

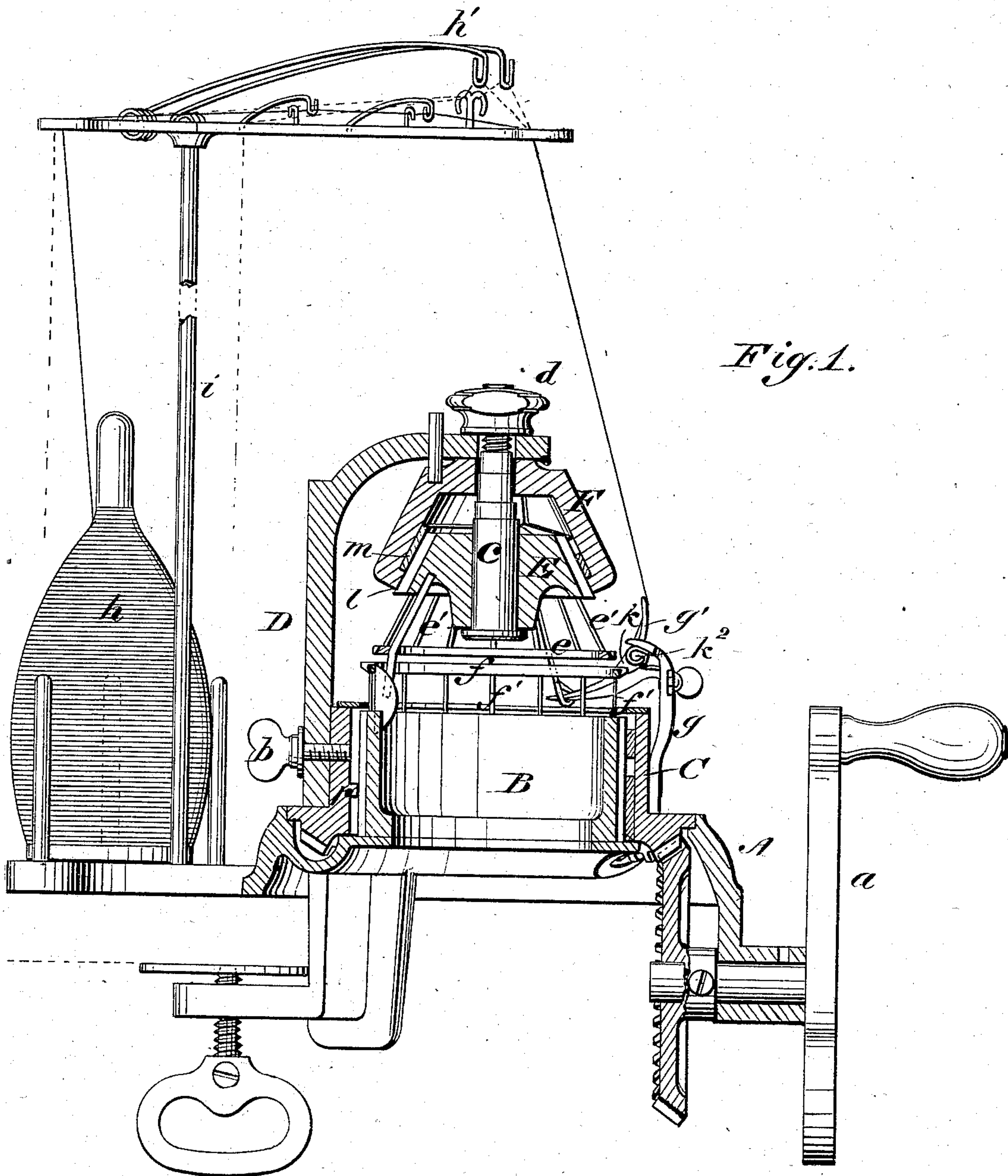
(No Model.)

2 Sheets—Sheet 1.

G. A. WHITE.
KNITTING MACHINE.

No. 254,750.

Patented Mar. 7, 1882.



WITNESSES:

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A. Sedgwick

INVENTOR:

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BY

Mum & Co

ATTORNEYS.

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Fig. 2.

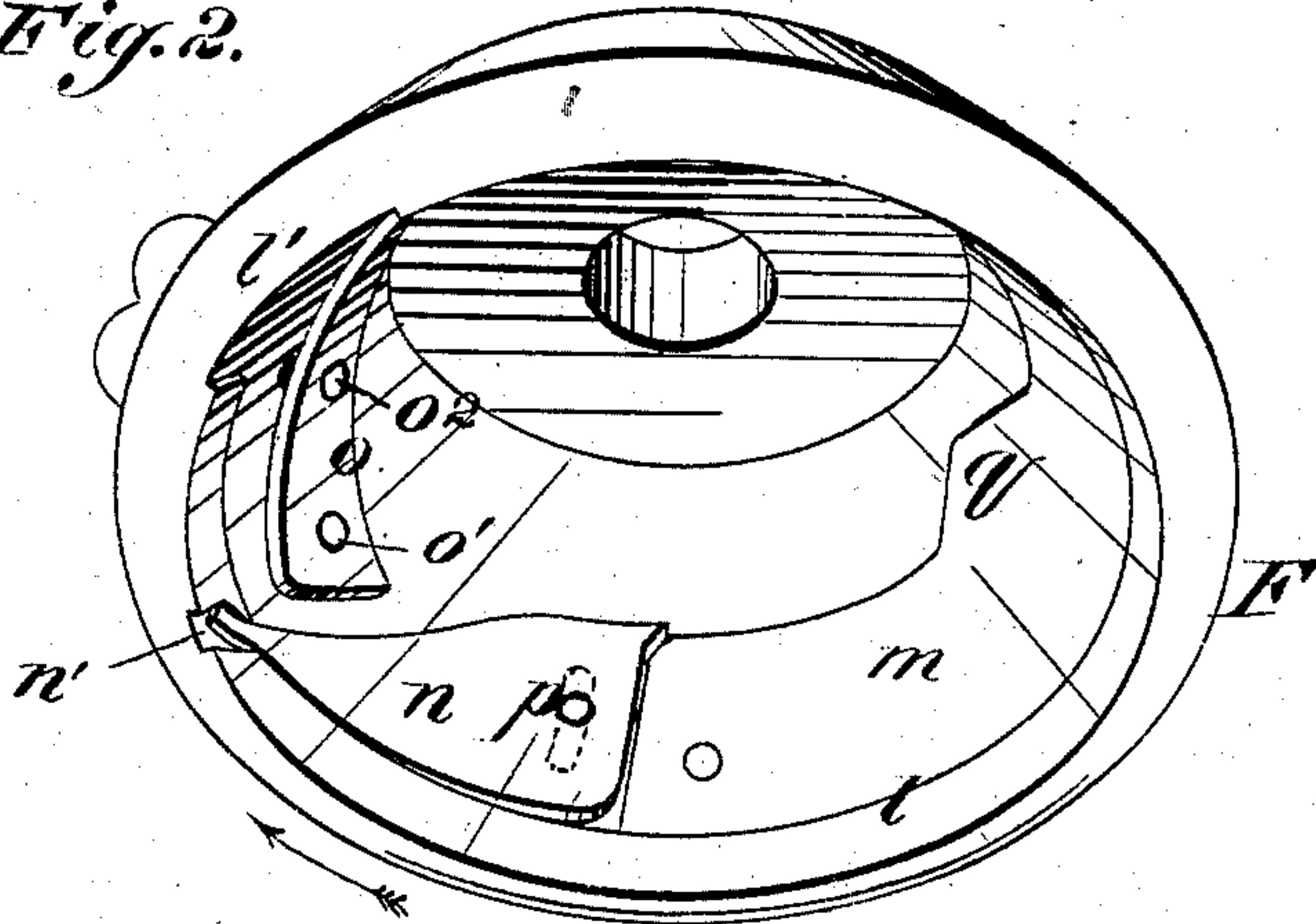


Fig. 3.

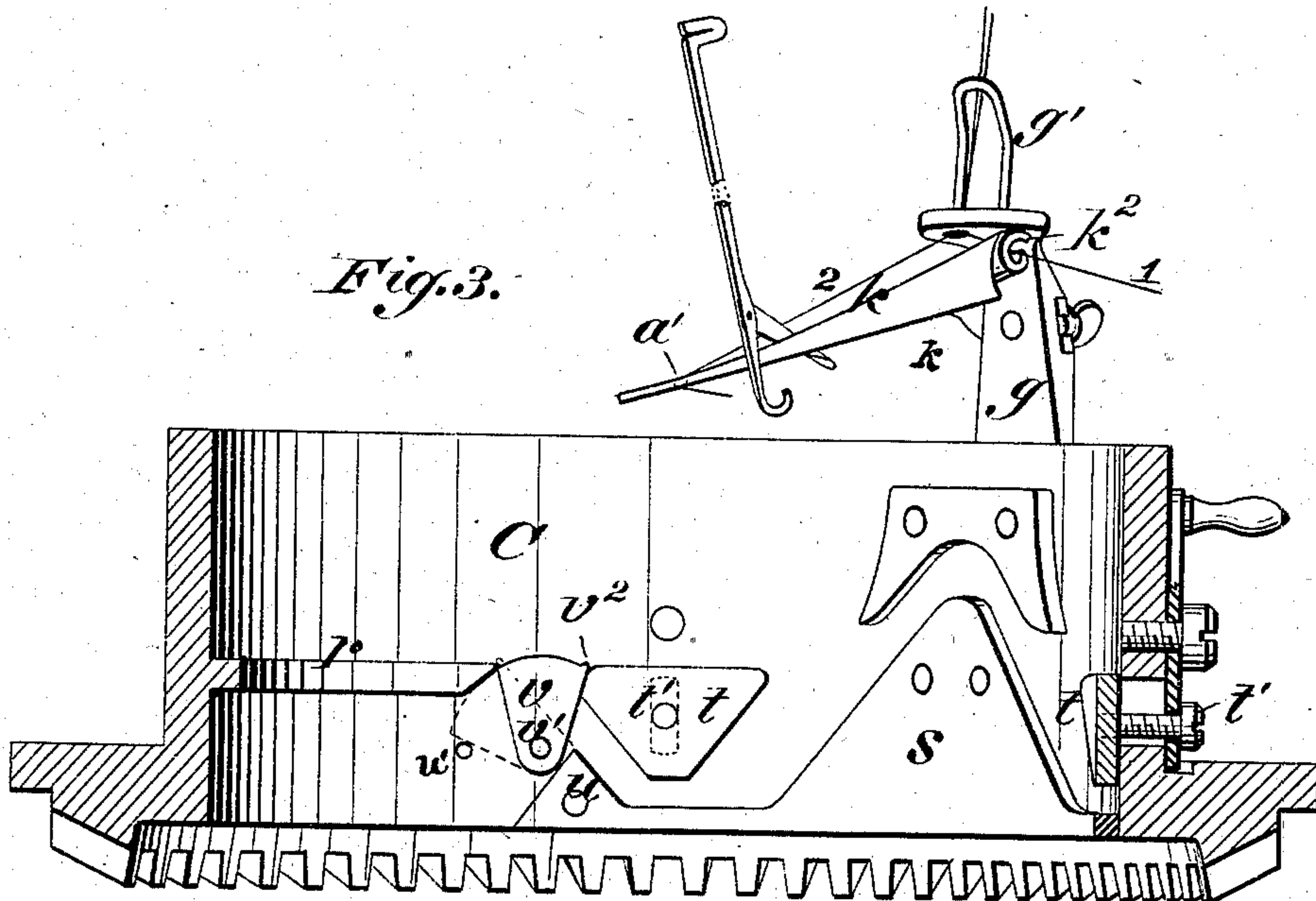
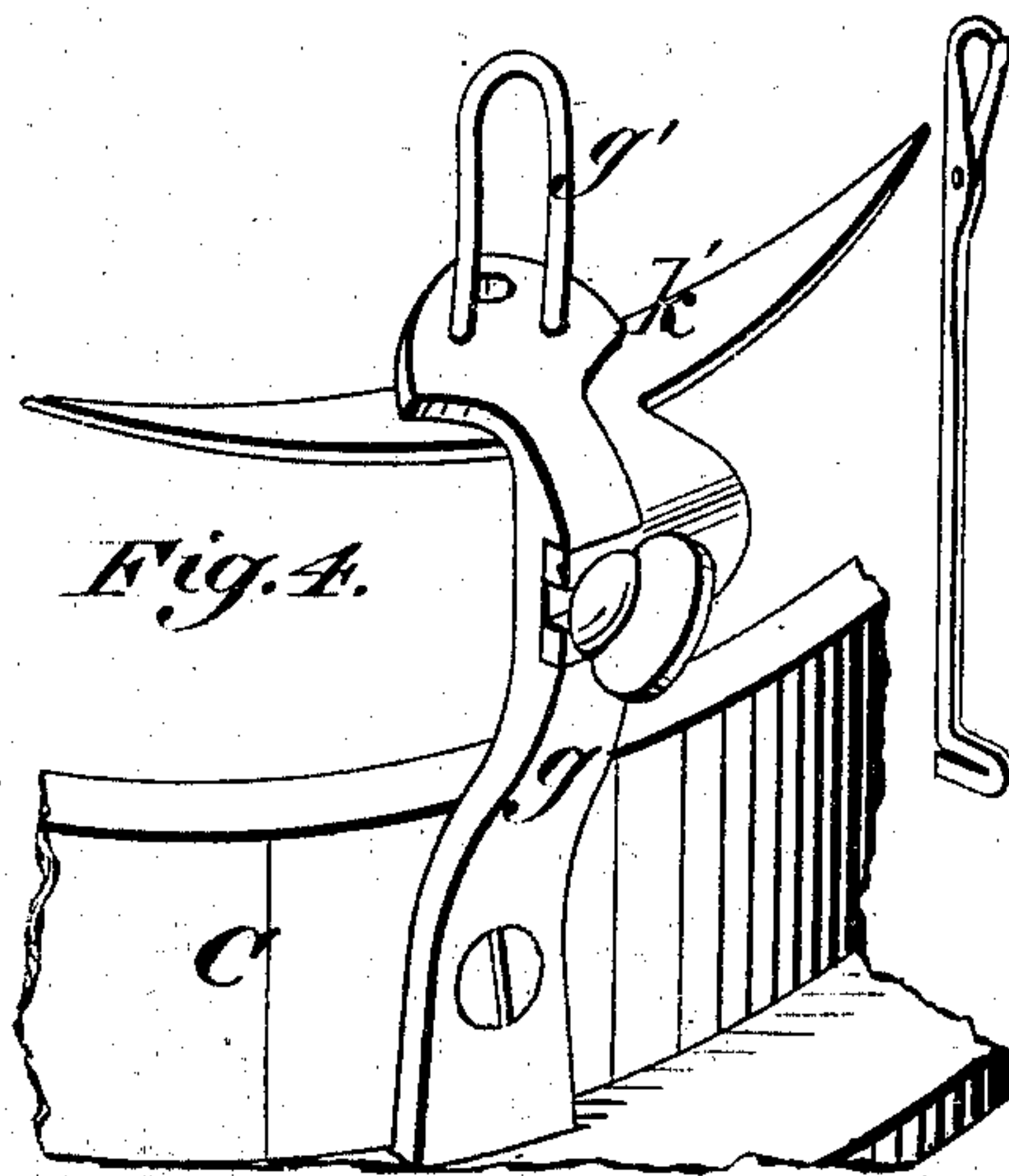


Fig. 4.



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UNITED STATES PATENT OFFICE.

GEORGE A. WHITE, OF HALIFAX, NOVA SCOTIA, CANADA, ASSIGNOR OF
ONE-HALF TO WILLISTON I. ALVORD, OF BRIDGEPORT, CONNECTICUT.

KNITTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 254,750, dated March 7, 1882.

Application filed October 4, 1880. (No model.)

To all whom it may concern:

Be it known that I, GEORGE A. WHITE, of Halifax, in the Province of Nova Scotia, and Dominion of Canada, have invented a new and
5 useful Improvement in Knitting-Machines, of which the following is a specification.

My improvements relate to circular-knitting machines for the manufacture of tubular fabrics, particularly to the class of hand-machines
10 using double sets of needles for forming ribbed fabrics.

The object of my invention is to render such machines more perfect in operation, and thus produce better fabrics with less labor and at-
15 tention in the operation of the machine.

The invention consists in certain novel features of construction, particularly in the fender or latch-opener and the cams for moving the needles, all of which will be set forth in detail
20 hereinafter, with reference to the drawings forming part of this specification.

In the drawings, Figure 1 is a vertical section of a knitting-machine embodying my improvements. Fig. 2 is a perspective view of the
25 conical sleeve, showing the cams which operate the upper set of needles. Fig. 3 is a vertical section of the revolving cylinder, and Fig. 4 is a detail perspective view of the latch-opener for the lower set of needles.

30 Similar letters of reference indicate corresponding parts.

For a clearer understanding of the nature of this invention, I will first briefly describe the steps that have been taken in the develop-
35 ment of the class of machines to which the invention relates.

Circular-knitting machines for making a straight tubular fabric have been known a long time. The first improvement on these
40 machines, whereby they were adapted for family use in the manufacture in one piece of hosiery and other irregular-shaped articles, was in the application of a cylinder carrying the cams for raising and lowering the needles and fitted for
45 rotation, so that by stopping out some of the needles and reciprocating the cylinder the required shape could be given to the fabric. These last machines, though varying somewhat in details of construction, had one feature

in common—that is, the stitch was produced 50
on one side of the fabric uniformly, and it was not possible to produce a ribbed fabric. The next important improvement consisted in arranging the needles in two sets—an upper and lower set—and providing separate cams for
55 moving the needles. This improvement opened the way for variations in the fabric produced; but in the development of the details many difficulties have been encountered, and as heretofore made the machines used a slotted cone 60
above the main bed, in which cone the second set of needles were placed, and an outer conical sleeve fitted for rotation carried the cams and served to operate the needles.

The difficulties with the last-named machine, 65
which is the one to which my improvements particularly relate, have been in the liability to drop stitches, in the irregularity of the ribs, caused by variations in the length of stitches, inability to observe the work, and to pick up 70
dropped stitches. By my improvements I overcome these difficulties and produce a superior fabric.

Referring to the drawings, A is the circular bed of the machine, fitted for being clamped to 75
a suitable support, and carrying the cylinder B, that is slotted to receive the lower set of needles, as usual.

C is the outer cylinder, fitted for rotation by handle *a*, and carrying the cams that operate 80
the lower set of needles.

D is a standard, clamped by a set-screw, *b*, to cylinder C, and extending over the center of the machine.

c is a vertical spindle, clamped by a nut, *d*, 85
to standard D, and depending therefrom over the center of cylinder B.

E is a cone, loose on spindle *c*, and sustained by a flange on the lower end of the spindle.

F is a conical sleeve, sustained by a shoulder 90
on the upper part of spindle *c*, and covering the upper part of cone E. This sleeve F is attached to standard D, so as to be carried thereby, and carries on its inner side the cams for operating the upper set of needles, which are 95
placed upon the cone E in slots provided for receiving them.

The upper edge of cylinder B and the lower

end of cone E come closely together, and as the cylinder and cone have heretofore been made solid there was no access to the interior for taking up a dropped stitch, and work could not be
 5 watched. I fit the lower portion of cone E with a ring, *e*, suspended by rods or arms *e'*, and the upper part of cylinder B with a ring, *f*, sustained by rods *f'*. The rings *e f* are grooved to receive the outer ends of the needles to sustain them against the side strain. With this
 10 construction the cylinder and cone are cut away, leaving only so much of the solid portion as is necessary to sustain the needles, thereby permitting observation of the work and giving access to the same.

Upon one side of cylinder C is fixed the thread-guide *g*, having an eye, *g'*, for the thread that comes from the bobbin *h* over tension-springs *h'*, that are carried by standard *i*, as
 20 usual. Upon the guide *g* is clamped the latch-opener or fender *k*, which is formed with an eye or tube, *k²*, for the thread, and serves to retain the latches of the upper set of needles open until the thread is caught by the needles.

Upon the construction of fender *k* depends the proper operation of the upper set of needles to a great extent. The needles of the upper set are allowed by the stitch-cam, as hereinafter described, to fall before reaching the
 25 fender *k*, so that the needles are sustained only by the thread. The forward end or finger of fender *k* passes beneath the latches of the needles as they come up successively and pass behind the fender, and the latches are held until
 30 the fender is past and the needles have commenced to rise, when the latches drop by gravity. The forward end or finger of the fender is pointed and curves slightly outward from the support *g*, tangentially of cylinder B, so that
 40 the point is in position for entering behind the latches. The fender also inclines upward from the point to the support *g*, so that the inner edge of the finger enters below the latch-pivot, and the latch is raised until it clears the edge of the
 45 fender and passes below the same.

In order that my machine may knit when turned in either direction, I make use of two stitch and wing cams.

The cams for raising and lowering the upper
 50 needles are shown clearly in Fig. 2. Upon the inner side and lower edge of the conical sleeve is formed a rib, *l*, that is continuous except at the opening *l'*, which is directly above the fender *k*, where the rib is discontinued.
 55 Above the rib *l* is fixed the shaker-plate *m*, of suitable length, terminating at one end with the termination of rib *l*, and at the other end (the forward end) terminating a short distance from the opening *l'*, and forming a continuation
 60 of the stitch-cam. Between the end of plate *m* and the opening *l'* is the stitch-cam *n*. This is triangular in shape, and is attached to the sleeve by a set-screw, *p*, passing through a slot in the sleeve, so that the cam *n* can be raised
 65 and lowered to vary the length of stitch. The forward end or point of cam *n* extends into a diagonal slot, *n'*, that is cut in rib *l*, so that

the point is held in place, and a second screw or pin is not required to hold the cam.

o is a swinging gate, hung by a pin, *o'*, between the cam *n* and the opposite end of plate
 70 *m*, and held in place by a set-screw, *o²*. This gate *o* is the same as generally used to form a continuation of plate *m* above the opening *l'* when it is desired to retain the upper needles
 75 out of use in knitting a welt or selvage edge.

Upon the upper edge of plate *m*, a short distance behind cam *n*, is a triangular elevation, *q*, which I term the "shaker," as it serves to
 80 shake or cast off the loops or stitches from the needles. Heretofore the cam which raised the needles was constructed to give them a drop as soon as the new stitch was formed to cast the previous loop, with the result that the new
 85 loop was drawn tight at the point where the thread was fed, which necessarily made a long stitch and produced an irregular rib. The machine was thus limited to the use of very few sizes of yarn, or else the rib was formed
 90 out of center. By the construction shown the cam *n* regulates the length of stitch, and the previous stitch is not cast until several successive stitches have been taken, so that the tension of the stitch will be regulated according
 95 as the cam *n* is set.

The cams for operating the lower set of needles are placed, as usual, upon the inner side of cylinder C. My improvements on these are for the purpose of reducing the friction and rendering the movement of the needles more
 100 regular.

r is a rib formed on the cylinder C, between the ends of which are placed the fixed central cam, *s*, adjustable stitch-cam *t*, and fixed wing-cams
 105 *u*. There are similar stitch and wing cams at each side of cam *s*, as usual, though but one set is shown in Fig. 3. I form the wing-cams *u* in one piece with cam *s*, or connect those cams as shown, to form a continuous support for the needles. The adjustable
 110 cams *t* are attached by set-screws *t'* passing through slots in the cylinder, so that they can be raised or lowered to vary the drop of the needle. Between the end of each cam *t* and
 115 the end of rib *r* a triangular gate, *v*, is hung by a pin or screw, *v'*, which gate, when raised, closes the passage between cams *t u* when not in use, and forms a smooth continuation of the rib.

The gate is fitted to fall by gravity when struck by an ascending needle, its movement being arrested by a pin, *u'*. There is a small
 120 projection, *v²*, on the upper edge of the gate, which, when the gate is in the last-named position, projects slightly above the rib *r*, so that the needle coming from the rib will take the
 125 projection *v²* and restore the gate to the first position, the butt of the needle passing in one case over gate *v* and cam *t*, and in the other case beneath cam *t* and up the side of cam *u* and
 130 gate *v*. The gate made in this form is durable and gives ample support to the needle, and carries the needle over without shock or unnecessary friction.

For weaving flat fabrics, and in shaping the work, I prefer to use, in connection with the lower set of needles, a latch-opener to insure movement of the latches. This device is shown in Fig. 4 at k' as attached to the thread-guide g , to which the latch-opener may remain permanently attached. The latch-opener k' is substantially similar to the latch-opener k , and is made in double form or extended in both directions, so as to operate when the cylinder C is turned in either direction. The double fender k' is used with the lower cylinder, when moved back and forth for certain kinds of work, and each fender or latch is attached, when used, to the thread-guide g . The fender or latch-opener k of the upper set of needles I utilize as a carrier for a second thread when knitting striped goods. In this case, as shown in Fig. 3, the thread 1 of one color passes through the eye of guide g and tube k^2 of fender k for engagement by the lower needles. The thread 2 of another color extends from the eye of guide g , and through an eye, a' , that is formed in the outer end of fender k , for engagement by the upper needles. The needles of the upper set being arranged to form a rib, and the second thread used as mentioned, a fabric striped lengthwise is produced by the operation of the machine.

To form a welt or selvage edge the gate o is first moved to retain the upper needles out of use. A few turns are knit with the lower needles, and the upper needles then brought into use to bind the turns last knit together.

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

1. The needle-cylinder B, provided with grooved ring f , sustained by rods f' at the upper end of said cylinder, substantially as shown and described, and for the purposes set forth.

2. The cone E for sustaining the upper needles, provided with grooved ring e at its base, sustained by arms or rods e' , combined with

needle-cylinder B, substantially as shown and described, and for the purposes specified.

3. The combination, with the revolving cylinder C and the thread-guide g , of the latch-opener or fender k , provided with the eyes $a' k^2$, and having its forward end pointed and curved outward from the thread-guide, substantially as and for the purpose set forth.

4. The combination, with the revolving cylinder C, provided with rib r , pin w' , the fixed cams $s u$, and the adjustable stitch-cam t , of the gate v , provided with the projection v^2 , pivoted to the said cylinder between the said ribs and adjustable cam, substantially as and for the purpose set forth.

5. The combination, with the slotted conical sleeve F, provided with the diagonal slot n' and the fixed plate m , of the triangular stitch-cam n , secured to the said sleeve by the set-screw p , substantially as and for the purpose set forth.

6. The combination, with the cone E, of the conical sleeve F, provided with the adjustable stitch-cam n , the swing-gate o , and the plate m , provided with the triangular projection q , substantially as and for the purpose set forth.

7. The combination, with the cone E, carrying the upper set of needles, and the conical sleeve F, provided with rib l , and the adjustable triangular stitch-cam n , of the plate m , arranged above the said rib and provided with a triangular projection, q , arranged at a distance of three or four needles from the said stitch-cam, as shown and described, whereby the old loop is shaken off after a new stitch is formed, the new loop being held by three or more new stitches when its needle reaches the point q , and the operation of casting the old loop cannot alter the new stitch, as set forth.

GEORGE A. WHITE.

Witnesses:

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C. SEDGWICK.