(No Model.) 3 Sheets—Sheet 1.

W. R. JOHNS.

CIRCULAR KNITTING MACHINE.

No. 531,463. Patented Dec. 25, 1894.

Fig. 1

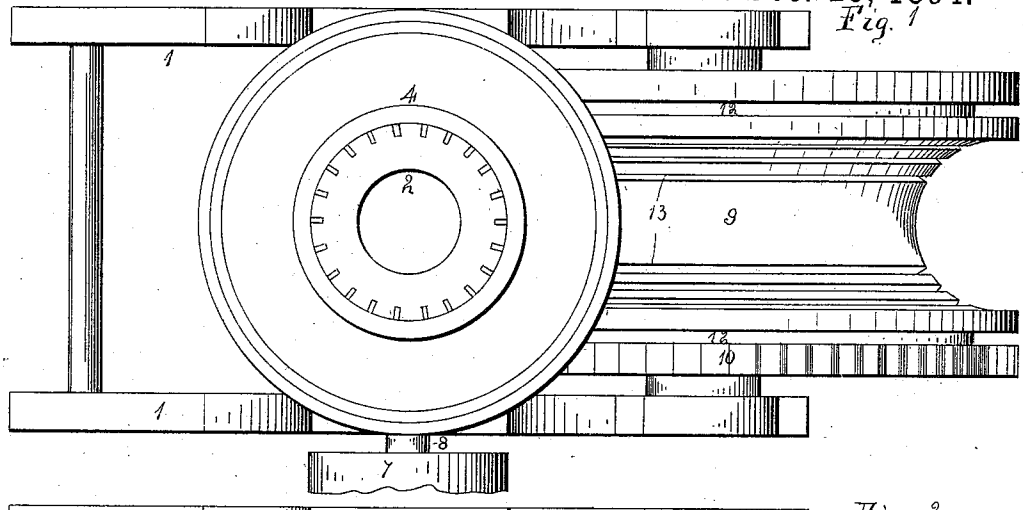

Fig. 2

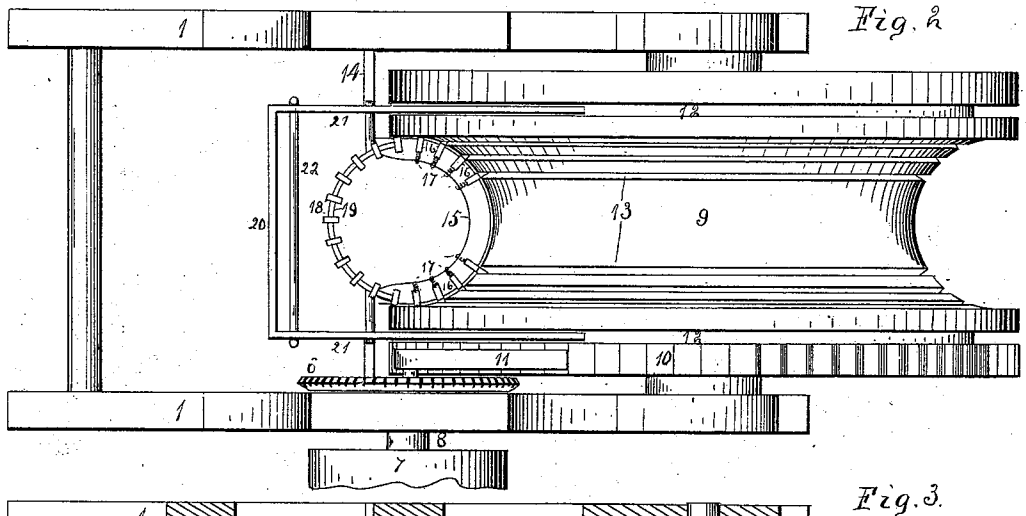

Fig. 3.

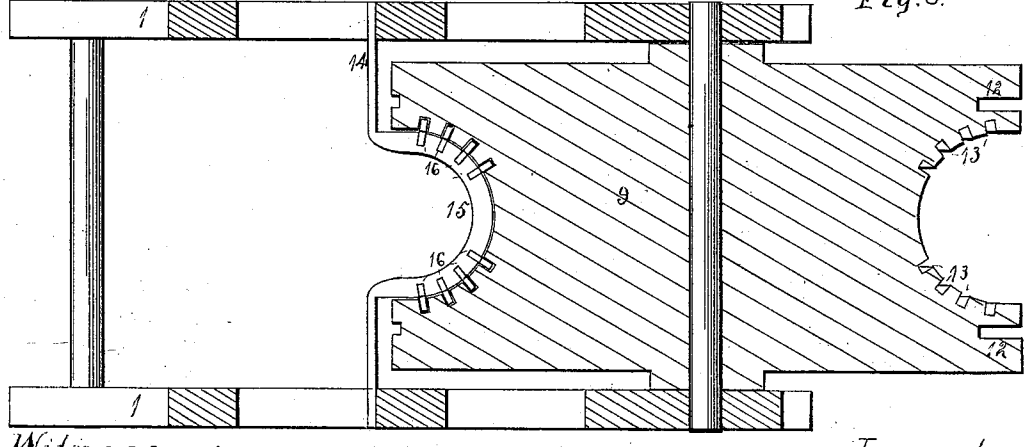

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Fig. 4

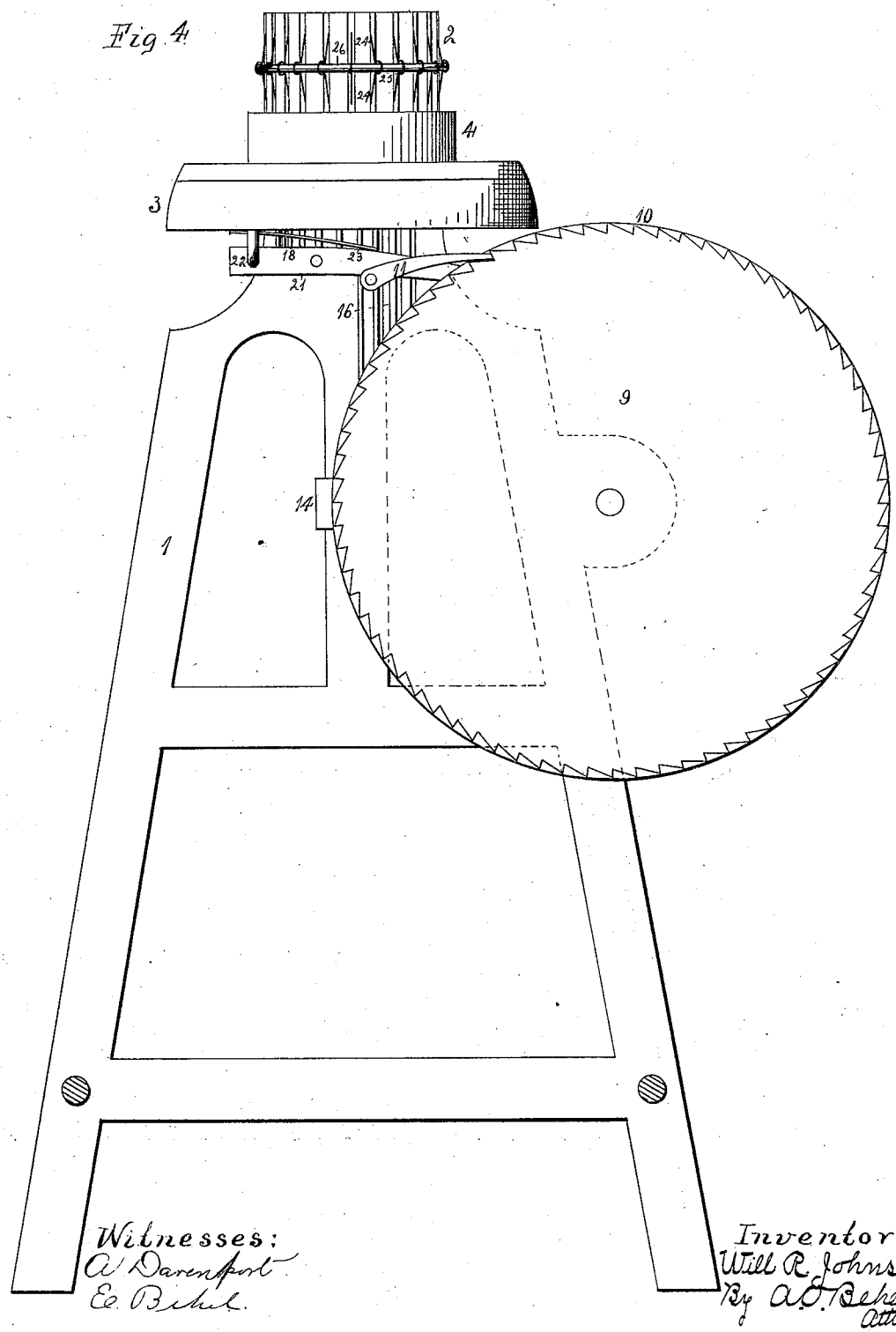

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Fig 5.

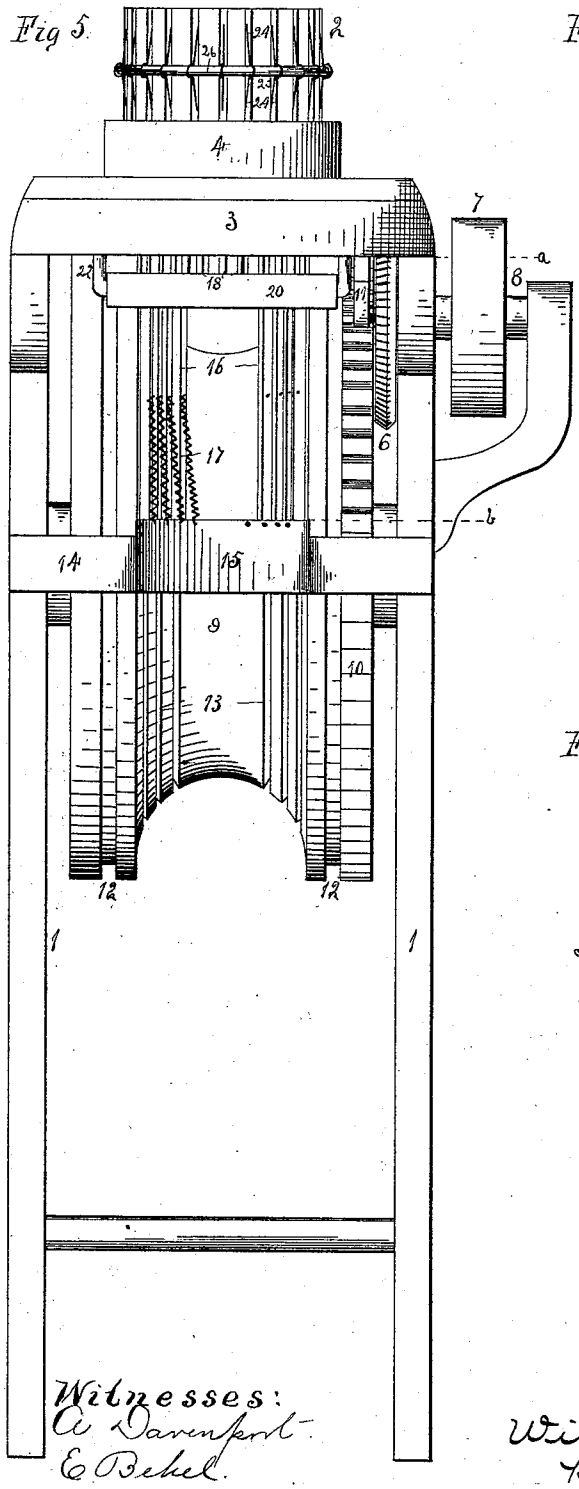


Fig 6.

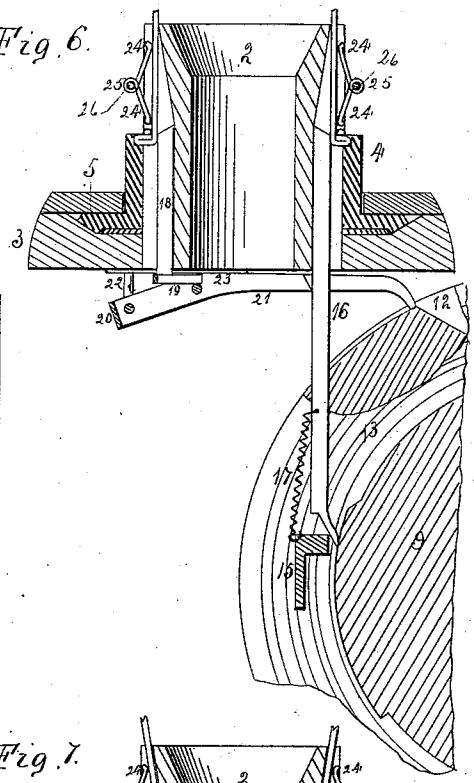
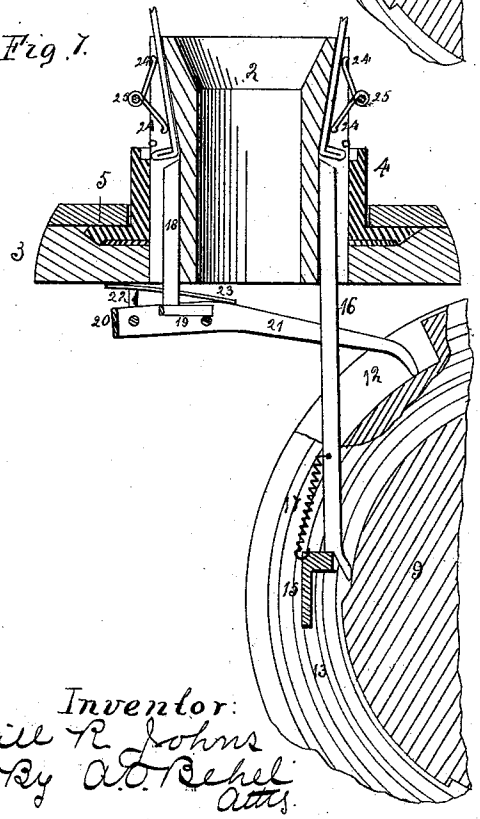


Fig 7.



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UNITED STATES PATENT OFFICE.

WILL R. JOHNS, OF ROCKFORD, ILLINOIS.

CIRCULAR-KNITTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 531,463, dated December 25, 1894.

Application filed October 30, 1893. Serial No. 489,488. (No model.)

To all whom it may concern:

Be it known that I, WILL R. JOHNS, a citizen of the United States, residing at Rockford, in the county of Winnebago and State of Illinois, have invented certain new and useful Improvements in Circular-Knitting Machines, of which the following is a specification.

The object of this invention is to construct a pattern wheel having its periphery recessed or concaved, and provided with means to operate devices for holding the needles in engagement with their operating cam, or permitting their disengagement therefrom.

The further object of this invention is to provide double ended spring devices which press against the needles, holding their upper ends in the needle grooves, and when the needles are free to move out of action, forcing their lower ends out of engagement with the cam.

In the accompanying drawings, Figure 1, is a plan view of a knitting machine embodying my improvements. Fig. 2, is a horizontal section on dotted line *a*, Fig. 5. Fig. 3, is a horizontal section on dotted line *b*, Fig. 5. Fig. 4, is an elevation in which one side of the frame work has been removed. Fig. 5, is an end elevation. Fig. 6, is a lengthwise vertical section showing the needles in engagement with their operating cam. Fig. 7 is also a lengthwise vertical section showing the needles out of engagement with their operating cam.

This invention relates to the circular class of knitting machines in which the supporting frame consists of the side bars 1, supporting the needle cylinder 2, and its base 3, within which is located the cam ring 4, a bevel gear wheel 5, meshing with the teeth of a beveled pinion 6, supported by one of the side bars of the frame, the pinion being driven by a belt connection with the pulley 7, supported by a shaft 8, and on the inner end of the shaft is supported the pinion 6.

Between the side bars 1, of the frame is supported a wheel having a portion of its periphery formed with ratchet teeth 10, and a dog 11, connected with the inner face of the pinion 6, engages the ratchet teeth, the dog being located at one side of the center of the pinion so that a crank motion is given to that end, which will impart a reciprocating motion to its free end thereby imparting an intermittent rotary movement to the pattern wheel. The face of this pattern wheel is provided with two grooves 12, and the space between these grooves is recessed or concaved conforming as nearly as may be to the outer surface of the needle cylinder, and is provided with grooves 13, in its concave face. This pattern wheel is located at one side of the needle cylinder, so that its concave face will be directly below the needle cylinder as shown at Figs. 6 and 7. The grooves of this pattern wheel are deeper in places leaving cam projections which operate upon the needles, holding them in engagement with their cam.

To the side bars is connected a cross bar 14, having its center portion curved to conform to the curvature of the central concave portion of the pattern wheel as shown at Fig. 3. This central portion 15, of the cross bar is provided with a series of vertical radial grooves which coincide with the grooves 13, of the pattern wheel, and within which are located fingers 16, which extend upward and lie in the needle grooves and have their upper ends beveled. Springs 17, are connected at one end to the circular portion 15, of the arm, and at the other end to the fingers, their action being to draw the fingers downward.

The lower ends of the fingers travel in the grooves of the pattern wheel and when a depression is encountered they will be moved therein by the springs which will move the fingers downward, and when a rise is encountered the fingers will be raised against the action of the springs, the positions being shown at Figs. 6 and 7. This vertical movement of the fingers will cause their upper ends to force themselves behind the lower ends of the needles as shown at Fig. 6, holding the needles in engagement with their operating cam, and will remain in action so long as the fingers are in their elevated positions. Upon the downward movement of the fingers their upper ends will be withdrawn from behind the lower ends of the needles, thereby allowing the needles to be pressed out of engagement with their operating cam. The concave surface of the pattern wheel in this instance is intended to only operate upon the fashioning needles, and it is evident that the

depressions and rises in the grooves of the pattern wheel may be made to suit the style of knitting required.

The back half of the needles are generally thrown into action or out of action by a single movement, and for this purpose I have connected the fingers 18, for such needles to a semi-circular ring 19, which is located below the needle cylinder and concentric thereto, the upper ends of the fingers being beveled the same as those for the fashioning needles. This semi-circular ring is supported in a frame composed of an end bar 20, and side bars 21, by being located upon and secured to a transverse rod, the rod having a pivotal connection with the side bars 21 and the frame has a pivotal connection with the under face of the base for the needle cylinder by the bail shaped support 22. The free ends of the side bars 21, lie in the grooves 12, of the pattern wheel which are located on either side of its concave center, and the depression in these grooves allows the frame carrying the fingers to descend withdrawing the upper ends of the fingers from behind the lower ends of the needles thereby permitting them to remain out of action, and upon the ends of the side bars 21, encountering a rise in the groove, the frame will be moved on its pivotal connection thereby raising the semi-circular ring which in turn raises the fingers 18, forcing their upper ends behind the lower ends of the needles forcing them into engagement with their operating cam. Springs 23, are secured to the under face of the base 3, and press upon the side arms of the frame assisting gravity in withdrawing the fingers from behind the needles.

In order that the needles may be held out of action when the fingers have descended, I have arranged spring devices which press against the needles and consist each of a spring having ends 24, and a central coil 25. One of these springs is located in each needle groove and is held in place by a ring 26 passing through its center coil, and located outside of the needle cylinder, the springs resting against the needles at two points forming the only support for the ring, and the ring and needles forming the only support for the springs. When the needle is in action its lower end will rest against the face of the fingers and its upper end against the upper end of the needle cylinder and will move in a vertical plane, but when the needle is out of action its lower end will move toward the center of the cylinder by the action of the spring device, and this construction does away with the band usually employed to hold the upper ends of the needles in place, and the springs are held from a vertical movement by their connection with the remaining springs and the frictional contact with the needles.

It is evident that the pattern wheel may be made in two halves, each half having independent operating means. In this instance the pattern wheel is rotated only during the widening and narrowing process, but it is evident that by making the wheel of greater diameter to allow for the knitting of the circular work it may be constantly rotated.

I claim as my invention—

1. In a circular knitting machine, the combination of a needle cylinder, needles located in the cylinder, a pattern wheel having a concave surface corresponding to the convex surface of the cylinder, and means forming a connection between the pattern wheel and needles.

2. In a circular knitting machine, a needle cylinder, needles located in the cylinder, a pattern wheel, fingers controlling the actions of the fashioning needles located in the needle grooves, each having an independent engagement with the pattern wheel, a suitable frame having an engagement with the pattern wheel, and fingers supported by the frame.

3. In a circular knitting machine, a needle cylinder, needles located in the cylinder, a pattern wheel, a series of fingers connected to a semi-circular ring, a swinging frame having a pivotal connection with the semi-circular ring, the frame being controlled by the pattern wheel, fingers located in the needle grooves and having a movement in the lengthwise direction thereof.

4. In a circular knitting machine, a needle cylinder, needles located in the cylinder, a concave faced pattern wheel, fingers controlling the action of the fashioning needles located in the needle grooves, each having an independent and direct engagement with the pattern wheel, and a spring having a connection with each finger and with a stationary support holding the fingers in a yielding manner in their downward position.

5. In a circular knitting machine, a needle cylinder, needles located therein, a ring located around the cylinder and a series of springs connected to the ring independent of any other support, resting in contact with the needles at two points, and forming the only means for holding the needles in the needle grooves.

6. In a circular knitting machine, a needle cylinder, needles located therein, a ring located around the cylinder and a series of springs connected to the ring independent of any other support, resting in contact with the needles at two points, and forming the support for the ring and the only means for holding the needles in the needle grooves.

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