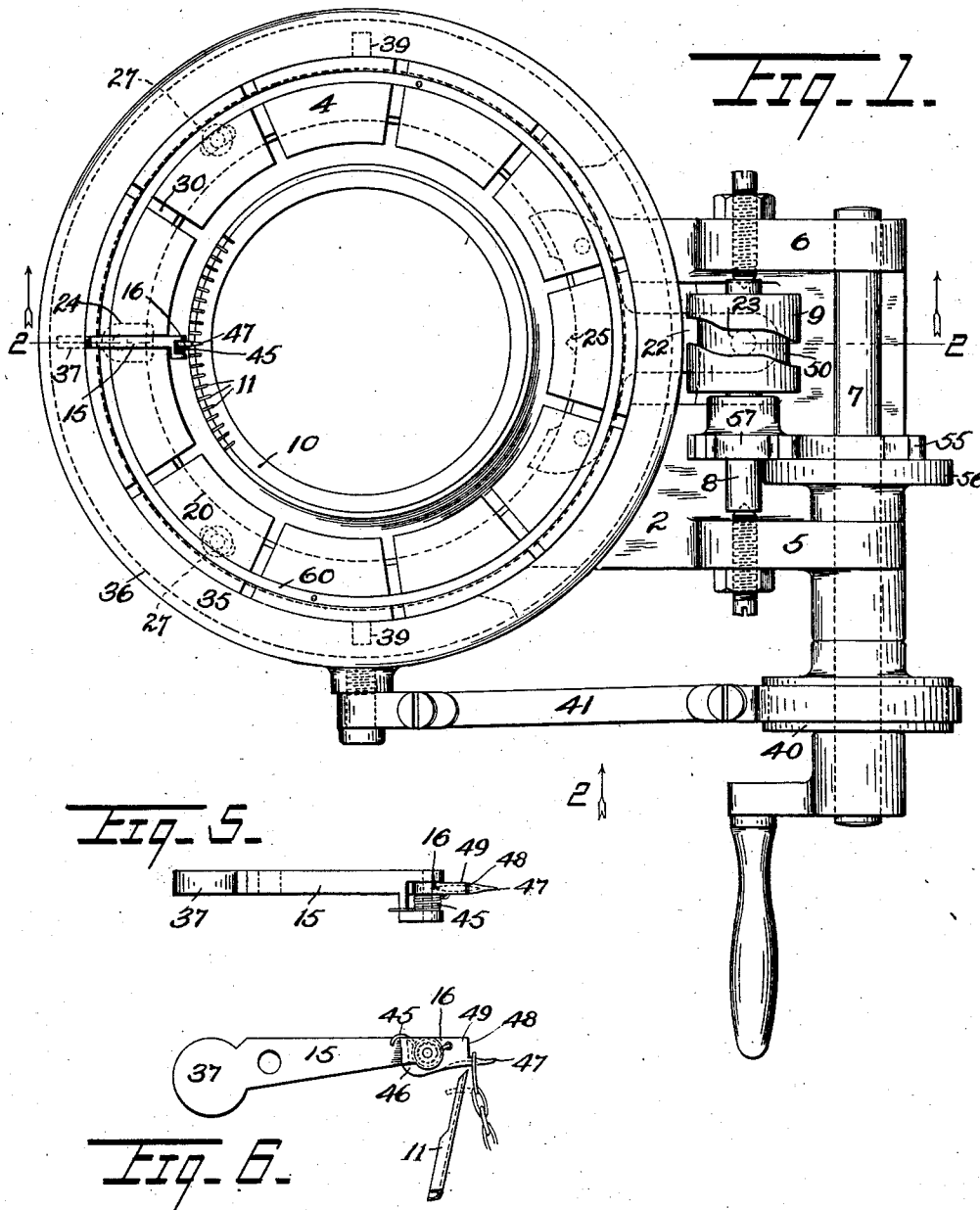


F. W. ROBINSON.
 LOOP DOUBLING MECHANISM.
 APPLICATION FILED FEB. 15, 1911.

1,021,800.

Patented Apr. 2, 1912.

2 SHEETS-SHEET 1.



Frank W. Robinson, Inventor

Witnesses

D. M. Stewart
Calvin J. Fisher

By

[Signature]

Attorney

2 SHEETS-SHEET 2.

Fig. 2.

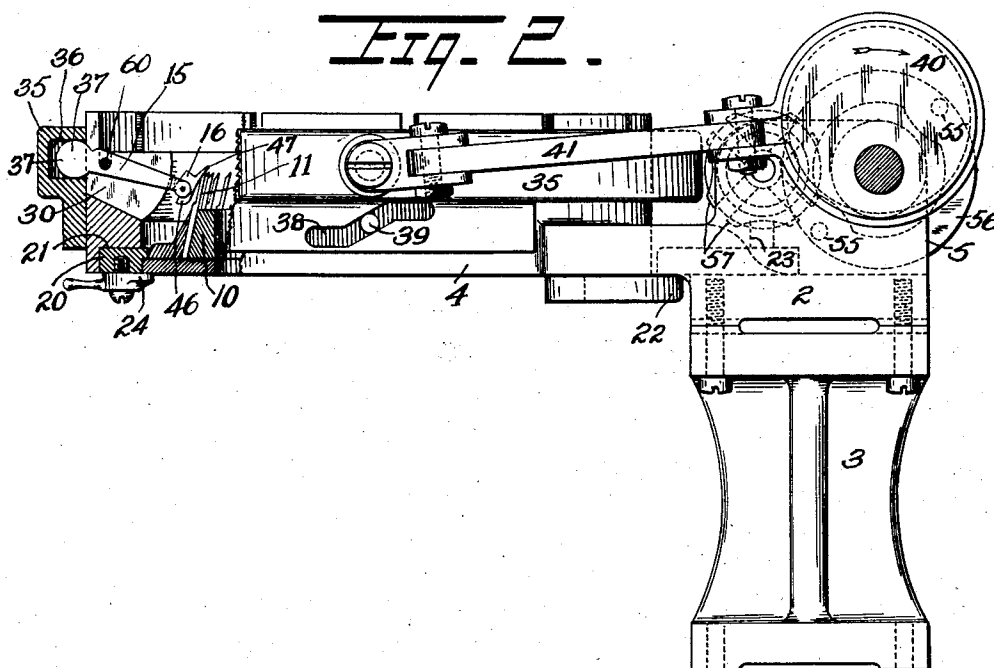


Fig. 3

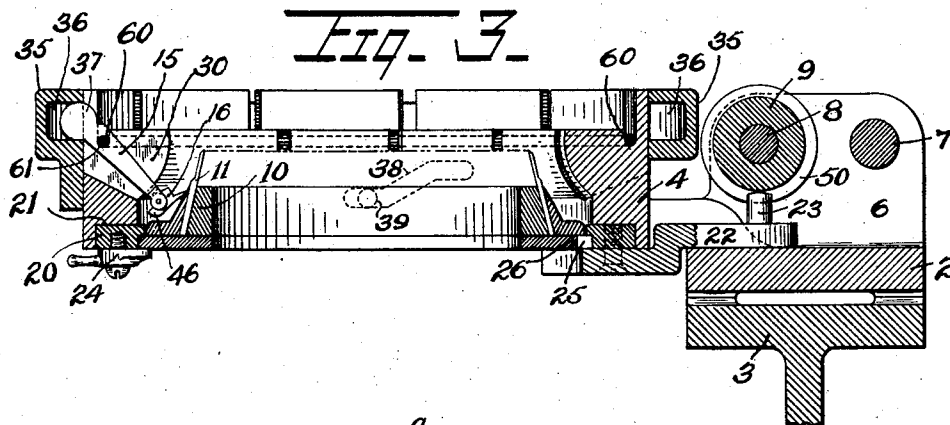


Fig. 4.

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UNITED STATES PATENT OFFICE.

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LOOP-DOUBLING MECHANISM.

1,021,800.

Specification of Letters Patent.

Patented Apr. 2, 1912.

Application filed February 15, 1911. Serial No. 608,795.

To all whom it may concern:

Be it known that I, FRANK W. ROBINSON, a citizen of the United States, and a resident of the city of Reading, in the county of Berks and State of Pennsylvania, have invented certain new and useful Improvements in Loop-Doubling Mechanism, of which the following is a specification.

In knitting men's hosiery the separately formed tops are commonly transferred to a circular knitting machine through the medium of a so-called quill ring; the loops of separately knitted tops being engaged upon the quill-shaped points of said ring preliminary to transferring them quickly and accurately to the corresponding needles of the machine. When it has been desired to produce drop-stitch effects, certain of the loops engaged upon these quill points have been picked therefrom and transferred to adjacent points, thus "doubling" the loops as it is termed; this picking of the loops being commonly effected by hand and requiring considerable care and skill as well as time.

The object of my invention is to provide for effecting any such changing or doubling of the loops automatically and with great accuracy and economy of time and labor, and a preferred form of mechanism for carrying it into effect is fully described in connection with the accompanying drawings, the novel features of which are particularly pointed out in the claims.

Figure 1 is a plan view of a machine embodying my invention. Fig. 2 is mainly a front elevation, but in part a section on the line 2—2 of Fig. 1. Fig. 3 is a complete cross-sectional view on the line 2—2 of Fig. 2, certain of the parts being represented in different positions from those shown in Fig. 2. Fig. 4 is a diagrammatic view indicating the loop-doubling movements provided for with the machine illustrated. Figs. 5 and 6 are enlarged detail views of the picker.

As shown, the frame 2 of the machine, which is carried on a standard 3, is formed with a frame-ring 4, and with shaft bearings 5, 6; and a crank-operated shaft 7, and

a countershaft 8 carrying a peripherally grooved cam-wheel 9, are mounted in said bearings.

The quill ring 10 is provided with a circular series of loop-engaging points 11 corresponding in number with the needles used in the knitting machines in connection with which it is employed; said points being concaved as usual (see Fig. 6) to facilitate the operation of transferring the loops thereon to the needles. This quill ring, after having the loops of the knitted tops placed upon it as usual, is secured as hereafter described, in the frame ring 4; which also carries any desired number of picker arms 15, each of which has a finger end 16 adapted to swing in the plane of a determined concaved loop-engaging point 11 of the quill ring.

The quill ring 10 is directly secured, as shown, to a carrier ring 20 therefor; which ring is rotatably fitted in the recessed lower face 21 of the frame ring 4, and provided with a rigid arm 22 arranged to ride upon the frame plate 2 below the countershaft 8, said arm having a projection 23 adapted to engage the peripheral groove of the cam-wheel 9 on said shaft. Additional means are provided for holding the carrier ring 20 to the frame ring 4, consisting merely, as indicated in dotted lines Fig. 1, of screw bolts engaged in circular slots 27, 27 of the carrier ring, which latter is movably supported upon the heads of the bolts. The quill ring is conveniently attached to or released from the carrier ring 20 by means of a suitable turn piece 24; and is positively located therein so as to insure proper registry of its quill points 11 with the pickers 15, by means of an interior projection 25 on the carrier ring arranged to engage a corresponding recess 26 in the periphery of the quill ring.

Each of the picker arms 15 is pivotally mounted, as shown, in a radial slot 30 in the frame ring 4, so as to swing in a vertical plane; and is provided with a finger end 16 which reaches into the concaved face of a corresponding quill point so as to satisfactorily engage a loop thereon in its swinging movement. To provide for imparting

a reciprocating movement to said picker I preferably employ a rotary cam ring 35, having a circular groove 36 in which the outer ends 37 of the pickers are engaged; said cam ring being caused to rise and fall upon the frame ring, when reversely rotated upon the latter, by providing the cam ring with an inclined slot or groove 38 in which is engaged a fixed projection 39 on the frame ring. As shown, the cam ring is arranged to be reversely swung for each rotation of the operating shaft 7, by means of an eccentric 40 on said shaft and a suitable connecting rod 41 pivotally attached to the cam ring.

The finger end 16 of each picker arm 15 is preferably formed as a separate part pivotally connected to the arm 15; said part being held in normal straightened-out position by a spring 45 and stop 46, but being adapted to turn upon the arm 15 when it comes in contact with the quill ring, as indicated. To insure satisfactory operation of this finger, both in picking a loop from a quill point and in delivering it to another quill point as required, the pointed tip 47 thereof is arranged to extend beyond the quill point when it is raised above the latter (see Fig. 6), and is formed with a shoulder 48 at a widened portion 49 rearward of the tip, so as to hold the loop in determined spread position above a quill preparatory to properly delivering it to the latter when the picker is swung downward to double loops thereon. As the picker is thus swung downward the finger 16 is turned upward upon its pivot and rides freely in the concaved quill point to its lowered position (Fig. 3). It will be readily understood that during the upward swing of the picker to pick off a loop from a quill point, the finger is similarly bent and will positively enter the loop until the latter is stopped against the shoulder 48.

The cam wheel 9 upon the shaft 8, is provided, as shown, with a peripheral groove 50 so shaped as to impart a determined lateral movement to the engaged carrier-ring arm 22 for each quarter rotation of the cam wheel; such movements being adapted, in the construction shown, to provide for the transferring of two different loops to other determined needles so as to form a double drop stitch, as hereafter fully described. These movements imparted to the quill ring for the purpose of presenting different determined quills to the action of the reciprocating pickers, must take place in accord with the operation of the latter, and are also effected by the rotation of the operating shaft 7; the cam wheel shaft being intermittently rotated as required, by means of two projecting pins 55, 55, provided on

the collar 56 of the operating shaft and arranged to engage a star wheel 57 on the cam wheel shaft, so that a complete rotation of the operating shaft will impart reverse turning movements to the quill ring as required to effect the transfer of a single loop by a given picker. If it is desired to transfer two different loops from adjacent needles so as to form a double drop stitch, instead of a single, a second rotation of the operating shaft, as shown, will complete the rotation of the cam wheel and effect such double transfer; the movements being indicated diagrammatically in Fig. 4.

In Fig. 4, *a*, *b*, *c* and *d* indicate a series of four loop-engaging points on the quill ring; the heavy curved line *e* indicates the transfer of a loop from point *c* to point *d*, and the light curved line *f* indicates a succeeding idle movement to the point *b*, these two movements, with the corresponding properly timed picker movements, being effected by a single revolution of the operating shaft. If a double drop stitch is to be formed, the operating shaft is merely rotated a second time, the heavy curved line *g* indicating the resulting additional transfer of a loop from *b* to *a*, and the light curved line *h* indicating the final idle movement to the point *c*. It will be understood that in the preferred mechanism described the quill points are moved to receive the raised loops, instead of moving the loops laterally as indicated for clearness of illustration in the diagram, the effect however being the same in either case.

Any desired number of pickers 15 may be strung upon the pivot wire 60, which is removably held in a groove 61 of the frame ring 4, each picker being placed in a guide slot as determined by the number and location of drop stitches desired. The quill ring is quickly placed and the transfer of all the loops as desired is simultaneously and accurately effected by quickly turning the crank shaft one or more revolutions as the case may be.

What I claim is:—

1. In combination with a supporting frame, a quill ring provided with a circular series of loop-holding quill points, a loop picker and mechanism for reciprocatively operating the same, and means for automatically presenting one determined quill point to said picker during the movement of the latter in one direction and another determined quill point during the reverse movement thereof.

2. In combination with a supporting frame, a quill ring provided with a circular series of loop-holding quill points, a loop picker and mechanism for reciprocatively operating the same, and means for succes-

sively presenting adjacent quill points to successive movements of said picker in one direction and different determined quill points to the corresponding reverse movements thereof.

3. In combination with a supporting frame, a quill ring provided with a circular series of loop-holding quill points, a loop picker and mechanism for reciprocally operating the same, means for holding said ring so as to present a determined quill point to the outward movement of said picker, and means for turning said ring so as to present another determined quill point to the reverse movement thereof.

4. In combination with a supporting frame, a quill ring provided with a circular series of loop-holding quill points, a loop picker pivotally mounted in said frame, means for imparting a reciprocating movement to said picker, and coacting means for turning said ring so as to present different determined points to the picker during each to and fro movement thereof substantially as set forth.

5. In combination with a supporting frame, a quill ring provided with a circular series of loop-holding quill points, a loop picker pivotally mounted in said frame, means adapted to impart a rocking movement to said picker, and mechanism for jointly operating said means and the quill ring substantially as set forth.

6. In combination with a supporting frame, a quill ring provided with a circular series of loop-holding quill points, a loop picker pivotally mounted in said frame, a cam ring engaging said pickers, and mechanism for coöperatively moving said cam ring and quill ring.

7. In combination with a supporting frame, a quill ring provided with a circular series of loop-holding quill points and rotatively mounted in said frame, a loop picker and mechanism for reciprocally operating the same, and means for imparting reverse turning movements to said quill ring whereby different determined quill points are successively moved into the path of the reciprocating picker.

8. In combination with a supporting frame, a quill ring provided with a circular series of loop-holding quill points and rotatively mounted in said frame, a loop picker and mechanism for reciprocally operating the same, and a cam wheel engaging said quill ring and operated in connection with the reciprocating picker.

9. In combination with a supporting frame, a quill ring provided with a circular series of loop-holding quill points and rotatively mounted in said frame, a loop picker and mechanism for reciprocally operating

ing the same, a cam wheel engaging said quill ring, and mechanism for jointly operating said cam wheel and picker.

10. In combination with a supporting frame, a quill ring provided with a circular series of loop-holding quill points and rotatively mounted in said frame, a reciprocally operated loop picker, a cam wheel engaging said quill ring, an operating shaft for said picker and quill ring, and means for imparting a plurality of reciprocating movements to the picker for each rotation of the cam wheel.

11. In combination with a supporting frame, a quill ring provided with a circular series of loop-holding quill points and rotatively mounted in said frame, a reciprocally operated loop picker, a cam wheel engaging said quill ring, an operating shaft for said picker and quill ring, and means for imparting a determined part-rotation to the cam wheel preliminary to each movement imparted to the picker.

12. In combination with a supporting frame, a quill ring provided with a circular series of loop-holding quill points, a series of loop pickers pivotally mounted in said frame, a rotary cam ring operatively engaging said pickers, and means for presenting a different determined quill point to each picker for each swing of the latter.

13. In combination with a supporting frame, a quill ring provided with a circular series of loop-holding quill points, a loop picker having a yielding finger adapted to swing in operative contact with a quill point, and mechanism for reciprocating said picker.

14. In combination with a supporting frame, a quill ring provided with a circular series of loop-holding quill points, a loop picker having a yielding finger adapted to swing in operative contact with a quill point and to extend beyond the latter when at the end of its swing, and mechanism for reciprocating said picker.

15. In combination with a supporting frame, a quill ring provided with a circular series of loop-holding quill points, a loop picker having a yielding finger adapted to swing in operative contact with a quill point and to project and spread the engaged loop above said point, and mechanism for reciprocating said picker.

16. In combination with a supporting frame, a quill ring provided with a circular series of loop-holding quill points, a loop picker having a pivotally connected spring-pressed finger, and mechanism for reciprocating said picker.

17. In combination with a supporting frame, a quill ring provided with a circular series of loop-holding quill points, a loop

picker having a pivotally connected spring-pressed finger, and mechanism for reciprocating said picker, said finger being enlarged rearward of its tip so as to spread a loop
5 supported thereon substantially as set forth.

18. In combination with a supporting frame, a quill ring provided with a circular series of loop-holding quill points, a loop
10 picker pivotally mounted in said frame, means adapted to impart a rocking movement to said picker, a main shaft arranged

to directly operate said picker-rocking means, and a counter-shaft having a cam-wheel arranged to impart a determined swinging movement to said quill ring. 15

In testimony whereof, I affix my signature, in the presence of two witnesses.

FRANK W. ROBINSON.

Witnesses:

D. M. STEWART,
W. G. STEWART.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."
