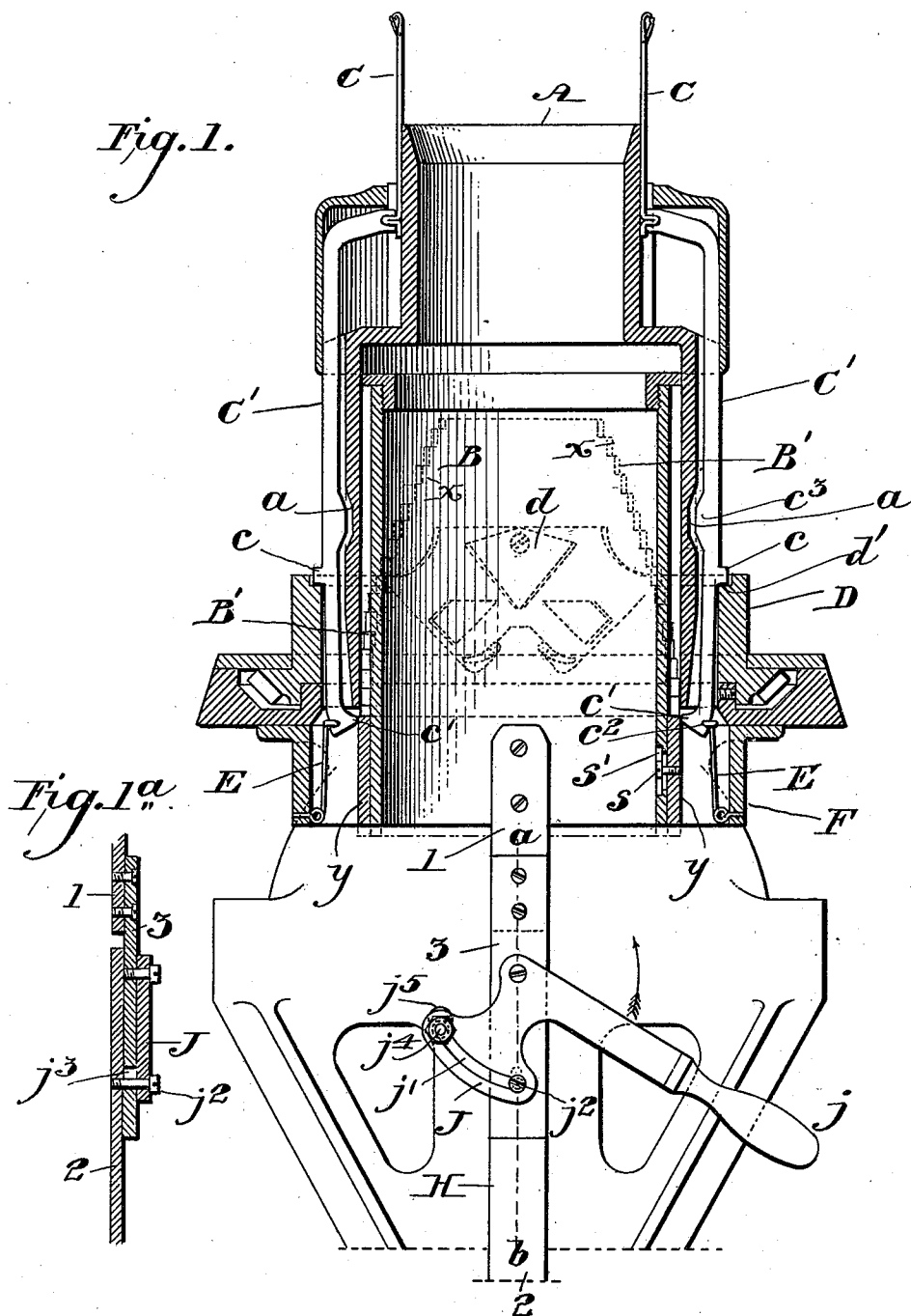


W. R. JOHNS.
CIRCULAR KNITTING MACHINE.

No. 548,206.

Patented Oct. 22, 1895.

Fig. 1.



Witnesses:

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John W. Davis

Inventor:

Wm. R. Johns
per John E. Nolan
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Fig. 2.

Fig. 3.

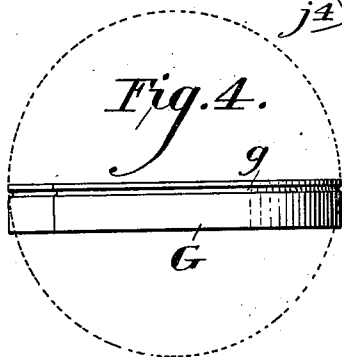
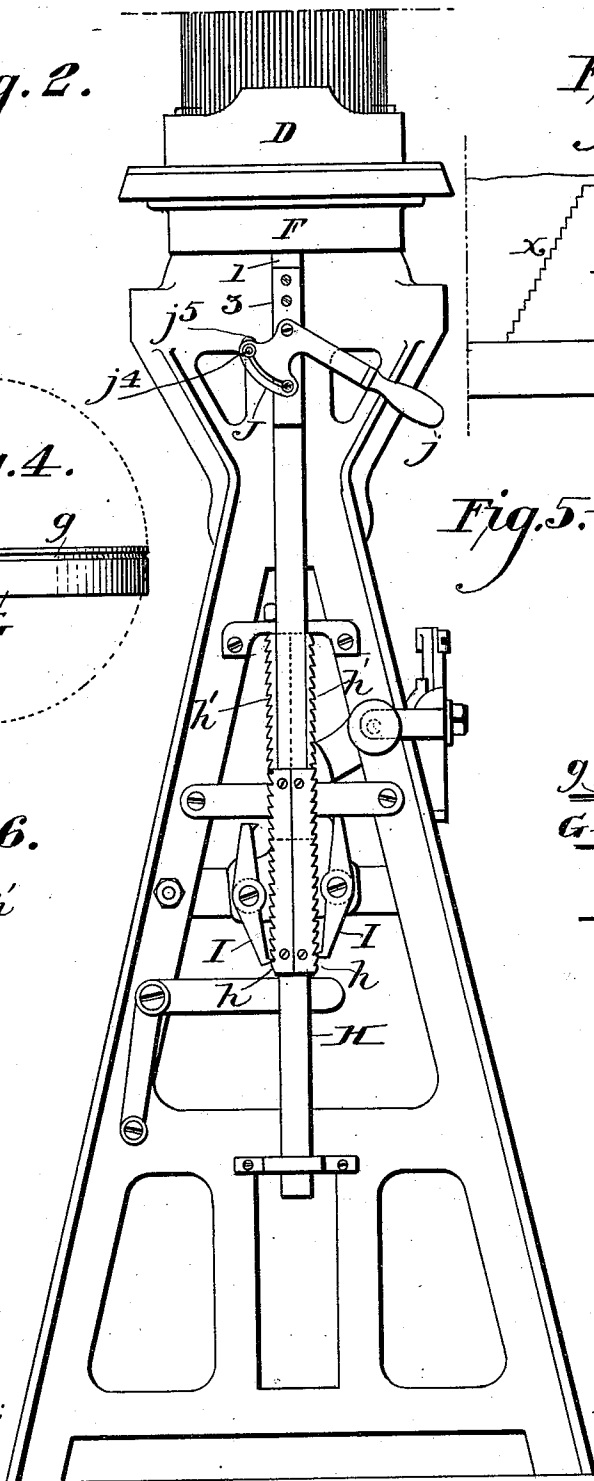
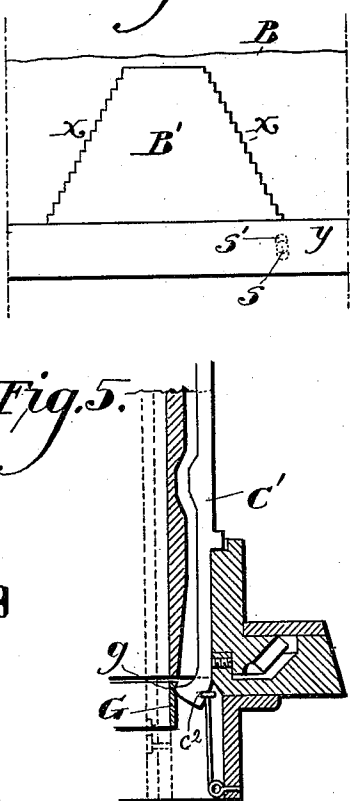


Fig. 5.



Witnesses:

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Inventor:

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UNITED STATES PATENT OFFICE.

WILL R. JOHNS, OF ROCKFORD, ILLINOIS, ASSIGNOR TO THE EXCELSIOR
AUTOMATIC KNITTING MACHINE COMPANY, OF NORRISTOWN, PENN-
SYLVANIA.

CIRCULAR-KNITTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 548,206, dated October 22, 1895.

Application filed January 21, 1893. Serial No. 459,052. (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 full, clear, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

This invention relates especially, though not exclusively, to the construction of the knitting-machine illustrated in Letters Patent of the United States No. 456,308, granted to me July 21, 1891, and subsequently assigned to the Excelsior Automatic Knitting Machine Company, of Norristown, Pennsylvania.

The nature of the improvements will appear from the following description, in connection with the annexed drawings, in which—

Figure 1 is a vertical section through the head portion or cylinder of a circular-knitting machine embodying my improvements, Fig. 1^a being a sectional detail as on the line *a b* of Fig. 1. Fig. 2 is a side elevation, on a reduced scale, of a portion of a knitting-machine in which dog and ratchet mechanism for operating the needle-controlling device is represented. Fig. 3 is a view on a flat surface of the vertically-movable needle-controlling device. Fig. 4 is an elevation of a supplemental ring for holding the jacks in active position upon the removal of the controlling device. Fig. 5 is a section of one side of said ring as applied to the machine. Fig. 6 is a transverse section of the ratchet-supporting bar.

In the drawings, A represents the needle-cylinder or needle-bed, and B the tube or support therein which carries the stepped needle-controlling device B'.

C are the needles, fitted to vertical grooves in the needle-cylinder and provided each with a depending jack C'. This jack may be jointed with the heel of the needle or be integral therewith. The jack is provided with a lug or butt *c*, that is adapted to be engaged by the usual knitting-cams *d* in the surrounding cylinder D, and it is also provided with a foot or projection *c'*, that is extended below

the bottom of the cylinder A into engagement with the needle-controlling device. This foot or projection is adapted to be acted upon by said device similarly to the "sub-jack," as I have termed it in the patented construction above referred to. There is, of course, one of these jacks C' to each needle in the cylinder.

The needle-controlling device B', when the tube is in the extreme upward position, maintains the lugs or butts of the jacks in active position relative to the knitting-cams, as formerly; but when said section is dropped step by step the lugs or butts are successively freed from the alternate sides of the stepped portions *x* of the device. When so freed, the lugs are automatically moved inward from the path of the knitting-cams, preferably by spring-pressure. In this instance the lower ends of the jacks are engaged by the looped ends of individual springs E, that are secured to a depending annulus or flange F on the base-plate. The lower end of each of the jacks is provided with a notch or offset *c*², which is engaged by the end of the spring when the jack is in its extreme upward position. Hence when the jack is freed from the knitting-cams said jack is held positively elevated by the spring.

In the present case I make that portion (marked *y*) of the needle-controlling device which supports the one-half series of needles a ring or annulus that extends below the stepped portion *x*. I preferably secure this ring to the tube by means of a screw *s*, which extends through an elongated slot *s'* in the tube, so that said ring may be dropped downward below proximate feet or projections of the jacks when it is desired to throw the lugs of said jacks out of active position. This is done when it is requisite to remove the cam-cylinder from or apply it to the machine.

It will be evident that if the tube B, with its sections, be removed from the machine all the jacks will be thrown inward out of the path of the knitting-cams, thus making it difficult to reapply the tube. To obviate this objection I have provided a thin split ring G, which is adapted to besprung around the ring or annulus *y* in such manner as to act against the feet or projections on the jacks. Thus

when the tube is removed the ring maintains the jacks in their outer or active positions. This ring is by preference provided with a circumferential groove *g*, with which the feet engage. (See Figs. 4 and 5.)

By extending the jack below the end of the cylinder, as above described, not only is the internally-disposed needle-controlling device permitted to act directly upon the jacks, but such device may be elongated so as to permit the use of a comparatively large number of steps. Hence a cylinder of very fine gage may be employed. Besides the individual steps may be comparatively high or coarse, so as to permit of a longer throw of the tube than formerly during the vertical step-by-step movement thereof. Although any suitable means may be used for imparting this movement to the tube, I have deemed it advisable to indicate in the drawings a means therefor, the same comprising a bar *H*, fixedly secured to the tube, and provided with suitably-disposed ratchet-teeth *h h'*, which are adapted to be engaged by vibratory dogs *I*. There are two sets of ratchet-teeth, the same being oppositely pitched, as shown. When the lower ends of the dogs are engaged with the lower set *h*, as indicated in the drawings, and the arm supporting said dogs is oscillated, the ratchet-teeth and their connections are lowered step by step until the requisite number of jacks have been disengaged from the cams, whereupon the lower ends of the dogs are disengaged from the opposed ratchet-teeth, while the upper ends of the dogs are engaged with the upper set of oppositely-pitched teeth *h'*. This done, the dog-supporting arm is oscillated with the effect of raising the ratchet-teeth and their connections step by step until the requisite number of jacks have been re-engaged with the knitting-cams, whereupon straight-ahead knitting may be taken up.

Mechanism for supporting and actuating the dogs is fully set out in my pending application for Letters Patent, Serial No. 444,841, filed September 1, 1892, to which reference may be had.

As a simple and efficient means whereby the tube *B* may be dropped a distance of one step, so as to effect the throwing of one-half of the needles out of action, and thus permit all the needles in the cylinder to be raised for the "topping" operation, I have constructed the bar *H* in sections 1 2 and connected the latter by means of a cam-head *J*, which is provided with a handle *j*, whereby it may be manipulated. The cam-head comprises a plate, which is pivoted to a strip 3 on the upper section 1 of the bar, this strip overlapping the lower section 2 thereof. The plate is provided with a cam-slot *j'*, into which projects a stud *j''* from the section 2, the strip 3 being furnished with a slot *j'''* for the passage of the stud. When the cam-head is in the position indicated in the drawings, the tube with its stepped sections is in the up or

normal position; but if the handle of the cam-head be thrown upward, as indicated by the arrow in Fig. 1, the cam-slot in the head will draw down the upper section of the bar with the effect before described. Should the dog and ratchet mechanism get out of time, the step-carrying tube might be jammed forcibly into the cylinder after the tube had reached its extreme upward position, unless a means were provided to prevent such action. I therefore provide the outer end of the cam-head with an inwardly-projecting stud *j⁴* and the face of the main frame with a fixed stud *j⁵* in line with the former when the parts are in their normal position. Hence when the tube reaches the prescribed limit of its upward movement an additional movement thereof will bring the stud *j⁴* forcibly against the stud *j⁵*, thereby moving the cam-head laterally and depressing the tube.

I prefer to cut away the upper edge of the cam-cylinder on each side of the knitting-cams, so that the position of the jack-lugs on the usual needle-rest *d'* may be observed. (See Figs. 1 and 2.) I prefer, also, to provide the jacks on their inner edges with lugs *c³*, which act as guides for the jacks during the vertical reciprocation of the latter in the knitting operation. The grooves in the lower extended portion of the cylinder are provided with offsets *a*, which receive these lugs when the jacks are thrown out of action. Of course the lower portions of the grooves are cut away to permit the movement of the jacks when they are thus outthrown.

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

1. The combination, with the needle cylinder, its needles and the knitting cams, of the jacks, and the stepped controlling device disposed within the needle cylinder, the jacks being constructed to engage the controlling device and to be acted upon directly thereby, substantially as described.

2. The combination with the needle-cylinder or bed, its needles and the knitting cams, of the jacks and the controlling device disposed within the needle-cylinder, the jacks being adapted to be acted upon directly by said controlling device, together with spring devices pressing the jacks; substantially as described.

3. The combination with the needle-cylinder or bed, its needles and the knitting cams, of jacks provided with notches therein, a controlling device adapted to act upon said jacks, and spring devices provided with loops or projections which are adapted to bear against the notched edges of the jacks, substantially as described.

4. The combination with the needle-cylinder or bed, its needles and the knitting cams, of jacks projecting below the bottom of the cylinder and provided with inwardly projecting feet, and a stepped controlling device dis-

posed within the needle-cylinder or bed and adapted to act upon said feet; substantially as described.

5 The combination with the needle-cylinder or bed, its needles and the knitting cams, of jacks, a controlling device acting upon the latter, a series of springs bearing upon the lower ends of the jacks, and a depending ring or support to which the ends of the springs
10 are secured; substantially as described.

6. The combination with a stepped needle-controlling section and its support, of an independently movable plane section or annulus disposed below said former section, and
15 means for securing said plane section or annulus in place, substantially as described.

7. The combination with the needle-cylinder, its needles and a stepped needle-controlling device operatively connected with the needles, of a cam-head for depressing said device one step; substantially as described.
20

8. The combination with a vertically movable needle-controlling device, of a two part bar depending therefrom, a shifting cam device connecting the parts of said bar, and
25 means for raising and lowering the latter; substantially as described.

9. The combination with a vertically movable needle-controlling device, of a two-part
30 bar depending therefrom, a shifting cam device connecting the parts of said bar, and

means for raising and lowering the latter, together with the fixed stop or stud projecting into the path of said cam device; substantially as described.

10. The combination with the needle-cylinder, its needles and the knitting cams, of the jacks and a controlling device acting upon the latter, of a separate ring adapted to be applied to said jacks; substantially as described.
35 40

11. The combination with the needle-cylinder, its needles and the knitting cams, the jacks and a controlling device acting upon the latter, of a split ring provided with a circumferential groove and adapted to be applied to
45 said jacks substantially as described.

12. The combination with the needle-cylinder, its needles and the knitting cams, of the jacks provided with the guide lugs on their inner edges, and a controlling device adapted
50 to act upon said jacks, the grooves for the jacks in the lower extended portion of the needle-cylinder being offset; substantially as described.

In testimony whereof I have hereunto affixed my signature in the presence of two
55 subscribing witnesses.

WILL R. JOHNS.

Witnesses:

WM. F. BALLINGER,
JOHN R. NOLAN.