

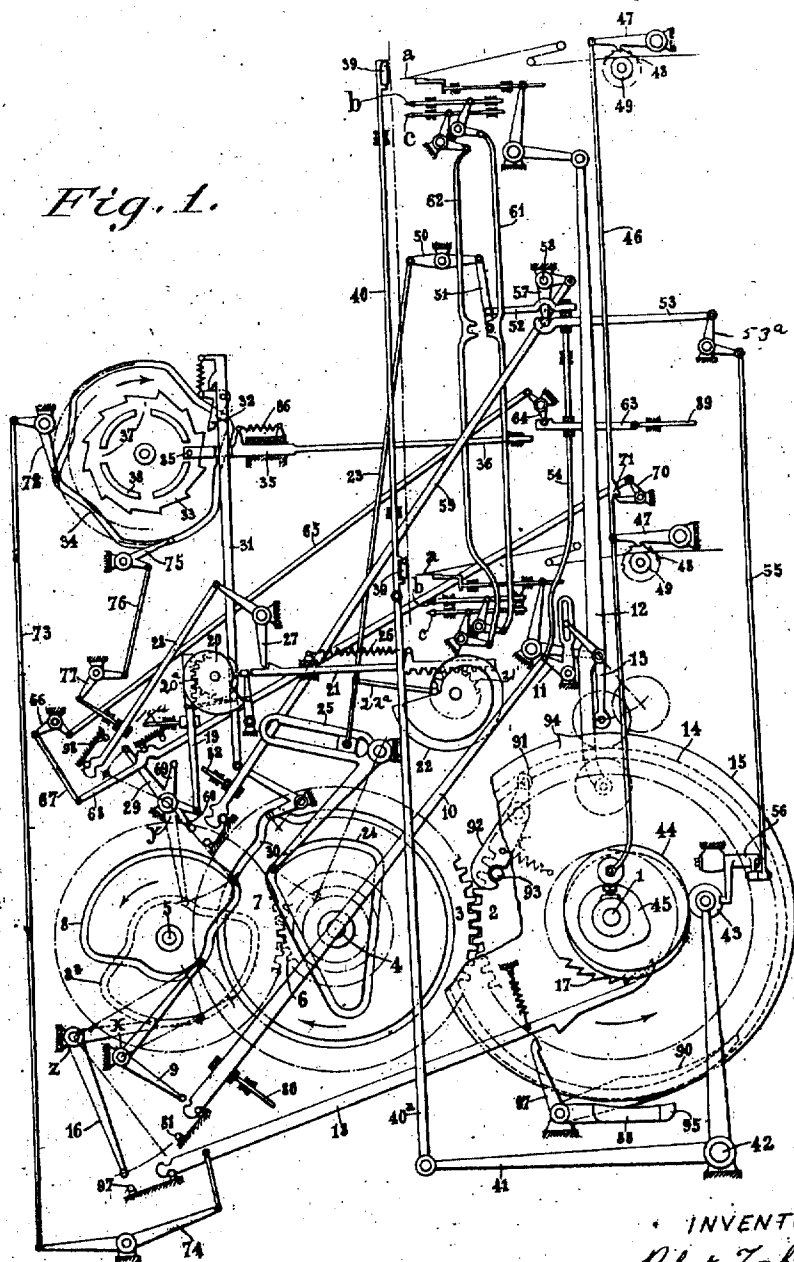
R. ZAHN.
JACQUARD EMBROIDERING MACHINE.
APPLICATION FILED MAR. 18, 1910.

995,394.

Patented June 13, 1911.

2 SHEETS—SHEET 1.

Fig. 1.



WITNESSES:

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William F. Martine

INVENTOR:

Robert Zahn

By Attorneys:

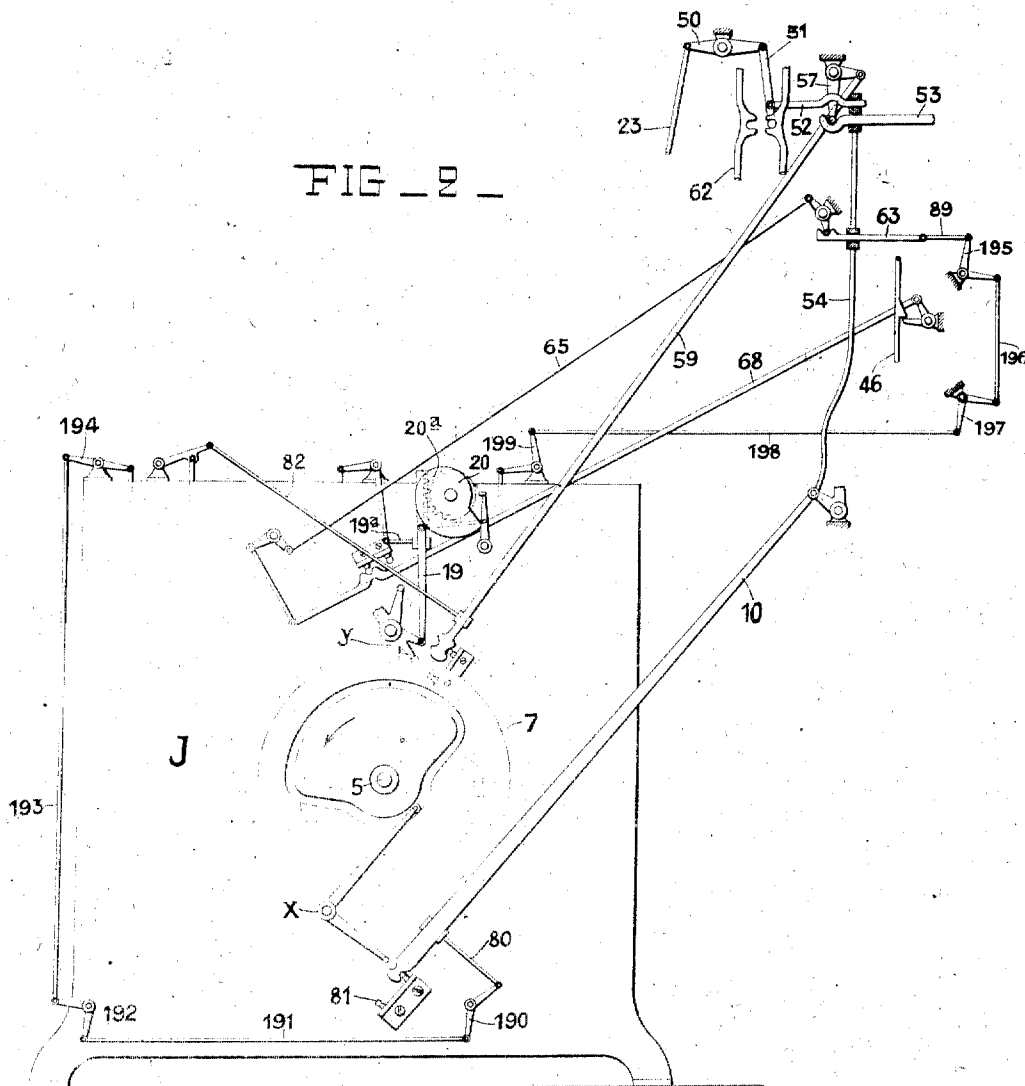
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2 SHEETS—SHEET 2.

FIG. 2 —



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UNITED STATES PATENT OFFICE.

ROBERT ZAHN, OF PLAUE, GERMANY.

JACQUARD EMBROIDERING-MACHINE.

995,394.

Specification of Letters Patent. Patented June 13, 1911.

Application filed March 18, 1910. Serial No. 550,180.

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 Jacquard Embroidering-Machines, of which the following is a full, clear, and exact specification.

The present invention relates to jacquard embroidering machines having several auxiliary implements necessary for the embroidering operation, such as for instance the bore tools and the stüpfel tools and it differs from the known constructions of embroidering machines of this kind by the feature that the needle mechanism is connected to a controlling device for a drive common to the auxiliary implements and that this controlling device is dependent from a needle of the jacquard mechanism, all said parts being arranged so that in changing over from embroidering operation to auxiliary operations the embroidering mechanism acts on the controlling device above mentioned in such a manner, that the latter can then bring into action under the control of the jacquard mechanism an automatic changing over of the drive from one auxiliary implement to the other. In this arrangement, chiefly owing to the existence of the controlling device mentioned above, the jacquard mechanism has only to control said controlling device after the changing over from embroidering operation to bore operation, in order to effect the changing over of the drive from one auxiliary implement (the bore points) to the other (the stüpfel points), whereby the jacquard mechanism is greatly simplified.

The accompanying drawings show diagrammatically a method of carrying out the present invention.

Figure 1 is a general view of the whole arrangement, and Fig. 2 shows the jacquard controlled devices in connection with a conventionally represented jacquard mechanism.

The main shaft 1 of the embroidering machine is driven by means of a pair of toothed wheels 2, 3 at the same speed as the jacquard main shaft 4 which is driven by a motor. An auxiliary shaft 5 is driven from the shaft 4, by means of the pair of toothed wheels 6, 7 at half the speed of the shaft 4, so that the shaft 5 only completes half a revolution for every revolution of the shaft 4. Thus during one revolution of the shaft

4 one of the two operative portions of a governing cam groove 8 is brought into action, while during the following complete revolution of the shaft 4 the other operative portion of the said cam groove comes into operation; in an analogous manner, a similar governing cam groove 8^a, but displaced 180 degrees with regard to that 8, comes into operation.

The cam groove 8 moves a driving lever *x*, having an arm 9 which may be connected with a lever 13 provided with a roller and pivoted on the needle driving rod 12, by means of a coupling rod 10 and a bell crank lever 11 for the purpose of taking the roller of this lever 13 out of engagement with a cam surface 14 which is carried by a disk 15 on the shaft 1 and drives the embroidering needles *a* by means of the rod 12. The cam groove 8^a actuates a driving lever *z* to the arm 16 of which can be coupled a control rod 18 which engages with a ratchet wheel 17 on the main shaft 1. Further this cam groove moves a driving lever *y* which operates a toothed rack 19 which can be brought into engagement with a pinion 20^a of a helical cam 20 by means of a rod 19^a connected through a lever with a needle of the jacquard mechanism J indicated in Fig. 2.

The driving rod 23 for the bore and stüpfel tools is actuated by means of a slide lever 25 from a disk having a cam groove 24 and arranged on the wheel 3. In this slide lever 25 the rod 23 is guided by means of a guide block and may be adjusted therein by means of a toothed slide 21 which meshes with a pinion 21'. This pinion 21' is connected to a spirally grooved disk 22 in which the free end of a rod 22^a pivoted to the rod 23 is guided. The toothed slide is actuated by a tension spring 26 and controlled by the aforementioned helical cam 20. Thus, the stroke of the driving rod 23 and consequently the depth of penetration of the bore and stüpfel tools can be enlarged or decreased according as the rod 23 is adjusted within the slide lever 25 to lie farther or nearer the fulcrum of the said lever 25.

The tension spring 26 tends to hold the toothed slide 21 against the stopping lever 27. The latter through the medium of a coupling rod 28 depending on the jacquard mechanism, as hereinafter described, can be brought into engagement with an arm 29 of

the lever *y*, so as to swing out and to allow the slide 21 to move under the action of the spring 26 toward the helical cam 20.

A rod 31 can be moved up and down by means of a cam groove 30 which is arranged on the wheel 3 on the shaft 4, in the same manner as the cam groove 24. The rod 31 carries a pawl 32 which is adapted to co-operate with a ratchet wheel 33 of a grooved cam disk 34 in the manner described below. The rod 31 is also controlled by a spring controlled slide 35 which is provided with an extension rod 36, and which can be stopped in the engaged position of the pawl-rod 31 with respect to the ratchet wheel 33 by means of an annular flange 38 provided on said ratchet wheel and having four slots 37.

The shuttles 39 are driven by means of a driving rod 40 and a guiding rod 40^a through a bell crank lever 41 which is pivoted at 42 and carries at its free end the shuttle changing roller 43, movable along its axis, which is adapted to co-operate with a cam disk 44 on the shaft 1. The cam disk 44 consists of two cam parts displaced one relatively to another so as to form a step-like profile at two opposite points and to be at the same height at two other opposite points, as it will be understood from Fig. 1 where said cam parts are represented by two superposed displaced circles. A cam disk 45 is secured to the shaft 1 which actuates by means of the rod 46 the stopping levers 47 of the ratchet wheels 48 of the thread tensioning rollers 49.

The motion of the driving rod 23 mentioned above is transmitted to the bore or stüpfel tools by means of a balance lever 50 and an oscillating coupling rod 51. In one end position of the coupling rod 51 the latter engages with the bore tool connecting rod 61 (see the drawings). By moving the coupling rod 51 to the left it is brought into engagement with the stüpfel tool connecting rod 62. A changing rod 52 is pivotally secured on the coupling rod 51 and passes through a bearing in a vertically movable controlling rod 54. A rod 53 is also passed through a similar bearing in the rod 54. The controlling rod 54 is connected to the bell crank lever 11 mentioned above, while the rod 53 is connected by the rod 55 to the bell crank lever 56 engaging the stitch changing roller 43. By moving the controlling rod 54 up and down the rods 53 and 52 are alternatively brought into engagement with a controlling lever 57 which is movable about the pivot 58 and which can be brought into engagement with an arm 60 of the driving lever *y* by means of a coupling rod 59 controlled by a lifting rod 82 connected to a needle of the jacquard mechanism J (Fig. 2). The controlling rod 54 carries in another bearing a coupling rod 63 which is

brought into engagement with a lever 64 when the control rod 54 rises. The lever 64 is connected by means of rod 65, lever 66, and link 67 with a coupling rod 68 which can be coupled to an arm 60 of the lever *y*, and which is pivotally connected to a disconnecting lever 70 which engages beneath a nose piece 71 of the thread stopping lever rod 46.

The grooved cam disk 34 mentioned above owing to its step by step rotary movement acts on the one hand on the control rod 18 by means of lever 72, rod 73 and lever 74 in order to bring the rod 18 into and out of engagement with the arm 16 of the lever *z*, and on the other hand causes the connection and disconnection of the coupling rod 28 relative to the arm 29 of the driving lever *y* by means of lever 75, rod 76 and lever 77.

The mode of operation of the arrangement described above is as follows: Let it be supposed that the machine is embroidering then the coupling rods 53 and 63 will be connected to the respective levers 57 and 64, owing to the fact that the control rod 54 is then in the raised position. If now the working of the machine be changed from embroidery to bore operation, then the coupling rod 10 is brought into engagement with the arm 9 of the lever *x* by means of an adjusting rod 80 which is connected through lever 190, rod 191, lever 192, rod 193 and lever 194 (Fig. 2) to a lifting needle of the jacquard mechanism J. By the oscillatory movement of this lever *x* the rod 10 is drawn downward and by means of the bent lever 11 the lever 13 with the needle controlling roller is brought out of engagement with the cam surface 14 governing the stroke of the needles *a*. As soon as this has taken place the jacquard controlled rod 80 draws the coupling rod 10 into engagement with a fixed stopping bolt 81. By means of the downward movement of the coupling rod 10 the controlling rod 54 is drawn downward at the same time, and the changing rod 52 is thereby brought into engagement with the control lever 57, while the rod 53 is disengaged from the lever 57 and the rod 63 is freed from the lever 64 and is placed just opposite to the free end of the extension rod 36 of the slide 35.

If at convenient time the lifting rod 82 connected to the coupling rod 59 is actuated by its respective jacquard needle while the embroidering needles *a* are at work, that is to say while the coupling rod 53 hangs on the controlling lever 57, then the rod 59 is coupled to the opposite arm 60 of the lever *y* and the latter now displaces the rod 59 and by means of lever 57, coupling rod 53, lever 53^a, rod 55 and lever 56 shifts the stitch changing roller 43 from the one cam path to the other cam path of the cam 44, or vice versa, thereby producing a stitch change.

If, however, the lifting rod 82 is actuated by its corresponding jacquard needle after the embroidering needles have been set at rest, that is to say, while the coupling rod 52 hangs on the controlling lever 57, then the arm 60 of the lever y acts upon the coupling rod 51 by means of rod 59, lever 57 and coupling rod 52 and thus pushes said coupling rod 51 from a claw of the bore connecting rod 61 into a similar claw of the stüpfel connecting bar 62, or vice versa, thereby producing the desired exchange between the bore and the stüpfel tools.

If at a convenient time the rod 89 connected to the coupling rod 63 is actuated by the jacquard mechanism J (Fig. 2) through lever 195, rod 196, lever 197, rod 198 and lever 199, while the embroidering needles a are at work, that is to say, while the coupling rod 63 hangs on the lever 64, then the rod 89 pushes the rod 68 on to the opposite arm 69 of the lever y , by means of rod 68, lever 64, rod 65, lever 66 and rod 67. The lever y then moves the rod 68 upward so that the disconnecting lever 70 lifts the rod 46 and with it the stopping levers 47 out of the teeth of the stopping wheels 48 of the thread tensioning rollers 49. The thread tensioning rollers are therefore released. Should, however, the lifting rod 89 be moved by means of its jacquard needle after the embroidering needles have been set out of action, then the rod 63 stands in front of the extension rod 36 of the slide 35 and pushes under the action of the rod 89 the slide 35 to the left. The pawl 32 of the rod 31 is thereby brought into engagement with the ratchet wheel 33. The pawl-rod 31 now turns the ratchet wheel 33 one tooth farther during a whole revolution of the main jacquard shaft 4. A pin 85 of the slide 35 is hereby brought behind the annular flange 38 of the ratchet wheel 33, so that the spring 86 cannot pull the slide 35 back, until the ratchet wheel 33 has been turned three teeth forward and one of the slots 37 comes opposite the pin 85. On turning the ratchet wheel 33 one tooth the grooved cam disk 34 rotating with it, brings the rod 18 into engagement with the arm 16 of the lever z by means of lever 72, rod 73 and lever 74. The lever z then pulls the rod 18 downward owing to its oscillatory movement, and a brake shoe 88 is hereby pressed against the disk 15 on the main driving shaft 1 of the machine, by means of a lever 87. At the same time a curved piece 90 secured to the lever 87 is raised, and a roller 91 of a coupling pawl 92 pivoted to the disk 15 and adapted to connect the loose wheel 2 to the disk 15 by means of a coupling pin 93 on the wheel 2 then runs over the curved piece 90, so that the pawl 92 is obliged to release the coupling pin 93 on the loose wheel 2 so that the disk 15 and with it the shaft 1 upon which the disk 15 is fastened are dis-

connected from the driving gear 2, 3 and while being under brake action are positively stopped as soon as a projection 94 of the disk 15 comes into engagement with a nose 95 on the lifted brake shoe 88. The machine shaft 1 therefore stands still while the wheel 2 continues to run freely on the shaft 1 under the action of the drive of the jacquard shaft 4. On turning the ratchet wheel 33 a second tooth farther, the rod 18 will be drawn to a fixed point 97 owing to the shape of the grooved cam disk 34 and the rod 28 will be brought into engagement with the arm 29 of the lever y by means of lever 75, rod 76 and lever 77. The stopping lever 27 is therefore rocked and the slide 21 is thereby allowed to so turn, under the action of the spring 26, the spirally slotted or grooved disk 22, that the driving rod 23 is adjusted and brought into a working position in the slot of the slotted lever 25 nearer or farther away from the pivoting point of the lever 25 in the well known manner according to the angular position of the helical cam 20, forming a variable stop for the slide 21 and determining through the latter the amplitude of angular displacement of the grooved disk 22, whereupon the slotted lever 25 is rocked by means of the cam groove 24 so that either the bore tools b or the stüpfel tools c are operated according to the position of the coupling rod 51. On turning the ratchet wheel 33 a third tooth onward the rod 28 is brought on to a fixed point 98. At the end of this third step of movement, a slot 37 comes opposite to the stopping pin 85 of the slide 35 so that the spring 86 pulls back this slide. The embroidering mechanism is then at rest and either the bore or the stüpfel apparatus is in operation.

If the main shaft 1 of the machine is to be reset in motion and the bore and stüpfel apparatus to be put out of action, then the adjusting rod 89 is actuated for a second time in such a manner by its respective jacquard lifter, that the cam groove disk 34 will be turned by an intermittent feeding motion corresponding to three further teeth of the ratchet wheel 33, whereby the driving rod 23 is moved back in the slotted lever 25 from its former left hand position and the brake shoe 88 is allowed to disengage itself by means of the rod 18 which simultaneously shifts the ratchet wheel 17 secured to the shaft 1 to start the latter, so that the coupling pawl 92 can again engage the pin 93 and the main shaft 1 of the machine is now again driven from the jacquard shaft 4.

What I claim is:

1. In jacquard embroidering machines, the combination of a needle mechanism, a jacquard mechanism, several auxiliary implements for the embroidering operation, a common drive mechanism for said implements, a controlling device for said drive

mechanism to shift the latter from one to another of said auxiliary implements, means for operating said controlling device under the control of said jacquard mechanism, and
 5 interconnecting means between said controlling device and the needle mechanism, so that in passing from embroidering operation to the use of said auxiliary implements the controlling device may be rendered operative
 10 for automatically changing over said drive mechanism from one auxiliary implement to another, substantially as described.

2. In jacquard embroidering machines, the combination of a needle mechanism, a
 15 jacquard mechanism, several auxiliary implements for the embroidering operation, a common drive mechanism for said implements, a coupling to connect the drive mechanism with one or another of said auxiliary
 20 implements; a controlling lever gear for said coupling, a driving member connected to said controlling lever gear, operating means for said driving member, jacquard controlled means to connect said operating
 25 means with said driving member and means connecting said controlling lever gear with the needle mechanism, so that in passing from embroidering operation to the use of
 30 said auxiliary implements said controlling lever gear may be rendered operative for automatically coupling over said drive mechanism from one auxiliary implement to another substantially as described.

3. In jacquard embroidering machines, the combination of a needle mechanism, a
 35 jacquard mechanism, several auxiliary implements for the embroidering operation, a common drive mechanism for said implements, a controlling device for said drive
 40 mechanism to shift the latter from one to another of said auxiliary implements, means for operating said controlling device under

the control of said jacquard mechanism, interconnecting means between said controlling device and the needle mechanism, a
 45 mechanism for changing shuttle control and means connected to the needle mechanism to connect said shuttle control changing mechanism with said controlling device when the needle mechanism is in operation, substantially as described. 50

4. In jacquard embroidering machines, the combination of a needle mechanism, a jacquard mechanism, several auxiliary implements for the embroidering operation, a
 55 common drive mechanism for said implements, a coupling to connect the drive mechanism with one or another of said auxiliary implements, a controlling device for said coupling, means for operating said
 60 controlling device under the control of said jacquard mechanism, a mechanism for changing shuttle control, a releasable thread tensioning device, operating means for releasing said tensioning device, coupling
 65 means between said drive coupling and said controlling device, coupling means between said shuttle control changing mechanism and said controlling device, coupling means for throwing-into-operation the operating
 70 means for releasing said tensioning device, and a single controlling member connected to the needle mechanism and controlling all said coupling means in dependence upon
 75 said needle mechanism, substantially as and for the purpose hereinbefore described.

In witness whereof I have hereunto signed my name this 21st day of February 1910, in the presence of two subscribing witnesses.

ROBERT ZAHN.

Witnesses:

ROBERT H. NIER,
 RICHARD B. WASHINGTON.