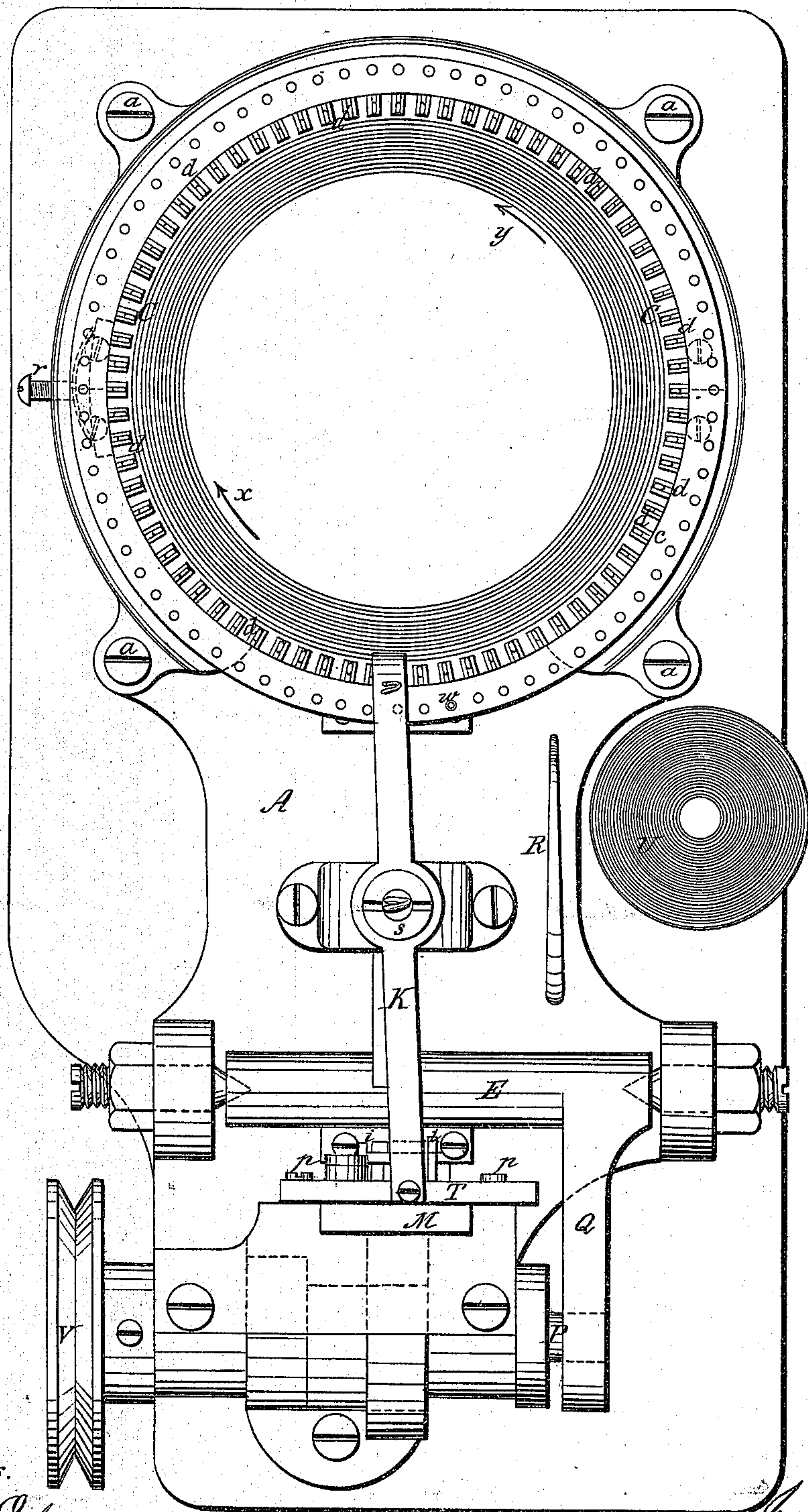


W. S. Hill.
Knitting Mach.

Nº 103,332.

Patented May 24, 1870.

Fig. 1.



Witnesses.

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Robert H. Manners

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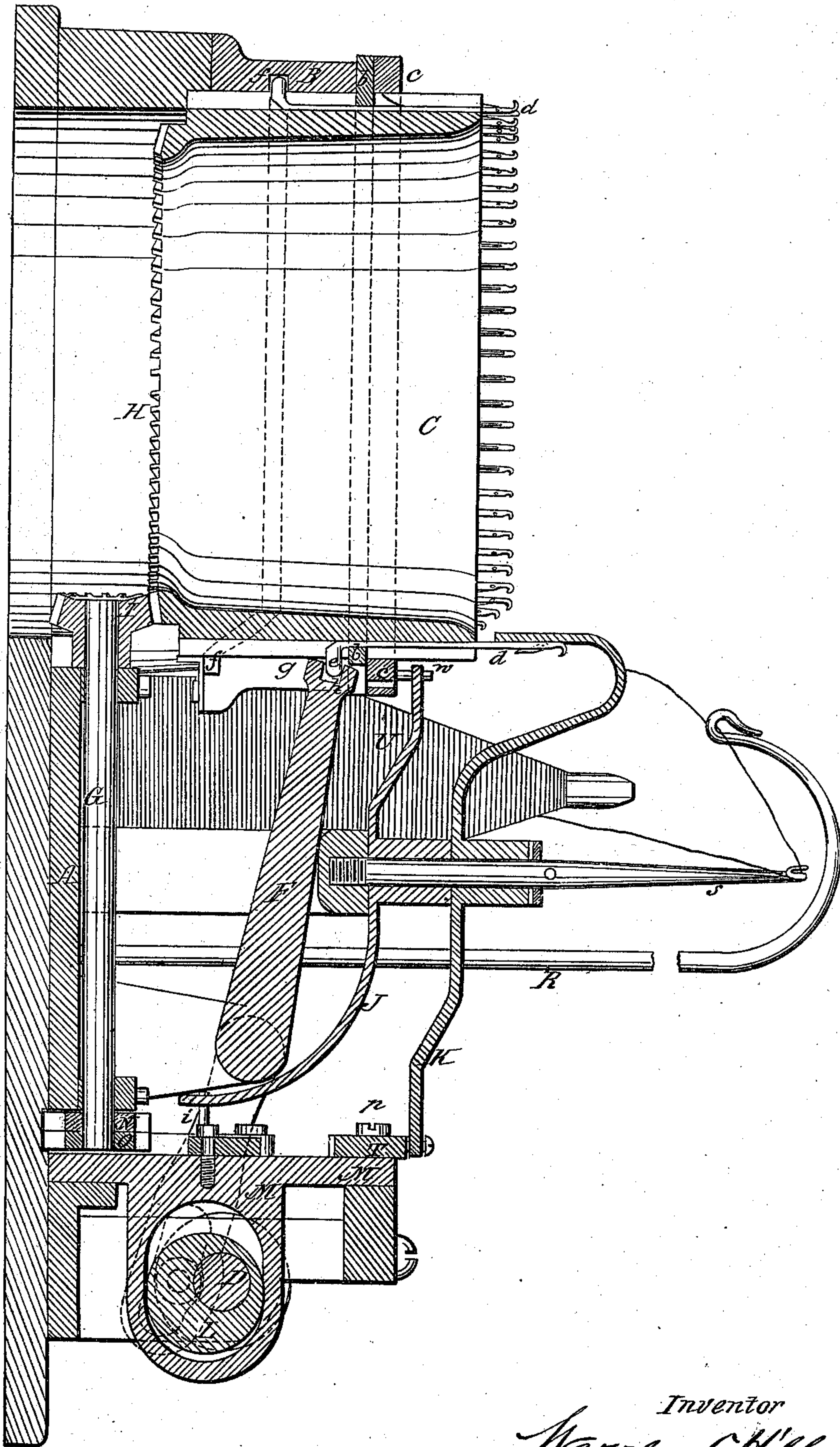
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Sheet 2. 3 Sheets.

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Fig. 2.



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Fig. 3.

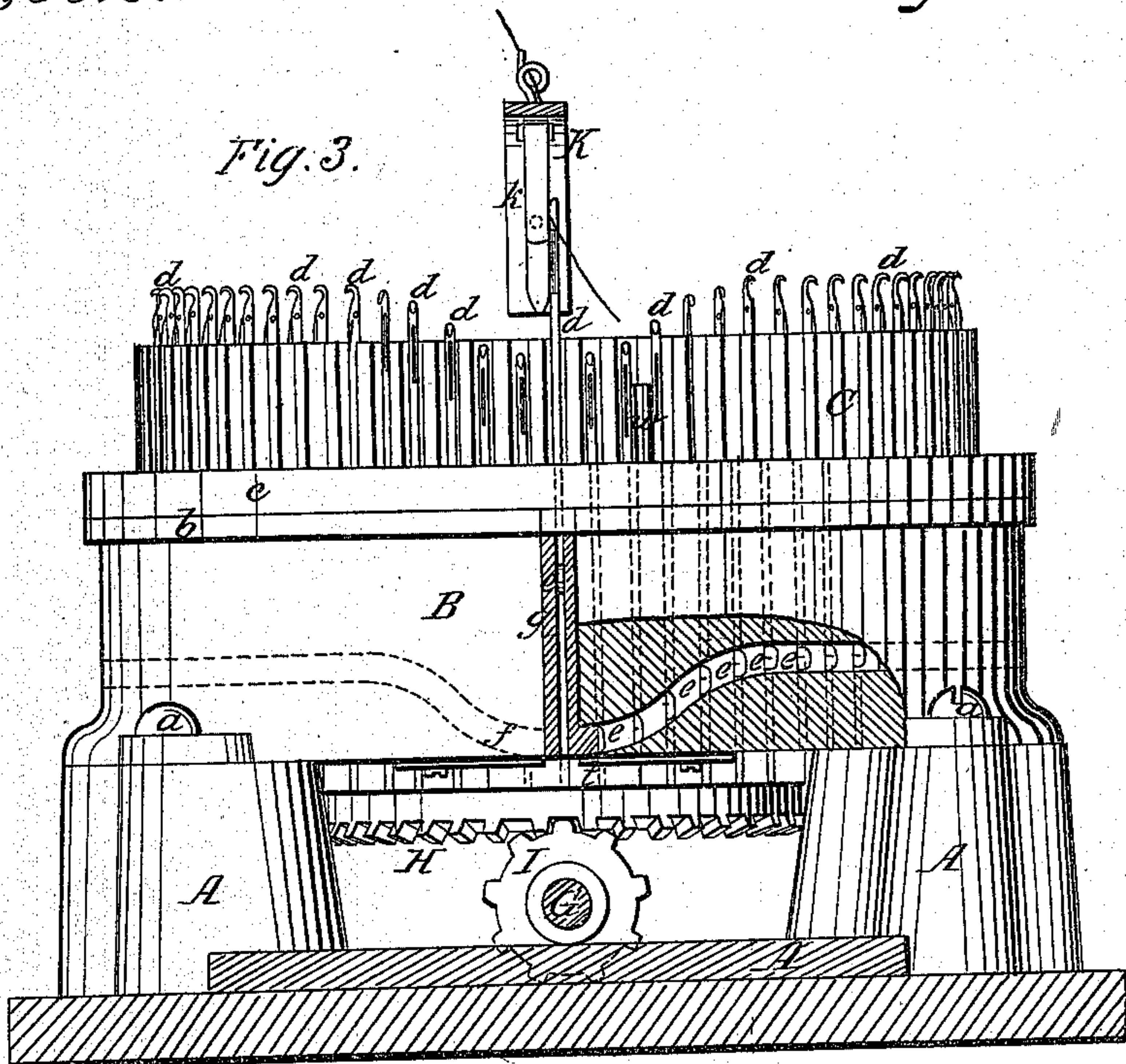


Fig. 4.

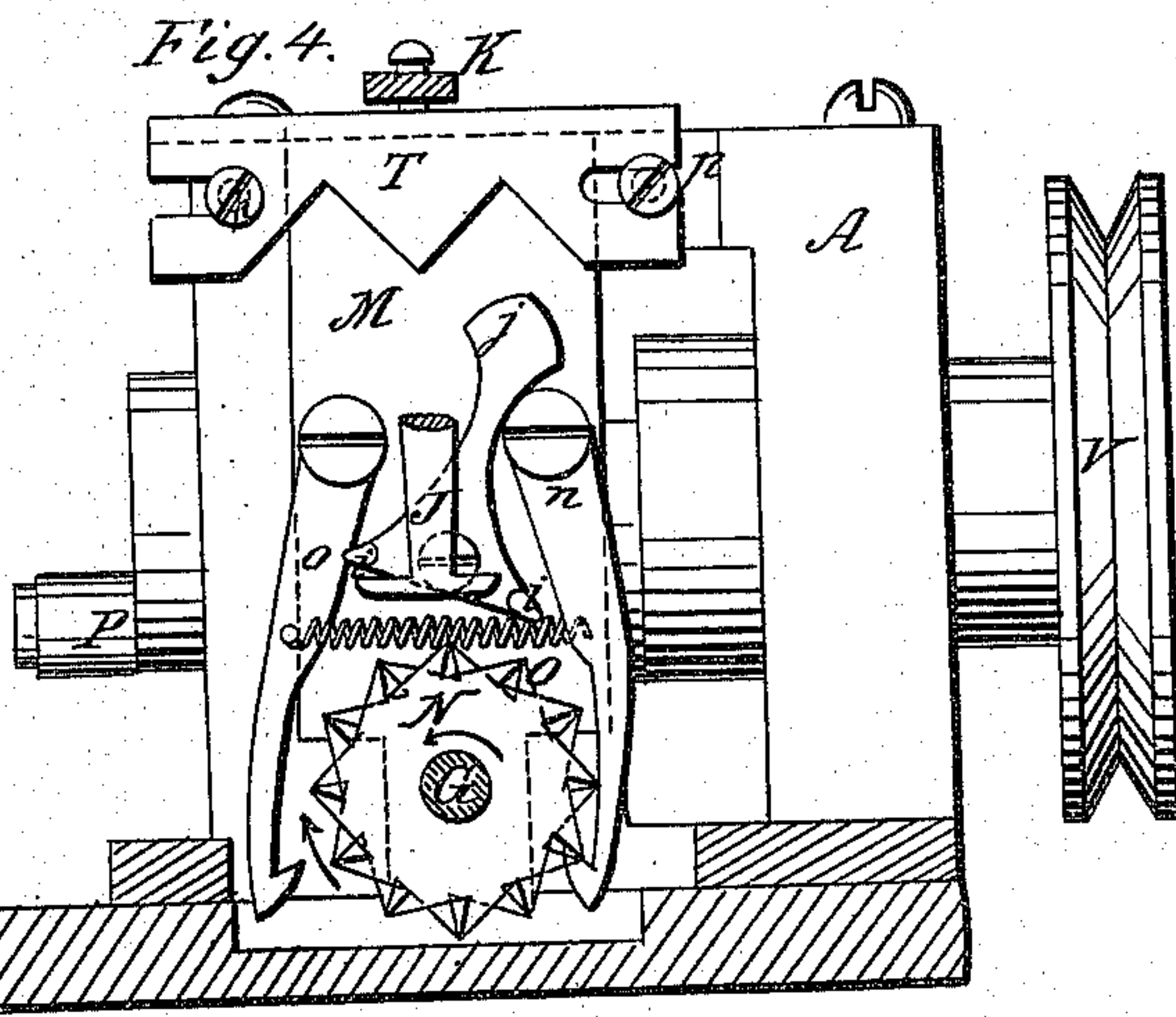


Fig. 6.

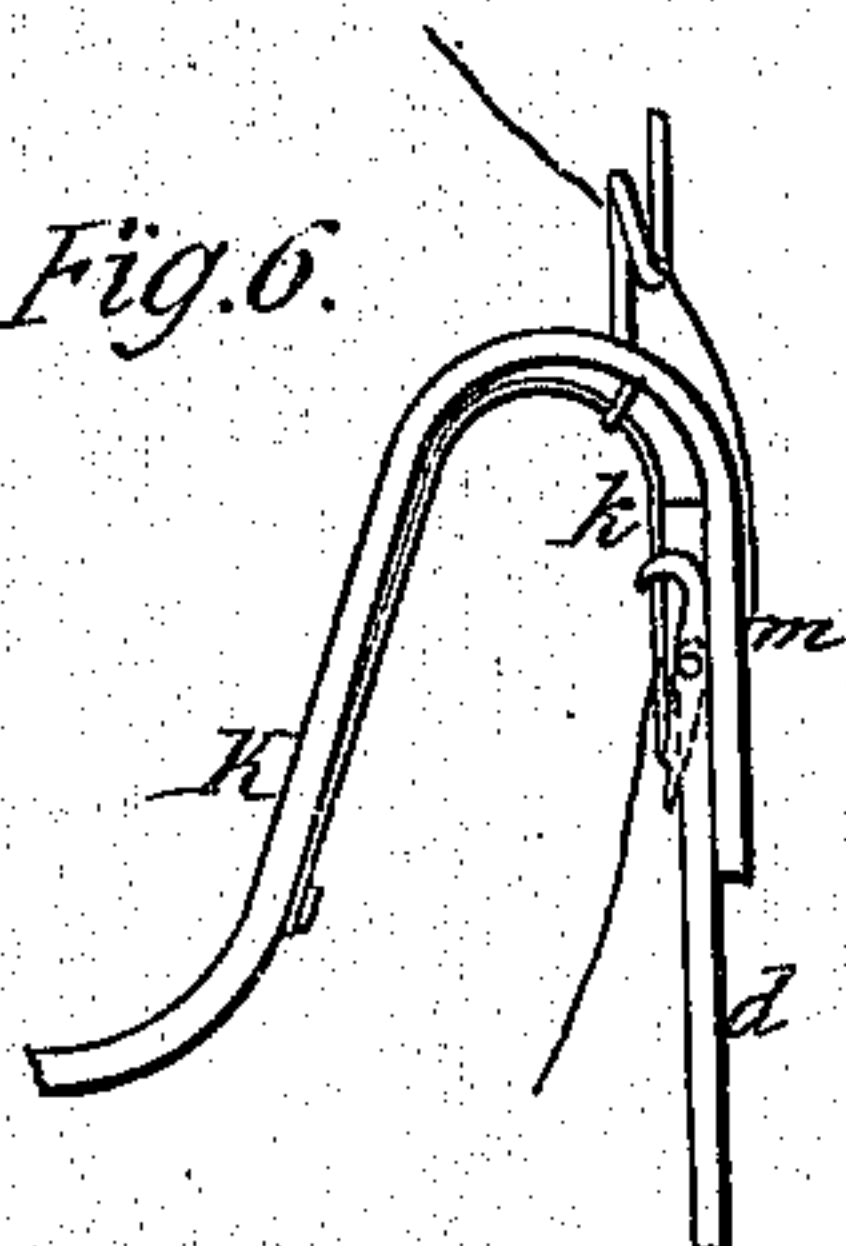
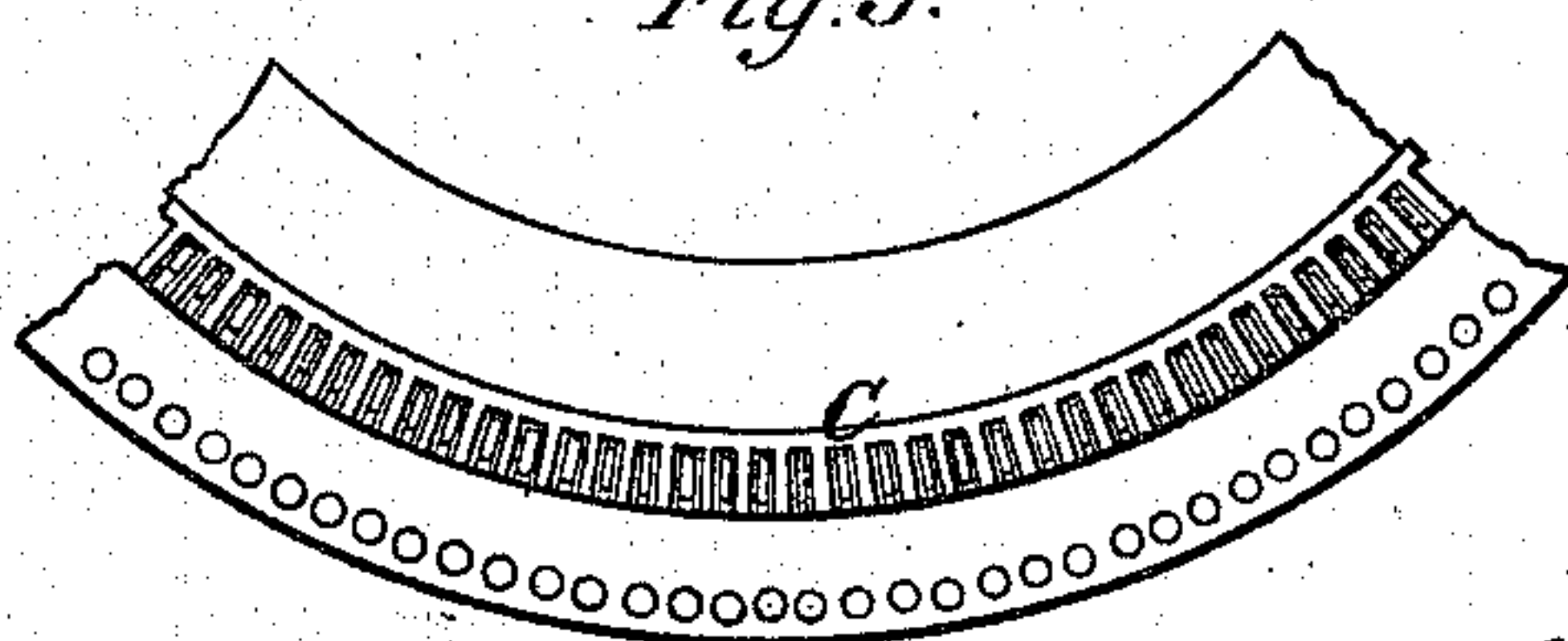


Fig. 5.



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UNITED STATES PATENT OFFICE

WARREN S. HILL, OF MANCHESTER, NEW HAMPSHIRE.

IMPROVEMENT IN KNITTING-MACHINE.

Specification forming part of Letters Patent No. 103,332, dated May 24, 1870.

I, WARREN S. HILL, of Manchester, in the county of Hillsborough and State of New Hampshire, have invented certain new and useful Improvements in Knitting-Machines, of which the following is a specification:

Nature and Objects of my Invention.

My invention consists in certain novel combinations and arrangements of parts, which have for their object the production of a knitting-machine simple in its construction, and capable of knitting either flat or tubular work, as will be fully set forth hereinafter.

Description of the Drawings.

Figure 1 is a plan or top view of my improved machine. Fig. 2 is a vertical longitudinal section in a plane taken through the center of the cylinder. Fig. 3 is a rear view, partly in section, the plane being taken in a line with the face of the bevel-pinion I, and a portion of the outer cylinder being broken away. Fig. 4 is a view of the reversing mechanism. Fig. 5 represents a portion of the cylinder in which the needles are placed. Fig. 6 is a side view of the end of the yarn-carrier.

General Description.

The frame A of the machine is made of such form as to support the various working parts and furnish suitable bearings for the shafts D E G.

The cylinder B is secured to the frame by the screws *a*. It is stationary, and supports the needle-cylinder C, which revolves within it.

A cam-groove, *f*, in the inside of this cylinder is so arranged that the butts *e* of the needles *d*, which play in the groove, are depressed as they approach the slot *g*, in which the needle-operating arm F works, and are raised as they recede from it. The form and arrangement are shown in Fig. 3 of the drawings.

The needle-cylinder is supported within the cylinder B by the ring *b*, whose inner edge fits in a groove in the needle-cylinder with sufficient play to allow the cylinder to revolve freely upon it. This ring is secured upon the cylinder B by screws. (Shown in dotted lines in Fig. 1 of the drawings.)

The needles *d* are of the same form and construction as those in general use in this class

of machines. They are held in slots arranged around the circumference of the needle-cylinder, and are inserted and removed through the vertical slot *g* in the outer cylinder.

The butts *e* of the needles are thrown into the vertical slot *g* at its lower end, and in line with the slot *h* in the needle-carrying arm F, by the action of the cam-groove *f*.

The arm F is vibrated, through the medium of the wrist-pin P, upon the driving-shaft D, and the slotted arm Q connected with the rock-shaft E, to which the arm is secured, its movement being so timed with relation to the motion of the needle-cylinder that, as each needle-butt is thrown into the slot *g*, the end of the arm F will be in proper position at the bottom of the slot to receive it.

The intermittent motion of the needle-cylinder in either direction is produced by the bevel-wheel H on the cylinder, the bevel-pinion I on the shaft G, the ratchet-wheels N O on the same shaft, and the pawls *n o* upon the reciprocating bar M. This bar is held in bearings in the back part of the frame A, and is actuated by the eccentric L on the shaft D.

The ratchet-wheels on the shaft G are placed with their teeth inclining in opposite directions, and one of them is at all times, during the operation of the machine, in working contact with one of the pawls, the pawl *n* actuating the ratchet N, and the one *o* operating the ratchet O.

If the ratchet-wheel N is in operation the needle-cylinder will rotate in the direction of the arrow *y*, Fig. 1, and if the other ratchet is engaged with its pawl the cylinder will revolve in the opposite direction, indicated by the arrow *x*.

The pawls *n o* are engaged with and disengaged from the ratchet-wheels automatically during the operation of the machine, and while the driving-shaft rotates continuously in one direction, by the reversing mechanism, consisting of the ring *c*, attached to and revolving with the cylinder C, whose face is provided with holes for the reception of one or more pins, *w*, and the lever J turning upon the standard *s*.

The curved end of the lever J is bent down between the two pins *i i* upon the dog *j*, that is pivoted to the reciprocating bar M between

the two pawls, and as the straight end of the lever strikes against the pin *w* as the cylinder revolves, the curved end is thrown under one of the pins *i* of the dog *j* upon the bar *M*, which at this moment is at the highest part of its movement, so that, as the downward motion of the bar *M* takes place, the pin *i* catches upon the projecting T-shaped end of the reversing-lever and the dog *j* is thrown over to the opposite side, releasing one pawl and raising the other from contact with its ratchet-wheel.

As the ring *c* is provided with holes around its entire circumference in which to place the pins *w*, the motion of the cylinder may be reversed at any part of its revolution, and straight as well as tubular work be produced, while, by using two pins placed at greater or less distance apart, straight work of any desired width may be knit.

The yarn from the bobbin *U* passes through the eyes in the standards *R s* to the yarn-holder *K*, where it is held to be seized by the needles. The front and curved portion of the holder is provided with a tension-spring, *k*, under which the yarn passes through a hole, *m*, in the front of the holder. The rear end of the holder is attached to the movable plate *T*, which slides upon the screws *p p*.

As the holder *K* must be adjusted to properly present the yarn to the needles as each reverse motion is made, the plate *T* is so arranged that, as the end of the dog *j* upon the bar *M* rises after being reversed by the lever *J*, it will strike against the inclined surface cut upon the lower edge of the plate and throw it over to the opposite side. The end of the

holder, being attached to this plate, will move with it, and the opposite end of the holder carrying the yarn will be thrown over to the opposite side of the needles, to present the yarn in a proper manner to them.

As it is necessary that the yarn-holder should remain in position after the reversing-lever has moved, in order to present the yarn for the last stitch, the plate *T* is not moved by the dog *j* until the upward movement of the bar *M*, next after the reverse motion of the dog is made.

Claims.

I claim as my invention—

1. The arrangement and combination of the reversible cylinder *C*, having the ring *c* and pins *w*, vibrating needle-carrier *F*, reversing-lever *J*, plate *M*, dog *j*, and slide *T* and yarn-carrier *k*, all constructed and operating as described and specified.

2. The combination, with the cylinder *C*, provided with the ring *c* and pins *w*, of the reversing-lever *J*, pawls *n o*, ratchet-wheels *N O*, reciprocating plate *M*, dog *j*, for changing the direction of the motion of the cylinder, substantially as described and specified.

3. The yarn-carrier, the notched and slotted plate *T*, in combination with the dog *j*, pivoted to the reciprocating bar *M*, and operated by the lever *J* and the pins *w* in the ring *c*, all constructed as described and specified.

WARREN S. HILL.

Witnesses:

S. N. BELL,

JOHN H. ANDREWS.