

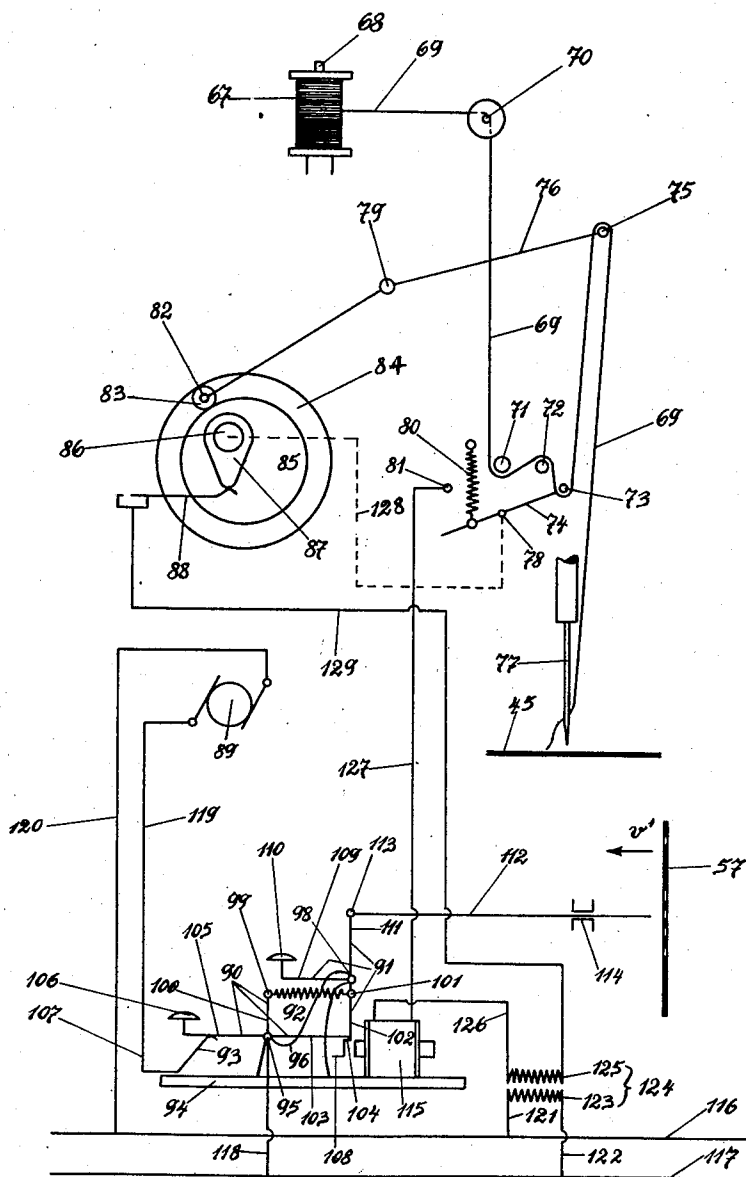
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AUTOMATIC SINGLE NEEDLE EMBROIDERING MACHINE

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AUTOMATIC SINGLE-NEEDLE EMBROIDERING MACHINE

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This invention relates to improvements in the construction of automatic single-needle embroidering machines controlled by a jacquard card.

5 The object of the invention is to provide means for automatically stopping the automatic single-needle embroidering machines as soon as the thread gets slack, when the thread breaks or when the embroidery pattern is finished, the same device serving to
10 prevent the restarting of the machine as long as the thread is broken or if no threads are in the embroidering tools.

One person attends usually to several automatic single-needle embroidering machines
15 and has to remedy the disturbances which occur during the embroidering process and which consist mainly of breaking of the threads, said attendant having also to stop
20 the machine when the embroidery pattern is finished. It depends therefore entirely on the skill of the attendant whether more or less great faults occur in the embroidery when the thread breaks. These faults have to be
25 repaired by hand. The number of machines attended to by one person is limited by the fact that the greater the number of machines to which one person attends is, the greater will be the number of faults in the embroidery, the economy of single-needle
30 embroidering machines being further impaired by this difficulty.

The inconveniences which have just been mentioned are obviated by the invention or
35 reduced to a minimum, by providing means for automatically stopping the automatic single-needle embroidering machine at slackening or breaking of a thread, or when the embroidery pattern is finished, and to prevent re-starting of the machine as long as the
40 thread has not been threaded into the needle. The repairing work is, therefore, done away with almost entirely, and one person is able to attend to a greater number of machines
45 than hitherto, without unfavorable influence upon the quality of the work.

The invention is illustrated in the accompanying drawing.

Referring to the drawing the thread bobbin 67 is rotatably mounted on a pin 68 fixed

in the machine frame which is not shown in the drawing. The thread 69 unwound from the bobbin 68 passes through between a pair of brake-pulleys 70 which are fixed on the machine frame. The thread 69 is then guided
55 around guide bolts 71 and 72, a bolt 73 on one end of a thread stretching lever 74, a bolt 75 at one end of the thread guiding lever 76, and then through the eye of the embroidering
60 needle 77 to be stitched through the fabric 45. The guide bolts 71 and 72 are fixed on the machine frame, the thread stretching lever 74, and the thread guiding lever 76 being
65 pivotably mounted on the machine frame at the points 78, 79 respectively. The needle 77 is mounted in the machine frame so that it can be shifted in longitudinal direction. The thread stretching lever 74 has two arms, a spring 80 attached at one end to the machine
70 frame being attached at the other end to the free arm of said thread stretching lever 74. This spring 80 serves to pull the free end of the thread stretching lever against a contact 81 when the thread is not in the needle, this contact 81 being fixed in and insulated
75 from the machine frame. At the end 82 of the two-armed thread guiding lever 76 a roller 83 is rotatably mounted which engages with a groove 84 of an eccentric 85 keyed on the main needle shaft 86. On the main shaft
80 86 a control cam 87 is also keyed which co-operates with a contact spring 88 fixed on and insulated from the machine frame.

The switch of the driving motor 89, which is shown diagrammatically, consists essentially of a switch lever 90, a locking pawl 91,
85 a spring 92 connecting said two last mentioned elements, and a contact spring 93. The base plate 94 of the switch is made from insulating material. The three-armed switch
90 lever 90 is pivotally mounted on a pivot axle 95 of a bearing 96. On the bearing 96 a locking pawl 91, composed of three arms, is pivotably mounted at 98. The spring 92 the one
95 end of which is attached at 99 to the lever 100 of the switch lever is attached at the other end at 101 to the locking arm 102 of the locking pawl 91. The spring 92 presses, therefore, the locking arm 102 of the locking pawl 91
100 against the locking arm 103 of the switch

lever 90 tending at the same time to make the switch lever pivot into the cutting-out position this being prevented, when said switch lever is in the switching in position, by a locking nose 104 of the locking pawl 91. The arm 105 of the switch lever 90 produces the circuit closing if it comes into contact with the contact spring 93. This arm has further a knob 106 of insulating material by means of which the switch can be operated by hand. The contact spring is fixed on the base plate 94 at the point 107. The locking arm 102 of the locking pawl 91 has a second locking nose 108 which limits the movement of the switch lever 90 in the cutting-out position so that complete slackening of spring 92 is thus prevented. The arm 109 of the locking pawl 91 serves for releasing by hand and it has, with this object in view, a knob 110 of insulating material. On the arm 111 of the locking pawl 91 a lifting wire 112 is hingedly fixed at the point 113. This lifting wire 112 is shiftably mounted in a bearing 114 and insulated from the machine frame. The lifting wire 112 is shifted from the jacquard card 57 which moves in the direction of the arrow *v*. On the base plate 94 of the switch an electromagnet 115 is mounted the armature of which is formed by the locking arm 102 of the locking pawl 91, 116 and 117 are the two conductors of the net. 118 is the conductor for the switch lever 90, 119 is the conductor leading from the contact spring 93 to the driving motor 89 and 120 is the return conductor to the conductor 116 of the net. The conductor 118, the arm 105 of the switch lever, the contact spring 93, the conductor 119, the electromotor 89 and the conductor 120 form therefore the circuit for the driving motor 89. Through the two conductors 121 and 122 the primary winding 123 of a transformer 124 is further connected to the net conductors 116, 117. The secondary winding 125 of the transformer 124 forms, together with a conductor 121, the electromagnet 115, a conductor 127, the contact 81, the thread stretching lever 74, the mass of the machine frame which is not shown and which is designed to be represented by the conductor 128 shown in dash lines, the cam 87, the contact spring 88 and the conductor 129 the so-called releasing circuit.

The operation of this mechanism is as follows:—

After the thread 69 which is wound off the bobbin 67 has been passed over its guide bolts the switch lever 90 is depressed by hand so that the locking nose 104 of pawl 91 grips under the locking arm 103 of the switch lever and is held in this position by the pull exerted by spring 92. By the depression of the switch lever 90 which comes into contact with the contact spring 93 the circuit 117, 118, 105, 93, 119, 89, 120 and 116 of the electromotor is closed, so that the electromotor and through it the main shaft 86 are rotated. In

the movements which now begin, owing to the oscillation of the thread guiding lever 76 which is driven by the eccentric 84, 85 and by the descending and ascending needle 77, the driving mechanism for which is not shown as it is not necessary for explaining the present invention, the thread stretching lever 74 is alternately pulled away from the contact 81 at the moment when the tension of the thread is produced and then when the thread is subsequently pulled. At the same instant the cam 87 acts upon the contact spring 88. If, during the embroidering process, the tension of the thread 69 slackens for any reason or if the thread breaks, a displacement of the movement of the thread stretching lever 74 will take place in the first case, or said thread stretching lever 74 will in the second case remain pressed against the contact 81. The main shaft 86 continuing to rotate the cam 87 will act again upon the contact spring 88 so that this time as the thread stretching lever 74 is pressed against the corresponding contact 81, the releasing circuit 125, 126, 127, 81, 74, 128, 86, 87, 88 and 129 is closed. The releasing electromagnet 115 is thus excited and attracts its armature, consisting of the locking arm 102 of the three-armed locking pawl 91. The locking arm 103 of the switch lever 90 is thus released and pulled, by the action of spring 92, into its position of rest so that it rests upon the nose 108 of the locking pawl 91, the arm 105 of the switch lever 90 interrupting the contact with the contact spring 93 whereby the circuit for the electromotor 89 is interrupted and this electromotor and the main shaft 86 are stopped. If, without having previously threaded the thread into the needle, one presses upon the knob 106 of the switch lever 90, the motor 89 will be started, and the main shaft 86 rotated, but the motor will be switched out again during the first rotation of shaft 86 by the action of the cam 87 upon the contact spring 88, as the thread stretching lever 74 is still in touch with the contact 81. When, however, prior to starting the electric motor, the thread 69 is threaded into the needle, the thread stretching lever 74 will be moved away from the contact 81 at the moment when the cam 87 acts upon the contact spring 88 after the electromotor 89 has been switched in by the depression of the switch lever 90, this oscillation of the thread stretching lever 74 being caused by the pull exerted by the thread guiding lever 76, whereby closing of the releasing circuit is prevented. The machine will therefore remain running. To stop the machine for any reason whatsoever it is merely necessary to depress the knob 110 of the arm 109 of the locking pawl 91, whereby the same effect is produced as described with reference to the electromagnetic releasing. If the embroidery pattern is finished, the jacquard card 57 of the automatic embroider, 130

not shown on the drawing, pushes against the lifting wire 112 as said card has at this point no perforation, and moves periodically at every stitch in the direction of the arrow
 5 v towards the lifting wire 112, wherefrom results that the locking pawl 91 is raised and the switch lever 90 pulled back by the action of spring 92 into its cutting-out position. That this does not occur during the em-
 10 broidering process is due to the fact that the jacquard card 57 for the lifting wire 112 has for each stitch one hole.

The above described mechanism stops the machine also at breaking of the shuttle-
 15 thread, not shown on the drawing, as in this case the tension of the thread 69 slackens also. No special thread-detector is required.

We claim:—

1. In an electrically driven automatic one-
 20 needle embroidering machine an electro-motor, a switch inserted in the circuit of such motor, a shaft driven by the said motor, a cam on the shaft, a thread tensioning arm over which the embroidering thread passes,
 25 a locking member which normally locks the switch of the motor circuit to keep the said switch in the closed position, and a release circuit provided with an electromagnet and controlled by the said cam, said electromag-
 30 net when energized operating to actuate the said locking member so as to cause the switch in the motor circuit to open the motor circuit, said electromagnet being inoperative until
 35 the thread tensioning arm rises upon the slackening of the thread.

2. In an electrically driven automatic one-
 needle embroidering machine an electro-motor, a switch inserted in the circuit of such
 40 motor, a shaft driven by the said motor, a cam on the shaft, a contact spring with which the cam makes contact on rotation of the shaft, a tensioning arm over which the em-
 broidering thread passes, a contact member for such arm, the said thread tensioning arm
 45 and contact forming a closed switch when slackening of the thread allows contact between the said arm and contact member, a locking member normally maintaining the
 switch of the motor circuit closed, the cam,
 50 contact spring, tensioning arm, contact member, and locking member being included in a release circuit which is closed by the cam on its rotation to operate the locking member
 to release the switch and thus open the motor
 55 circuit, only when the thread has slackened and allowed contact between the thread tensioning arm and its contact member included in the release circuit.

3. In an electrically driven automatic one-
 60 needle embroidering machine an electro-motor, a switch inserted in the circuit of such motor, a shaft driven by the said motor, a cam on the shaft, a contact spring with which the cam makes contact on rotation of
 65 the shaft, a thread tensioning arm over which

the embroidering thread passes, a contact member for such arm, the said thread tensioning arm and contact member forming a closed switch when slackening of the thread allows
 70 contact of the said arm and contact member, a locking member normally maintaining the switch of the motor circuit closed, an electromagnet of which the locking member forms the armature, a magnet exciting transformer, and means for supplying current to the pri-
 75 mary of the transformer; the cam, contact spring, tensioning arm, contact member, and electromagnet and transformer secondary circuit being included in a release circuit which is closed by the cam on its rotation to excite
 80 the electromagnet and release by movement of the armature thereof the switch in the motor circuit and thus open the latter when the thread slackens and allows the thread
 85 tensioning arm and its contact member included in the release circuit to make contact.

In testimony whereof we have affixed our signatures.

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