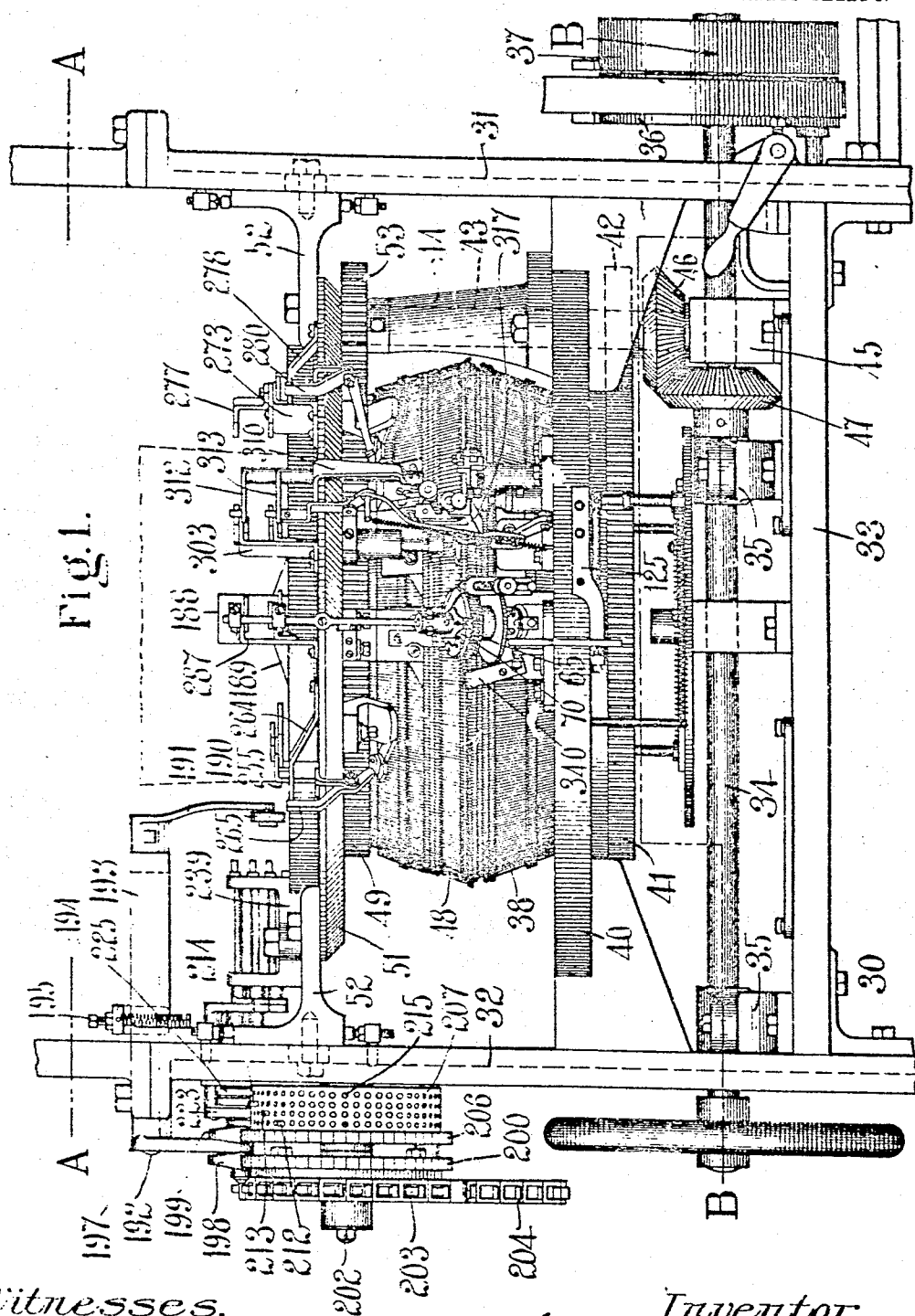


1,003,085.

14 SHEETS-8 SHEET 1.



Franklin E. Low.

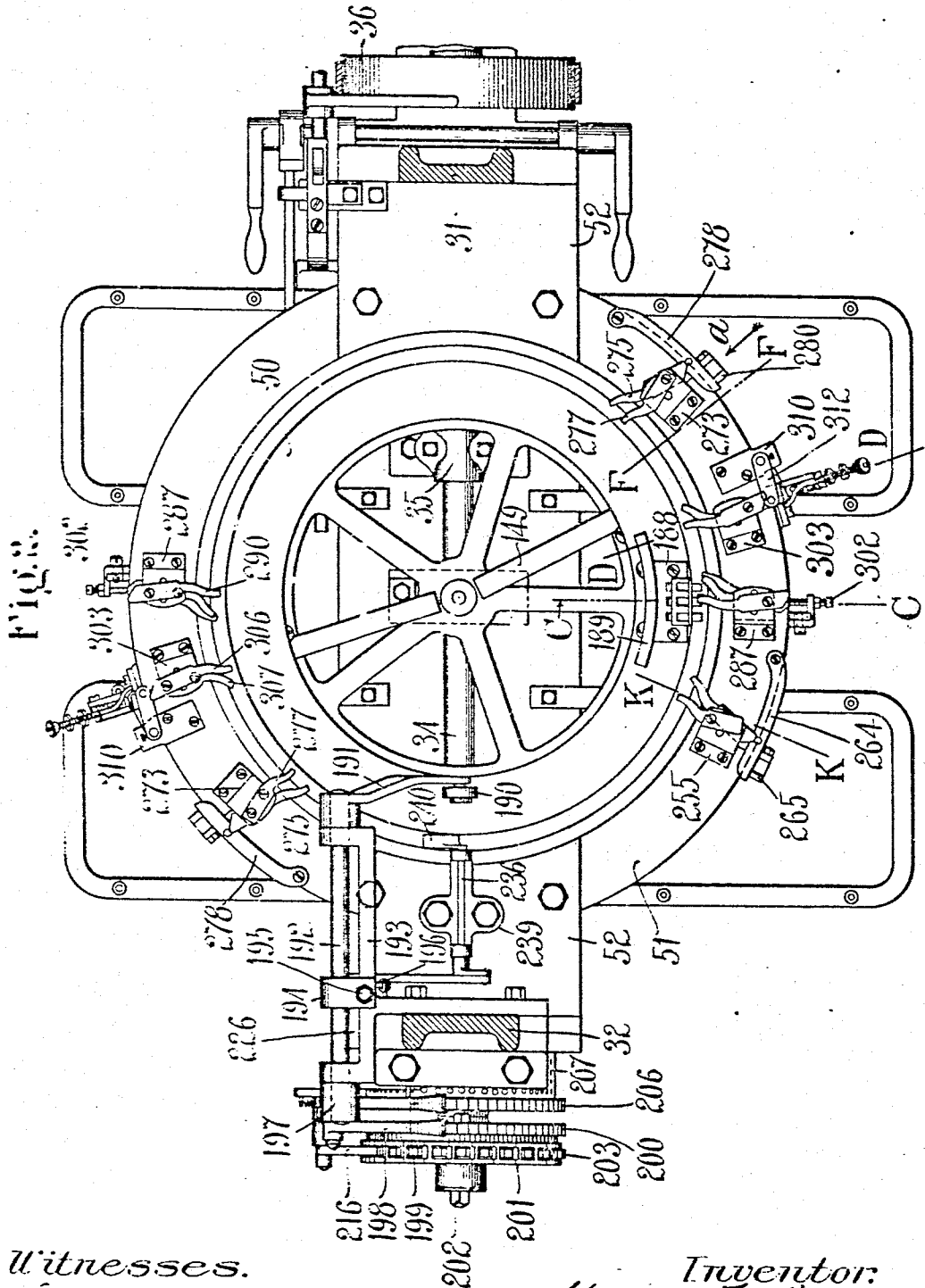
By his attorney, Charles S. Foxing.

W. T. BARRATT.
CIRCULAR KNITTING MACHINE.
APPLICATION FILED MAY 9, 1907.

1,003,085.

Patented Sept. 12, 1911.

14 SHEETS—SHEET 2.



Witnesses.
Sydney E. Taft.
Franklin E. Low.

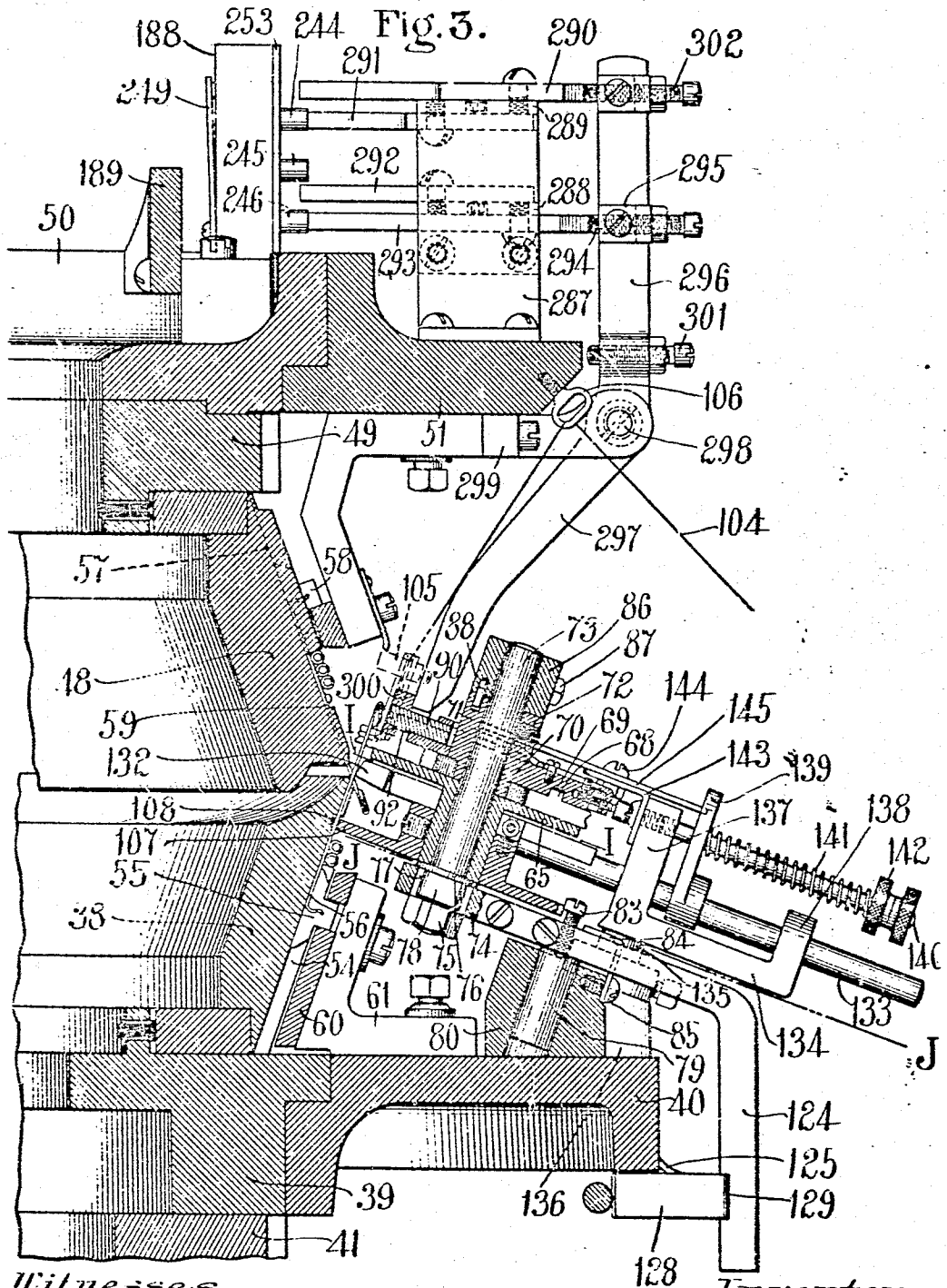
Inventor:
William J. Barratt,
by his attorney, Charles S. Gooding

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APPLICATION FILED MAY 9, 1907.

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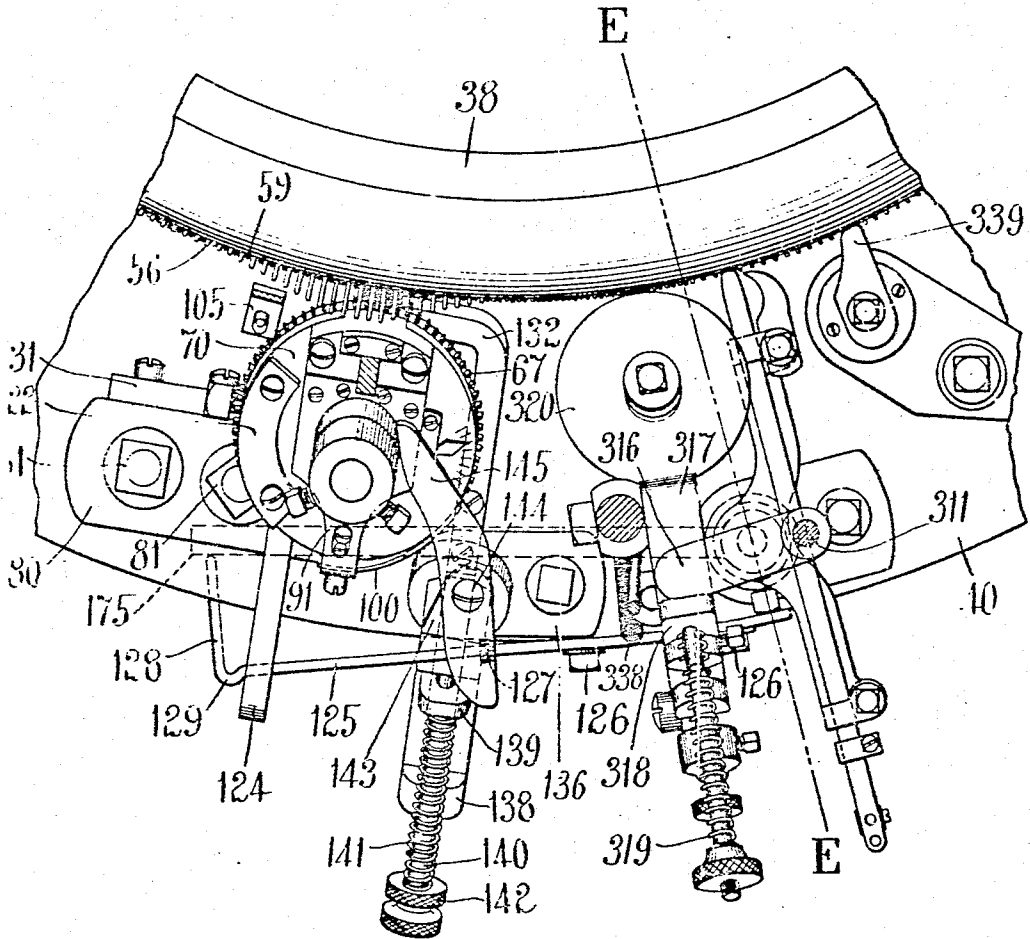
14 SHEETS-SHEET 3.



Witnesses.
Lydney C. Taft.
Franklin E. Low.

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

Fig. 4.



Witnesses.

Sydney C. Taft.

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W. T. BARRATT.
CIRCULAR KNITTING MACHINE.
APPLICATION FILED MAY 9, 1907.

1,003,085.

Patented Sept. 12, 1911.
14 SHEETS—SHEET 5.

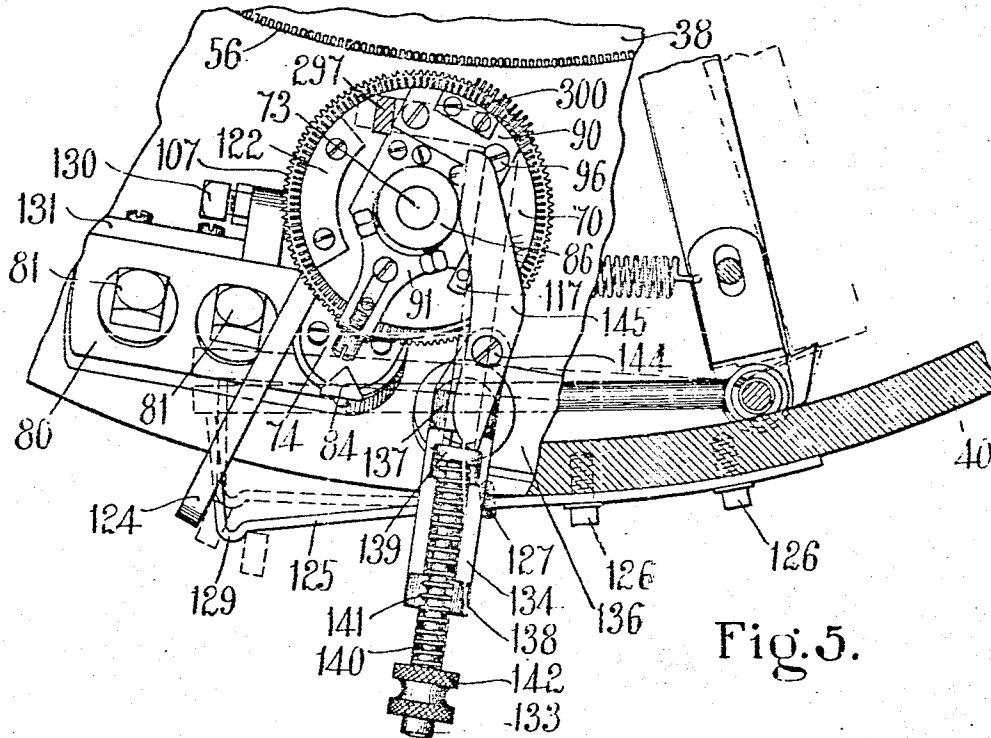


Fig. 5.

Witnesses.

Sydney C. Taft.

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W. T. BARRATT.
CIRCULAR KNITTING MACHINE.
APPLICATION FILED MAY 9, 1907.

1,003,085.

Patented Sept. 12, 1911.
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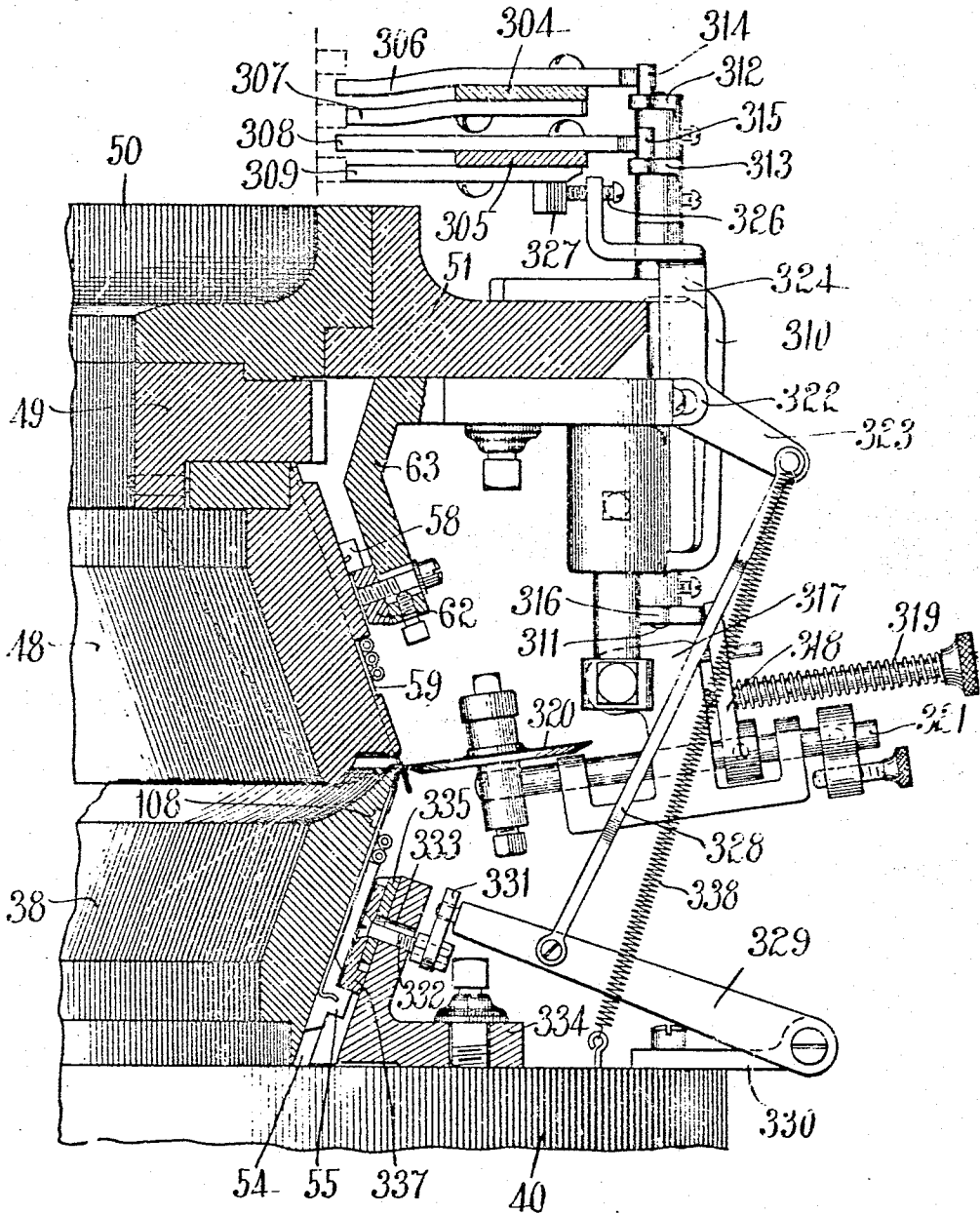


Fig. 6.

Witnesses.

Sydney C. Taft.

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CIRCULAR KNITTING MACHINE.
APPLICATION FILED MAY 8, 1907.

Patented Sept. 12, 1911.
14 SHEETS-SHEET 7.

1,003,085.

Fig. 8.

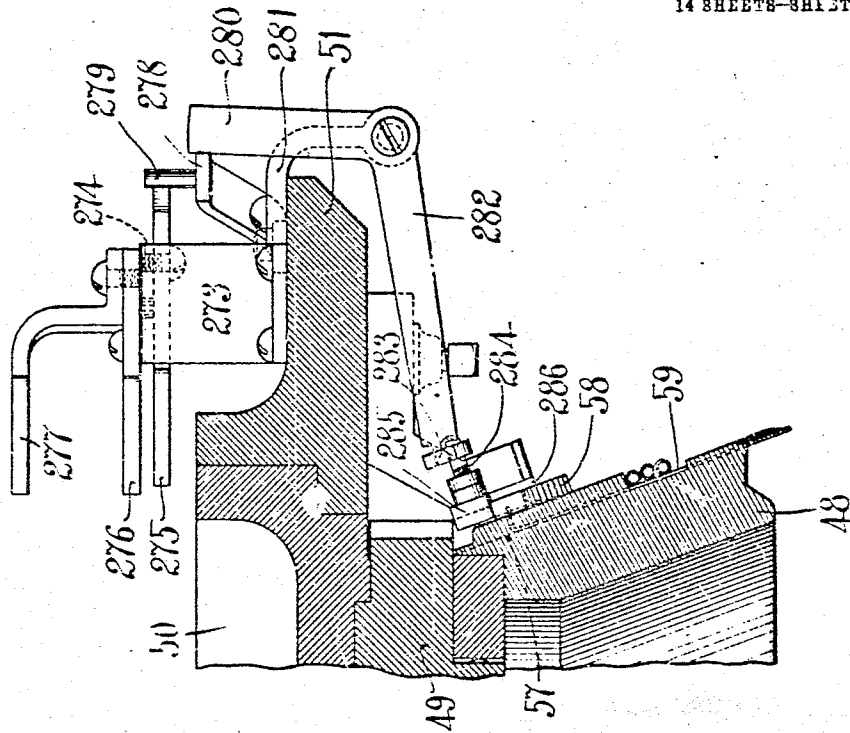
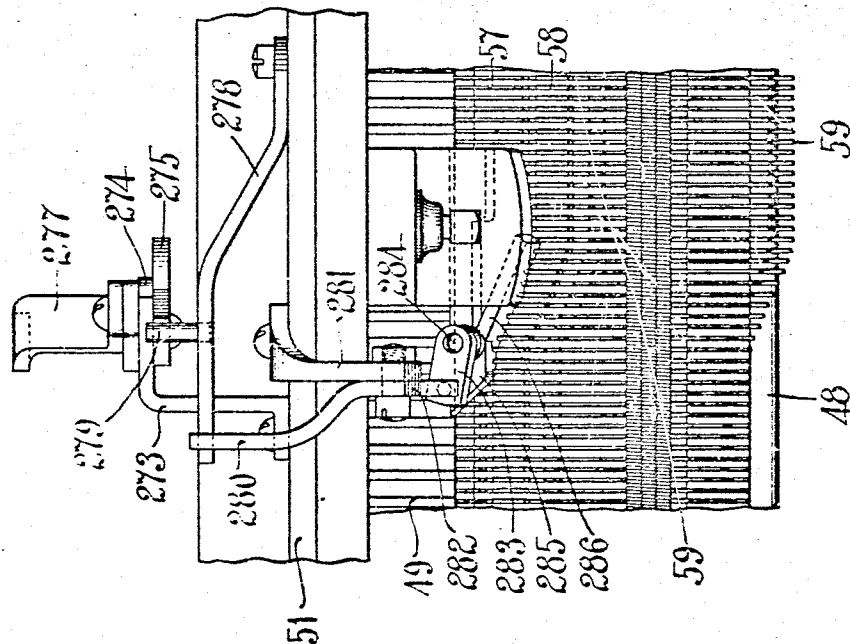


Fig. 7.



Witnesses.

Sydney C. Taft.

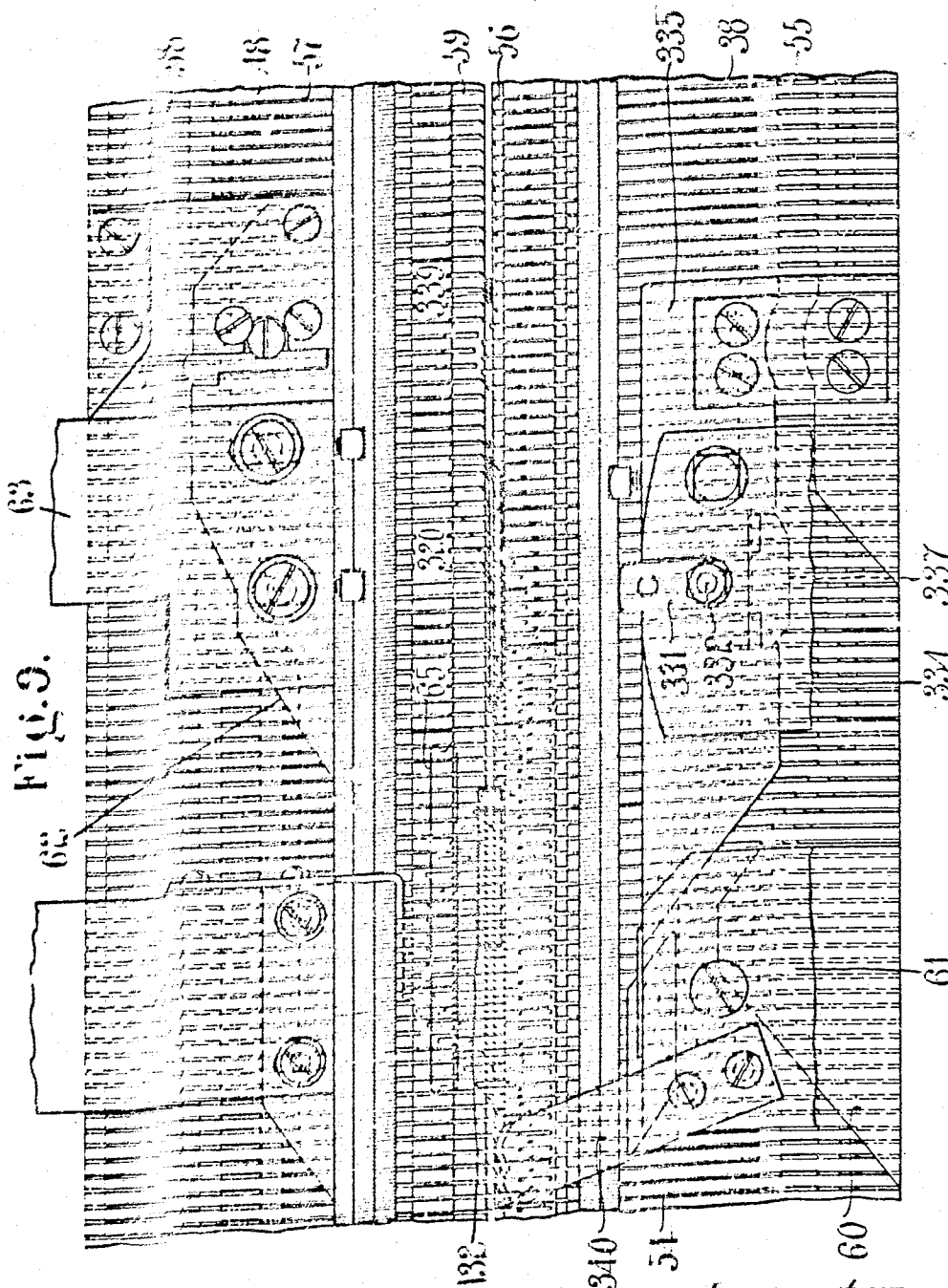
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William T. Barratt

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1,003,085.



WITNESSES:
Edmund C. Tatt
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CIRCULAR ENITTING MACHINE.
APPLICATION FILED MAY 9, 1907.

1,003,085.

Patented Sept. 12, 1911.

14 SHEETS—SHEET 9.

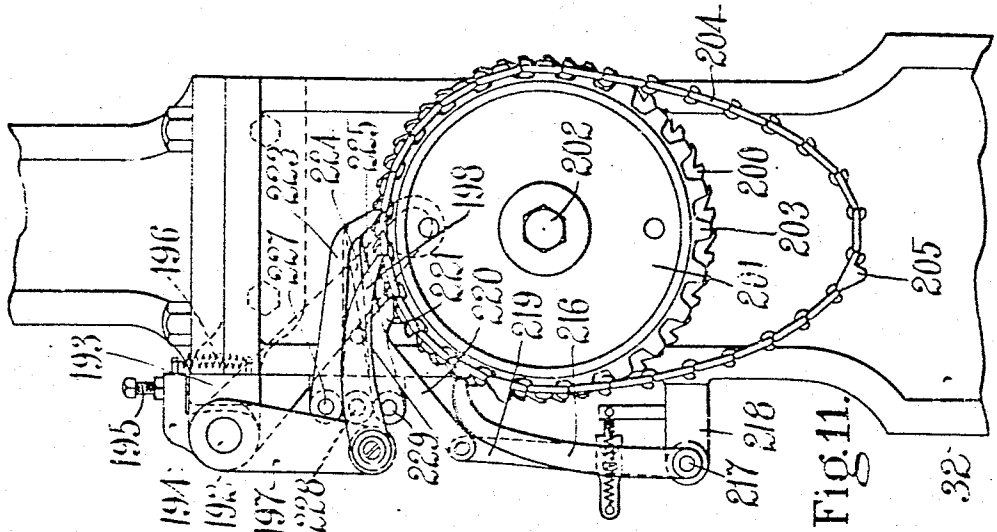


Fig. 11.

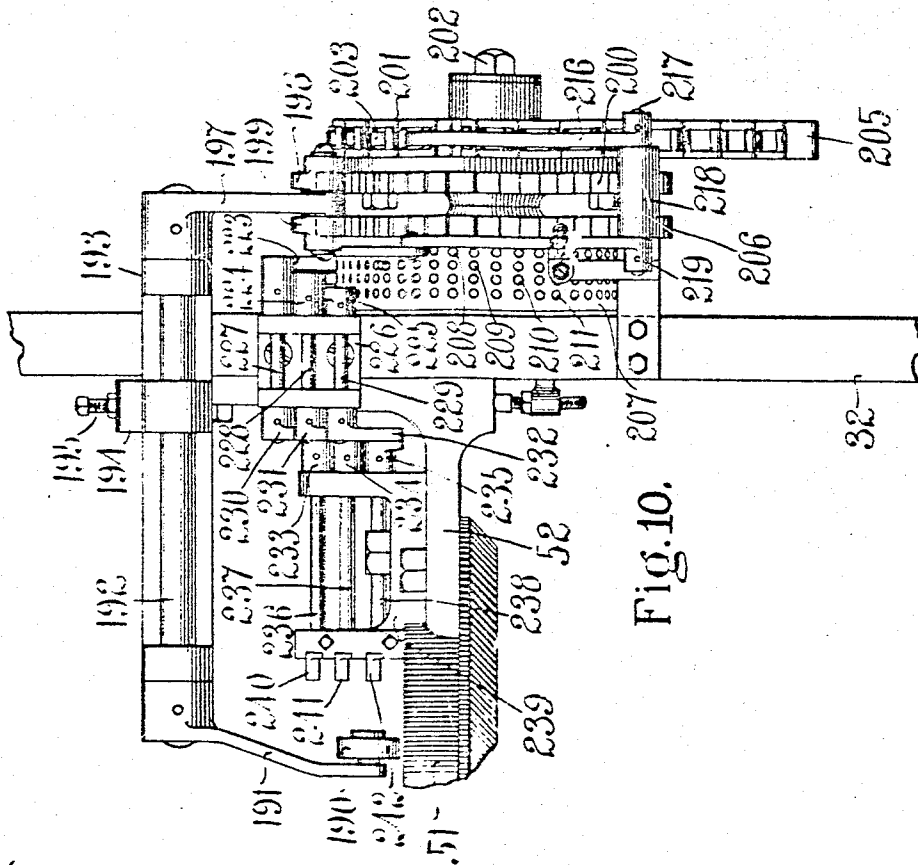


Fig. 10.

Witnesses.

Sydney C. Taft.

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APPLICATION FILED MAY 9, 1907.

1,003,085.

Patented Sept. 12, 1911.

14 SHEETS—SHEET 10.

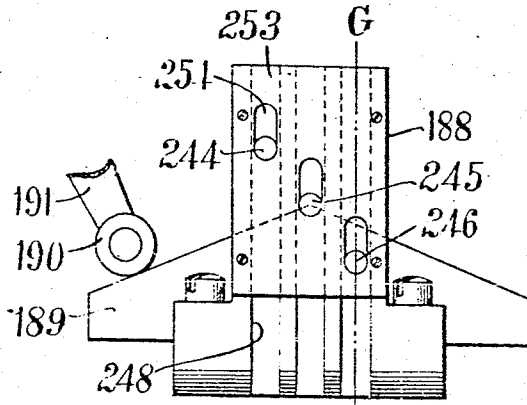


Fig. 14.G

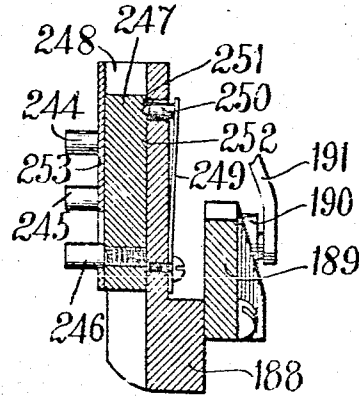


Fig. 15.

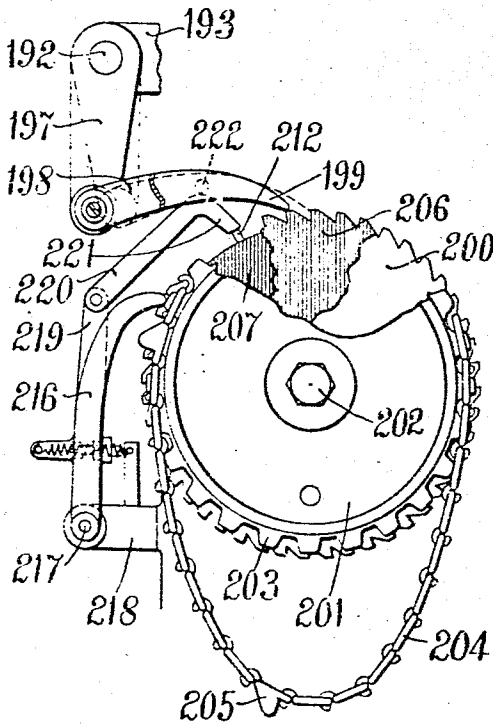


Fig. 12.

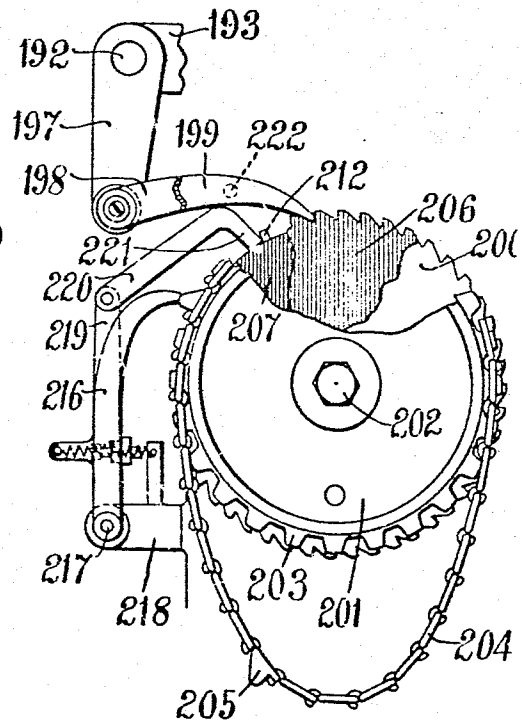


Fig. 13.

Witnesses.

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1,003,085.

14 SHEETS--SHEET 11.

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-114 by his attorney
Charles W. Gooding.

1,003,085.

Patented Sept. 12, 1911.

14 SHEETS-SHEET 12.

Fig. 22.

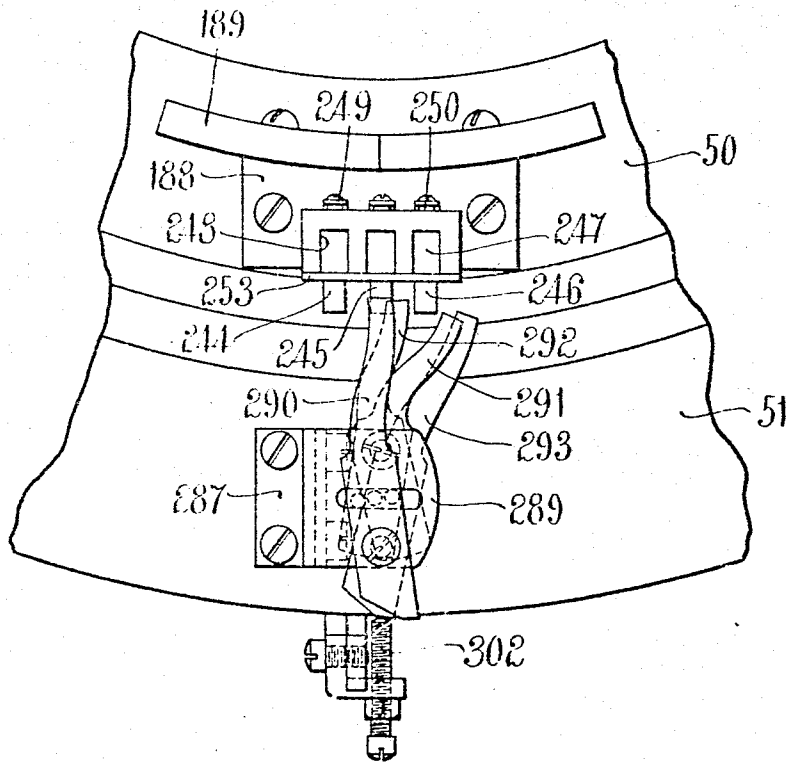
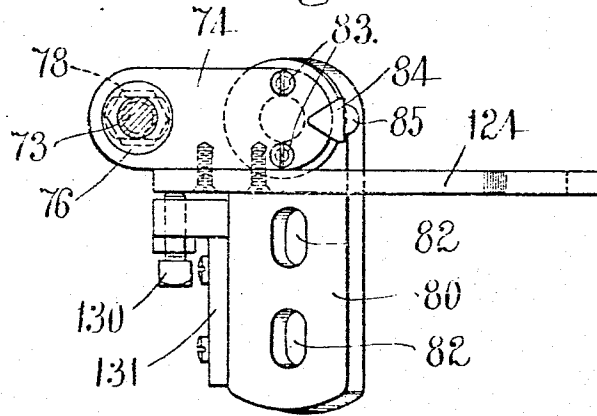


Fig. 23.

Witnesses.

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By his attorney Charles S. Goring.

1,003,085.

Patented Sept. 12, 1911.

14 SHEETS—SHEET 13.

Fig. 27.

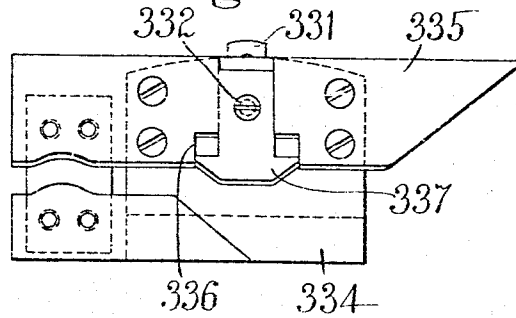
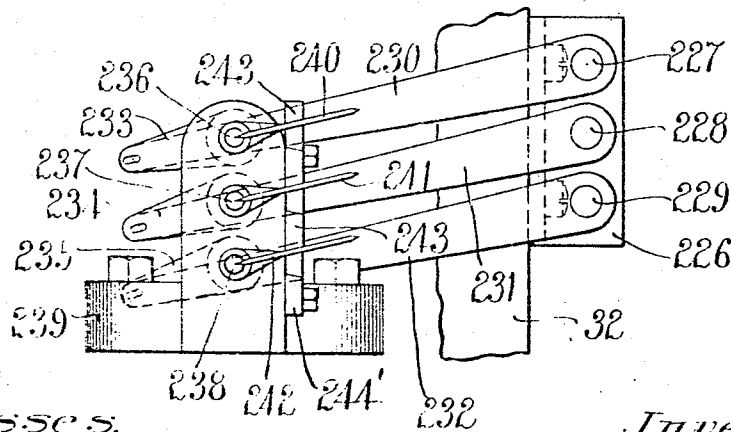
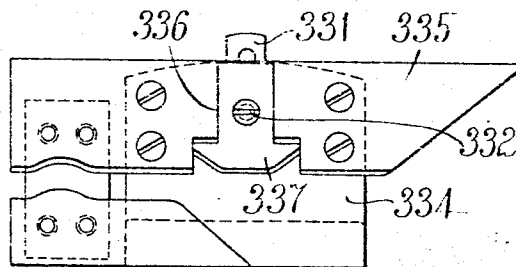


Fig. 28.



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Fig. 24.

W. T. BARRATT.
CIRCULAR KNITTING MACHINE.
APPLICATION FILED MAY 9, 1907.

1,003,085.

Patented Sept. 12, 1911.

14 SHEETS-SHEET 14.

Fig. 25.

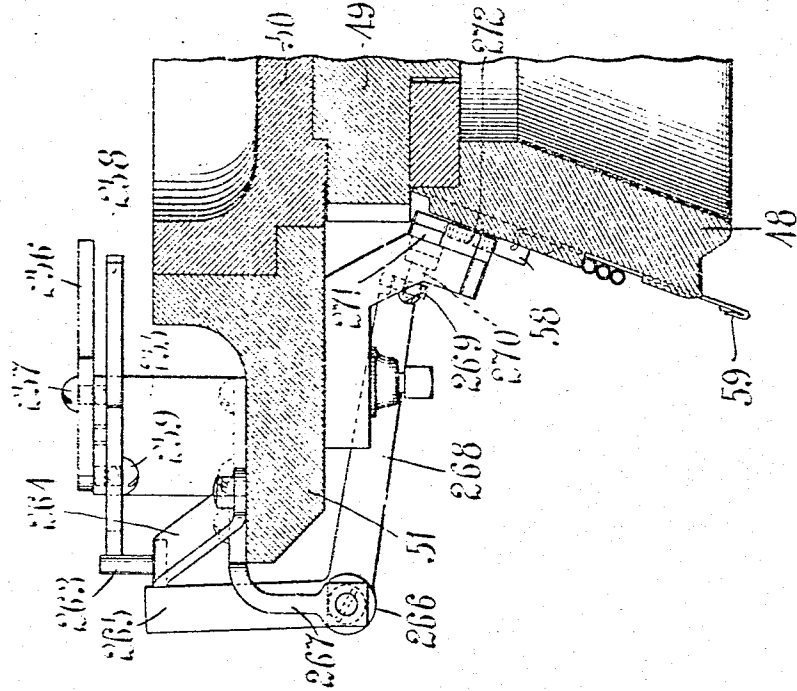
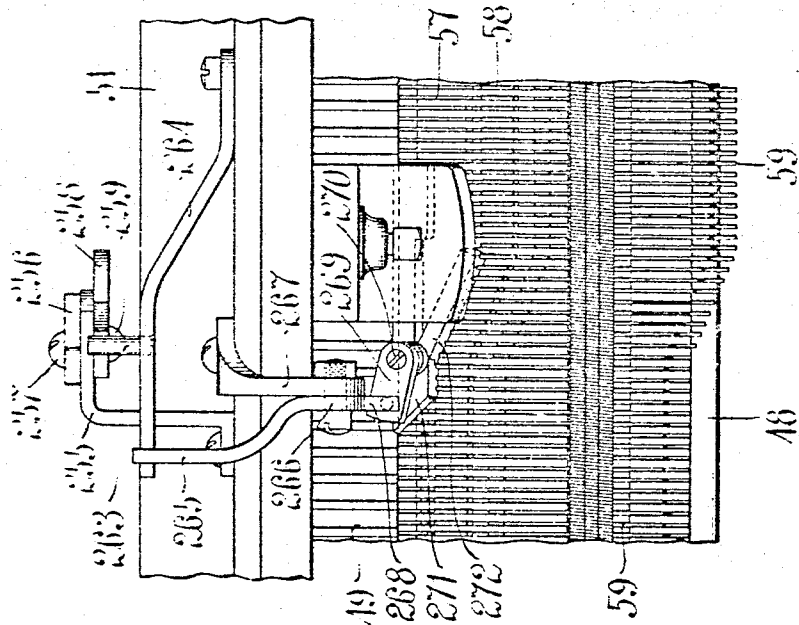


Fig. 26.



Witnesses.

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Franklin E. Low

Inventor.

William J. Barratt
by his attorney Charles S. Goring

UNITED STATES PATENT OFFICE.

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

CIRCULAR-KNITTING MACHINE.

1,003,085.

Specification of Letters Patent.

Patented Sept. 12, 1911.

Application filed May 9, 1907. Serial No. 372,812.

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 improvements in knitting machines, being particularly adapted, although not confined, to use in connection with circular knitting machines and further to that class of knitting machines in which two cylinders are employed for knitting rib work, the same being preferably used in connection with two conical needle cylinders employing spring needles to produce a rib fabric.

My invention is also adapted to be used in connection with two cylinders in that class of circular knitting machines known as a "rib top" machine, which is a knitting machine adapted to knit the regular or rib fabric and is also provided with attachments whereby a welt may be knit, said welt serving as a finish on the ends of cuffs, drawer bottoms, bottoms of shirts, tops of socks and the like. Said rib top machine is further adapted to knit a royal rib and a loose or slack course in the fabric wherever it may be desired.

The invention consists in certain improvements pertaining to a sinker wheel, *i. e.*, to a rotary wheel provided with sinkers which are adapted to be moved in and out between the needles of the primary set of needles—that is, between those needles to which the yarn is first fed.

I have illustrated and described my invention, in so far as it pertains to a sinker wheel as employing sliding sinkers in connection with a needle cylinder, but I do not wish to be understood as limiting my invention to a sinker wheel with sliding sinkers, as the same may be adapted for use with pivoted sinkers without departing from the spirit of my invention.

It will be seen that my improved sinker wheel may be used in connection with a single cylinder machine or a two cylinder machine and also it will be understood that said sinker wheel may be used in connection with a straight or flat machine without departing from the spirit of my invention, as

hereinafter described and particularly set forth and pointed out in the claims.

In so far as the sinker wheel in itself is concerned, the same has been disclosed and set forth in U. S. Letters Patent No. 864,354, issued to me August 27, 1907, but in the present application certain improvements and additions to the invention set forth in said application for Letters Patent are disclosed, whereby my improved sinker wheel in combination with one or two cylinders is rendered capable of being used in machines of the character set forth, *viz.*, in rib top machines, and, moreover, said sinker wheel is so constructed and mounted upon a pivoted or rocking frame that in case of any imperfections in the yarn or in the needles or in the sinkers which would tend to cause a "bunching" or "loading" up, or in case the sinker wheel in its bearings or the sinkers themselves were not properly oiled and failed to move freely, and possibly lead to the breaking of said sinkers and needles, the sinker wheel will be immediately thrown out so that the sinkers will be disengaged from the needles and held out of engagement therewith and at the same time the presser for the primary set of needles will be thrown out of connection with said needles, so that the loops of yarn cannot be cast off of said needles, thus avoiding any possibility of breakage of either needles or sinkers or other parts of the machine which might result through various causes, some of which have been hereinbefore enumerated, by the failure of the sinker wheel to rotate.

The invention, then, primarily consists in a knitting machine having in combination a needle carrier and a rotary sinker wheel, the rotary sinker wheel being mounted upon a movable support and acting as a detector for bunched yarn, bent needles, bent sinkers, or any imperfection which interferes with the free rotation of said sinker wheel. Said sinker wheel, when its free rotation is interfered with, causes its support to be moved, so that the blades of said sinker wheel are moved out of engagement with the needles of said knitting machine and the presser for the primary needles thrown out of connection with said needles.

The invention further consists in providing means to move the sinker wheel and its support away from the needle carrier other

than the intermeshing of the sinkers with the needles.

The invention further consists in mounting the rotatable sinker wheel upon a rotatable support and in fastening to said sinker wheel a gear which meshes with the needles, said needles preferably supported on opposite sides of the teeth of said gear, the sinker wheel being resiliently held in operative engagement with the needles until such time as for any reason the sinker wheel is prevented from rotating freely, whereupon the gear meshing with the needles and not rotating about its axial center is moved with said support by the rotation of the needle carrier, and the sinker wheel is moved out of engagement with the needles.

The invention further consists in the means whereby the slur cock of the sinker wheel is automatically actuated to increase or diminish the distance to which the sinkers may be moved between the needles of the primary set of said needles, so that loops of different lengths may be fed to the primary needles; for instance, a short loop can be fed to the primary needles when a plain stitch or welt is being knit; a longer loop can be fed to the needles when a one-and-one or rib fabric is being knit; and a longer loop still can be fed to the needles when a slack or loose course is to be knit thereon.

The invention finally 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 of a rib top knitting machine embodying my invention, the lower portion of the frame being broken away and the upper portion of the frame which supports the cloth tension instrumentalities being also broken away. Fig. 2 is a plan view of the same, the side standards of the frame being shown in section on line A—A of Fig. 1. Fig. 3 is a sectional elevation, taken on line C—C, Fig. 2, illustrating the sinker wheel and the series of levers by which the slur cock in said sinker wheel is operated, also showing a portion of the needle cylinders in connection therewith. Fig. 4 is a plan view, partly in section, illustrating the sinker wheel and pressers and the mechanism for operating the stop mechanism, a portion of the lower cylinder being shown in connection therewith and broken away, the sinker wheel being shown in its position with the sinkers advanced between the needles of the lower cylinder. Fig. 5 is a plan view of the sinker wheel, the presser for the primary needles, and a portion of the stop mechanism, the sinker wheel being shown together with the lower cylinder and thrown out of operative relation to the needles of said lower cylinder, said

lower cylinder being partly broken away and in section, the lower bed plate shown in section. Fig. 6 is a sectional elevation taken on line D—D, Fig. 2, illustrating the rotary presser for the secondary set of needles, and the cam which actuates the primary set of needles, in connection with a portion of the primary and secondary cylinders and their needles, together with the two series of levers by means of which said presser is thrown out of engagement with said secondary needles and said needle cam is raised or lowered to change the throw of the primary needles. Fig. 7 is a detail front elevation, viewed in the direction of the arrow *a*, Fig. 2, illustrating the mechanism by means of which the cam for throwing down the secondary set of needles is actuated. Fig. 8 is a sectional elevation taken on line F—F, Fig. 2. Fig. 9 is a detail front elevation of a development of a portion of the primary and secondary cylinders, illustrating the needle cams and the relative location thereto of the sinker wheel, the stationary presser for the primary set of needles, the rotary presser for the secondary set of needles, the tripper for the stop mechanism and the "push back". Fig. 10 is a rear elevation of the pattern wheel and mechanism connected therewith, together with a portion of the supporting ring in which the secondary cylinder rotates. Fig. 11 is a side elevation of the pattern wheel and mechanism connected therewith, one of the side standards of the machine being shown broken away in both Figs. 10 and 11. Fig. 12 is a side elevation, similar to Fig. 11, showing the pattern wheel broken away and connecting mechanism in different positions relatively thereto. Fig. 13 is a side elevation of the pattern wheel broken away and connecting mechanism in still another position relatively thereto. Fig. 14 is a detail view of the shipping pins and their stand, together with the cam for actuating the lever by means of which the pattern wheel is rotated, said lever being broken away to save space. Fig. 15 is a detail section partly in elevation taken on line G—G, Fig. 14. Fig. 16 is a plan view of one of the pairs of levers by means of which the mechanism for actuating the cams is actuated. Fig. 17 is a sectional elevation taken on line H—H, Fig. 16. Fig. 18 is a rear elevation of one of the cams for actuating the secondary set of needles. Fig. 19 is a plan view, in detail of the sinker wheel, cam plate, and slur cock, showing the same with a portion of the sinkers engaging or being advanced between the needles of the primary cylinder, said needles being shown in connection with a portion of said primary cylinder, which is broken away to save space in the drawings. Fig. 20 is a plan view of the sinker wheel and cam plate, with the

slur cock removed. Fig. 21 is a detail section taken on line I—I, Fig. 3. Fig. 22 is a detail plan, partly in section, of the sinker wheel rocker frame and stand taken on line J—J, Fig. 3. Fig. 23 is a plan view of two pairs of levers and the shipping pins by means of which they are actuated, together with the lever which operates the slur cock upon the sinker wheel, these parts being shown in connection with a portion of the secondary cylinder and its supporting ring. Fig. 24 is a side elevation, as viewed from the right of Fig. 1 of the switch plates, the stand upon which they are pivotally supported, and the levers by which they are rocked. Fig. 25 is a sectional elevation taken on line K—K, Fig. 2. Fig. 26 is a front elevation of the parts shown in Fig. 25. Fig. 27 is a rear elevation of an adjustable cam in its normal position for making the regular work. Fig. 28 is a rear elevation of the cam illustrated in Fig. 27, after the cam is raised as the same is changed after making the stitch of the regular work.

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

In the drawings, 30 is the frame, consisting of side standards 31 and 32 suitably connected together by a cross-head 33. The main driving shaft 34 is journaled to rotate in bearings 35, 35 fast to said cross-head 33 and is rotated by means of a fast pulley 37, a loose pulley 36 also being provided and adapted to rotate upon the main shaft 34 adjacent to the pulley 36. The lower cylinder 38 is fast to a running ring 39 rotatably supported upon the bed-plate 40. A gear 41 is fastened to the running ring 39 and is driven by a pinion 42 fast to a vertical shaft 43 journaled to rotate in bearings 44 and 45 and rotated by means of a bevel gear 46 fast to the lower end thereof and meshing into a bevel gear 47 fast to the main driving shaft 34. The upper cylinder 48 is fastened to a gear 49 which, in turn, is fastened to a running ring 50, said running ring being constructed to rotate in the upper bed-plate 51. The upper bed-plate 51 is adjustably fastened to brackets 52, 52 which, in turn, are adjustably supported upon and fastened to the side standards 31 and 32. The upper cylinder is rotated by means of the gear 49 which meshes into a pinion 53 fast to the vertical shaft 43.

The lower cylinder 38 is provided with grooves 54 in which are needle jacks 55 with spring needles 56 connected or fastened thereto. The upper cylinder 48 is provided with grooves 57 and in said grooves are located jacks 58 to which are attached needles 59. The yarn is fed first to the needles of the lower cylinder, and, therefore, said needles and the cylinder upon which they are adapted to slide will be hereinafter referred to as the "primary"

needles and cylinder, while the upper cylinder and the needles supported thereon will be referred to as the "secondary" cylinder and needles, for the reason that the loops of yarn are fed to the needles of the upper cylinder by the needles of the lower cylinder. A reciprocatory motion is imparted to the primary needles by needle cams 60 fast to brackets 61 which, in turn, are fastened to the bed-plate 40. A reciprocatory motion is imparted to the secondary needles by needle cams 62 fast to brackets 63 which brackets are fastened to the upper bed-plate 51. The rotation of the cylinders and the operation of the primary and secondary spring needles therein is well known to those skilled in the art and results from the rotation of the cylinders relatively to the stationary cams.

The sinker wheel 65 has a series of grooves 66 in the upper face thereof, said grooves radiating from a common center and in these grooves are located sinkers 67, each of said sinkers being provided with a lug 68 which projects into a groove 69 formed in the under face of the cam plate 70. The cam plate 70 has a hub 71 projecting upwardly therefrom which has a flush set-screw 72 in screw-threaded engagement therewith adapted to bear against the shaft or stud 73, which is rigidly clamped at its lower end to a rocker-frame 74 by means of a nut 75. The stud 73 is provided with a flange 76 which bears against the upper face of the rocker frame 74, and that portion of the stud between the flange 76 and the nut 75 projects through a slot 77 in the rocker frame 74 and is flattened off at 78 to prevent the rotation of said stud relatively to said rocker frame.

The rocker frame 74 has a cylindrical stem 79 rigidly fastened thereto which projects into a bearing or hole formed in a base 80, said base being adjustably fastened to the lower bed-plate 40 by screws 81 which project through slots 82 provided in said base (Fig. 22). The rocker frame 74, together with the stem 79 and the sinker wheel and cam supported upon said rocker frame, may be adjusted longitudinally of the needles of the lower cylinder by means of adjusting screws 83, 83 which have screw-threaded engagement with said rocker frame and bear at their lower ends against the base 80, so that by screwing toward the right upon said screws 83 the rocker frame and parts supported thereon may be moved upwardly parallel to the primary needles 59. A plate 84 is fastened to the base 80 and is bent at its upper end to project over the top of the rocker frame 74 and thus prevent the same from moving upwardly after the same has been adjusted by means of the adjusting screws 83. Said plate 84 is fastened by a screw 85 to the base 80, the screw 85

projecting through a slot provided in the plate 84 and having screw-threaded engagement with said base.

It will be understood that the cam plate 70 is fastened to the stud 73 by a set-screw 72, and said cam is further securely fastened to said stud, in order to prevent rotation thereon, by a collar 86 which is fastened to the stud 73 by set-screws 87, 87 (Fig. 19) and is locked to the cam plate 70 by a pin 88 which is fast to the collar 86 and projects downwardly therefrom into the hub 71 of said cam 70.

The slur cock 89, by means of which the sinkers are moved inwardly and outwardly between the primary needles 56, consists, as a whole, of a cam block 90 and a slide plate 91 fast to said cam block and extending across the upper face of the sinker cam 70. Said cam block 90 is preferably made in three parts screwed together and having a cam groove or space 92 therebetween which forms a continuation of the groove 69 formed in the under face of the cam 70. This construction enables the parts of the slur cock which have become worn to be removed and replaced by new parts. The slide plate 91 is suitably guided upon the cam 70 by a screw 94 which projects through a slot 95 provided in the slide plate 91 and has screw-threaded engagement with the cam plate 70. Said slide plate is further guided by two screws 96, 96 which project through slots 97, 97 provided in the cam block 90, said screws having screw-threaded engagement with the cam plate 70. The front end of the slide plate 91 is bent downwardly at 98 and is forked to straddle a screw 99 which, in function, is both a stop screw and an adjusting screw, for the slur cock 89.

A flat spring 100 is fastened at one end to the cam plate 70, the free end of said spring bearing against the inner face of the downwardly extending end 98 of the slide plate 91, so that said slide plate 91 and the slur cock as a whole, including said cam plate and the cam block 90 fast thereto, are held against the stop-screw 99, and if it is desired to adjust said slur cock, so that its position farthest removed from the primary needles shall be diminished or increased, the stop-screw 99 is rotated toward the right or toward the left, respectively. After such adjustment has been performed, the screw 99 is held in position against accidental displacement by means of a set-screw 101. The cam block 90 and slide plate 91, forming as a whole the slur cock 89, are further guided, on being adjusted as hereinbefore described, by the slot or opening 102 which is formed in the cam plate 70 and extends therethrough (see Fig. 20), the cam block 90 projecting downwardly into said opening and fitting there-

in. The slide plate 91 has an opening or slot 103 therein which surrounds the hub 71 of the cam plate 70 and thus enables said slide plate, with the cam block attached thereto, to be moved across the upper face of the cam plate 70 by rotating the adjusting screw 99 as hereinbefore described.

The yarn 104 is guided to the sinkers 67 by yarn guides 105 and 106, the yarn guide 105 being fastened to the cam bracket 63, while the yarn guide 106 is fastened to the upper bed-plate 51. A gear 107 meshes into the primary needles 56 and projects into an annular groove 108 provided in the periphery of the primary cylinder 38. Said gear is fastened to a hub 109 projecting downwardly from the sinker wheel 65 by means of a set-screw 110. The hub 109 of the sinker wheel 65 has a bracket or arm 111 (Fig. 21) fast thereto and forming, in effect, a portion thereof, into which is screwed an adjusting screw 112, which rotatably engages a swivel bearing 113. The swivel bearing 113 consists of a screw 114 which engages the hub of the gear 107, the upper end of said screw being forked to receive the shank of the screw 112 between the head thereof and a flange formed thereon.

An index finger 115 is pivoted upon a pin 116 fast to a bracket-plate 117. The bracket plate 117 is adjustably fastened by means of set-screws 118, 118 to the upper face of the cam plate 70. The screws 118 project through slots 119, 119 provided in said bracket plate, and the outer end of the index finger 115 moves over the upper face of the cam plate 70 adjacent to graduations 120, 120 provided in the upper face of said cam plate. The rear end of said index finger 115 is slotted to straddle a pin 121 fast to the slide plate 91 which constitutes a portion of the slur cock 89.

In order to render the device capable of having the sinkers readily removed from the sinker wheel, a segment 122 of the cam plate 70 is made removable from the main portion of said cam and is secured thereto by screws 123, so that if desired said segment may be taken out by removing the screws 123 and the sinkers removed from the sinker wheel to be repaired or replaced.

The rocker frame 74 is rotatable upon the base 80 and carries with it the sinker wheel, sinker cam and other parts supported thereon, thus removing the sinkers from operative engagement with the primary needles whenever the sinker wheel, for any reason, is prevented from rotating freely upon the stud 73, the different reasons which might occur to prevent said sinker wheel from rotating having been hereinbefore set forth. In order to hold the sinker wheel with its sinkers normally in operative relation to the primary needles an arm 124 is fastened

to the rocker frame 74. The free end of said arm 124 projects downwardly (see Figs. 3 and 4) and engages the free end of a flat spring 125, which is fastened by screws 126, 126 to the lower bed-plate 40. The position of the free end of said spring 125 is regulated by a set-screw 127 having screw-threaded engagement with said spring 125 and bearing at its inner end against the lower bed-plate 40.

The free end of the spring 125 is bent at an angle to the main body thereof at 123 and is also curved at 129 intermediate said angle portion and said body portion, so that said curved portion, at the base thereof, adjacent to said body portion bears against one side of the arm 124 when the parts are in the position illustrated in Figs. 3 and 4, and thus holds the rocker frame in engagement with a screw 130 (Fig. 22) having screw-threaded engagement with a bracket 131 fast to and forming, in effect, a portion of the base 80. The flat spring 125 thus holds the sinker wheel in position with the sinkers in operative engagement with the primary needles. If, however, for any reason, said sinker wheel is prevented from rotating about its axis, such as the bending of needles, or sinkers, or the "bunching up" of the yarn and accidents of a like character which are liable to occur in any knitting machine, the sinker wheel being fastened to the gear 107, said sinker wheel, gear and the rocker frame 74 become as one piece, and the teeth of the gear meshing into the needles of the primary cylinder are moved by said needles and the movement of their primary cylinder as though a portion of the rocker frame 74, so that the rocker frame 74, together with the sinker wheel and cam thereon, rotates about its axis, viz., the axis of the cylinder stem 79, thus rocking the arm 124 from the position illustrated in Fig. 4 to that illustrated in Fig. 5, wherein it will be seen that the sinker wheel and the sinkers are moved out of engagement with the primary needles and the arm 124 is moved so that the inner corner thereof bears against the outer face of the angle portion 128 of the spring 125. Thus the spring 125 bears against the opposite side of the arm to that against which it bore when the sinker wheel was in the position illustrated in Fig. 4. The flat spring 125, therefore, acts to hold the sinker wheel in position with the sinkers in operative relation, to move in and out between the primary needles and feed the yarn thereto, when the parts are in the position illustrated in Fig. 4, and when the parts are in the position illustrated in Fig. 5 said spring holds said sinker wheel with the sinkers out of engagement with or working operative relation to the primary needles. Said spring also performs the further function

of assisting the movement of the sinker wheel from the position illustrated in Fig. 4 to that illustrated in Fig. 5, when the arm 124 passes over the curved portion 129 thereof, so that there may be no danger of the sinker wheel stopping in such a position that the sinkers will drag against the primary needles, as said needles move with the primary cylinder.

It will be understood that the spring 125 acts to hold the rocker frame with the sinker wheel and its sinkers in operative relation to the needles and also when the rocker frame is thrown out, together with the sinker wheel and its sinkers, as hereinbefore described, said spring acts to hold said rocker frame and sinker wheel and sinkers away from the needles, and that said rocker frame, sinker wheel and sinkers would in the absence of the spring be moved out of operative relation to the needles without any obstruction occurring to prevent the sinker wheel from rotating, by the rotation of the needle carrier, with its needles meshing into the gear 107, without any aid from the spring.

When the sinker wheel is thrown out, as hereinbefore described, it is very desirable that the loops should remain upon the primary needles, thus saving the labor of putting the cloth back on the primary needles, and this is accomplished by removing the presser for the primary needles from engagement therewith simultaneously with the outward movement of the sinker wheel. The presser 132 for the primary needles is a stationary presser, that is, as distinguished from a rotary presser, and is preferably formed of a cylindrical rod 133, bent at its inner end at the proper angle to engage the beards of the primary needles as they descend and press them to cast off the old loops. Said rod is arranged to slide in a bracket 134 which is provided with a downwardly projecting stem 135, adjustably supported upon and fastened to a base 136, which is adjustably fastened to the lower bed-plate 40. The rod 133 slides in ears 137 and 138 which project upwardly upon the bracket 134 and has fastened thereto an arm 139 through which projects a rod 140 encircled by a spiral spring 141, one end of which bears against said arm 139, the other end of which bears against the adjusting nut 142, the action of said spring being to hold the bent forward end of the presser rod against the primary needles. An angle plate 143 is fastened to the upper end of the ear 137 and upon said angle plate is pivoted at 144 a lever 145. The inner end of the lever 145 bears against the hub 71 of the cam 70. The outer end of said lever is suitably curved and bears against the arm 139 (see Figs. 3 and 4), so that when the rocker frame 74 is rocked to move the

sinker wheel and its cam from the position illustrated in Fig. 4 to that illustrated in Fig. 5, the lever 145 is rocked upon its pivot thus moving the arm 139 outwardly, together with the presser rod 133 which is fastened thereto, so that as soon as the sinker wheel commences its outwardly swinging movement, together with its rocker frame 74, it will be seen that the presser 132 will be removed from engagement with the primary needles and, therefore, the loops will not be pressed off of said needles.

It is desirable that in case of the sinkers or needles becoming jammed or the yarn bunching up the machine should be stopped automatically and this may be done by operating a stop motion by means of the sinker wheel as it is moving away from the needle cylinder, such a construction being made the subject-matter, by applicant, of a co-pending application for Letters Patent Ser. No. 408,515, filed December 30, 1907.

In a machine known as a "rib top" machine, which has for its object to produce a welt, serving as a finish for the ends of cuffs and the like, it is desirable to automatically change the needle cams, the pressers, and the sinker wheel in order to knit automatically upon the machine the rib fabric, a plain fabric for the "welt," a "royal rib" and a "loose course." To accomplish these ends, different series of levers are employed on the machine which change the needle cams, the distance to which the sinkers are advanced between the needles of the primary set, and which move the presser for the secondary set of needles into and out of operation therewith. The different series of levers are operated to secure these ends by means of two pattern wheels, and these pattern wheels, together with the mechanism actuated thereby, and the different series of levers for actuating the needle cams, slur cock for the sinker wheel, and rotary presser for the secondary needles I will now proceed to describe.

Referring to Figs. 1, 2, 3 and Figs. 10 to 18, inclusive, it will be seen that the running ring 50, to which the secondary cylinder 48 and the gear 49 are fastened, has a stand 188 fastened thereto which has arranged to slide therein a series of movable shipping pins which are adapted to come in contact with and operate on said series of levers hereinbefore referred to. A cam 189 is fastened to the inside of said stand and revolves with the secondary cylinder. At each revolution of the secondary cylinder 48, the cam 189 comes in contact with a friction roll 190 rotatably mounted upon an arm 191 which is fastened to a rock-shaft 192 journaled to rock in bearings formed in a bracket 193 which is fastened to the side frame standard 32. An arm 194 fast to the shaft 192 is provided with a stop-screw 195, which

is adapted to abut against the bracket 193, said stop-screw being normally held in engagement with said bracket by a spiral spring 196. An arm 197 is fastened to the outer end of the rock-shaft 192 and on the lower end thereof two pawls 198 and 199 are pivotally mounted. The pawl 198 engages a ratchet 200 which is rigidly fastened to a pattern wheel 201 journaled to rotate upon a stud 202 fast to the side frame 32. At each rotation of the needle cylinders the cam 189 rocks the arm 191, together with the rock-shaft 192 and also the arm 197, thus moving the pawl 198 a sufficient distance to rotate the ratchet 200 one tooth. The pattern wheel 201 has sprocket teeth 203 formed upon its periphery which mesh into a pattern chain 204, said pattern chain being provided at intervals with a tooth 205. A second ratchet 206 is journaled upon the stud 202 and this ratchet is rotated by the pawl 199. A second pattern wheel 207 is fastened to the ratchet 206 and has in its periphery four series of screw-threaded holes 208, 209, 210 and 211. These holes extend entirely around the periphery of the pattern wheel 207 and one is provided in alignment with the bottom of each of the ratchet teeth upon the ratchet 206. Pins 212, 213, 214 and 215 are provided for each of said holes 208, 209, 210 and 211, respectively, and are inserted in said holes, as may be desired, to form the different stitches for the fabric to be knit upon the machine. An arm 216 is fastened to the outer end of a rock-shaft 217, said arm 216 being in alignment with the pattern chain 204. The rock-shaft 217 is journaled to rock in a bracket 218 fast to the side frame standard 32 and has fastened to its inner end another arm 219, to the upper end of which is pivotally attached an arm 220. The arm 220 is bent at its free end to form an inclined or angular extension 221. Said arm 220 is in alignment with the screw-holes 208 and pins 212 upon the pattern wheel 207 and extends beneath a pin 222 fast to and extending inwardly from the pawl 199. It will be understood that the pawl 198 is always in engagement with the ratchet 200, so that said ratchet 200 is rotated one tooth, together with the pattern chain 204, at each rotation of the needle cylinders, and so long as the pawl 199 is in engagement with its ratchet 206, said ratchet 206, together with the second pattern wheel 207, will be rotated. If, now, it is desired to stop the rotation of the pattern wheel 207 in order that several courses of a certain kind of stitch may be knit in the fabric, the pawl 199 is thrown out of engagement with its ratchet 206 and this is accomplished by one of the pins 212 in the pattern wheel 207, which, as said pattern wheel is rotated toward the right (Fig. 12) passes beneath the free end of the arm 220 and lifts the same to the position illus-

trated in Fig. 15—that is, with the pin 212 beneath the outermost free end of said arm 220. This elevation of the arm 220 causes the same to engage the pin 222 on the pawl 199 and lifts said pawl 199 out of engagement with the ratchet 206. The ratchet 206 will now remain stationary, together with the second pattern wheel 207, until such time as one of the teeth 205 upon the pattern chain 204 engages the arm 216 and lifts the same to the position illustrated in Fig. 13, thus rocking the arm 219 and drawing the arm 220 backwardly off of the pin 212, from the position illustrated in Fig. 12 to that illustrated in Fig. 13. As soon as this happens the pawl 199 will drop into engagement with the ratchet 206 and subsequently at each rotation of the needle cylinders, the second pattern wheel will be rotated one notch or tooth as well as the first pattern wheel. In the series of holes 209 are inserted the pins 213 at such points as may be desired, the function of these pins 213 being to lift the end of a lever 223 in making a loose course in the work. In the series of holes 210 are placed the pins 214 which are inserted at proper intervals for raising the lever 224, as the pattern wheel revolves in making the "royal rib" in the work, and the pins 215 are placed at proper intervals in the holes 211 for raising a lever 225 for the purpose of making the "welt" on rib-tops for socks, anklets for drawers, shirt borders and cuffs. A bracket 226 is fastened to the frame standard 32 and in said bracket are journaled three rock-shafts 227, 228 and 229. The rock-shaft 227 has fastened to its outer end the lever 223 and to its inner end the lever 230. The rock-shaft 228 has fastened to its outer end the lever 224 and to its inner end a lever 231. The rock-shaft 229 has fastened to its outer end the lever 225 and to its inner end a lever 232. The free ends of the levers 230, 231 and 232 are operatively connected to levers 233, 234 and 235, respectively. These levers 233, 234 and 235 are each fastened, respectively to rock-shafts 236, 237 and 238 which are adapted to rock in a bracket or standard 239. The inner ends of the rock-shafts 236, 237 and 238 have fast thereto switch-plates 240, 241 and 242, respectively. The movement of the switch-plates up or down is limited between the stops 243 on a plate 244' screwed to an edge of the bracket 239. The stand 188, which revolves with the upper cylinder, has three shipping pins 244, 245 and 246 supported thereon for operating on and changing the levers for producing the different stitches in making the various kinds of work on the machine. Each of these pins is arranged on a slide 247 and these slides work up and down in grooves 248 in said stand. The pins 244, 245 and 246 are adapted to be respectively engaged by the switch-plates 240, 241 and 242 and these plates being inclined said pins will be moved positively up or down according to the direction of the inclination of the plates, and such inclination will be changed by the axial turning of the shafts 236, 237 and 238, respectively, so that the three pins will be moved into or out of operative position to accomplish the purposes hereinafter described. Each of the slides 247 is held in its raised or depressed position by a flat spring 249 fast to the stand 188 and having a pin 250 fast thereto which projects into a depression 251 when the slide is lowered, and into a depression 252 when the slide is raised, it being understood that for each of the slides 247 there is a spring 249 and pin 250 and that each of said slides has depressions 251 and 252 therein to receive said pins, so that the pins will be held in elevated or depressed positions, together with their respective slides, after the switch-plates have passed out of engagement therewith. The front plate 253 of the stand 188 is provided with slots 254 through which the shipping pins project. Said slots 254 are arranged at different heights in order that the shipping pins 244, 245 and 246 may be adjusted at different heights. When said pins are lowered to the bottom of the slots, as in Fig. 14, the machine is then adjusted for making its regular work. The shipping pin 244 is adjusted to the upper extremity of its slot in order to bring the same in contact with certain levers for changing the stitch from the regular work to that of the loose course; the shipping pin 245 is adjusted to the upper part of its slot for the purpose of bringing said pin 245 in contact with certain levers for changing the stitch from the regular work to that of the "royal rib;" and the shipping pin 246 is adjusted to the upper part of its slot for the purpose of bringing said pin in line with certain other levers for the purpose of changing the stitch from the regular work to that of making the "welt." The series of levers upon which the shipping pins are made to operate at such times as may be desired to change the stitch during the rotation of the needle cylinders are arranged at different points on the upper bed-plate 51 (Figs. 1 and 2). These levers are arranged in pairs and are all constructed and operated substantially on the same plan. As shown in Figs. 1 and 2 and in detail in Figs. 16 and 17, it will be seen that one pair of these levers is attached to a slotted bracket plate 255 which is secured to said upper bed-plate 51. The lever 256 is pivoted at 257 to the rear of said plate, while the other lever 258 is pivoted at 259 to the front of said plate. The bracket plate 255 has a slot 260 therein extending substantially at right angles to the length of the levers, and the lever 258 has two upwardly projecting

pin 261, 261 which are separated by a short space and project into said slot. The lever 256, which is on the upper side of the plate, has a single projecting pin 262 which extends downwardly through the slot 260 and between the pins 261 of the lever 258. The outer or free end of the lever 258 is beveled or cam-shaped so that when said lever is in the position indicated in Fig. 16 it engages a pin 263 projecting from a pivoted arm 264, Figs. 25 and 26 and thereby holds said arm in its forward position, as hereinafter more fully stated. In this arrangement of levers it will be readily understood that when the arm of the lever 256 is carried forward by the shipping pin 246 in the stand 188, the front end of the lever 258 will be thrown forward and released from the pin 263, and the levers will remain in this position until the shipping pin 246 in the stand is adjusted to come in contact with the arm of the lever 258, when it will be thrown forward into engagement with the pin 263 and operate thereon to force the lever arm 264 back and into its original position. As above stated, the pin 263 projects upwardly from the lever arm 264, one end of which is pivotally attached to the upper bed-plate 51, while the other end extends back over the outer edge of the bed-plate 51 and rests against the upwardly extending end 265 of an angle lever 266 which is pivoted to a depending bracket 267 which is rigidly secured to the top of the upper bed-plate 51. The lower arm 268 of the lever 266 extends backwardly beneath the upper bed-plate and is loosely connected with the end of an arm 269, said arm being rigidly secured to a rocker pin 270 which is adapted to rock in a stationary cam 271, and on the other end of said rocker pin is attached a movable cam 272, which is raised by the operation of said lever 256 for the purpose of enabling the secondary needles to remain elevated on the secondary cylinder and leave them out of engagement with the primary needles while passing through the feed in making the welt. The cam 272 is depressed by the lever 258, after the welt is made, to bring the needles back into their operative position for the regular or rib work.

On the upper side of the upper bed-plate 51, referring to Figs. 1, 2, 7 and 8, is fastened an angle bracket 273 which extends upwardly and has a lateral slotted plate 274 that supports another pair of levers constructed and arranged to operate in substantially the same manner as those hereinbefore described. The lower lever 275 is pivoted to the under side of the slotted plate 274, while the upper lever 276 is pivoted to the upper side of this plate. Both of these levers are operated by the shipping pin 246, the same as the levers 256 and 258, before described, when the machine is making a welt.

The cam operated by the levers 275 and 276, as hereinafter described, in making the welt is also operated for the purpose of changing the regular stitch to a loose course, and when so operated it must be without operating the cam 272, and in order to accomplish this a supplemental lever or arm 277 is rigidly secured to the front end of the lever 276 in position to be operated by the shipping pin 244 without bringing into action the lower shipping pin 246 that operates the levers 256 and 258 when it is elevated. An arm 278 is pivoted at one end thereof to the upper surface of the upper bed-plate 51, while the free end thereof extends over the front edge of said upper bed-plate in front of and beyond the levers 275 and 276. A vertical pin 279 is fast to said arm 278 in front of said levers and when the shipping pin 246 is brought in contact with the arm of the lower lever 275 the outer end of said lever is turned and comes in contact with the pin 279, pressing the arm 278 forward and carrying with it the vertical arm of a lever 280. The lever 280 is pivoted to a bracket 281 which extends downwardly from the top of the upper bed-plate 51. The other arm 282 of said lever extends beneath said upper bed-plate and is loosely connected at one end to an arm 283. The arm 283 is rigidly secured to a pintle 284 which has its bearing in a stationary cam 285. The other end of said pintle has rigidly secured thereto a movable cam 286, which is in its depressed position, as shown in Fig. 7, when the levers 275 and 276 occupy the position shown in Fig. 2, and the cam 286 is firmly maintained in such position as long as the lever 275 engages the pin 279 and holds the arm 283 forward. When in this position the cam 286 acts on the needles in the upper cylinder to depress them in the usual manner to do regular work. When, however, it is necessary to make a loose course or welt, the cam 286 must be raised and this is accomplished by the shipping pin 244 engaging the lever 277 or the shipping pin 246 engaging the lever 276, as the case may be, and thereby disengaging the lever 275 from the pin 279, whereupon the cam 286 will be free to be moved up by the secondary needles and the latter will remain elevated and out of engagement with the needles of the lower cylinder. When the shipping pin 244 in its elevated position is carried around by the needle cylinder until it reaches a point opposite the bracket 226 without operating on the lever 277 to raise the cam 286, the switch-plate 240 in its normal inclined position comes in contact with the pin 244 and presses it down as the pin passes under the plate, when the pin assumes its original depressed position with the other pins for making the regular work, and when the shipping pin 246 comes in contact with the lever 275 the cam 286 will be again de-

pressed, throwing the needles of the upper cylinder down at this point, where they will again engage in making the regular work until the switch-plates have changed the shipping pins to operate on levers for making the welt.

When the welt is being knit with a plain stitch a short loop of yarn is fed to the primary needles only, and when the regular or one-and-one rib fabric is being knit a longer loop is fed to the needles, and when a slack course is being knit a longer loop still is fed to the needles. The length of these different loops which are fed to the needles is regulated by the position of the slur cock 89, and the position of said slur cock is automatically changed by mechanism which I will now proceed to describe.

Referring to Figs. 1, 2, 3 and 23, it will be seen that a bracket 287 is fastened to the upper bed-plate 51. Said bracket has two slotted plates 288 and 289 rigidly fastened thereto, each of which supports a pair of levers similar in construction to the different pairs of levers hereinbefore described, the upper pair of levers consisting of an upper lever 290 and a lower lever 291. The lower pair of levers consists of an upper lever 292 and a lower lever 293. When knitting the regular course, said levers are in the position illustrated in Figs. 3 and 23, the lower lever 293 being in contact with a screw 294 which has screw-threaded engagement with a bracket 295 fast to the vertical arm 296 of a lever 297 which is pivoted at 298 to a bracket 299 fastened to the needle cam bracket 63. The lever 297 projects downwardly (Fig. 3) and engages at its lower end a block 300 fast to the cam block 90 which forms a portion of the slur cock 89. When the parts are in the position illustrated in Fig. 3 the machine is knitting the regular work. When the shipping pin 246 is raised it will engage the upper lever 292 and reverse the position of the lever 293, disengaging the same from the screw 294 and allowing the lever 296 to move outwardly at the lower end thereof until the screw 301, which is also fastened to the lever 297, abuts against the upper bed-plate 51. The spring 100 (Fig. 19) moves the slur cock outwardly from the needles and keeps the block 300 pressed against the lower end of the lever 297. Thus it will be seen that when the welt is to be knitted, the shipping pin 246 will actuate the levers 292 and 293 and the lever 297 to move the slur cock into position where a short loop will be fed to the primary needles. When the slack course is being knit, the shipping pin 244 is raised and engages the upper lever 290 (Fig. 3) moving the same at the forward end of said lever toward the left (Fig. 23) to engage a screw 302 fast to the lever 297, moving the lower end of said lever 297 toward the cylinders or

inwardly, thus moving the slur cock to its normal position and feeding the sinkers between the needles to their greatest depth to form loops of proper length for a slack course. The levers in Figs. 3 and 23 are shown in the position occupied thereby when the regular course is being knit upon the machine. A bracket 303 is fastened to the upper bed-plate 51 immediately following the bracket 287, (as shown in Figs. 1, 2 and 6,) which has projecting from its side the usual upper and lower slotted plates 304 and 305 to which are attached an upper pair of levers 306 and 307 and a lower pair of levers 308 and 309 which are constructed with interlocking pins in the slotted plates to operate one upon the other in substantially the same manner as those hereinbefore described and shown in Figs. 16 and 17. At one side of the bracket 303 on the bed-plate there is secured a downwardly extending bracket 310 having bearings in its upper and lower end supporting a vertical shaft 311. This shaft extends above the upper bearing and has adjustably secured thereto two crank-arms 312 and 313, one above the other, each of which extends at right angles to the shaft 311 to a point in front of the pairs of levers 306, 307 and 308 and 309. The crank-arms 312 and 313 are adjusted inwardly to bring vertical pins 314 and 315 within a short space of the levers 306 and 308 which operate upon them to swing said arms outwardly. On the lower end of the shaft 311 is adjustably attached a foot-piece 316 which is at right angles to the shaft 311 and extends over the top of the bracket 317 of the well-known spring presser attachment below and is held in front of the vertical arm 318 of said presser which is forced in toward the needle cylinders by a coil spring 319 which encircles the presser rod and performs the function of holding the presser wheel 320 against the secondary needles to press the beards of said needles in order to cast off the loop in making the regular work. When it is desired to withdraw the presser wheel 320 from the secondary needles to leave the beards of the needles open, as is necessary in making the welt and the royal rib, the lever 306 or 308 is forced against the pins 314 or 315, respectively, driving the end of the arms 312 or 313 outwardly, thereby rocking the shaft 311 and swinging the foot-piece 316 outwardly, carrying with it the vertical arm 318 which is rigidly attached to the rod 321 which holds the presser 320, thus withdrawing the presser wheel 320 from contact with the needles of the upper cylinder or secondary needles. A bracket 322 is fastened to the upper bed-plate 51 and to said bracket is pivoted a rock-lever consisting of a forwardly projecting arm 323 and a vertical arm 324. The upper end of the arm 324 is provided with an adjust-

ing screw 326 which is adapted to contact with a depending lug 327 near the end of the lower lever 309 on the bracket 303, hereinbefore described. The outer end of the arm 323 is connected by a link 328 to an arm 329 pivoted to a bracket 330 fast to the lower bed-plate 40. The arm 329 is connected at its free end to an arm 331 rigidly secured to a pintle 332 which passes through a slot 333 in a bracket 334 fast to said lower bed-plate. Said bracket 334 has a needle cam 335 rigidly secured thereto adjacent to the needles of the lower cylinder. This stationary cam 335 has a recess 336 in its inner side, as shown in Figs. 27 and 28 and in this recess there is a T-shaped sliding cam 337 which is attached to the inner end of the pintle 332 and is moved up or down in said recess to regulate the downward movement of the lower or primary needles, as may be necessary in changing from making the regular work to making the welt or vice versa. In making the regular work, the cam 337 is pressed downward and is held in that position by the lug 327 on the lever 309, which forces the screw 326 in the end of the arm 324 outwardly and the arm 323 is thus rocked downwardly, carrying with it the link 328 and the arm 329, which, through the arm 331, depresses the cam 337 where it is held. When it is desired to change the stitch to that of making a welt, the lever 309 is moved away from the end of the screw 326, whereupon the cam 337 is at once forced upwardly into its seat by the strain of the yarn which draws up the needles and said cam is held in that position by means of the needles until the lever 309 again forces the cam 337 down. A light tension spring 338 is attached at one end to the lever arm 323 and at the other end thereof to the lower bed-plate 40 for the purpose of accommodating varying conditions and lengths of stitch and to keep the tension on the yarn the same whether the yarn is on one or both sets of needles.

A suitable presser finger 339 (Fig. 9) is held with a spring pressure between the needle cylinders in order to keep the regular work forced back and in making a welt, where several courses are knit on the lower needles alone, to keep the work forced back between the cylinders until the courses are finished, when the needles of the upper cylinder are again brought into operation and the knitted courses turned over upon themselves and their edges joined to the regular work to complete the welt.

A guard finger 340 is fastened to the bracket 61, said finger being in front of and near the needles at their crossing point between the cylinders for the purpose of keeping the needles from being raised out of their grooves in case of a "bunching up".

In Fig. 9 is illustrated the cams for the upper and lower needles and in dotted lines

the sinker wheel is illustrated, while in section the tripper finger and slide are shown between the needles, the presser finger 339 being also shown. The guard finger 334 is also shown in said figure.

It will be understood that the action of the primary needles is the same in making the regular work, a loose course, the royal rib or the welt.

In the machine illustrated four feeds may be employed, but only two are illustrated, viz., Nos. 1 and 4, No. 1 being at one side of the cylinders and No. 4 being at the other side thereof (Fig. 2), it being understood that feeds Nos. 2 and 3 would be inserted between feeds Nos. 1 and 4, illustrated in said Fig. 2. The special mechanism for changing the stitch at each feed is duplicated with the following exceptions: The arm 277 fast to the lever 276 will be employed only between feeds Nos. 1 and 2; the levers 290 and 291, which actuate the mechanism to enable the sinkers to feed a long loop for a slack course, will be omitted at feeds Nos. 3 and 4; the levers 308 and 309 and the mechanism operated by them will be present at feed No. 1 only; the levers 306 and 307 and the mechanism operated thereby will be present at feeds Nos. 1 and 3. It is not, however, to be understood that my invention is limited to machines with four feeds only, as the number of feeds may be increased or decreased as may be desired. Should the number of feeds be increased, the additional feeds should be provided with the special mechanism to feeds Nos. 1 and 4.

The general operation of the machine hereinbefore specifically described is as follows: When the machine is engaged in making the regular work, such as the one-and-one rib, the several pairs of levers are in the position shown in Figs. 1 and 2, the levers 258 and 275 forcing the pins 263 and 279, respectively, outward, actuating the levers 266 and 280 and depressing the cams 272 and 286, respectively, thereby forcing the needles of the secondary cylinder downwardly for receiving the stitch for making the one-and-one or regular work, while the lever 293 contacts with the screw 294 to hold the lever 297 in the position illustrated in Fig. 3, thus holding the slur cock 89 in position to move the sinkers the correct distance between the needles of the primary cylinder to feed loops of the proper length of yarn for the one-and-one stitch. At the same time it will be understood that the lever 309 is in position to force the screw 326 outwardly, which rocks the arm 323 of the angle lever to depress the link 328 through the arm 329, whereby the movable cam 337 is depressed. During the operation of the machine the pattern wheel 201 will be kept moving step by step carrying the pattern chain 204 with it, but while the

machine is knitting regular work the pattern wheel 207 will be at rest, the pawl 199 being held out of engagement with the ratchet 206 by means of the pin 222 and arm 220, the latter being elevated by the pin 212 in the pattern wheel 207. To change the stitch from the regular work it will be necessary to start the pattern wheel, and to do this the pattern chain 204 will be arranged on the pattern wheel 201 to bring one of its cam-shaped links 205 into engagement with the lever 216 at the proper time, which will lift the latter and thereby move the arm 220 off the pin 212 and permit the pawl 199 to engage its ratchet 206, and the pattern wheel 207 will then be rotated step by step. It is also to be understood that when the pattern wheel 207 is at rest and the machine is doing regular work, the levers 223, 224 and 225 will rest at their free ends upon the periphery of said pattern wheel 207. If it is desired to knit a loose course, the pin 213 will be inserted in the pattern wheel 207, which is behind the free end of the lever 223, and when the pattern wheel is moved the lever 223 will ride up on said pin, which will result in rocking the rock-shaft 227, and through the medium of the levers 230 and 233, the inclination of the switch-plate 240 will be changed to bring its free edge downward, so that when the cylinders are revolved the shipping pin 244 will ride upon the inclined surface of said switch-plate and be brought upwardly into operative position, remaining in this position during one revolution of the cylinders. As the stand 188 is carried around by the upper cylinder, the shipping pin 244, which has been raised as hereinbefore described, comes in contact with the lever 290 which operates upon the lever 297 to move the slur cock 89 forward to its innermost position, thus forcing the sinkers to their most advanced positions between the needles of the primary cylinder and feeding to said needles the longest loops. Said shipping pin 244 also strikes the lever arm 277, forcing it forward, thereby moving the lever 275 out of engagement with the pin 279, releasing the angle arm 282, whereupon the needles of the upper cylinder will carry the cam 286 upwardly and thus the upper needles will not be forced downwardly at this point while the slack course is being knit on the needles of the lower cylinder. Just before the completion of the rotation of the cylinders above referred to, the cam roll 190 will pass over the cam 189 and thereby operate the pawl 199 and move the pattern wheel 207 one notch, which will move the pin 213 from beneath the lever 223 and thereby reverse the inclination of the switch-plate 240. As the stand 188 is carried around the shipping pin 244 comes under the switch-plate 240 and said pin 244 is forced down in its slot to its original position, whereupon

said pin 244 will come in contact with the lever 291 and disengage the lever 290 from the screw 302, allowing the lever 297 to assume the position shown in Fig. 3 and the slur cock to be moved backwardly to the proper position to feed the sinkers forward for the regular work. In the same rotation of the stand 188 the shipping pin 246 strikes against the lever 275, carrying it forward against the pin 279, thereby throwing the lever arm 282 upwardly, which, through the arm 283, tips the cam 286 (Fig. 7) downwardly to its original position for depressing the needles of the upper cylinder for making the regular work.

In placing the machine in position for making the royal rib, the lever 224 is drawn up on the head of the screw pin 214, previously placed in the desired position in the pattern wheel 207, thereby tilting the rock-shaft 228 and actuating the levers 231, and 234 to rock the shaft 237 and thus tilt the switch-plate 241 down against the stop 243 for the purpose of raising the shipping pin 245 in the stand 188. Now, as the cylinder revolves the pin 245 is forced up over the inclined surface of the switch-plate 241, so that said shipping pin 245 is raised in its slot and held in position by the spring 249. As the cylinders revolve, carrying the stand 188 with the pin 245 in its elevated position, while the pins 244 and 246 are in their lowered positions, said pin 245 comes in contact with the lever 306, rocking it into engagement with the pin 314, thereby throwing the arm 312 forward, rocking the shaft 311 and moving the foot-piece 316 outward, which carries with it the arm 318, removing the presser wheel 320 from contact with the beards of the needles on the upper cylinder for the purpose of leaving them in a raised position at this point, so the yarn will pass under the beard and will be held on the needle and will not be cast off, while at a point farther around a like presser wheel is performing its regular work in pressing down the beards of the needles, for the purpose of allowing the loops to pass over the beards and be cast off the needles.

To set the mechanism for knitting the royal rib the pattern wheel 201 is started by the pattern chain in the manner already described, viz., by the cam link 205 engaging the lever 216 and thereby permitting the pawl 199 to drop into engagement with its ratchet. When the pattern wheel 207 is moved one notch the lever 224 will ride up on a pin 214 and the same movement of the pattern wheel will move the pin 212 under the arm 220, which will again lift the pawl 199 out of engagement with its ratchet 206 and the pattern wheel 207 will remain at rest, with the lever 224 elevated until the desired number of royal rib courses have been knit. The number of courses will be gov-

5 erned by the pattern chain, which will have a second cam-link 205 at the proper distance behind the first link 205 which started the pattern wheel, and as soon as the second link 205 engages the lever the pattern wheel 207 will be again started and move the pin 214 from beneath the lever 224, dropping the end of the lever down on the pattern wheel 207, rocking the connecting levers and arms, and thereby tilting the switch-plate 241 into its original position. As the shipping pin 245 passes around under the switch plate 241, it is forced down to its lowest position in its slot 254 when in its course it comes in contact with the lever 307, carrying the end of said lever forward and throwing the lever 306 off the pin 314, thereby enabling the arm 312 to swing back, turning the shaft 311 and foot-piece 316, whereupon the spring 319 will force the presser wheel back into contact with the needles of the upper cylinder, placing the machine again in condition for performing regular work. The same movement of the pattern wheel which releases the pin 314 from the lever 224 may also, if desired, move another pin 212 beneath the arm 220 and stop the movement of the pattern wheel 207, as before described.

30 To change the stitch for making the welt, the pattern wheel 207 will be moved to bring the pin 215 into engagement with the lever 225 and there will be as many pins 215 arranged in succession as may be necessary to keep the lever elevated while the necessary number of courses in the welt are knitted. Raising the end of the lever 225 rocks the shaft 229 and operates the levers 232 and 235, whereby the rock-shaft 238 is rocked to tilt the switch-plate 242 downward on the lug 243, where it remains as long as the courses are being made for the welt. As the stand 188 is moved around, the third shipping pin 246 is raised to the top of its slot by being forced up and over the inclined switch-plate 242. Now, as the stand 188 moves forward with the cylinders, said pin 246 comes in contact with the levers 256 and 276, carrying their ends forward and thereby moving the levers 258 and 275 off the pins 263 and 279, thus rocking the lever arms 268 and 282 in the proper direction to force the cams 272 and 286 up out of action, whereupon the knitting is done upon the primary needles. Said pin 246 also comes in contact with the lever 292, moving the lever 293 out of contact with the screw 294, so that the lever 297 is moved forwardly at its upper end until the screw 301 contacts with the upper bed-plate 51, the lower end of said lever being moved back and the slur cock 89 being carried therewith by means of the spring 100, thus shortening the distance to which the sinkers are forced between the needles of the primary cylinder sufficiently

to feed the short loop necessary for the welt. Said pin 246 also strikes the lever 308 and moves it into engagement with the pin 315, rocking the arm 313 outwardly, rotating the vertical shaft 311, carrying the foot-piece 316 and with it the arm 318, thereby removing the presser wheel 320 from the beards of the upper cylinder needles. As the pin 246 turns the lever 308, the lever 309 is moved so that its lug 327 is released from the screw 326, whereupon the tension upon the knitted work draws up the movable cam 337, thus moving the arm 329 and link 328 upwardly and tilting back the lever arm 324, releasing the strain on the yarn when passing the cam. When the number of courses have been made for the desired width of welt by this process, the machine is then changed to perform the regular work, and the courses of the welt are folded over upon themselves, and the two edges of the welt are united by bringing into action the upper cylinder needles.

In returning the machine to the regular work after having knit the welt, the lever 225 drops off the head of the screw-pins on the pattern wheel 207, thereby tilting the shaft 229, levers 232 and 235, rock-shaft 238, and raising the switch-plate 242 to its original position. Now, as the stand 188 is moved around the pin 246 passes under the switch plate and is forced down into its normal position, as shown in Fig. 14, and when it rotates with the cylinder it comes in contact with the levers 258 and 275, carrying their ends forward in contact with the pins 263 and 279, respectively, forcing the arms 268 and 282 downwardly and forcing the cams 272 and 286 downwardly, thereby depressing the secondary needles to do the regular work. Said pin 246 in its rotation comes in contact with the lever 293 and brings the same in contact with the screw 294, thus rocking the lever 297 to the position illustrated in Fig. 3 and moving the slur cock 89 into the proper position to move the sinkers between the needles a sufficient distance to feed the loops of yarn for the regular stitch. The pin 246 also strikes the lever 309, removing the lever 308 from contact with the pin 315, whereupon the crank-arm 313 is forced inwardly by the action of the coil spring 319 through its connecting arms and shaft, and the presser wheel 320 is again brought into contact with the needles of the upper cylinder, when it is in position for doing its regular work. The shipping pin 246 strikes the lever 309, whereupon the lug 327 on its front end is brought into contact with the screw 326, forcing the arm 324 outwardly, carrying the arm 323 downwardly, thereby depressing the link 328 and arm 329 and forcing the cam 337 downward into its normal position for making the regular work.

The operation of the sinker wheel as to its being thrown out of operative relation with the primary needles and the mechanism which is actuated by the movement of said sinker wheel away from the cylinders to move the presser for the primary needles out of operative relation thereto, (if, for any reason the sinker wheel does not rotate freely upon its stud,) have all been hereinbefore fully described both in detail of construction and in operation and, therefore, the operation of said sinker wheel and the mechanisms actuated thereby will not be repeated.

I have described and illustrated my improved sinker wheel and the means for throwing the same out of operative relation to the needles of the primary cylinder in combination with a primary needle cylinder in which the needles are adapted to slide in grooves provided in said primary cylinder and the needle cylinder is adapted to be rotated while the sinker wheel is supported upon a rocker frame, which, in turn, is supported upon a stationary bed-plate. It is evident that without departing from the spirit of my invention the sinker wheel might be supported upon a rocker frame which, in turn, might be supported upon a rotary bed-plate while the needle cylinder remained stationary, and also that said sinker wheel might be used in combination with a needle cylinder and a set of needles fast to said needle cylinder, the loops of yarn being fed up on the needles to perform the casting off operation by means of bur wheels in a manner well known to those skilled in this art.

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

1. A knitting machine having, in combination, a needle carrier, a set of needles therefor, a sinker wheel equipped with sinker blades adapted to feed yarn to said needles, a rotary support upon which said sinker wheel is eccentrically and rotatably mounted, means to resiliently hold said sinker wheel and rotary support in operative position, and mechanism adapted to impart a motion to said carrier relatively to said sinker wheel, whereby, under abnormal stress, said sinker blades may be automatically moved out of the path of said needles.

2. A knitting machine having, in combination, a needle carrier, a set of needles therefor, a sinker wheel with sinker blades adapted to be engaged by said needles, a yieldingly mounted support upon which said sinker wheel is rotatably mounted, said support being movable in the general direction of movement of the portion of said carrier adjacent thereto, whereby, under

conditions of abnormal stress, said sinker wheel and its support will be moved in the direction aforesaid.

3. A knitting machine having, in combination, a needle carrier, a set of needles therefor, a sinker wheel with sinker blades, a yieldingly mounted support upon which said sinker wheel is rotatably mounted, said support movable in the general direction of movement of the portion of said carrier adjacent thereto, and means adapted, under conditions of abnormal stress, to move said sinker wheel and its support in the direction aforesaid.

4. A knitting machine having, in combination, a needle carrier, a set of needles supported thereon, a rotary sinker wheel, a plurality of sinkers on said sinker wheel adapted to be moved in and out between said needles, whereby loops of yarn may be fed to said needles, means to cast off the loops from said needles, mechanism adapted to move said needle carrier relatively to said sinker wheel, means adapted to move said sinker wheel away from said needle carrier when the free rotation of said sinker wheel is obstructed, whereby said sinkers are moved out of operative relation to said needles, means to resiliently hold said sinker wheel in position with its sinkers in operative relation to said needles, and means to hold said sinker wheel in position with its sinkers out of engagement with said needles.

5. A knitting machine having, in combination, a needle carrier, a set of needles therefor, a sinker wheel, with sinker blades, a yieldingly mounted support upon which said sinker wheel is rotatably mounted, and means adapted under conditions of abnormal stress to move said sinker wheel and sinkers bodily away from said needle carrier and said sinkers permanently out of coöperative relation with said needles.

6. In a knitting machine, a needle carrier, a set of needles adapted to slide in grooves provided in said carrier, a rocker frame, a sinker wheel equipped with sinker blades journaled to rotate upon said rocker frame and eccentric to the axis thereof, and yielding means adapted to hold said rocker frame in position and prevent the same from rotating while said sinker blades are in operative engagement with said needles.

7. In a knitting machine, a needle carrier, a set of needles adapted to slide in grooves provided in said carrier, a rocker frame, a sinker wheel equipped with sinker blades, journaled to rotate upon said rocker frame and eccentric to the axis thereof, and yielding means adapted to hold said rocker frame in position and prevent the same from rotating while said sinker blades are in operative engagement with said needles, said yielding means also adapted to hold

said rocker frame in position with said sinker blades out of engagement with said needles.

8. In a circular knitting machine, a needle cylinder, a set of needles adapted to slide in grooves provided in the periphery of said cylinder, a rocker frame, a sinker wheel equipped with sinker blades, said sinker wheel journaled to rotate upon said rocker frame and eccentric thereto, a stop and a spring adapted to hold said frame against said stop, whereby said sinker blades are held in operative engagement with said needles.

9. In a circular knitting machine, a needle cylinder, a set of needles adapted to slide in grooves provided in the periphery of said cylinder, a rocker frame, a sinker wheel equipped with sinker blades, said sinker wheel journaled to rotate upon said rocker frame and eccentric thereto, a stop, and a spring constructed to hold said frame against said stop and also constructed to hold said frame out of contact with said stop.

10. In a circular knitting machine, a needle cylinder, a set of needles adapted to slide in grooves provided in the periphery of said cylinder, a rocker frame, a sinker wheel equipped with sinker blades, said sinker wheel journaled to rotate upon said rocker frame and eccentric thereto, an arm on said rocker frame, a stop, and a flat spring bent at its free end and adapted to bear against said arm upon opposite sides thereof, whereby said frame may be held against said stop or out of contact therewith.

11. In a circular knitting machine, a needle cylinder, a set of needles adapted to slide in grooves provided in the periphery of said cylinder, a rocker frame, a sinker wheel equipped with sinker blades, said sinker wheel journaled to rotate upon said rocker frame and eccentric thereto, yielding means adapted to hold said rocker frame in position and prevent the same from rotating while said sinker blades are in operative engagement with said needles, and means to adjust said rocker frame about its axis, whereby said sinker blades may be brought into operative relation with said needles.

12. In a knitting machine, a needle carrier, a set of needles therefor, a sinker wheel equipped with sinkers, a yieldingly mounted support upon which said sinker wheel is rotatably mounted, mechanism adapted to move said needle carrier relatively to said sinker wheel, and means adapted under conditions of abnormal stress to move said sinker wheel and sinkers away from said carrier and said sinkers permanently out of cooperative relation with said needles; in combination with a presser adapted to be

pressed against the beards of said needles and instrumentalities operated by the movement of said sinker wheel away from said carrier to move said presser away from said needles.

13. In a circular knitting machine, a needle cylinder, a set of needles adapted to slide in grooves provided in the periphery of said cylinder, a rocker frame and a sinker wheel equipped with sinkers which are adapted to be moved between said needles, said sinker wheel journaled to rotate upon said rocker frame and eccentric to the axis thereof; in combination with a presser adapted to be pressed against the beards of said needles and instrumentalities operated by the rocking of said rocker frame in one direction to move said presser away from said needles.

14. In a circular knitting machine, a needle cylinder, a set of needles adapted to slide in grooves provided in the periphery of said cylinder, a rocker frame, and a sinker wheel equipped with sinkers which are adapted to be moved between said needles, said sinker wheel journaled to rotate upon said rocker frame and eccentric to the axis thereof, a stop, and a spring adapted to hold said frame against said stop; in combination with a presser adapted to be pressed against the beards of said needles, and instrumentalities operated by the rocking of said rocker frame in one direction to move said presser away from said needles.

15. In a circular knitting machine, a needle cylinder, a set of needles adapted to slide in grooves provided in the periphery of said cylinder, a rocker frame, a sinker wheel equipped with sinkers which are adapted to be moved between said needles, said sinker wheel journaled to rotate upon said rocker frame and eccentric to the axis thereof, a stop, and a spring constructed to hold said frame against said stop and also constructed to hold said frame out of contact with said stop; in combination with a presser adapted to be pressed against the beards of said needles, and instrumentalities operated by the rocking of said rocker frame in one direction to move said presser away from said needles.

16. In a circular knitting machine, a needle cylinder, a set of needles adapted to slide in grooves provided in the periphery of said cylinder, a rocker frame, a sinker wheel equipped with sinkers which are adapted to be moved between said needles, said sinker wheel journaled to rotate upon said rocker frame and eccentric to the axis thereof, an arm on said rocker frame, a stop, and a flat spring bent at its free end and adapted to bear against said arm upon opposite sides thereof alternately, whereby said frame may be held against said stop or out of contact therewith; in combination

with a presser adapted to be pressed against the beards of said needles and instrumentalities operated by the rocking of said rocker frame in one direction to move said presser
5 away from said needles.

17. In a knitting machine, a needle carrier, a set of needles supported thereon, a rotary sinker wheel, a plurality of sinkers supported upon said sinker wheel, movable
10 relatively thereto, and adapted to be moved in and out between said needles, and instrumentalities adapted to automatically change the distance to which said sinkers may be advanced from the axial center of said
15 sinker wheel and between said needles.

18. In a circular knitting machine, a needle cylinder, a set of needles adapted to slide in grooves provided in the periphery of said cylinder, a rotary sinker wheel, a
20 plurality of sinkers supported upon said sinker wheel, movable relatively thereto and adapted to be moved in and out between said needles, instrumentalities adapted to automatically change the distance to which
25 said sinkers may be advanced from the axial center of said sinker wheel and between said needles, mechanism to rotate said cylinder, and means to move said sinker wheel away from said cylinder, whereby said
30 sinkers are moved out of engagement with said needles.

19. In a knitting machine, a rotary sinker wheel, a plurality of sinkers adapted to slide in grooves provided in said wheel, a
35 cam plate, a slur cock, and instrumentalities adapted to automatically move said slur cock relatively to said cam plate, whereby the distance to which said sinkers may be advanced from the axial center of said
40 sinker wheel may be varied.

20. In a knitting machine, a rotary sinker wheel, a plurality of sinkers adapted to slide in grooves provided in said wheel, a cam plate, a slur cock, a lever adapted to move
45 said slur cock relatively to said cam plate, and mechanism adapted to automatically rock said lever, whereby the distance to which said sinkers may be advanced from the axial center of said sinker wheel may
50 be varied.

21. In a knitting machine, a rotary sinker wheel, a plurality of sinkers adapted to slide in grooves provided in said wheel, a cam plate, a slur cock, a lever adapted to move
55 said slur cock relatively to said cam plate in one direction, a spring to move said cam plate in the opposite direction, and mechanism adapted to automatically rock said lever, whereby the distance to which said
60 sinkers may be advanced from the axial center of said sinker wheel may be varied.

22. In a circular rib knitting machine two needle cylinders, a set of needles adapted to
65 slide in grooves provided in the peripheries of each of said cylinders respectively, a

sinker wheel, and a plurality of sinkers supported on said sinker wheel, a rotary support upon which said sinker wheel is eccentrically and rotatably mounted, means to resiliently hold said support and sinker
70 wheel in position with its sinkers in operative relation to one of said sets of needles, and means operated by the rotation of one of said cylinders adapted, under conditions of abnormal stress, to move said sinker wheel
75 and its rotary support away from said cylinders.

23. In a circular rib knitting machine, two needle cylinders, a set of needles adapted to slide in grooves provided in the peripheries
80 of each of said cylinders, respectively, a rotary sinker wheel, a plurality of sinkers supported upon said sinker wheel, movable relatively thereto and adapted to be moved in and out between the needles of the primary
85 cylinder, means to resiliently hold said sinker wheel in position with its sinkers in operative relation to the needles of the primary cylinder, and means operated by the rotation of the primary cylinder, adapted
90 ed, under conditions of abnormal stress, to automatically move said sinker wheel bodily in the general direction of movement of that portion of said primary cylinder adjacent thereto until said sinkers are moved out
95 of the path of movement of said primary needles.

24. In a circular knitting machine, two needle cylinders, a set of needles adapted to slide in grooves provided in the periphery
100 of each of said cylinders, respectively, a rotary sinker wheel, sinkers adapted to slide in grooves provided in said sinker wheel and in and out between the needles of the primary set of said needles, a cam
105 plate, a slur cock, a presser for each set of needles, respectively, and needle actuating cams; in combination with a pattern wheel, shipping pins controlled by said pattern wheel and carried by the needle cylinder,
110 and means connected with the slur cock, the presser for the secondary needles, and needle cams, and operated by said shipping pins to change the stitch.

25. In a circular knitting machine, two
115 needle cylinders, a set of needles adapted to slide in grooves provided in the periphery of each of said cylinders, respectively, a rotary sinker wheel, sinkers adapted to slide in grooves provided in said sinker wheel
120 and in and out between the needles of the primary set of said needles, a cam plate, a slur cock, a presser for each set of needles, respectively, and needle actuating cams, in combination with a plurality of shipping
125 pins carried by one of said needle cylinders, switch devices for adjusting said pins automatically, and means controlled by said shipping pins to change the positions of said slur cock, the presser for the secondary
130

needles, and said needle cams as and for the purpose set forth.

26. In a circular knitting machine, two needle cylinders, a set of needles adapted to slide in grooves provided in the periphery of each of said cylinders, respectively, a rotary sinker wheel, sinkers adapted to slide in grooves provided in said sinker wheel and in and out between the needles of the primary set of said needles, a cam plate, a slur cock, a presser for each set of needles, respectively, and needle actuating cams; in combination with a pattern wheel, switches controlled by said pattern wheel, shipping devices controlled by said switches, and a series of levers connected with said slur cock, another series of levers connected with the presser for the secondary needles, and another series of levers connected with said needle cams, said different series of levers being operated by the shipping devices to change the positions thereof as and for the purpose set forth.

27. In a circular knitting machine, two needle cylinders, a set of needles adapted to slide in grooves provided in the periphery of each of said cylinders, respectively, a rotary sinker wheel, sinkers adapted to slide in grooves provided in said sinker wheel and in and out between the needles of the primary set of said needles, a cam plate, a slur cock, a presser for each set of needles, respectively, and needle actuating cams; in combination with a pattern wheel having a series of projecting pins, means for operating the pattern wheel, levers arranged in the path of said pins, shipping pins carried by one of said needle cylinders, switch plates connected with said levers and operated thereby to actuate the shipping pins, and a series of levers supported by a stationary part and controlled by said shipping pins and connected with said slur cock, the presser for the secondary needles, and the needle cams as and for the purpose set forth.

28. In a circular knitting machine, two needle cylinders, a set of needles adapted to slide in grooves provided in the periphery of each of said cylinders, respectively, a rotary sinker wheel, sinkers adapted to slide in grooves provided in said sinker wheel and in and out between the needles of the primary set of said needles, a cam plate, a slur cock, a presser for each set of needles, respectively, and needle actuating cams; in combination with a series of levers supported by a stationary part and arranged in pairs adjacent to the upper needle cylinder, mechanism, operated by one of said pairs of levers for controlling the position of said slur cock, another mechanism operated by one of said pairs of levers for controlling the position of the presser for the secondary needles, another mechanism operated by one of said pairs of levers for con-

trolling the position of the needle cams, shipping pins carried by one of said needle cylinders for operating said levers, a pattern wheel, and switch plates controlled by said pattern wheel and operating said shipping pins, as described, whereby the machine may be set to knit the regular course, the "royal rib" and the "welt" and changed automatically from one to another as and for the purpose set forth.

29. In a circular knitting machine, two needle cylinders, a set of needles adapted to slide in grooves provided in the periphery of each of said cylinders, respectively, a rotary sinker wheel, sinkers adapted to slide in grooves provided in said sinker wheel and in and out between the needles of the primary set of said needles, a cam plate, a slur cock, a lever operatively connected with said slur cocks, and a pair of pivoted levers supported upon a stationary part and adapted to control said first named lever, and means carried by one of said cylinders adapted to actuate said pair of levers.

30. In a circular knitting machine, two needle cylinders, a set of needles adapted to slide in grooves provided in the periphery of each of said cylinders, respectively, a rotary sinker wheel, sinkers adapted to slide in grooves provided in said sinker wheel and in and out between the needles of the primary set of said needles, a cam plate, a slur cock, a lever operatively connected with said slur cock, a pair of pivoted levers supported upon a stationary part and adapted to control said first named lever, shipping pins carried by one of said cylinders and adapted to operate said pair of levers, and means for operating said shipping pins, whereby the distance to which said sinkers may be advanced between the needles of the primary set of said needles may be increased or diminished.

31. In a circular knitting machine, two needle cylinders, a set of needles adapted to slide in grooves provided in the periphery of each of said cylinders, respectively, a rotary sinker wheel, sinkers adapted to slide in grooves provided in said sinker wheel and in and out between the needles of the primary set of said needles, a cam plate, a slur cock, a lever operatively connected with said slur cock, a plurality of pairs of pivoted levers supported on a stationary part and adapted to engage said first named lever at different distances from its pivotal center, and means carried by one of said cylinders adapted to actuate said pairs of levers, whereby the distance to which said sinkers may be advanced between the needles of the primary set of said needles may be increased or diminished.

32. In a circular knitting machine, two needle cylinders, a set of needles adapted to slide in grooves provided in the periphery of

each of said cylinders, respectively, a rotary sinker wheel, sinkers adapted to slide in grooves provided in said sinker wheel and in and out between the needles of the primary set of said needles, a cam plate, a slur cock, a lever operatively connected with said slur cock, an adjusting screw on said lever, a pair of pivoted levers supported on a stationary part and adapted to engage said screw, and means carried by one of said cylinders adapted to actuate said pair of levers.

33. In a knitting machine, a needle carrier, a set of needles adapted to slide in grooves provided in said needle carrier, a rotary sinker wheel equipped with a plurality of sinkers, a yieldingly mounted support upon which said sinker wheel is rotatably mounted, said support being movable in the general direction of movement of the portion of said carrier adjacent thereto, mechanism adapted to move said needle carrier relatively to the said sinker wheel, and a gear fast to said sinker wheel and adapted to mesh into said needles, whereby when said sinker wheel is prevented from rotating about its own axis, said sinkers are moved out of operative relation to said needles.

34. In a knitting machine, a needle carrier, a set of needles adapted to slide in grooves provided in said carrier, a rocker frame, a sinker wheel equipped with sinker blades and journaled to rotate upon said rocker frame and eccentric to the axis thereof, a gear fast to said sinker wheel and adapted to mesh with said needles, and yielding means adapted to hold said rocker frame in position and prevent the same from rotating while said sinker blades are in operative engagement with said needles.

35. In a knitting machine, a needle carrier, a set of needles adapted to slide in grooves provided in said carrier, a rocker frame, a sinker wheel equipped with sinker blades journaled to rotate upon said rocker

frame and eccentric to the axis thereof, a gear fast to said sinker wheel and adapted to mesh with said needles, and yielding means adapted to hold said rocker frame and prevent the same from rotating while said sinker blades are in operative engagement with said needles, said yielding means adapted to hold said rocker frame in position with said sinker blades out of engagement with said needles.

36. In a circular knitting machine, a needle cylinder, a set of needles adapted to slide in grooves provided in the periphery of said cylinder, a rocker frame, a sinker wheel equipped with sinker blades, said sinker wheel journaled to rotate upon said rocker frame and eccentric thereto, a gear fast to said sinker wheel and adapted to mesh with said needles, and yielding means adapted to hold said rocker frame in position and prevent the same from rotating while said sinker blades are in operative engagement with said needles.

37. A knitting machine having, in combination, a needle carrier, a set of needles therefor, a rotary sinker wheel with sinker blades, devices adapted to hold the sinker wheel and sinkers in operative relation to the needles and resilient means permitting the devices for holding the sinkers in operative relation with the needles to yield and return, said resilient means embodying devices to prevent the return of the sinkers into coöperative relation with the needles under the unaided stress of the resilient means when said resilient means has yielded to an abnormal extent.

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

WILLIAM T. BARRATT.

Witnesses:

CHARLES S. KEHOE,
ANNA V. MURPHY.