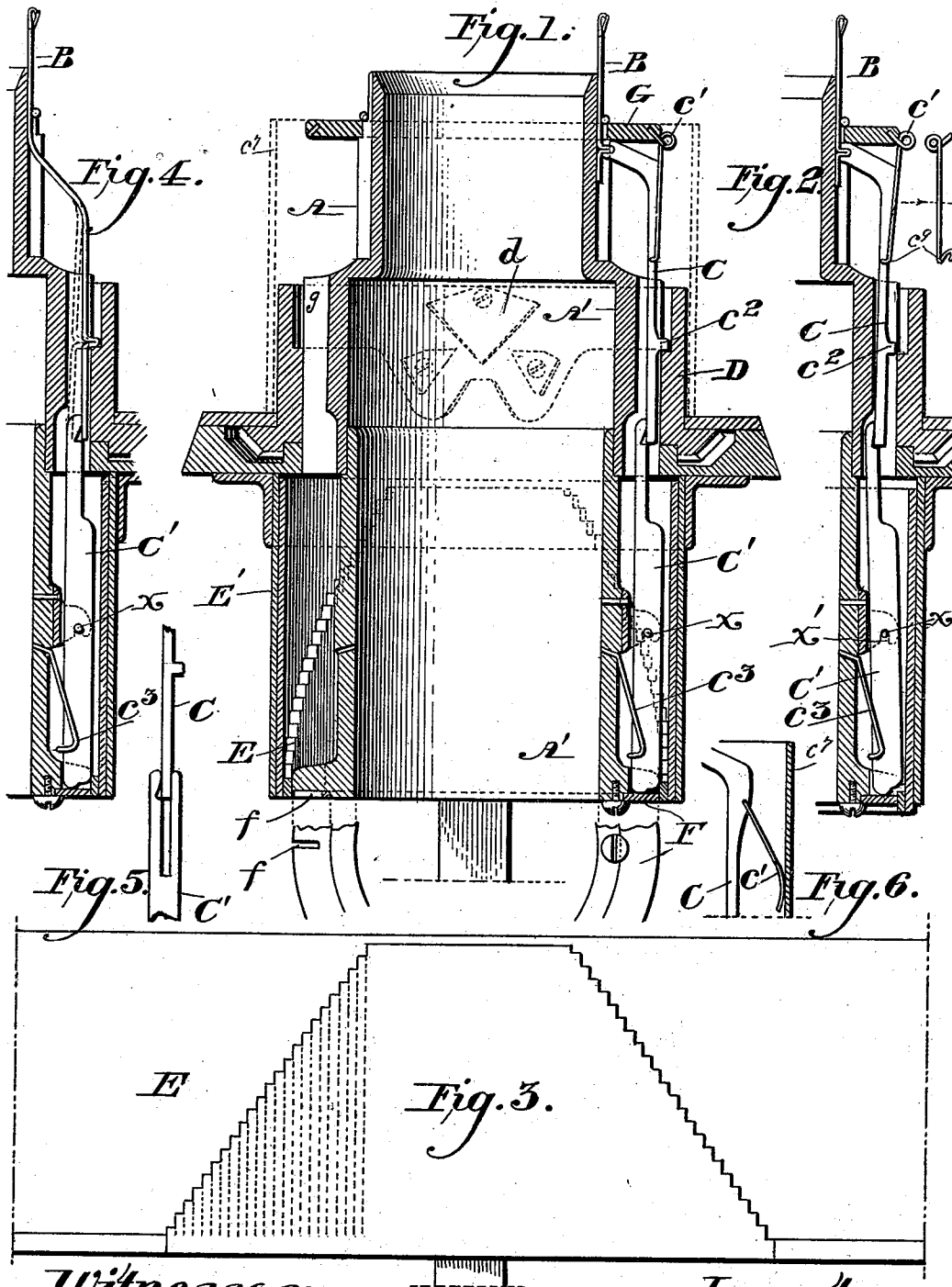


(No Model.)

W. R. JOHNS.
KNITTING MACHINE.

No. 548,205.

Patented Oct. 22, 1895.



Witnesses:
Wm. B. Ballinger
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Inventor:
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per John E. Nolan
att'y

UNITED STATES PATENT OFFICE.

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KNITTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 548,205, dated October 22, 1895.

Application filed January 21, 1893. Serial No. 459,051. (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 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 to that class of knitting-machines termed "automatic," in which are provisions for throwing certain needles out of and into action during the process of narrowing and widening, as in the formation of the heel and toe parts of stockings.

This invention consists, primarily, in the combination, with the needle-cylinder, its needles, and the knitting-cams, of a needle-controlling device located exteriorly to the cylinder and movable step by step in the same direction as the needles, whereby a predetermined number of the needles, during the action of said device, are successively thrown out of operation from side to side alternately to effect the narrowing and then permitted to become active in reverse order to effect the widening. Spring-pressure devices, sliding jacks, and vibratory sub-jacks are employed in combination with the needle-controlling devices, as hereinafter described.

In the annexed drawings, Figure 1 is a vertical section through the head of a knitting-machine in which my invention is embodied. Fig. 2 is a section of one side, showing a needle, its jack, and adjuncts in the positions which they are caused to assume when the needle is inactive. Fig. 3 is a view on a flat surface of the needle-controlling device. Fig. 4 is a section of a modification in which the jack and its spring are dispensed with, the shank of the needle being elongated and rendered elastic. Figs. 5 and 6 are details of modified forms of sub-jack and in-pressing spring respectively.

A represents the needle-cylinder provided with the elongated and expanded lower portion A'. The exterior of the cylinder A is grooved vertically, as usual, to receive the needles B, while the exterior of the portion A' is provided with suitable guideways *g* to receive jacks C, that are connected with the

needles. Fulcrumed below each of these jacks, at *x*, is another jack C', that I shall term a "sub-jack." The upper end of the latter extends back of the main jack. The lower end of the main jack is held yieldingly against the opposed sub-jack by means of a suitably-disposed spring *c'*, whereby if said sub-jack be oscillated the lug or projection *c''* on the main jack will be moved into or out of the path of the knitting-cams *d* in the surrounding cylinder D. The upper end of each sub-jack is held normally inward by means of a suitably-disposed spring *c''*, the upper end of the latter being fixedly secured to the cylinder, while its lower or free end is looped to embrace the opposed end of said sub-jack. Thus the lug or projection on the jack C is maintained normally out of action with the cams. Surrounding the lower portion of the sub-jacks is the needle-controlling device E, which is movable vertically or in the same direction as the needles. This device when in its normal or elevated position acts against the sub-jacks in such a manner as to maintain the lugs on the jacks in active position relative to the knitting-cams, whereby a uniform tubular web, such as the leg or foot of a stocking, may be formed. When, however, the device is lowered one step, one-half the sub-jacks is freed, thereby permitting the lugs to be retracted by the pressure of the springs from the path of the knitting-cams to the end that the latter may be reciprocated during the narrowing and widening operations to follow. When the device is lowered another step, the first active sub-jack on one side is freed and its main jack retracted from the knitting-cams. When it is dropped another step, the first active sub-jack on the other side is freed, and so on successively from the alternate sides until the requisite narrowing has been effected. This done the device is raised step by step, whereupon the idle or disengaged jacks are pushed back to their engaged or active position in inverse order, so as to effect the widening of the web. In the present instance the needle-controlling device E is a tube or cylinder provided interiorly with a double series of gradually-receding steps, as indicated in Fig. 3, which are adapted to act at the predetermined periods upon the lower ends of the sub-jacks. This step-carrying

cylinder is fitted to and guided in a cylinder or support E' depending from the base of the machine.

I have not deemed it necessary to show or describe herein means for operating the needle-controlling device, as any suitable mechanism to that end may be employed. I remark that one means for operating the same is illustrated in an application for Letters Patent of the United States filed by me September 1, 1892, Serial No. 444,841.

It will be observed that the upper end of each of the sub-jacks is notched to receive and support the lower end of the main jack when the latter is thrown back out of action. (See Fig. 2.)

The lower ends of the sub-jacks are supported upon a ring F, which is rotatably held to the bottom of the portion A' by screws, as shown. This ring is provided with a radial slot *f* at a suitable point therein, which may be moved below any one of the jacks, so that the jack may be removed from the machine, as occasion may require, the bearings *x'* in which the pivotal pins *x* of the sub-jacks are mounted being open on their lower edges, as indicated.

By the exterior disposition of the needle-controlling device, as above described, a comparatively large number of steps may be used, and hence a needle-cylinder of very fine gage may be employed.

In Fig. 4 is shown a modification in which the jack and its in-pressing spring are dispensed with, the shank of the needle being elongated and rendered elastic, so as to spring inward automatically, as indicated.

In Fig. 5 is shown the upper end of a sub-jack, which obviates the use of the in-pressing spring *c'*, this jack being vibrated positively by the sub-jack. In this construction the action of the vertically-movable needle-controller upon the sub-jacks is the same as in the previously-described construction.

In Fig. 6 is shown a form of in-pressing spring which differs but slightly from that represented in Fig. 1. In the form of spring shown in Fig. 1 the upper end of the spring is secured to a fixed ring G, surrounding the cylinder A, while its lower end is bent at *c'* to embrace and bear against the edge of the jack, whereas in the form shown in Fig. 6 the upper end of the spring is secured to the jack, while its lower end bears against an externally-surrounding shell or casing *c'*.

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

1. The combination with the needle-cylinder or bed, its needles and the knitting cams, of a needle-controlling device located exteriorly to the cylinder or bed and movable step-by-step in the same direction as the needles, said device comprising a tube or cylinder provided with a double series of gradually receding steps having operative connection with the needles and of provisions for supporting

and guiding said device, substantially as described.

2. The combination with the needle-cylinder or bed, its needles and the knitting cams, of jack devices whereby said needles may be engaged conditionally with the knitting cams, and a controlling device located exteriorly to said jack devices and movable step-by-step in the same direction as the needles, whereby said jack devices may be thrown into and out of action with the cams at predetermined intervals together with provisions for supporting and guiding said device; substantially as described.

3. The combination with the needle-cylinder or bed, its needles, and the knitting cams, of vibratory arms, connections between the latter and the needles, and a longitudinally movable device disposed exteriorly to said arms and adapted to actuate the same together with provisions for supporting and guiding said device, substantially as described.

4. The combination with the needle-cylinder or bed, its needles, and the knitting cams, the jacks, sub-jacks and spring devices therefor, of longitudinally-movable stepped controlling devices located exteriorly to said sub-jacks and adapted to actuate the same together with provisions for supporting and guiding said device; substantially as described.

5. The combination with the needle-cylinder, its needles, the pivoted sub-jacks, operatively connected with said needles, and means for actuating said sub-jacks, of the rotatable slotted ring upon which the latter are supported; substantially as described.

6. The combination with the needle-cylinder or bed, its needles, and the jacks connected therewith, of the ring or support on said cylinder or bed and the wire springs secured to said ring or support, and acting upon the jacks, the free ends of said springs being looped to embrace the jacks, substantially as described.

7. The combination with the needle-cylinder, its needles and the knitting cams, of a needle-controlling device located exteriorly to the cylinder in operative connection with the needles and movable step-by-step in the same direction as the needles, together with a guide cylinder or support depending from the bed of the machine; substantially as described.

8. The combination with the needle-cylinder or bed, the needles, the pivoted arms, operatively connected with said needles, the springs and the stepped-controlling device acting oppositely upon said arms; substantially as described.

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

WILL R. JOHNS.

Witnesses:

WM. F. BALLINGER,
JOHN R. NOLAN.