

No. 670,308.

Patented Mar. 19, 1901.

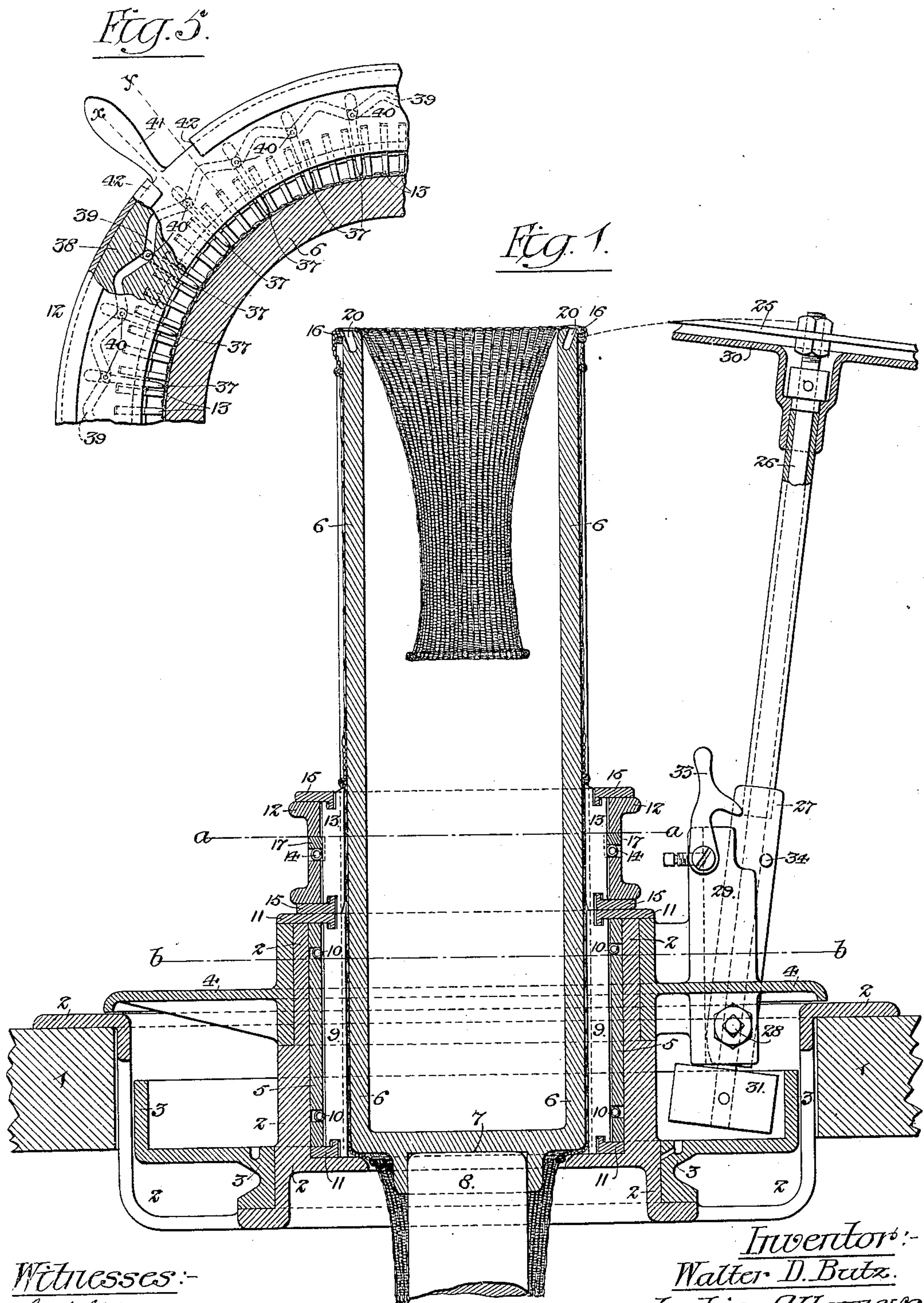
W. D. BUTZ.

MACHINE FOR RUNNING ON KNITTED FABRICS.

(Application filed Aug. 20, 1900.)

(No Model.)

3 Sheets—Sheet 1.



Witnesses:-

Louis H. Whitehead.

Chas. D. Cor.

Inventor:-

Walter D. Butz.

by his Attorneys:-

Howson & Howson

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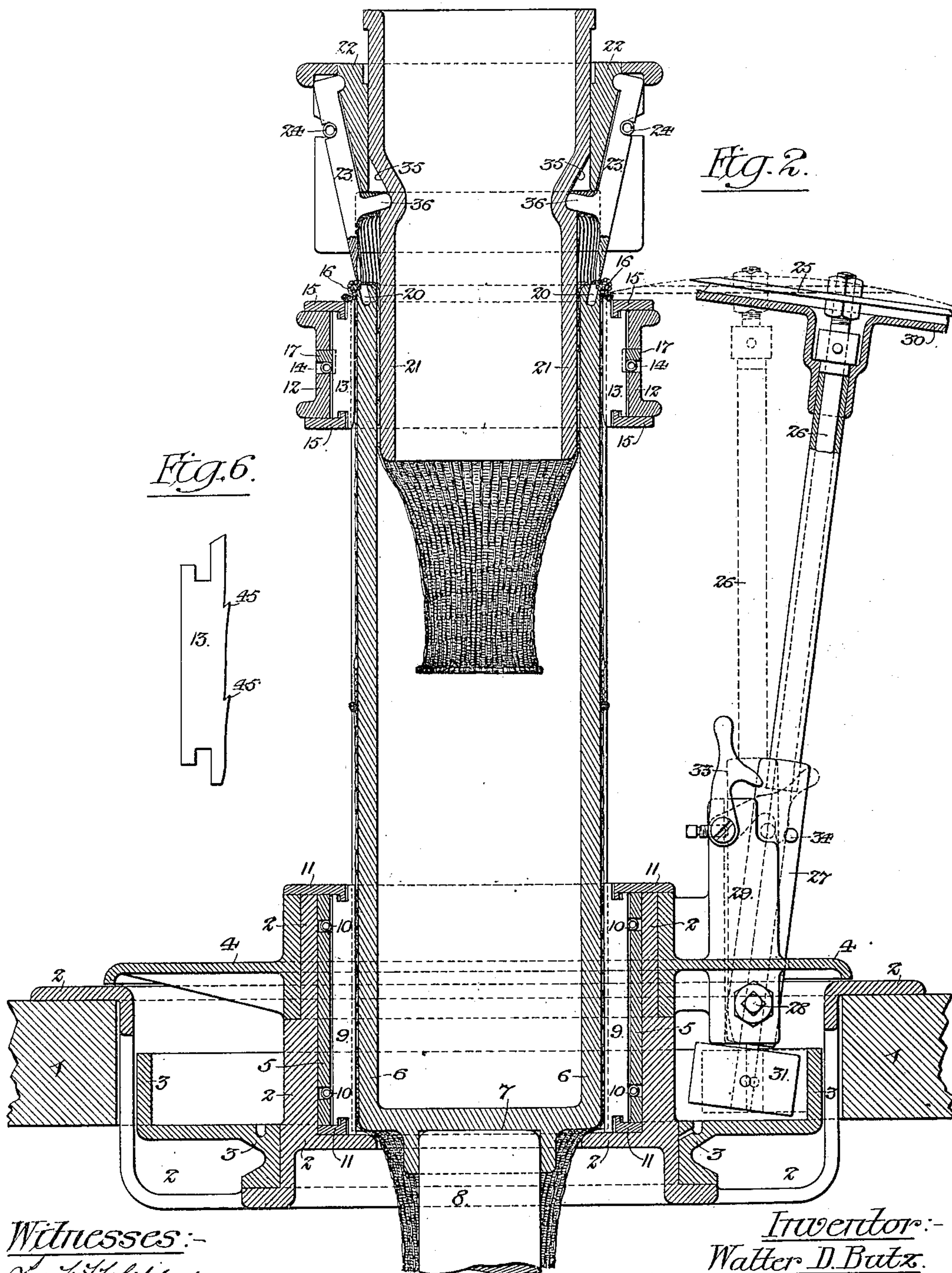
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Fig. 3.

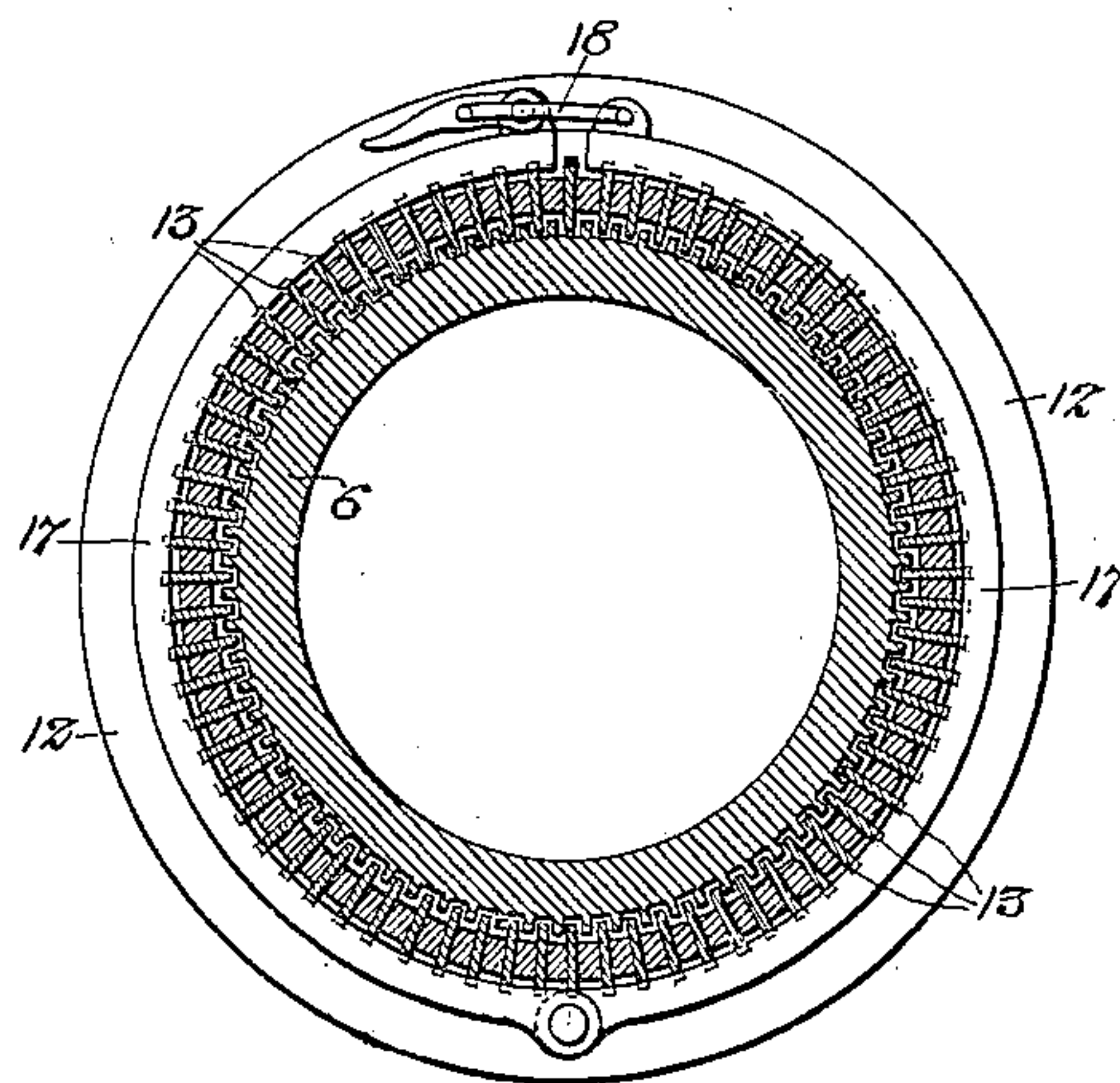
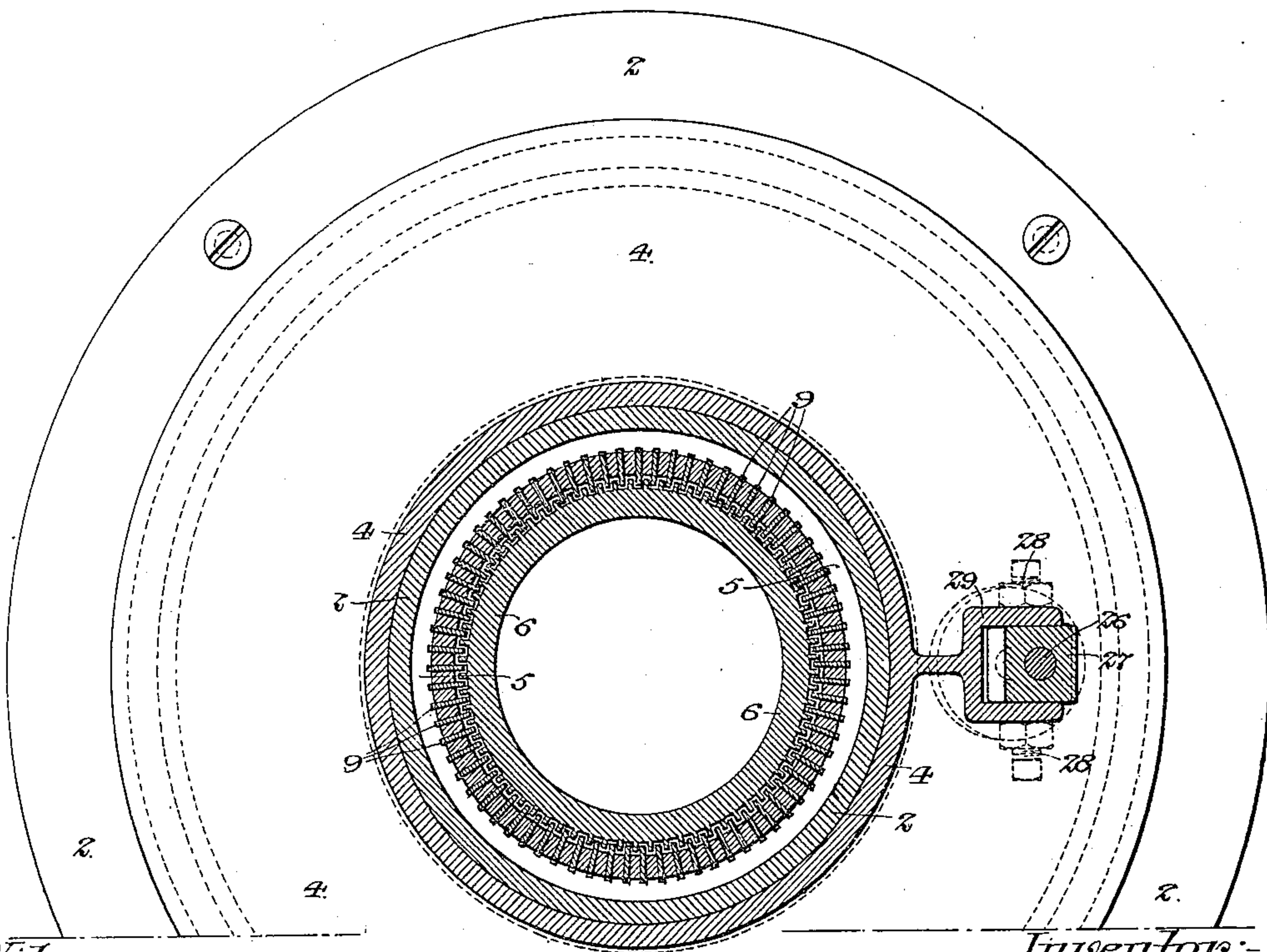


Fig. 4.



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UNITED STATES PATENT OFFICE.

WALTER D. BUTZ, OF NORRISTOWN, PENNSYLVANIA.

MACHINE FOR RUNNING ON KNITTED FABRICS.

SPECIFICATION forming part of Letters Patent No. 670,308, dated March 19, 1901.

Application filed August 20, 1900. Serial No. 27,467. (No model.)

To all whom it may concern:

Be it known that I, WALTER D. BUTZ, a citizen of the United States, residing in Norristown, Montgomery county, Pennsylvania, have invented certain Improvements in Machines for Running On Knitted Fabrics, of which the following is a specification.

The object of my invention is to provide a mechanical device for performing the operation known as "running on" in connection with the application of tubular webs of knitted fabric, either ribbed or plain, to the needles of a machine for knitting hosiery.

Ordinarily tubes of ribbed fabric intended to form the tops of half-hose or the legs of stockings are produced in a machine which forms in each tube a series of courses, each containing a bunch of threads and called a "welt," these welts being separated from each other to the extent of the desired length of the ribbed top or leg, and adjacent to each welt is formed a course composed of longer or slacker stitches than those in the body of the fabric, this "slack course" being the one which is intended to be run upon the needles of the machine for knitting the half-hose or foot portions onto said ribbed tops or legs. This running-on operation is usually performed by hand, the operator picking stitch after stitch of the slack course onto the successive needles of the needle-cylinder, there being, of course, as many stitches in said slack course as there are needles on the cylinder of the machine. This method of running on the fabric is a tedious and expensive one, and the aim of my invention is to provide a machine which will render it unnecessary.

In the accompanying drawings, Figure 1 is a vertical sectional view of sufficient of the machine to illustrate the first step in the operation of running on the stitches. Fig. 2 is a similar section of the complete machine, illustrating succeeding steps in the process. Fig. 3 is a sectional plan view on the line *a a*, Fig. 1. Fig. 4 is a sectional plan view on the line *b b*, Fig. 1; and Figs. 5 and 6 are views illustrating modifications of my invention.

Part of a table or bench is represented at 1 in Figs. 1 and 2, and to this table or bench is suitably secured a cylindrical structure 2, which provides a bearing for a friction driv-

ing-pulley 3, for a ring 4, and for a cylinder 5, said structure 2 also providing a rest or support for an internal cylinder 6, which has at its lower end a socket 7 for the reception of the upper end of a rod 8, upon which the tube of ribbed knitted fabric comprising the successive ribbed tops or legs is run preparatory to its application to the machine.

The cylinder 5 is slotted radially for the reception of a number of radially-guided bits or plates 9, one for each of the ribs of the knitted tube, these bits being pressed inwardly or toward the cylinder 6 by the action of surrounding coiled springs 10 and their movement being restricted within certain limits by ribs on cap-plates 11 at the ends of the cylinder 5, these ribs engaging with the recessed ends of the bits 9, as shown in Figs. 1 and 2.

The ribbed fabric is drawn from the rod 8 up over the cylinder 6, which is by preference ribbed externally to correspond with the ribs of the knitted web, the ribs of the cylinder alternating with the bits 9, so that said ribs of the cylinder will enter the spaces between the ribs on the inside of the knitted web, while the bits 9 will enter the spaces between the ribs on the outside of said knitted web. The ribbing of the cylinder 6, however, is not essential to the proper carrying out of my invention, the bits 9 being in most cases sufficient to effect the proper disposal and guidance of the ribs of the knitted web on the outside of the cylinder 6 by reason of the registry of said bits with the spaces between the ribs on the outside of the web.

Mounted so as to be free to slide vertically on the cylinder 6 is a ring 12, which carries a series of bits 13, similar in number and character to the bits 9, but shorter than the latter, these bits 13 being pressed inwardly or toward the cylinder 6 by means of the surrounding coiled spring 14 and having their movement limited by the ribs upon cap-plates 15. The fabric is drawn up on the cylinder 6 past the bits 13 of the ring 12 until the second welt from the end of the tube of ribbed fabric is above the tops of the bits 13, as shown in Fig. 1. The ring 12 is then raised so as to pull the tube of ribbed fabric evenly up on the cylinder 6, and that portion of the tube above the ring 12 is turned in over the

top of the cylinder until the welt is just below the annular flange 16 at the top of the cylinder, as shown in Fig. 2. The ring 12 may be self-retaining in this position by reason of the tension of the surrounding spring 14 upon the bits 13, or, if desired, the ring 12 may be recessed for the reception of a hinged two-part clamp-ring 17, such as shown in Fig. 3, the free ends of this ring being provided with lever or toggle mechanism 18, whereby said free ends may be drawn together, so as to clamp the ring tightly upon the bits 13, and thereby force the same firmly against the ribbed fabric and the latter against the cylinder 6.

The upper end of the cylinder 6 has an annular recess or channel 20 formed in it, and when the surplus fabric has been drawn in snugly over the top of the cylinder the stitches of the slack course immediately above the welt, which is resting on the tops of the bits 13 of the ring 12, will span the upper end or mouth of this recess or channel.

The snug drawing of the ribbed knitted tube over the top of the cylinder 6 may be effected by thrusting down into said cylinder the lower end of another cylinder 21, which fits so closely within the cylinder 6 as to confine the knitted web snugly between the two, the exterior of the cylinder 21 being, if desired, roughened or provided with suitable spurs or barbs which will engage with the knitted web and draw the same downward as the cylinder 21 is thrust down into the upper end or mouth of the cylinder 6.

Mounted on the cylinder 21 is a ring 22, slotted for the reception of a number of fingers 23, one for each stitch of the slack course of the ribbed web, these fingers being pivoted to the ring 22 at their upper ends and being retained normally in their innermost positions by the action of an encircling spring 24. When thus retained, the lower ends or points of the fingers 23 are in line with the upper end or mouth of the recess or channel 20 in the cylinder 6, and the fingers 23 bear such relation to the bits 13 that when the cylinder 21 is thrust down into the upper end of the cylinder 6 the point of each finger will enter one of the stitches of the slack course of knitted web which spans the mouth of said recess 20. The next operation is to cut the section of knitted web thus applied to the fingers 23 from the next section, which remains upon the cylinder 6, and this is effected by means of a rotary cutter 25, mounted upon a vertical shaft 26, which is adapted to suitable bearings in a swinging carrier 27, pivoted at 28, adjacent to its lower end, in an open-ended box 29, formed upon the ring 4. The upper end of the hanger 27 is expanded so as to form a shield or guard 30 for the rotating knife 25, and the lower end of the knife shaft or spindle 26 is provided with a friction-drum 31, which can be rotated by contact with the inner surface of the flange of the friction driving-pulley 3, the latter being con-

tinuously rotated by means of a suitable driving-belt adapted to the grooved hub 32 of the pulley. Normally the hanger 27 is swung outwardly, as shown in Fig. 1, so that the drum 31 is free from contact with the flange of the driving-pulley 3 and no rotating movement is imparted to the knife 25. When it is desired to put the knife into action, however, the upper end of the hanger 27 is swung inwardly toward the cylinder 6, so as to bring the knife 25 into cutting relation with that portion of the knitted fabric immediately below the top flange 16 of said cylinder 6, this being the portion between the slack course and the welt. This same movement brings the drum 31 into driving contact with the flange of the pulley 3. Hence rotary motion is imparted to the knife 25. A pivoted catch-lever 33 on the box 29 engages with a stud or pin 34 on the hanger 27 to retain the latter in the operative position, and when the parts have been thus adjusted, as shown by dotted lines in Fig. 2, the ring 4 is turned on its bearing, so as to carry the knife around the cylinder 6, and thereby completely sever that portion of the knitted tube which is impaled upon the fingers 23 from that portion which remains upon the cylinder 6. After the slack course of stitches had been thus impaled upon the points of the fingers 23 and before the cutting operation the ring 12 was dropped to its lowermost position, so that the upper ends of the bits 13 pass below the next welt of the knitted tube preparatory to a repetition of the lifting operation. After the cutting of the fabric has been effected the cylinder 21 is removed from the cylinder 6, and the fingers 23 are expanded by pushing said cylinder downward into the ring 22, so that the upper cam-face 35 of an external recess formed in said cylinder will act upon inwardly-projecting tongues 36 on the fingers 23 and force the latter outwardly, so as to stretch or expand the fabric impaled upon the points of the fingers, this being necessary because the diameter of a tube of ribbed fabric is considerably less than the diameter of the needle-cylinder upon which it was produced, the fabric being knitted under considerable tension and the tube contracting as soon as it is relieved from this tension.

From the points of the fingers 23 the stitches of the slack course can be readily slipped onto the grooved points of an ordinary transfer-ring and from the latter onto the needles of the knitting-machine.

It will be evident that the machine constructed in accordance with my invention will perform the operation of placing in position for the entrance of the points of the receiving-fingers 23 the stitches of the slack course of the knitted web by uniformly spacing said stitches for the entrance of the points of said fingers, this uniform spacing being effected by the action of the bits 9 and 13, which are caused to register with the spaces between the external ribs of the fabric as the

latter is drawn up over the cylinder 6. The use of the lower set of bits may be dispensed with in some cases and the upper set of bits 13 relied upon for effecting proper registry of the ribs of the fabric, or the reverse arrangement may be adopted, although the use of both sets of bits is preferred. Fixed bits may also be employed, if desired, instead of the radially-moving and spring-actuated bits which I have shown and described, the use of the latter, however, providing for inequalities in the thickness of the fabric, and for this reason being preferable to fixed bits. In some cases, also, the fingers 23 may be grooved, as shown in Fig. 2, in a manner similar to the points of a transfer-ring, and the stitches of the slack course may be transferred directly from these fingers to the needles of a knitting-machine without the intervention of the transfer-ring.

Although I have described the operation of running on by the use of my improved device, in connection with a slack row or course of knitting, it will be understood that any course of stitches, slack or tight, may be run onto the fingers 23.

While I have shown and described my invention as applied to the running on of ribbed tops or legs provided with welts, it is not confined to such work and may be applied to the running on of plain work. Such work is usually made without a welt, and to insure the engagement of the ring 12 with the fabric I may arrange a series of points 37 in the upper cap-plate 15, such points being disposed at suitable intervals around the plate, as shown in the sectional plan view. When the fabric is being raised on the guide, the points 37 are in engagement with the fabric, and when the ring is lowered for another portion of the web these points are thrown out of engagement therewith. To accomplish this, I provide a cam-ring 38, having a cam-groove 39, of the shape shown in Fig. 5, adapted to engage butts 40 on the ends of the points 37. The cam-ring 38 is provided with a handle 41, so that it may be given a partial rotative movement, and stops 42 are preferably carried by the cap-plate 15 to limit the movement of the ring, the points 37 being fully extended when the handle is at *x*, the limit of movement in one direction, and fully retracted when at *y*, the limit of movement in the opposite direction. A simpler method of attaining the same result is to provide the bits 13, or as many of them as may be necessary, with upwardly-projecting spurs or barbs 45, as shown in Fig. 6, these spurs engaging with and moving the fabric on the upward movement of the bits, but slipping over the fabric on the reverse movement of the same.

Having thus described my invention, I claim and desire to secure by Letters Patent—

1. The combination in a device for running

on knitted webs, of a guide for the web, means adapted to engage the latter whereby it may be moved on the guide, and a carrier for said engaging means movable on the guide, substantially as specified.

2. The combination in a device for running on ribbed knitted webs, of a guide for the web, a series of bits adapted to engage the latter, and a carrier for said bits movable on the guide, substantially as specified.

3. The combination in a device for running on ribbed knitted webs, of a guide for the web, a series of bits adapted to register with the spaces between the ribs of the web, means for engaging the web, and a carrier for the engaging means movable in respect to the guide, substantially as specified.

4. The combination in a device for running on ribbed knitted webs, of a guide for the web, a series of bits adapted to register with the spaces between the ribs of the web and to engage with said web, and a carrier for said bits movable on the guide, substantially as specified.

5. The combination in a device for running on knitted webs, of a guide for said web, a series of radially-movable bits adapted to engage with said web, means for pressing said bits yieldingly inward against the web, and a carrier for the bits movable on the guide, substantially as described.

6. The combination in a device for running on ribbed knitted webs, of a guide for said web, a series of radially-movable bits adapted to register with the spaces between the ribs of the fabric, means for pressing said bits yieldingly inward against the fabric, provision for engaging the fabric, and a carrier for the latter movable on the guide, substantially as described.

7. The combination in a device for running on ribbed knitted webs, of a guide for the web, a series of radially-movable bits adapted to register with the spaces between the ribs of the fabric, a clamp-ring surrounding said bits and serving to force them against the fabric, and a carrier for the bits movable on the guide, substantially as specified.

8. The combination in a device for running on ribbed knitted webs, of a guide for the web, and two sets of bits, one occupying a fixed longitudinal relation to said guide, and the other having movable longitudinal relation thereto, each of said sets of bits being adapted to register with the spaces between the ribs of the fabric, and provision on the movable element for engaging the fabric, substantially as specified.

9. The combination in a device for running on ribbed knitted webs, of a guide for the web, two sets of bits adapted to register with the spaces between the ribs of the web, both sets of ribs being radially movable, and one set occupying a fixed longitudinal relation to the web-guide and the other set being in movable longitudinal relation thereto, means for yield-

ingly pressing inward both sets of bits, and provision on the movable element for engaging the fabric, substantially as specified.

10. The combination in a device for running on ribbed knitted webs, of a guide for said web having at the top a recess or channel over which the stitches of the web can be drawn, and a web-registering device having bits for entering the spaces between the ribs of the fabric, substantially as specified.

11. The combination in a device for running on ribbed knitted webs, of a guide for said web having at the top a recess or channel over which the stitches of the web can be drawn, and a web-registering device having bits for entering the spaces between the ribs of the fabric, said registering device also serving as a means of moving the web longitudinally on the guide, substantially as specified.

12. The combination in a device for running on ribbed knitted webs, of a guide for the web, a web-registering device having bits for entering the spaces between the ribs of the web, and a cutting-knife mounted in such relation to the web-guide as to cut the web thereon, substantially as specified.

13. The combination in a device for running on ribbed knitted webs, of a web-guide, a web lifter or mover having bits for registering with the spaces between the ribs of the web, and a knife mounted so as to travel around the web-guide and cut the web thereon, substantially as specified.

14. The combination in a device for running on ribbed knitted webs, of a guide, a web lifter or mover having bits for registering with the spaces between the ribs of the web, and a knife mounted so as to travel around the web-guide and cut the web thereon, and means for rotating said knife, substantially as specified.

15. The combination in a device for running on ribbed knitted webs, of a web-guide, a web lifter or mover having bits for registering with the spaces between the ribs of the web, and a rib or flange at the end of said web-guide, said rib or flange serving as a guide for the cutting-knife, substantially as specified.

16. The combination in a device for running on ribbed knitted webs, of a web-guide, a web-registering device having bits which enter the spaces between the ribs of the web, and a series of fingers occupying such relation to the said bits that they will enter the stitches between the same, substantially as specified.

17. The combination in a device for running on ribbed knitted webs, of a web-guide, a web-registering device having bits which enter the spaces between the ribs of the web, said registering device serving also as a means of moving the web longitudinally on the guide, and a series of fingers occupying such relation to the said bits that they will enter the stitches between the same, substantially as specified.

18. The combination in a device for running on ribbed knitted webs, of a web-guide hav-

ing a recessed or channeled end, a web-registering device having bits which enter the spaces between the ribs of the web, and fingers adapted to enter the recess or channel of the web-guide and bearing such relation to the bits of the web-registering device that they will enter the stitches between said bits as said stitches are drawn over the recessed top of the web-guide, substantially as specified.

19. The combination in a device for running on ribbed knitted webs, of a web-guide having a recessed or channeled end, a web-registering device having bits which enter the spaces between the ribs of the web, said registering device serving also as a means of moving the web longitudinally on the guide, and fingers adapted to enter the recess or channel of the web-guides and bearing such relation to the bits of the web-registering device that they will enter the stitches between said bits as said stitches are drawn over the recessed top of the web-guide, substantially as specified.

20. The combination in a device for running on ribbed knitted webs, of a web-guide, a web-registering device having bits which enter the spaces between the ribs of the web, a cylinder adapted to enter the web-guide and confine and stretch the web, and a series of fingers for entering the stitches which have been uniformly spaced by the action of the bits of the web-registering device, substantially as specified.

21. The combination in a device for running on knitted webs, of a web-guide, means for moving the web longitudinally thereon, and a series of fingers for entering stitches of the web at the end of the guide, substantially as specified.

22. The combination in a device for running on knitted webs, of a web-guide, means for moving the web longitudinally on said guide, a series of fingers for entering stitches at the end of the guide, and means for expanding said series of fingers, substantially as specified.

23. The combination in a device for running on ribbed knitted webs, of a web-guide, a web-registering device having bits which enter the spaces between the ribs of the web, fingers for entering the stitches which have been uniformly spaced by the action of said bits, and means for expanding said fingers so as to stretch the web, substantially as specified.

24. The combination in a device for running on ribbed knitted webs, of a web-guide, a web-registering device having bits which enter the spaces between the ribs of the web, said registering device serving also as a means of feeding the web longitudinally on the guide, fingers for entering the stitches which have been uniformly spaced by the action of said bits, and means for expanding said fingers so as to stretch the web, substantially as specified.

25. The combination in means for running

on the stitches of webs, of a web-guide, means for moving the web longitudinally on said guide, and for spacing the stitches of the web, a series of fingers for entering said stitches, 5 a ring to which said fingers are pivoted, and a cam-cylinder for acting on said fingers so as to expand the same, substantially as specified.

26. The combination in a device for running on knitted webs, of a web-guide, a ring rotatable thereon, a device for moving the web longitudinally on the web-guide, and a web-cutting knife mounted in a swinging hanger on the rotating ring, substantially as specified. 10

27. The combination in a device for running 15 on knitted webs, of a web-guide, means for moving the webs longitudinally on said guide, a rotary cutting-knife, a swinging hanger therefor, mounted so as to rotate about the web-guide, and driving mechanism for the

knife-shaft so disposed as to be thrown into 20 operative relation therewith when the knife is moved into operative position and out of operative relation when the knife is swung outward, substantially as specified.

28. The combination in a device for running 25 on knitted webs, of a web-guide, means for moving the web longitudinally on the web-guide, a cutting-knife mounted so as to rotate around the web-guide, and a carrier for the knife forming also a guard therefor, substantially as specified. 30

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

WALTER D. BUTZ.

Witnesses:

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H. HAYES AIKENS.