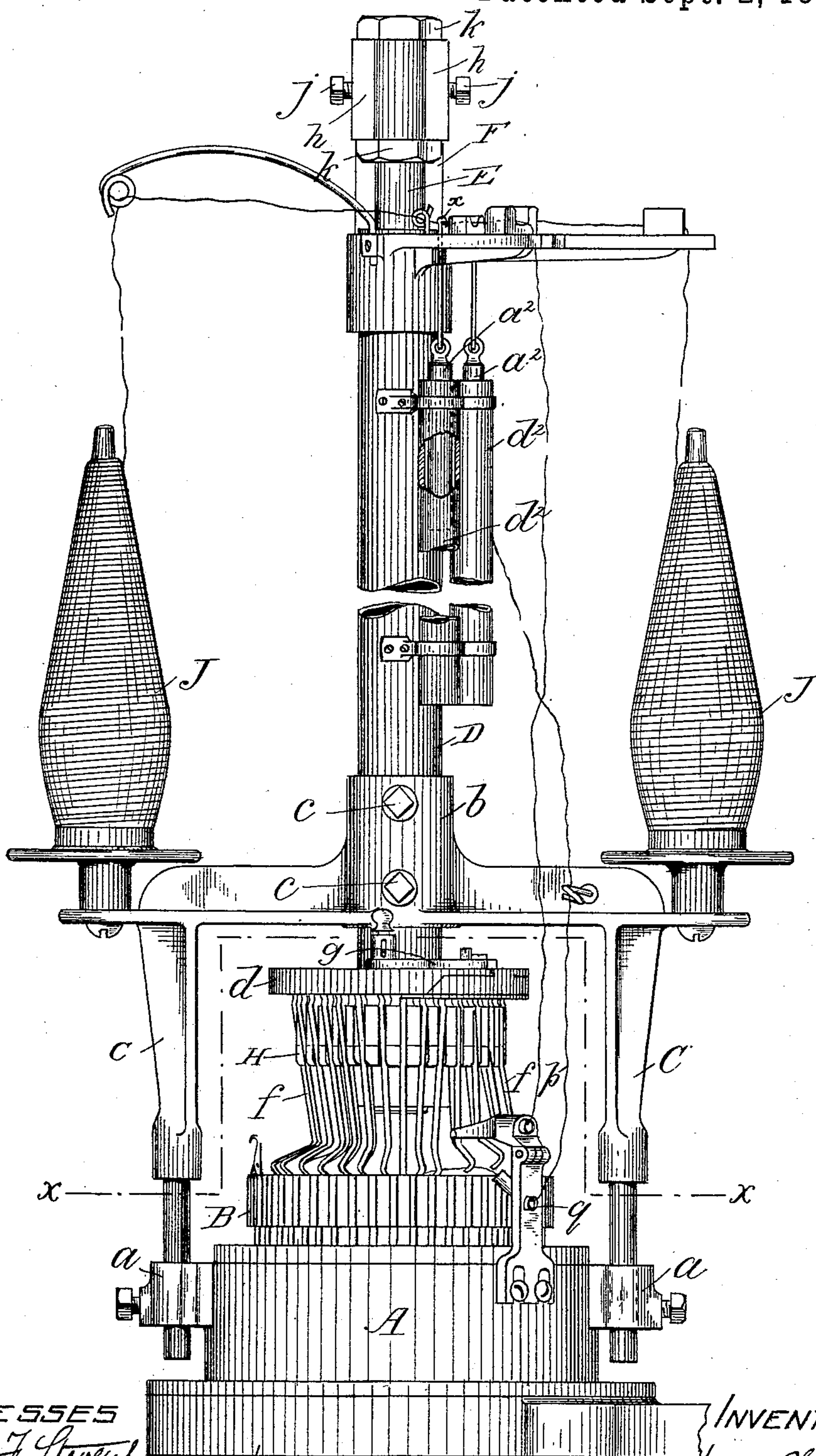


2 Sheets—Sheet 1.

No. 435,449.

Patented Sept. 2, 1890.



WITNESSES
Milan F. Stevens.
Robert Wallace.

INVENTOR
James H. Reed
by Wm. H. Macleod
his atty

Fig-1.

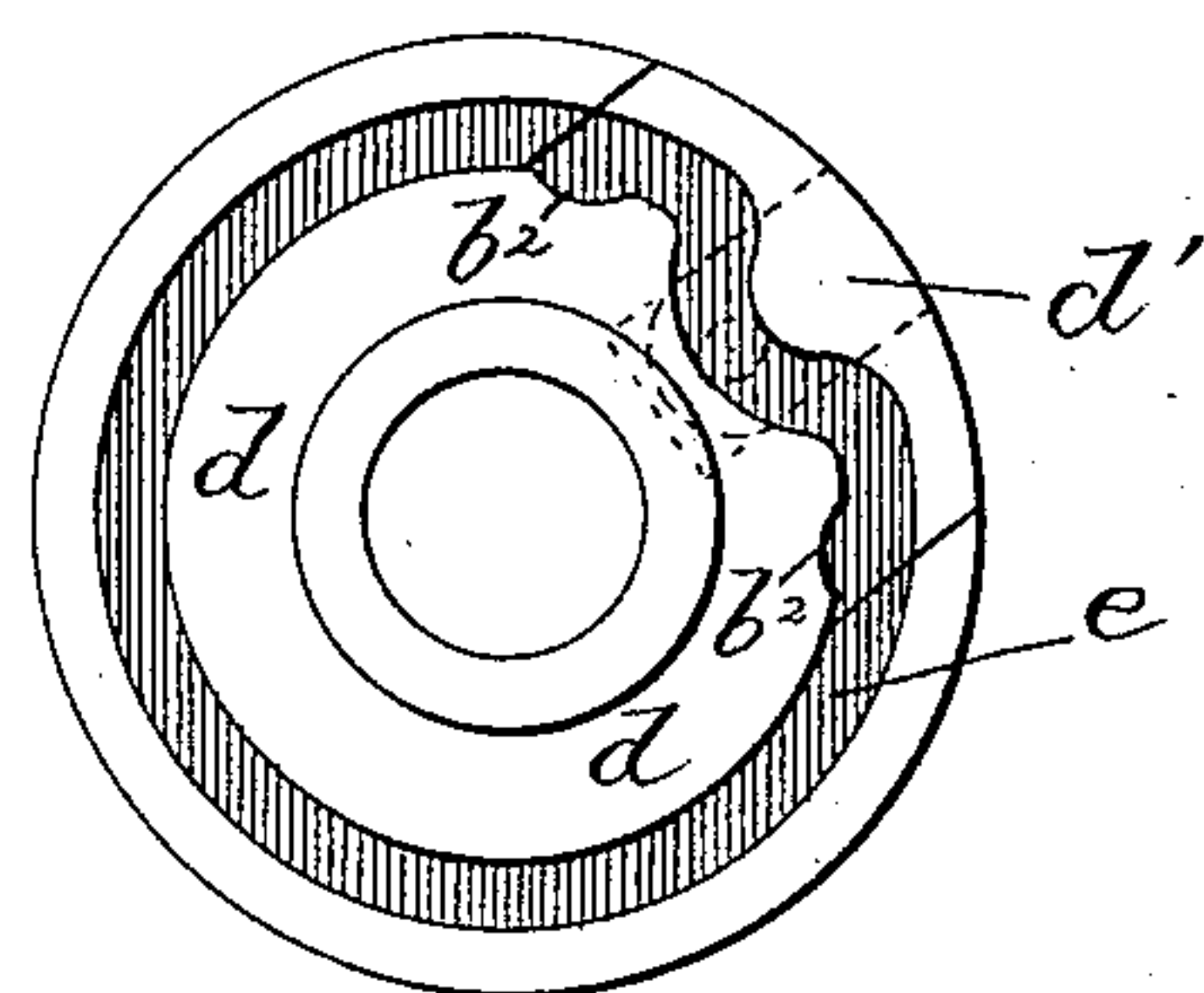
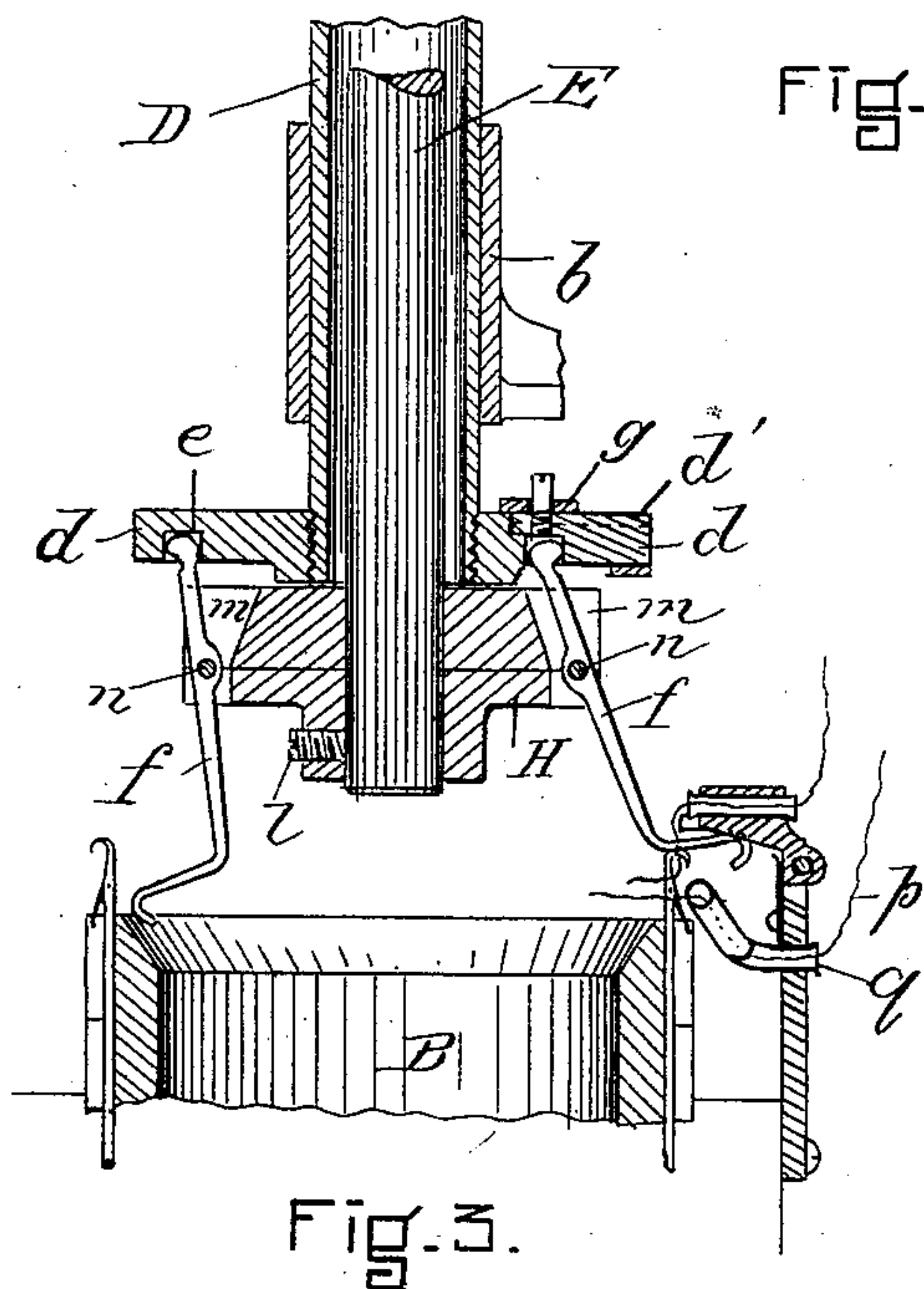
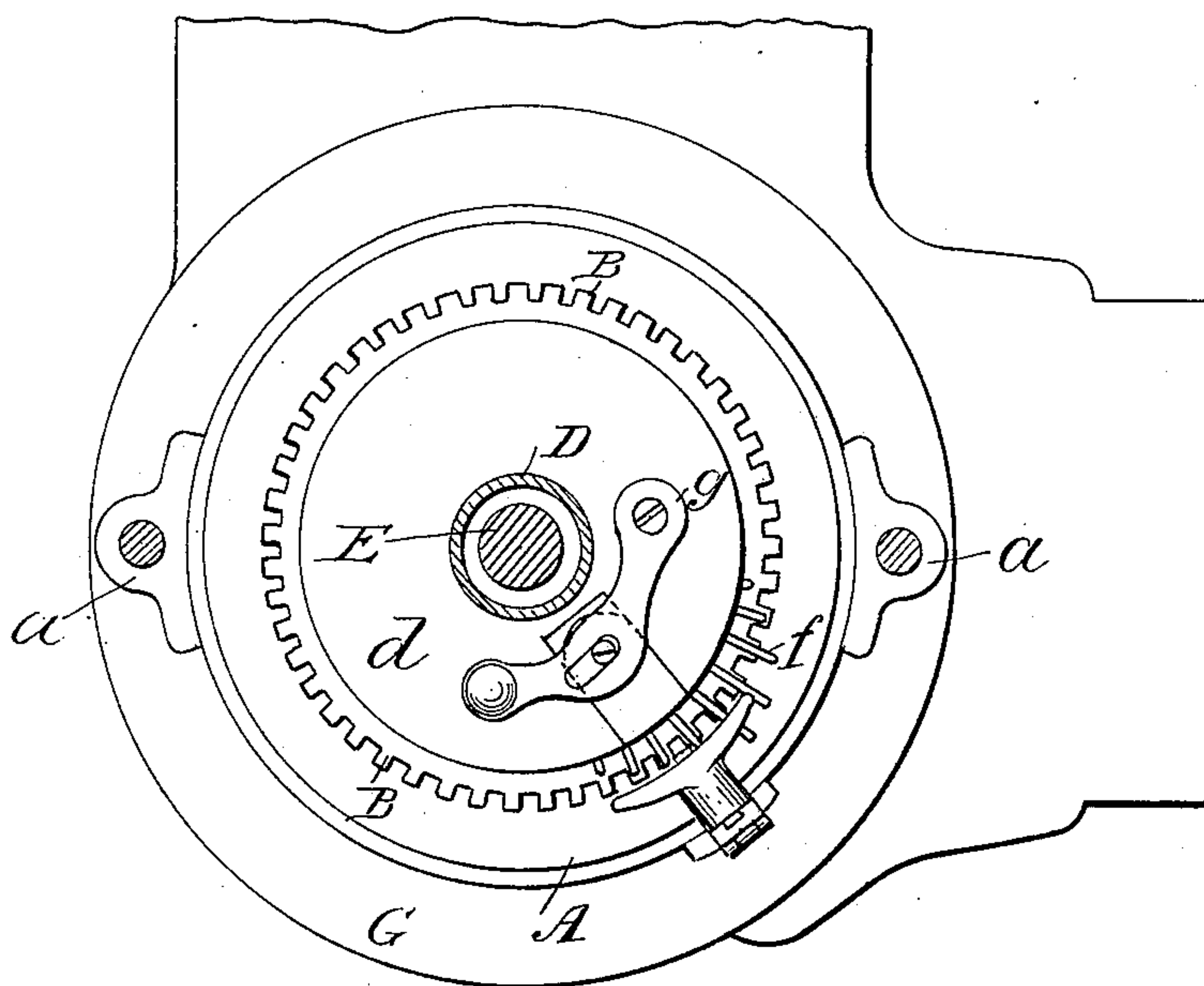
(No Model.)

2 Sheets—Sheet 2.

J. H. REED.
KNITTING MACHINE.

No. 435,449.

Patented Sept. 2, 1890.



WITNESSES
Milan F. Stevens,
Robert Wallace.

INVENTOR
James H. Reed
by J. A. MacLeod
his atty

UNITED STATES PATENT OFFICE.

JAMES H. REED, OF LYNN, MASSACHUSETTS.

KNITTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 435,449, dated September 2, 1890.

Application filed November 3, 1888. Serial No. 289,921. (No model.)

To all whom it may concern:

Be it known that I, JAMES H. REED, of Lynn, county of Essex, State of Massachusetts, have invented certain new and useful
5 Improvements in Knitting-Machines, of which the following is a specification, reference being had to the drawings accompanying and forming a part hereof, in which—

Figure 1 is an elevation of a machine constructed in accordance with my invention. Fig. 2 is a plan looking down from line $x x$, Fig. 1. Fig. 3 is a vertical section of part of the machine, showing the manner of mounting and actuating the loopers. Fig. 4 is a
15 plan of the looper-cam.

The object of my invention is the production of a knitting-machine which will not only knit a sock or similar article, but will at the same time tuft the inside of the sock—
20 that is, knit into the work an extra thread and draw that thread into a series of loops or tufts, thus producing a sock or other article of extra weight and warmth.

My invention, as shown in the accompanying drawings, is applied to a common form of circular-knitting machine; and it consists, chiefly, in a circular head or disk which is rigidly secured above the center of the needle-cylinder, said head or disk being provided
30 with a series of loopers placed opposite the spaces between the needles, and being actuated by a revolving cam secured to a yoke which supports the yarn and which revolves with the needle-cam cylinder of the machine.

My invention also consists in certain details of construction and arrangement, all of which will be hereinafter more fully described.

I will describe my invention as it is embodied in the machine shown in the accompanying drawings, using like letters of reference to indicate like parts throughout the same.

A represents the needle-cam cylinder, and B the needle-cylinder, of a circular-knitting
45 machine.

C represents the yoke, the downwardly-projecting ends of which are secured in projections a , which are fast on the needle-cam cylinder, as shown in Fig. 1. The yoke or
50 frame C is provided centrally with a bearing b , through which a sleeve or hollow shaft D passes. (See Figs. 1 and 3.) The hollow

shaft D is secured to the part b of the yoke by set-screws c , Fig. 1, so that as the yoke revolves with the needle-cam cylinder the hollow shaft D will revolve with it. On the lower end of the shaft D a cam-disk d is secured, the under side of the disk d being provided with a cam-path e , Fig. 4, which receives the upper ends of the loopers f , and which acts
55 to operate the loopers as the cam revolves. The cam-disk d carries at one side a plate d' , the inner end of which forms the sharply-curved or operative portion of the cam-slot e . This plate d' may be slid inwardly or outwardly by means of a lever g , Fig. 2, pivoted
60 on top of the disk d , so that when the machine is used on plain work and the loopers are not required to operate the plate d' may be slid outwardly, so that it will not bear on
65 any of the loopers and the loopers will not be actuated, but will all be left with their lower ends inside of the needles and clear of the work.

Inside of the hollow shaft D a vertical rod
75 E projects downwardly from an upright frame-piece F, which stands on a projection of the base G of the machine, and which is bent at its upper end, so as to bring its upper end, where the rod E is secured to it, over the center of
80 the needle-cylinder. The upper end of the support F is Y-shaped, and the rod E is secured between the arms $h h'$ of the Y by means of set-screws j and clamping-nuts k . The greater portion of the support F is not
85 shown, being directly behind the machine, as shown in Fig. 1.

On the lower end of the rod E a disk or head H, Fig. 3, is secured by means of a set-screw l . The periphery of the disk H is slot-
90 ted, as shown at m , Fig. 3, and in each slot a looper f is pivoted at n . By this arrangement the lower ends of the loopers, which are bent outwardly and provided with hooks, may be swung outwardly and inwardly between the
95 needles. The shape of the loopers will be clear from Fig. 3. The yarn which is used to tuft the work is shown at p , and is delivered through a carrier or delivery-tube q , which is set below the regular delivery-tube of the ma-
100 chine and in the same standard and acts to deliver the tufting-yarn outside of the needles and beneath or in front of the loopers as they are in their outward positions, so that on

their movement inwardly they catch the tufting-yarn and draw it into a loop between the needles. As the needle passes downwardly, the tufting-yarn is knit into the work, and the inwardly-projecting loop of tufting-yarn is held by the looper inside the inner face of the work. Immediately after a looper has moved inwardly to form a loop the needle preceding the loop moves downwardly, knitting one end of the loop into the work. To allow this needle to move downwardly without unduly straining the tufting-yarn, the looper is allowed to slack up slightly, and this is effected by widening the cam-path e , as shown at b^2 , Fig. 4. In Fig. 4 two of these widened portions in the cam-path are shown, one on each side of the operating part of the cam, this construction admitting of the reversal of the cam, if necessary or desirable. The upper end of the looper is at this widened portion of the cam-path when the loop is to be slackened, so that as the needle passes down the looper yields slightly and relieves the yarn from undue strain. As one looper has substantially completed its inward movement before the succeeding looper bears on the yarn, there is no extra strain on the yarn in forming the loops or tufts. At the next revolution of the machine the looper is again moved upwardly and outwardly, freeing itself readily from the preceding tuft or loop. As the looper mechanism is located above the needles, it does not in any way interfere with the operation of knitting or taking the work from the machine.

As the yarn must travel around with the carriers or delivery-tubes, I have provided spindles set on the yoke C for the reception of the yarn-bobbins J, while on the upper part of the sleeve D are secured projecting arms, over which the yarn is guided and on which are arranged take-ups, which take care of any slack in the yarn and maintain the proper tension. The take-up consists of weights a^2 , which are free to move vertically in cases d^2 , secured to the sleeve D, as shown, Fig. 1. These weights are provided with hooks, as x , by which they may be suspended from the yarn by the operator whenever a slack occurs, as in knitting the heel or toe of a sock. In the drawings, Fig. 1, the weights a^2 are shown in the position which they occupy when placed on the yarn and before they have acted to draw the yarn taut. The springs hitherto used as take-ups do not maintain a uniform tension on the thread, since if the slack is slight the spring acts more strongly than if there is more slack. By the use of weights this objection is overcome and uniform tension maintained.

It will be observed by reference to Figs. 3 and 4 that the grooved cam which operates the loopers f is of such construction that each of the loopers, after drawing in a loop of yarn to form a tuft, remains in during nearly an entire revolution of the cam, and thus holds its tuft until it is firmly set in the work by

the knitting of nearly an entire round or course, and preventing any of the tufts from being pulled out when subsequent tufts are formed. The tufting-loops must be drawn in one at a time, else the yarn will be strained or broken, and by employing looper-levers, which are pivoted between their ends and operated by a cam which engages them above their pivots and which is constructed to give them a quick throw, I am enabled to operate these levers with proper rapidity to effect this result, even when the loopers are arranged between all of the needles, as shown. The throw of the hooks of the loopers is preferably somewhat greater than the length of the loops or tufts which they make, so that they begin to move inward before they engage the tufting-yarn.

It is not essential that the delivery-tube for the tufting-yarn should be directly underneath and in line with the delivery-tube for the knitting-yarn, except in narrowing in, as in knitting a heel or toe. In such case, however, the delivery-tubes require to be in line, and I prefer, therefore, to place them in that position. The yoke C may have either two downwardly-projecting supports or it may have more, and it may also be provided with more than two spindles or studs for bobbins, and so be adapted to carry more than two bobbins of yarn. As will be obvious, the number of loopers employed may be diminished, diminishing the number of tufts or loops produced on the work.

I do not desire to limit my invention to circular machines, as it may be applied to straight machines.

I am aware that a looping attachment for knitting-machines wherein tuft-forming loopers consisting of levers pivoted at their upper ends and operated by a cam-plate between the fulcra of said levers and their looping-ends is old; but with such construction of parts the looping-levers were so long and the parts were so arranged that the device was much more cumbersome than with my looping mechanism with the looping-levers pivoted between their ends and operated by a cam engaging their upper ends, this construction and arrangement of parts being compact, with comparatively short looping-levers, admitting of high speed with but little friction.

What I claim is—

1. The combination, with the operative parts of a knitting-machine, of a series of loopers supported above the needles and pivoted between their ends, and an actuating-cam for said loopers arranged above the latter engaging portions thereof above their pivots and constructed to move the lower ends of the said loopers inwardly and outwardly between the said needles, substantially as shown and described.

2. The combination, with the operative parts of a knitting-machine, of a series of loopers supported above the needles and piv-

oted between their ends, and an actuating-
cam for said loopers provided with one or
more widened portions, as b^2 , adjacent to the
operating part of the said cam, substantially
5 as shown and described.

3. In a knitting-machine, the combination,
with the needle-cam cylinder A, of a station-
ary head or disk, as H, supported above said
cam-cylinder, a series of loopers, as f , pivoted
10 between their ends to said head or disk, and
a rotating cam engaging said loopers above
their pivots and constructed to move the
lower ends of the same in and out between
the needles of the machine, substantially as
15 shown and described.

4. In a knitting-machine, the combination,
with the needle-cam cylinder A, of the yoke
C, carried thereby, the stationary support F,
the rod E, secured to said support, the head or
disk H, attached to said rod above said cyl- 20
inder, the loopers f , pivoted between their
ends to said head or disk, the hollow shaft D,
attached to said yoke, and the cam d , carried
by said shaft and engaging the upper ends
of said loopers, substantially as shown and 25
described.

JAMES H. REED.

Witnesses:

WM. A. MACLEOD,
R. WALLACE.