L. N. D. WILLIAMS.

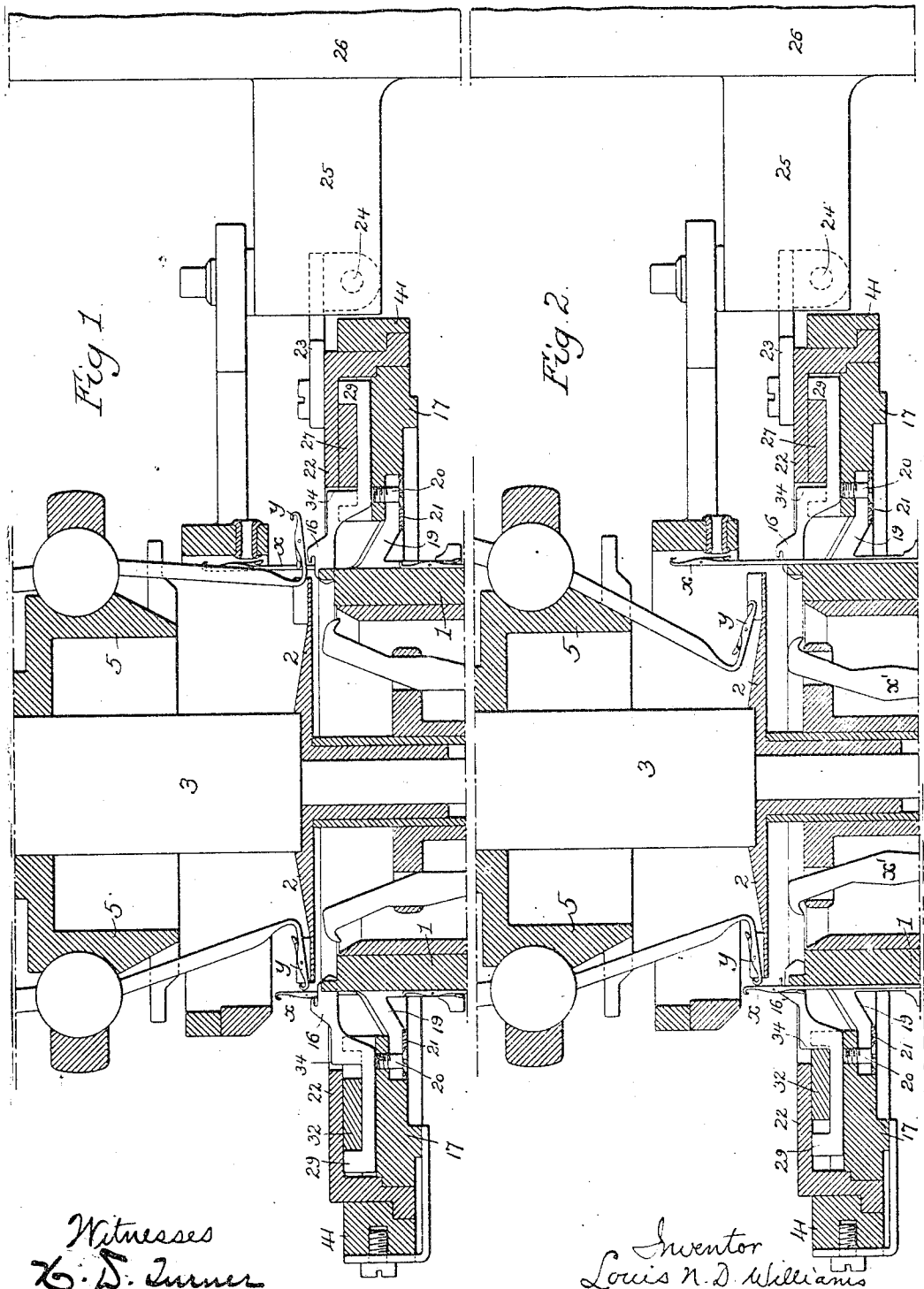
KNITTING MACHINE.

APPLICATION FILED JAN. 29, 1910.

1,120,578.

Patented Dec. 8, 1914.

3 SHEETS—SHEET 1.



Witnesses
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3 SHEETS—SHEET 2.

Fig. 3

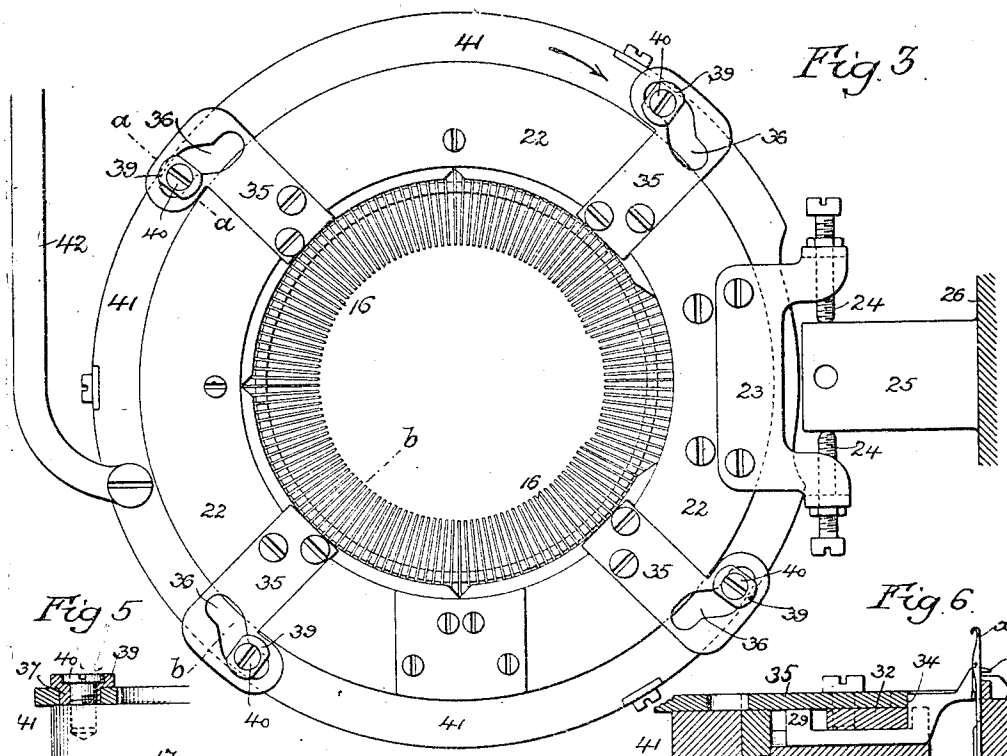
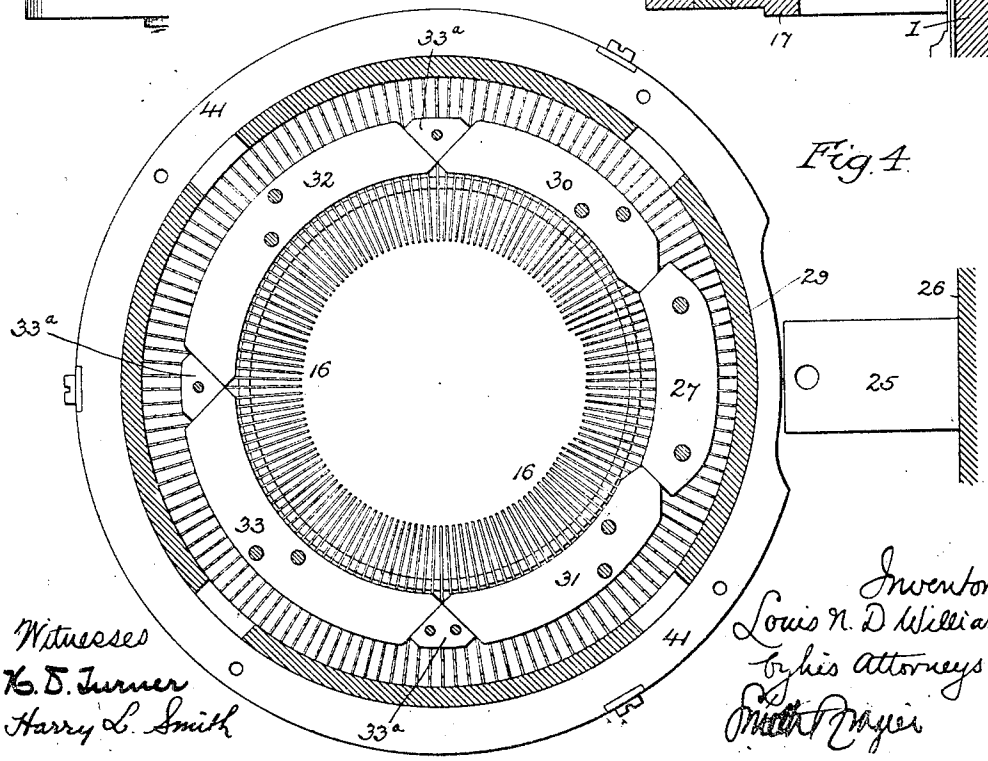


Fig. 5

Fig. 6

Fig. 4



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3 SHEETS—SHEET 3.

Fig. 7

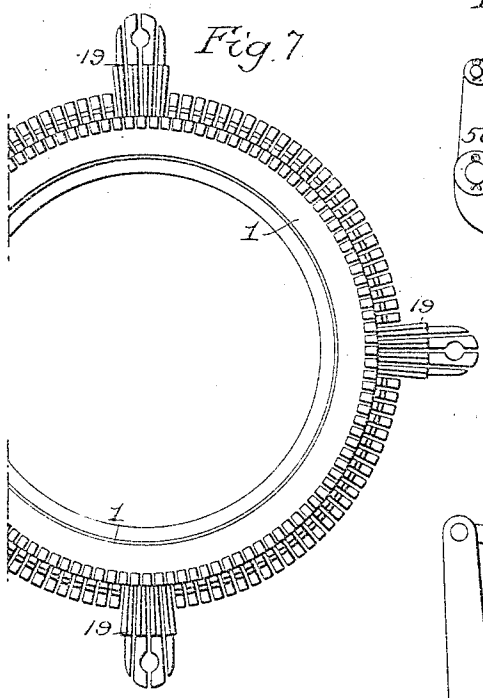
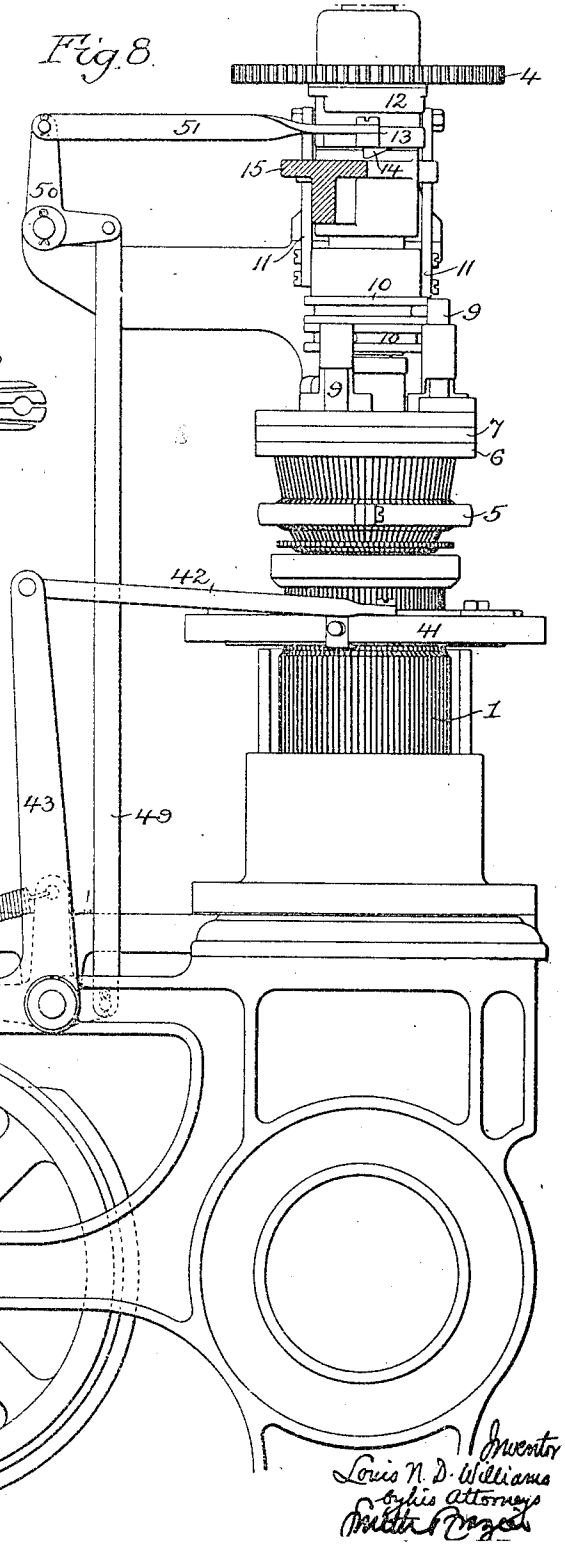


Fig. 8.



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UNITED STATES PATENT OFFICE.

LOUIS N. D. WILLIAMS, OF OGONTZ, PENNSYLVANIA, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO SCOTT & WILLIAMS, INCORPORATED, OF CAMDEN, NEW JERSEY, A CORPORATION OF NEW JERSEY.

KNITTING-MACHINE.

1,120,578. Specification of Letters Patent. Patented Dec. 8, 1914.

Application filed January 29, 1910. Serial No. 540,793.

To all whom it may concern:

Be it known that I, LOUIS N. D. WILLIAMS, a citizen of the United States, residing in Ogontz, Montgomery county, Pennsylvania, have invented certain Improvements in Knitting-Machines, of which the following is a specification.

My invention consists of certain improvements especially designed for use in connection with the knitting machine for which Letters Patent No. 834,763 were granted to Robert W. Scott on the thirtieth day of October, 1906, although not limited to such application, the objects of my present invention being to permit of the production of a closely knitted ribbed web and to prevent the web holders from interfering with the operation of the machine when ribbed web is being knitted thereupon. These objects 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 and partly in elevation, of sufficient of a knitting machine of the type shown in said patent to illustrate my present invention, the parts occupying the position which they assume when ribbed web is being knitted; Fig. 2 is a similar view illustrating the parts in the position assumed by them when the ribbing needles are out of action and plain web is being produced; Fig. 3 is a plan or top view of the web holders and devices for operating the same; Fig. 4 is a horizontal sectional view with the top of the web holder cam ring removed; Fig. 5 is a view partly in elevation and partly in vertical section on the line *a*—*a*, Fig. 3; Fig. 6 is a view partly in elevation and partly in transverse vertical section, on the line *b*—*b*, Fig. 3; Fig. 7 is a plan or top view of part of the needle cylinder, and Fig. 8 is a side elevation illustrating certain operative parts of the machine not shown in the other views.

In the drawing, 1 represents part of the needle cylinder of the machine, 2 the dial, *x* the cylinder needles, *y* the dial needles, and 3 a shaft carrying said dial and extending upwardly to the hub of a spur wheel 4 (Fig. 8) to which it is secured, said spur wheel being driven in consonance with the mechanism which imparts rotating movement to the cylinder of the machine as fully set forth in said former patent.

The shanks of the dial needles are pivotally mounted upon a ring 5 carried by the shaft 3 and their upper ends are guided in a ring 6 which also rotates with the shaft, the shanks of the needles projecting above this ring and being acted upon by cams in a non-rotating cam ring 7, certain of these cams having stems 9 which are raised and lowered by engagement with the grooved rings 10 connected by rods 11 to a ring 12, the latter being interposed between the hub of the spur wheel 4 and a ring 13, which has one or more cams 14 adapted to beveled recesses in the cross bar 15 of the fixed frame of the machine, whereby, when said ring 13 is partially rotated, the spur wheel 4 and consequently the shaft 3 and all the parts carried thereby may be raised or lowered, similar raising and lowering movement being imparted to the vertically movable cams of the cam ring by reason of the connections before described.

During the production of the plain work upon the cylinder needles web holders 16 cooperate with said needles to retain the knitted web, these web holders also operating as sinkers over which the knitting yarn is drawn by the needles as they descend to knock over the old and draw the new stitches. During rib knitting, however, the web is taken up by a weighted take-up device having hooks *x'* which engage said web, when expanded, as shown in Fig. 1, these hooks being, however, retracted as shown in Fig. 2, so as to be free from engagement with the web, or being otherwise rendered inoperative as a take-up when plain web is being produced. Such a take-up device is fully described in Letters Patent No. 920,671, granted to Robert W. Scott and Harry Swinglehurst, on the fourth day of May, 1909.

When a closely knitted ribbed web is to be produced, it is advisable to adjust the dial 2 as close to the top of the cylinder 1 as is possible, consistent with the passage of the ribbed web between them, in which position the dial is liable to interfere with the proper operation of the web holders. I therefore provide for the retraction of said web holders and the maintenance of the same in the retracted position during the time that the machine is operating to produce ribbed web, as shown in Fig. 1, the

web holders being restored to operative position in respect to the cylinder needles, as shown in Fig. 2, during the production of plain web, at which time the dial, its needles and the parts coöperating therewith are raised, as shown in said Fig. 2, if such elevation is necessary for the proper operation of the web holders.

The web holders 16 are guided in radial grooves in a ring 17 which is mounted upon lugs 19 projecting from the cylinder of the machine at certain intervals around the periphery of the same, as shown in Fig. 7, these lugs being grooved for the passage of the needles. The inner face of the ring 17 is located at some distance from the outer face of the cylinder 1, so that ample opportunity is afforded between the ring supporting lugs 19 for the downward passage of dirt or lint which is thereby prevented from accumulating around the head of the cylinder in such quantity as to interfere with the proper reciprocation either of the needles or of the web holders. In the present instance, that portion of the ring 17 which overlaps each of the grooved lugs 19 is vertically confined thereto by a vertical bolt 20 whose head bears upon a plate 21, the latter bridging the grooves of the lug so as to provide an extended bearing upon the underside of the lug.

Mounted upon the web holder ring 17 is a ring 22 carrying the cams whereby reciprocating movement is imparted to said web holders, this ring being held in a fixed position by means of a bracket 23 having arms provided with set screws 24 which bear against the opposite sides of a lug 25 projecting from one of the fixed standards 26 of the machine, the set screws providing for such circumferential adjustment of the cam ring 22 as may be required in the operation of the machine.

Secured to the under side of the cam ring 22 are the cams whereby the web holders are retracted, projected and retained in the projected position, the retraction of the web holders being effected at the time the cylinder needles are drawing their stitches, and said web holders being then projected and retained in the projected position until the knitting point has again been reached.

The retracting cam is illustrated at 27 in Fig. 4, and said retracting cam acts upon lugs 29 on the radially guided stems of the web holders, the projection of the web holders being effected by cams 30 and 31, and the maintenance of the web holders in the projected position being effected partly by these cams and partly by other cams 32 and 33, all of these cams 30, 31, 32 and 33 acting upon shoulders 34 on the web holder stems, as shown in Fig. 2. The retracting cam 27 is fixedly mounted on the under side of the cam ring 22 but the cam sections 30, 31, 32 and 33 are susceptible of radial movement on said ring, being guided in such movement by the ends of the retracting cam 27 and by certain angular blocks 33a secured to the under side of the cam ring, as shown in Fig. 4. Each of the cam sections 30, 31, 32 and 33 is secured to the underside of a slide 35 radially guided on the cam ring 22 and having, in its outer portion, a cam slot 36 which receives the tubular stem 37 of an adjusting block 39, the latter being vertically confined, by means of a screw 40, to a ring 41 which surrounds the ring 22, is mounted vertically thereon and is free to turn in respect thereto, whereby partial turning movement of said ring in the direction of the arrow, Fig. 3, will retract the slides 35 and with them the cam sections 30, 31, 32 and 33, so that the web holders when retracted by the action of the cam 27 will not be again projected, reverse movement of the ring 41 projecting the slides 35 and cam sections 30, 31, 32 and 33 so as to cause the latter to operate upon the web holders to project the same and maintain them in the projected position. The tubular stem 37 of the adjusting block 39 is eccentrically disposed in respect to the retaining screw 40, whereby rotative movement of said adjusting block around the retaining screw will effect projection or retraction of its corresponding slide 35 and of the cam section controlled thereby, so as to govern the extent of projection of the web holders as may be desired.

The ring 41 is connected by a rod 42 to a lever 43, which is held under control of a pattern drum 44 (Fig. 8) by means of a spring 45, and said pattern drum also controls another lever 46 which is acted upon by a spring 47, and is connected by a rod 49 to a lever 50, the latter being connected by a rod 51 to the cam ring 13, which controls the rise and fall of the dial needles and dial, proper correlation being thus provided between the raising and lowering of the dial and its needles and the adjustment of the web holder operating cams to render such web holders inactive when the dial and its needles are lowered, and active when the dial and its needles are raised.

The dial needles in addition to the knitting movement imparted to them by the cams of the cam ring 7 can also, by means of the vertically adjustable cams of said cam ring be adjusted so as to transfer their stitches to the cylinder needles. I have not considered it necessary to illustrate the special cams for this purpose, since they are fully shown and described in the Letters Patent No. 834,763, before referred to.

Although I have shown my invention as applied to a machine in which are employed laterally swinging ribbing needles coöperating with a dial it can be used in connection

with any form of knitting machine intended for the production of plain and ribbed web alternately, and in which the ribbing needles and their carrier when in position to coöperate with the plain web needles would interfere with the proper operation of the web holders, or in which it is, for other reasons, advisable to render the web holders inoperative during the production of ribbed web. In the broad embodiment of my invention also, it is immaterial whether the member to which vertical movement is imparted, is that carrying the dial needles, and their coöperating parts, or the cylinder and the parts coöperating therewith.

I claim:

1. The combination, in a knitting machine, of two sets of needles operable to produce either ribbed web or plain web, web holders coöperating with one set of needles, and means for rendering said web holders inoperative when ribbed web is being knitted and operative when plain web is being knitted.

2. The combination, in a knitting machine, of two sets of needles operable to produce either ribbed web or plain web, web holders coöperating with one set of needles, and pattern-controlled means for rendering said web holders operative when plain web is being knitted and inoperative when ribbed web is being knitted.

3. The combination, in a knitting machine, of two sets of needles, operable to produce either ribbed web or plain web and to transfer stitches from one set of needles to the other when the character of the knitting changes, web holders coöperating with one set of needles, and means for rendering said web holders inoperative when ribbed web is being knitted, and operative when plain web is being knitted.

4. The combination, in a knitting machine, of two sets of needles, operable to produce either ribbed web or plain web and to transfer stitches from one set of needles to the other when the character of the knitting changes, web holders coöperating with one set of needles, and pattern-controlled means for rendering said web holders operative when plain web is being knitted and inoperative when rib web is being knitted.

5. The combination, in a knitting machine, of two sets of needles operable to produce either ribbed web or plain web, take-up devices operative when ribbed web is being knitted and inoperative when plain web is being knitted, web holders coöperating with one set of needles, and means for rendering said web holders operative when plain web is being knitted and inoperative when ribbed web is being knitted.

6. The combination, in a knitting machine, of two sets of needles, operable to produce either ribbed web or plain web, take-up devices operative during the production of ribbed web and inoperative during the production of plain web, web holders coöperating with one set of needles, and pattern-controlled means for rendering said web holders operative during the knitting of plain web and inoperative during the knitting of ribbed web.

7. The combination, in a knitting machine, of two sets of needles, operable to produce either ribbed web or plain web and to transfer stitches from one set of needles to the other when the character of the knitting changes, take-up devices operative during the production of ribbed web and inoperative during the production of plain web, web holders coöperating with one set of needles and means for rendering said web holders operative during the knitting of plain web and inoperative during the knitting of ribbed web.

8. The combination, in a knitting machine, of two sets of needles operable to produce either ribbed web or plain web and to transfer stitches from one set of needles to the other when the character of the knitting changes, take-up devices operative during the production of ribbed web and inoperative during the production of plain web, web holders coöperating with one set of needles, and pattern-controlled means for rendering said web holders operative during the knitting of plain web and inoperative during the knitting of ribbed web.

9. The combination, in a knitting machine, of two sets of needles operable to produce either ribbed web or plain web, carriers for said needles, means for adjusting one of said carriers into closer relation to the other when knitting ribbed web than when knitting plain web, web holders coöperating with one set of needles, and means for rendering said web holders operative during the knitting of plain web and inoperative during the knitting of ribbed web.

10. The combination, in a knitting machine, of two sets of needles operable to produce either ribbed web or plain web, carriers for said needles, means for adjusting one of said carriers into closer relation to the other during the knitting of ribbed web than during the knitting of plain web, web holders coöperating with one set of needles, and pattern-controlled means for rendering said web holders operative during the knitting of plain web and inoperative during the knitting of ribbed web.

11. The combination, in a knitting machine, of two sets of needles operable to produce either ribbed web or plain web and to transfer stitches from one set of needles to the other when the character of the knitting changes, carriers for said needles, means for adjusting one of said carriers into closer relation to the other during the knitting of ribbed

web than during the knitting of plain web, web holders coöperating with one set of needles, and means for rendering said web holders operative during the production of plain web and inoperative during the production of ribbed web.

12. The combination, in a knitting machine, of two sets of needles operable to produce either ribbed web or plain web and to transfer stitches from one set of needles to the other when the character of the knitting changes, carriers for said needles, means for adjusting one of said carriers into closer relation to the other during the knitting of ribbed web than during the knitting of plain web, web holders coöperating with one set of needles, and pattern-controlled means for rendering said web holders operative during the production of plain web and inoperative during the production of ribbed web.

13. The combination, in a knitting machine, of two sets of needles operable to produce either ribbed web or plain web, carriers for said needles, means for adjusting one of said carriers into closer relation to the other during the knitting of ribbed web than during the knitting of plain web, take-up devices operative during the knitting of ribbed web and inoperative during the knitting of plain web, web holders coöperating with one set of needles, and means for rendering said web holders operative during the knitting of plain web and inoperative during the knitting of ribbed web.

14. The combination, in a knitting machine, of two sets of needles operable to produce either ribbed web or plain web, carriers for said needles, means for adjusting one of said carriers into closer relation to the other during the knitting of ribbed web than during the knitting of plain web, take-up devices operative during the knitting of ribbed web and inoperative during the knitting of plain web, web holders coöperating with one set of needles, and pattern-controlled means for rendering said web holders operative during the knitting of plain web and inoperative during the knitting of ribbed web.

15. The combination, in a knitting machine, of two sets of needles operable to produce either ribbed web or plain web and to transfer stitches from one set of needles to the other when the character of the knitting changes, carriers for said needles, means for adjusting one of said carriers into closer relation to the other during the knitting of ribbed web than during the knitting of plain web, take up devices operative during the knitting of ribbed web and inoperative during the knitting of plain web, web holders coöperating with one set of needles, and means for rendering said web holders operative during the knitting of plain web and inoperative during the knitting of ribbed web.

16. The combination, in a knitting machine, of two sets of needles operable to produce either ribbed web or plain web and to transfer stitches from one set of needles to the other when the character of the knitting changes, carriers for said needles, means for adjusting one of said carriers into closer relation to the other during the knitting of ribbed web than during the knitting of plain web, take-up devices operative during the knitting of ribbed web and inoperative during the knitting of plain web, web holders coöperating with one set of needles, and pattern-controlled means for rendering said web holders operative during the knitting of plain web and inoperative during the knitting of ribbed web.

17. The combination, in a knitting machine, of two sets of needles operable to produce either ribbed web or plain web, carriers for said needles, pattern-controlled means for adjusting one of said carriers into closer relation to the other during the knitting of ribbed web than during the knitting of plain web, web holders coöperating with one set of needles, and means for rendering said web holders operative during the production of plain web and inoperative during the production of ribbed web.

18. The combination, in a knitting machine, of two sets of needles operable to produce either ribbed web or plain web, carriers for said needles, pattern-controlled means for adjusting one of said carriers into closer relation to the other during the knitting of ribbed than during the knitting of plain web, web holders coöperating with one set of needles, and pattern-controlled means for rendering said web holders operative during the production of plain web and inoperative during the production of ribbed web.

19. The combination, in a knitting machine, of two sets of needles, operable to produce either ribbed web or plain web and to transfer stitches from one set of needles to the other when the character of the knitting changes, carriers for said needles, pattern-controlled means for adjusting one of said carriers into closer relation to the other during the knitting of ribbed web than during the knitting of plain web, web holders coöperating with one set of needles, and means for rendering said web holders operative during the knitting of plain web and inoperative during the knitting of ribbed web.

20. The combination, in a knitting machine, of two sets of needles, operable to produce either ribbed web or plain web and to transfer stitches from one set of needles to the other when the character of the knitting changes, carriers for said needles, pat-

tern-controlled means for adjusting one of said carriers into closer relation to the other during the knitting of ribbed web than during the knitting of plain web, web holders coöperating with one set of needles, and pattern-controlled means for rendering said web holders operative during the knitting of plain web and inoperative during the knitting of ribbed web.

21. The combination, in a knitting machine, of two sets of needles operable to produce either ribbed web or plain web, carriers for said needles, pattern-controlled means for adjusting one of said carriers into closer relation to the other during the knitting of ribbed web than during the knitting of plain web, take-up devices operative during the knitting of ribbed web and inoperative during the knitting of plain web, web holders coöperating with one set of needles, and means for rendering said web holders operative during the knitting of plain web and inoperative during the knitting of ribbed web.

22. The combination, in a knitting machine, of two sets of needles operable to produce either ribbed web or plain web, carriers for said needles, pattern-controlled means for adjusting one of said carriers into closer relation to the other during the knitting of ribbed web than during the knitting of plain web, take-up devices operative during the knitting of ribbed web and inoperative during the knitting of plain web, web holders coöperating with one set of needles, and pattern-controlled means for rendering said web holders operative during the knitting of plain web and inoperative during the knitting of ribbed web.

23. The combination, in a knitting machine, of two sets of needles operable to produce either ribbed web or plain web and to transfer stitches from one set of needles to the other when the character of the knitting changes, carriers for said needles, pattern-controlled means for adjusting one of said carriers into closer relation to the other during the knitting of ribbed web than during the knitting of plain web, take-up devices operative during the knitting of ribbed web and inoperative during the knitting of plain web, web holders coöperating with one set of needles, and means for rendering said web holders operative during the knitting of plain web and inoperative during the knitting of ribbed web.

24. The combination, in a knitting machine, of two sets of needles operable to produce either ribbed web or plain web and to transfer stitches from one set of needles to the other when the character of the knitting changes, carriers for said needles, pattern-controlled means for adjusting one of said carriers into closer relation to the other during the knitting of ribbed web than during the knitting of plain web, take-up devices operative during the knitting of ribbed web and inoperative during the knitting of plain web, web holders coöperating with one set of needles, and pattern-controlled means for rendering said web holders operative during the knitting of plain web and inoperative during the knitting of ribbed web.

25. The combination, in a machine for producing either plain or ribbed web, of a cylinder and its needles, a dial and needles coöperating therewith, means for maintaining the dial and its needles in close relation to the cylinder and its needles when ribbed web is being knitted and for raising the dial and its needles when plain web is being knitted, web holders operating in conjunction with the cylinder needles, and means for rendering said web holders inoperative when ribbed web is being knitted, and operative when plain web is being knitted.

26. The combination, in a machine for producing either plain or ribbed web, of a cylinder and its needles, a dial and needles coöperating therewith, pattern-controlled means for maintaining the dial and its needles in close relation to the cylinder and its needles when ribbed web is being knitted and for raising the dial and its needles when plain web is being knitted, web holders operating in conjunction with the cylinder needles, and means for rendering said web holders inoperative when ribbed web is being knitted and operative when plain web is being knitted.

27. The combination, in a machine for producing either plain or ribbed web, of a needle cylinder and its needles, a dial and needles coöperating therewith, means for maintaining said dial and its needles in close relation to the cylinder and its needles when ribbed web is being knitted, and for raising the dial and its needles when plain web is being knitted, web holders operating in conjunction with the cylinder needles, and pattern-controlled means for rendering said web holders inoperative when ribbed web is being knitted and operative when plain web is being knitted.

28. The combination, in a machine for producing either plain or ribbed web, of a needle cylinder and its needles, a dial and needles coöperating therewith, pattern-controlled means for maintaining said dial and its needles in close relation to the cylinder and its needles when ribbed web is being knitted and for raising the dial and its needles when plain web is being knitted, web holders operating in conjunction with the cylinder needles, and pattern-controlled means for rendering said web holders inop-

erative when ribbed web is being knitted and operative when plain web is being knitted.

29. The combination of the web holders and their carrier, a web holder operating ring having a retracting cam which occupies a fixed position therein, a series of cams for projecting the web holders and retaining them in the projected position, and means for simultaneously projecting or retracting all of the latter cams without effect upon the retracting cam.

30. The combination, of the web holders and their carrier, a web holder operating ring having a retracting cam, and movable cams for projecting the web holders and retaining them in such projected position, slides carrying said cams, and a ring having cam connection with said slides whereby movement of the ring will cause all of the web holder projecting cams to be advanced and retracted simultaneously.

31. The combination of the web holders and their carrier, the web holder operating ring, a cam thereon having a slide with cam groove therein, and an adjusting block having a stem adapted to said cam groove, and a confining screw for said block whose axis is eccentric to the periphery of the stem.

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

LOUIS N. D. WILLIAMS.

Witnesses:
KATE A. BEADLE,
HAMILTON D. TURNER.