

No. 836,058.

PATENTED NOV. 13, 1906.

J. VAUGHAN.

STITCH TRANSFERRING DEVICE FOR KNITTING MACHINES.

APPLICATION FILED JUNE 14, 1905.

4 SHEETS—SHEET 1.

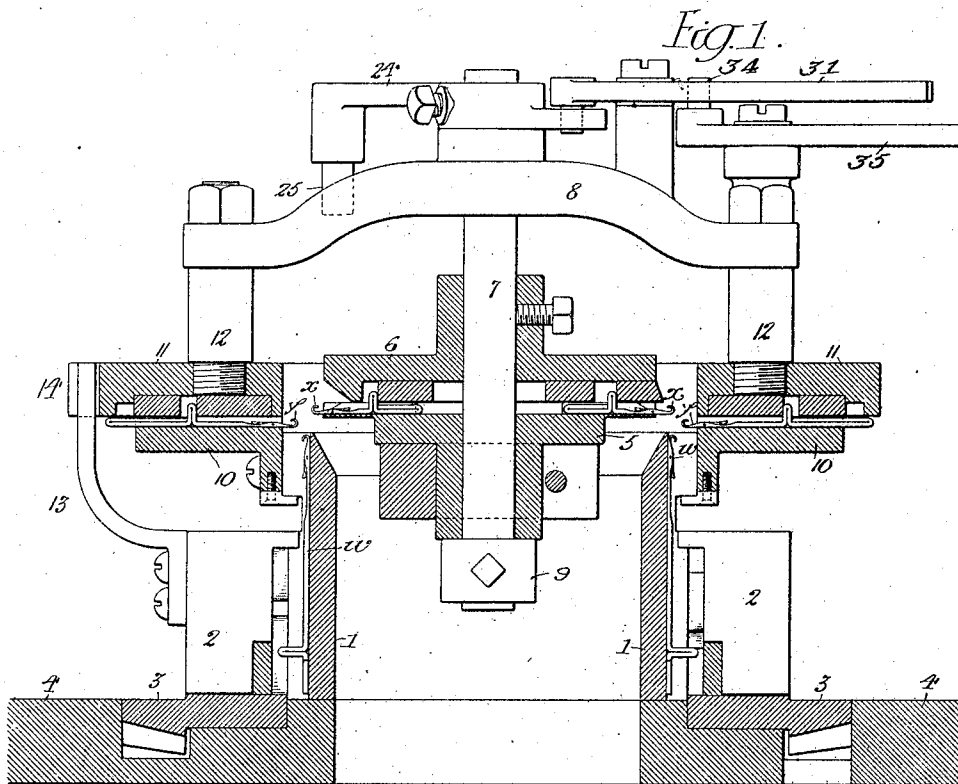
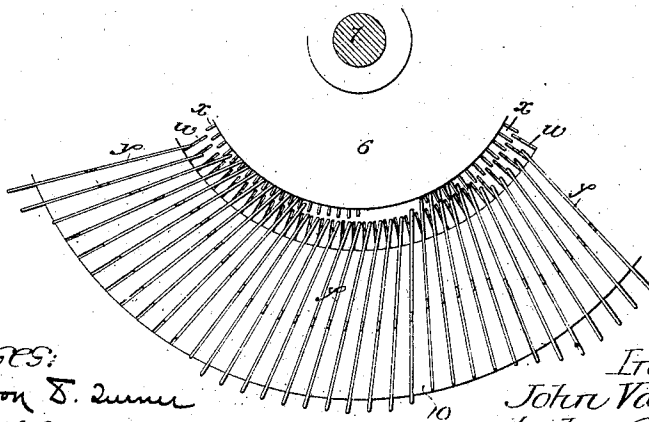


Fig. 6.



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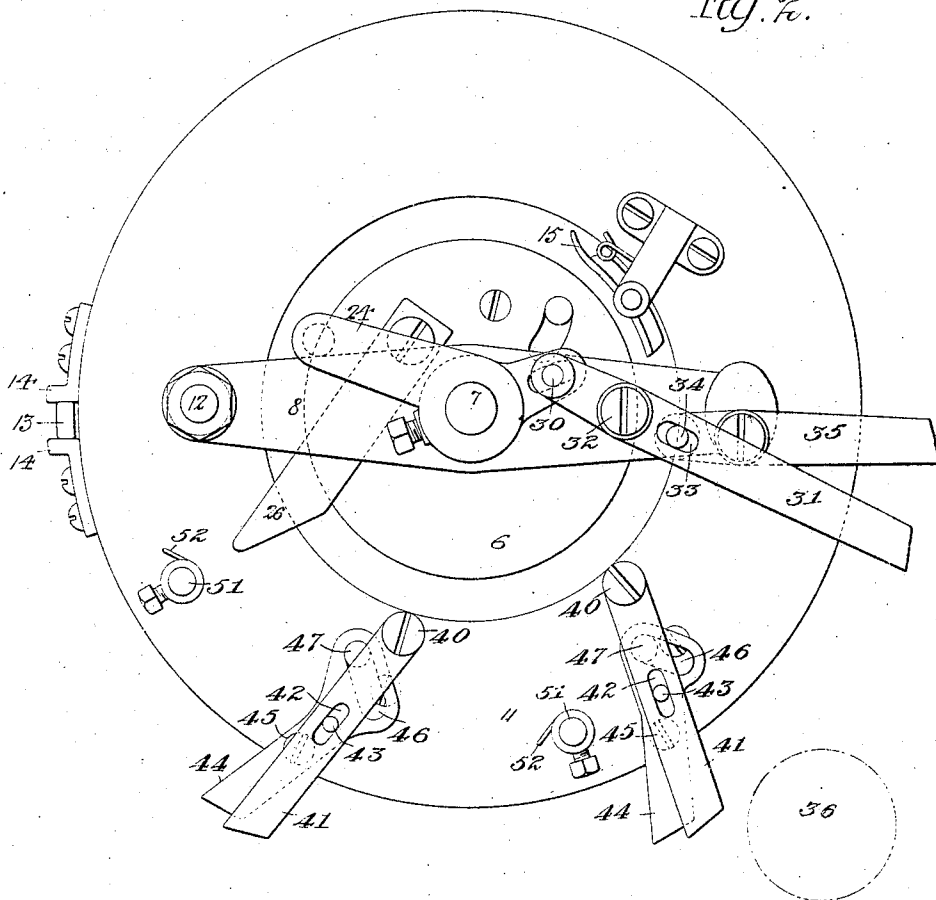
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4 SHEETS—SHEET 2.

Fig. 2.



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4 SHEETS—SHEET 3.

Fig. 3.

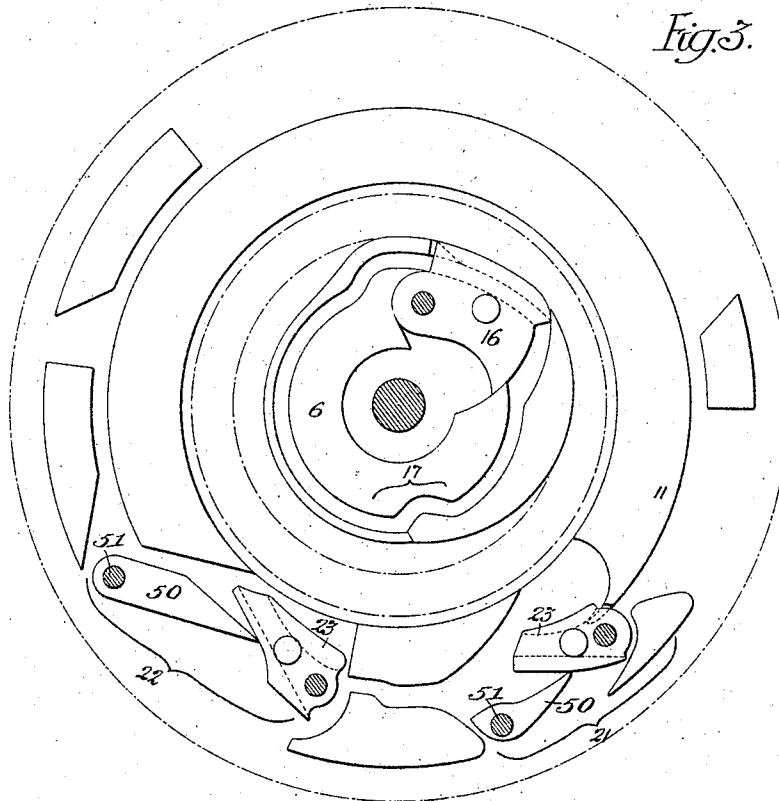


Fig. 4.

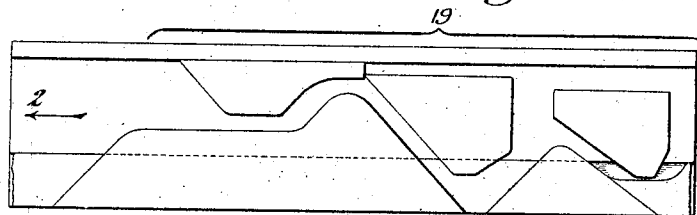
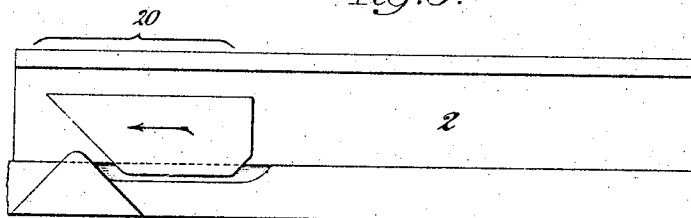


Fig. 5.



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4 SHEETS—SHEET 4.

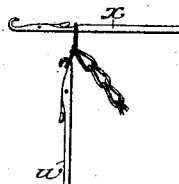


Fig. 7.

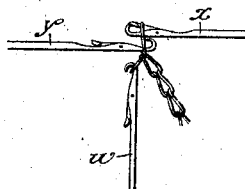


Fig. 8.

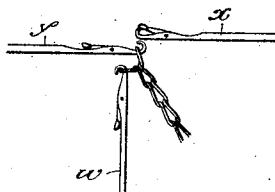


Fig. 9.

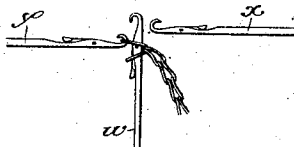


Fig. 10.

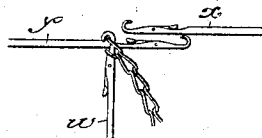


Fig. 11.

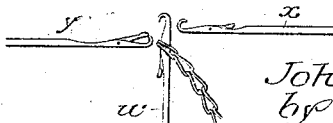


Fig. 12.

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UNITED STATES PATENT OFFICE.

JOHN VAUGHAN, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO
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STITCH-TRANSFERRING DEVICE FOR KNITTING-MACHINES.

No. 836,058.

Specification of Letters Patent.

Patented Nov. 13, 1906.

Application filed June 14, 1905. Serial No. 285,249.

To all whom it may concern:

Be it known that I, JOHN VAUGHAN, a citizen of the United States, residing in Philadelphia, Pennsylvania, have invented certain
5 Improvements in Stitch-Transferring Devices for Knitting-Machines, of which the following is a specification.

The object of my invention is to effect the quick and accurate transfer of stitches from
10 the needles of one of the needle-carriers of a rib-knitting machine to the needle of the other needle-carrier, so as to change from rib-knitting to plain knitting without dropping stitches or otherwise interfering with
15 the integrity of the fabric. This object I attain in the manner hereinafter set forth, reference being had to the accompanying drawings, in which—

Figure 1 is a view, partly in vertical section
20 and partly in elevation, of sufficient of a rib-knitting machine to illustrate my present invention. Fig. 2 is a plan or top view of the machine. Fig. 3 is a plan view showing the
25 cams of the dial-cam plate and also the cams of an outer cam-ring for operating the transfer-needles. Figs. 4 and 5 are views of the
30 cams of the cylinder-cam box. Fig. 6 is a plan view of part of the machine, showing the relation of the three sets of needles one to another; and Figs. 7 to 12, inclusive, are views
illustrating the operation of transferring a stitch from a dial-needle to a cylinder-needle
of the machine.

Referring first to Fig. 1 of the drawings, 1
35 represents the fixed cylinder of a machine having the usual vertically-guided needles *w*, which are vertically reciprocated by means of cams mounted upon a cylinder-cam box 2,
40 which is mounted upon a bevel-wheel 3, turning in suitable bearings in the bed-plate 4 and having rotary movement imparted to it in a manner customary in machines of this type.

Centrally disposed within the cylinder 1
45 and above the top of the same is a needle-dial 5, carrying the horizontally-guided dial-needles *x*, which are radially reciprocated by means of cams on the under side of a dial-cam
50 box 6, the latter being secured to a stem or spindle 7, depending from a yoke or arch 8, which is rotated in unison with the dial-cam box 2 in the manner described hereinafter:

The needle-dial 5 has a depending hub which is supported upon a collar 9 at the

lower end of the stem or spindle 7, suitable
55 means being provided for preventing rotation of the needle-dial independently of the needle-cylinder.

Surrounding and secured to the upper portion of the needle-cylinder is an annular
60 needle-ring 10, which is grooved for the reception and guidance of a series of horizontally-guided needles *y*, which are reciprocated by means of cams on the under side of an annular
65 cam-ring 11, which is supported vertically on the needle-ring 10, has studs 12, supporting the arch or yoke 8, and is driven in unison with the cylinder-cam box 2 by means of an
70 arm 13 on the latter engaging with lugs or ears 14, projecting from the peripheral portion of the cam-ring 11.

The dial-cam plate has the usual cams for projecting the dial-needles so as to cause
them to receive at the knitting-point the
75 yarn from a suitably-located yarn-guide 15, one of said dial-needle-operating cams 16 being pivoted so that it can be swung outwardly into operative position, as shown in Fig. 3,
80 so as to project the needles, or inwardly to an inoperative position, so as to fail to project the same. The dial-cam plate also has another set of cams 17 for imparting reciprocating movement to the dial-needles at the transfer-point, which is some distance in the
85 rear of the knitting-point.

The cylinder-cam box has a set of cams 19
90 for properly operating the cylinder-needles at the knitting-point and another set of cams 20 for projecting the cylinder-needles at the transfer-point.

The annular cam-ring 11 has two sets of
95 cams 21 and 22, the cams 21 serving when properly adjusted to project the needles *y* to an intermediate point and the cams 22 when properly adjusted serving to fully project the
100 needles *y* and then to retract the same. Each of the sets of cams 21 and 22 has a swinging member 23, shown in the operative position in Fig. 3, but capable of being retracted, so as to retain the needles *y* always in the retracted position when desired.

Mounted upon the stem or spindle 7 is a
105 lever 24 with depending pin 25, which by contact with the arch or yoke 8 restricts movement of the arm 24 in one direction, an arm 26, secured to the back of the dial-cam plate, serving by contact with one of the posts 12 to restrict the movement of said arm in the oppo-

site direction, the lever 24 being secured to the stem 7, so that any movement imparted to the same will be transmitted to the dial cam-plate 6, and vice versa. The needles *y* are not guided radially in the annular ring 10, but are inclined slightly in respect to the radial paths of the dial-needles *x*.

The cams 23 and lever 24 may be moved from one position to another by any available means, those shown in the drawings being the usual duplex levers to be operated by contact with a disk under control of a pattern-chain. These may be briefly described as follows, reference being had to Figs. 2 and 3: One arm of the lever 24 is slotted for the reception of a pin 30 on a lever 31, which is hung to a stud 32 on the arch 8, and has a slot 33 for the reception of a pin 34 on a lever 35, the latter being hung to another stud on said arch 8, whereby contact of a disk 36 with the lever 31 will move the lever 24 in one direction and contact of said disk with the other lever 35 will move the said lever 24 in the opposite direction. Each of the cams 23 is secured to a pivot-stud 40, which has an arm 41 with slot 42 for the reception of a pin 43 on a lever 44, hung to a pin 45 on the cam-ring 11 and having a slot 46 for the reception of a stud 47, which limits the movement of said lever. When therefore the arm 41 strikes a disk located below the disk 36, the cam 23 will be moved in one direction, and when the lever 44 strikes the said lower disk the cam will be moved in the opposite direction. The back of the cam 23 is acted upon by a tongue 50, secured to a pivot-stud 51, which is mounted so as to be free to turn in the cam-ring 11, and is acted upon by a spring 52, tending to maintain the point of the tongue constantly in contact with the back of the cam.

In the ordinary operation of the machine the dial-cam plate bears such relation to the cylinder-cam box that both the dial-needles and the cylinder-needles will be projected at the yarn-guide 15 and will both receive yarn from the same in order to produce ribbed knitted fabric in the ordinary way. During this operation the swinging cams 23 of the two sets of cams 21 and 22 of the cam-ring 11 are retracted, so as to retain the needles *y* in the retracted position. When it is desired to effect transfer of stitches from the dial-needles to the cylinder-needles in changing from rib-knitting to plain knitting, however, the dial-cam plate 6 is moved rearwardly to a limited extent by the lever 31 acting upon the arm 24 and moving the same until the arm 26 comes into contact with one of the posts 12. As a consequence of this the dial-needles *x* will not be projected so as to receive yarn from the guide 15, but will be fully projected at a point in the rear of said guide. At the same time that this operation is performed the swinging cams 23 are moved so

as to put the needles *y* into operation, the result being that indicated in Figs. 7 to 12 of the drawings. When the dial-needle *x* is fully projected, it will slip its stitch back of the latch, as shown in Fig. 7, and when retracted will close the latch and cause the stitch to ride up on the same, as shown in Fig. 8. When in this position, a needle *y* is projected, so as to enter the stitch, as shown in Fig. 8, and the dial-needle *x* is then retracted by the cams 17, so as to cast its stitch, which falls into the hook of the needle *y*, as shown in Fig. 9. The needle *y* is then retracted, so as to draw the stitch over the top of the adjoining cylinder-needle *w*, this being the purpose of the angular arrangement of the needles *y*, for as the dial-needles and the cylinder-needles alternate with each other or occupy different vertical planes some lateral deflection of the stitch is necessary in order to bring it into the plane of the cylinder-needle. As soon as the needle *y* has been retracted the cylinder-needle *x* is raised by the cams 20, so as to enter the stitch carried by said needle *y*, as shown in Fig. 10, and is then depressed, as shown in Fig. 11. Meantime needle *y* has been fully projected by the cams 22, so as to slip the stitch back of its latch, and it is then retracted, so as to cast the stitch onto the cylinder-needle, as shown in Fig. 12. These operations are repeated for each of the dial and cylinder needles, so that at one rotation of the machine all of the stitches will be transferred from the dial-needles to the cylinder-needles.

While I have shown my invention as applied to a rib-knitting machine of ordinary type having a needle-cylinder and needle-dial equipped with latch-needles and having an annular needle-ring also equipped with latch-needles, it will be evident that my invention is applicable as well to machines having spring-beard needles and to machines in which the needle-cylinder, needle-dial, and transfer-needle ring rotate and operate in conjunction with stationary cam-carriers. It is also evident that my invention can be embodied in machines of different type from the cylinder and dial machine—that is to say, machines having straight needle-beds disposed at an angle to each other. Hence in some of my claims I have used the term "carrier" instead of the term "cylinder," "dial," or "ring."

Without limiting myself, therefore, to the details of the construction which I have illustrated in the drawings, I claim and desire to secure by Letters Patent—

1. The combination of a pair of needle-carriers of a rib-knitting machine, their needles, means for knitting upon the latter, a supplementary carrier having stitch-transferring devices, means whereby the transferring-needles are first operated to cast their stitches onto said transfer devices,

means whereby the latter are then operated to move such transferred stitches into the path of the receiving-needles, means for operating said receiving-needles to engage said stitches, and means for then operating the transfer devices to cast the stitches onto the receiving-needles.

2. The combination of the two sets of needle-carriers of a rib-knitting machine and their needles, a carrier having a set of transfer devices, a yarn-guide operating in conjunction with both sets of knitting-needles, and means for shifting the cams which act upon one set of needles so that the latter will not receive yarn from said yarn-guide but will be projected and then retracted at another point, so that the stitches will close the latches and ride up on the same for receiving the transfer-needles.

3. The combination of the two sets of needle-carriers of a rib-knitting machine and their needles, a carrier having a set of transfer devices, a yarn-guide operating in conjunction with both sets of knitting-needles,

and means for shifting the cams which act upon one set of needles so that they will not receive yarn from said yarn-guide but will be projected and then retracted at another point, so that the stitches will close the latches and ride up on the same for receiving the transfer-needles, and means for further retracting said needles, so that their stitches will be cast off onto said transfer devices.

4. The combination of the two needle-carriers of a rib-knitting machine and their needles, and means for knitting upon said needles, with a carrier having a set of transfer devices disposed to operate slantwise to the planes of movement of the needles with whose stitches they engage.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOHN VAUGHAN.

Witnesses:

WALTER CHISM,
JOS. H. KLEIN.