June 10, 1958 K. WINZ 2,838,019

STOP MECHANISM FOR SEWING MACHINES

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FIG. 1

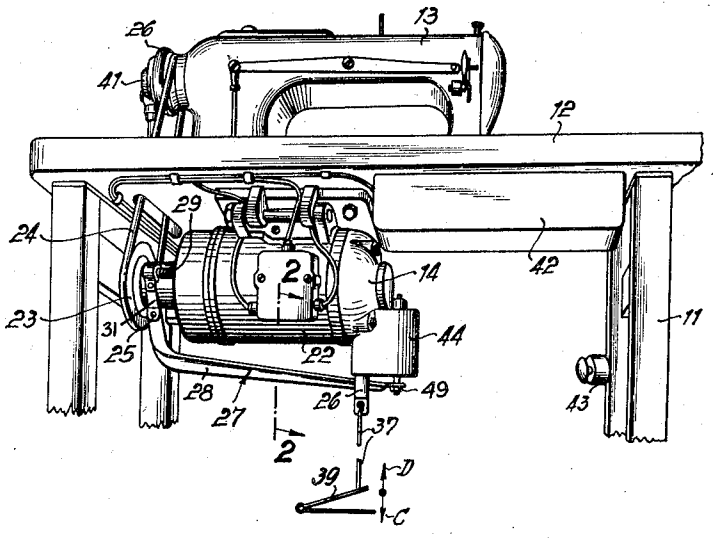


FIG. 2

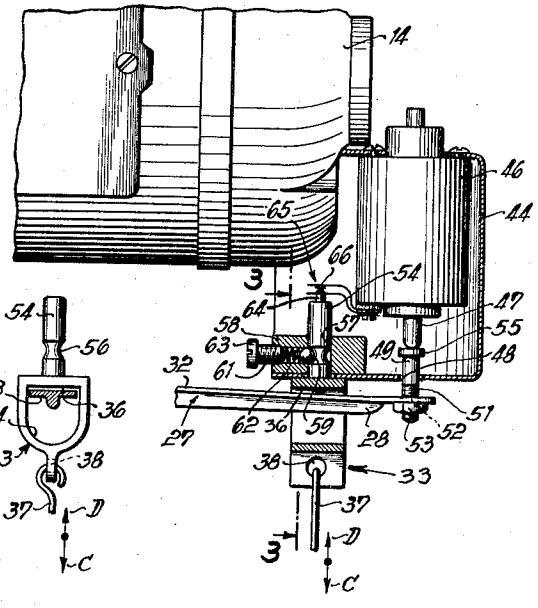


FIG. 3

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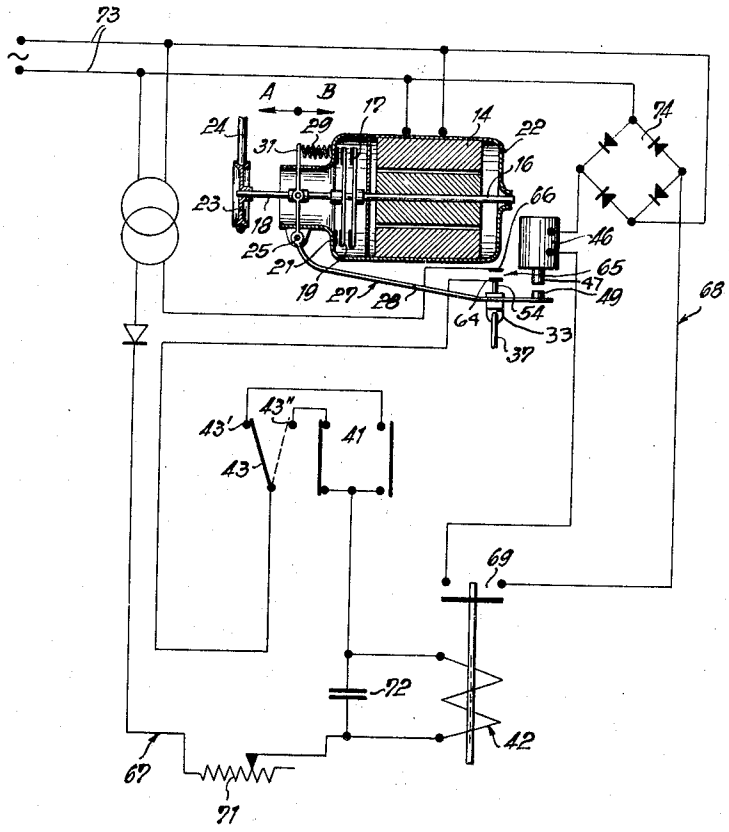
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FIG. 4



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STOP MECHANISM FOR SEWING MACHINES

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Claims priority, application Germany September 27, 1954

7 Claims. (Cl. 112—219)

The invention relates to sewing machines, and relates more particularly to sewing machines of the type having a clutch motor of the friction clutch type, so that the sewing machine is driven with a speed proportional to the pressure exerted on the clutch. Still more particularly, the invention relates to such a sewing machine that has means for arresting the machine with the needle in a predetermined position.

Sewing machine equipped with a friction clutch type motor in most instances do not provide for arresting the needle in a predetermined position. The proposals that have been made in that direction, however, provide, after the arrest of the sewing machine, for energization thereof at reduced speed by means other than the clutch connection as used for the machine during the sewing operation, until the needle has reached the desired position, but most of these are characterized by a complicated mechanism that is costly to make and difficult to maintain in proper working order.

The instant invention has among its objects to provide for simple electromagnetic means to arrest, in a desired needle position, a sewing machine that is equipped with a friction type clutch motor by re-establishing temporarily and automaticallly the clutch drive as used during the sewing operation after the machine has been arrested at the end of the sawing operation. It is another object of the invention to provide means for predetermining the position that the needle will have when the sewing machine is arrested. It is a still further object of the invention to provide for selection among alternate predetermined needle arresting positions in advance of the arrest of the machine.

The invention accordingly comprises the features of construction, combination of elements and arrangement of parts which will be exemplified in a construction hereinafter set forth and the scope of the application of which will be indicated in the claims.

In the accompanying drawings,

Fig. 1 is a fragmentary perspective underside view of a sewing machine and stop mechanism, in accordance with the invention;

Fig. 2 is a fragmentary plan view seen in direction 2—2 of Fig. 1, partly in section;

Fig. 3 is a fragmentary elevational view, partly in section, taken on line 3—3 of Fig. 2; and

Fig. 4 is a wiring diagram.

Driving and arresting of the sewing machine

In carrying the invention into effect in one of the embodiments which has been selected for illustration in the accompanying drawings and for description in this specification, and referring now particularly to Fig. 1, there is provided a support 11 for a sewing machine. On the support 11 there is mounted a table 12, which supports the head 13 of the sewing machine, and on the underside of which there is mounted a friction clutch type motor 14 of conventional construction. The motor 14 has a shaft 16 that carries a rotary clutch plate 17.

A drive element 18 is journalled rotatably in axial alignment with the axis of the shaft 16, and is shiftable in opposite directions A and B for braking and respectively driving of the element 18. When the element 18 is shifted in the direction B, the clutch plate 19 thereof will engage the clutch plate 17 of the motor 14. When, on the other hand, the element 18 is shifted in the direction A, the clutch plate 19 thereof will engage a brake disc 21 that is connected to the housing 22 of the motor 14, to arrest the rotary movement of the element 18. The element 18 carries a pulley 23, which drives a belt 24 and thereby the flywheel 26 of the sewing machine.

The shifting of the element 18 is carried out by a lever 27 that is pivoted at 25 with relation to the housing 22 of the motor 14. Extending upwardly at one side of the pivot 25, the lever 27 has arms 31 that engage the drive element 18 for shifting it. The lever 27 has another, substantially horizontally extending, arm 28 that is disposed below the motor 14. When the arm 28 is pressed downwardly, the arms 31 of the lever 27 will shift the element 18 in the direction B for driving; conversely, when the arm 28 of the lever 27 is lifted, the arms 31 of the lever 27 will shift the element 18 in the direction A for braking. A compression spring 29 is provided for each arm 31 and urges the arm 31 in the direction A, biasing the lever 27 to turn (counterclockwise, Figs. 1, 4) thereby to move the element 18 to a normal brake position where it is uncoupled from the shaft 16 of the motor 14 and has its clutch plate 19 in frictional engagement with the brake disk 21 braking the rotation of the element 18 and thereby of the sewing machine.

The arm 28 of the lever 27 has a flat upper surface 32. Near its end, the arm 28 is surrounded by an endless member such as an actuator member 33 that defines on its interior an elongated opening 34. The member 33 has a flat upper surface 36, which is adapted to engage the flat upper surface 32 of the arm 28 when the member 33 is moved downwardly in the direction C. A rod 37 is hooked near its upper end into an aperture 38 of the member 33, and is connected near its lower end to a treadle 39 of conventional design. By stepping on the treadle, the operator will move downwardly the member 33, thereby causing a downward movement of the arm 28, resulting in the coupling of the element 18 with the motor 14 for driving the sewing machine. The driving speed of the element 18 and therefore of the sewing machine will be proportional to the amount of friction between the disks 17 and 19, and thus proportional to the force exerted by the operator onto the treadle 39. Upon release by the operator of the pressure on the treadle 39, the spring 29 will return the element 18 to the brake position to arrest the sewing machine.

Needle positioning upon arresting

Means are provided for arresting the needle (not shown) of the sewing machine in a predetermined position when the sewing machine is stopped, by arresting the drive shaft (not shown) for the needle in a predetermined position. Generally speaking, this is accomplished by re-engaging the sewing machine with the motor 14 automatically, upon release by the operator of the treadle 39, until the needle driving shaft of the head 13 has reached the selected predetermined position. This is accomplished by temporarily depressing the arm 28 by means other than the treadle 39 and the rod 37 and member 33, as it occurs only after release by the operator of the pressure exerted against the treadle 39 and the member 33 has returned to its inactive position as shown in Fig. 2.

The flywheel 26 is carried on the said driving shaft for the needle. A switch 41 is connected to the flywheel

26. The switch 41 has as many contact positions as there are stop positions; in Fig. 4 it is shown by way of exemplification with two positions, namely one for the upper needle stop position and one for the lower needle stop position as only these two stop positions have herein been considered. The switch 41 is electrically interconnected with a relay arrangement 42 that is mounted on the underside of the table 12. On one of the legs of the support 11, there is mounted a preselector switch 43 which is arranged in series in the electrical circuit of the switch 41 and the relay arrangement 42. The preselector switch 43 is movable between selecting positions, for instance a selection position 43' (shown in solid lines in Fig. 4) and a position 43'' (shown in broken lines in Fig. 3).

To the motor 14, there is connected a casing 44 (Figs. 1 and 2) on the interior of which there is secured an electromagnetic apparatus such as a solenoid 46. In axial registry with the plunger 47 of the solenoid 46, the casing 44 has a hole 48 in which there is axially moveably arranged a bolt 49. The bolt 49 carries near its lower end a thread 51 with which the bolt 49 engages a threaded opening 52 that is formed in the end portion of the arm 28 of the lever 27. A nut 53 engages the thread 51 below the arm 28, adjustably locking the bolt 49 on the arm 28. Near its upper end the bolt 49 carries a flange 55 that has a larger diameter than the hole 48, and which limits the downward stroke of the bolt 49. The free end of the plunger 47 engages the transverse end surface of the flange 55 of the bolt 49. Upon actuation of the solenoid 46, the plunger 47 will press the bolt 49 downwardly in direction C, thereby moving downwardly the arm 28.

The opening 34 of the actuator member 33 is sufficiently wide and long to clear the path of the arm 28 as impelled by the solenoid 46 when the member 33 is in the inactive upper position following release of the treadle 39.

By threading the bolt 49 more or less deeply into the opening 52 of the arm 28, the length of the stroke which will be exerted by the solenoid 46 on the arm 28 can be adjusted so that the downward movement of the arm 28, impelled by the solenoid 46, will be sufficient to establish a driving connection between the motor 14 and the drive element 18. Upon energization of the solenoid 46, the driving connection will thus be made and will continue until the solenoid 46 is de-energized. By the foregoing arrangement, the sewing machine can be driven temporarily while the normal actuating mechanism represented by the member 33, the rod 37 and the treadle 39 is inactivated.

To the top of the actuating member 33, there is connected an upwardly extending pin 54 that has a recess such as an annular peripheral groove 56. The pin 54 protrudes to the interior of the casing 44 and is slidable in a bore 57 that is formed inside a body 58 that is connected on the interior to the casing 44. In the inactive position of the member 33 (Fig. 2) the pin 54 is releasably latched in the bore 57, so that the member 33 can be moved downwardly in direction C only by overcoming the latching force. The latching is provided by a sphere 59 that is disposed in a horizontal bore 61 of the body 58, and that is biased by a spring 62 to engage the groove 56 of the pin 54. The bore 61 is closed by a screw 63 that is threaded into the open end of the bore 61, and by which the pressure can be adjusted that the spring 62 exerts upon the sphere 59.

The pin 54, in the inactive position of the actuator member 33, projects beyond the bore 57 of the body 58 and in this position closes a switch 65 that is formed by two electric contacts 64 and 66. The pin 54 is insulated from the contact 64, for instance by means of an insulator (not shown). The contacts 64 and 66 are interconnected with the pre-selector 43, the switch 41, and the relay arrangement 42, in an actuating circuit 67 for the relay 42. The solenoid 46 is arranged in a solenoid circuit 68 that is controlled by a switch 69 that is actuated by the relay 42.

The relay arrangement 42 is so designed that upon inter-engagement of the contacts 64 and 66, it will be energized after a predetermined retarding interval, in order to retard the closing of the switch 69 in accordance with a predetermined small period. The retarding means of the relay arrangement 42 may include a variable resistance 71 in series with the relay 42, and a condenser 72 in parallel with the relay 42. Instead of the foregoing retarding means to be used in connection with the relay, the relay 42, however, may be provided with a built-in retarding mechanism of conventional design. The retarding of the relay arrangement 42 is so arranged that the relay will be actuated only after the element 18 has come to a complete standstill. The braking of the element 18 consumes the time of only minimal fractions of one second. The exact length of time of the retarding may be adjusted by the variable resistor 71.

The motor 14 is fed from a network 73, delivering for example alternating current, and the solenoid circiut 68 may be tapped off the network 73, for instance by means of a direct current rectifier 74. The energy for the relay actuating circuit 67 may also be supplied from the network 73.

Operation

The operation of the above described mechanism is as follows.

In the inactive position of the actuator member 33 (Fig. 2), the surface 36 of the actuator member 33 is out-of-contact with, and spaced for a small distance above, the upper surface 32 of the arm 28. In this inactive position, the member 33 is held by the latching action of the sphere 59 engaging the groove 56 of the pin 54 that is mounted on the member 33. In this inactive position, the pin 54 closes the switch 65.

When the operator depresses the treadle 39, the rod 37 will move the actuator member 33 downwardly in the direction C. The surface 36 of the member 33 will engage the surface 32 of the arm 28 of the lever 27 and will turn the lever 27 (clockwise in respect of Fig. 1) about the pivot 25. The lever 27 will thereby shift the element 18 in direction B to inter-engage the clutch discs 19 and 17, thereby driving the element 18 from the motor 14. The element 18, by means of the pulley 23 and the belt 24 will drive a flywheel 26 to operate the sewing machine with a speed proportional to the pressure exerted by the operator on the treadle 39.

During the downward movement of the actuator member 33, the latching between the sphere 59 and the groove 56 is released, and the switch 65 will be opened interrupting the electric circuit 67.

Upon cessation of the pressure exerted on the treadle 39, the spring 29 will return the lever 27 to the initial position (Fig. 2), whereby the disk 19 of the element 18 will frictionally engage the brake disk 21 thereby braking the sewing machine. As the spring 29 returns the lever 27 to the normal position and the arm 28 returns the actuator member 33 to the inactive position, the pin 54 will again inter-engage the contacts 64 and 66, and the sphere 59 will again latch the groove 56 to hold the member 33 in the inactive position.

The pre-selector switch 43 has been selected to one of the positions 43' or 43'', for instance to the position 43' shown in solid lines in Fig. 4.

If the sewing machine comes to a halt with the needle in a position different from the predetermined selected position, the switch 41 will be in closed position thereby completing the circuit 67 for energizing the relay arrangement 42 for retarded relay action. The action of the relay will close the switch 69, thereby completing the circuit 68, and the solenoid 46 will actuate the sewing machine to turn slowly. This is accomplished by the downward moving of the bolt 49 by the plunger 47 of the solenoid 46, the bolt 49 depressing thereby the arm 28

until the flange 55 stops the downward movement of the bolt 49. During this movement, the arm 28 moves within the opening 34 of the member 33, without engaging the member 33.

When the selected predetermined position is reached by the needle, the switch 41 will be opened, thereby breaking the circuit 67, and the relay 42 will open the switch 69 interrupting the circuit 68 of the solenoid 46. Thereupon, the plunger 47 will be retracted by the solenoid 46, and the spring 29 will return the lever 27 to the normal position of sewing machine arrest.

I wish it to be understood that I do not desire to be limited to the extact details of construction shown and described, for obvious modifications will occur to a person skilled in the art.

Having thus described the invention, what I claim as new and desire to be secured by Letters Patent, is as follows:

1. In a stop mechanism, for use in connection with a sewing machine having a needle and a clutch type driving motor including an actuating lever, in combination, electromagnetic means connected to the motor and including an electric circuit having a retarding relay arrangement and being operable automatically after the uncoupling of the sewing machine from the motor, to actuate said lever after a predetermined time interval for reestablishing the driving connection between the motor and the sewing machine until the sewing machine has reached a predetermined needle position, and thereafter uncoupling it again.

2. In a stop mechanism, as claimed in claim 1, means for shifting said lever from a braking position to a driving position for the control of the normal sewing machine operation, said means including a member normally in an inactive position and actuatable to engage said lever for shifting it and being operable to be releasably latched in said inactive position when said lever is in the braking position.

3. In a stop mechanism, as claimed in claim 2, together with, means for latching said shifting means in said inactive position comprising a pin connected to said shifting means and having a recess, and a spring biased latching element operable to engage releasably said recess.

4. In a stop mechanism, as claimed in claim 3, said circuit for said electromagnetic means including an electric switch, said pin being operable to close said switch in the inactive position of said shifting means.

5. In a stop mechanism, for use in connection with a sewing machine having a needle and a clutch motor drive

including a lever shifting the clutch between braking and driving positions, in combination, means for operating said lever to control the normal sewing machine operation comprising a member movable to and from an inactive position and operable to be moved from the inactive position to shift said lever from the braking position to the driving position and, said member in the inactive position clearing the shifting path of said shifting lever, electromagnetic means connected to said motor and including an electric circuit having a retarding relay arrangement and being operable to shift said lever from the braking position to the driving position said circuit having a switch closed by said member when in the inactive position thereof and opened by said member when it is moved from the inactive position.

6. In a stop mechanism, as claimed in claim 5, said electromagnetic means including a solenoid energizable to shift said lever when said member is in the inactive position, said circuit including a second switch, said relay being in driving connection with said second switch and responsive to the position of said needle and operable to open said second switch when said needle is in the predetermined position and to close it in all other needle positions.

7. In a stop mechanism, as claimed in claim 5, said lever being biased towards the braking position, the electric circuit including said switch, a second switch being in series with said relay, means responsive to the position of the sewing machine needle and operable for opening said second switch when the needle is in a predetermined position and for closing said switch in all other needle positions, whereby said circuit will be closed when said member is returned to the inactive position and the needle is in any but the predetermined position, said electromagnetic means including a solenoid operable when energized to shift said lever from the braking position to the driving position and to release the lever when de-energized for return under the bias to the braking position, said circuit including a branch for energizing said solenoid including a third switch operated by said relay.

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