

R. ZAHN.
PANTOGRAPH EMBROIDERING MACHINE.
APPLICATION FILED FEB. 21, 1911.

1,013,467.

Patented Jan. 2, 1912.

2 SHEETS-SHEET 1.

FIG - 2 -

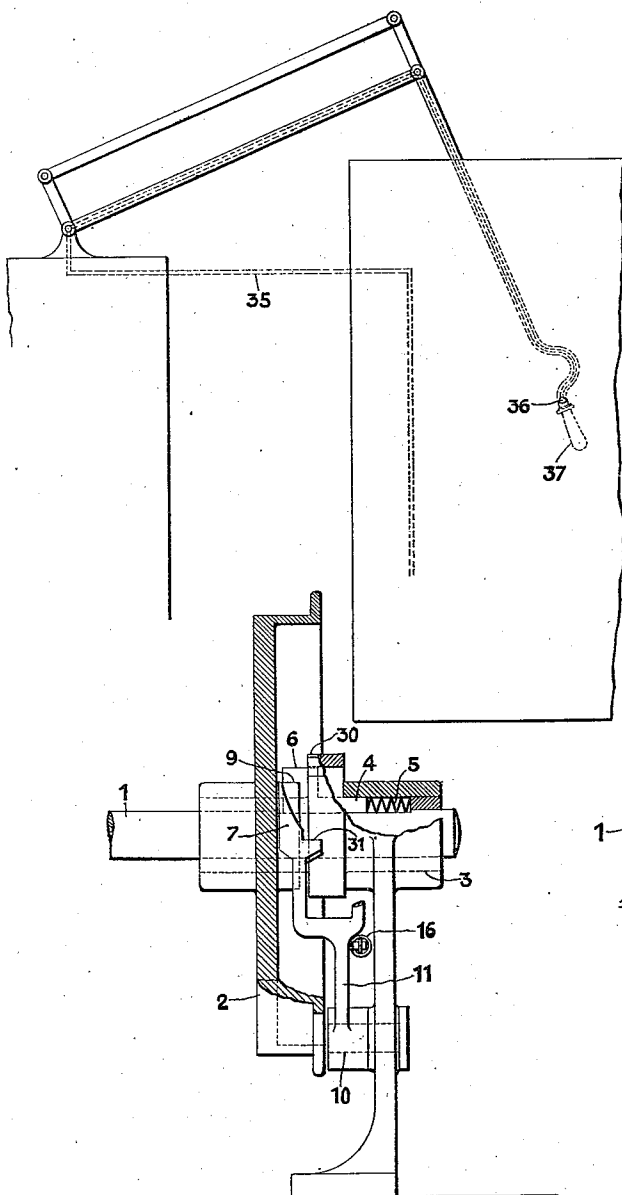
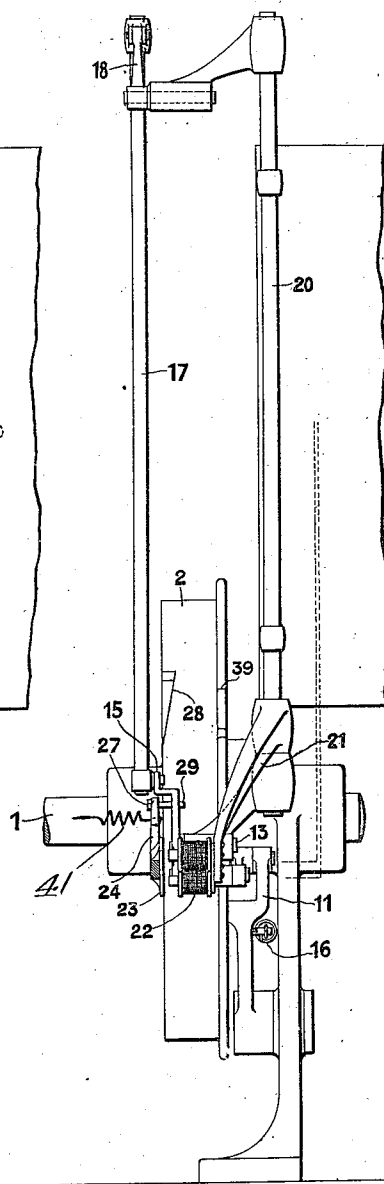


FIG - 1 -



WITNESSES:

Irish White
Rene' Guine

INVENTOR:

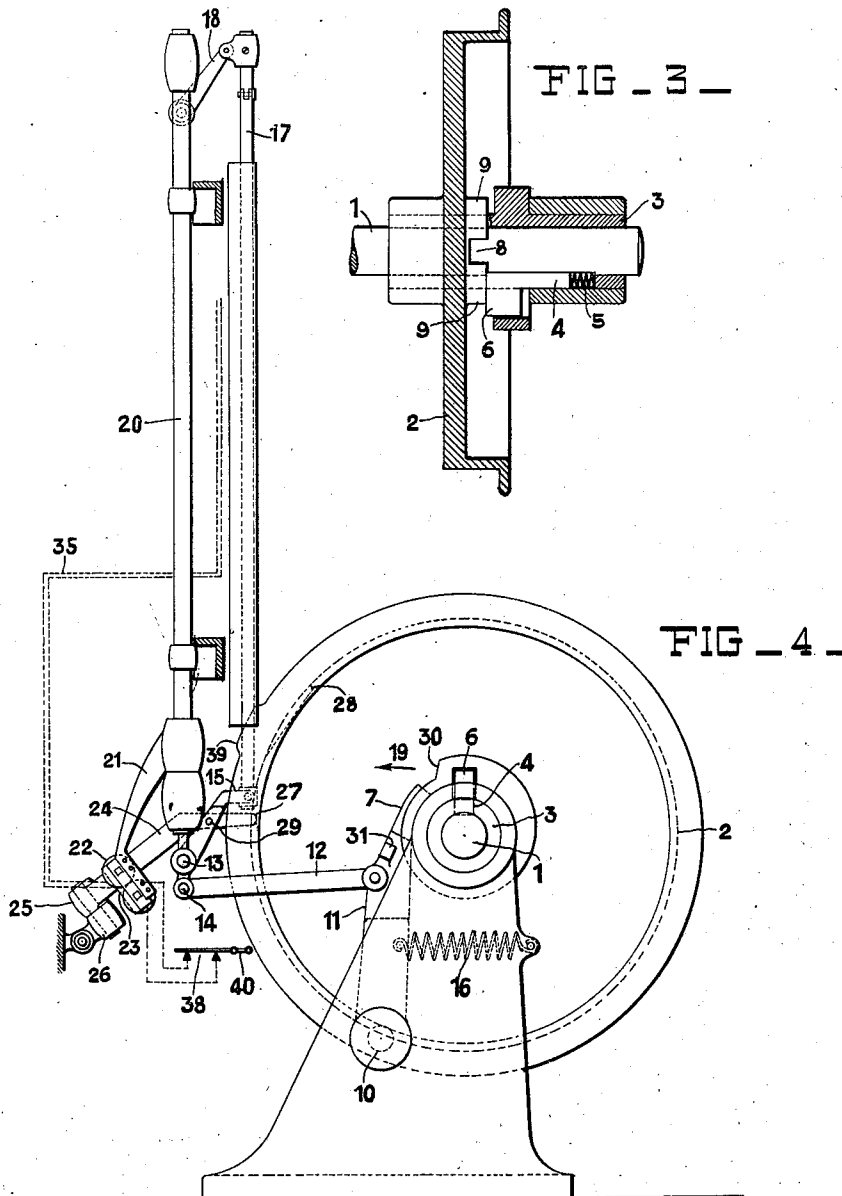
Robert Zahn,
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Fred White
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UNITED STATES PATENT OFFICE.

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PANTOGRAPH EMBROIDERING-MACHINE.

1,013,467.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, ROBERT ZAHN, a subject of the King of Bavaria, and resident of Plauen, Germany, have invented new and useful Improvements in Pantograph Embroidering-Machines, of which the following is a full, clear, and exact specification.

In difficult embroidery patterns, in which very long stitches alternate with short ones, it becomes more difficult for the operator as the machines are improved, and larger fabric frames used, the machines moving faster, to guide the fabric frame from stitch to stitch in the short instant during which the machine remains at rest for the purpose of this operation. It is known that only the fractional part of a second is allowed for this operation. If very short stitches are to be made then the reciprocating motion of the fabric frame by means of the pantograph can easily take place even if the machine is moving fast. When long stitches however are being made, strain is laid not only on the strength of arm but also on the eyesight of the operator, as not only is it essential that the fabric frame be moved, but it is especially important that the pantograph needle at the termination of the frame movement be located at the required point on the design. If the point be overstepped the embroidery is spoiled. The importance of this fact is increased in view of the fact that recently it has become the practice to connect the embroidering machine with a card punching machine, which perforates a jacquard card while the embroidering operation is in progress, which jacquard card after being completed is to be used on an automatic embroidery machine. Should the operator make a mistake under these conditions in guiding the fabric frame then each mistake will be repeated in each of the hundred work operations controlled by the jacquard card. This disadvantage is completely avoided in the mechanism for engaging and disengaging the machine drive in embroidery machines with pantograph controlled embroidery frame, which forms the subject of the present invention. This mechanism has the peculiarity that by using an electromagnetic control for the operation of the engaging and disengaging of the machine drive which is controlled by a contact on the pantograph handle, an automatic coupling on the machine driving shaft is operated by an automatic disengaging

member, and the latter is made dependent on the said electromagnetic control, so that when the contact is closed for some time or permanently the disengaging member is put out of action, while on the other hand when the contact is closed and opened for short periods the disengaging member is put for a short time into an inoperative position with regard to the coupling, but is immediately brought back again into its operative or disengaging position to disengage the coupling and thereby automatically disconnect the machine drive after a complete revolution of the machine driving shaft. This mechanism is so operated that under normal conditions, when the pattern calls for relatively short stitches, the machine is kept moving in regular time owing to the closed condition of the contact on the pantograph handle. On the other hand the operator each time he has to take a long stitch on the pattern closes the contact on the pantograph handle for an instant only and then opens it again in order that the machine which has momentarily been set in motion will again be brought to a standstill after the completion of a complete revolution of the driving shaft of the machine. The operator can then move the pantograph from one spot of the pattern to another at his leisure, and then allow the driving shaft of the machine to start and to rotate once, that is to allow the needles to make a single stitch, and when he has then positioned the pantograph with the necessary care and accuracy at the next stitch, he closes again shortly the contact and continues the sequence of operations mentioned above until short stitches occur in the pattern, whereupon he allows the machine to resume its uninterrupted regular motion.

A constructional example of the subject of the invention is illustrated in the accompanying drawings in which—

Figure 1 is a front view and Fig. 2 a partial vertical section of the apparatus. Fig. 3 illustrates the coupling in horizontal section, in a different position of its parts, and Fig. 4 is a side view of the apparatus.

A driving belt pulley 2 is loosely arranged on the machine driving or main shaft 1 and runs on a journal 3 which is fixed on the shaft 1 and is provided with a longitudinal slot in which lies a prismatic coupling slide 4 together with a spring 5. The slide 4 is provided with a radially ar-

ranged projection 6 and the spring 5 tends to thrust it constantly in toward the machine, that is to say in Figs. 1, 2 and 3, toward the left, and to allow it to pass into a slot 8 of a coupling ring 9 on the belt pulley 2, and thereby couple the shaft 1 with the belt pulley 2. The slide 4 can be pushed to the right in such a manner that it can, by reason of its turning movement with the shaft 1, be brought opposite to a tapered disengaging member 7. The projection 6 of the slide 4 can then run up the tapered face of said disengaging member 7 so that it is pushed to the right and in this manner the coupling between the belt pulley 2 and the shaft 1 is disengaged.

In Fig. 2 the driving belt pulley 2 is coupled with the main shaft 1 because the slide 4 is thrust toward the left by the spring 5, so that its projection 6 is located in the slot 8 of the ring 9 of the belt pulley 2. In Fig. 3 the slot 8 is empty, that is, the shaft 1 is uncoupled from the belt pulley 2, the slide 4 is pushed toward the right against the action of its spring 5 and its projection 6 rests against the free edge of the ring 9. The tapered disengaging member 7 is carried by a disengaging lever 11 movable about the pin 10 and connected to a lever 14, 15 movably pivoted about the fixed pin 13, by means of a connecting rod 12 (Fig. 4). A strong spring 16 pulls the lever 11 automatically into the disengaging position relative to the coupling slide 4. To the rod 20 fixed to the machine frame, a stationary arm 21 is arranged which carries a pair of electromagnets 22. The armature 23 of this pair of electromagnets is connected to an interconnecting lever 24, one end of which is movably pivoted to a universal joint 25—26, while its other end 27 is arranged in proximity to the free edge of the rim of the belt pulley 2, which is provided with a catching notch 28 (Fig. 1). A pin 29 is carried by the lever 24 near the end 27 thereof and loosely engages with the opening of the lever arm 15. The pair of electromagnets 22 lie in an electric control circuit 35 indicated in dotted lines, which leads to a contact 36 (Fig. 2) on the pantograph handle 37 and also to a normally closed interrupting switch 38 (Fig. 4).

If the pair of electromagnets 22 are excited, which follows when the contact 36 is closed, then the interconnecting lever 24 is drawn up and its free end 27 thereby pressed against the edge of the rim of the pulley 2 so that this end of the lever catches in the notch 28 of the driving pulley as this rotates and is drawn downward by the pulley 2 (overcoming the magnetic attraction). The pin 29 thereby carries the lever 14, 15 with it, and thus swings the disengaging lever 11 out of its normal operative or disengaging position, in the direction

of the arrow 19 (Fig. 4). The disengaging member 7 thereby is out of range of the projection 6 of the coupling slide 4, and this is then pressed by the spring 5 into the slot 8 waiting for it and the coupling of the shaft 1 and the driving pulley 2 is completed. Immediately thereafter the control circuit 35 is automatically broken at the contact 38 (Fig. 4) by reason of a projection 39 on the pulley 2 having lifted the switch lever 40, so that the excitation of the pair of electromagnets 22 ceases and the end 27 of the interconnecting lever 24 is again pulled out of the catching notch 28 by means of a spring 41 (Fig. 1). The spring 16 then pulls the disengaging lever 11 again to the right (Fig. 4) and thus brings the member 7 back into its operative or disengaging position relative to the coupling slide 4. If the contact 36 is permanently kept closed, then immediately after the contact 38 having been closed, the lever 24 will again be drawn by the pair of electromagnets 22 against the rim of the belt pulley 2 in order that it may catch in the notch 28 as described above, and the cycle of operations already described is repeated at each revolution of the pulley 2, the coupling of said pulley with the shaft 1 remaining engaged. Should, however, the contact 36 only be closed for a moment, in fact just long enough to enable the lever 24 to catch in the notch 28 of the belt pulley 2, then the disengaging lever 11 keeps the position into which it has been pulled by the spring 16, so that the cam shaped part of the disengaging member 7 lies in the range of the projection 6 of the coupling slide 4. When under these conditions the shaft 1 completes a complete revolution, the coupling slide 4 is then pushed back against the action of the spring 5 by means of the disengaging member 7, and thereby the coupling between the shaft 1 and the driving pulley 2 is immediately disengaged. Immediately after a projection 30 on the journal 3 comes into engagement with a projection 31 on the lever 11 and thereby stops further rotation of the disengaged shaft 1.

In order to allow the apparatus to be operated by hand if necessary, a vertical rod 17 is linked to the end 15 of the lever 14, 15, which is within easy reach of the embroidery operator's right hand, the upper end of said rod being guided by a link 18. If the embroidery operator catches hold of the rod 17 with his right hand and pulls this downward, then the disengaging lever 11 is shifted over in the direction of the arrow 19 and the spring 5 then forces the coupling slide 4 into the slot 8, and the coupling between the parts 1 and 2 is completed. If the embroidery operator again leaves go of the rod 17, then the spring 16 pulls the lever 11 back into the disengaging position, and

the decoupling of the parts 1 and 2 is then automatically completed in the manner described above.

What I claim is:

5 1. In embroidering machines, the combination of a driving member, a main shaft in the machine to be driven by said driving member, a coupling between said driving member and the main shaft, a movable disengaging member to control said coupling,
10 an interconnecting mechanism between said disengaging member and said driving member for periodically connecting said driving member to said disengaging member to cause said disengaging member to be shifted
15 out of its operative position, an electromagnetic device controlling said interconnecting mechanism, an electric control circuit containing said electromagnetic device,
20 a pantograph for shifting the fabric frame of the machine, a contact device on the handle of said pantograph for controlling said control circuit by hand and automatic circuit controlling means for periodically opening
25 said circuit so as to allow of periodic disconnection between said disengaging and driving members, said contact device, when said contact is left open, permitting said disengaging member to remain in its operative position for producing the disengagement of the coupling, substantially as
30 and for the purpose described.

2. In embroidering machines, the combination of a driving member, a main shaft
35 in the machine to be driven by said driving member, a coupling between said driving member and the main shaft, a movable disengaging member to control said coupling, an interconnecting mechanism between said
40 disengaging and driving members, an electromagnetic device controlling said interconnecting mechanism, a hand controlled rod connected to said interconnecting mechanism, an electric control circuit containing
45 said electromagnetic device, a pantograph for shifting the fabric frame of the machine and a contact device on the handle of said pantograph for controlling said control circuit by hand, whereby the said interconnecting mechanism and consequently the
50 said disengaging member for the coupling may be controlled either electromagnetically or by hand, substantially as and for the purpose described.

55 3. In embroidering machines, the combination of a driving member, a main shaft in the machine to be driven by said driving member, a spring controlled coupling slide connecting in its coupling position said
60 driving member with said main shaft, a spring actuated disengaging lever, a cam

face carried by said lever to engage with said coupling slide when said lever is in operative position, for the purpose of moving
65 said slide out of its coupling position, an interconnecting mechanism between said disengaging lever and said driving member for periodically connecting said driving member to said disengaging member to cause said disengaging member to be shifted
70 out of its operative position, an electromagnetic device controlling said interconnecting mechanism, an electric control circuit containing said electromagnetic device, a pantograph for shifting the fabric frame
75 of the machine, a contact device on the handle of said pantograph for controlling said control circuit by hand and automatic circuit controlling means for periodically opening said circuit so as to allow of periodic
80 disconnection between said disengaging and driving members, said contact device, when said contact is left open, permitting said disengaging member to remain in its operative position for producing the disengagement of the coupling, substantially as
85 and for the purpose described.

4. In embroidering machines, the combination of a rotary driving member, a main shaft in the machine to be driven by said
90 driving member, a coupling between said driving member and said main shaft, a spring actuated disengaging lever adapted to control said coupling normally held in operative position, an interconnecting lever
95 between said disengaging lever and the driving member, said interconnecting lever being connected to the disengaging lever, an electromagnetic device controlling said interconnecting lever and arranged so as to
100 shift it close to said driving member, catching means on the latter to catch then the said interconnecting lever for the purpose of positively shifting the disengaging lever out of its operative position, an electric control circuit containing said electromagnetic device, automatic electric means controlled
105 by said driving member for producing periodic disengagement of said interconnecting lever from said catching means, a pantograph for shifting the fabric frame of the machine and a contact device on the handle of said pantograph for controlling said control circuit by hand, substantially as and for the purpose described.
115

In witness whereof I have hereunto signed my name this 26th day of January 1911, in the presence of two subscribing witnesses.

ROBERT ZAHN.

Witnesses:

LOUIS KÖELLER,
ROBERT HEINRICH NIER.