

F. W. ROBINSON.
 DROP STITCH MECHANISM FOR KNITTING MACHINES.
 APPLICATION FILED DEC. 3, 1910.

1,021,799.

Patented Apr. 2, 1912.

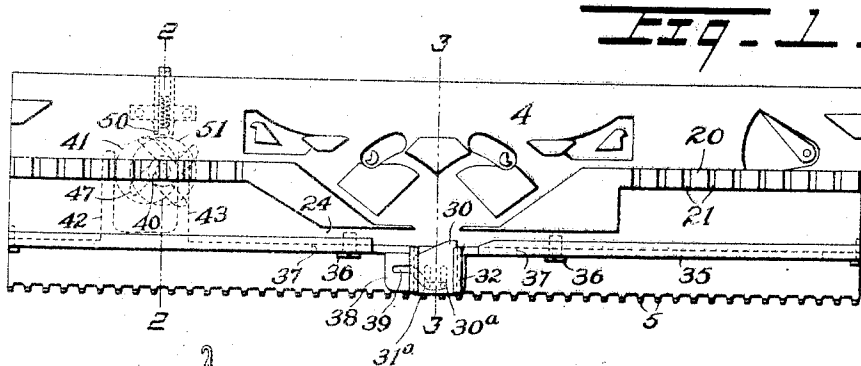


Fig. 2.

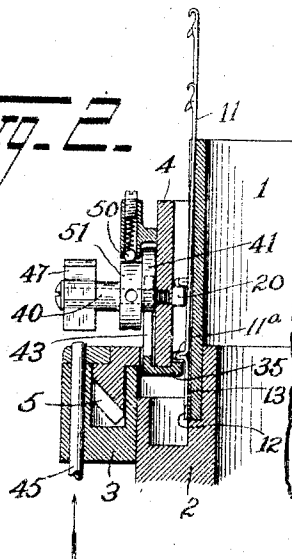


Fig. 3.

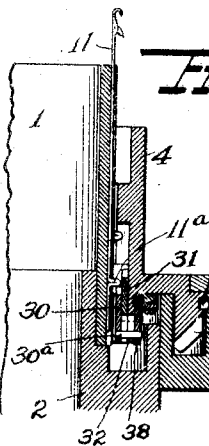


Fig. 7.

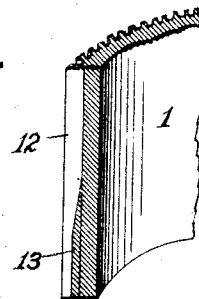


Fig. 5.

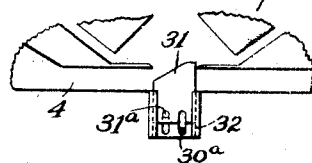


Fig. 6.

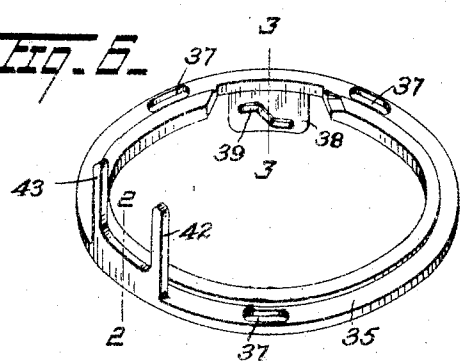
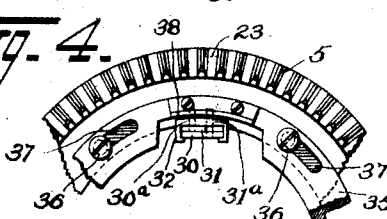


Fig. 4.



Frank W. Robinson Inventor

Witnesses

W. M. ...
Caleb J. Dieber

By

[Signature]

Attorney

UNITED STATES PATENT OFFICE.

FRANK W. ROBINSON, OF READING, PENNSYLVANIA, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE NOLDE & HORST CO., OF READING, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

DROP-STITCH MECHANISM FOR KNITTING-MACHINES.

1,021,799.

Specification of Letters Patent.

Patented Apr. 2, 1912.

Application filed December 3, 1910. Serial No. 595,332.

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 Drop-Stitch Mechanism for Knitting-Machines, of which the following is a specification.

My invention relates to circular knitting machines, and particularly to attached mechanism for producing drop-stitch hosiery or the like thereon.

The invention is fully described in connection with the accompanying drawing illustrating a preferred embodiment thereof and is specifically pointed out in the claims.

Figure 1 is an inside view of the cam cylinder employed, developed upon a plane surface. Fig. 2 is a sectional elevation taken on the line 2—2 of Figs. 1 and 6, and Fig. 3 is a similar view on the line 3—3 of said figures, certain connecting portions of the machine being also indicated. Fig. 4 is a partial bottom view of the cam cylinder. Fig. 5 is a partial view corresponding to Fig. 1, but showing one of the lifting cams for the drop-stitch needles in raised position. Fig. 6 is a separate perspective view of the slide ring. Fig. 7 shows a vertical section of the needle cylinder through one of the needle slots which is provided with a hub-projecting jack.

Figs. 2 and 3 show a needle cylinder 1, carried by a supporting ring 2 mounted in the machine frame 3 as usual. The inclosing cam cylinder 4 is provided with a bevel gear 5 through which it is rotated, and with fixed and movable cams for effecting the vertical movements of the needles, as required for ordinary circular knitting, and for the narrowing and widening operations. Particular description of these well-known features is not necessary to the setting forth of my invention, the purpose of which is to satisfactorily provide for the continuous production of a drop-stitch fabric.

The drop-stitch effect generally desired for hosiery requires the joint operation of adjacent drop-stitch needles rather than single needles, and my invention therefore provides for operating upon a plurality of adjacent drop-stitch needles. The main object

sought for is to enable the continuous knitting of stockings in which the drop-stitches appear in both the front and rear portions of the leg, but are stopped at the rear by the raising of first one and then another of each pair or series of adjacent drop-stitch needles provided therefor, so as to successively engage these needles upon their threads preliminary to the knitting of the foot, while the front drop-stitches are continued. The usual latch needles 11 are employed as shown, having short hubs 11^a as usual for the rear half; but as my invention provides that these needles, after they have been lowered to form drop-stitches, shall be automatically raised into action singly instead of jointly, certain of the needle grooves 12 in the needle cylinder are provided, as shown in Figs. 2 and 7, with wedge-offsets 13 which form jacks adapted to bend outward the hub ends of the lowered needles therein, so that said needles may be separately raised as hereafter more fully referred to.

When a separately formed stocking top is attached to the needles 11, the drop-stitch needles are lowered in pairs, as indicated, to form a desired number of double drop-stitches spaced apart around the leg of the stocking. To facilitate this operation I provide a notched leveling-ring 20 in the cam cylinder, the notches 21 of which are sized and spaced so as to permit the passage therethrough in pairs of the desired number of rear-half needles, the front-half drop-stitch needles being commonly entirely removed from the cylinder. The needle cylinder being raised as usual, and the leveling ring 20 of the cam cylinder being properly set by pushing a locking pin 22 into an engaging recess 23 in the cam cylinder, the lowering of the needle cylinder permits the drop-stitch needles only to pass through the notches of the leveling ring; and when the cam cylinder is released and rotated the drop-stitch needles are all lowered by the fixed cam of the cylinder so as to bring their hubs 11^a into inoperative position in the lower course 24 while the operating needles are leveled upon the ring 20. One needle of each lowered pair being engaged in a needle cylinder groove which is provided with a jack 13, is bent outward so that its hub 11^a extends beyond the hub of the other needle, thus producing the same effect as would be

produced by providing said bent needles with a different length of hub.

To provide for raising into action the drop-stitch needles, preliminary to knitting the foot, I employ, as shown, vertically slidable lifter plates 30 and 31, mounted in a guide 32 at the base of the cam cylinder; and mechanism for successively lifting said plates to raise into action first one and then another of each pair of the drop-stitch needles; such separate elevation being practically necessary to insure the proper engagement of each of the raised needles with the thread. This mechanism, as shown, comprises a cam ring 35, movably secured to the base of the cam cylinder by screws 36 engaged in slots 37 in the ring so as to permit of a limited rotary movement upon the cam cylinder, and provided with a cam plate 38 having a slot 39 into which are extended parallel pins 30^a and 31^a fixed respectively to the lifters 30 and 31. These lifter pins are successively raised or lowered in the inclined portion of the slot 39 by operation of the ring 35, and rest in one or other positions in the horizontal end portions of the slot, suitable pin-clearance ways being provided to permit independent movement of the two lifters 30 and 31. For imparting this turning movement to the cam ring 35 at the proper time without intermitting the operation of the machine, I employ a cam wheel mounted upon a stud 40 projecting radially from the cam cylinder. This wheel has a cam disk 41 engaged between vertical arms 42, 43 provided on the cam ring 35, so that a first quarter revolution of the wheel will impart sufficient swing to the ring to raise the outside lifters 30 into the path of the needle hubs which are bent outward by the jacks 13, and a second quarter turn will similarly raise the other lifter 31 into the path of the other drop-stitch needle hubs, while succeeding quarter revolutions will in like manner lower said lifters. These successive quarter revolutions of the cam which are effected at successive revolutions of the cam cylinder by a strike-pin 45, which pin is moved upward in the machine frame 3 (as indicated by the arrow) just before the foot portion of the stocking is to be knitted. When thus raised the pin 45 is arranged to strike one of the four radiating arms 47 provided on the outer end of the cam wheel, at each revolution of the cam cylinder, so as

to impart a quarter revolution to the said cam wheel; and after each lifter is thus raised said lifter is swung around with the cam cylinder so that its inclined upper edge will throw into action the drop-stitch needles whose hubs extend into its path. After the needles are thus raised single into certain engagement with the thread the uninterrupted knitting proceeds with the drop stitches continued only on the upper portion of the foot. The accurate turning of the cam disk 41 for a quarter revolution only by each contact with the strike-pin 45 is insured as shown by providing a spring-pressed stop 50 which successively engages four equally spaced recesses in the periphery of a collar 51 carried by the cam wheel.

What I claim is:—

1. A knitting machine having a vertically movable needle cylinder and a cam cylinder provided with a fixed leveling ring having a series of notches adapted to permit the passage below said ring of determined drop-stitch needles only.

2. In a knitting machine, a cam cylinder carrying a plurality of vertically movable drop-stitch-needle lifters, and means for separately moving said lifters by successive rotations of the cam cylinder.

3. In a knitting machine, a cam cylinder carrying a plurality of vertically movable drop-stitch-needle lifters, and a cam ring engaging the several lifters so as to operate the latter successively by turning movements of the ring, and means for giving a step-by-step movement to the ring by successive rotations of the cam cylinder.

4. A knitting machine having a series of needles with like hubs, a needle cylinder with guide grooves for said needles certain only of which are provided with wedge offsets adapted to deflect the hub portions of the corresponding depressed needles, a cam cylinder provided with separate hub engaging lifters for the deflected and undeflected needles respectively, and means for separately moving said lifters by successive rotations of the cam cylinder.

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

FRANK W. ROBINSON.

Witnesses:

D. M. STEWART,
H. G. STEWART.