Aug. 21, 1956 M. SCHWAB ET AL 2,759,444

SEWING MACHINES

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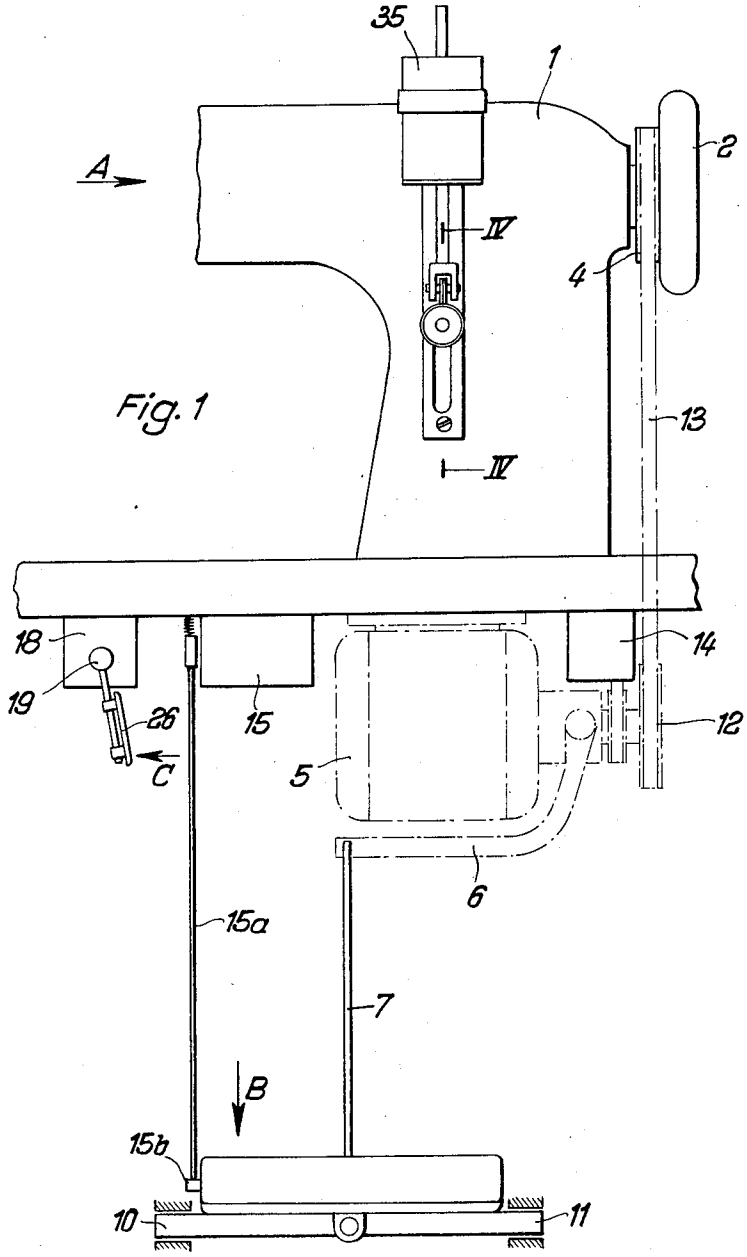


Fig. 1

Inventors
MAX SCHWAB
KARL WILHELM HEIMANN
BY Robert K. Jacob
AGENT

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Fig. 4

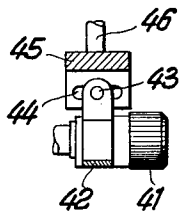


Fig. 2

Inventors

MAX SCHWAB

KARL WILHELM HEIMANN

BY Robert H. Jacob.

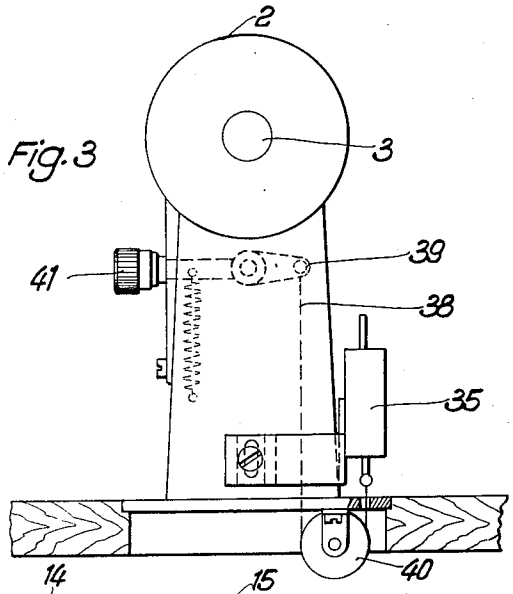
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SEWING MACHINES

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Fig. 3



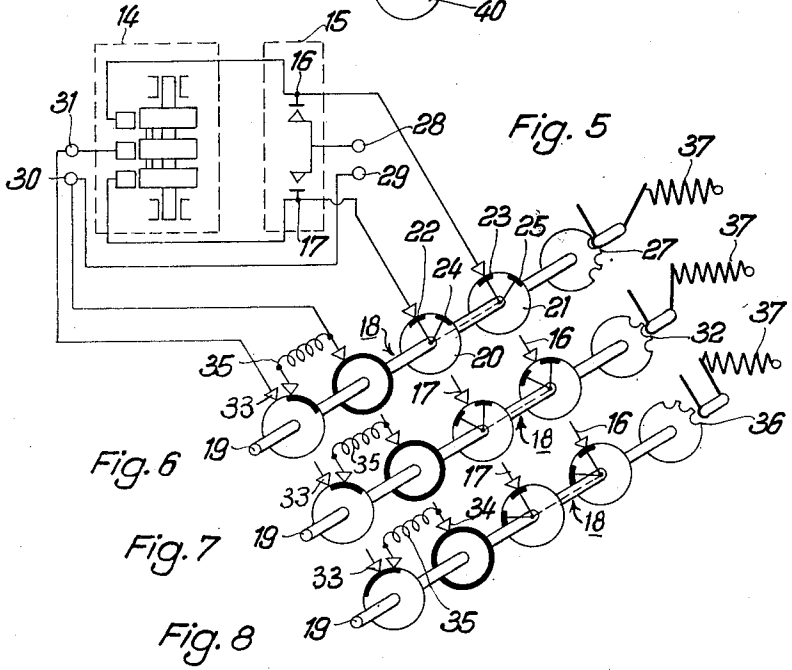


Fig. 5

Fig. 6

Fig. 7

Fig. 8

Inventors
MAX SCHWAB
KARL WILHELM HEIMANN
BY Robert K. Jacob
AGENT

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SEWING MACHINES

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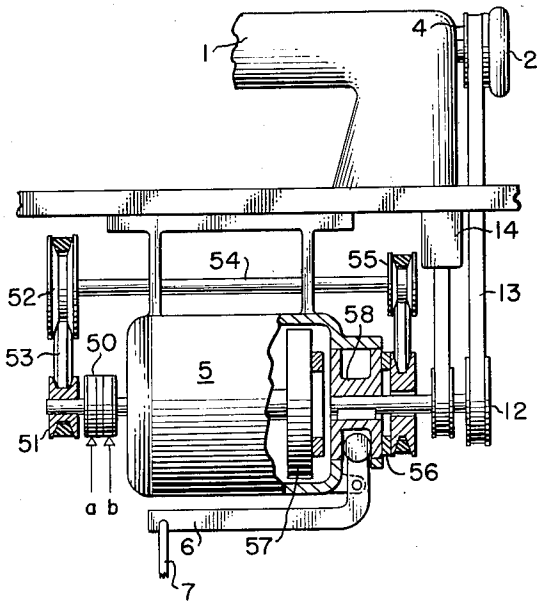


FIG.9

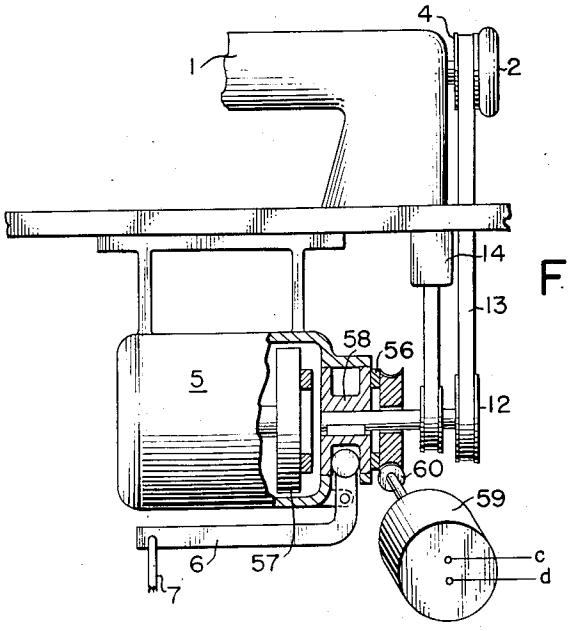


FIG.10

INVENTORS

MAX SCHWAB AND
KARL WILHELM HEIMANN

BY Robert H. Jacobs
AGENT

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2,759,444

SEWING MACHINES

Max Schwab, Schwetzingen, Baden, and Karl Wilhelm Heimann, Kaiserslautern, Germany

Application September 28, 1953, Serial No. 382,810

4 Claims. (Cl. 112—210)

This invention concerns improvements relating to sewing machines. In the production of sewn-work, it is often necessary to change the machine over from forward sewing to reverse sewing and conversely. These changes are effected by acting upon the stitch-setting means usually provided on sewing machines, namely by adjusting a stitch-setting screw.

According to the invention, the change-over between forward sewing and reverse sewing is effected by means of an electromagnet acting upon the stitch-setting means. This electromagnet may be energised under the control of a member which can be operated at will, for example a lever to be operated by the operator with her knee. Changes between forward and reverse sewing can then be effected quickly, conveniently and in operationally reliable manner by merely closing a pair of contacts by the knee of the operator. Heretofore the operator had to operate by hand the stitch-setting means usually provided on the super-structure of the machine. In accordance with this invention the operator can leave her hands on the material being sewn by the machine even though forward and reverse sewing is being effected and can ensure accurate guidance of the material through the machine.

The arrangement in accordance with the invention proves particularly advantageous in the locking of a seam sewn by the machine. This operation is performed by sewing a certain number of stitches, for example four stitches, forward and then the same number of stitches reverse or backward.

In addition, the arrangement can be employed in cases in which it is important to sew stitch for stitch, without using a device separately operated for this purpose. In such sewing, the difficulty is that the stitches to be followed correspond to a certain machine speed which can be maintained, with the normal driving means of the machine, only by the exercise of considerable skill. Arrangements are known in which when pressure on a machine pedal controlling a clutch in the driving means of the machine, is released, the needle bar and needle are brought to rest in the upper dead-centre position of the machine. Upon slight tilting of the pedal to one side, however, the needle-bar remains in the lower dead-centre position. Stitch-for-stitch sewing is possible with such known arrangements by imparting a number of controlled tilting motion to the pedal of the machine with an appropriate rhythm. By tilting the pedal of the machine, the leads of a change-over switch may be connected to one or another of a pair of supply contacts coming from a further contact device to connect one or another circuit associated with the supply contacts to this further contact device when the needle bar is in the upper or lower dead-centre position respectively. This control arrangement is combined with a device which acts upon an auxiliary drive for the shaft of the machine and ensures that the latter is driven at a reduced speed.

In accordance with the invention, the leads of the

contact device, which ensures that the needle bar remains in the upper or lower dead-centre position otherwise connected to the change-over switch, are conducted to a switch drum, roller or the like which completes the circuit through the engaging device. The latter acts upon the auxiliary drive for the machine shaft, for as long as is desired, so that the auxiliary drive is engaged for an arbitrarily long period. To accomplish this purpose, the switch drum, for example, may be moved by means of a knee lever until detent engagement with a notch occurs. The machine shaft is then turned, for example four times, by way of the engaging device with a revolution speed which is reduced in relation to the normal speed derived from the main driving means of the machine. This reduced speed is constant, for example 60–100 R. P. M., and is readily kept under control. If the switch drum is now moved to its end position, the circuit of the engaging device is interrupted for a short time and a circuit is closed, which produces reverse sewing of the machine. The former circuit is then immediately re-closed, which sets the engaging device in operation and establishes the auxiliary drive with reduced, constant speed. If, for example, four stitches are again sewn and the pressure on the knee lever is then interrupted, the circuit for the reverse sewing is also opened and the machine is restored to its normal operating condition for forward sewing, the needle bar being returned to the upper dead-centre position.

Two embodiments of the invention by way of example are illustrated in the accompanying drawing, in which:

Figure 1 is an elevation of one embodiment with the electromagnet mounted above the stitch-setting means,

Figure 2 is an end view of Fig. 1 looking in the direction of the arrow A,

Figure 3 is a view illustrating the second embodiment of this invention wherein the stitch-setting lever is shown by a broken line and the electromagnet (not shown) is mounted on the other side of the machine,

Figure 4 is an enlarged sectional view of the stitch-setting screw shown in Figures 1 and 2, taken along the line IV—IV in Figure 1.

Fig. 5 is a diagrammatic view of the circuits used to correct the contact device and change over switch illustrated in Figs. 1, 2 and 3,

Fig. 6 is a diagrammatic view of one portion of the contact drum used with the contact device and change over switch illustrated in Figs. 1, 2, 3 and 5,

Fig. 7 is a diagrammatic view of another position of the contact drum illustrated in Fig. 6,

Fig. 8 is a diagrammatic view of a further position of the contact drum illustrated in Figs. 6 and 7,

Fig. 9 is an elevational view partly in cross section of the auxiliary drive means for the sewing machine structure, and

Fig. 10 is an elevational view partly in cross section of a modification of the auxiliary drive means illustrated in Fig. 8.

The superstructure of a sewing machine is indicated by **1**. A flywheel **2** is mounted on a driving shaft **3** and may be combined with a grooved pulley **4**. An electric motor **5** is furnished with a controllable clutch whose actuating lever **6** is connected by way of a pull rod **7** and pivot **9** to a pedal **8**. The pedal is mounted so that it can be tilted sideways as well as turned about trunnions **10**, **11** in known manner. The driving arrangement, by which the shaft **3** is driven from the motor **5** through pulley **12**, belt **13** and pulley **4**, is provided in known manner with a contact device **14** which, when no clutch-engaging pressure is exerted on the pedal **8**, normally ensues that the pulley **12** continues to drive the shaft **3** until the needle is situated in the upper dead-centre position. If, however, the pedal **8** is tilted sideways in the direction of the

arrow B, the needle is brought to rest in the lower dead-centre position. The device 14 opens a circuit when the needle is situated in the upper and lower positions respectively. Associated leads are carried through a change-over switch 15 which, according to its position, prepares the circuit for the upper or the lower needle position. The switch is connected by a rod 15*a* and pivot 15*b* to one side of the pedal 8. The circuit actuates in known manner the aforesaid device, for instance a rotatably disposed brake abutment which receives its drive from an auxiliary motor or from the main driving motor.

The arrangement for controlling the machine comprises the contact device 14, change over switch 15 and contact device 18 shown in Figures 5 to 8. The contact device 14 comprising terminals 30 and 31 is connected to a suitable auxiliary drive member which can be coupled with a power take-off of the shaft 3 of the main drive member. Device 14 is further connected to contacts 16 and 17 of the change over switch 15 and contacts 22, 23, 24 and 25 arranged on shaft 19 of the contact device 18 through suitable electric circuits. Contacts 33 and 34 connect the electro magnet 35 to contact device 14 and shaft 19, respectively.

When a knee lever 26 is pressed in the direction of the arrow C (Figure 1), a contact device 18 comprising a switch drum 19 is actuated. Drum 19 as shown in Figure 6 transmits the supply voltage from terminals 28 and 29 to the contact device 14 which causes the driving shaft 3 to turn further with suitably reduced, but constant, speed until the switch drum 19 arrives in a first switching position which subsists until the needle has reached the upper dead-centre position. The pressure on the knee lever 26 is then increased to bring the drum 19 into the next switching position, in which the magnet 35 is energized and brings the stitch-setting screw into position for reverse sewing. At the same time, further sewing at reduced, constant speed is permitted until the seam-locking is completed. After completion of the said locking, for example after four stitches, pressure on the knee lever 26 is removed and the latter snaps back into the initial position under the action of a spring 37.

The pull of the magnet 35 acts vertically on the stitch setting screw 41. As shown in Figures 2 and 4, the neck of the screw is embraced by a clamp or collar 42 held together by a pin 43. The pin is secured in an elongated slot 44 in the actuating fork 45 of the magnet or of a pull rod 46. Instead of this, in accordance with the example of Figure 3, the magnet 35 may adjust the stitch-setting lever 39 by way of a link chain 38, wire cable or the like. The chain or cable is preferably carried around a roller 40. The stitch adjustment is effected by the stitch-setting screw 41 in known manner in both cases.

In the embodiment in accordance with Fig. 9 a magnetic coupling 50 is inserted in the power transmission between the continuously rotating motor 5 and the auxiliary drive which is controlled by the contact device 14 in such a manner that its electrical connection leads *a* and *b* are connected with contacts 30 and 31 shown in Fig. 5, i. e. the control device 14 disconnects the coupling when the desired dead position is reached. As a result the sewing machine needle is brought to a standstill.

In operation, the pulley disk 51 and the pulley disk 52, which are connected by way of a belt 53, rotate the shaft 54 and, by way of a belt pulley 55, the rotatably mounted brake counter-bearing 56. Upon being uncoupled from the main driving member 57 the coupling portion 58 of the motor 5 engages the rotatably mounted brake counter-bearing 56 as long as the magnetic coupling 50 is in operative position. As a result the driven coupling portion 58 and the belt pulley 12 are slowly driven and accordingly continue to slowly drive the sewing machine into the desired dead center position in which the contact device 14 disconnects the magnetic coupling and effects immediate stopping of the machine.

In the embodiment shown in Fig. 10 two power supply leads *c* and *d* of the auxiliary motor 59 are connected with the contacts 30, 31 shown in Fig. 5 so that contact device 14 can effect the on and off switching of the auxiliary motor. After the disconnecting of the driven coupling member 58 from the main drive 57 the same again engages the rotatable braking counter-bearing 56. This rotatable bearing 56 is connected, for example, by means of a transmission 60, with the auxiliary motor 59 so that the driven coupling portion 58, shaft 12, and in turn the sewing machine, are slowly turned until the desired position of dead center is attained, where the contact device 14 effects the disconnecting of the auxiliary drive (see Fig. 5).

As operating means for the control of the electromagnet 35, provision may be made, instead of the knee lever 26, of some other operating member on the pedal or on the frame of the machine, for instance in the form of an additional pedal or hand lever.

We claim:

1. An electrically operated and electromagnetically controlled sewing machine comprising a sewing machine needle and a material feed mechanism associated therewith, a main drive member adapted to actuate said needle in a definite cycle at a predetermined speed, an auxiliary drive member adapted to actuate said needle in a definite cycle at a speed reduced from the speed imparted to said needle from said main drive member, a stitch setting means for reversing said feed mechanism, an electromagnet connected to said stitch setting means for actuating when energized said stitch setting means to reverse said feed mechanism of said sewing machine, and dual purpose means mounted on said machine for actuating said auxiliary drive member to reduce the speed imparted to said needle and for energizing said electromagnet for actuating said stitch setting means to change the direction of said feed mechanism.

2. An electrically operated and electromagnetically controlled sewing machine comprising a sewing machine needle and a material feed mechanism associated therewith, a main drive member adapted to actuate said needle in a definite cycle at a predetermined speed, an auxiliary drive member adapted to actuate said needle in a definite cycle at a speed reduced from the speed imparted to said needle from said main drive member, a stitch setting means for reversing said feed mechanism, an electromagnet connected to said stitch setting means for actuating when energized said stitch setting means to reverse said feed mechanism of said sewing machine, and dual purpose means mounted on said machine for simultaneously actuating said auxiliary drive member to reduce the speed imparted to said needle and for energizing said electromagnet for actuating said stitch setting means to change the direction of said feed mechanism.

3. An electrically operated and electromagnetically controlled sewing machine comprising a sewing machine needle and a material feed mechanism associated therewith, a main drive member adapted to actuate said needle in a definite cycle at a predetermined speed, an auxiliary drive member adapted to actuate said needle in a definite cycle at a speed reduced from the speed imparted to said needle from said main drive member, a stitch setting means for reversing said feed mechanism, an electromagnet connected to said stitch setting means for actuating when energized said stitch setting means to reverse said feed mechanism of said sewing machine, dual purpose means mounted on said machine for controlling the actuation of said auxiliary drive member to reduce the speed imparted to said needle and for setting up an interlocking circuit for energizing said electromagnet, an interlocking circuit connected to a source of electric power for energizing said electromagnet, a first lever means mounted on said machine for actuating said dual purpose means and setting up said interlocking circuit, and a second lever means mounted on said machine for completing said interlocking circuit to said electromagnet upon actuation

of said first lever means to energize said electromagnet to actuate said stitch setting means to change the direction of said feed mechanism.

4. An electrically operated and electromagnetically controlled sewing machine comprising a sewing machine needle and a material feed mechanism associated therewith, a main drive member adapted to actuate said needle in a definite cycle at a predetermined speed, an auxiliary drive member adapted to actuate said needle in a definite cycle at a speed reduced from the speed imparted to said needle from said main drive member, a stitch setting means for reversing said feed mechanism, an electromagnet comprising a coil, core and armature, said electromagnet being connected to said stitch setting means for actuating when energized said stitch setting means to reverse said feed mechanism of said sewing machine, an electric circuit for connecting said coil to a source of electric power, dual purpose means mounted on said machine and comprising a plurality of switch contacts for actuating said auxiliary drive member to reduce the speed imparted to said needle and for setting up said circuit through said contacts for controlling the energization of said coil of said electromagnet, a first lever means mounted on said machine for actuating said dual purpose means to actuate said auxiliary drive member and for closing said contacts, and a second lever means mounted on said machine for sequential operation with said first lever means for causing energization of said electric circuit and said electromagnet to actuate said stitch setting means to change the direction of said feed mechanism.

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