

(No Model.)

3 Sheets—Sheet 1.

A. J. GULICK & W. HUMPHREY.
KNITTING MACHINE.

No. 459,827.

Patented Sept. 22, 1891.

Fig. 1.

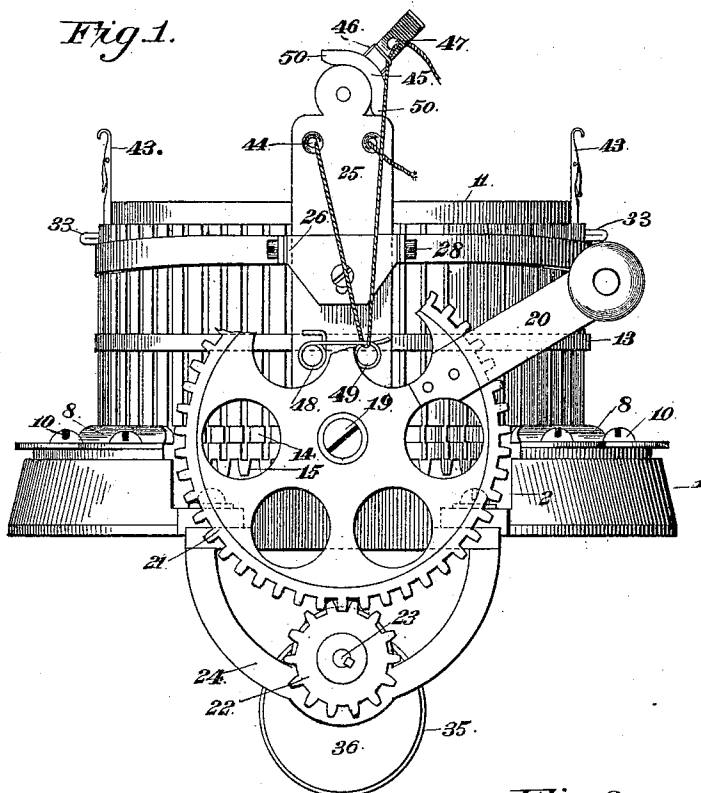
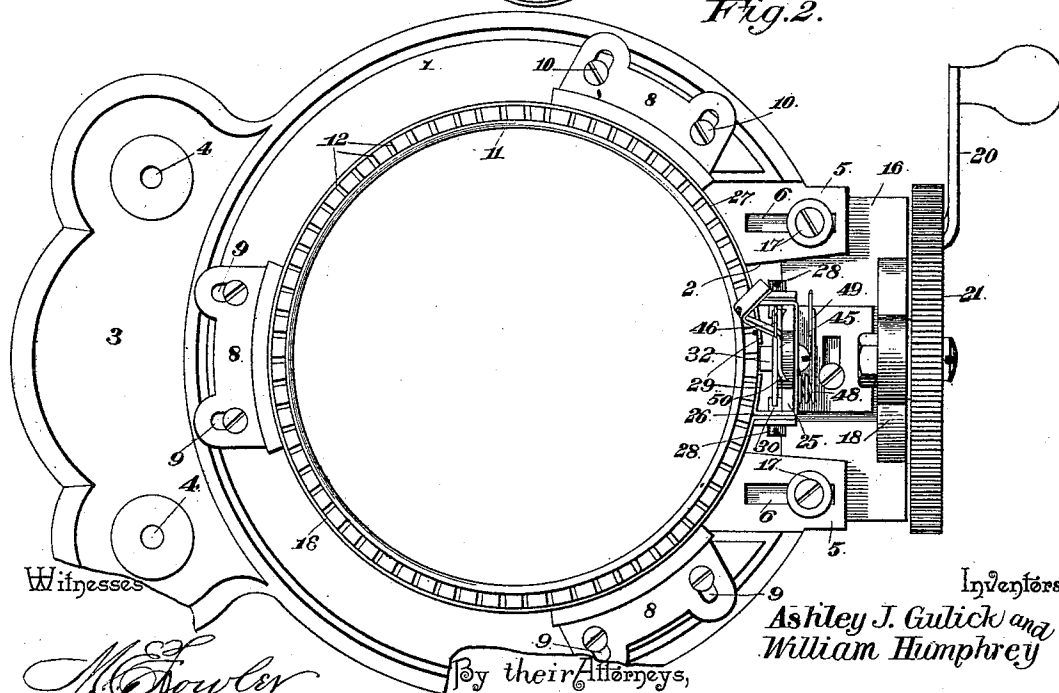


Fig. 2.



Witnesses

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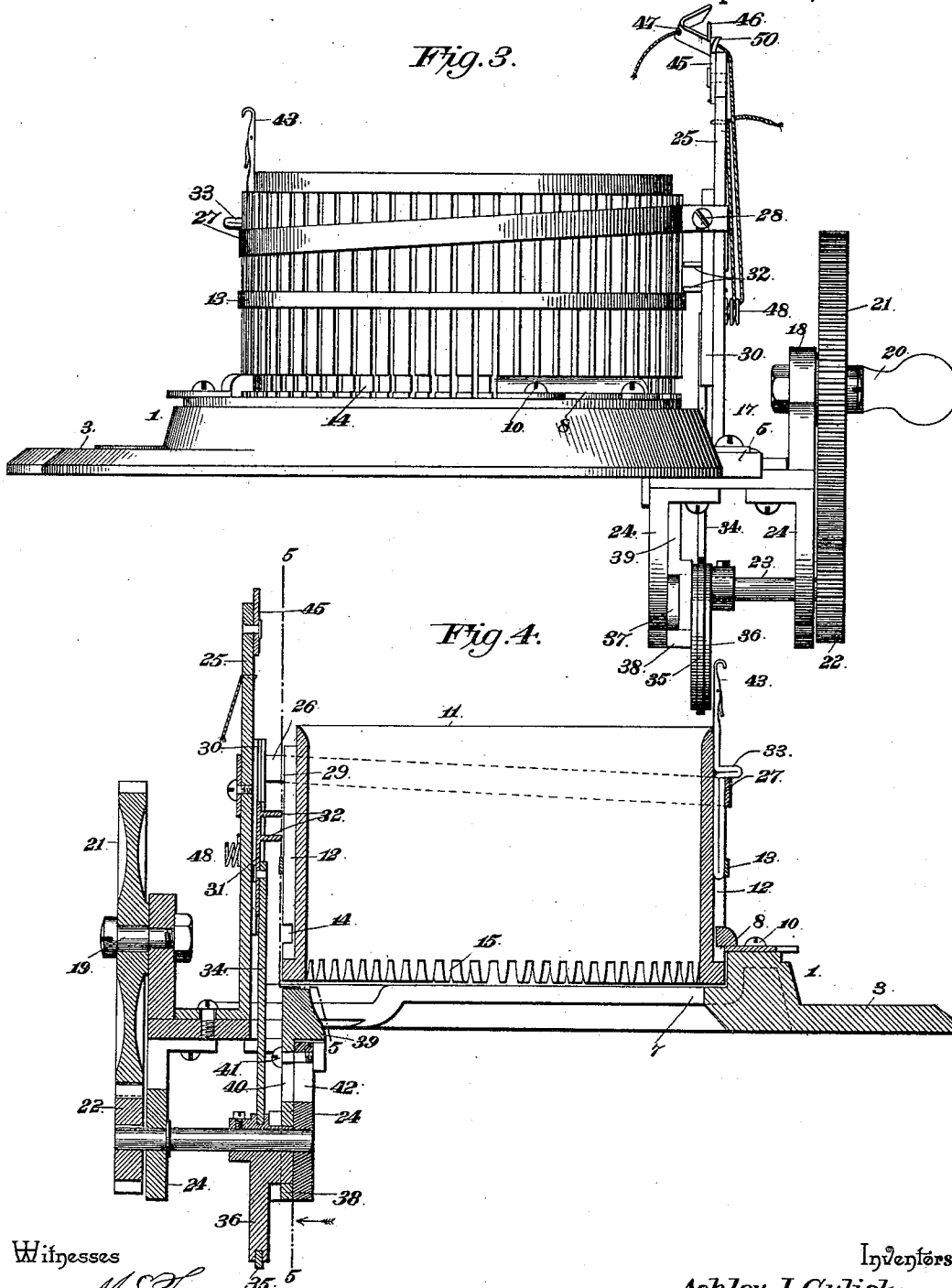
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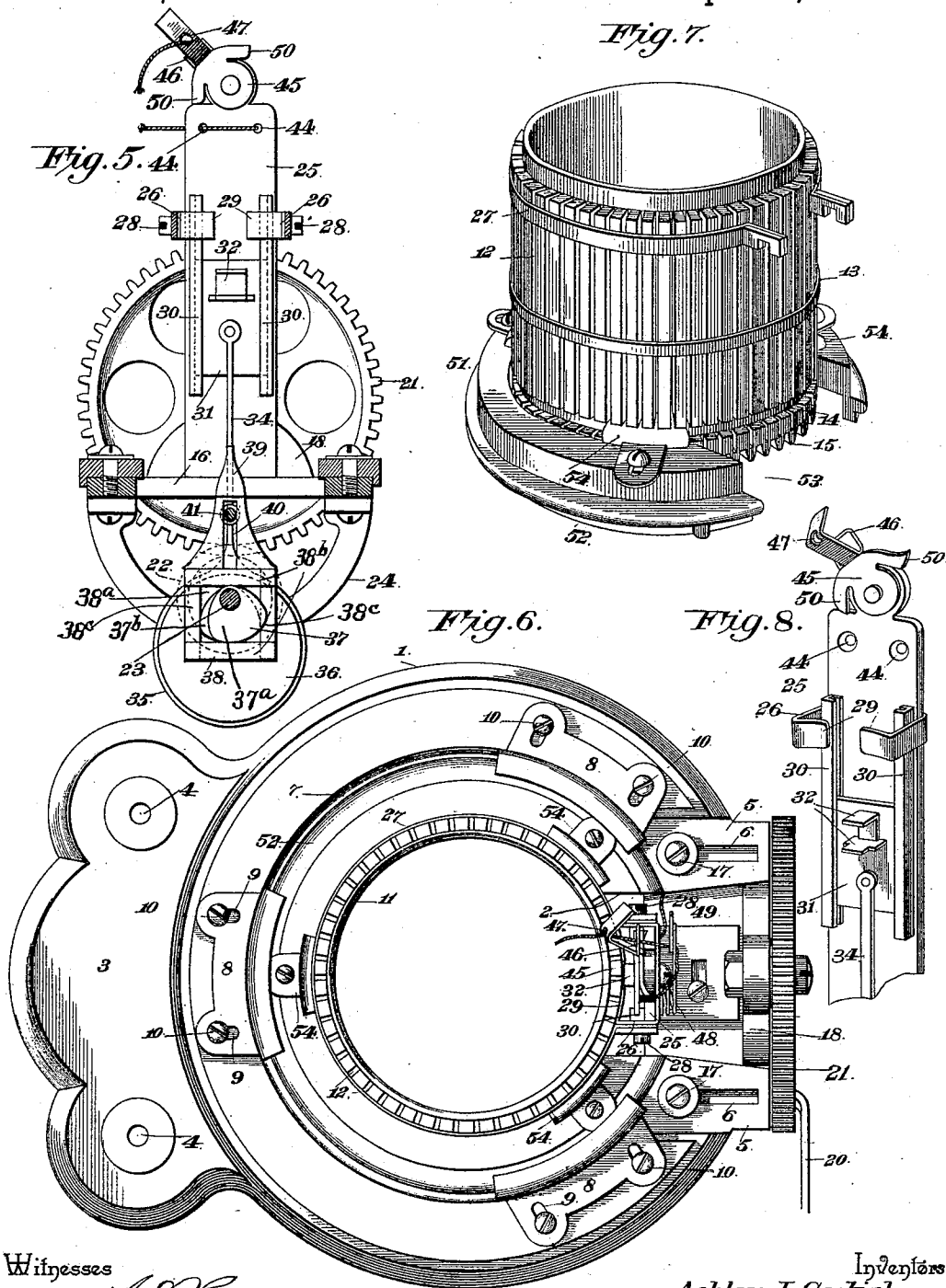
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UNITED STATES PATENT OFFICE.

ASHLEY J. GULICK AND WILLIAM HUMPHREY, OF CLEARFIELD,
PENNSYLVANIA.

KNITTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 459,827, dated September 22, 1891.

Application filed February 26, 1891. Serial No. 382,891. (No model.)

To all whom it may concern:

Be it known we, ASHLEY J. GULICK and WILLIAM HUMPHREY, citizens of the United States, residing at Clearfield, in the county of Clearfield and State of Pennsylvania, have invented a new and useful Knitting-Machine, of which the following is a specification.

This invention relates to that class of knitting-machines which are known as "circular-knitting machines" and which are employed principally for knitting tubular fabrics; and among its objects is to provide a machine of this class in which the needle-carrying cylinder shall be interchangeable and detachable to admit of a cylinder of a different size being used when fabric of a different diameter is to be produced, thus enabling seamless fabrics of various diameters to be produced by the same machine by merely using different cylinders.

A further object of the invention is to so construct the frame that the operating mechanism or gearing may be used in connection with cylinders of different diameters by mounting the said gearing upon a slide which is mounted adjustably with relation to the main frame.

A further object of the invention is to improve and to simplify the general construction of the machine.

With these ends in view the invention consists in the improved construction, arrangement, and combination of parts, which will be hereinafter fully described, and particularly pointed out in the claims.

In the drawings hereto annexed, Figure 1 is a front elevation of a knitting-machine constructed in accordance with our invention. Fig. 2 is a top plan view of the same. Fig. 3 is a side elevation. Fig. 4 is a central longitudinal sectional view. Fig. 5 is a vertical sectional view taken on the line 5 5 in Fig. 2. Fig. 6 is a plan view showing the machine with one of the reducing-rings and a smaller cylinder in position. Fig. 7 is a perspective view of a reducing-ring with the cylinder mounted therein. Fig. 8 is a perspective detail view of a part of the operating mechanism.

Like numerals of reference indicate like parts in all the figures of the drawings.

1 designates the base or frame of the machine, which is composed of a ring provided at one side with an opening 2 and at the opposite side with a flange 3, which latter may be provided with perforations, as 4, to receive screws or other fastening devices, by means of which the said base or frame may be secured in position for operation to a table or bench. The ends of the said base adjacent to the opening 2 are provided with arms 5, having longitudinal slots 6. The inner side of the frame 1 is provided with a flange 7, and upon the upper side of said frame are mounted a series of radially-adjustable plates 8, having slots 9 to receive the screws or bolts 10, by means of which they are secured in position.

11 designates a cylinder, which is provided on its outer side with vertical grooves or recesses 12 to receive the needles. Said cylinder is also provided with a stationary annular hoop or band 13 to secure the needles in the grooves 12, and it furthermore has near its lower edge an annular groove 14 to receive the inner edges of the radially-adjustable plates 8 upon the base or frame of the machine. These adjustable plates serve to support the cylinder in position upon the base or frame in such a manner as to permit it to revolve thereon, the bearing for the cylinder being formed by the inner edges of the plates 8 engaging the annular groove 14 of said cylinder. The lower edge of the cylinder is provided with a circumferential series of teeth or cogs 15. Said cogs, which are normally raised a short distance above the annular flange 7 of the frame, are arranged in alignment with the vertical needle-carrying grooves 12, as will be clearly seen in several figures of the drawings, the object of this being simply to cause the needles to be squarely engaged by the operating mechanism, which is to be hereinafter described.

16 designates a plate which is provided with set-screws 17, by means of which it is connected adjustably with the arms 5 of the base or frame 1, said set-screws being extended through the slots 6 in said arms. The plate 16 is provided with an upright 18, forming a bearing for the shaft 19. Said shaft carries a spur-wheel 21, having the operating-

crank 20 and meshing with a pinion 22 upon a counter-shaft 23, which is journaled in suitable bearings 24 upon the under side of the plate 16. The upper side of the latter is also
 5 provided with an upright 25, having arms or brackets 26, to which are secured the ends of a hoop or band 27, partially encircling the cylinder, as will be clearly seen by reference to the drawings. This band or hoop surrounds
 10 or encircles the cylinder loosely, so as to permit the latter to be freely rotated. The side of said hoop opposite to the upright 25 will sag slightly, as shown in the drawings, and the upper edge of said hoop will thus to all
 15 intents and purposes form an inclined track, along which the needles are guided to the operating mechanism. The brackets 26, to which the ends of the hoop 27 are attached by means of set-screws 28, are provided with inwardly-
 20 extending arms 29, forming a continuation of the track or guide formed by the upper edge of the hoop 27, thus preventing the needles from dropping until they are engaged by the operating mechanism.

25 The upright 25 is provided on its inner side with vertical guides 30 for a vertically-reciprocating plate or cross-head 31, which is provided with lugs or projections 32, adapted to engage the shoulder 33 of each successive
 30 needle for the purpose of imparting to the latter a vertical reciprocating movement. The plate or cross-head is connected with and operated by a pitman 34, the lower end of which has a ring or strap 35 encircling a
 35 a disk 36, which is eccentrically mounted upon the counter-shaft 23. The latter is also provided at its inner end with a double cam 37, having the double bearing portions 37^a and 37^b out of alignment with each other
 40 and engaging a frame 38 at the lower end of a pawl 39, which is provided with a slot 40, by means of which it is mounted pivotally and in such a manner as to be capable of being vertically reciprocated upon a pin or stud
 45 41. The latter is vertically adjustable in a slot 42 in one of the frames or brackets 24, that depend from the under side of the plate 16 to form bearings for the counter-shaft 23. The said frame 38 is provided with a central
 50 rectangular opening 38^a, within which said cam works, and said space is inclosed between the parallel upper and lower parts 38^b and the parallel side parts 38^c, which are in different vertical planes with each other and
 55 form the bearing-surface, which are engaged by the bearing-faces of the portions 37^a and 37^b of said cam, respectively.

It will be observed that when the counter-shaft 23 is rotated by means of the spur-wheel 21, engaging or meshing with the pinion 22, the cam 37 serves to impart a vertically-reciprocating combined with an oscillating or vibrating movement to the pawl 39, causing the latter to engage the teeth or cogs
 60 15 at the lower edge of the cylinder 11, thus imparting to said cylinder an intermittent rotary movement to the extent of the space

of one tooth for each throw of the pawl. The adjustable fulcrum-pin 41, upon which the said pawl is mounted, enables it to be adjusted to operate in connection with cylinders in which the teeth 15, and consequently the needle-carrying grooves, are differently spaced. It will be observed that, owing to the compound movement of the dog or pawl
 75 39, the operation of the latter to actuate the cylinder is effected in a very brief space of time, or while the counter-shaft 23 makes only a very small portion of a revolution. The operation of said pawl to engage the cylinder is timed to take effect while the reciprocating plate or cross-head 31 is at the upper limit of its movement, thus carrying one
 80 needle out of engagement and the next one into engagement with the lugs 32 of the said cross-head, while the latter remains practically stationary. It will also be seen that the construction of this operating mechanism is such as to enable the machine to be operated at a considerable rate of speed, and
 90 likewise enable it to be reversed or the counter-shaft to be rotated in either direction.

The needles of the machine which are designated 43 are of ordinary well-known construction, and inasmuch as they form no part
 95 of the present invention only a few such needles have been shown in position in the machine.

The upper end of the upright 25 is provided with eyes or perforations 44 for the passage
 100 of the yarn, and the upper end of said upright likewise has a pivoted arm or plate 45, provided with a loop or guide 46 and an eye or perforation 47. A tension-spring 48, secured to the upright 25, is likewise provided with
 105 an eye 49 for the passage of the yarn. The latter is threaded first through one of the perforations 44, then through the other of said perforations, next through the eye 49 of the tension-spring, next through the loop 46,
 110 and finally through the eye 47 of the pivoted arm or plate 45. The latter, it will be observed, may be easily thrown to either side of the upright 25, so as to guide the yarn in the desired direction, according to the direction
 115 in which it is desired to rotate the cylinder 11. The plate 45 is provided with laterally-extending lugs 50, adapted to rest upon the upper edge of the upright 25 to support the said plate 46 in position for operation.

51 designates a reducing-ring, which is adapted to be mounted in the frame 1 and to be supported upon the flange 7 of the latter when the cylinder 11 has been removed, said
 120 reducing-ring being provided with a flange 52, adapted to rest upon the said flange 7. The said reducing-ring is not a complete annulus, but is provided with an opening 53, adapted to register with the opening 2 in the main frame, which is for the purpose of enabling
 125 the needles to be moved downwardly during the operation of the machine. It is proposed to furnish in connection with each machine a series of reducing-rings (two or more) hav-

ing cylinders of different diameters to enable work of various kinds to be performed, the exterior diameter of all the reducing-rings being alike and their interior diameter being different, according to the sizes of the cylinders mounted therein. Said reducing-rings are provided on their upper sides with radially-adjustable plates, as 54, to engage the annular grooves 14 near the lower edges of the cylinders mounted therein, in the same manner as the radially-adjustable plates 8 upon the base-frame 1. Said plates 8 may also perform the function of retaining the reducing-rings in position when used.

When one of the reducing-rings, with the cylinder mounted therein, is placed in position in the main frame, it becomes necessary to adjust the operating mechanism in such a manner as to enable the pawl 39 to engage the teeth or cogs at the lower edge of the smaller cylinder. This adjustment may be readily effected by simply loosening the set-screws 17, thus enabling the plate 16, carrying the operating mechanism, to be moved inwardly and to be adjusted to the proper position, as will be readily understood. For each auxiliary cylinder a hoop or band, as 27, is of course to be provided of the proper size.

The operation of our invention and its advantages will be readily understood by those skilled in the art to which it appertains. The method of threading the needles is well understood, the loop being formed and the knitting accomplished in the manner in which the same is effected on circular machines having a series of independently-operating needles controlled in an analogous manner, and it will be readily seen that when necessary the superfluous needles may be very easily removed by simply loosening or detaching one end of the hoop or band 27, such needles being likewise very readily restored when desired.

The general construction of the machine is exceedingly simple, and the cylinders may be very readily and quickly interchanged. The adjustment of the operating mechanism may likewise be very easily and quickly effected.

We desire it to be understood that while we have in the foregoing described the preferred construction of our invention, we do not desire to be understood as limiting ourselves to the precise details of construction herein set forth, but reserve the right to any such changes as may be resorted to without departing from the spirit of our invention.

Having thus described our invention, what we claim is—

1. In a circular-knitting machine, the combination of the base or frame, the annularly-grooved cylinder, and bearings or supports for said cylinder mounted adjustably upon the base or frame and adapted to engage the annular groove of the cylinder, thus supporting the latter revolubly, substantially as set forth.

2. In a circular-knitting machine, the combination, with the revoluble cylinder having

vertical grooves to accommodate the needles and provided with an annular band to secure said needles in their respective grooves, of an inclined ring or band forming a needle track and securer, loosely encircling the said cylinder and having its ends connected to a suitable support, substantially as and for the purpose set forth.

3. In a circular-knitting machine, the combination of the revoluble cylinder having vertical grooves, the needles mounted in said grooves, the upright having a vertically-reciprocating cross-head provided with lugs or projections to engage the shoulders of the needles, and a hoop or band loosely encircling the cylinder and having its ends connected with the said upright, substantially as and for the purpose set forth.

4. In a circular-knitting machine, the combination, with the revoluble cylinder having the grooves and the needles mounted in said grooves, of an upright having a vertically-reciprocating cross-head adapted to engage the needles and laterally-extending brackets, a hoop or band loosely encircling the cylinder and having its ends attached to said brackets, and arms extending laterally from the latter and serving to form continuations of the track or guide formed by said hoop or band, substantially as and for the purpose set forth.

5. In a circular-knitting machine, the combination of the base or frame, the revoluble cylinder having vertical needle-carrying grooves and provided at its lower edge with teeth or cogs alternating with said grooves, a ring or band loosely encircling the cylinder and having its ends attached to brackets on opposite sides of an upright, a vertically-reciprocating cross-head mounted upon said upright and having lugs or projections to engage the needles, a vertically reciprocating and vibrating or oscillating pawl adapted to engage the teeth at the lower edge of the cylinder, and suitable operating mechanism, all constructed and arranged substantially as set forth.

6. In a circular-knitting machine, the combination, with the revoluble cylinder having the needle-carrying grooves and provided with teeth or cogs at its lower edge, of an upright having a reciprocating cross-head adapted to engage the needles, a shaft having an eccentric-disk suitably connected with said cross-head, a cam mounted upon said shaft adjacent to the eccentric-disk, a vertically-movable pawl having a frame engaging the said cam and provided with a vertical slot, and a fulcrum-pin extending through the said slot and mounted adjustably in a vertical slot in a suitable bracket or hanger, substantially as and for the purpose set forth.

7. In a circular-knitting machine, the combination, with a revoluble cylinder provided at its lower edge with teeth or cogs, of a vertically reciprocating and vibrating pawl adapted to engage said teeth or cogs, a vertically-adjustable fulcrum-pin for said pawl,

and suitable operating mechanism, substantially as and for the purpose set forth.

8. In a circular-knitting machine, the combination, with a base or frame having a suitable supporting-flange, of a reducing-ring adapted to be supported on said flange and having a revoluble needle-carrying cylinder, and a radially-adjustable supporting-plate suitably connected with the base or frame and having mechanism whereby cylinders of different sizes may be intermittently rotated and whereby needles of said cylinders may be operated, substantially as and for the purpose herein set forth.

9. In a circular-knitting machine, the combination of a base or frame, a reducing-ring adapted to be mounted detachably upon said frame and carrying a revoluble cylinder having the vertically-reciprocating needles, an adjustable supporting-plate having set-screws extending through suitable slots in the base or frame, and mechanism mounted upon said adjustable plate for guiding the yarn and for operating the cylinder and the needles, substantially as herein set forth.

10. In a circular-knitting machine, the combination, with a base or frame having a supporting-flange, of a reducing-ring adapted to be supported upon said flange and having radially-adjustable bearing-plates, and a needle-carrying cylinder having an annular groove engaging said bearing-plates, substantially as and for the purpose set forth.

11. In a circular-knitting machine, the combination, with the revoluble cylinder having

vertical grooves to accommodate the needles, of a ring or band loosely encircling the said cylinder and having its ends connected to a suitable support, said ring or band being thus adapted to sag at one side, so as to form an inclined track up which the needles are guided, and mechanism for operating said needles, substantially as and for the purpose set forth.

12. In a circular-knitting machine, the combination of the base or frame, the revoluble cylinder having vertical needle-carrying grooves, and provided at its lower edge with teeth or cogs alternating with said grooves, a vertically-reciprocating cross-head having lugs or projections to engage the needles, a vertically reciprocating and vibrating or oscillating pawl adapted to engage the teeth at the lower edge of the cylinder, and suitable operating mechanism, all constructed and arranged substantially as set forth.

13. In a circular-knitting machine, the combination, with a revoluble cylinder provided at its lower edge with teeth or cogs, of a vertically reciprocating and vibrating pawl adapted to engage said teeth or cogs, and suitable operating mechanism, substantially as and for the purpose set forth.

In testimony that we claim the foregoing as our own we have hereto affixed our signatures in presence of two witnesses.

ASHLEY J. GULICK.
WILLIAM HUMPHREY.

Witnesses:

ALFRED MITCHELL,
JOHN H. MARTIN.