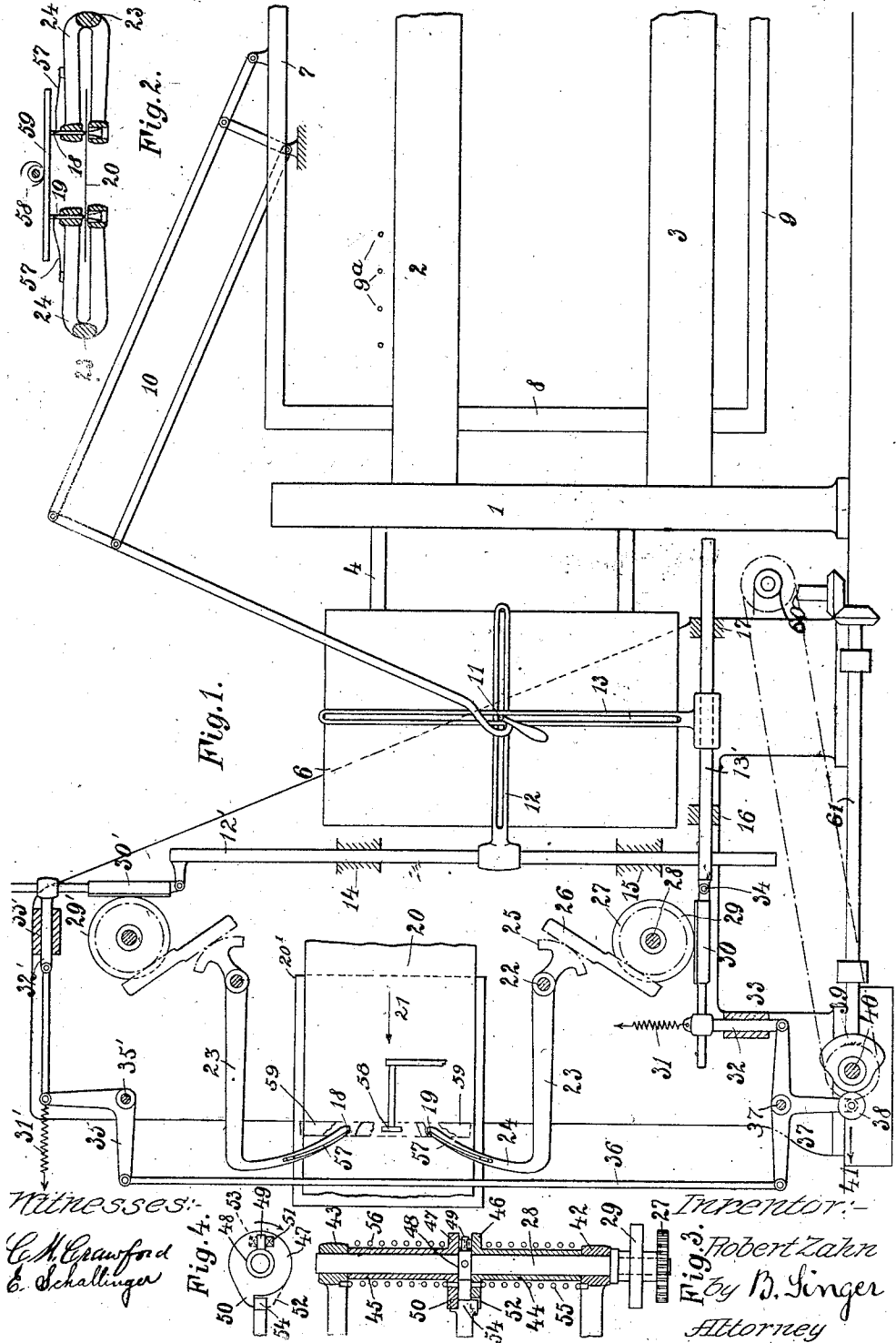


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CARD PUNCHING AND EMBROIDERING MACHINE.
APPLICATION FILED DEC. 18, 1908.

1,047,602.

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UNITED STATES PATENT OFFICE.

ROBERT ZAHN, OF PLAUEN, GERMANY.

CARD-PUNCHING AND EMBROIDERING MACHINE.

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Specification of Letters Patent.

Patented Dec. 17, 1912.

Application filed December 18, 1908. Serial No. 468,246.

To all whom it may concern:

Be it known that I, ROBERT ZAHN, a subject of the Emperor of Germany, residing at Plauen, in the Kingdom of Saxony and Empire of Germany, have invented certain new and useful Improvements in Card-Punching and Embroidering Machines, of which the following is a specification.

The jacquard card required for the operation of an automatic shuttle embroidering machine, has hitherto been produced with much labor and loss of time by means of a separate card punching machine worked by hand. Since from the arrangement or distribution of the holes punched in the jacquard card it is not possible to get the faintest idea of how the embroidery design will look which will be produced by the embroidering machine when using the particular card, a special or auxiliary embroidering machine containing only about two to four needles with as many shuttles has been required, in order to allow of production of a sample embroidery design. This special embroidering machine has been arranged at the side of the card punching machine and has had its small embroidery frame coupled to the card punching machine in such a manner that as the card is being punched, a sample of the embroidery design is produced, which sample served to show whether or not the punched card corresponds with the designed pattern. In operating such card punching machine, it has been necessary after each punching operation to turn around the small shaft of the auxiliary embroidering machine, whereby each time a single stitch was produced. Thereupon, the punching machine has been adjusted for the punching of the next hole and the shaft of the auxiliary embroidering machine has been given another turn for the production of another stitch and so forth. This manipulation had to be repeated until the entire design was ready. As already stated, the production of a jacquard card in this manner has taken several hours and with larger designs even a whole day and, with all this labor and expense only a reduced design has been produced that could not serve any other purpose but to verify the correctness or accuracy of the produced jacquard card.

The present invention has for its object to provide a combination card punching and shuttle embroidering machine, whereby Jacquard cards are produced without any additional labor, expense and any loss of time. The invention may be applied to embroidering machines controlled by a pantograph or to such of the "automatic" type. In the first case, that is to say, when an embroidering machine controlled by a pantograph is used, there is the advantage that it is possible to easily ascertain the value of a newly designed embroidery pattern. For, since embroideries of a total length of fifteen to twenty meters can be produced on embroidering machines of ordinary size, this length will be quite sufficient to allow of the produced embroidery being cut up into a great number of samples for the distribution among customers. If the design is not approved or is not salable, the loss caused by the cutting up of the embroidery is not great, because the latter has been produced almost without expense, excepting the cost of the material. If, on the other hand, the new design proves to be easily salable, the manufacturer can at once without the slightest loss of time, fill the orders that come in, even if urgent, because the jacquard card is already at hand and ready for use on the embroidering machine. This constitutes the great economical value and the technical progress afforded by the present invention.

In the case of an automatic embroidering machine when joined with a card punching machine the latter will serve as a substitute for a jacquard card copying machine and will allow of a large number of jacquard cards of the desired design being produced in a very short time so that an unlimited number of orders can be quickly filled.

To make my invention more clear, the same is illustrated in the accompanying drawing, in which similar reference numerals denote corresponding parts and in which—

Figure 1 is an elevation of an embroidering machine and auxiliary mechanism embodying the main features of my invention; Fig. 2 is a sectional view of a detail of the card punching machine; Fig. 3 is a section through shaft 28 of Fig. 1 and Fig. 4 is a cross section through Fig. 3.

In the drawing, which forms a part of this specification, the parts 1, 2 and 3 represent the left hand end of the frame of a shuttle embroidering machine which may be of ordinary construction.

6 is the board to which the pattern of the embroidery design is fixed and which by means of the arms 4 and 5 is secured to the machine frame: The large embroidering or fabric frame 7, 8 and 9 is guided by means of the pantograph 10, the pointer 11 of which is guided as in every ordinary shuttle embroidering machine, along the lines of the pattern fixed to the board 6. For the purpose of operating the card punching machine, hereinafter specified, the pointer 11 also engages two loops or guides 12, 13 that are arranged crosswise and at right angles to each other. The guide 12 is rectilinearly guided with least possible friction by means of bearings 14, 15 and the guide 13 is similarly guided by means of bearings 16, 17. When the pointer 11 is moved along a horizontal line, the guide 12 remains stationary and the guide 13 only shares this movement. The reverse takes place when the pointer 11 is moved along a vertical line. When, however, the pointer 11 is moved along an inclined or curved line, then both guides 12 and 13 will be compelled to move simultaneously in one or the other direction. All these movements of the two guides 12 and 13 are utilized for the purpose of swinging two perforating punches 18 and 19 over the paper strip 20 around their fulcrums 22. The paper strip 20 is slowly fed step by step in the direction of the arrow 21 by suitable means (not shown), while the two punches 18 and 19 by the mechanism shown in Fig. 2 are caused at each step to punch two holes in the paper strip 20.

Since the mechanism shown in Fig. 1 for transmitting motion from the part 12 to the part 18, is exactly the same as that for transmitting motion from the part 13 to the part 19, it will be sufficient for the understanding of this invention to describe in detail only one of these two mechanisms.

Each punch is arranged, as will be hereinafter specified, in a lever or arm 23, which is pivoted to the fixed pin 22 and the free end 24 of which is curved in a circle having as its center the pin 22. The lever 23 is rigidly connected to a toothed segment 25. A rack 26 engages on one side with the teeth of the said segment and on the other side with the teeth of a gear 27. By this means, the lever 23 is positively connected to the shaft 28 on which the toothed wheel 27 is fixed, that is to say, to every position assumed by the toothed wheel 27 in its rotation, a definite position of the punch 19 over or in front of the paper strip 20 is obtained. Fixed on the shaft 28 is also a smooth disk 29 against the periphery of which a smooth

bar 30 guided in a sleeve secured to or formed integrally with a slide 32, is pressed by means of a powerful spring 31. The said spring exerts sufficient pressure between the said bar 30 and the disk 29 to cause the latter to swing back and forth as the bar 30 is being reciprocated in a straight line. The bar 30 is pivotally connected at 34 to a cross piece of the guide 13, and consequently all the movements of the latter will be transmitted to the perforating punches 18, 19, and thus to every position assumed by the guide 13 in its movements in front of the pattern board 6, a definite position of the punch 19 over the paper strip 20 will correspond.

The slide 32', which is mounted in a bearing 33' and which is acted upon by the spring 31' to press a bar 30' against a friction wheel 29' is pivotally connected by means of a bell crank lever 35, rod 36 and a three armed lever 37 to the slide 32. The said three armed lever 37 carries a roller 38 which travels on the periphery of a cam 39 fixed on the shaft 40. This shaft 40 is so operatively connected to the main shaft 61 of the embroidering machine, that it is compelled to make exactly the same revolutions as the said main shaft. Since at the moment the needles of the embroidering machine enter the fabric, the embroidery frame 7, 8, 9 must be kept stationary and consequently, the pantograph pointer 11 and the entire system 13, 30, 12, 30' also must be stationary, the high and low portions of the periphery of the cam 39 are so arranged that by the high portion thereof the roller 38 is moved in the direction of the arrow 41, whereby the bars 30 and 31 are drawn away from the friction wheels 29 and 29', and this disconnection is maintained until the embroidering needles are withdrawn from the fabric, that is to say, until the high portion of the cam 39 has disengaged the roller 38.

As will be seen by reference to Figs. 1 and 2, the curved ends 24 of the arms 23 are bifurcated and extend on opposite sides of the material 20. The punches 18 and 19 are slidably mounted in one portion of the fork of each arm. Springs 57 mounted on the fork portions 24 normally hold the punches 18, 19 upwardly in their bearings. A member 59 engages the outer ends of the punches 18 and 19 and is actuated by a cam 58, so as to depress the punches when the same have been properly positioned abreast of the material 20. The shaft of the cam 58 by suitable means (not shown) is so connected to the main shaft 61 of the embroidering machine, that the punches 18 and 19 will enter the strip 20 synchronously with the entrance of the needles into the fabric. After the punches have entered the material 20 the arms 23 must be retracted to their

initial or starting position prior to subsequent movement thereof. In order to accomplish this, the following arrangement is made: The shaft 28 on which the friction wheel 29 and the gear 27 are fixed is mounted in bearings 42, 43 and carries sleeves 44 and 45. The outer ends of the sleeves 44 and 45 abut against the bearings 42 and 43 respectively. The inner end of the sleeve 44 is provided with a disk 46 which carries an abutment or lug 53 (Fig. 4) and which is provided with a shoulder 52 (Figs. 3 and 4). The inner end of the sleeve 45 is provided with a disk 47 which carries an abutment or lug 51 (Fig. 4) and is provided with a shoulder 50 (Figs. 3 and 4). The shoulders 50 and 52 face in opposite directions and engage a fixed abutment 54 (Fig. 4). The sleeve 45 is provided with a spring 56 which normally maintains the shoulder 50 in engagement with the fixed abutment 54. The sleeve 44 is provided with a spring 55 which normally maintains the shoulder 52 in engagement with the abutment 54. The shoulders 50 and 52 engage on opposite sides of the abutment and the springs 55 and 56 are tensioned and arranged to normally maintain the shoulders of the disks in engagement with the abutment 54. Opposite the shoulders 50 and 52 the lugs or abutments 53 and 51 engage on opposite sides of the lug 49 secured to a collar 48 which is fast on the shaft 28. It will be understood that the same construction is used for the shaft of the friction wheel 29.

When the member 30 is moved in one direction and is in contact with the friction wheel 29, one of the springs 55, 56 will be tensioned and one of the sleeves 44, 45 will be moved under the action of the spring to position the punch 19. As soon as the bar 30 has been withdrawn from the engagement with the wheel 29 such spring will return the shaft 28 and arms 23 to a normal position. Movement of the member 30 in another direction will cause a like operation of the other sleeve and spring.

When the embroidery is finished, the paper strip 20 is provided with all the perforations representing the design of the embroidery and this paper strip which now is a jacquard card, may be put into an embroidering machine for the production of the same embroidery as that from which the card was punched.

What I claim and desire to secure by Letters Patent is:

1. The combination of an embroidering frame, jacquard card punching means and means whereby the latter are coupled to the said embroidering frame so that all movements of the latter are synchronously transmitted to the said punching means.

2. The combination of an embroidering frame, means for transmitting motion there-

to, jacquard card punching means and means between the said motion transmitting means and the said card punching means whereby the latter are coupled to the said embroidering frame so that all movements of the latter are synchronously transmitted to the said punching means.

3. The combination of an embroidering frame, means for transmitting motion thereto, a jacquard card punching mechanism, including movable punch carrying members and means between said members and the said motion transmitting means whereby the latter are coupled to the said members so that all movements of the said embroidering frame are synchronously transmitted to the said punch carrying members.

4. The combination of an embroidering frame, means for transmitting motion thereto, a jacquard card punching mechanism including movable punch carrying members adapted to be arranged over a fed paper strip, means between said members and the said motion transmitting means whereby the latter are coupled to the said members so that all movements of the said embroidering frame are synchronously transmitted to the said punch carrying members and means whereby the said members are at certain intervals automatically uncoupled from the said motion transmitting means.

5. The combination of an embroidering frame, means for transmitting motion thereto, a jacquard card punching mechanism including punch positioning means and punch operating means and means whereby the said punch positioning means are coupled to the said embroidering frame so that all movements of the latter are synchronously transmitted to the said punch positioning means, which are thereby adjusted in accordance with the embroidery design, and means for transmitting motion to said punch operating means.

6. The combination of an embroidering machine including an embroidering frame, a pantograph operating means and a pattern board, a jacquard card punching mechanism, including punching members and means between said pantograph operating means and the said punching members, whereby the latter are coupled to the said pantograph operating means, so that all movements of the embroidering frame are synchronously transmitted to the said punching members, which are thereby adjusted in accordance with the embroidery design.

7. The combination of an embroidering machine including a pantograph operating means, a pattern board and angularly disposed movable members abreast of the said pattern board, and connected for operation by the pantograph, a jacquard card punching mechanism and means between the latter and the said movable members for syn-

chronously operating the said embroidering machine and the said card punching mechanism.

8. The combination of an embroidering machine including a pantograph operating means, a pattern board and two movable loops crossed at right angles to each other abreast of the pattern board, a jacquard card punching mechanism and means between said card punching mechanism and the said loops for synchronously operating the said embroidering machine and the said punching mechanism.

9. The combination of an embroidering machine including a pantograph operating means, a pattern board and angularly disposed movable members abreast of the said pattern board, and connected for operation by the pantograph, a jacquard card punching mechanism including movable members carrying the punches, and means between said latter movable members and the said angularly disposed members whereby the former and the latter are so coupled that the embroidering machine and the said card punching mechanism will work synchronously.

10. The combination of an embroidering machine including a pantograph operating means, a pattern board and angularly disposed movable members abreast of the said pattern board, and connected for operation by the pantograph, a jacquard card punching mechanism, means between the latter and the said movable members for synchronously operating the said embroidering machine and the said card punching mechanism

and means for automatically uncoupling at certain intervals the said card punching mechanism from the said embroidering machine.

11. The combination of an embroidering machine including a pantograph operating means and a pattern board, angularly disposed members abreast of the pattern board and connected for operation by the pantograph, punches for reproducing the pattern of the board, releasable means transmitting movement of said members to position said punches, means for synchronously operating said punches and embroidering machine, mechanism for releasing said releasable means, and means for returning said punches to their normal position.

12. The combination of an embroidering machine including a pantograph operating means and a pattern board, angularly disposed members abreast of the pattern board and connected for operation by the pantograph, punches for reproducing the pattern of the board including slidable member, releasable means for transmitting movement of said members to position said punches, means for synchronously operating said punches and the embroidering machine, mechanism operated by said embroidering machine for releasing said releasable means, and means for returning said punches to their normal position.

In testimony whereof I affix my signature.
ROBERT ZAHN.

In the presence of—

BRUNO LAUTER,

WM. H. H. SPIELMEYER.