

W. T. BARRATT.
CIRCULAR KNITTING MACHINE.
APPLICATION FILED JAN. 30, 1909.

1,013,471.

Patented Jan. 2, 1912.

3 SHEETS—SHEET 1.

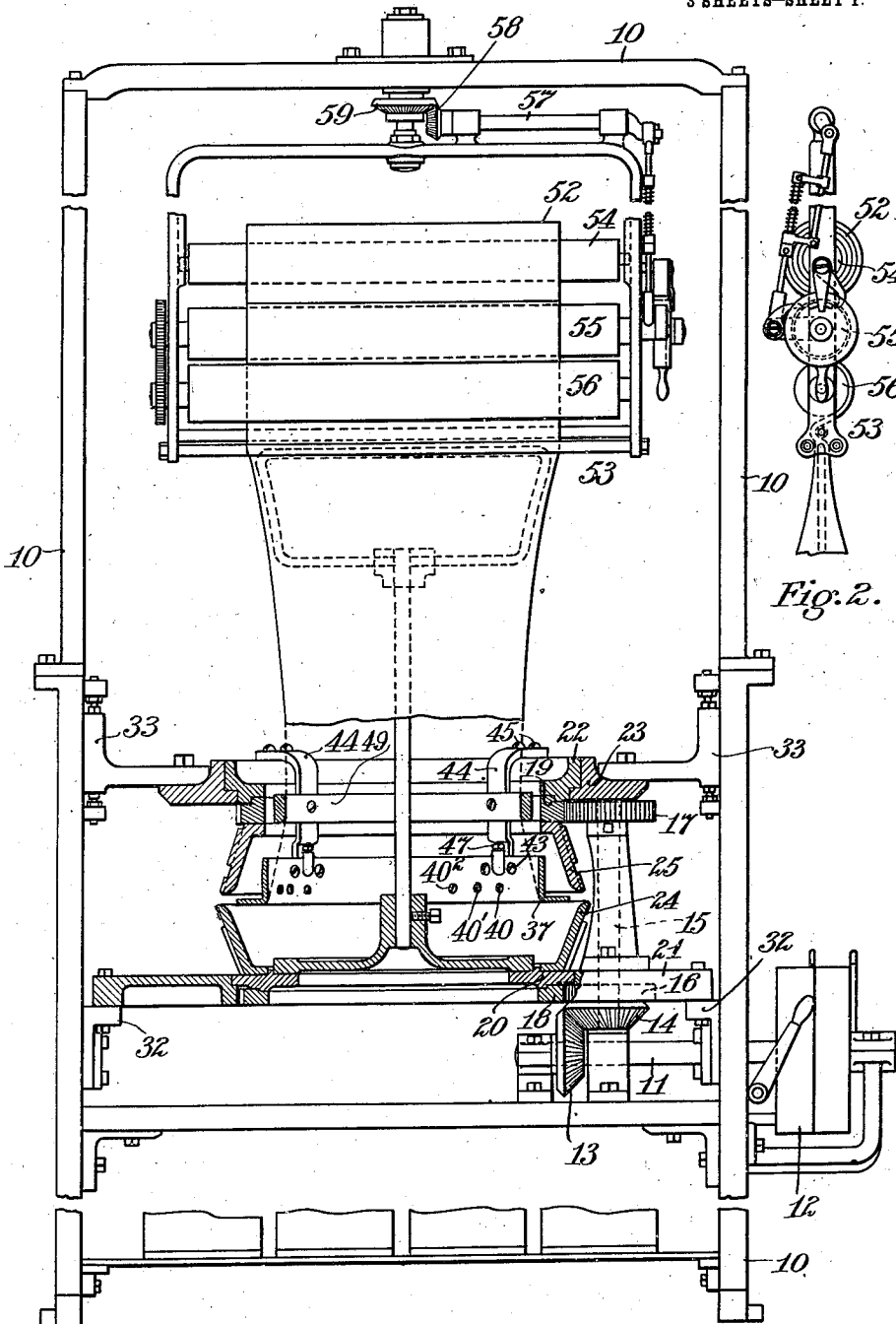


Fig. 2.

Fig. 1.

Witnesses:
Sydney C. Taft.
Franklin C. Low.

Inventor:
William T. Barratt,
by his attorney,
Charles S. Ford.

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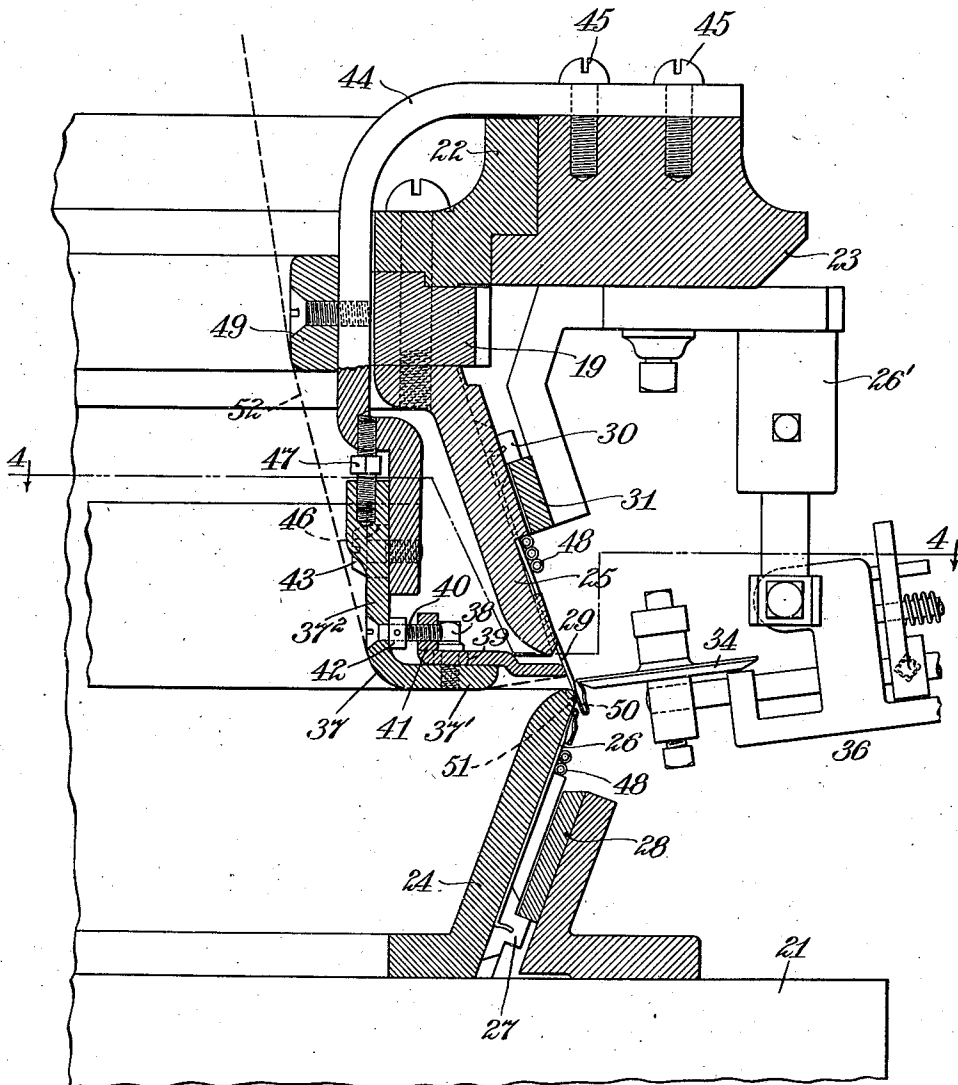


Fig. 3.

Witnesses:
Sydney E. Taft.
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William T. Barratt
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Charles S. Gooding.

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3 SHEETS—SHEET 3.

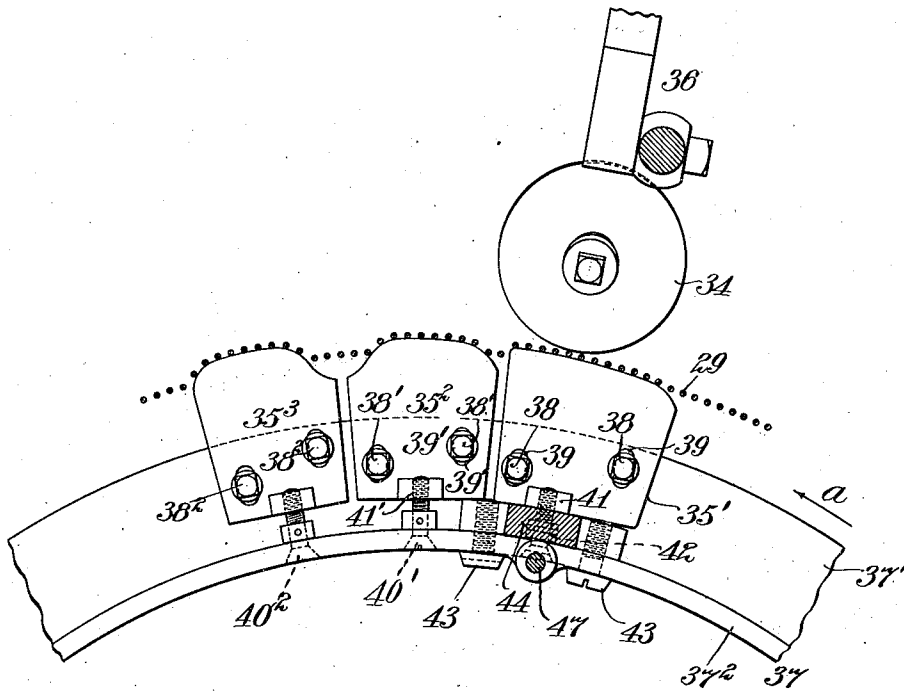


Fig. 4.

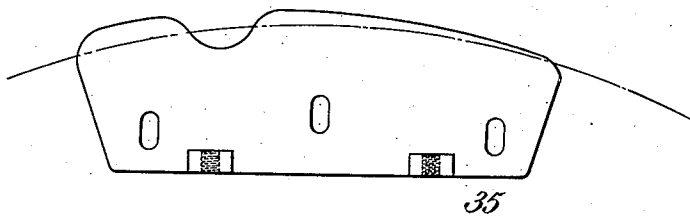


Fig.5.

Witnesses:

Sydney E. Taft.

Franklin E. Low.

Inventor:

William J. Barnatt
by his attorney,
Charles J. Gooding.

UNITED STATES PATENT OFFICE.

WILLIAM T. BARRATT, OF BENNINGTON, VERMONT, ASSIGNOR TO ALEXANDER J. COOPER, ANNIE COOPER, AND CHARLES S. KEHOE, ALL OF BENNINGTON, VERMONT, EXECUTORS OF CHARLES COOPER, DECEASED, LATE OF BENNINGTON, VERMONT.

CIRCULAR-KNITTING MACHINE.

1,013,471.

Specification of Letters Patent.

Patented Jan. 2, 1912.

Application filed January 30, 1909. Serial No. 475,107.

To all whom it may concern:

Be it known that I, WILLIAM T. BARRATT, a citizen of the United States, residing at Bennington, in the county of Bennington and State of Vermont, have invented new and useful Improvements in Circular-Knitting Machines, of which the following is a specification.

This invention relates to a circular knitting machine employing two needle cylinders, viz., a primary and a secondary cylinder, with a series of spring needles slidably mounted on each of said cylinders, respectively. The cylinders are preferably "conical" cylinders and are preferably rotatable, the usual cams and pressers being employed for imparting a reciprocatory motion to the needles and for pressing said needles during the knitting operation. Suitable means, preferably a cam, are employed to move the secondary needles outwardly to press and cast off, and to cause said needles to clear the edge of the primary cylinder and the fabric during their downward motion. Said cam also performs the function of assisting in the casting of the old loops from the secondary needles as said secondary needles are drawn upwardly along the edge of said cam.

The particular object of this invention is to so arrange and construct the needle cylinders, and said cam for moving the secondary needles outwardly from the cylinder, that the knitted fabric may be taken out through either one of said cylinders, and preferably said fabric is to be taken out through the secondary cylinder, so that the finished face of the fabric will be on the outside thereof and visible to the operator of the machine, so that he may readily detect any imperfections therein.

The object of the invention is further to so construct and support said cam that it may be accurately and conveniently adjusted transversely of the secondary needles, longitudinally of said secondary needles, or both transversely and longitudinally, as may be desired, said cam and its adjusting means being so arranged and supported that the adjustments of said cam may be made without interfering with the fabric, cylinders and their needles.

To these ends the invention consists in

the combination and arrangement of parts set forth in the following specification and particularly pointed out in the claims thereof.

Referring to the drawings: Figure 1 is a front elevation, broken away and shown in section, of my improved circular knitting machine, the pressers and needle cams being removed. Fig. 2 is a side elevation of the take-up mechanism, the same being also broken away. Fig. 3 is an enlarged vertical sectional elevation taken through one side of the needle cylinders and particularly illustrating the construction and arrangement of the inside cam and its adjusting means. Fig. 4 is a sectional plan taken on line 4-4 of Fig. 3, showing the inside cam in three parts. Fig. 5 is a detail plan showing the inside cam in one part.

Like numerals refer to like parts throughout the several views of the drawings.

In the drawings, 10 is the frame of the machine; 11 is the main driving shaft journaled in suitable bearings and driven by a pulley 12. A bevel gear 13 fast to said main driving shaft meshes into another bevel gear 14 fast to the vertical shaft 15. The shaft 15 has gears 16 and 17 fast thereto and meshing into annular gears 18 and 19, respectively. The annular gear 18 is fastened to a running ring 20 journaled in the lower bed-plate 21. The annular gear 19 is fastened to the running ring 22 journaled in bearings in the upper bed-plate 23. The primary cylinder 24, running ring 20 and gear 18 are fastened together to rotate as one piece and might, if desired, be made or cast in one piece. The secondary cylinder 25, the gear 19 and upper running ring 22 are fastened together and rotate as one piece and said cylinder, gear and running ring might also be made in one piece, if desired.

The primary cylinder 24 is larger in diameter than the secondary cylinder 25 and has slidably mounted thereon a series of primary needles 26, said needles being preferably connected to jacks 27 and having a reciprocatory motion imparted thereto by needle cams 28 (Fig. 3). The secondary cylinder 25 has a series of secondary needles 29 slidably mounted thereon and connected to jacks 30 to which a reciprocatory motion is imparted by means of the needle cams 31.

The primary and secondary needles are held in their respective grooves or tricks by elastic bands or springs 48, 48.

The lower bed-plate 21 is supported upon the frame 10 by means of brackets 32, 32. The upper bed-plate 23 is adjustably supported upon the frame by means of brackets 33, 33. The primary needles 26 are pressed at the proper time by a suitable presser (not shown in the drawings, but well known to those skilled in this art). The secondary needles 29 are pressed at the proper time by a rotary presser 34 coacting with an inside cam 35, as hereinafter more fully described. The rotary presser 34 is mounted upon a suitable presser stand 36 which, in turn, is supported upon a bracket 26' fast to the upper bed-plate 23. The inside cam 35 may be made in one piece, as illustrated in Fig. 5, or it may be made in three parts 35', 35² and 35³, as illustrated in Fig. 4.

Referring to Figs. 3 and 4 it will be seen that the cam 35' is fastened to a guide-ring 37 by means of screws 38, 38 which project through slots 39, 39 in said cam plate 35' and have screw-threaded engagement with the horizontal flange 37' upon the guide-ring 37. Said cam 35' is beveled along its outer edge and bears against the backs of the secondary needles, as they are rotated with the secondary cylinder 25. Said cam is adapted to be adjusted transversely of said needles by means of an adjusting screw 40 which has screw-threaded engagement with an ear 41 projecting upwardly from the cam plate 35' and is rotatably mounted in the vertical flange 37² of the guide-ring 37. The head upon the screw 40 prevents its moving longitudinally thereof in one direction and collar 42 fast to said screw prevents said screw from moving longitudinally thereof in the opposite direction. The cam 35² is fastened to the horizontal flange 37' of the guide-ring 37 by screws 38', 38' which extend through slots 39', 39' in said cam plate 35² and have screw-threaded engagement with the flange 37'. Said cam 35² is adjusted transversely of the needles by means of a screw 40' which has screw-threaded engagement with an ear 41' extending upwardly from said plate 35². The plate 35³ is fastened to the flange 37' in a similar manner by screws 38², 38² and adjusted transversely of the needles by means of a screw 40². The guide ring 37 is fastened by screws 43, 43 to an arm or bracket 44 which, in turn, is fastened, by screws 45, 45 to a stationary support, such as the upper bed-plate 23. The screws 43, 43 have screw-threaded engagement with the arm 44 and project through slots 46 in said arm. The flange 37, together with the cams 35', 35² and 35³ thereon may be adjusted vertically or longitudinally of the needles 29 by means of a right and left threaded adjusting screw

47 which at its upper end has screw-threaded engagement with the arm 44 and at its lower end has screw-threaded engagement with the vertical flange 37² of said guide-ring 37. Therefore, by rotating the right and left screw 47 the guide-ring 37 will be raised or lowered and when brought to the desired height relatively to the needles and cylinders, said guide ring can then be clamped in position by means of the screws 43, 43, thus adjusting and properly locating the cams 35', 35² and 35³ longitudinally of the needles, while the adjustment of said cams transversely of the needles may be obtained by rotating the screws 40, 40' and 40² in the proper direction to move said cams outwardly or inwardly, as may be desired, and finally said cams are locked in position by tightening, respectively, the screws 38, 38' and 38².

The guide-ring 37 extends entirely around the inside of the secondary cylinder 25 and is supported by any suitable number of arms or brackets 44, preferably by four of said arms. The arms or brackets 44 are connected together by a ring 49 to which they are rigidly fastened.

The secondary needles 29, as will be seen by reference to Fig. 3, preferably slide in auxiliary grooves 50 formed in the upper outer edge of the primary cylinder. If desired, however, the upper outer edge of said primary cylinder may be turned off smooth as, for instance, upon the line 51 (Fig. 3), in which case there would be no auxiliary grooves for the secondary needles to project into when said secondary needles are advanced as shown in Fig. 3.

The knitted fabric 52 may, and preferably will, pass from the needles beneath the cam 35 and around the guide-ring 37 upwardly through the secondary cylinder to the take-up 53 located above the secondary cylinder, or, if desired, the take-up may be arranged below the primary cylinder and the fabric may pass from the needles downwardly through said primary cylinder to said take-up. It is desirable, however, that the fabric should pass through the secondary cylinder to a take-up above, for the reason that in that case, the finished face of the fabric will be on the outside of the tube of fabric and can be readily inspected by the operator, whereas if the fabric is taken downwardly through the primary cylinder, the finished face of the fabric would be inside, it being understood that the finished face of the fabric is that face to which the loops are drawn by the secondary needles.

The take-up mechanism 53 may be of any suitable construction well known to those skilled in this art. In the present case, in the form illustrated in Figs. 1 and 2, the fabric 52 is wound upon a roll 54, said fabric first passing between the tension rolls 55

and 56 which are rotated by suitable mechanism, actuated by a shaft 57 and bevel gear 58, said bevel gear 58 meshing into a stationary gear 59, and as the cylinders rotate, together with the fabric and tension rolls and the fabric thereon, the gear 58 will be rotated to rotate the shaft 57 and by means of suitable actuating mechanism interposed between said shaft 57 and the tension rolls 55 and 56, said rolls 55 and 56 are rotated, as well as the fabric roll 54 to wind the fabric upon said fabric roll 54.

It will be seen by reference to Fig. 3, as shown in dotted lines, that the fabric passes from the needles beneath the cams 35', 35² and 35³ and the horizontal flange 37' of the guide-ring 37, thence extending upwardly through the secondary cylinder to the take-up mechanism thereabove, and that the cams 35', 35² and 35³ are located inside the hollow cylinder 25 and outside said fabric, said cams bearing against the backs of the secondary needles, so that the different adjusting means hereinbefore described for adjusting said cams may be reached without injuring the fabric and without disturbing in any way the relative location of the cylinders and their series of needles by reaching downwardly in the interior of the secondary cylinder and manipulating the different adjusting means by suitable wrenches.

The general operation of the mechanism hereinbefore specifically described is as follows: The shaft 11 imparts a rotary motion to the gears 13, 14, 16 and 17 and the gears 16 and 17 rotate the primary and secondary cylinders, respectively. As these cylinders are rotated the primary and secondary needles are moved longitudinally thereof in the grooves on their respective cylinders. The yarn is fed to the needles in the usual manner and the beards of the needles are pressed by their respective pressers during the knitting operation, it being understood that the cylinders are rotating in the direction of the arrow *a* (Fig. 4). It will be seen that the secondary needles 29 first engage the cam 35' and are pushed outwardly thereby from the secondary auxiliary grooves 50 into engagement with the rotary presser 34. Said secondary needles, as they pass beyond the cam 35', engage the cam 35² and are moved slightly farther from their cylinder in opposition to the force of the take-up and thus assist in casting off the stitches, as they are moved upwardly by the secondary needle cam. The cam 35³ engages the secondary needles and forces them outwardly from their grooves as said needles are descending, thus preventing said needles from colliding with the outer edge of the primary cylinder in their descent and also preventing said needles from being thrust through the fabric during their descent.

As illustrated in Fig. 5, the three cams 35',

35² and 35³ may be made in one piece and adjustably supported upon the horizontal flange 37' of the guide ring 37, but I prefer to make said cam 35 in three parts as illustrated in Fig. 4, for the sake of obtaining greater variety and nicety of adjustment. As the cylinders and their needles rotate, it will be understood that the take-up rolls rotate therewith, as well as the fabric and that the cam 35' remains stationary.

Any desired number of "feeds" may be placed about the outside of the needle cylinders, as is well understood by those skilled in this art.

Having thus described my invention what I claim and desire by Letters Patent to obtain is:

1. A knitting machine having, in combination, an annular primary cylinder and an annular secondary cylinder, a series of spring needles mounted on each of said cylinders, respectively, a presser for each of said series of needles, means to feed the knitted fabric through one of said annular cylinders, means adapted to bear against the backs of the needles of said secondary cylinder, and a support for said last-named means extending through said secondary cylinder adjacent to the inner surface thereof.

2. A knitting machine having, in combination, an annular primary cylinder and an annular secondary cylinder, a series of spring needles mounted on each of said cylinders, respectively, a presser for each of said series of needles, means to feed the knitted fabric through one of said annular cylinders, means adapted to bear against the backs of the needles of said secondary cylinder, and a support for said last named means extending through said secondary cylinder and separated therefrom by a substantial space extending entirely through said secondary cylinder between said support and the innermost surface of said cylinder.

3. A knitting machine, having in combination a primary needle cylinder, a secondary needle cylinder having an opening extending entirely through said secondary cylinder adapted to allow the passage of the fabric therethrough, a series of spring needles mounted on each of said cylinders respectively, a presser for said secondary set of needles, means to feed the knitted fabric through said secondary cylinder and means adapted to move the needles of said secondary cylinder outwardly therefrom against said presser, and a support for said means extending through said secondary cylinder outside said fabric.

4. A knitting machine having, in combination, an annular primary cylinder and an annular secondary cylinder, a series of spring needles mounted on each of said cyl-

inders, respectively, a presser for each of said series of needles, means to feed the knitted fabric through one of said annular cylinders, means adapted to bear against the backs of the needles of said secondary cylinder, and a support for said last named means extending through said secondary cylinder at a substantial distance from the median axial line thereof.

5 5. A knitting machine having, in combination, an annular primary cylinder and an annular secondary cylinder, a series of spring needles mounted on each of said cylinders, respectively, a presser for each of
15 said series of needles, means to feed the knitted fabric through one of said annular cylinders, means adapted to bear against the backs of the needles of said secondary cylinder, a support for said last named
20 means extending through said secondary cylinder at a substantial distance from the median axial line thereof, and means to adjust said second-named means transversely of said needles.

25 6. A knitting machine having, in combination, an annular primary cylinder and an annular secondary cylinder, a series of spring needles mounted on each of said cylinders, respectively, a presser for each
30 of said series of needles, means to feed the knitted fabric through one of said annular cylinders, means adapted to bear against the backs of the needles of said secondary cylinder, a support for said last-named
35 means extending through said secondary cylinder at a substantial distance from the median axial line thereof, and means to adjust said second-named means longitudinally of said needles.

40 7. A knitting machine having, in combination, an annular primary cylinder and an annular secondary cylinder, a series of spring needles mounted on each of said cylinders, respectively, a presser for each of
45 said series of needles, means to feed the knitted fabric through one of said annular cylinders, means adapted to bear against the backs of the needles of said secondary cylinder, a support for said last-named
50 means extending through said secondary cylinder at a substantial distance from the median axial line thereof, and means accessible from the inner side of said support adapted to adjust said second named means
55 transversely of said needles.

8. A knitting machine having, in combination, a primary needle cylinder, a secondary needle cylinder having an opening extending entirely through said secondary
60 cylinder adapted to allow the passage of fabric therethrough, a series of spring needles mounted on each of said cylinders, respectively, a presser for said secondary set of needles, means to feed knitted fabric
65 through said secondary cylinder, a cam

adapted to move the needles of said secondary cylinder outwardly therefrom, a support for said cam extending through said secondary cylinder outside said fabric, and means to adjust said cam transversely 70 of the secondary needles.

9. A knitting machine having, in combination, a primary needle cylinder, a secondary needle cylinder having an opening extending entirely through said secondary cylinder adapted to allow the passage of the fabric therethrough, a series of spring needles mounted on each of said cylinders, respectively, a presser for said secondary set of needles, means to feed knitted fabric
75 through said secondary cylinder, a cam adapted to move the needles of said secondary cylinder outwardly therefrom, a support for said cam extending through said secondary cylinder outside said fabric, and
80 means to adjust said cam longitudinally of the secondary needles.

10. A knitting machine having in combination a primary needle cylinder and a hollow secondary needle cylinder, a set of
85 spring needles mounted on each of said cylinders respectively, means to feed the knitted fabric through said secondary cylinder, a cam adapted to move the needles of said secondary cylinder outwardly therefrom
90 and means to support said cam extending through said secondary cylinder outside said fabric.

11. A knitting machine, having in combination a primary and a secondary needle cylinder, a series of spring needles mounted on each of said cylinders respectively, means to feed the knitted fabric through said secondary cylinder, a stationary ring located
95 inside said secondary cylinder adapted to guide said fabric and a cam fast to said guide ring adapted to move the needles of said secondary cylinder outwardly therefrom.

12. A knitting machine, having in combination a primary and a secondary needle cylinder, a series of spring needles mounted on each of said cylinders respectively, means to feed the knitted fabric through said secondary cylinder, a stationary ring located
100 inside said secondary cylinder adapted to guide said fabric, a cam fast to said guide ring adapted to move the needles of said secondary cylinder outwardly therefrom, and means to adjust said cam transversely
105 of the secondary needles.

13. A knitting machine, having in combination a primary and a secondary needle cylinder, a series of spring needles mounted on each of said cylinders respectively, means to feed the knitted fabric through said secondary cylinder, a stationary ring located
110 inside said secondary cylinder adapted to guide said fabric, a cam fast to said guide ring adapted to move the needles of said secondary cylinder outwardly therefrom, and means to adjust said cam transversely
115 of the secondary needles.

120 125 130

ondary cylinder outwardly therefrom, and means to adjust said cam longitudinally of the secondary needles.

14. A knitting machine having in combination a primary needle cylinder, a secondary needle cylinder having an opening extending entirely through said secondary cylinder adapted to allow the passage of the fabric therethrough, a series of spring needles slidably mounted on each of said needle cylinders respectively, needle cams adapted to impart a reciprocatory motion to said needles, a presser for the primary needles, a presser for the secondary needles, a take-up adapted to feed the knitted fabric through said secondary cylinder and means adapted to move the secondary needles outwardly from said secondary cylinder, and a support for said last named means extending through said secondary cylinder outside said fabric.

15. A knitting machine having in combination a presser, a primary needle cylinder, a secondary cylinder having an opening extending entirely through said secondary cylinder adapted to allow the passage of the fabric therethrough, bearing plates in which said cylinders are rotatably mounted, a series of spring needles for each of said cylinders respectively, means to feed the knitted fabric through said secondary cylinder, a cam adapted to move the secondary needles outwardly from said secondary cylinder and supporting means for said cam fast to the bearing plate of said secondary cylinder, and extending downwardly therefrom through said secondary cylinder outside said fabric.

16. A knitting machine, having in combination a primary needle cylinder, a secondary needle cylinder having an opening extending entirely through said secondary cylinder adapted to allow the passage of the fabric therethrough, a series of spring needles mounted on each of said cylinders respectively, a take-up adapted to feed the knitted fabric through said secondary cylinder, and a plurality of cams for each yarn feed of said knitting machine adapted to move the needles of said secondary cylinder outwardly therefrom, and a support for said cams extending through said secondary cylinder outside said fabric.

17. A knitting machine, having in combination a primary needle cylinder, a secondary needle cylinder having an opening extending entirely through said secondary cylinder adapted to allow the passage of the fabric therethrough, a series of spring needles mounted on each of said cylinders respectively, a take-up adapted to feed the knitted fabric through said secondary cylinder, a plurality of cams for each yarn feed of said knitting machine adapted to move the needles of said secondary cylinder outwardly therefrom, and means to adjust each of said cams transversely of said needles,

and a support for said cams extending through said secondary cylinder outside said fabric.

18. A knitting machine, having in combination a primary needle cylinder, a secondary needle cylinder having an opening extending entirely through said secondary cylinder adapted to allow the passage of the fabric therethrough, a series of spring needles mounted on each of said cylinders respectively, a take-up adapted to feed the knitted fabric through said secondary cylinder, a plurality of cams for each yarn feed of said knitting machine adapted to move the needles of said secondary cylinder outwardly therefrom, a support for said cams extending through said secondary cylinder outside said fabric, and means to adjust all of said cams longitudinally of said needles.

19. A knitting machine, having in combination a primary needle cylinder, a secondary needle cylinder having an opening extending entirely through said secondary cylinder adapted to allow the passage of the fabric therethrough, a series of spring needles mounted on each of said cylinders respectively, means to feed the knitted fabric through said secondary cylinder, a presser for the needles of said secondary cylinder, means adapted to bear against the backs of the needles of the secondary needle cylinder to assist in the casting off of the loops from said secondary needles and a support for said last named means extending through said secondary cylinder outside said fabric.

20. A knitting machine, having in combination a primary needle cylinder, a secondary needle cylinder having an opening extending entirely through said secondary cylinder adapted to allow the passage of the fabric therethrough, a series of spring needles mounted on each of said cylinders respectively, means to feed the knitted fabric through said secondary cylinder, a presser for the needles of said secondary cylinder, a plate adapted to bear against the backs of the needles of the secondary needle cylinder to assist in the casting off of the loops from said secondary needles, and a support for said plate extending through said secondary cylinder outside said fabric.

21. A knitting machine having, in combination, a primary and a secondary needle cylinder, a series of spring needles mounted on each of said cylinders, respectively, a presser for each of said series of needles, respectively, and means adapted to bear against the backs of the needles of said secondary cylinder, and a support for said last-named means extending through said secondary cylinder and separated therefrom by a substantial space extending entirely through said secondary cylinder between said support and the innermost surface of said cylinder.

22. A knitting machine having, in combination, a primary and a secondary needle cylinder, a series of spring needles mounted on each of said cylinders, a presser for each of said series of needles respectively, a plate adapted to bear against the backs of the needles of said secondary cylinder, and a support for said plate extending through said secondary cylinder and separated therefrom by a substantial space extending entirely through said secondary cylinder between said support and the innermost surface of said cylinder.

23. A knitting machine having, in combination, a primary and a secondary needle cylinder, a series of spring needles mounted on each of said cylinders, respectively, a presser for said secondary set of needles, means to feed knitted fabric through said secondary cylinder, means adapted to bear against the backs of said needles of said secondary cylinder to support the same against the action of said presser, and a support for said last named means extending through said secondary cylinder outside said fabric.

24. A knitting machine having, in combination, a primary and a secondary needle cylinder, a series of spring needles mounted on each of said cylinders, respectively, means to feed the knitted fabric through said secondary cylinder, means adapted to bear against the backs of the needles of said secondary cylinder, a support for said last named means extending through said secondary cylinder outside said fabric, and a ring adapted to guide said fabric and connected to said support.

25. A knitting machine having, in combination, an annular primary cylinder and

an annular secondary cylinder, a series of spring needles mounted on each of said cylinders, respectively, a presser for each of said series of needles, means adapted to bear against the backs of the needles of said secondary cylinder, a hollow support for said last-named means extending through said secondary cylinder and means to feed the knitted fabric through said support and secondary cylinder.

26. In a machine of the class described, the combination of two conical needle cylinders, one of which is materially smaller than the other at its knitting edge, independently movable spring needles, means for actuating said cylinders and needles, an open cylindrical bracket located within the needle cylinder inclosure adapted to take on one or more casting-off cams and their supports, and one or more casting-off cams with which the needles of the smaller cylinder cooperate, substantially as specified.

27. The combination with the needle beds and needles and means for actuating them of a two-cylinder rib knitting machine, of a casting-off cam located within the cylinder inclosure and operating between the edges of the cylinders, an internal bracket for supporting said cam having a vertical opening through which the finished web may be conducted to a take-up, substantially as specified.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

WILLIAM T. BARRATT.

Witnesses:

LOUIS A. JONES,
SYDNEY E. TAFT.