

(No Model.)

2 Sheets—Sheet 1.

C. CALLAHAN.
KNITTING MACHINE.

No. 311,410.

Patented Jan. 27, 1885.

Fig. 1.

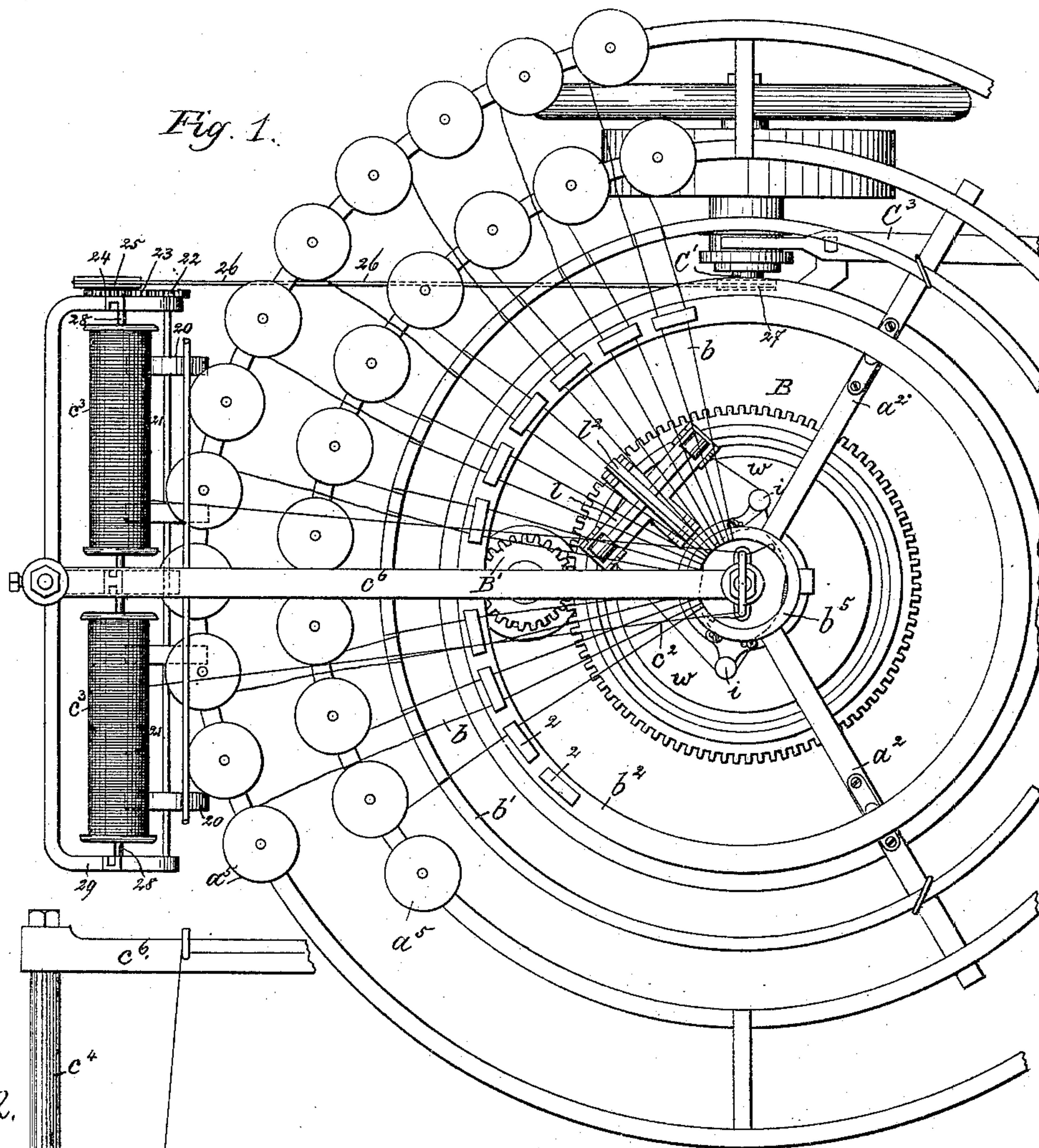


Fig. 2.

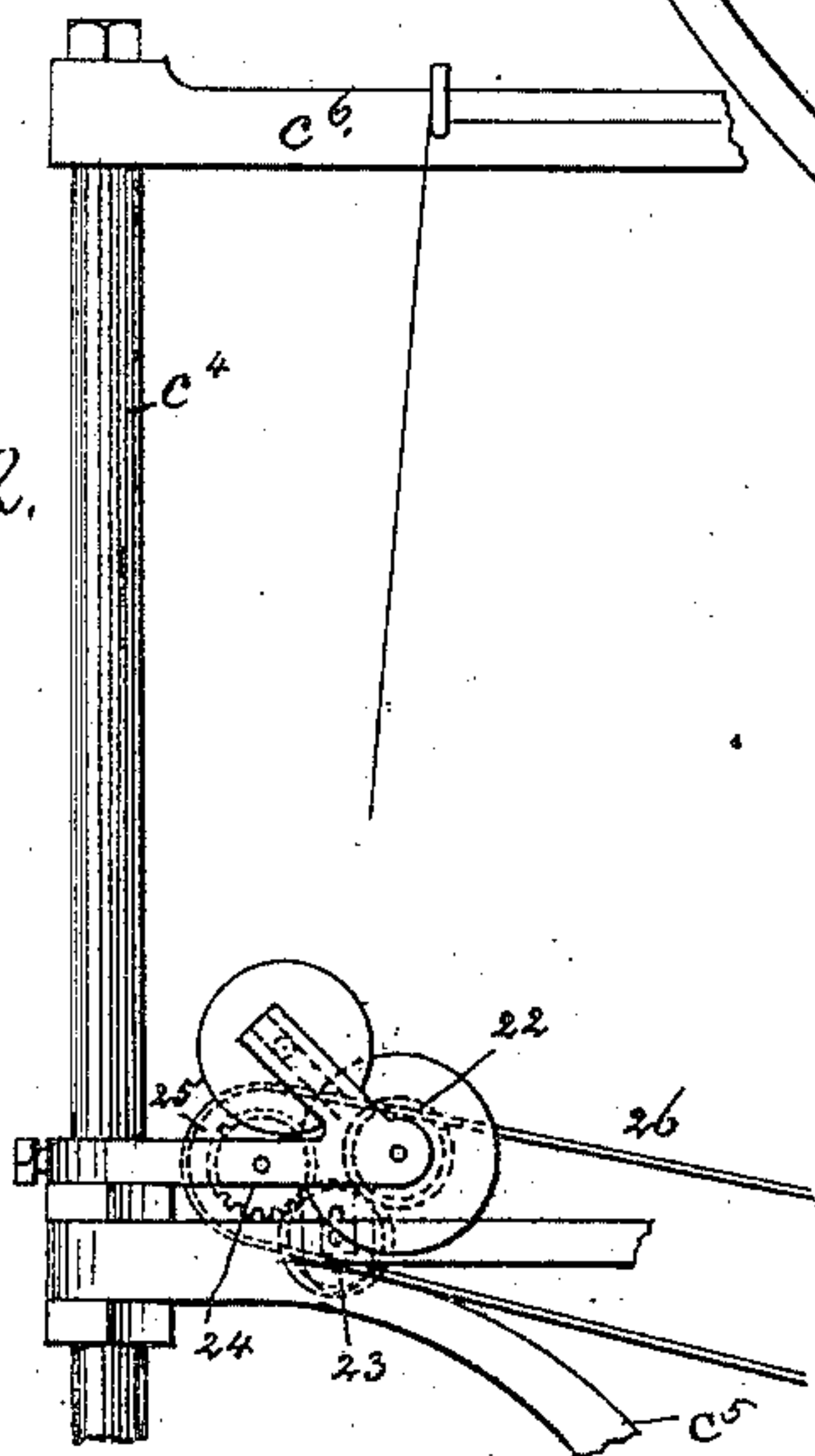
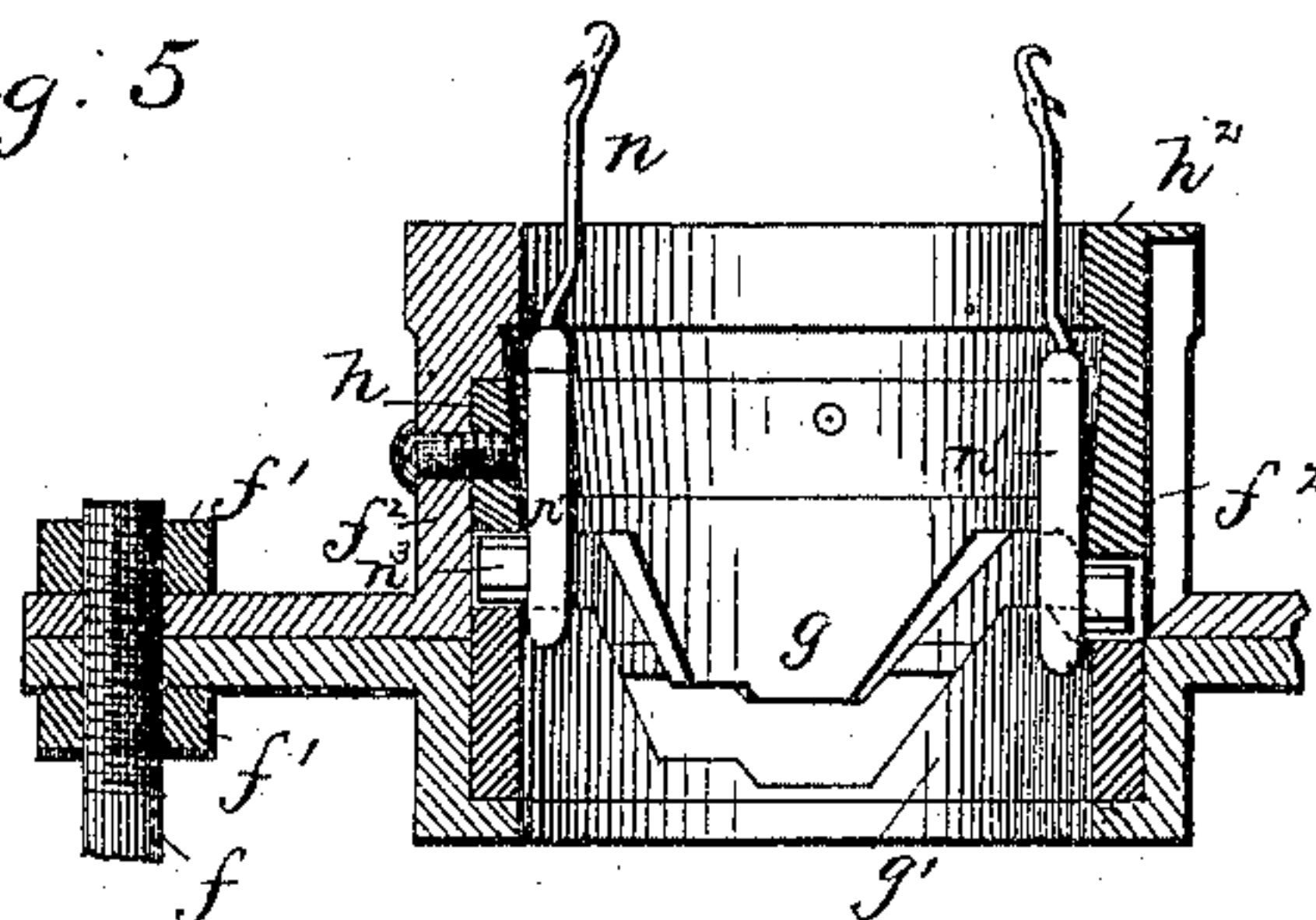


Fig. 5.



Witnesses.
Arthur Lipperlen
Henry March

Inventor.
Cornelius Callahan
By Crosby & Gregory attys.

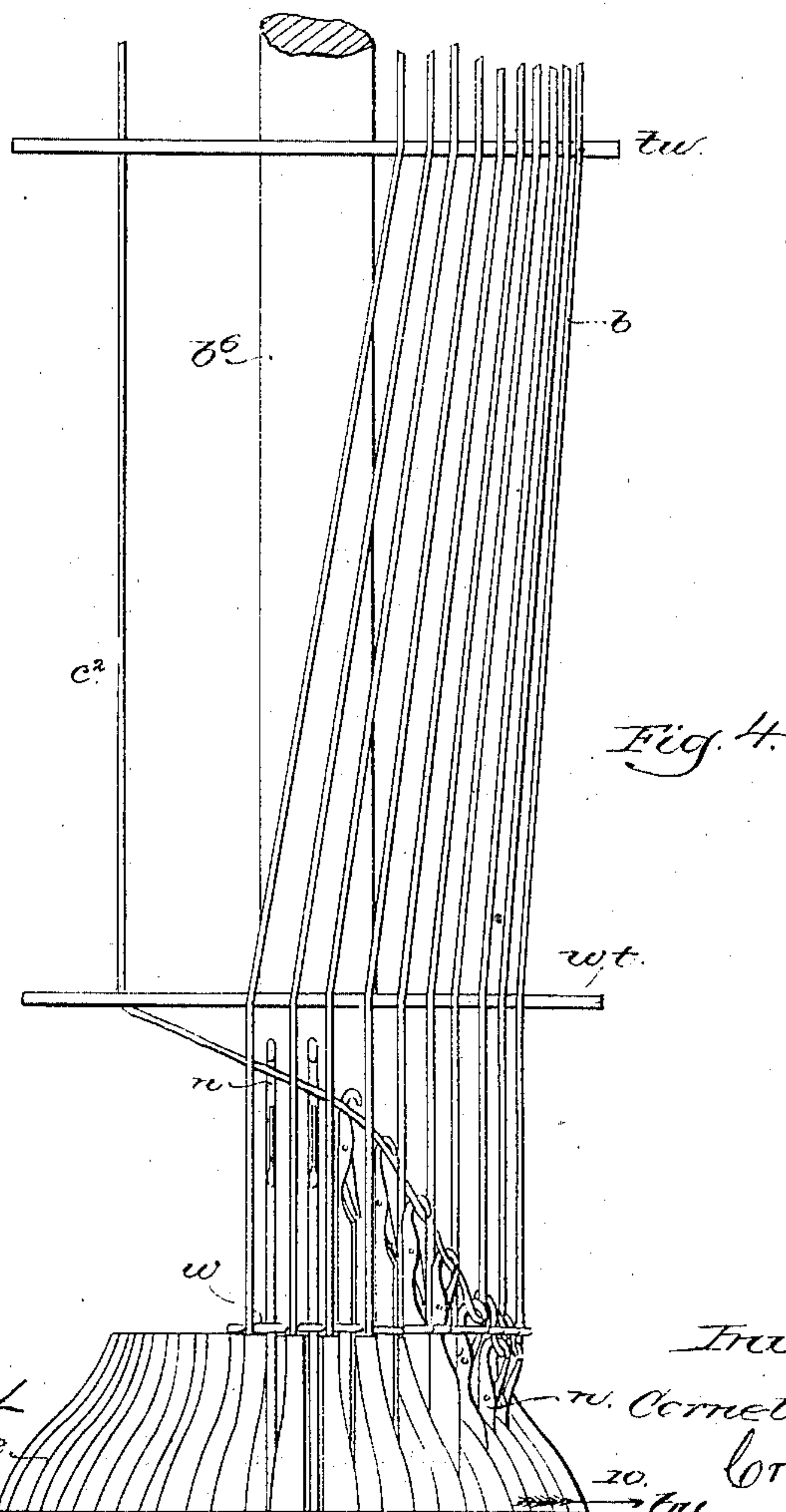
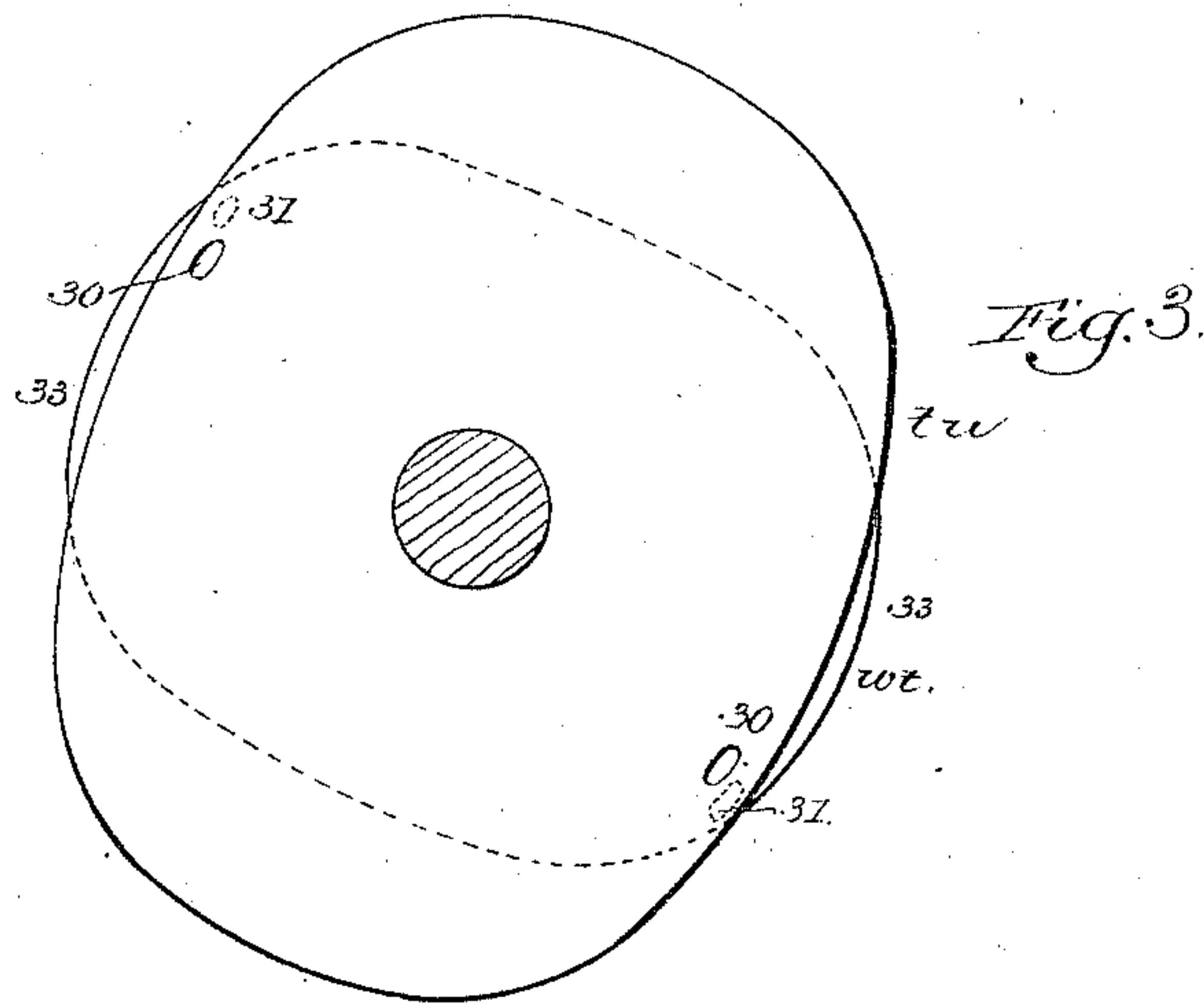
(No Model.)

2 Sheets—Sheet 2.

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KNITTING MACHINE.

No. 311,410.

Patented Jan. 27, 1885.



Witnesses:

John F. C. Pinkert
Wm. A. Finkel

Inventor.

W. Cornelius Callahan
Grosby & Gregory
attys

UNITED STATES PATENT OFFICE.

CORNELIUS CALLAHAN, OF CHELSEA, MASSACHUSETTS.

KNITTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 311,410, dated January 27, 1885.

Application filed February 8, 1884. (No model.)

To all whom it may concern:

Be it known that I, CORNELIUS CALLAHAN, of Chelsea, county of Suffolk, State of Massachusetts, have invented an Improvement in Knitting-Machines, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

My invention relates to machines of the class represented in United States Letters Patent No. 246,288, dated August 30, 1881. In the patent referred to the warp-threads are thrown out by an oval-shaped warp-throwing cam provided in the line of its greatest radius with downward projections having inclined ends. The upper edge of the cam forms a corner against which the warp-threads are drawn, and the lower edge of the said projection forms a second corner against which the warp-threads are drawn at a point below the tops of the needles when the latter are in their most elevated positions. In the patent referred to the cam for throwing the warp-threads out beyond the path of the rising needles is oval in shape, and that part of the said cam of greatest radius is provided at its under side with projections which are of such depth as to act upon the warp-threads at a point below the hooks of the raised needles, as shown in Fig. 11 of the said patent. These projections extended downwardly below the tops of the needles when elevated to catch the knitting-thread, have and present inclined edges against which the warp-threads strike as they are carried about the said oval cam, and each warp-thread brought in succession against that part of the cam of greatest radius and against the inclined edge of the downward projection is gradually flattened for a distance equal to the distance between the top of the cam-plate and the extreme lower edge of the said projection, such edge being located below the tips of the elevated needles, and as a result the warp-threads are flattened at a point below the tops of the raised needles, thus spreading them close to the point where the hooks of the raised needles seize the knitting-thread, such flattening of the warp-threads located close together—one in the narrow space between adjacent needles—resulting in the needles catching not only the knit-

ting-thread, but also strands or portions of the warp-threads, thus cutting them or taking parts of the warp-threads into the hooks of the needles and preventing the said threads from readily moving into their proper position between the needles when the same are again raised.

In practice I have discovered that the warp-throwing cam may be made as a plate of uniform thickness, and that the projection referred to which flattens the warp-threads at a point below the tips of the elevated needles may be dispensed with, thus preventing the descending needles from catching the warp-threads, provided, however, that the said cam is made circular rather than oval, as heretofore, at its point of greatest radius, the said circular portions being, however, of such length and being so located with relation to the cams which reciprocate the needles as to extend from one of the highest to one of the lowest of the descending needles, or for a distance equal to the distance between the highest and lowest needles, or one or two needles beyond. The warp-threads, when being carried about a warp-throwing cam having circular edges located as stated with relation to the cams which reciprocate the needles, are subjected to exactly the same strain so long as they remain on the said circular portions, and these circular portions, as stated, are long enough to allow all the warp-threads between needles which are fully elevated and about to catch a knitting-thread to those needles which are descending to and including the lowest needle to be held under like tension, and as the edge of the cam-plate always occupies a position a considerable distance above the elevated needles it follows that the warp-threads which are carried about the edge of the warp-throwing cam are not flattened opposite the hooks of the raised needles, nor are the warp-threads untwisted at such point, as is the case with the oval cam having the downward projection referred to.

In this my present invention I have added to the so-called "stationary" rod common to the said patent a take-up cam-plate, which by its action on the warp-threads above the warp-throwing cam causes the said warp-threads to be held at uniform tension, notwithstanding the difference in the radius of the said

cam at different points, and by employing two plates of cam shape I am enabled to transfer the flattening or untwisting points of the warp-threads, always, however, above the elevated
 5 needles, from one to the other of the said plates, and at the same time I am enabled to keep the untwisting point some distance above and never below the tops of the highest needles, as in the said patent. I have also made pro-
 10 vision for positively rotating the spool carrying the knitting-threads, thus relieving the needles from turning said spools by pulling upon the knitting-thread.

Figure 1 in top view shows a portion of a
 15 knitting-machine such as represented in the said Patent No. 246,288, but with my improvements added; Fig. 2, a detail in side view to represent the gearing and parts immediately associated therewith for rotating the spools
 20 which carry the knitting-thread. Fig. 3 is a section showing the stationary rod with its attached take-up cam-plate and warp-throwing cam-plate, the latter under the former being shown partly in dotted lines. Fig. 4 is a
 25 partial side elevation, showing the device of Fig. 3 and part of the needle-bed, some needles, some warp-threads, and one knitting-thread; and Fig. 5 is a section showing the needle-operating cams and shell and two needles therein.

In the drawings, the grooved needle-bed *e*, the needles *n*, stationary rod *b*⁶, bar *c*⁶, standard *c*⁴, arm *c*⁵, arms *a*², leading-ring *b*¹, tension-ring *b*², cylinders 2 for tension, warp-spools *a*⁵,
 35 warp-gaging ring *b*⁵, knitting-thread spools *c*³, knitting-threads *c*², weft-thread *w*, the shaft *C*¹, the shipper-lever *C*³, the gear *B*, gear *B*¹, tension device *l* for the weft-thread *w*, and stud *i*, about which the weft-threads pass, the shell
 40 *f*², and cam portions *g g'* are all common to United States Patent No. 246,288 referred to, and to which reference may be had, wherein the said parts are designated by the same letters, all the said parts in this my present in-
 45 vention being operated as and for the purposes therein stated.

In Figure 4 I have shown but a part of the series of needles *n*, those shown being the ones which are located between the highest and
 50 lowest needles, the needle-bed being rotated in the direction of the arrow 10 on it, the needles shown being supposed to be descending.

Referring to Figs. 1 and 2, the spools *c*³, which carry two knitting-threads, there being
 55 two such spools, as in the said patent, rest each upon one or more drums, 20, on a shaft, 21, having at one end a gear, 22, which is engaged by an intermediate, 23, driven by a gear, 24, attached to a pulley, 25, driven by
 60 a belt, 26, extended over a pulley, 27, (shown only in dotted lines, Fig. 1,) attached to the shaft *C*¹. The spindles 28, extended through the spools *c*³, have their ends entered into slots in brackets 29. As the shaft *C*¹ is rotated the
 65 drums 20 are rotated, and the knitting-thread spools, with the thread resting directly against the said drums, are turned to deliver the said

knitting-threads at a uniform speed, notwithstanding variation in the diameter of the mass of thread on the said spools. The stationary
 70 rod *b*⁶ has attached to it, at a point just above the tops of the needles *n* when in their most elevated position, as at the left of Fig. 4, a warp-thread-throwing-out cam-plate, herein
 75 marked *w t*, and in practice at a distance of about six inches above the said cam-plate *w t* the said rod *b*⁶ is provided with a take-up cam-plate, *t u*. Each of these cam-plates is shaped as represented in Fig. 3, wherein the
 80 cam-plate *w t* is partially represented by dotted lines. The cam-plate *t u* is provided with holes 30 and the cam-plate *w t* with holes 31 for the passage through them of the knitting-thread. These cam-plates *w t* and *t u* are so arranged
 85 with relation to each other that the circular parts of one for about one-fourth of its entire distance on opposite sides is opposite those parts of the other cam-plate which are not cir-
 90 cular, and hence, as described, of least diameter, as shown in Fig. 3, and the circular parts 33 of the warp-throwing cam-plate *w t* are so arranged with relation to the stationary cams
 95 *g g'*, which reciprocate the needles *n*, that the warp-threads held between the said needles *n* arrive in contact with the circular parts of
 the warp-throwing cam-plate *w t* at or about as the needles near or next to the said warp-threads reach their highest positions, the said
 warp-threads thereafter traveling over and along the said circular surface 33 until they
 100 have passed a distance of one or more needles beyond the lower needle, or the needle last to cast the loop on its shank over its hook.

By the employment of the cam-plates *w t* and *t u*, shaped as shown and described, the
 105 warp-threads are presented more accurately to the needles, and the said threads are prevented from being strained unequally and thus carried out of their proper positions with
 110 relation to adjacent needles, and the edge of the said warp-throwing cam-plate being circular and thin, and being located at a considerable distance above the hooks of the ele-
 115 vated needles, obviates the flattening and untwisting of the warp-threads between the said cam-plate *w t* and the hooks of the needles, and consequently the warp-threads are not
 spread out, as heretofore, in the path of the hooks of the descending needles, and conse-
 120 quently I obviate the production of bad or imperfect work or breaking of needles, which was very liable to occur by the use of a warp-throwing-out cam such as shown in my patent
 referred to and marked *c*. The take-up cam
 125 *t u* takes up the slack which arises in the warp-threads when they pass from the circular parts 33 of the cam-plate *w t* upon the straighter portions or sides thereof. (Represented by dotted lines in Fig. 2.)

The particular shapes given to the cam-
 130 plates *t u* and *w t* enable the warp-threads to be supported at each rotation of the needle-cylinder at different points as regards the length of the said threads between the gaging-

ring b^5 and the needles, such change of the supporting-points of the warp-threads preventing injurious twisting of the warp-threads near the knitting-point.

5 With fine hard-twisted yarn or cord for the warp-threads I may omit the take-up cam-plate $t u$; but I prefer to use it. Heavy as well as soft yarns exert more friction against the warp-throwing cam than do lighter and
10 harder twisted yarns. The warp-threads between the fabric and the warp-throwing cam must be kept as central as possible in the spaces between adjacent needles. Heavy and soft yarns, if led downward from the gaging-
15 ring in substantially vertical lines with relation to the sides of the needles, will be deflected from such line by friction on the cam-plate, and hence the said warp-threads will not be maintained central in the spaces be-
20 tween adjacent needles. To counteract this evil due to friction, I have discovered that the tension-ring b^2 may be adjusted ahead somewhat in the direction of its rotation to thus place the warp-threads in such position with
25 relation to the needles as to enable the gaging and tension rings to draw, as it were, the warp-threads from the point of their friction on the warp-throwing cam, such action preventing the pulling back of those parts of the warp-
30 threads below the warp-throwing cam and between adjacent needles. The ring b^2 may be set or moved so far ahead that a warp-thread to be taken by a needle will come from a spool located in advance of the said needle
35 in the direction of the rotation of the said cylinder, and it may be a distance of from two to ten needles in advance, according to the material being used for the warp-threads.

I claim—

40 1. The needle-bed, a series of needles, n , therein, and means to rotate the needle-bed and needles, and means to reciprocate the said needles, combined with the rod b^6 , and stationary throwing-out cam-plate $w t$, made

as a thin plate provided with the circular 45 parts 33, against which the warp-threads take bearing wholly above the tops of the said needles when in their most elevated positions, the said circular part being substantially equal in length to the distance between the highest 50 needle and the lowest needle along the series of descending needles, or those acting to draw down the knitting-thread, substantially as described.

2. The needle-bed, a series of needles, n , 55 therein, and means to rotate the needle-bed and needles, and means to reciprocate the said needles, combined with the rod b^6 and stationary throwing-out cam-plate $w t$, made as a thin plate provided with the circular parts 60 33, against which the warp-threads take bearing wholly above the tops of the said needles when in their most elevated positions, the said circular part being substantially equal in length to the distance between the highest 65 needle and the lowest needle along the series of descending needles, or those acting to draw down the knitting-thread, and with the fixed take-up cam-plate $t u$, having circular portions substantially as described, the circular 70 portions being arranged with relation to each other as and for the purposes set forth.

3. The needle-bed, needles therein, warp-throwing-out cam, and means to support it, combined with spools to supply the knitting- 75 thread, drums upon which the said spools rest, and with means to rotate the said drums and spools to feed the knitting-thread as required by the needles, substantially as set forth. 80

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

CORNELIUS CALLAHAN.

Witnesses:

GEO. W. GREGORY,
B. J. NOYES.