembled relation of parts is spaced from the bushing **182** by a collar **206**. Secured to the eccentric **205** by screws **207** is a handwheel **208** formed with two annular belt pulley grooves **209** and **210**. The belt pulley groove **209** accommodates a drive belt **211** from any suitable source of power, such as for instance, as a drive pulley **212** on an electric motor **213** supported on a bracket **214** secured by screws **215** to the plate **180**. The belt pulley groove **210** accommodates a drive belt **216** which runs over a pair of idler pulleys **217** and **218** carried on the plate **180** and is directed about the pulley **123** on the loop taker **104**. Preferably using the thread manipulating and stitching instrumentalities illustrated in the drawings, the handwheel pulley **210** is three times the diameter of the pulley **123** on the loop taker so that a speed ratio of approximately three revolutions of the loop taker will be maintained for each reciprocation of the needle.

For driving the work feeding mechanism, the feed driving eccentric **205** is embraced by two pitman straps **220** and **221** which, as illustrated in FIG. 3, extend substantially at right angles to each other. The pitman strap **220** extends substantially vertically downward and is pivoted to a cylindrical boss **222** formed on a vertical link **223** which is constrained to move in a slot **224** in the supporting plate **180**. At the lower extremity the link **223** is formed with a lengthwise slot **225** along which as extension abutment **226** may be selectively clamped between nuts **227** and **228** on a headed fastening screw **229**. The extension abutment **226** may be formed with an inturned tang **230** extending into the slot **225** to prevent the abutment from turning. The fastening screw **229** extends through a vertical guide slot **231** formed in the plate **180**.

FIG. 5 illustrates the position of parts when both the actuating module **14** and the loop taker module are assembled on the frame **11**. The feed lift lever **173** will pass through the guide slot **231** beneath the abutment extension **226**. A tension spring **232** arranged to act between the lever **173** and an anchor pin **233** fixed in the plate **182** biases the lever **173** into engagement with the abutment extension **226**.

Referring to FIGS. 3 and 5, the feed advance rock shaft **163** extends through an aperture **239** in the plate **180** when the parts are assembled on the frame. A rock arm **240** is secured to the rock shaft **163** by a set screw **241**. A link **242** pivoted to the rock arm **240** by a pivot pin **243** is also connected by a pivot pin **244** to the pitman strap **221** which extends generally horizontally from the feed eccentric **205**. Journaled on the pivot pin **244** is a slide block **245** which is constrained to move along the diametrical slot **189** in the collar **188**. Adjustment of the angular position of the slot **189** by means of the finger grip **187** will determine the direction in which the work will be fed and the length of the feed step at each stitch.

In assembling the sewing machine of this invention, the support block **30** of frame **11** may be secured to a base **250** or to a table, carrying case, or the like as is desired. The actuating module **14** is then secured in place by the screws **22** and **23**. The loop taker module **13** is then secured in place using the screws **101** and **102** taking care that the feed lift lever **173** is inserted through the slot **231** and the feed lift rock shaft is inserted into the bore in the rock arm **240** in the actuating module support plate **180** when the spring **232** is attached to the feed lift lever **173**. The set screw **241** is tightened to complete the feed advance connection, and when the belt **216** is entrained on the pulleys **123**, **210**, **217**, and **218**, the loop taker and work feed mechanism will be operatively installed on the frame.

The needle module **12** is then installed simply by plac-

ing the bore **42** of the block **41** on the cylindrical portion **18** of the frame arm **15** and simultaneously inserting the shaft **200** in the axial bore **58** of the stud shaft **54**. The support plate **40** of the needle module **12** may then be turned and slid axially upon the cylindrical portion **18** of the frame until the needle **51** is accurately aligned with the needle aperture **168'** of the throat plate on the loop taker module in place. The set screw **202** is then tightened to connect the needle bar drive and the sewing machine will be completely assembled.

Since the stud shaft **57** is accommodated in a spherical bearing seat **55** in the support plate **40** of the needle bar module, and the bearing seat **181** for the shaft **200** in the supporting plate **180** of the actuating module is similarly spherical, conisderable variation in the relative positions of the support plates **40** and **180** on the frame **11** may be accommodated without binding of the shaft **200**. The construction of the needle thread take up arm **65** as an integral part of the needle bar drive link **63** makes possible this advantageous utilization of the self-aligning bearings **55, 181** because this take up construction obviates the need for any anchor pivots or anchor links between the take up arm **65** and the supporting frame as exist in conventional link type take-ups. A shaft which drives a conventional link take-up having a pivot pin or anchor link connection with the machine frame must be manufactured in predetermined spacing and alignment with the pivot pin or anchor link connection, which requirement in the present invention would obviate the advantages of the self-aligning bearings **55–181**.

Referring to FIGS. 2 and 10, it will be noted that the take-up arm **65** projects toward the rear of the sewing machine substantially perpendicularly from the needle bar drive link **63** at a point opposite the pivotal connection provided by the pin **52** with the needle bar. Moreover, the distance of the take-up eyelet **66** from the pivot pin **52** is approximately twice the distance between the pivot pins **52** and **62**. With this construction, as illustrated in FIG. 10, the path of the eyelet **66** on the take-up arm is a flattened figure eight oriented substantially parallel to the axis of the needle bar **49**. Optimum efficiency of thread metering will thus be obtained relatively to the checkspring **83** about which the thread approaches the eyelet **66** and the thread guide eyelet **85** to which the thread extends from the eyelet **66**.

As ilustrated in FIG. 10, the path of motion of the take-up eyelet **66** substantially parallel to the axis of the needle bar makes possible effective and convenient shrouding of the operating mechanism on the needle bar module **12** by a cover plate **250** which may follow the functional substantially rectangular outline of the support plate **40**, without the requirement for flanges, lips, or extensions, in order to shroud the movement of the take-up arm **65**.

The graph ilustrated in FIG. 11 indicates the co-operative relationship between the manner in which the needle thread is metered by the take-up eyelet **66** and the demands of the stitch forming instrumentalities upon the needle thread during stitch formation. This graph plots as abscissa the needle bar crank angle, and as ordinate the total lengths of thread on the one hand as made available by the take-up, and on the other hand as demanded by the stitch forming instrumentalities including the rotary hook **104** which is driven at approximately three revolutions for each needle reciprocation. The curve illustrated in dashed lines and labeled TAKE-UP indicates the thread made available at each crank angle by the take-up while the curve illustrated in solid lines indicates the corresponding thread demanded by the stitch forming instrumentalities.

As described hereinabove, the loop taker **104** is preferably of the type in which the motion imparted to the needle loop seizing beaks **129** need not be timed precisely relatively to the needle reciprocation, it being immaterial to stitch formation which of the beaks **129** seizes the needle thread. The thread demand curve in FIG. 11, therefore, from the points A and B to the points C and D widens into an area or family of parallel curves depending at each stitch upon the actual time at which loop seizure occurs. Similarly from the points C and D to the point E the demand must be represented by a family of curves since the cast off of the thread from a stored position on the bobbin case may be influenced by the actual time at which loop seizure occurs.

Whereas in conventional lock stitch sewing machines in which the loop taker is driven in precise timed relation with the needle reciprocation, the take-up need satisfy only one predetermined thread demand, in the machine of the preferred form of this invention, the take-up must satisfy whichever one of the family of different thread demands may occur. As illustrated in FIG. 11 the thread supplied by the take-up of this invention adequately incompasses the entire range of thread demands which are imposed by these stitch forming instrumentalities.

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

1. A sewing machine comprising a C-shaped frame having spaced frame arms, an accurately machined straight cylindrical portion at the extremity of one of said frame arms, an accurately machined flat slabbed surface on the other frame arm parallel to the axis of said straight cylindrical surface, a first and a second module each including a bracket and a movable stitch forming instrumentality carried one on each of said brackets, means for securing said first and second module brackets each on a respective one of said two accurately machined frame surfaces in positions arranging said stitch forming instrumentalities complemental to each other for cooperation in the formation of stitches, said means including an accurately machined straight cylindrical bore formed in said first module bracket complemental to said straight cylindrical portion, and an accurately machined flat seat formed on said second module bracket complemental to said slabbed surface, a third module including a bracket and a driven actuating element carried thereon, means for securing said third module to said frame unit remote from said two accurately machined surfaces, and means operatively connecting said driven actuating element with at least one of said stitch forming instrumentalities, the stitch forming instrumentality carried on said first module bracket comprises a thread carrying needle supported for endwise reciprocation in a path extending transversely of said cylindrical bore, and in which the stitch forming instrumentality carried on said second module bracket comprises a loop taker, a needle reciprocating crank journaled in said first module bracket, a drive link connecting said crank with said needle bar, in which said means operatively connecting said driven actuating element with at least one of said stitch forming instrumentalities includes shaft means operatively connecting said driven actuating element with said needle reciprocating crank, self-aligning bearing means in each of said first and third module brackets defining an axis of turning movement of said shaft means, and in which a needle thread take-up arm extends laterally from said drive link and is formed at the free extremity with a thread engaging eyelet.

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