July 14, 1925. 1,545,810

W. BRASE

FESTOON STITCH SEWING MACHINE

Filed Sept. 5, 1923

Fig. 1

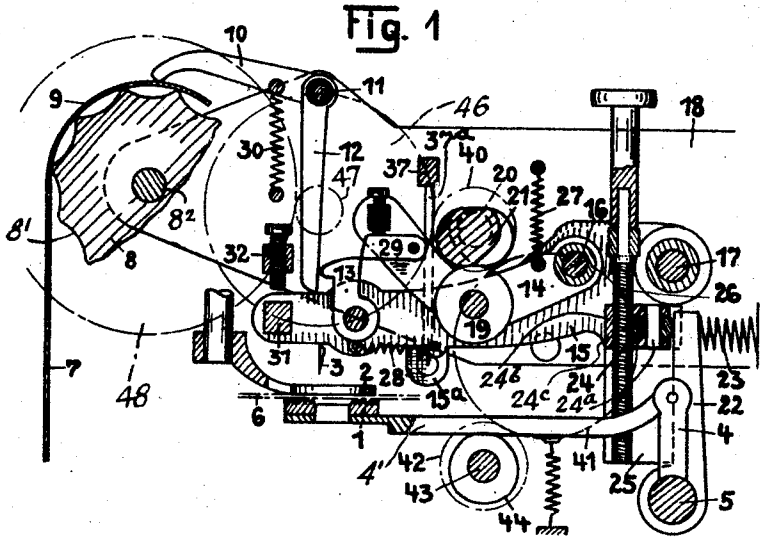


Fig. 2

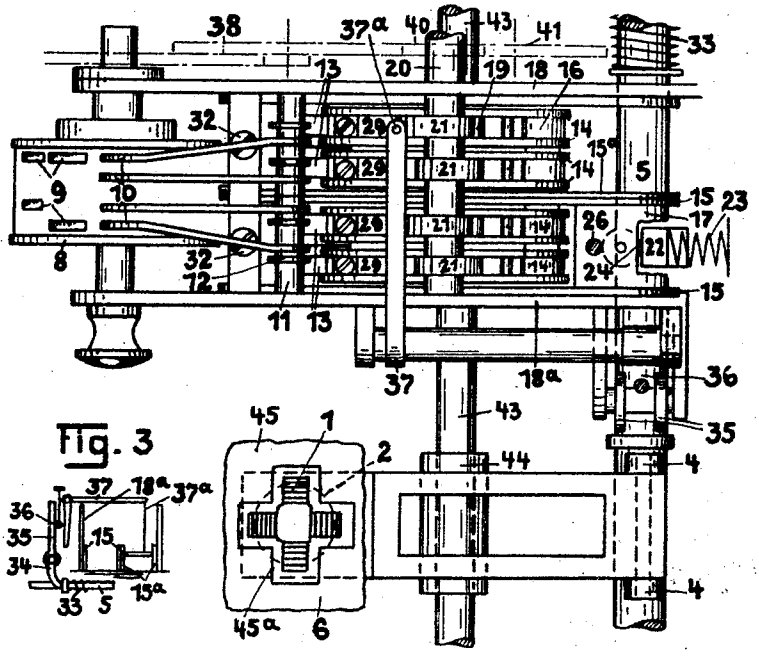


Fig. 3

Inventor:

Wilhelm Brase.

Patented July 14, 1925. 1,545,810

UNITED STATES PATENT OFFICE.

WILHELM BRASE, OF BERLIN-TREPTOW, GERMANY.

FESTOON-STITCH-SEWING MACHINE.

Application filed September 5, 1923. Serial No. 661,086.

To all whom it may concern:

Be it known that I, WILHELM BRASE, a citizen of the German Republic, and resident of Berlin-Treptow, Germany, have invented new and useful Improvements in a Festoon-Stitch-Sewing Machine, of which the following is a specification.

My invention relates to an embroidery machine of the sewing-machine type, in which the fabric to be embroidered is fed by a feed dog.

The principal object of my invention is to provide a control device in a sewing-machine, whereby the feed dog, which is arranged in the immediate vicinity of the needle stitch point, and which, while reciprocating vertically, cooperates from below with the presser-foot to feed the fabric, is moved horizontally in different directions automatically by a jacquard mechanism, as a result of which embroidery of the greatest variety of design can be easily produced.

Another object of this invention is to provide such construction of the control device that the means imparting the horizontal movements to said feed dog are only indirectly influenced by said jacquard mechanism, so that the jacquard or pattern cards or the like of such mechanism can be greatly simplified and easily and cheaply manufactured.

With these and other objects in view, my invention consists in the construction, combination and arrangement of parts as will be hereinafter fully described and defined in the appended claims.

In the accompanying drawing showing one embodiment of my invention and in which similar reference characters denote corresponding parts, Fig. 1 is a vertical section of my new feed dog control device of a sewing-machine; Fig. 2 is a plan view thereof and Fig. 3 is a diagrammatical plan view on a greatly reduced scale of a part of said control device.

Of the sewing-machine, which in itself is of well-known construction, only so much is shown in the drawing, as is necessary to clearly understand my invention, 3 being the sewing needle, 2 the presser-foot, 45 the table and 1 the feed dog, arranged in the immediate vicinity of the needle stitch point and adapted in its usual quadrangle motion to be pressed periodically from below against the presser-foot 2 to feed the fabric 6 resting on said feed dog.

According to this invention, the table 45 is provided with a cross-shaped opening 45ª, through which the feed dog is able to move vertically and also horizontally in four directions, to wit: forward, backward, left-hand and right-hand, relative to the direction of the fabric feed. The feed dog is carried by an arm 4′ extending below the table 45 and pivoted to a lever 4 fixed to a shaft 5 forming part of my new automatic control device to extend transversely of the machine. The vertical reciprocatory motion is imparted to the feed dog 1 from a cam 44 acting from below against said arm 4′ and fixed on a shaft 43 driven from shaft 20 through cog wheels 40, 41 and 42. This construction permits the transmission of the horizontal movement to said feed dog, irrespective of the position the latter occupies in the vertical plane.

The shaft 5 is supported in the side walls 18, 18ª of the machine frame, so as to be not only oscillatory, but also displaceable in longitudinal direction, and is adapted, through these oscillatory and longitudinal movements to impart or transmit the different horizontal movements to the feed dog. These movements are adapted to be automatically controlled through a jacquard mechanism to be hereinafter described. To this end, on a stationary shaft 17 supported in the walls 18, 18ª parallel to and above the shaft 5, are mounted parallel oscillatory frames 15, 15ª extending at a right angle thereto. One of said frames, say 15, serves to transmit oscillatory motion to said shaft 5 and the other 15ª, longitudinal movement. Each of said frames carries a short shaft 16 on which are fulcrumed a pair of parallel levers 14. These levers are each under the influence of spiral springs 27, which tend to draw the same and consequently the frames 15, 15ª upwardly. Fixed to and arranged near the free end of each of said levers 14, is an abutment tongue 29 and supported about centrally by each arm 14, is a roller 19. Each of the four rollers is adapted to tightly bear against a separate cam 21, there being four such cams fixed on the driving shaft 20 extending above and across said arms 14 and journalled in the walls 18, 18ª. Through the operation of these cams 21, the arms 14 are continuously oscillated on their shafts 16. Near the free end of each frame 15, 15ª, is pivoted a pair of couplers or coupling members 13, which are adapted to be

actuated independently of each other by means controlled directly from the jacquard mechanism. The coupling members 13 are so disposed that, when in normal position, they are out of contact with the tongues 29 of the corresponding levers 14, but when any one of them is tilted by the action of the jacquard mechanism, it will pass into the path of the tongue 29 of the corresponding lever 14, so that at the downward stroke of the latter, it will effect a coupling between said lever and the corresponding frame 15 or 15ª, causing the latter to be carried along in the downward swing. 32 denotes a set screw serving as adjustable stop for the oscillatory frames 15, 15ª. This stop is necessary to prevent the frames 15, 15ª from swinging too high upwardly under the action of the springs 27, when the corresponding tongues 29 do not engage a member 13. By the downward swing of any one of the frames 15, 15ª, movement is transmitted to the shaft 5. One of the pair of levers 14, say of the frame 15, when coupled thereto, is adapted to transmit to the shaft 5 oscillatory motion in one direction, the other of said pair, in opposite direction, while one of the pair of levers 14 of the frame 15ª, when coupled thereto, is adapted to transmit longitudinal motion to said shaft in one direction and the other of this pair, in opposite direction. The cams 21 actuating the arms 14 through the rollers 19 are each so shaped and displaced relative to one another, that through their action, the frames 15, 15ª at the proper time of each operative stroke will effect a corresponding movement of the feed dog.

The transmission of motion from the oscillatory frame 15 to the shaft 5 is accomplished by means of an arm 22 fixed to the shaft and pressed by a spring 23 in contact with a roller 24 carried by the frame 15. This roller is supported on a vertical pin 24ª carried by a block 24ᵇ. The latter is formed with a vertical threaded bore 24ᶜ to work as a nut on a screw spindle 26 carried by said frame 15 and is capable of being adjusted by said screw in vertical direction. By such adjustment, the roller 24 can be brought nearer or farther from the shaft 5 and the amplitude of the lever 22 cooperating with said roller decreased or increased. The oscillatory movement of the shaft 5 imparts horizontal movement to the feed dog in the forward and backward direction relative to the fabric feed and by the aforesaid adjustment of the amplitude of the swinging movement transmitted to the arm 22, the fabric feed and length of stitch can be varied.

The longitudinal movement is transmitted to the shaft 5 from the frame 15ª. To this end, the latter is connected by means of a rod 37ª to one arm of a bell-crank lever 37 fulcrumed in a stationary part of the main frame of the machine. The other arm of said bell-crank lever, through the intermediary of an adjustable roller 36 acts against one arm 35 of a second bell-crank lever, the other arm 34 of which acts against a collar fixed to said shaft 5, which, by a spring 33 is pressed against said arm.

When the frame 15ª is oscillated through the medium of one of its pair of levers 14 in the aforedescribed manner, the arm 34 of the bell-crank lever 35, 34 will displace the shaft longitudinally against the action of the spring 33 say to the right and when the same is oscillated through the medium of the other lever, the shaft 5 will be moved to the left.

The jacquard mechanism for actuating the coupling members 13 comprises a drum 8 having uniformly distributed cavities 8′ on its circumference and fixed on a shaft 82 rotatively supported in the frame of the machine, and adapted to be suitably driven from the shaft 20 through cog-wheels 46, 47 and 48. Suitably guided over this drum, is a jacquard pattern card or the like 7 formed with four parallel rows of perforations 9 corresponding to the desired four movements to be imparted to the feed dog.

The non-perforated parts of the band or card 7 cover the cavities in conformity with the design. Cooperating with this card or band 7 are four bell-crank levers oscillatorily mounted side by side on a stationary shaft 11. One arm 10 of each of said bell-crank levers bears on the card 7 and the other 12 extends vertically downward to be opposite and bear against the corresponding coupling member 13. Each bell-crank lever is actuated by a spring 30, whereby close contact of its arms with the card is effected. The coupling member 13 under the influence of springs 28 are normally pressed against the lower ends of the arms 12 of the corresponding bell-crank levers. The rows of perforations 9 in the card 7 are made to be in range with the corresponding arms 10 of the bell-cranks. When, as the card is fed over the drum, a perforation happens to arrive opposite the arm 10 of the corresponding bell-crank, said arm is permitted to enter the cavity of the drum, as a result of which the opposite arm 12 will thrust the corresponding coupling member 13 into the path of the corresponding lever 14 and thereby effect a coupling between the latter and the corresponding frame 15 or 15ª.

The mode of operation is as follows:—

If any one of the arms 10 of the bell-crank levers passes into a cavity 8′ of the drum 8 uncovered by a perforation 9 in the band 7, the other arm 12 of said lever throws the corresponding coupler 13 into the path of the tongue or abutment 29. In consequence thereof, the corresponding lever

14, during its downward stroke, will swing with it the corresponding frame 15 or 15ª. When the arm 10 leaves the cavity of the drum, the coupler 13, under the action of its spring 28 will return to its initial position. The return stroke of each lever 14 is effected by its spring 27 under the control of the corresponding cam 21, whereby the movements are properly timed with the movements of the needle. The oscillation imparted to each frame 15, 15ª, through the levers 14, is then transmitted to the shaft 5 in the aforedescribed manner, so that the feed dog will be moved horizontally in any of the directions named or through the simultaneous oscillation of both frames in a diagonal direction.

I am aware that embroidery machines of the sewing-machine type are known in which the fabric feed is automatically controlled, but while with the known machines the automatic device directly controls the feed member, with my invention this is effected through the intermediary of coupling members, which enables me to employ a simple jacquard device, with a jacquard card that can be cheaply produced, so that any number of such cards can be kept in stock to be exchanged, when different designs are required. As compared with the existing automatic fabric feed controlling devices on such sewing-machines, my invention, by reason of the indirect control, also has the advantage that the jacquard card can be readily and quickly replaced in case of wear or damage and without any appreciable expense.

What I claim is:—

1. In a sewing-machine of the character described, a fabric feed member operating below the fabric, means for transmitting motion to said feed member in different directions, driving means, and automatically controlled means for coupling said driving means to said motion transmitting means to effect movement of said feed member in a predetermined direction.

2. In a sewing-machine of the character described, a fabric feed member operating below the fabric, means for transmitting motion to said feed member in different directions, driving means and a plurality of automatically controlled members, each for independently coupling said driving means to said motion transmitting means and thereby effecting movement of said feed member in a predetermined direction.

3. In a sewing-machine of the character described, a fabric feed dog operating below the fabric, means for transmitting motion to said feed dog in different directions, driving means, including a plurality of oscillatory members and a plurality of jacquard controlled members, each for independently coupling a corresponding oscillatory member to said motion transmitting means to effect movement of said feed dog in a predetermined direction.

4. In a sewing-machine of the character described, a vertically reciprocated fabric feed dog operating below the fabric, means for transmitting horizontal motion to said feed dog in different directions, driving means, and jacquard controlled means for coupling said driving means to said motion transmitting means to effect horizontal movement of said feed dog in a predetermined direction.

5. In a sewing-machine of the character described, a fabric feed dog operating below the fabric, means for reciprocating said feed dog vertically, means for transmitting horizontal motion to said feed dog in different directions, driving means, and jacquard controlled means for coupling said driving means to said motion transmitting means to effect horizontal movement of said feed dog in a predetermined direction.

6. In a sewing-machine of the character described, a fabric feed dog operating below the fabric, a cam for reciprocating said feed dog vertically, means for transmitting horizontal motion to said feed dog in different directions, driving means, and jacquard controlled means for coupling said driving means to said motion transmitting means to effect horizontal movement of said feed dog in a predetermined direction.

7. In a sewing-machine of the character described, a vertically reciprocated fabric feed dog operating below the fabric, means for transmitting horizontal motion to said feed dog in different directions, including an oscillatory and longitudinally displaceable shaft operatively connected to said feed dog, driving means and jacquard controlled means for coupling said driving means to said motion transmitting means to effect horizontal movement of said feed dog in a predetermined direction.

8. In a sewing-machine of the character described, a vertically reciprocated fabric feed dog operating below the fabric, means for transmitting horizontal motion to said feed dog in different directions, including a plurality of oscillatory arms, an oscillatory and longitudinally displaceable shaft operatively connected to said feed dog and actuated from said arms, driving means and a plurality of jacquard controlled members, each for independently coupling a corresponding oscillatory arm to said driving means to effect horizontal movement of said feed dog in a predetermined direction.

9. In a sewing-machine of the character described, a vertically reciprocated fabric feed dog operating below the fabric, means for transmitting horizontal motion to said feed dog in different directions, including a plurality of oscillatory frames, a pair of

oscillatory arms carried by each of said frames, an oscillatory and longitudinally displaceable shaft operatively connected to said feed dog and actuated from said frames and means for adjusting the amplitude of the oscillatory motion of said shaft, driving means and jacquard controlled means for independently coupling each arm to its corresponding frame.

10. In a sewing-machine of the character described, a vertically reciprocated fabric feed dog operating below the fabric, driving means, means for transmitting horizontal movement to said feed dog in different directions, including a plurality of oscillatory members, a jacquard mechanism, and a plurality of coupling members controlled from said jacquard mechanism for coupling any one of said oscillatory members to said driving means, to effect horizontal movement of said feed dog, according to a predetermined design.

11. In an embroidery machine of the character described, a universally movable fabric feed dog operating below the fabric, driving means and automatically controlled means for coupling said driving means to said feed dog to cause the latter to move in predetermined directions.

12. In an embroidery machine of the character described, a universally movable fabric feed dog operating below the fabric, driving means and a plurality of pattern controlled members for independently coupling said driving means to said feed dog to cause the latter to move in predetermined directions.

13. In an embroidery machine of the character described, a universally movable fabric feed dog operating below the fabric, driving means, including a plurality of constantly oscillating members, and a plurality of pattern controlled members for independently coupling said oscillating members to said feed dog to cause the latter to move in predetermined directions.

WILHELM BRASE.