

Jan. 29, 1963

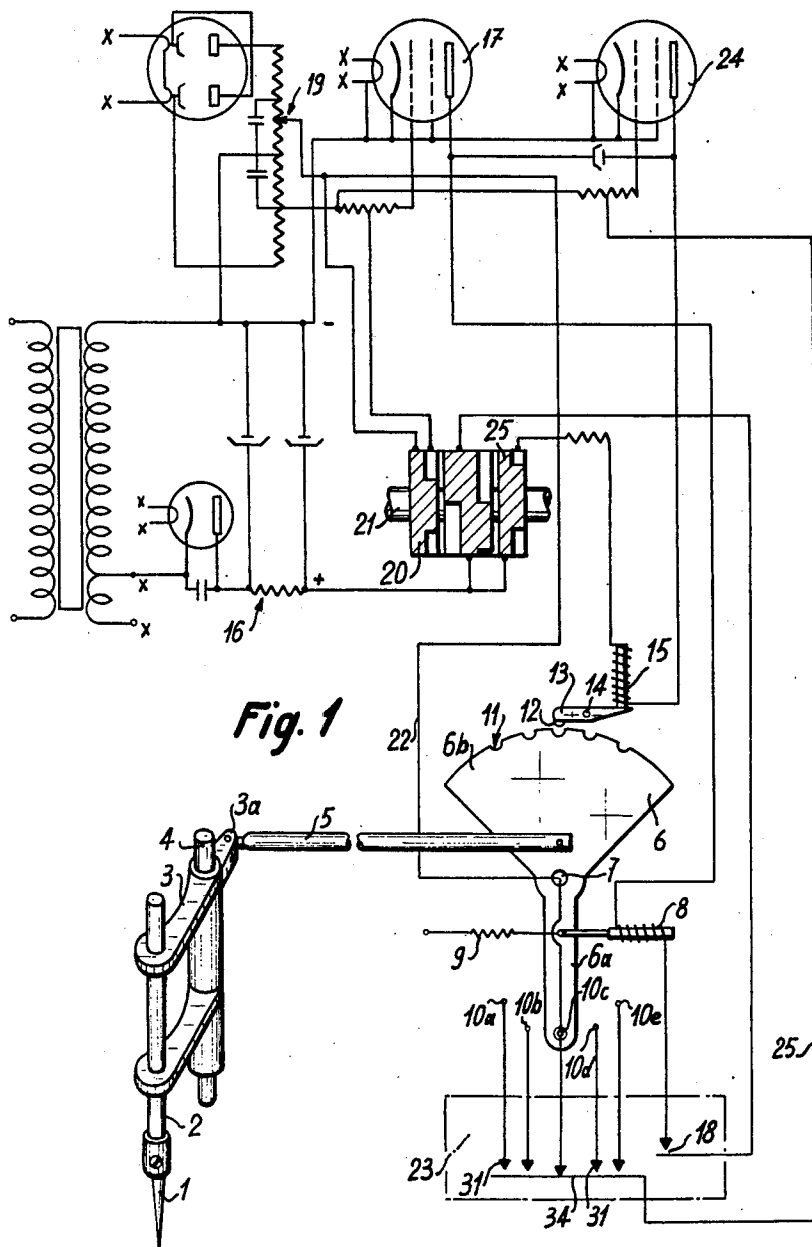
C. CARON

3,076,066

DIGITAL PROGRAMME CONTROLLER

Original Filed April 16, 1958

2 Sheets-Sheet 1



INVENTOR
Charles CARON
By *John B. Armentrout*
Attorney

Jan. 29, 1963

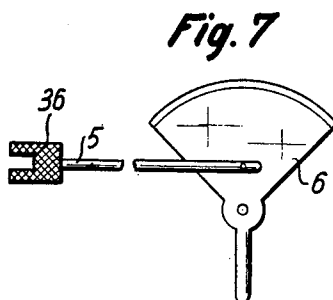
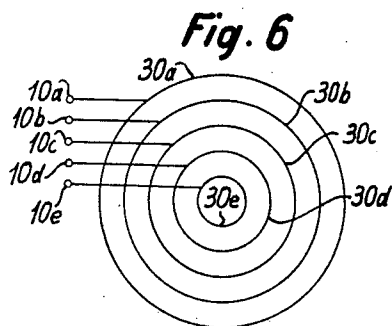
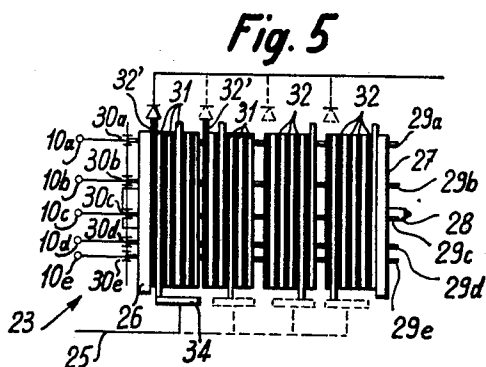
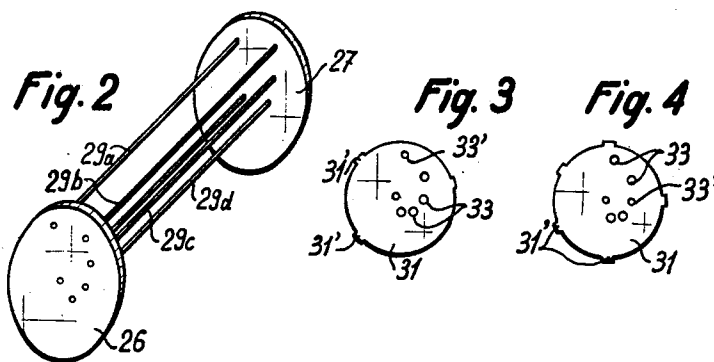
C. CARON

3,076,066

DIGITAL PROGRAMME CONTROLLER

Original Filed April 16, 1958

2 Sheets-Sheet 2



INVENTOR

Charles CARON

By *John B. Lament*
Attorney

1

3,076,066

DIGITAL PROGRAMME CONTROLLER

Charles Caron, Geneva, Switzerland, assignor to Mefina S.A., Fribourg, Switzerland, a firm

Original application Apr. 16, 1958, Ser. No. 728,868, now Patent No. 3,005,137, dated Oct. 17, 1961. Divided and this application Aug. 9, 1960, Ser. No. 48,421

3 Claims. (Cl. 200—37)

Divisional patent application of copending patent application Serial No. 728,868, filed April 16, 1958 now Patent No. 3,005,137, granted October 17, 1961.

The present invention relates to a digital programme controller supplying electric signals especially for a sewing machine whereby stitches forming various patterns can be produced automatically, and wherein at least one of the two effective elements—needle bar and work feed device—is subjected to the action of a control device which is intended to locate the exact position at which the needle penetrates the work.

This digital programme controller comprises a current source, a series of contact studs, a series of rotatable rods parallel to one another, an insulating rotatable frame driven stepwise synchronously with the machine and carrying said rods which are each situated at a different distance from the axis of rotation of the said frame, circular concentric contact tracks, each connected electrically to one of said studs, and with each of which one of the said rods is constantly in contact, at least one series of contact discs stacked on one another, a series of insulating discs interposed between said contact discs, and an electric contact connected to said current source, said contact discs comprising each one nose which is intended to cooperate with said electric contact, the whole arrangement being such that during the rotation of the rod carrying the contact discs, the nose of one or other of them supplies current to one of the said studs.

One form of embodiment of the subject of the invention, and a modified form of embodiment, are illustrated by way of example in the accompanying drawings.

FIGURE 1 is a diagrammatic general view of part of a sewing machine, showing only those parts which are necessary for the understanding of the invention.

FIGURE 2 is a perspective view of a part of the mechanism which provides the programme.

FIGURES 3 and 4 are plane views of two details.

FIGURE 5 is an elevational view of the mechanism providing the programme.

FIGURE 6 is a plan view of a detail, and,

FIGURE 7 is a view of a detail of a modified form of embodiment.

The machine illustrated comprises a needle 1 fixed to a needle-carrying bar 2, which itself is mounted in a cradle 3. The latter is articulated on a pin 4 belonging to the frame of the machine. The needle could also be mounted in a so-called pendulum-type arrangement. An arm 3a of the cradle is connected by a rod 5 to a control member 6 articulated at 7 to the frame of the machine and rockable about the said point.

The movements of the member 6 are brought about by an electromagnet 8 acting in opposition to the action of a restoring spring 9. The member 6 comprises an exploring arm 6a which is displaceable opposite a series of electrical contact studs 10a to 10e. Also, the member 6 comprises a sector 6b in the edge of which are formed a series of notches 11 with which co-operates a finger 12 carried by a two-armed lever 13. This lever is articulated at 14 to the frame of the machine and its movements are controlled by an electromagnet 15. When the latter is energised, the pin 12 co-operates with one or

2

other of the notches 11 and immobilises the control member 6.

This machine operates in the following manner:

The actuator 8 which brings about the movements of the needle through the agency of the control member 6 and the rod 5, is energised by a current source 16 through the agency of a thyatron 17 and a contact 18 controlled by a programme controller which will be described hereinafter. The actuator acts or does not act, in accordance with the programme, thus determining the direction in which the control member 6 is displaced. Also, the grid of the thyatron 17 is supplied with current by a current source 19 through the agency of a ring 20 carried by a shaft 21, the latter being driven by the motor of the machine by means of a mechanism which is not shown in the drawings. The object of this ring is to supply current to the grid of the thyatron 17 at well-defined instants, in such manner that the displacements of the control member 6 are effected synchronously with the other movements of the machine.

The automatic stopping of the control member 6 in one or other of the various positions which it is adapted to occupy, is carried out in the following manner:

The said member is connected, by a conductor 22, to the current source 19. During the displacements of the said member its exploring arm 6a comes into contact successively with the various studs 10, which are connected through the intermediary of the device 23 (FIGURE 5) supplying the programme, and which is described hereinafter, to the grid circuit of a thyatron 24 whose output circuit supplies the locking electromagnet 15. As soon as the exploring arm 6a comes into contact with the particular stud 10 which is at that time in communication with the grid of the thyatron 24, electromagnet 15 is energised and the control member 6 is locked. It should be noted that the feed circuit of the electromagnet 15 passes through a ring 25 carried by the shaft 21, so that after each stitch the electromagnet 15 is released, thus allowing the member 6 to move again in order to occupy the desired position for the following stitch.

The mechanism 23 providing the programme is arranged as follows:

A frame is formed of two insulating plates 26 and 27 fixed to a shaft 28 which is mounted rotatably in the machine. These two plates carry five metallic rods 29a to 29e which are parallel to the rotatable shaft 28 and are each situated at a different distance therefrom. These rods project slightly from the plate 26 and contact concentric circular contact tracks 30a to 30e which are connected respectively to the studs 10a to 10e (FIGURE 6). The rods 29 carry several series of five contact discs 31 which are insulated from one another by intermediate discs 32 (FIGURES 3 and 4) and are each formed with holes 33 for the passage therethrough of the rods. These discs each comprise a plurality of external noses 31' which extend over a sector covering $\frac{1}{2}$ of a revolution, and are intended to come into contact with a brush 34. The holes 33, except for a hole designated as 33', are sufficiently large to ensure that the rods 29 do not touch them. The hole 33' is of smaller diameter, so that the rod 29 which extends through it is in electrical contact with the corresponding disc 31. Each disc carries a hole 33' corresponding to a different rod 29, so that each disc is in electrical contact with one of these rods. During the rotation of the plates 26 and 27 carrying the rods 29, which rotation is produced step-by-step by a mechanism not shown in the drawings acting synchronously with the rest of the machine, the noses 31' come successively into contact with the brush 34 connected to the grid of the

thyatron 24 by a conductor 25. When one nose 31' comes into contact with the brush 34, it connects the said grid to the corresponding stud 10a through the intermediary of one of the rods 29 and one of the contact tracks 30. One of the insulating discs 32 situated between the disc 31, and designated as 32', is in the form of a cam and controls the contact 18 for supplying the actuator. This disc 32' thus determines, by the shape of its profile, whether, for the following stitch, the actuator is to be energized or not, that is to say in which direction the control member 6 is to be displaced in order to reach by the shortest path of travel the stud at which it will be immobilized; this arrangement prevents idle travel of the control member and consequently of the needle. It should be noted that the rods 29 carry several series of five discs 31 and that the brush 34, and also the contact 18, may be displaced in such a manner as to be brought opposite one or other of these series of discs. Thus the machine comprises a plurality of programmes incorporated therein, which can easily be brought into operation or rendered inoperative.

The control device which is illustrated and described may also be applied to the work feed device instead of being connected to the needle. The work feed device, designated as 36 in FIGURE 7, will be connected to the control rod 5 in place of the cradle 3 carrying the needle. It may be advantageous not to drive the work feed device directly but to drive an intermediate selecting member, known in the sewing machine field, for determining the amplitude of the movements of the work feed device which are produced by the motor of the machine.

In the example described and illustrated, the number of studs 10 is five. This number could also be higher, eight or sixteen for example.

What I claim is:

1. A programme device, for a sewing machine programme controller having electrically conductive brush means, a series of electrical contacts, a movable electrically conductive control member electrically conductively engaging said contacts in a sequence of control corresponding to a sequence of relative positions of the needle and work of a sewing machine, said programme device including, a rotatable frame supporting a plurality of parallel extending electrically conductive rods electrically insulated from each other and each situated at a different distance from the axis of rotation of said frame, a plurality of electrically conductive contact discs and electrical insulation interposed between said discs, said discs having spaced noses to contact in succession the electrically conductive brush means of a sewing machine programme controller and said contact discs each having openings therein receiving said rods and being electrically connected with a different one of said rods, and circular concentric contact tracks each electrically connected to a corresponding one of said rods and adapted to be electrically connected to a corresponding one of the series of contacts engaged by the electrically conductive control member of a sewing machine programme controller.

2. A programme device, for a sewing machine programme controller having electrically conductive brush means having selectively different conductive positions, a series of electrical contacts, a movable electrically con-

ductive control member electrically conductively engaging said contacts in a sequence of control corresponding to a sequence of relative positions of the needle and work of a sewing machine, said programme device including, a rotatable frame supporting a plurality of parallel extending electrically conductive rods electrically insulated from each other and each situated at a different distance from the axis of rotation of said frame, a plurality of series of electrically conductive contact discs, each of said series of discs having electrical insulation interposed between said discs thereof and having spaced noses to contact in succession the electrically conductive brush means of a sewing machine programme controller independently of the other discs of said series of discs in a corresponding one of the conductive positions of the brush means of the sewing machine programme controller, said contact discs each having openings therein receiving said rods and said discs in each one of said series of discs being electrically connected with a different one of said rods, and said programme device further including circular concentric contact tracks each electrically connected to a corresponding one of said rods and adapted to be electrically connected to a corresponding one of the series of contacts engaged by the electrically conductive control member of a sewing machine programme controller.

3. A programme device, for a sewing machine programme controller having electrically conductive brush means, a series of electrical contacts, a movable electrically conductive control member electrically conductively engaging said contacts in a sequence of control corresponding to a sequence of relative positions of the needle and work of a sewing machine, said programme device including a spaced pair of rotatable electrically insulating plates supporting a plurality of parallel extending electrically conductive rods electrically insulated from each other and each situated at a different distance from the axis of rotation of said plates, electrically conductive contact discs and electrically insulating discs interposed between said contact discs, said insulating discs and contact discs having opening therein receiving said rods, said contact discs having spaced noses to contact in succession the electrically conductive brush means of a sewing machine programme controller, and said contact discs each being electrically connected with a different one of said rods, and circular concentric contact tracks on the outside of a corresponding one of said rotatable electrically insulating plates, each of said tracks being electrically connected to a corresponding end of one of said rods and adapted to be electrically connected to a corresponding one of the series of contacts engaged by the electrically conductive control member of a sewing machine programme controller.

References Cited in the file of this patent

UNITED STATES PATENTS

2,656,497	Schweighofer et al. -----	Oct. 20, 1953
2,712,374	Smith et al. -----	July 5, 1955
2,803,207	Sotzky -----	Aug. 20, 1957
2,884,581	Schunemann et al. -----	Apr. 28, 1959
2,906,217	Myska -----	Sept. 29, 1959
2,929,344	Theenhausen et al. -----	Mar. 22, 1960