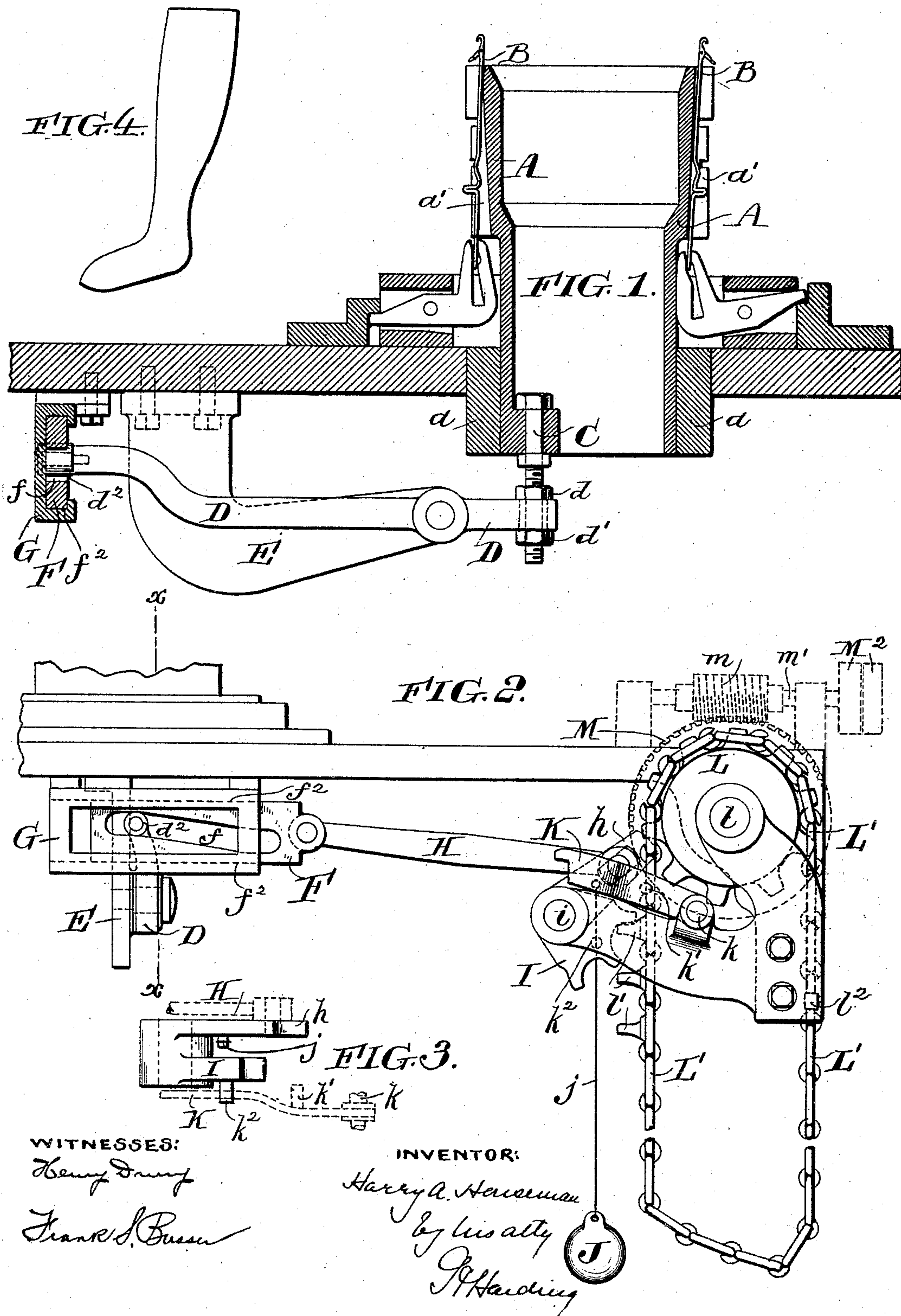


(No Model.)

H. A. HOUSEMAN.  
CIRCULAR KNITTING MACHINE.

No. 489,957.

Patented Jan. 17, 1893.



WITNESSES:

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# UNITED STATES PATENT OFFICE.

HARRY A. HOUSEMAN, OF PHILADELPHIA, PENNSYLVANIA.

## CIRCULAR-KNITTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 489,957, dated January 17, 1893.

Application filed June 25, 1892. Serial No. 437,988. (No model.)

*To all whom it may concern:*

Be it known that I, HARRY A. HOUSEMAN, a citizen of the United States, residing at Philadelphia, county of Philadelphia, and State of Pennsylvania, have invented a new and useful Improvement in Circular-Knitting Machines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, which form a part of this specification.

My invention consists in certain improvements in mechanism connected with circular knitting machines in which the needle cylinder is raised and depressed automatically to make a longer stitch when it is elevated.

As the mechanism for operating the cam cylinder and the operation of the needles form no part of this invention, I have not illustrated the same.

In the drawings—Figure 1 is a sectional view of portion of a knitting machine, on line  $x-x$  Fig. 2. Fig. 2 is a side elevation of part of the needle cylinder with the elevating device. Fig. 3 is a plan view of the sector used in the needle cylinder elevating device. Fig. 4 is a view of a stocking showing a tube of varying diameters.

A is the needle cylinder in guides  $a$ , and in slots  $a'$  in said cylinder are the needles B.

C is a rod threaded at its lower end, and the upper end of which passes through the needle cylinder and is fixedly secured thereto.

D is a lever having the nuts  $d$   $d'$  which may be secured on the threaded end of rod C at the points desired. This lever D is pivoted to bracket E supported from the frame of the machine. The end of this lever D is bent upward and provided with a roller  $d^2$  which rests in a cam slot  $f$  in the frame F. This frame F rests in grooves  $f^2$  in the plate G which plate is secured to the bed of the machine. Connected to frame F is the rod H secured at its other end to a slot in the arm  $h$  keyed to the tooth sector I, said sector being pivotally connected at  $i$  to the frame of the machine.

J is a weight secured by the cord or wire  $j$  to the sector I.

K is a pawl pivotally secured to the frame at  $k$  and having the pin  $k'$ .

$k^2$  is the pin on the sector I.

L is a sprocket wheel on the shaft  $l$ . On

the same shaft I is the worm wheel M working in the worm  $m$  on the shaft  $m'$ .

$M^2$  are operating pulleys.

Upon the sprocket wheel L is the sprocket chain  $L'$  having at proper places the projecting lugs  $l'$  and side lug  $l^2$ . The teeth of sector I are in line of movement of lugs  $l'$  and pin  $k'$  in line of movement of side lug  $l^2$ . The sprocket wheel L is revolved, and to cause it to revolve connection may be made by any desired mechanism with the driving mechanism, the lugs  $l'$  being set at any point where it is desired to fashion or make a tube larger than the main size of the tube, and the lug  $l^2$  at the position where it is desired to cease knitting this large tube and return to the regular size. When the lugs  $l'$  strike the teeth of the sector they cause the sector to move which moves the rod H to the left and with it the frame, causing the roller  $d^2$  on the lever D to move downward, depressing the portion of the lever D to the left of the pivot point and raising that portion to the right of said pivot point, which through the medium of rod C elevates the needle cylinder gradually and makes the stitches larger to the extent of this elevation, and thus the extent of increase of the size of the stitches and the size of the tube may be governed by the point where the lever D is secured to the rod C. The movement of the sector I moves the pawl on its pivot point by the pin  $k^2$  striking it, and said sector passes beyond it until the pin  $k^2$  passes beyond the point of the pawl when the said pawl drops down and said pawl having but one direction of movement prevents the return of the sector. When the lug  $l^2$  arrives at the position of the pawl it strikes the pin  $k'$  elevating the pawl and the weight J returns the sector, forcing the roller  $d'$  up the incline and bringing the needle cylinder down to its normal position.

As before stated I do not intend to limit myself to any particular mechanism for operating the sprocket wheel L.

In knitting the stocking after the tube is started to be formed of a certain width, by my improved arrangement, at a predetermined position the cylinder is automatically elevated so that the stitch and the tube are made gradually larger and after the desired



amount has been made the cylinder is automatically returned to its normal position thus returning the size of stitch and tube to the normal.

5 Having now fully described my invention, what I claim and desire to protect by Letters Patent, is—

1. In a circular knitting machine, in combination, a needle cylinder secured so as to  
10 be adapted to have a vertical movement, a rod, secured to said cylinder, a pivoted lever connected to said rod, a sprocket wheel, a pattern chain, lugs upon said pattern chain at prearranged positions and intermediate connection between said lugs and said lever.  
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2. In a circular knitting machine, in combination, a needle cylinder secured so as to be adapted to have a vertical movement, a rod secured to said cylinder, a pivoted lever  
20 adjustably connected to said rod, a sprocket wheel, a pattern chain, lugs upon said pattern chain at prearranged positions, and intermediate connection between said lugs and said lever.

25 3. In a circular knitting machine, in combination, a needle cylinder secured so as to be adapted to have a vertical movement, a rod secured to said cylinder, a pivoted lever connected to said rod, a roller mounted on  
30 the end of said lever, a frame provided with a cam slot in which said roller rests, said frame being adapted to slide, a sprocket wheel, a pattern chain on said wheel, lugs upon said pattern chain at pre-arranged positions, and  
35 intermediate connection between said lugs and the frame.

4. In a circular knitting machine, in combination, a needle cylinder secured so as to be adapted to have a vertical movement, a  
40 rod secured to said cylinder, a sprocket wheel, a pattern chain upon said wheel, lugs at prearranged positions upon said pattern chain, a toothed sector, the teeth of which are in line of movement of said lugs, and intermediate  
45 connection between said sector and said rod.

5. In a circular knitting machine, in combination, a needle cylinder secured so as to be adapted to have a vertical movement, a rod secured to said cylinder, a pivoted lever  
50 connected to said rod, a sprocket wheel, a pattern chain upon said wheel, lugs at prearranged positions upon said pattern chain, a toothed sector, the teeth of which are in line of movement of said lugs and intermediate  
55 connection between said sector and said lever.

6. In a circular knitting machine, in combination, a needle cylinder secured so as to be adapted to have a vertical movement, a rod secured to said cylinder, a pivoted lever  
60 connected to said rod, a roller mounted on the end of said lever, a frame provided with a cam slot in which said roller rests, said frame

being adapted to slide, a sprocket wheel, a pattern chain upon said wheel, lugs at prearranged positions upon said pattern chain, a  
65 toothed sector the teeth of which are in line of movement of said lugs, and intermediate connection between said sector and said frame.

7. In a circular knitting machine, in combination, a needle cylinder secured so as to  
70 be adapted to have a vertical movement, a rod secured to said cylinder, a sprocket wheel, a pattern chain upon said wheel, lugs at prearranged positions upon said pattern chain, a toothed sector, means for exerting a down-  
75 ward pressure upon said sector, a pivoted pawl, a pin upon said pawl adapted to be engaged by a lug upon said chain, the teeth of said sector being in line of movement with lugs on the pattern chain, a pin upon the sector,  
80 the pawl being in line of movement of said pin, and intermediate connection between said sector and rod.

8. In a circular knitting machine, in combination, a needle cylinder secured so as to  
85 be adapted to have a vertical movement, a rod secured to said cylinder, a pivoted lever connected to said rod, a sprocket wheel, a pattern chain upon said wheel, lugs at prearranged positions upon said pattern chain, a  
90 toothed sector, means for exerting a downward pressure upon said sector, a pivoted pawl, a pin upon said pawl adapted to be engaged by a lug upon said chain, the teeth of said sector being in line of movement with  
95 the lugs on the pattern chain, a pin upon the sector, the pawl being in line of movement of said pin, and intermediate connection between said sector and said lever.

9. In a circular knitting machine, in combination, a needle cylinder secured so as to  
100 be adapted to have a vertical movement, a rod secured to said cylinder, a pivoted lever connected to said rod, a roller mounted on the end of said lever, a frame provided with a  
105 cam slot in which said roller rests, said frame being adapted to slide, a sprocket wheel, a pattern chain upon said wheel, lugs at prearranged positions upon said pattern chain, a toothed sector, means for exerting a down-  
110 ward pressure upon said sector, a pivoted pawl, a pin upon said pawl adapted to be engaged by a lug upon said chain, the teeth of said sector being in line of movement with the lugs on the pattern chain, a pin upon the  
115 sector, the pawl being in line of movement of said pin, and intermediate connection between said sector and said frame.

In testimony of which invention I have hereunto set my hand.

HARRY A. HOUSEMAN.

Witnesses:

JOHN SHALLCROSS,  
WM. E. DUDLEY.