Dec. 10, 1929. V. G. SAURMAN 1,738,672

SEWING MACHINE

Filed Sept. 6, 1927

Fig. 1.

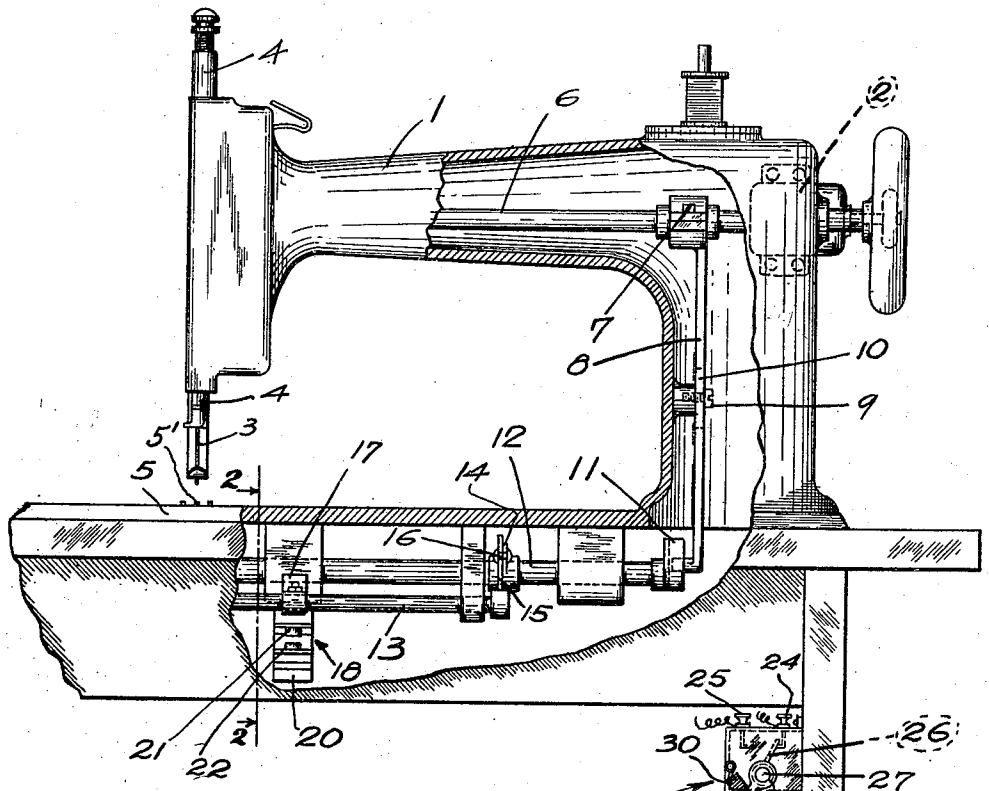


Fig. 2.

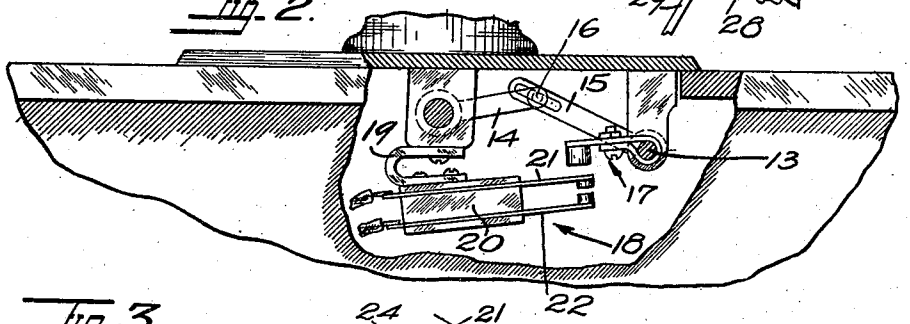
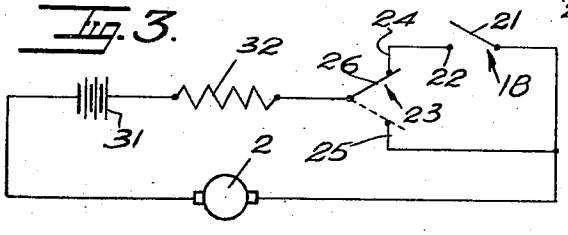


Fig. 3.



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UNITED STATES PATENT OFFICE

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SEWING MACHINE

Application filed September 6, 1927. Serial No. 217,629.

The invention forming the subject matter of this application relates to sewing machines.

The principal object of the invention is to provide a device for preventing the stopping of the electric motor of a sewing machine at a time when the sewing needle is in engagement with the material to be stitched.

Another object of the invention is to provide a device for sewing machines which controls the electric motor of said machine so that every time before the movement of the sewing needle ceases said needle is withdrawn from the material to be stitched.

A still further object of the invention is to provide a device for controlling the electric motor of a sewing machine, said device to be automatically operated in co-relation with the needle actuating mechanism.

Another object of this invention is to provide an auxiliary circuit breaker for controlling the electric motor of a sewing machine, said circuit breaker to be automatically actuated by the needle actuating means of said machine and to cooperate with the main switch of said machine, said device to be simple in construction, convenient of arrangement and comparatively inexpensive.

The auxiliary circuit breaker and the actuating device thereof is so constructed as to be readily attachable to any kind of electric sewing machine without necessitating material alteration thereon.

With the foregoing and other objects in view, my invention resides in the combination and arrangement of parts and in the details of construction hereinafter described and claimed. The invention is clearly illustrated in the accompanying drawing, forming part of the specification and in which,

Figure 1 is a side view of a sewing machine, the casing thereof being partly broken away, so as to disclose the circuit breaker and the circuit breaker actuating mechanism,

Figure 2 is a sectional view of the device taken along the line 2—2 of Figure 1, and

Figure 3 is a wiring diagram of the device.

In carrying out my invention, I make use of the operating mechanism of a standard type of sewing machine, having a casing 1 inclosing the operating mechanism driven by an electric motor 2. A needle 3 is clamped in any conventional manner not shown to a bar 4 which moves vertically up and down in the casing 1 usually at a great speed for piercing the material to be stitched. Said material is placed upon a flat steel plate 5 and is gradually advanced thereon by a feeding mechanism. A feed dog 5′ of said mechanism is shown as extending above the plate 5 and is actuated in synchronism with the bar 4 by the driving means hereinafter set forth. Both the feeding mechanism and the needle are driven by the electric motor 2 rotating a driving shaft 6. A cam transmission mechanism is secured to the end of the driving shaft 6 for reciprocating the casing in the bar 4. This transmission mechanism is of different construction in sewing machines of different make but any conventional movement transmitting mechanism not shown will readily cooperate with my device to be hereinafter described. An eccentric cam 7 is disposed on the shaft 6 and is raised and lowered according to the rotation of said shaft. The eccentric cam 7 causes the lever 8 to move slightly upwardly and downwardly and at the same time to turn around the pivot pin 9, said pin being secured to the wall of the casing 1. A slot 10 in the intermediate portion of the lever 8 permits the vertical sliding of the lever 8 on the pin 9 but said slot 10 does not provide sufficient space for lateral movement of said lever thereon. The pivoting of the lever 8 around the pin 9 causes the rocking of a cam 11 adjacent to the end of the lever and disposed on a bobbin shaft 12. The bobbin shaft 12 actuates in turn the feeding mechanism and the feed dog 5′.

The rocking of the bobbin shaft is transmitted to a feed shaft 13 by means of levers 14 and 15, pivotally secured to each other at 16. The lever 14 is rocked by the bobbin shaft 12 and in turn it causes the lever 15 to oscillate, the latter being secured to the feed shaft 13, and rocks the same. An arm 17 is secured to the feed shaft 13 in such a relation as to actuate an auxiliary circuit breaker 18 in a manner to be hereinafter described.

The auxiliary circuit breaker 18 comprises a bracket 19 secured to the casing of the sew-

ing machine. An insulating block 20 is supported on said bracket, resilient contacts 21 and 22 are carried in said insulating block 20.

The arm 17 is so disposed that when rocked it engages the resilient contact 21 and presses the same toward the opposite resilient contact 22, thereby completing the circuit through said contacts. When the arm 17 is rocked in the opposite direction to the one heretofore described the pressure on the resilient contact 21 is released and the circuit between said contacts is automatically interrupted.

A two way switch 23 is provided to control the circuit of the electric motor 2. The two way switch 23 may be constructed in any conventional manner adapted to be used in connection with sewing machines. The terminals 24 and 25 thereof are alternately contacted by a switch arm 26, said arm to be secured to an operating shaft 27 and to be insulated therefrom. A terminal 28 on said arm 26 is connected to the source of the electric current. For the purpose of illustration, I show a lever arm 29 adapted to be actuated by the movement of the knee of the sewing machine operator. The terminal 25 is directly connected into the circuit of the electric motor 2 while the terminal 24 is connected into the electrical circuit of the auxiliary circuit breaker 18. A spring 30, secured on one end thereof to the lever arm 29 and at the other end thereof to the casing of the switch 23, holds the lever arm 29 in a position so that in the "Off" position of the switch the arm 26 thereof is in engagement with the terminal 24.

The wiring diagram in Figure 3 clearly illustrates the cooperation between the two way switch 23, the auxiliary switch 20 and the electric motor 2. When the switch 23 is in the "Off" position shown in Figure 1 the switch arm 26 thereof is pressed against the terminal 24. The source of the electromotive force is indicated in the diagram as being a battery 31, but it is understood that any source of electric current may be used in connection with my device. In most cases the lever arm 26 is connected to the electric light circuit of a building. A resistance unit 32 is indicated in the wiring diagram for transforming the current to the required voltage. The sewing machine is started by exerting a pressure on the arm 29 so as to move the same against the tension of the spring 30 thereby turning the switch arm 26 and bringing the same into contact with the terminal 25 in the position shown in dotted line in the wiring diagram. The switch arm 26 is now held in position and in contact with the terminal 25 by the continuous pressure on the lever arm 29 so that the current is directly connected therethrough to the electric motor 2 driving the sewing machine.

In the sewing machines used at present when the pressure on the lever arm 29 is released the flow of the electric current is immediately interrupted and the motor 1 is stopped regardless of the position of the needle 3 relative to the material to be stitched. It is a very common occurrence that the electric motor stops at a time when the needle 3 is not yet withdrawn from the material, and it is found to be necessary to manually turn the motor until the needle is withdrawn.

In my device the arm 29 is automatically brought back to the starting position by the spring 30 immediately after the pressure thereon is released and the switch arm 26 is brought thereby into contact with the terminal 24. As shown in the full line position thereof in the wiring diagram the current is connected from the source of the electric motive force 31 through the resistance 32, through the switch arm 26 and terminal 24 to the resilient terminal 22 of the auxiliary switch 18. Now the arm 17 is so adjusted on the feed shaft 13 that when the needle 3 is piercing the material to be stitched said arm presses the contact 21 against the contact 22 thereby closing the circuit through the circuit breaker 18. It is apparent therefore from the wiring diagram that when the needle 3 is piercing the material and the arm 17 closes the circuit breaker contact 21 to the contact 22, the electric current continues to flow through the switch arm 26, the contact 24 and through the circuit breaker 18 to the electric motor 2 rotating said motor until the needle 3 is withdrawn from the material to be stitched. The rocking of the feed shaft 13 is in finely adjusted coaction with the vertical movement of the needle bar 4 by means of the lever 8; therefore when the needle 3 is withdrawn from the material the feed shaft 13 is rocked in the opposite direction so as to bring the arm 17 out of engagement with the contact plate 21 thereby instantaneously breaking the circuit of the electric motor 2. It is evident that by properly adjusting the arm 17 on the rocking feed shaft 13 the circuit of the electric motor is disconnected only at a time when the needle 3 is completely withdrawn from the material, thereby eliminating the necessity of manual turning of the motor 2.

It is to be noted that the bobbin shaft 12 is illustrated in the present drawing as a rocking shaft, but in some sewing machines the bobbin shaft is a rotary shaft, nevertheless there are transmitting means provided thereon, such as cams and levers, in all make of sewing machines for rocking the feed shaft 13 in proper coaction with the movement of the needle bar 4. The lever arm 17 may be readily adjusted and installed on the feed shaft of any standard sewing machine. The auxiliary switch 18 and the arm 17 may be also in-

stalled to any other rocking part of the sewing mechanism, in which the rocking of said particular part is adjusted to coact with the movement of the needle bar 4. It is also to be noted that the simple two way switch 23 is shown only for the purpose of illustration but any two way switch adapted for use on sewing machines may be also readily adapted to cooperate with the auxiliary circuit breaker 18. It is to be understood that changes may be made within the domain of mere form of construction or arrangement by persons skilled in the art without involving any change of mode of operation or extension of result described in the appended claims.

Having thus described my invention what I now claim as novel and desire to secure by Letters Patent is:

1. In an electric motor driven sewing machine having a needle thereon actuated by said motor to pierce a material; and means driven by said motor in co-relation to the position of said needle to feed the material; a main electric circuit to control the motor; an auxiliary electric circuit actuated by said feeding mechanism for controlling the motor at the material engaging position of the needle; and means to render said auxiliary circuit operative when the main circuit is disconnected.

2. In an electric motor driven sewing machine having a needle thereon actuated by said motor to pierce a material; a two way switch connected one way to the motor; an auxiliary circuit breaker connected in series between the other way of said switch and the motor; means on said two way switch to automatically close the circuit to said auxiliary circuit breaker after breaking the motor circuit; and rocking means for closing the auxiliary circuit breaker when the needle is in engagement with said material.

3. In an electric motor driven sewing machine having a needle thereon actuated by said motor to pierce a material, and means driven by the motor in co-relation to the position of the needle for feeding said material, a two way switch, an auxiliary circuit breaker, one way of said switch being connected to the motor, the auxiliary circuit breaker being connected in series between the other way of said switch and the motor; means on said two way switch to automatically close the circuit to said auxiliary circuit breaker after breaking the circuit to the motor, and means actuated by said feeding mechanism to close the auxiliary circuit breaker when the needle is in engagement with said material.

4. In a sewing machine having electric driving means therefor and a needle actuated by said means to pierce a material; a main electric circuit, an auxiliary electric circuit connected to the main electric circuit; an auxiliary circuit breaker in the auxiliary circuit adapted to be automatically actuated in synchronism with the needle actuating mechanism so as to be closed when the needle is in engagement with the material; and means for disconnecting the auxiliary circuit from the motor and connecting the motor to the main circuit, and also for automatically connecting the motor to the auxiliary circuit upon the breaking of the main circuit connection.

5. In a sewing machine having electric driving means therefor and a needle actuated by said means to pierce a material, a main electric circuit, a circuit breaker adapted to connect the driving means to the main circuit and to automatically connect the driving means to the auxiliary circuit when disconnecting the motor from the main circuit; and an auxiliary circuit breaker in the auxiliary circuit being opened and closed in synchronism with the movement of the needle so as to be closed when the needle is in engagement with the material.

6. In a sewing machine having electric driving means therefor and a needle actuated by said means to pierce a material, a main electric circuit, an auxiliary electric circuit, a circuit breaker adapted to connect the driving means to the main circuit and to automatically connect the driving means to the auxiliary circuit when disconnecting the motor from the main circuit; an auxiliary circuit breaker in the auxiliary circuit; and means to close the said auxiliary circuit breaker when the needle is in engagement with the said material.

7. In a sewing machine having electric driving means therefor and a needle actuated by said means to pierce a material, a main electric circuit, an auxiliary electric circuit, a circuit breaker adapted to connect the driving means to the main circuit and to automatically connect the driving means to the auxiliary circuit when disconnecting the motor from the main circuit; an auxiliary circuit breaker in the auxiliary circuit; and means rocked by the driving means in synchronism with the movement of the needle so as to close the said auxiliary circuit breaker when the needle is in engagement with the said material.

8. In a sewing machine having electric driving means therefor, a needle moved by said means, and a feeding mechanism moved by said driving means in co-relation to said needle; a main electric circuit, an auxiliary electric circuit, a circuit breaker adapted to connect the driving means to the main circuit and to automatically connect the driving means to the auxiliary circuit when disconnecting the motor from the main circuit; an auxiliary circuit breaker in said auxiliary circuit; and means actuated by said feeding mechanism for closing said auxiliary circuit breaker when the needle is in engagement with the material.

9. In a sewing machine having electric driving means therefor and a needle moved by said means, an electric circuit, an auxiliary electric circuit; a circuit breaker, means in said circuit breaker for breaking and making the connection between the driving means and the first circuit, and for connecting said driving means into the auxiliary circuit after the breaking of the main circuit connection; and rocking means for closing said auxiliary circuit breaker when the needle is in engagement with the said material.

10. In an electric motor driven sewing machine having a needle thereon actuated by said motor, an electric circuit for the motor, a two way circuit breaker, one way connecting said motor into said circuit, an auxiliary circuit breaker connected between the other way of said circuit breaker and the motor; said circuit breaker being adapted to connect the auxiliary circuit breaker into the circuit, when the first connection to the motor is open; and rocking means for closing the auxiliary circuit breaker when the needle is in a sewing position.

11. In an electric motor driven sewing machine having a needle thereon actuated by said motor, an electric circuit for the motor, a two way circuit breaker, one way connecting said motor into said circuit, an auxiliary circuit breaker connected between the other way of said circuit breaker and the motor; means related to said circuit breaker to automatically connect the auxiliary circuit breaker into the said electric circuit when the first connection to the motor is opened; and rocking means for closing the auxiliary circuit breaker when the needle is in sewing position.

In testimony whereof I affix my signature.

VICTOR GEORGE SAURMAN.