

June 28, 1960

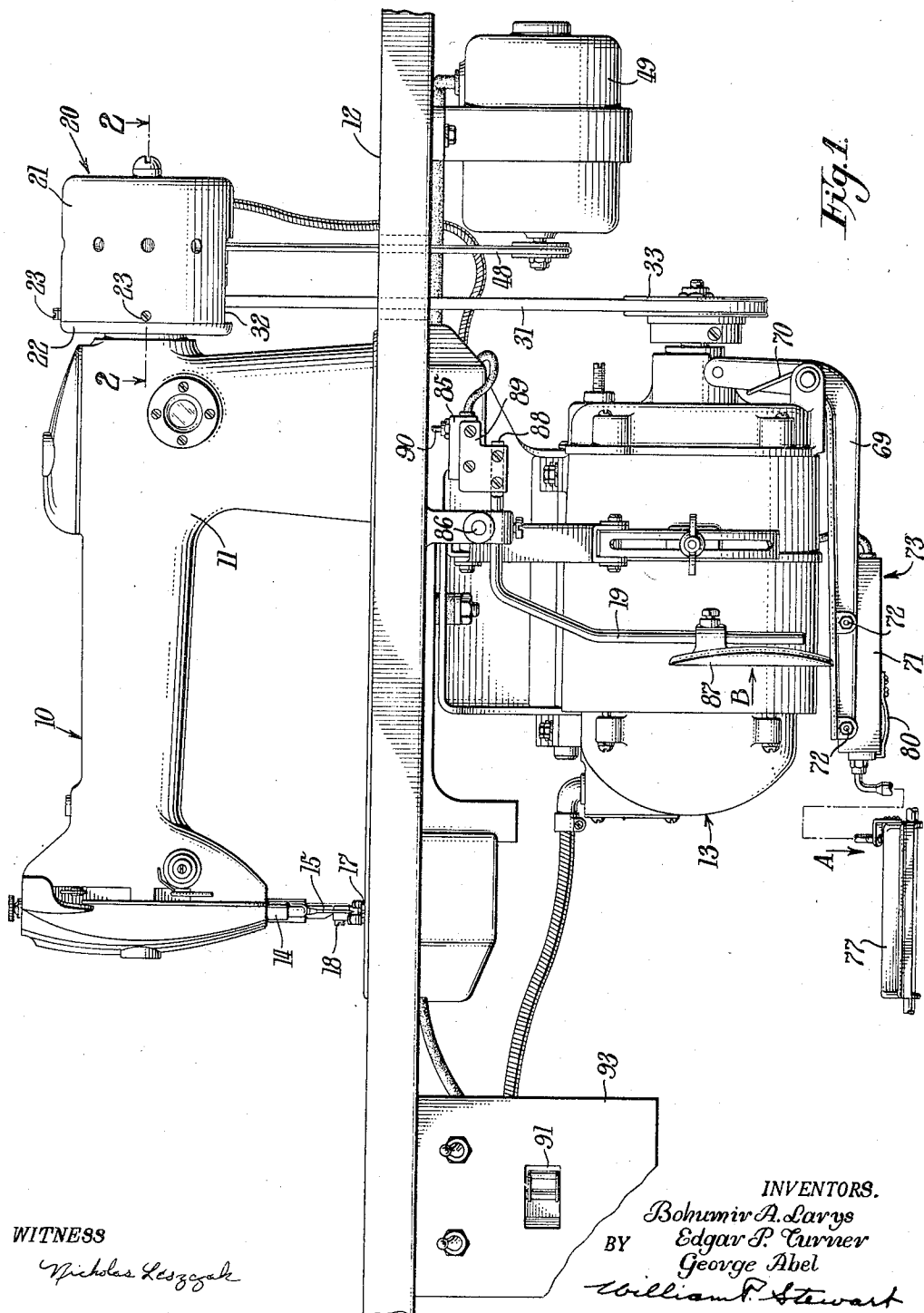
B. A. LARYS ET AL

2,942,564

NEEDLE POSITIONING DEVICES FOR SEWING MACHINES

Filed Jan. 30, 1952

4 Sheets-Sheet 1



WITNESS

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4 Sheets-Sheet 2

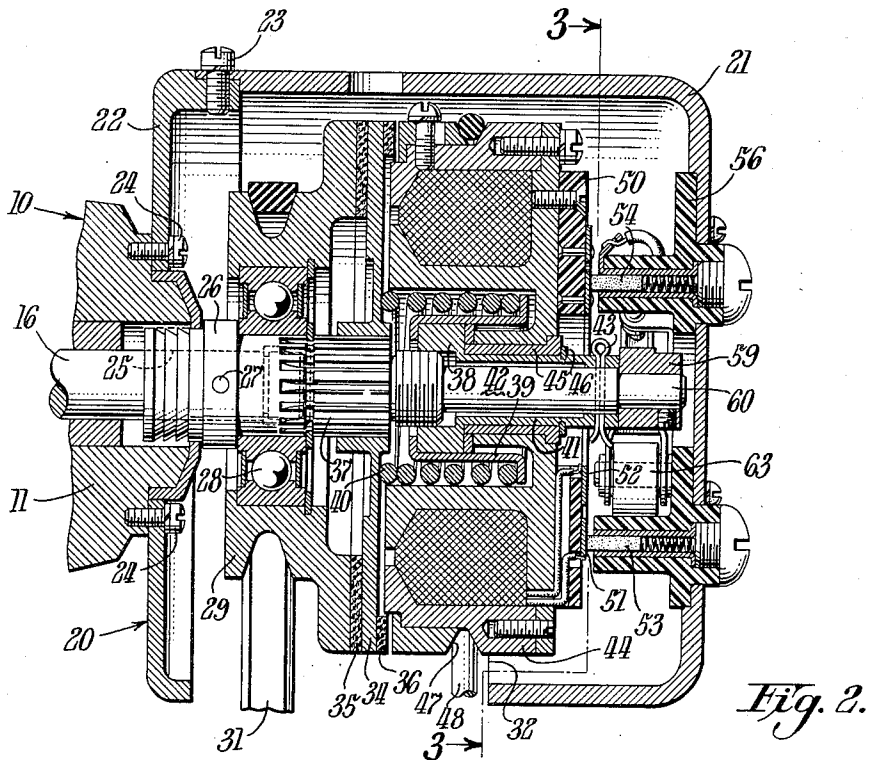


Fig. 2.

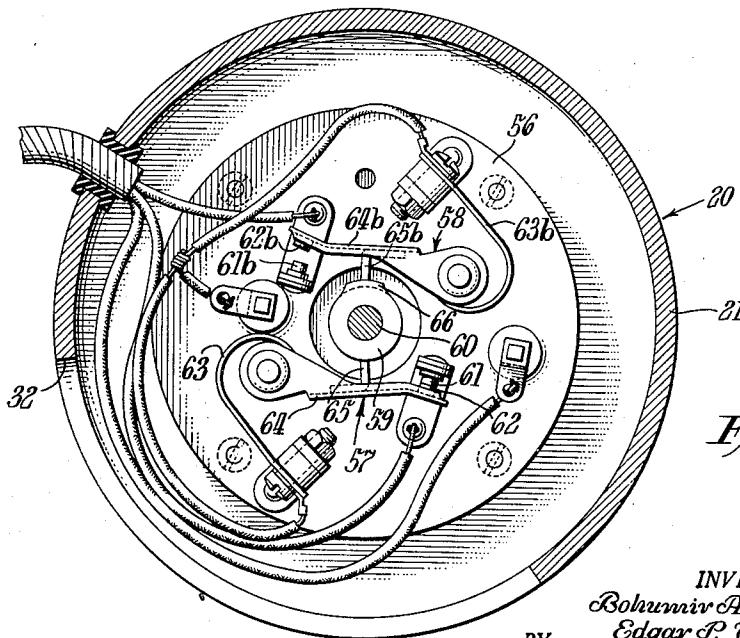


Fig. 3.

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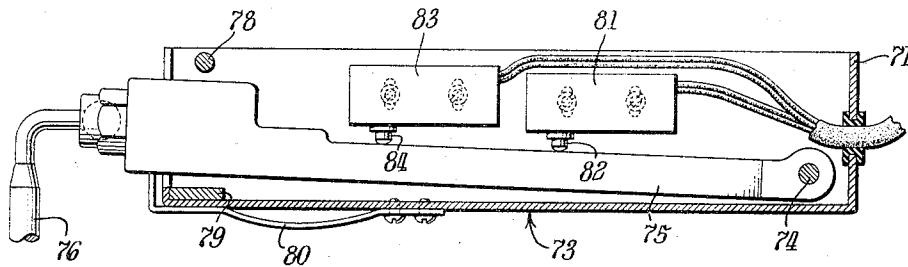


Fig. 4.

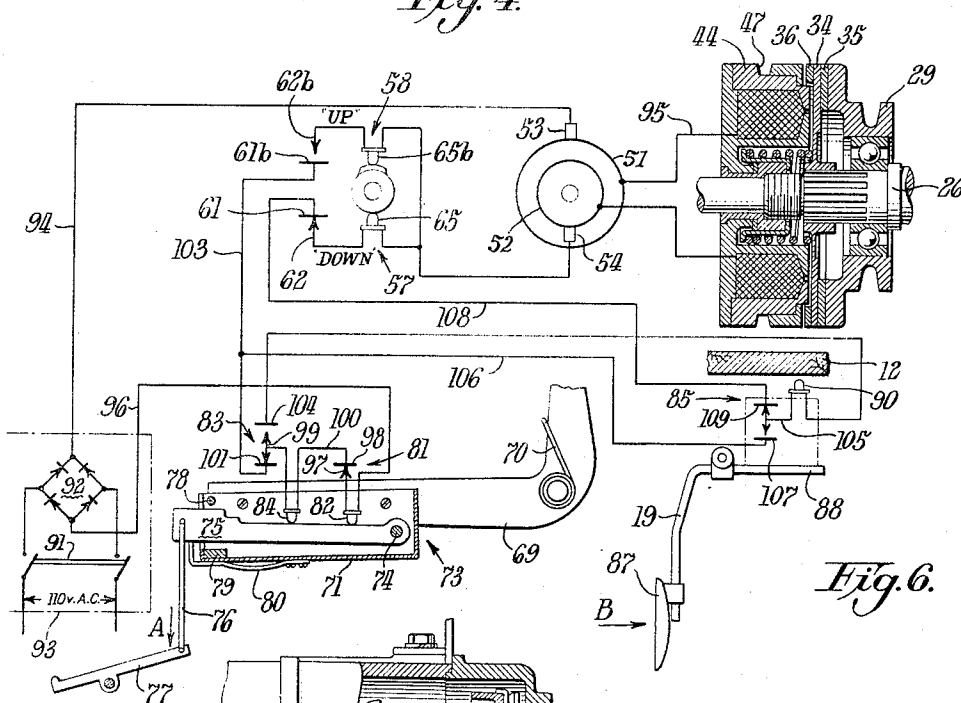
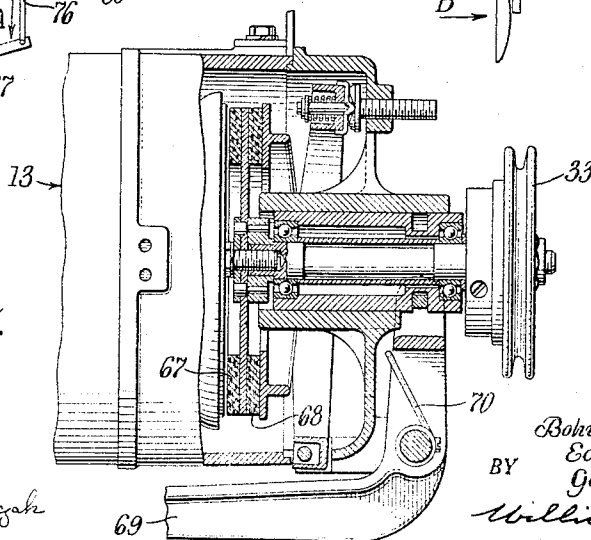


Fig. 6.

Fig. 5.



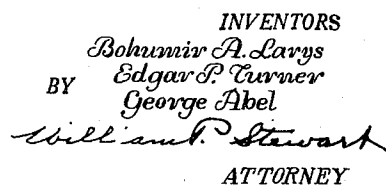
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4 Sheets-Sheet 4



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2,942,564

NEEDLE POSITIONING DEVICES FOR SEWING MACHINES

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Filed Jan. 30, 1952, Ser. No. 268,958

26 Claims. (Cl. 112-219)

This invention relates to sewing machines and more particularly to a device for controlling the operation of sewing machines to obtain accurate control of the stitching.

An object of the invention is to provide a sewing machine with a mechanism which will assure the stopping of the machine with the needle in a predetermined position.

Another object of the invention is to provide a sewing machine with a mechanism which will assure the stopping of the machine with the needle in one of a plurality of predetermined stopping positions.

A further object of the invention is to provide an improved two-speed driving mechanism for the sewing machine.

Another object of the invention is to provide an improved clutch and brake mechanism for the sewing machine actuating shaft.

Yet another object of the invention is to provide a unified control system for the sewing machine and positioning mechanism.

Still another object of the invention is to provide a sewing machine with a mechanism which will assure the operation of the machine through one complete stitch forming cycle or a predetermined portion of the cycle.

Another object of the invention is to provide a sewing machine with a mechanism whereby the machine can be stopped in a predetermined position and then moved through a predetermined portion of a stitching cycle under power.

A final object of the invention is to provide a control connection between a control treadle and a transmitter actuating lever which will permit operation of the sewing machine as described above.

In the drawings:

Fig. 1 is a view in front elevation of a sewing machine equipped with a first embodiment of the needle positioning device.

Fig. 2 is an enlarged sectional view of the clutch unit and timer taken substantially on line 2-2 of Fig. 1.

Fig. 3 is a sectional view of the timer taken on line 3-3 of Fig. 2.

Fig. 4 is an enlarged view partly in section of the energizing and selector switch mounting and control mechanism.

Fig. 5 is a partial view of the transmitter, partly broken away, showing the clutch and brake.

Fig. 6 is a schematic wiring diagram of the electrical control system.

Fig. 7 is a view similar to Fig. 1 but showing a second embodiment of the needle positioning device.

Fig. 8 is a schematic wiring diagram of the second embodiment.

Referring more specifically to the drawings, in the first embodiment a sewing machine 10 provided with a frame 11 is mounted in a power table top 12 which carries an electric transmitter 13 fastened to its lower surface.

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The sewing machine may be of any well known type, such as the machine shown in the Kaier U.S. Patent No. 2,206,285, dated July 2, 1940, which has been modified in a manner to be described. The machine 10 is provided with a reciprocating needle-bar 14 carrying a needle 15 and driven by an actuating arm shaft 16 journaled in the frame 11. A feed-dog 17 is also driven by the actuating shaft 16 in a conventional manner. A presser-foot 18 can be lifted from its work engaging position upon the application of pressure to an operating lever 19 of a knee-shift device similar to that disclosed in the Kaier patent. Since the sewing machine and presser-foot lifter mechanisms are fully disclosed in the Kaier patent, a further description of these mechanisms is not believed to be necessary.

In place of the usual balance wheel, a clutch and timer unit 20 is provided which is enclosed in a cap 21 fastened to a mounting plate 22 by screws 23. The mounting plate is attached to the sewing machine frame 11 by screws 24 spaced about the arm shaft 16. The arm shaft 16 enters a bore 25 provided in one end of a shaft extension 26. A pin 27 secures the extension 26 in place on the arm shaft. Journaled on a bearing 28 on the shaft extension 26 is a power pulley 29. A belt 31 passes through an opening 32 in the cap 21 and over a driven pulley 33 on the transmitter 13. A friction disc 34 carrying friction facings 35 and 36 on either side is slidably mounted on the shaft extension 26 but is prevented from rotating relative to the shaft extension 26 by means of splines 37 formed on the shaft extension. A nut 38 threaded onto a portion of the shaft extension 26 holds a spring retainer 39 in place with respect to the shaft extension 26. A compression spring 40 is interposed between the spring retainer 39 and the friction disc 34 to urge the disc 34 toward the pulley 29. The nut 38 is provided with an integral sleeve extension 41 which is fastened to a reduced diameter portion 42 of the shaft extension by a cotter pin 43. Thus the elements 34 and 35 comprise a first friction clutch for engaging the face of pulley 29.

An auxiliary power connection consists of a second clutch including elements 34 and 36 and an electromagnet 44 journaled on a bearing bushing 45 concentric with the sleeve extension 41 and held against axial movement between a snap ring 46 secured to the sleeve extension and the integral nut 38. A pulley 47 formed in the periphery of the electro-magnet casing is engaged by a belt 48 which passes through the opening 32 in the cap 21 to a small constant speed motor 49 mounted beneath the table top. The motor runs continuously. A disc of insulating material 50 is fastened to the electro-magnet 44 and carries two slip rings 51 and 52 which are connected to the electro-magnet winding. Two brushes 53 and 54 contact the slip rings 51 and 52, respectively, and are connected to an electrical control system to be described. The brushes 53 and 54 are carried by another disc of insulating material 56 fastened to the inside of the cap 21, which disc also carries two contact assemblies 57 and 58. The contact assemblies are identical but are angularly spaced from each other about a cam 59 fastened to a pilot end 60 of the shaft extension 26. The "down" contact assembly 57 consists of a fixed contact 61 and a movable contact 62 which is urged into contact with the fixed contact 61 by a spring 63 fastened at one end to the disc 56 and at the other end to an arm 64 carrying the movable contact 62. A follower 65 attached to the arm 64 contacts the cam 59 to open the contacts at a raised portion 66 of the cam. The elements of the "up" contact assembly 58 are identical to those of the "down" contact assembly 57 and are identified by the same numerals followed by a "b."

The assemblies 57 and 58 are adjusted to permit the contacts to close except when the follower 65 or 65b of the respective assembly engages the raised portion 66 of the cam 59.

The transmitter 13 may be of any well known type provided with a clutch 67, a normally engaged brake 68 and an operating lever 69. The brake 68 is normally held in engagement by a spring 70 which biases the actuating lever to the brake engaged position. A transmitter of this type is fully described in the U.S. Patent No. 2,739,251, of R. D. Ingalls, dated March 20, 1956. A support 71 is rigidly fastened to the lever 69 by the screws 72 to form an actuating lever 73. Pivotaly fastened to the lever 73 by a pivot pin 74 is a control lever 75 connected to a pitman 76 which is also fastened to a treadle 77. The control lever 75 extends between an upper stop member 78 and a lower stop member 79 carried by the actuating lever 73 near one end. A positioning spring 80, which is weaker than the brake engaging spring 70 of the transmitter, is fastened to the actuating lever 73 and engages the control lever 75 to normally hold it in a control or rest position approximately mid-way between the stop members 78 and 79. An energizing switch 81 is fastened to the actuating lever 73 with its operating member 82 engaging the control lever 75 in its rest position. A single pole, double throw selector switch 83 is also fastened to the actuating lever 73 and has its operating member 84 engaging the control lever 75. Obviously, the lever 75, switches 81 and 83 and members 78 and 79 could be fastened directly to the operating lever 69.

A single pole, double throw control switch 85 operated by the knee shift device provides a control for the mechanism under certain conditions of operation. The shift lever 19 of the knee shift device is fastened to a horizontal actuating shaft 86 and adjustably carries a knee pad 87 at one end. The other end or switch end 88 of the lever 19 is bent to lie in a plane substantially perpendicular to the shaft and also to lie substantially parallel to the table top 12. The control switch 85 is fastened to the switch end 88 of the lever by a mounting plate 89 and has an operating member 90 extending toward the under side of the table top 12. The switch 85 is adjusted to operate when the operator 90 engages the table top after a predetermined amount of motion of the lever 19 about the axis of the shaft 86.

Referring now to the schematic diagram of Fig. 6, alternating current is supplied through a power switch 91 to a small rectifier 92. Both the switch 91 and the rectifier 92 are mounted in a small box 93 which is attached to the power table 12, as shown in Fig. 1. A conductor 94 carries direct current directly from the rectifier 92 to the brush 53 in contact with the slip ring 51 which is connected to the electro-magnet 44 by a conductor 95. Another conductor 96 carries direct current between the rectifier and one contact 97 of the energizing or disabling switch 81. The other contact 98 of the energizing switch 81 is connected to the movable contact 99 of the single pole, double throw selector switch 83 by a conductor 100. One fixed contact 101 of the selector switch 83 is connected to the fixed contact 61b of the "up" contact assembly 58 by a conductor 103. The other fixed contact 104 of the switch 83 is connected to the movable contact 105 of the single pole, double throw control switch 85 on the knee shift lever 19. A conductor 106 and conductor 103 connect one fixed contact 107 of the control switch 85 to the fixed contact 61b of the "up" contact assembly 58 and a conductor 108 connects the other fixed contact 109 of the switch to the fixed contact 61 of the "down" contact assembly 57. The movable contacts 62 and 62b are both connected to the brush 54 which contacts the slip ring 52 connected to the winding of the electro-magnet. It is understood that appropriate condensers and resistors

(not shown) may be used in a conventional manner to prevent arcing of the contacts.

From the foregoing description, it is believed that the operation of the device will now be readily understood. The various elements of the device are shown in the drawings with the sewing machine at rest and the control treadle in its rest position. When it is desired to start the sewing machine, the operator must depress the treadle 77 to move the pitman 76 downwardly in the direction of the arrow A. Since the spring 80 is much weaker than the transmitter brake engaging spring 70, the initial motion of the treadle will merely cause the control lever 75 to pivot about the pin 74 until the lever 75 engages the lower stop member 79 in its operating position. During this movement of the control lever 75, the selector switch 83 remains with its movable contact 99 engaging the fixed contact 101 as shown in Fig. 6, but, as the control lever moves down, it permits the switch operator 82 to drop and open the contacts 98 and 97 of the energizing switch 81. When the energizing switch 81 is open, no current can be supplied to the contact assemblies 57 and 58 or the electro-magnet 44 and the entire needle positioner control circuit is disabled. It should be noted that thus far the transmitter actuating lever has not been moved. However, when the control lever engages the lower stop member 79, continued depression of the treadle 77 will operate the transmitter actuating lever 73 in a normal manner to disengage the transmitter brake and engage the transmitter clutch. Since no power can be supplied to the electro-magnet 44, the compression spring 40 holds the friction disc 34 in engagement with the power pulley 29 to permit the transmitter 13 to drive the sewing machine in a normal manner.

After the completion of the desired stitching operation, the sewing machine is brought to rest when the operator "heels" the treadle in a conventional manner. The machine finally stops with the needle-bar in a predetermined position, however. When the operator "heels" the treadle 77, the pitman 76 is forced upwardly, opposite to the direction of arrow A. The pitman moves the control lever 75 from its operating position against the lower stop member 79 to a braking and control position against the upper stop member 78 and then forces the end of the actuating lever 73 upwardly to engage the brake 68 which stops the pulley 33 and the power pulley 29. The "heeling" of the treadle holds the control lever 75 against the upper stop member 78, in which position the energizing switch 81 is closed and the movable contact 99 of the selector switch 83 contacts the fixed contact 104. The control switch 85 remains in the position shown in Fig. 6 with contacts 105 and 109 in engagement. Assuming that the follower 65 of the "down" contact assembly 57 is not on the raised portion 66 of the cam 59, a complete circuit is formed through the switches 81 and 83 and the "down" contacts 61 and 62 which energizes the electro-magnet 44.

It has been determined by experiment that a sewing machine can be brought to rest from full speed operation in a very short period of time after the engagement of the transmitter brake. Also, there is a time lag in the control system between the "heeling" of the treadle and the energization of the electro-magnet 44 which is inherent in the mechanical and electrical components of the control system. The electrical and mechanical lag in the control system is great enough that the pulley 29 and the friction disc 34 are brought substantially to rest by the transmitter brake 68 before the electro-magnet 44 is energized to draw the friction disc 34 away from the pulley 29 and into engagement with the rotating electro-magnet 44. When the friction disc 34 does engage the electro-magnet 44, it is driven at a constant reduced speed by the continuously running motor 49. The speed of the motor 49 and speed ratio of the belt connection are such that the motor 49 drives the electro-magnet at only

a fraction, for example one-tenth, of the maximum speed at which the transmitter 13 drives the pulley 29. The kinetic energy in the machine parts moving at the reduced speed is only a small fraction of the energy in the parts when they are moving at full speed and can therefore be more readily and accurately absorbed in stopping the machine.

After the friction disc 34 engages the electro-magnet 44, the disc 34 and actuating shaft 16 are driven at the reduced speed by the motor 49 until the raised portion 66 of the cam 59 engages the follower 65 of the contact assembly 57 and opens the contacts 61, 62, thus breaking the electrical circuit and de-energizing the electro-magnet 44. The spring 40 then returns the friction disc 34 into engagement with the braked power pulley 29 which instantaneously brings the sewing machine 10 to rest. It should be noted that the raised portion 66 of the cam 59 is carefully made to be of such a length that the contacts 61 and 62 will be held open long enough for the magnetic flux of the electro-magnet 44 to break down in order to release the friction disc 34 and allow it to return into engagement with the braked pulley 29. Further, the length of the raised portion 66 is such that only when the speed of the arm shaft 16 is substantially the same as the speed of the electro-magnet 44 and consequently the kinetic energy remaining in the parts is a small, substantially fixed amount, the follower 65 will remain on the raised portion 66 until the shaft 16 is braked to a stop by the stationary pulley 29.

From experiments it has been determined that the number of degrees of rotation of the actuating shaft 16 required to stop the sewing machine from the speed of the electro-magnet 44 is predictable and constant for a given sewing machine. Thus, by positioning the contact assembly 57 at the proper place about the shaft 16, the needle-bar can be stopped repeatedly in a predetermined position. In the present device, the contact assembly 57 is positioned to stop the shaft 16 and the needle-bar 14 with the needle 15 in the work material.

The "up" contact assembly 58 is operated by the cam 59 in the same manner as the "down" contact assembly 57 and controls the electro-magnet 44 in the same manner. In the present device, the "up" contact assembly is spaced about 180 degrees from the "down" contact about the shaft 16 and will stop the sewing machine 10 with the needle-bar 14 at the upper end of its stroke and the needle 15 out of the work.

When the treadle 77 is "heeled" and the needle-bar 14 is stopped with the needle 15 in the work, as described above, the presser-foot 18 may be lifted by moving the knee shift lever 19 in the direction of the arrow B a limited distance. This permits the work to be pivoted about the needle 15. If it is desired to remove the work from the machine, the lever 19 is moved as far as possible to actuate the control switch 85 fastened to the lever 19. When the control switch operates, the contacts 105 and 109 are opened to break the circuit to the "down" contact assembly 57 and the contacts 105 and 107 are closed to complete the circuit to the "up" contact assembly 58. Since the machine is stopped with the "down" contact assembly open and the "up" contact assembly 58, which now controls the stopping position, closed, the electro-magnet 44 is energized and draws the friction disc 34 away from the pulley 29 and into engagement with the electro-magnet. The auxiliary motor 49 then drives the actuating shaft in the same manner as described above until the "up" contact assembly opens and remains open. In this case it is only a matter of 180 degrees, since the contact assemblies 57 and 58 are spaced 180 degrees apart and the speed of the shaft 16 cannot exceed the speed of the electro-magnet 44. When the "up" contact assembly opens and remains open, the sewing machine comes to rest with the needle out of the work, permitting the work to be removed.

If the operator removes her feet from the treadle 77

after the machine has stopped, the weight of the treadle 77 and the pitman 76 will return the control lever 75 to the rest position with the control lever 75 held midway between the stop members 78 and 79. In this position, the energizing switch 81 remains closed and the contacts 99 and 101 of the selector switch 83 are closed to place the "up" contact assembly 58 in control of the circuit to stop the sewing machine with the needle 14 out of the work. The shaft 16 is rotated 180 degrees in the same manner as when the control switch 85 is actuated. It should be noted that the control switch 85 has no effect on the circuit when the control lever 75 is in the rest position midway between the stop members 78 and 79, since no power is supplied to its movable contact 105 when the contacts 99 and 104 of the selector switch 83 are open. When the sewing machine is operating at full speed and the operator removes her feet from the treadle 77, the machine stops in a manner similar to when the treadle is heeled, except that, since the control lever 75 returns to a position midway between the stop members 78 and 79, the sewing machine will be stopped with the needle-bar 14 raised.

It is possible with this device to form a single stitch by merely "heeling" the treadle 77 gently and then removing the "heel" pressure, while the transmitter actuating lever 73 remains in the brake engaged position. When the sewing machine 10 is at rest with the parts in the positions shown in the drawings, the needle-bar 14 and needle 15 are raised as described previously. Upon "heeling" the treadle 77, the control lever 75 moves up to contact the stop member 78 and actuate the selector switch 83 to open the contacts 99 and 101 and to close the contacts 99 and 104, placing the "down" contact assembly 57 in control of the circuit. The needle-bar 14 is then returned to the raised position by removing the "heel" pressure and one stitch forming cycle is completed. Each time the control lever is moved from its rest position to contact the upper stop member 78 or vice versa, the actuating shaft 16 is rotated 180 degrees to drive the sewing machine through one half of a stitching cycle. Of course, if the power switch 91 is opened, the entire needle positioner system is rendered inoperative. However, the spring 40 holds the disc 34 in contact with the power pulley 29, permitting the sewing machine 10 to be operated in a conventional manner when the power switch is open.

It is believed that the many uses of this device are readily apparent. For example, in sewing operations, such as the stitching of shirt pockets, the machine operator can operate the machine to form a seam along one edge of the pocket and then "heel" the control treadle, which causes the machine to stop with the needle in the work. Upon pressing the knee shift lever to raise the presser-foot, the work can be pivoted about the needle to align the work for sewing another seam. This sequence of operations is repeated for each seam until the end of the last seam is reached. At the end of the last seam, the operation is the same as at the end of any other seam except that the knee shift lever is pressed to its extreme position which will cause the needle to be stopped in its raised position permitting the work to be removed and a new work piece to be inserted. Of course, if the operator stops the machine before reaching the desired end of the seam, the machine can be operated to form only single stitches until the desired end of the seam is reached. All manual operation of the sewing machine by means of a balance wheel is eliminated. Obviously, the device can be used to advantage on many other stitching operations of a similar type.

A second embodiment of the needle-positioner is shown in Figs. 7 and 8. Most of the parts in this modification are identical with those of the primary embodiment and are designated by the same numerals. It is believed that a description here of the modified structure will be sufficient for the operation of the device to be understood,

In this modification only, an energizing or disabling switch 81 is fastened to the transmitter actuating lever 73 with a switch operator 82 operated by the control lever 75. The selector switch 83 of the first modification is not used. The switch contains contacts 97 and 98 which are normally held closed by the control lever 75 and spring 80 in their rest position and opened when the treadle 77 is depressed to release the transmitter brake 68. An overruling switch 110 is mounted in a box 111 fastened to the table top 12 and containing the rectifier 92, a power switch 112, a selector switch 113 and a motor switch 114. The overruling switch 110 is provided with an actuator 115 which can be operated by the operator's knee. All other parts of the device are the same as previously described in connection with the preferred embodiment.

Referring to the schematic diagram of Fig. 8, alternating current is supplied to the circuit through the manually controlled power switch. A conductor 116 connects one side of the switch 112 directly to the rectifier 92. The other side of the switch 112 is connected to the rectifier 92 through the energizing switch contacts 97 and 98. Direct current is supplied directly to the brush 54 by the rectifier 92 through a conductor 117. The other direct current connection of the rectifier 92 is connected to the movable contact 118 of the single pole, double throw overruling switch 110. The two fixed contacts 119 and 120 of the overruling switch 110 are connected to the movable contacts 121 and 122, respectively, of the double pole, double throw selector switch 113. One pair of inter-connected contacts 123 and 124 of the selector switch 113 are connected to the fixed contact 61b of the "up" contact assembly 58 and to a movable contact 125 of the motor switch 114. The other pair of fixed contacts 126 and 127 of the selector switch 113 are connected to the fixed contact 61 of the "down" contact assembly 57 and to the fixed contact 128 of the motor switch 114.

In operation, the second embodiment functions in a manner similar to the first embodiment of the device. Before operating the sewing machine, the power switch is closed and the stopping position of the needle-bar is chosen by moving the selector switch 113 to either the "up" or the "down" position. Assuming that the selector switch is moved to the "down" position with the contacts 121 and 122 in engagement, respectively, with the contacts 127 and 124, the "down" contact assembly 57 is placed in control of the circuit and determines the stopping position of the sewing machine 10, since the contacts 118 and 119 of the overruling switch 110 are normally closed and the contacts 125 and 128 of the motor switch 114 are normally open. When the treadle 77 is depressed to release the transmitter brake 68, the control lever 75 moves downwardly to engage the lower stop member 79 and opens the energizing switch 81. The entire control circuit is thus opened before the brake 68 is released and the sewing machine can then be operated in a normal manner as described in connection with the first embodiment of the device.

When it is desired to stop the sewing machine 10, the treadle 77 is "heeled" to force the control lever 75 against the upper stop member 78 and engage the brake 68. This action also closes the energizing switch 81 to condition the electrical circuit for operation. Once the switch 81 is closed, the sewing machine is brought to rest with the needle-bar 14 down in the same manner as in the first embodiment when the treadle 77 is "heeled." It will be readily seen that if the selector switch 113 is positioned in the "up" position, the device operates in a similar manner but since the "up" contact assembly controls the circuit, the sewing machine 10 will stop with the needle-bar 14 raised. It should be noted that in this embodiment nothing further takes place if the operator's feet are removed from the treadle 77. Even if the operator's feet are removed while the machine is run-

ning, the spring 80 returns the control lever to its rest position and the spring 70 engages the brake 68 causing the machine 10 to come to rest in the same manner as if the treadle 7 had been "heeled."

During a series of stitching operations, if the operator finds it desirable to stop the machine 10 with the needle-bar 14 in the position which has not been chosen at the selector switch, it is only necessary to press the switch operator 115 to open the contacts 118 and 119 and close the contacts 118 and 120 to overrule the choice made at the selector switch 113. Thus, if the selector switch is in the "down" position, the connection to contacts 121 and 127 and contact assembly 57 is broken and a connection to contacts 122 and 124 and "up" contact assembly 58 is completed. If the selector switch 113 is in the "up" position, operation of the switch 110 breaks the connections to contacts 121 and 123 and the "up" contact assembly 58 and closes the circuit to contacts 122 and 126 and the "down" contact assembly 57. As soon as the pressure is removed from the switch operator the switch 110 closes contacts 118 and 119 and the circuit is returned to the condition chosen at the selector switch. Of course, it will be appreciated that the selector switch can be operated by any suitable operator actuated means.

In this modification, the sewing machine can also be controlled to operate through only a single complete stitching cycle. When the sewing machine 10 is at rest and the selector switch 113 is in the "down" position, for example, the needle-bar 14 is in its lowered position. If the selector switch 113 is then moved manually to the "up" position, the sewing machine 10 is driven by the auxiliary motor 49 until the needle-bar 14 is in its raised position and the "up" contact assembly 58 is opened. Upon returning the selector switch 113 to the "down" position, the needle-bar 14 is returned to its lowered position to complete one stitching cycle. Each time the selector switch 113 is moved from one position to the other the sewing machine 10 is driven through one-half of a stitch-forming cycle by the auxiliary motor 49. It should be noted that the same result can be obtained by pressing and releasing the overruling switch.

A further feature of this modification is an arrangement whereby the sewing machine can be driven at a reduced speed by the auxiliary motor 49. When the normally open motor switch 114 is manually closed, the fixed contacts 61 and 61b of the contact assemblies 57 and 58, respectively, are directly connected together. Since one of the contact assemblies is always closed, the electro-magnet 44 is energized as long as the energizing switch 81 is closed, thus connecting the actuating shaft to the continuously running auxiliary motor 49. The circuit may be broken to de-energize the electro-magnet by manually opening the switch 114 or by gently depressing the treadle 77 to open the energizing switch 81. Further depression of the treadle 77, operates the machine 10 in a conventional manner.

It is to be further understood that the present invention provides a novel and meritorious driving mechanism having several embodiments which can be advantageously applied to various types of machines. For example, considering the stub shaft 26 (see Fig. 2) as comprising an actuating element which could be applied to various types of machines, the pulley 33 is a primary rotatable driving member, the pulley 29 is a driven element, and the casing 44 a secondary or auxiliary driving member. The transmitter brake 68 is adapted for retarding the member 29 through the brake operator 69. The first or normally engaged clutch 34-35 operatively connects the primary driving member 29 to the actuating element 26 while the second or normally disengaged clutch consisting of the members 34, 36 and the casing 44, is adapted to connect the secondary or auxiliary driving member (casing 44) to the actuating element 26. The spring 40 and magnet 44

constitute first and second clutch operating means while the circuit (Fig. 6) functions to interconnect the brake operator 69 and the first and second clutch operating means to disengage the first clutch 34—35 and to engage the second clutch 34—36 when the brake operator 69 is moved to engage the brake 68. The timer 57—58 is adapted to be operatively connected with the actuating element 26 and the operating means (magnet 44) for effecting the disengagement of the second clutch 34—36 and the engagement of the first clutch 34—35 at a predetermined position of the element 26 after engagement of the brake 68.

From the foregoing description of our device, it is apparent that this device has many practical advantages. The needle-positioner consists of a simple clutch device and timer which can readily be attached to a sewing machine, an auxiliary motor and power box which can be conveniently attached to a power table or other support means, and an electrical control system which is readily connected to be controlled by the conventional sewing machine controls. The friction braking means stops the sewing machine without a severe shock and positions the needle-bar of the sewing machine accurately in a predetermined position. The sewing machine can be driven to form only a single stitch merely by manipulating the manual controls. In addition, particularly in connection with the first embodiment of the device, the sewing machine operator can control all of the possible operations of the device merely by manipulating the conventional control treadle and knee shift mechanism.

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

1. A driving device comprising, an actuating element, a primary rotatable driving member, a secondary driving member, a brake for said primary driving member, a brake operator, a first clutch operatively connecting said primary driving member to said actuating element, a second clutch for connecting said secondary driving member to said actuating element, first and second clutch operating means, means operatively interconnecting said brake operator and said first and second clutch operating means to disengage said first clutch and engage said second clutch when said brake operator is moved to engage said brake, and a timer operatively connected to said element and said operating means operable to disengage said second clutch and engage said first clutch at a predetermined position of said element after engagement of said brake.

2. A driving device comprising, an actuating element, a primary power member adapted to rotate said element, a secondary power member adapted to rotate said element at a predetermined speed, primary connecting means between said element and said primary power member, secondary connecting means between said element and said secondary power member, a brake engageable to stop said primary power member, operator controlled brake engaging means, control means connected to said operator controlled means and said connecting means operable to disconnect one of said connecting means upon said operator controlled means tending to engage said brake, and a timer operatively connected to said element and said connecting means operable when said control means is operated to render said one of said connecting means operative only at a predetermined position of said shaft.

3. A driving device comprising, a driving element, a driven element, a first clutch for connecting said driving and driven elements, a brake for said driven element, actuator means for said clutch and brake, an actuating element, connecting means between said driven element and said actuating element including a second clutch, operating means for said second clutch, conditioning means connected to said actuator means operable to condition said operating means for disengaging said second clutch when said actuator means tends to engage said brake, control means associated with said condition-

ing means and said actuator means operable to cause said operator to disengage said second clutch after said conditioning means operates, and a timer associated with said actuating element and said operating means operable to permit re-engagement of said second clutch at a predetermined position of said shaft when said brake is engaged.

4. A sewing machine driving and control mechanism comprising, a transmitter including an oscillatable actuating lever, two spaced stop members carried by said actuating lever, a manually actuated control lever pivotally connected to said actuating lever and extending between said stop members, yieldable means normally holding said control lever out of contact with said stop members, and control means carried by one of said levers and controlled by relative movement of said levers.

5. A sewing machine; a transmitter having an actuating lever; and a needle positioner connected to said sewing machine and having a switch carried by said actuating lever; and operator actuated control mechanism comprising, a control lever pivotally connected to said actuating lever and controlling said switch, stop members carried by said actuating lever and engageable by said control lever, and a spring normally holding said control lever out of engagement with said stop members.

6. A sewing machine control mechanism comprising, a transmitter actuating lever carrying a plurality of stop members, a control lever pivotally connected to said actuating lever and engageable with said stop members, an electric switch carried by one of said levers and controlled by relative movement of said levers, and means normally holding said control lever out of engagement with said stop members.

7. A driving device comprising, an actuating element, a primary rotatable driving member, a secondary driving member, a brake for stopping said primary driving member, means for rotating said secondary driving member, a normally engaged first clutch operatively connecting said primary driving member to said actuating element, a normally disengaged second clutch for operatively connecting said secondary driving member to said actuating element, an electromagnet adapted to engage said second clutch and disengage said first clutch, electrical contacts operatively connected to said actuating element and adapted to be opened and closed upon rotation of said element, an actuator for said brake, and operative electrical connections from said contacts to said electromagnet and said brake actuator.

8. A sewing machine driving device comprising a sewing machine actuating shaft, a driving pulley journaled on said shaft, means for rotating and braking said pulley, an electromagnet rotatably supported on said shaft, a normally engaged first clutch operatively connecting said pulley to said actuating shaft, a normally disengaged second clutch for connecting said electromagnet to said shaft, said electromagnet being adapted to disengage said first clutch and engage said second clutch when energized, means for rotating said electromagnet, contact means operatively connected to said electromagnet and brake means, and a cam carried by said shaft and adapted to open and close said contacts, said contacts and electromagnet being conditioned for operation only upon engagement of said braking means.

9. In combination, a sewing machine having stitch-forming mechanism and a rotatable power shaft operatively connected to said stitch-forming mechanism; a unitary electric power transmitter comprising a rotatable driven shaft, a first electric motor adapted to rotate said driven shaft at high speed, clutch means for operatively connecting said driven shaft to said motor for rotation, a friction brake for stopping said driven shaft, and actuating means for said clutch means and brake; power transmission means operatively connecting said transmitter driven shaft to said sewing machine power shaft; auxiliary driving mechanism for driving said power shaft

at low speed including a continuously rotatable second electric motor supplying power for said mechanism; and control means actuated by said actuating means for at will causing said auxiliary driving mechanism to drive said power shaft and said stitch-forming mechanism through only one complete stitching cycle only after the driven shaft has been braked.

10. A driving device for a sewing machine having a rotatable power shaft comprising a driven shaft adapted to be operatively connected to said power shaft, a primary driving member carried by said driven shaft for free rotation relative thereto, a secondary driving member carried by said driven shaft for free rotation relative thereto, clutch means for connecting said driven shaft to said primary driving member, secondary clutch means for connecting said driven shaft to said secondary driving member, spring means for urging one of said clutch means into engagement, electromagnetic means for urging the other of said clutch means into engagement when energized, means for energizing said electromagnetic means including an electrical contact device adapted to permit energization and de-energization of said electromagnet at predetermined positions of said power shaft, means operatively connecting said contact means to said power shaft, and continuously rotatable electric motor means for rotating said power members.

11. A sewing unit comprising a table having a table-top, a sewing machine supported by said table-top, said sewing machine having a movable needle-carrier and a rotatable actuating shaft operatively connected to said needle-carrier, an electric power transmitter carried by said table beneath said table top, said transmitter having a motor rotor and a driven shaft, a clutch for connecting said driven shaft to said rotor and a brake for said driven shaft, a rotatable member adapted to rotate in synchronism with said actuating shaft, a primary driving member operatively connected to said driven shaft for rotation, an auxiliary continuously rotatable driving motor, an auxiliary driving member operatively connected to said auxiliary motor for rotation, connecting means for selectively connecting said primary driving member and said auxiliary driving member to said rotatable member, manually controlled means for actuating said clutch and brake and said connecting means, means actuated by said manually controlled means for permitting said auxiliary driving member to rotate said rotatable member only when said brake is engaged.

12. Driving mechanism for a sewing machine comprising a rotatable member, a primary rotatable power member for said rotatable member, driving and braking mechanism operatively connected to said primary power member for driving or stopping said power member, an auxiliary rotatable power member adapted to rotate said rotatable member at a continuous predetermined slow speed, clutch mechanism for connecting said rotatable member to said primary power member and to said auxiliary power member, control means operatively connected to said rotatable member and said clutch mechanism for permitting said clutch mechanism to connect said rotatable member to said auxiliary power member for only one revolution of said rotatable member at said predetermined slow speed, actuating means for said driving and braking mechanism, and interlocking means operatively connected to said actuating mechanism and said clutch mechanism for permitting said clutch mechanism to connect said rotatable member to said auxiliary power member only when said braking mechanism is engaged.

13. A power-driven sewing machine including a rotary needle-shaft, rotary power means, normally effective braking means, and clutching means for selectively connecting the needle-shaft either to the rotary power means for normal sewing purposes or to the normally effective braking means, in operative combination with automatic means, adapted to bring the needle-shaft to rest at a

predetermined point in its rotary cycle; said automatic means comprising an electrical power device operatively connected to said clutching means to move said clutching means into engagement with said rotary power means to effectuate unidirectional rotation of the needle-shaft in its normal sewing direction, an electrical circuit for energizing said electrical power device, a control contact in series in said circuit, and means associated with and operated in synchronism with the needle-shaft to open said contact at said predetermined point; whereby the normally effective braking means stops the needle-shaft at that predetermined point.

14. A control mechanism for stopping in a predetermined angular position the rotary shaft of a sewing machine, comprising, a primary rotatable driving member for driving the rotary shaft at high speed, an auxiliary rotatable driving member for driving the rotary shaft at low speed, friction brake means, operator-influenced clutch means for alternatively connecting the rotary shaft with the primary rotatable driving member and the brake means, additional clutch means for alternatively connecting and disconnecting the rotary shaft to and from the auxiliary rotatable driving member, electro-magnetic means for operating the additional clutch means, an electrical circuit for controlling that electro-magnetic means, timing means adapted for movement synchronously with the rotary shaft, first means included in the circuit and cooperative with the operator-influenced clutch means to effect through the magnetically operated additional clutch means an operative connection between the auxiliary rotatable driving member and the rotary shaft when the operator-influenced clutch is in its braked position, and second means included in the circuit and cooperative with the timing means to effect through the magnetically operated second clutch means the disconnection of the auxiliary rotatable driving member and the rotary shaft when the rotary shaft is in a predetermined angular position.

15. A control mechanism for stopping in a predetermined angular position the rotary shaft of a sewing machine, comprising, a primary rotatable driving member for driving the rotary shaft at high speed, an auxiliary rotatable driving member for driving the rotary shaft at low speed, friction brake means, operator-influenced clutch means for alternatively connecting the rotary shaft with the primary rotatable driving member and the brake means, additional clutch means for alternatively connecting the rotary shaft with the brake means and the auxiliary rotatable driving member when the operator-influenced clutch means is in its braked position, electro-magnetic means for operating the additional clutch means, an electrical circuit for controlling the electro-magnetic means, timing means adapted for movement synchronously with the rotary shaft, first means included in the circuit and cooperative with the operator-influenced clutch means to effect through the magnetically operated additional clutch means the operative connection between the auxiliary rotatable driving member and the rotary shaft upon the initial manual braking of the rotary shaft, and second means included in the circuit and cooperative with the timing means to effect through the magnetically operated additional clutch means the operative connection between the rotary shaft and the braking means when the rotary shaft is in a predetermined angular position and the operator-influenced clutch is in its braked position.

16. A control mechanism for stopping in a predetermined angular position the rotary shaft of a sewing machine, comprising, a primary rotatable driving member for driving the rotary shaft at high speed, an auxiliary rotatable driving member for driving the rotary shaft at low speed, a driven element, clutch means for alternatively connecting the rotary shaft with either the driven element or the auxiliary rotatable driving member, means normally maintaining through the clutch means operative engagement between the driven element and the

rotary shaft, friction braking means, an operator-actuated clutch for alternatively connecting the driven element with either the primary rotatable driving member or the braking means thereby either to drive or retard the rotary shaft through the driven element, an electric power device for shifting the first mentioned clutch means to effect operative driving engagement between the rotary shaft and the auxiliary rotatable driving member, an electric switch for energizing the power device only when the driven element is braked, and a timer operatively connected with the rotary shaft for deenergizing the power device when the rotary shaft is in a predetermined angular position.

17. A control mechanism for stopping in a predetermined angular position the rotary shaft of a sewing machine, comprising a main electric motor for driving the rotary shaft at high speed, an auxiliary electric motor for driving the rotary shaft at low speed, a driven element, clutch means for alternatively connecting the rotary shaft with either the driven element or the auxiliary motor, a spring normally maintaining through the clutch means operative engagement between the driven element and the rotary shaft, friction braking means, additional clutch means for alternatively connecting the driven element with either the main electric motor or the braking means thereby either to drive or retard the rotary shaft through the driven element, operator-actuated means for controlling the additional clutch means, an electromagnet for shifting the first mentioned clutch means against the action of the spring to effect operative driving engagement between the rotary shaft and the auxiliary motor, an electric switch operated by the operator-actuated means for energizing the electromagnet only when the driven element is braked, and a timer operatively connected with the rotary shaft for deenergizing the electromagnet when the rotary shaft is in a predetermined angular position.

18. A control mechanism for stopping in a predetermined angular position the rotary shaft of a sewing machine, comprising, a main electric motor for driving the rotary shaft at high speed, an auxiliary electric motor for driving the rotary shaft at low speed, a driven element, clutch means for alternatively connecting the rotary shaft with either the driven element or the auxiliary motor, means normally maintaining through the clutch means operative engagement between the driven element and the rotary shaft, friction braking means, additional clutch means for alternatively connecting the driven element with either the main electric motor or the braking means thereby either to drive or retard the rotary shaft through the driven element, operator-actuated means for operating the additional clutch means, means normally maintaining through the additional clutch means operative engagement between the driven element and the braking means, an electric power device for shifting the first mentioned clutch means to effect operative driving engagement between the rotary shaft and the auxiliary motor, an electric circuit for energizing the power device, an electric switch actuated by the operator-actuated means for closing the circuit only when the driven element is braked, and a timer operatively connected with the rotary shaft for opening the circuit when the rotary shaft is in a predetermined angular position.

19. A control mechanism for stopping in a predetermined angular position the rotary shaft of a sewing machine, comprising, a main electric drive for driving the rotary shaft at high speed, an auxiliary electric drive for driving the rotary shaft at low speed, first and second driven elements adapted to be mounted for free rotation upon the rotary shaft, a connection between the first of the driven elements and the auxiliary drive whereby such element will be constantly rotated, clutch means adapted to be mounted upon the rotary shaft for alternatively connecting the rotary shaft with either the first or second

driven elements, means normally maintaining through the clutch means operative engagement between the second driven element and the rotary shaft, friction braking means, an operator-actuated clutch for alternatively connecting the second driven element with either the main drive or the braking means thereby either to drive or retard the rotary shaft through the second driven element, an electric power device adapted to be supported upon the rotary shaft for shifting the first mentioned clutch means to effect operative driving engagement between the rotary shaft and the auxiliary drive, an electric switch for energizing the electric power device only when the second driven element is braked, and a timer adapted to be operatively connected with the rotary shaft for deenergizing the power device when the rotary shaft is in a predetermined angular position.

20. A control mechanism for stopping in a predetermined angular position the rotary shaft of a sewing machine, comprising, a high speed driving mechanism for driving the rotary shaft at high speed, a low speed driving mechanism for driving the rotary shaft at low speed, first and second driven elements adapted to be mounted for free rotation upon the rotary shaft, a connection between the first of the driven elements and the low speed driving mechanism whereby such element will be constantly rotated, clutch means adapted to be mounted upon the rotary shaft for alternatively connecting the rotary shaft with either the first or second driven element, a spring normally maintaining through the clutch means operative engagement between the second driven element and the rotary shaft, friction braking means, additional clutch means for alternatively connecting the second driven element with either the high speed driving mechanism or the braking means thereby either to drive or retard the rotary shaft through the second driven element, operator-actuated means for operating the additional clutch means, spring means normally maintaining through the additional clutch means operative engagement between the second driven element and the braking means, an electromagnet adapted to be supported upon the rotary shaft for shifting the first mentioned clutch means against the spring action to effect operative driving engagement between the rotary shaft and the low speed driving mechanism, an electric circuit for energizing the electromagnet, an electric switch actuated by the operator-actuated means for closing the circuit only when the second driven element is braked, and a timer adapted to be operatively connected with the rotary shaft for opening the circuit when the rotary shaft is in a predetermined angular position.

21. A control mechanism for stopping in a predetermined angular position the rotary shaft of a sewing machine, comprising, a high speed driving mechanism for driving the rotary shaft at high speed, a low speed driving mechanism for driving the rotary shaft at low speed, a driven element, clutch means for alternatively connecting the rotary shaft with either the driven element or the low speed driving mechanism, means normally maintaining through the clutch means operative engagement between the driven element and the rotary shaft, friction braking means, additional clutch means for alternatively connecting the driven element with either the high speed driving mechanism or the braking means thereby either to drive or retard the rotary shaft through the driven element, operator-actuated means for operating the additional clutch means, means normally maintaining through the additional clutch means operative engagement between the driven element and the braking means, an electric power device for shifting the first mentioned clutch means to effect operative driving engagement between the rotary shaft and the low speed driving mechanism, an electric circuit for energizing the power device, an electric switch actuated by the operator-actuated means for closing the circuit only when the driven element is braked, and a timer adapted to be operatively connected with the

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rotary shaft for opening the circuit whenever the rotary shaft is in a predetermined angular position.

22. In combination, a sewing machine having stitch-forming mechanism and a rotatable power shaft operatively connected to said stitch-forming mechanism; a unitary electric power transmitter comprising a rotatable driven shaft, a first electric motor adapted to rotate the driven shaft at high speed, clutch means for operatively connecting the driven shaft to the motor for rotation, a friction brake for stopping the driven shaft, and manually operable means for operating the clutch means and brake; power transmission means operatively connecting the transmitter driven shaft to the sewing machine power shaft; auxiliary driving mechanism for driving the power shaft at low speed including a continuously rotatable second electric motor supplying power for the mechanism; manually operable means for causing the auxiliary driving mechanism to drive the power shaft and the stitch-forming mechanism while the driven shaft is braked; and timing means operatively connected to and driven in synchronism with the rotatable power shaft to disconnect the auxiliary driving mechanism from driving relation with the power shaft at a predetermined position of the power shaft.

23. In combination, a sewing machine having stitch-forming mechanism and a rotatable power shaft operatively connected to said stitch-forming mechanism; a unitary electric power transmitter comprising a rotatable driven shaft, a first electric motor adapted to rotate the driven shaft at high speed, clutch means for operatively connecting the driven shaft to the motor for rotation, a friction brake for stopping the driven shaft, and manually operable means for operating the clutch means and brake; power transmission means, including a normally engaged friction clutch for operatively connecting the driven shaft to the sewing machine power shaft; auxiliary driving mechanism for driving the power shaft at low speed including a continuously rotatable second electric motor supplying power for the mechanism, and a normally disengaged clutch for operatively connecting when engaged the auxiliary driving mechanism in driving relation with the power shaft; manually operable means for causing the auxiliary driving mechanism to drive the power shaft through the normally disengaged clutch while the driven shaft is braked; and timing means operatively connected to and driven in synchronism with the power shaft to disconnect the auxiliary driving mechanism from driving relation with the power shaft at a predetermined position of the power shaft.

24. In combination, a sewing machine having stitch-forming mechanism and a rotatable power shaft operatively connected to said stitch-forming mechanism; a unitary electric power transmitter comprising a rotatable driven shaft, a first electric motor adapted to rotate the driven shaft at high speed, manually operable clutch means for operatively connecting the driven shaft to the motor for rotation, a friction brake for stopping the driven shaft, and manually operable means for operating the manually operable clutch means and brake; and a needle positioner unit comprising a shaft, means operatively connecting the needle positioner shaft with the power shaft, a pulley mounted on the needle positioner shaft for turning motion relative thereto, means operatively connecting the driven shaft with said pulley, normally engaged clutch means for maintaining a driving relation between the pulley and the needle positioner shaft whenever the driven shaft is being driven by its motor, an auxiliary slow speed driving mechanism including a second electric motor drive unit, normally disengaged clutch means for opera-

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tively connecting when engaged the auxiliary electric motor drive unit in driving relation with the needle positioner shaft while the pulley is stopped by the transmitter brake, manually operable means for controlling the engagement of said normally disengaged clutch means, and timing means operatively connected to and driven in synchronism with the needle positioner shaft to disengage through the normally disengaged clutch means the connection between the auxiliary electric motor drive unit and the needle positioner shaft when the needle positioner shaft is in a predetermined position.

25. A sewing machine; a transmitter having an actuating lever; and a needle positioner connected to said sewing machine and having a switch carried by said actuating lever; and operator actuated control mechanism comprising a control member connected to said actuating lever by means permitting limited relative movement between said lever and said control member, stop members carried by said actuating lever and engageable by said control member, said switch being positioned on said lever so as to be actuated in response to relative movements between said lever and said control member, and a spring normally holding said control member out of engagement with one of said stop members.

26. In combination, a sewing machine having stitch-forming mechanism and a rotatable power shaft operatively connected to the stitch-forming mechanism; an electric power transmitter comprising a rotatable driven shaft, a first electric motor adapted to rotate the driven shaft at high speed, clutch means for operatively connecting the driven shaft to the motor for rotation, a friction brake for stopping the driven shaft, and manually operable means for operating the clutch means and brake; power transmission means, operatively connecting the driven shaft to the sewing machine power shaft; and auxiliary driving mechanism for driving the power shaft at low speed including a second electric motor, timing means including an electrical circuit, a switch in the circuit, means actuated in synchronism with the power-shaft for periodically operating the switch to open and close the circuit, means operable upon the closing and opening of the circuit to effect respectively the connection and disconnection of the auxiliary driving mechanism to and from the power shaft, a second electrical switch in the circuit and operatively connected with the manually operable means thereby to connect the circuit with a source of electrical supply when the driven shaft is braked and to disconnect the circuit from such source when the driven shaft is in driving relation with its electric motor.

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