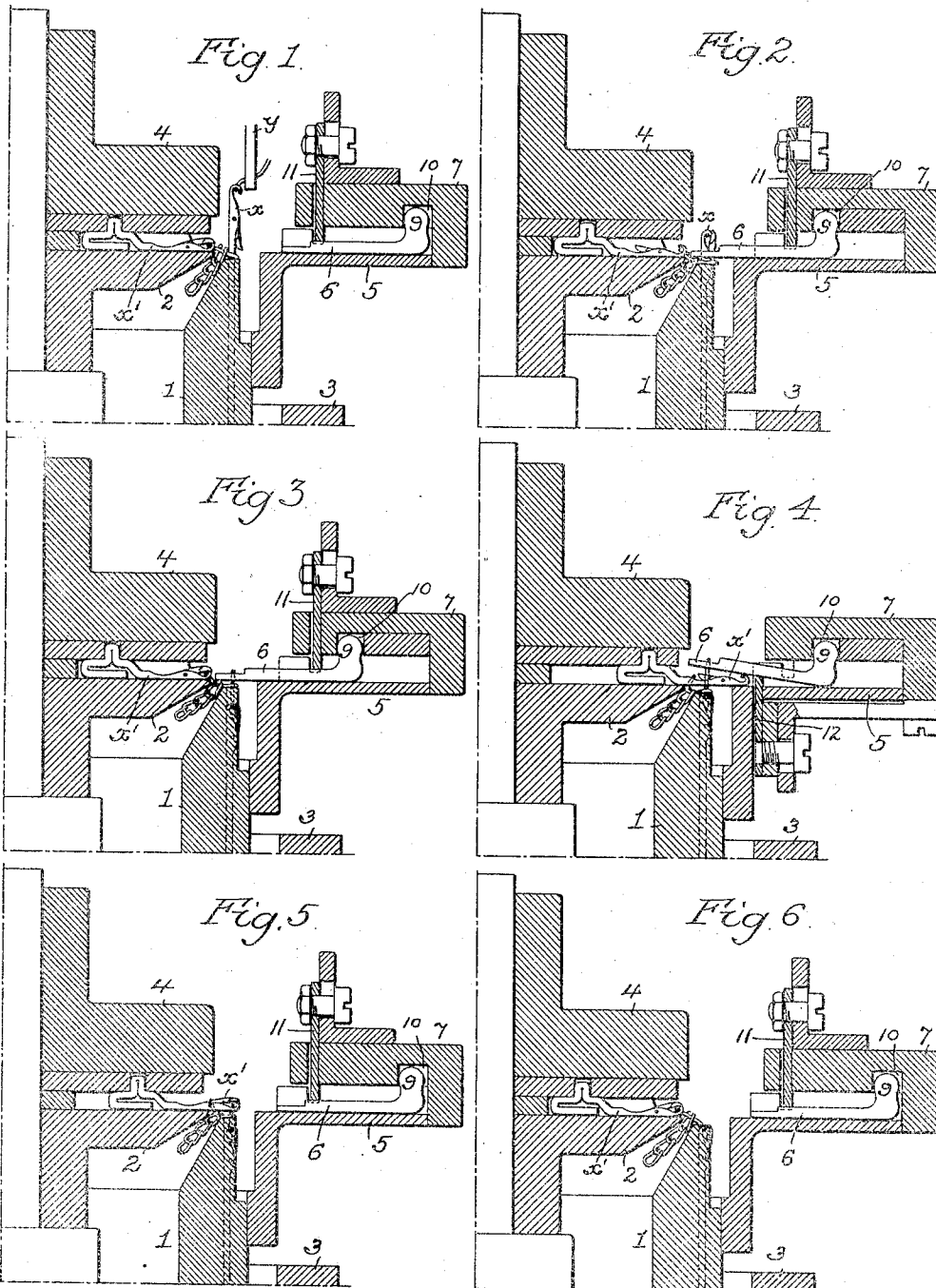


J. D. MORLEY.
RIB KNITTING MACHINE.
APPLICATION FILED AUG. 2, 1909.

1,039,990.

Patented Oct. 1, 1912.

2 SHEETS-SHEET 1.



Witnesses
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Inventor
Joseph D. Morley
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Smith & Rogers

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Fig. 7.

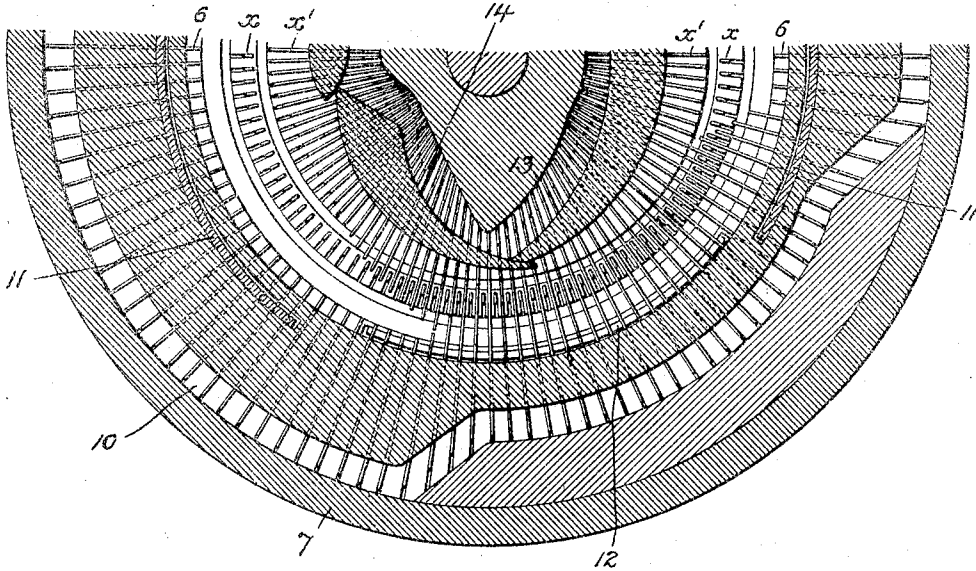


Fig. 8.

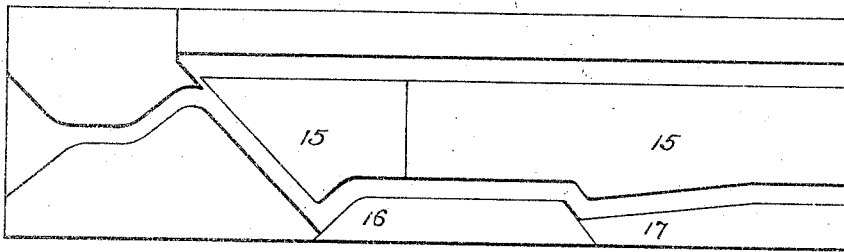


Fig. 9.

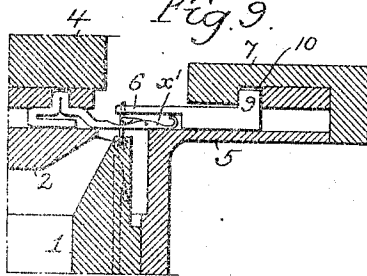
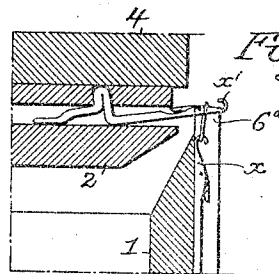


Fig. 10.



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UNITED STATES PATENT OFFICE.

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RIB-KNITTING MACHINE.

1,039,990.

Specification of Letters Patent.

Patented Oct. 1, 1912.

Application filed August 2, 1909. Serial No. 510,781.

To all whom it may concern:

Be it known that I, JOSEPH D. MORLEY, a citizen of the United States, residing in Utica, New York, have invented certain Improvements in Rib-Knitting Machines, of which the following is a specification.

My invention is intended especially for use in connection with rib knitting machines of fine gage, the purpose of my invention being to prevent interference of the needles, or of the latches of the needles, of one set, with the needles, or the latches of the needles, of the other set, in the operation of the machine. This object I attain in the manner hereinafter set forth, reference being had to the accompanying drawings, in which—

Figures 1, 2, 3, 4, 5 and 6 represent sufficient of the operative parts of a rib knitting machine to convey a proper understanding of my invention, the various figures showing said operative parts in different positions assumed by them during the knitting operation; Fig. 7 is a view of one-half of the machine, partly in top or plan view and partly in horizontal section, through the dial cam rings; Fig. 8 is an inside elevation showing one set of cams of the cylinder cam ring developed in a flat plane, and Figs. 9 and 10 are views similar to Fig. 4, but illustrating modifications of my invention.

My invention is equally applicable to straight machines or to circular machines but in the accompanying drawing, I have illustrated it in connection with a circular machine.

Referring first to Figs. 1 to 6 of the drawings, 1 represents part of the needle cylinder of the machine having vertically guided needles α , 2 part of the needle dial having horizontally guided needles α' , 3 part of the cylinder cam ring, and 4 part of the dial cam ring, all of these parts being constructed and operated in the usual manner except as to the timing of the movements of the cylinder and dial needles, as hereinafter explained.

The cylinder and dial may be the stationary members of the machine and the cylinder cam ring and dial cam ring the rotating members, or the reverse construction may be adopted, as desired.

Mounted upon the needle cylinder 1 is an outer annular dial 5 in which are radially guide loop-receiving points 6, equaling in number the dial needles α' and in line radially therewith and with the spaces between

the cylinder needles α . These loop-receiving points are acted upon by cams carried by an annular cam ring 7, which is mounted upon the dial 5 and is caused to rotate if said dial is stationary, or is held against rotation if said dial has rotary movement. The loop-receiving points 6 have butts 9 which travel in a cam groove 10 of the ring 7, said cam groove being so formed as to project and retract the points 6 in radial lines and the cam ring 7 also carries a depressing cam 11 and a lifting cam 12 for acting on the points in the manner described hereinafter.

In the operation of the machine the cylinder needles are raised to receive the knitting yarn from the guide γ , but the dial needles are at this time held in the retracted position, as shown in Fig. 1, instead of being projected, as in an ordinary rib knitting machine. Before the cylinder needles α are retracted so as to draw their stitches, the loop-receiving points 6 are projected as shown in Fig. 2, to such an extent that their inner ends occupy the spaces between the cylinder needles, whereby, as the latter are retracted so as to cast the previous stitches and draw stitches of the fresh yarn, loops of the latter will be formed over the inner portions of the projected points 6, as shown in Fig. 3, in the same manner that they would have been formed over the shanks of the dial needles if the latter had been projected in the ordinary manner. The inner ends of the loop-receiving points 6 are now raised by the action of the cam 12, as shown in Fig. 4, the cylinder needles, by preference, rising correspondingly as there illustrated, and the dial needles are projected so that their outer portions pass beneath the points 6, and through the loops of yarn carried by said points, the same movement also clearing the stitches on said dial needles, as shown in Fig. 4. The points 6 are now retracted so as to cast their loops onto the dial needles, this retraction of the points being, by preference, accompanied by a downward movement of the cylinder needles so as to draw the transferred loops into the hooks and in front of the latches of the partially retracted dial needles, as shown in Fig. 5, and the retraction of said dial needles then continues until they have cast their stitches and drawn new stitches as shown in Fig. 6, the cylinder needles preferably rising to permit such draft without imparting undue tension to the yarn.

In fine gage rib knitting machines in which both the cylinder and dial needles are projected at the same time to receive the knitting yarn, difficulty has been experienced because of the contact of the latches of one set of needles with those of the other set, such contact being due either to bending of the latches themselves or to twisting of the needles in their guides so as to have the same effect. It will be evident, however, that when one set of the needles is projected while the other set is retracted, this objection is effectually overcome.

In Fig. 7 of the drawing, 13 represents the projecting cam for the dial needles and 14 the retracting cam therefor, and in Fig. 8, 15 represents the draft cam for the cylinder needles which is so constructed as to permit rise of said cylinder needles when the loop-receiving points are raised, as in Fig. 4, further depression of said needles when the loop-receiving points are retracted, as shown in Fig. 5, and a final rise of the needles when the dial needles are retracted, as shown in Fig. 6.

The rising movement of the needles may be caused by the pull of the stitches upon them or it may be effected positively by cams acting upon their butts, such cams being represented at 16 and 17 in Fig. 8.

The transfer of the loops from the receiving points 6 to the dial needles α' should be effected at such a point in the movement of the latter needles that there is no likelihood of the trapping of the transferred loops by the closing latches of the dial needles.

If desired, the loop-receiving portion of the point 6 may be so high that the dial needle can pass beneath the same without any lift of the point, as shown in Fig. 9, in which case the points will simply have to be projected and retracted in their radial planes, the cylinder needles being drawn down in the first instance only far enough to cast their stitches and having further draft imparted to them after the loop-receiving points have been retracted and have cast their loops onto the dial needles, or on the other hand, if the loop receivers are at one side of the dial needles, the cams which impart radial reciprocating movement to the points 6 may be eliminated, rising and falling movement only being imparted to them by the arms 11 and 12.

In the modification shown in Fig. 10, the loops are formed over fixed loop receivers 6^a disposed between the cylinder needles and alongside of the dial needles, and after the latter have been projected so that their hooks have passed beyond the loops, and their stitches have cleared the latches, the needles are raised at their outer ends so that their hooks will engage the loops when the needles are retracted. Such raising of the hooks of the dial needles may be effected by

an angular pitch of the acting faces of the dial needle actuating cams, as shown in Fig. 10, and if desired each dial needle may have in the rear of its butt a tongue such as shown in Fig. 10, which tongue is subjected to pressure when the dial needles are tipped and freed from pressure when said dial needles resume their normal horizontal position and the faces of the actuating cams again resume their normal vertical relation.

Various arrangements of cams may be employed for imparting the desired movements to the loop-receiving points 6, such, for instance, as are shown in the Letters Patent of R. W. Scott, No. 925,036, dated June 15, 1909, for imparting movement to the web-holders, and any desired means may be employed for imparting tension to the knitted web, or causing the knocking over of the stitches upon the needles.

I claim:

1. A rib knitting machine in which are combined two sets of needles, means for projecting and retracting the needles of one set in advance of the projection and retraction of the needles of the other set, a set of loop receivers, means for feeding the knitting yarn to said loop receivers and to the first projected set of needles, prior to the projection of the needles of the other set, and means for transferring the loops from said loop receivers to said other set of needles after the same have been projected.

2. A rib knitting machine in which are combined two sets of needles, means for projecting and retracting the needles of one set in advance of the projection and retraction of the needles of the other set, a set of loop receivers, means for feeding the knitting yarn to said loop receivers and to the first projected set of needles, prior to the projection of the needles of the other set, and means for transferring the loops from said loop receivers to said other set of needles by movement of one in respect to the other, after said needles have been projected.

3. A rib knitting machine in which are combined two sets of needles, means for projecting and retracting the needles of one set in advance of the projection and retraction of the needles of the other set, a set of loop receivers, means for feeding the knitting yarn to said loop receivers, and to the first projected set of needles, prior to the projection of the needles of the other set, and means for moving said loop receivers in respect to said other set of needles so as to transfer their loops to the latter, after said needles have been projected.

4. A rib knitting machine in which are combined two sets of needles, means for projecting and retracting the needles of one set in advance of the projection and retraction of the needles of the other set, a set of loop receivers, means for feeding the knitting

yarn to said loop receivers, and to the first projected set of needles, prior to the projection of the needles of the other set, and means for moving the loop receivers in a direction parallel with the movement of the needles of one set to transfer their loops to the second projected set of needles, after said needles have been projected.

5. A rib knitting machine in which are combined two sets of needles, means for projecting and retracting the needles of one set in advance of the projection and retraction of the needles of the other set, a set of loop receivers, means for feeding the knitting yarn to said loop receivers, and to the first projected set of needles, prior to the projection of the needles of the other set, and means for moving the loop receivers in directions parallel with and transversely to the direction of movement of the other set of needles to transfer their loops to the latter, after said needles have been projected.

6. A rib knitting machine in which are combined two sets of needles, means for projecting and retracting the needles of one set in advance of the projection and retraction of the needles of the other set, a set of loop receivers, and means whereby the knitting yarn is fed directly to the first projected set of needles and to the loop receivers and means whereby said yarn is subsequently transferred from said loop receivers to the subsequently projected set of needles.

7. A rib knitting machine in which are combined two sets of needles, means for projecting each set of needles to receive the knitting yarn when the other set of needles is retracted, means independent of the needles for receiving loops of the knitting yarn when the latter is being fed to that set of needles which is first projected, and means for afterward transferring these loops to the subsequently projected set of needles.

8. A rib knitting machine, in which are combined two sets of needles, means for projecting and retracting the needles of one set in advance of the projection and retraction of the needles of the other set, a set of loop receivers located between the needles of one set and in line with the needles of the other set, means for actuating said loop receivers, means for feeding the knitting yarn to said loop receivers and to the first projected set of needles, and means for subsequently transferring loops from the loop receivers to the other set of needles, after the projection of the latter.

9. A rib knitting machine in which are combined two sets of needles, a set of loop receivers, a yarn feed, means for projecting and retracting first the needles of one set

and then needles of the other set, means for advancing and retracting the loop receivers, said means being so disposed that the loop receivers will be projected between the needles of the first projected set before the latter are retracted and will be retracted after the needles of said first set have been retracted and the needles of the other set have been projected.

10. A rib knitting machine in which are combined two sets of needles, means for projecting and retracting the needles of one set in advance of the projection and retraction of the needles of the other set, a set of loop receivers, means for feeding the knitting yarn to said loop receivers and to the needles of the first projected set, means for raising and lowering the loop receivers, means for projecting the retracted needles of the first projected set in accordance with said raising movement of the loop receivers, means for subsequently retracting said needles, and means for again projecting the same.

11. A rib knitting machine in which are combined two sets of needles, means for projecting and retracting the needles of one set in advance of the projection and retraction of the needles of the other set, a yarn feed, a set of loop receivers, operating above the hooks of the needles of the second set, means for imparting movement to the loop receivers whereby they will be projected when needles of the first set are advanced and will be held in the projected position until said needles have been retracted, and needles of the other set have been advanced, and will then be withdrawn.

12. A rib knitting machine in which are combined a yarn feed, two sets of needles, means for projecting and retracting the needles of one set in advance of the projection and retraction of the needles of the other set, a set of loop receivers, means for projecting said loop receivers when the needles of the first set are projected whereby the knitting yarn will be fed to said loop receivers and to said first set of needles, means for raising the loop receivers after they have received their loops and said first set of needles has been retracted, means for holding said loop receivers in the raised and advanced position while the other set of needles is being projected, and means for then retracting and lowering said loop receivers.

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

JOSEPH D. MORLEY.

Witnesses:

HAMILTON D. TURNER,
KATE A. BEADLE.