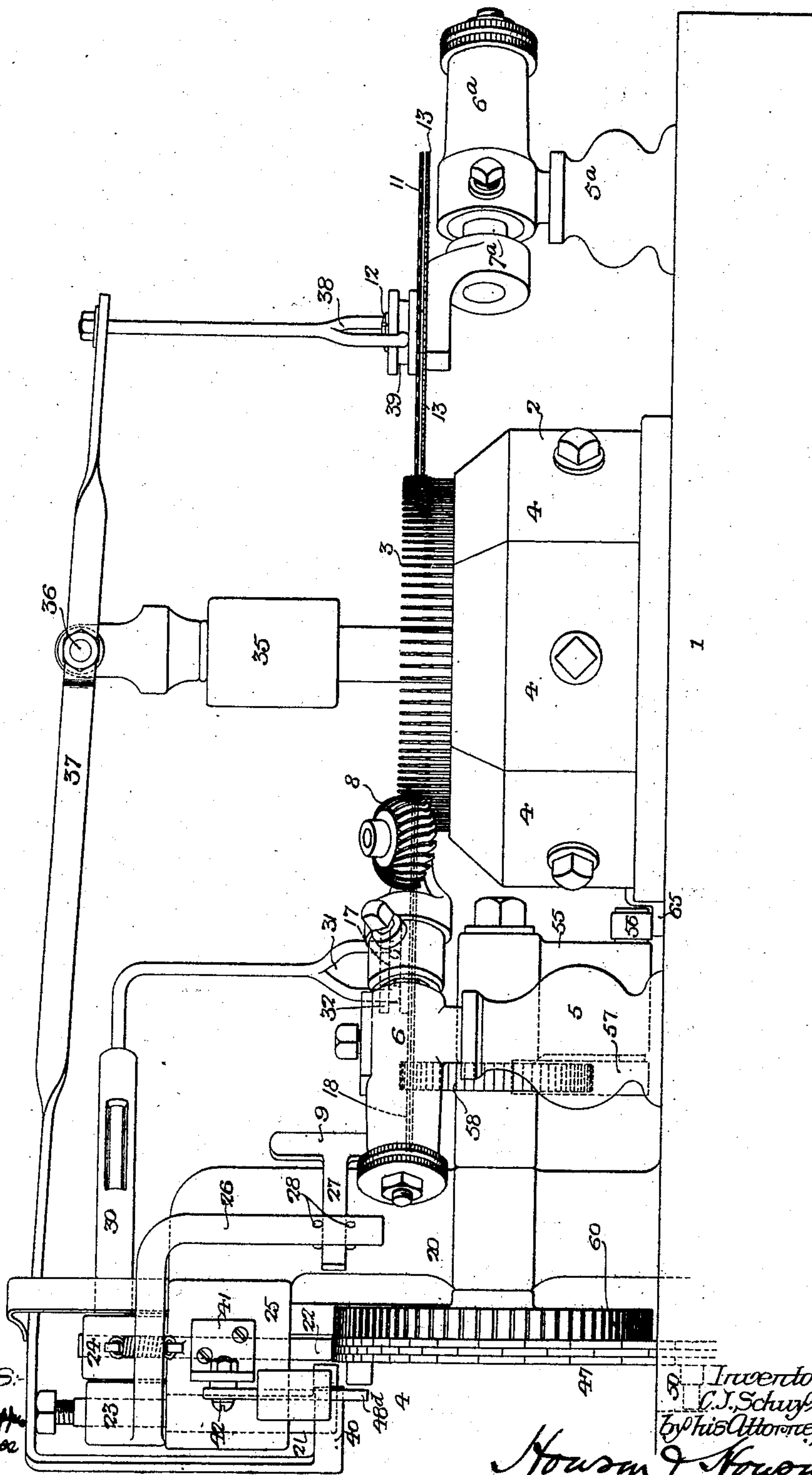


Fig. 1.



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C. J. SCHUYLER.
 OPENWORK AND TUCKING DEVICE FOR CIRCULAR KNITTING MACHINES.

915,627.

APPLICATION FILED MAR. 22, 1907.

Patented Mar. 16, 1909.

3 SHEETS—SHEET 2.

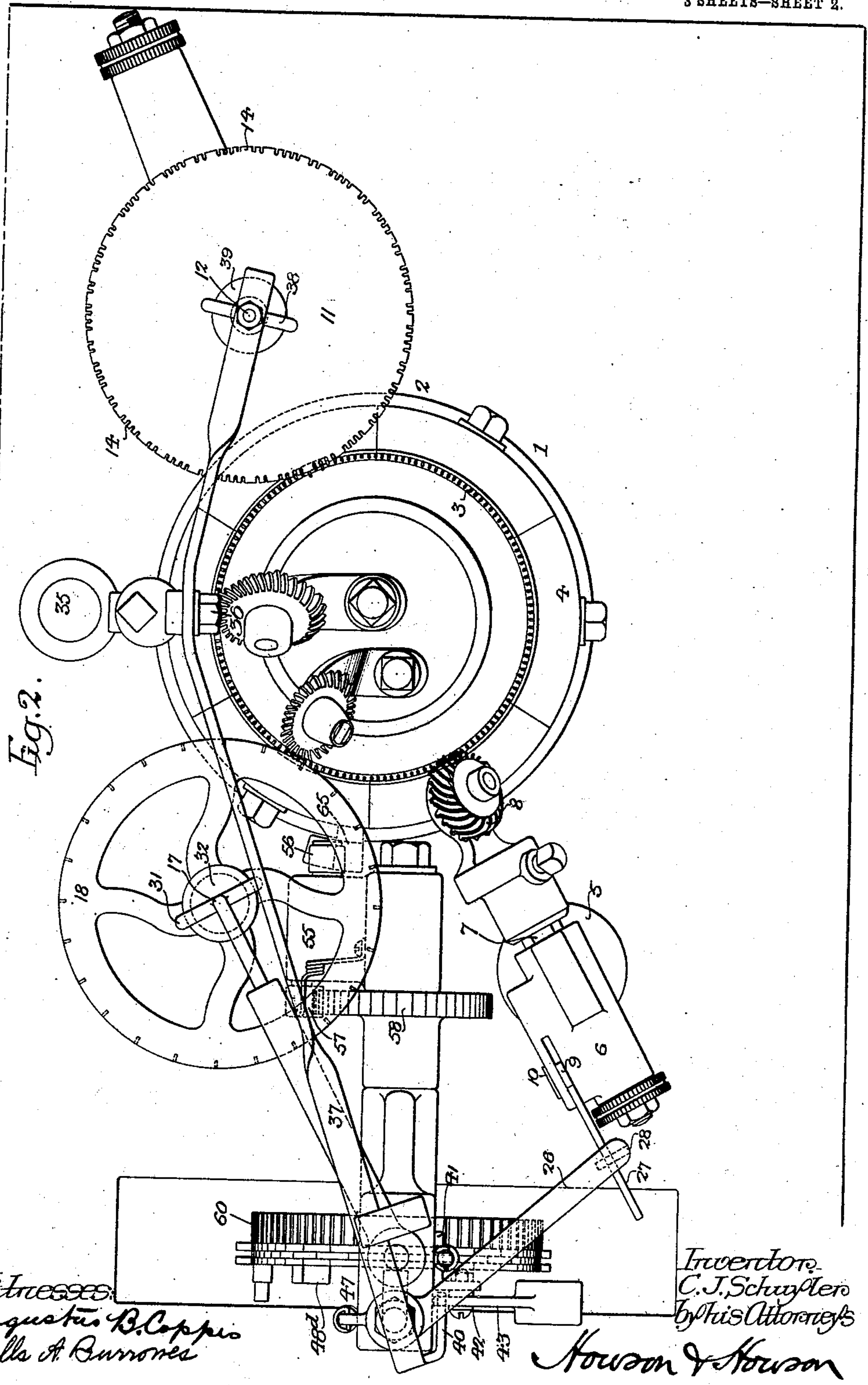


Fig. 2.

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Fig. 3.

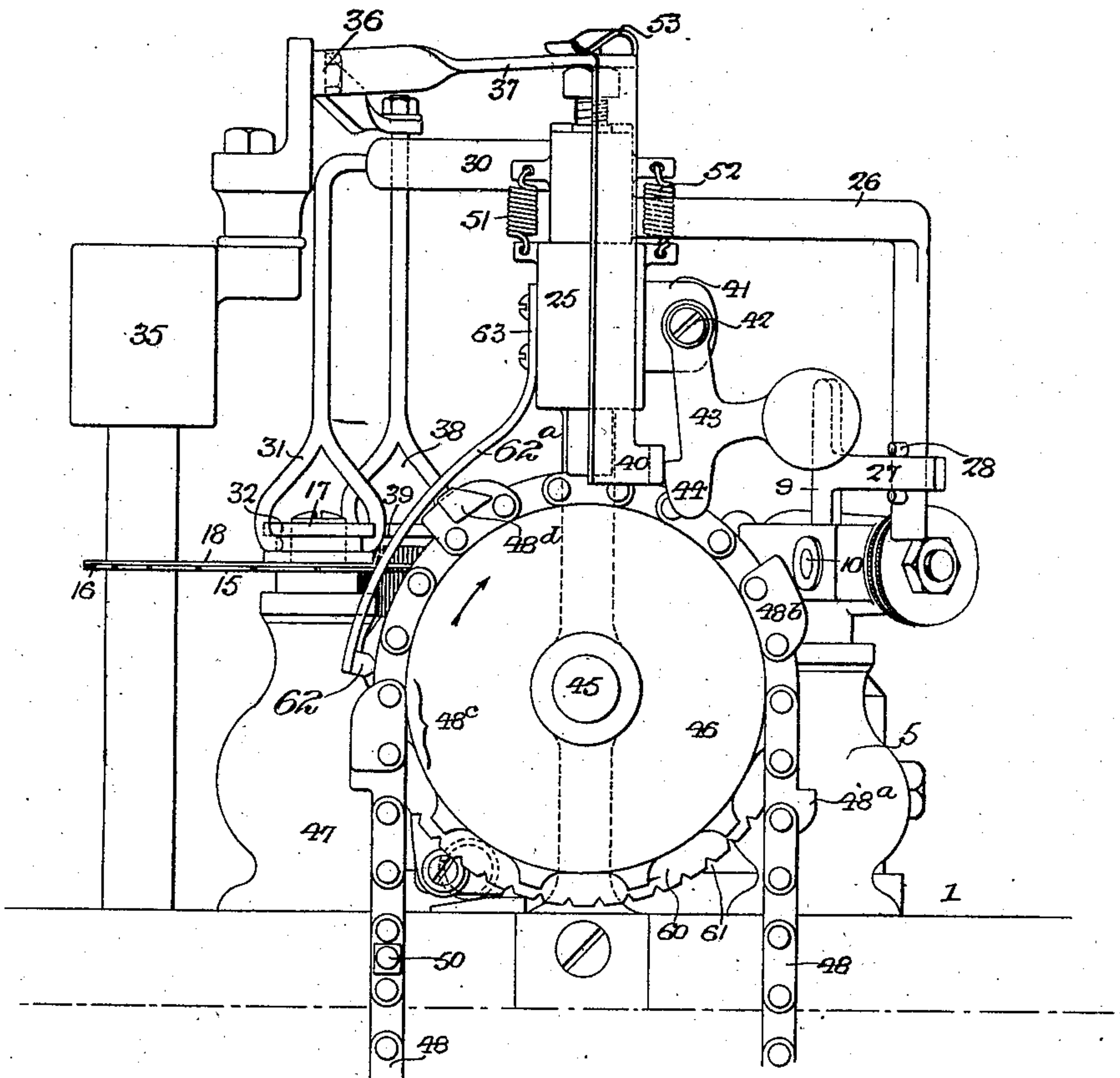
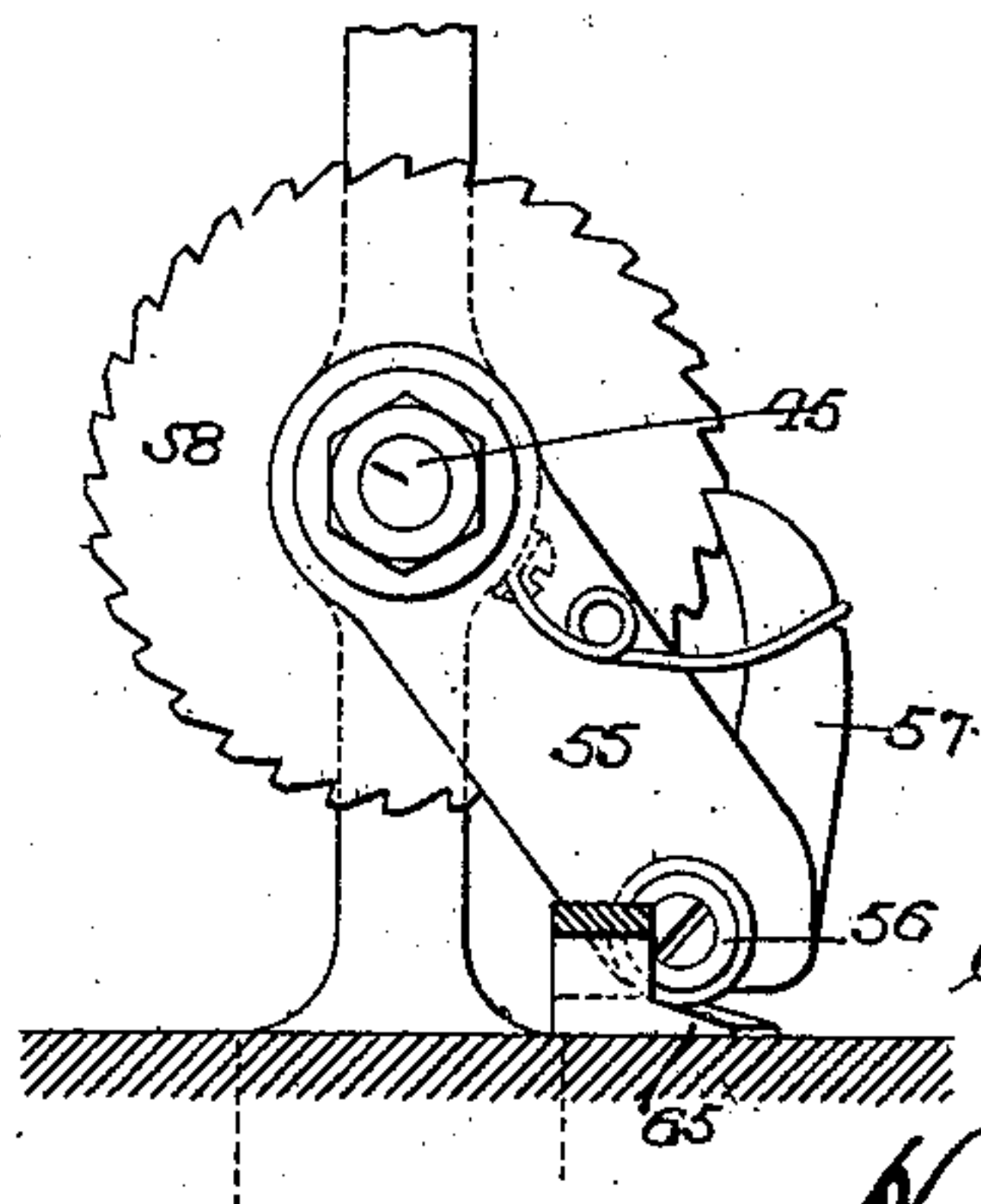


Fig. 4.



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UNITED STATES PATENT OFFICE.

CHARLES J. SCHUYLER, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO J. NEAFIE BOWER
AND EUGENE M. KAUFMANN, TRADING AS BOWER & KAUFMANN, OF PHILADELPHIA,
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OPENWORK AND TUCKING DEVICE FOR CIRCULAR-KNITTING MACHINES.

No. 915,627.

Specification of Letters Patent.

Patented March 16, 1909.

Application filed March 22, 1907. Serial No. 363,963.

To all whom it may concern:

Be it known that I, CHARLES J. SCHUYLER, a citizen of the United States, residing in Philadelphia, Pennsylvania, have invented certain Improvements in Openwork and Tucking Devices for Circular-Knitting Machines, of which the following is a specification.

My invention relates to circular knitting machines of the type employing bearded needles; the particular machine to which my improvements have been applied being designed for the production of stocking leg tubes and similar seamless fabrics having plain and lace portions, the knitting of which is effected by the aid of bur wheels and tuck-and drop-stitch presser disks, and in which provision is made for the introduction of a slack course or courses desired.

My invention consists of a series of mechanisms combined with a machine of the above described type for automatically controlling at predetermined intervals the raising and lowering of the tuck-and drop-stitch presser disks and the means for producing a slack course or courses, and the object of my invention is to produce continuous stocking legs on a knitting machine of this type having plain and lace portions, and to provide that the changes from plain knitting to lace-work, and vice versa, shall be done without stopping the machine.

A further object of my invention is to reduce the amount of attention necessary to be given by the operator in running a machine of this character, and to reduce the cost of running the machine and the product made thereon.

These objects I attain with the use of the mechanism forming the subject of my invention in the manner hereinafter described; reference being had to the accompanying drawings, in which:

Figure 1, is a side elevation of a knitting machine, of the type described having the improvements forming the subject of my invention applied thereto; Fig. 2, is a plan view of the same; Fig. 3, is an end elevation, looking in the direction of the arrow *a*, Fig. 2, and Fig. 4, is an elevation of the pattern chain actuating mechanism.

Referring to the drawings, 1 represents the base plate of the machine, in which is

mounted a rotatable needle cylinder 2 carrying the usual needles 3, rigidly fixed to and moving with said cylinder. The cylinder is provided with the usual segments 4 which may be removed in order to replace broken or damaged needles. Carried by said base plate 1 is a standard 5 in which is mounted a pivotal stem carrying a sleeve 6, and slidably supported in this sleeve is a bar 7 carrying at its projecting end a bur wheel 8 so constructed as to mesh with and deliver the yarn to the bearded needles 3. A lever 9 is connected at the bar 7 and said lever is pivoted at 10 to the sleeve 6 in such manner that when moved toward the needle cylinder it will move said bar 7 and cause the bur wheel 8 carried on the end of the same to deepen its mesh with the needles, thereby feeding more yarn; such action taking place during the introduction of a slack course.

Disposed opposite the bur wheel 8 is a drop-stitch presser disk 11, rotatably mounted on a suitable spindle 12, and this spindle is carried by an arm arranged on the end of a bar 7^a adjustably mounted in a sleeve 6^a, which sleeve is carried by a stem pivotally disposed in a standard 5^a. Disposed below the drop-stitch presser disk 11 and of the same diameter, is another disk 13, the function of which is to rotate with and maintain said drop-stitch presser disk 11 in the proper relative position with respect to the needles so that that part of the design consisting of drop-stitches may be produced as desired with perfect regularity. The drop-stitch presser disk 11 has notches 14 cut in its periphery, clearly shown in Fig. 2, which notches, coacting with the needles, serve to effect the drop stitch portion of the design of stocking being knitted.

At the opposite side of the cylinder a tuck-stitch presser disk 15, also having notches 16 formed in its periphery, is mounted; a spindle 17 supporting the same, and mounted above said disk on the same spindle is a plain edged disk 18, having the same diameter as the disk 15 and engaging the beards of the needles as the cylinder is rotated. The disk 15 has no vertical movement, while the disk 18 may be moved vertically, and when in a raised position the beards of some of the needles will pass into the notches of the disk 15, thereby

producing a tuck-stitch in the fabric being knitted, the position of which depends upon the spacing and arrangement of said notches in the disk 15. When the disk 18 is lowered, it presses against the beards of the needles, closing the same and permitting them to cast their stitches in the usual manner.

The elements so described belong to knitting machines of the type to which my invention has been applied, and the improvements forming the subject of my invention are employed in combination therewith.

Mounted on the base plate 1 at the rear of the machine is a standard 20 forming a support for a pair of vertically moving rods 21 and 22 having hubs 23 and 24 respectively, which hubs serve to limit the downward movement of the rods in a bracket 25 carried by the standard 20. The hub 23 of the bar 21 carries a cranked arm 26 having means providing an operative engagement with an arm 27 of the lever 9. In the present instance such means comprise pins 28 carried by the cranked arm 26 and disposed on opposite sides of said arm. This mechanism serves to control the position of the bur wheel 8, and vertical movement imparted to the rod 21 will raise and lower the cranked arm 26 and through the connection just noted, the lever 9 will move said bur wheel into greater or less engagement with the beards of the needles 3.

Carried by the hub 24 of the rod 22 is a cranked arm 30 having a yoke 31 at its lower extremity in engagement with a grooved hub 32 carried by the disk 18 mounted above the tuck-stitch presser disk 15, and vertical movement imparted to said arm 30 will raise and lower the disk, throwing the tuck-stitch presser disk into and out of action.

Secured to the base plate 1, at one side of the needle cylinder is a support 35 upon which is pivoted at 36, a double lever 37, one end of which is cranked and carries a yoke 38 for engagement with a grooved hub 39 of the drop-stitch presser disk 11, whereby the latter may be raised and lowered; the opposite end of said lever extending over the bar 21 and having an arm 40 lying adjacent the pattern chain for a purpose to be hereinafter described, such mechanism being clearly shown in Figs. 1 and 3.

Carried at the side of the bracket 25 of the standard 20 is an angle piece 41, to which is pivoted at 42 a weighted lever 43 having a hooked portion 44 for engagement at proper intervals with the arm 40 at the end of the lever 37, such mechanism controlling the action of the presser disk 11 to produce courses of drop-stitches. The standard 20 also forms a support for a rotating spindle 45, clearly shown in Fig. 3, which carries a

sprocket wheel 46 over which a pattern chain 47 passes, the latter being arranged to pass beneath the rod 22.

The chain is composed of links of different heights and sizes, those indicated at 48 producing plain knitting, those indicated at 48^a, 48^b and 48^c, producing, through the proper mechanism, tuck stitches, and in addition, projections 48^d are carried by certain of said links whereby, through the proper means, drop-stitches may be produced and the making of a loose or slack course provided for.

The links 48^a, having projections half the length of said links, will raise the rod 22 and cause the yoke 31 of the cranked arm 30 to raise the plate 18 above the tuck-stitch presser disk 15 and hold the same a sufficient length of time to enable said disk 15 to produce tuck-stitches including one course; those indicated at 48^b will lift the disk and hold it a sufficient length of time to produce tuck-stitches including two courses, and when these links are combined, as indicated at 48^c tuck-stitches including three courses will be produced. This method of combining the links may be carried out for as many courses of tuck-stitches as may be desired.

When one of the links carrying a projection 48^d passes beneath the rod 21, it raises it, which in turn acts upon the lever 10 to cause the feed wheel 8 to feed more yarn and produce a slack or loose course. The raising of the rod 21 also raises the lever 37, bringing the arm 40 of the same into position for engagement by the hook 44 by which it is held, thereby lowering the presser disk 11 for the production of the drop-stitches as desired. When a sufficient number of drop-stitch courses have been produced, the hook 44 is disengaged from the arm 40 by means of a pin 50 carried by one of the links of the chain and projecting into the path of said hook 44, and as many of these pins as desired may be carried by the chain.

The hubs 23 and 24 of the rods 21 and 22 are provided with springs 51 and 52, connected at their opposite ends to the bracket 25, whereby said rods can be returned to the lowered positions when released by the links of the pattern chain. The rod 21 is only raised long enough for the production of a slack course and is then returned to its lowered position, but the lever 37, when raised, permits the weighted hook 44 to pass under its arm 40, maintaining said lever in the raised position during the production of the courses of drop stitches. When the hook is disengaged by the pin 50 of the pattern chain, releasing said lever, the latter will be returned to its normal position by a spring finger 53 carried by the standard 20, thereby raising the presser disk 11 and stopping the production of drop-stitch courses.

Loosely mounted on the inner end of the spindle 45 is an arm 55 supporting a roller

56 and a pawl 57; said pawl being in constant engagement with a ratchet wheel 58 keyed to said spindle whereby the latter may be turned to carry the pattern chain.

5 A positioning wheel 60 is also carried by the spindle 45, having notches 61 evenly spaced in its periphery for engagement by a wedge-shaped pawl 62 carried by a spring arm 62^a secured at 63 to the bracket 25 whereby the
10 pattern chain may be definitely held between its intervals of movement. Mounted on the needle cylinder is a cam 65, and at every revolution of said cylinder it engages the roller 56, lifting the same to the extent of the
15 height of said cam, thereby causing the pawl 57 to rack one tooth of the ratchet wheel 58 keyed to the spindle 45; the chain 47 being thereby given feed equal to the length of half a tooth for every revolution of the needle cylinder.

By preference I begin the stocking leg by knitting several courses of tuck-stitches. The purpose of this is to prevent a back run of the drop stitches, as I practically knit my
25 stocking upside down; that is to say, I begin at the portion to which the foot is to be attached and work to the top. The tuck-stitches which I use to start a stocking also serve as a guide for the operator by which
30 he may know where to sever the legs of the stockings at different times.

I claim:

1. The combination, in a knitting machine, of a cylinder, bearded needles carried there-
35 by, pattern mechanism, a bur wheel for supplying thread to said needles, a presser disk for the production of tuck-stitches, a presser disk for the production of drop stitches, lifting means controlling said presser disks,
40 means for automatically operating said presser disks from the pattern mechanism, and means operatively connected therewith for actuating the bur wheel from and toward the needles.

45 2. The combination, in a knitting machine employing bearded needles, of a cylinder in which said needles are mounted, means for feeding thread thereto, means for producing courses of tuck-stitches in the work being
50 knitted, means for producing courses of drop-stitches in the work being knitted, means for operating the thread feeding mechanism to produce a slack course, pattern mechanism, and lifting means automatically controlled
55 by said pattern mechanism for operating the tuck-stitch, drop-stitch and loose course producing means.

3. The combination, in a knitting machine employing bearded needles, of a cylinder in
60 which said needles are mounted, means for feeding thread thereto, means for producing courses of tuck-stitches in the work being knitted, means for producing courses of drop-stitches in the work being knitted, means for
65 producing a slack course, a series of levers in

operative engagement with said several means for imparting vertical movement thereto, pattern mechanism, and means automatically controlled by said pattern mechanism for actuating said levers to put into
70 and out of action the tuck-stitch, drop-stitch and loose course producing means.

4. The combination, in a knitting machine employing bearded needles, of a cylinder, means for rotating the same, pattern mech-
75 anism, a bur wheel for feeding thread to the needles, means for moving the same into and out of deep engagement with said needles whereby slack courses may be produced, a presser disk for producing courses of drop-
80 stitches, a presser disk for producing courses of tuck-stitches, and lifting means for automatically operating said presser disks and the loose course forming mechanism, said lifting means being actuated by the pattern
85 mechanism.

5. The combination, in a knitting machine employing bearded needles, of a cylinder, means for rotating the same, a bur wheel for
90 feeding thread to the needles, means for placing the same in position to produce a slack course, a presser disk for producing courses of drop-stitches, a presser disk for producing courses of tuck-stitches, lifting
95 means connected to said presser disks, and pattern mechanism controlling said lifting means and the means for placing the bur wheel in position to form a slack course.

6. The combination, in a knitting machine employing bearded needles, of a cylinder, 100
means for rotating the same, chain pattern mechanism, a presser disk for producing courses of tuck-stitches, a presser disk for producing courses of drop-stitches, levers for
105 raising and lowering said presser disks, and means in operative engagement with said levers and disposed in the path of the pattern mechanism whereby said levers will be operated by certain links of said chain.

7. The combination, in a knitting machine 110
employing bearded needles, of a cylinder, means for rotating the same, a pattern chain, a presser disk for producing courses of drop-stitches, a lever connected to the same,
115 means controlled by the pattern chain for placing said lever in position to cause the presser disk to produce courses of drop-stitches, means for maintaining said lever in such position, and means also carried by the
120 pattern chain for releasing said lever when the formation of drop-stitch courses is to cease.

8. The combination, in a knitting machine employing bearded needles, of a cylinder, means for rotating the same, a pattern chain, 125
a presser disk for producing courses of tuck-stitches, a cranked arm connected to the same, means controlled by the pattern chain for placing said cranked arm in position to
130 cause the presser disk to produce courses of

tuck-stitches, means for maintaining said cranked arm in such position, and means, also carried by the pattern chain for releasing said cranked arm when the formation of tuck-stitch courses is to cease.

9. The combination, in a knitting machine employing bearded needles, of a cylinder in which said needles are mounted, a drop-stitch presser disk for engagement with said needles, a lever controlling the position of said disk, means for raising one end of said lever to place said disk in the operative position, and a hook for holding said lever in such position during the formation of the drop-stitch courses.

10. The combination, in a knitting machine employing bearded needles, of a cylinder in which said needles are mounted, a bur

wheel, a drop-stitch presser disk, a pattern chain, a vertically movable member disposed in position for engagement by said pattern chain, a cranked arm carried by said member for controlling the position of the bur wheel, a lever connected to said drop-stitch presser disk, and means carried by said pattern chain for raising said member and throwing the bur wheel into position to produce slack courses, and the presser disk into position to produce drop-stitches.

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

CHARLES J. SCHUYLER.

Witnesses:

A. H. McKNISTRY,
L. V. GOODWIN.