

(No Model.)

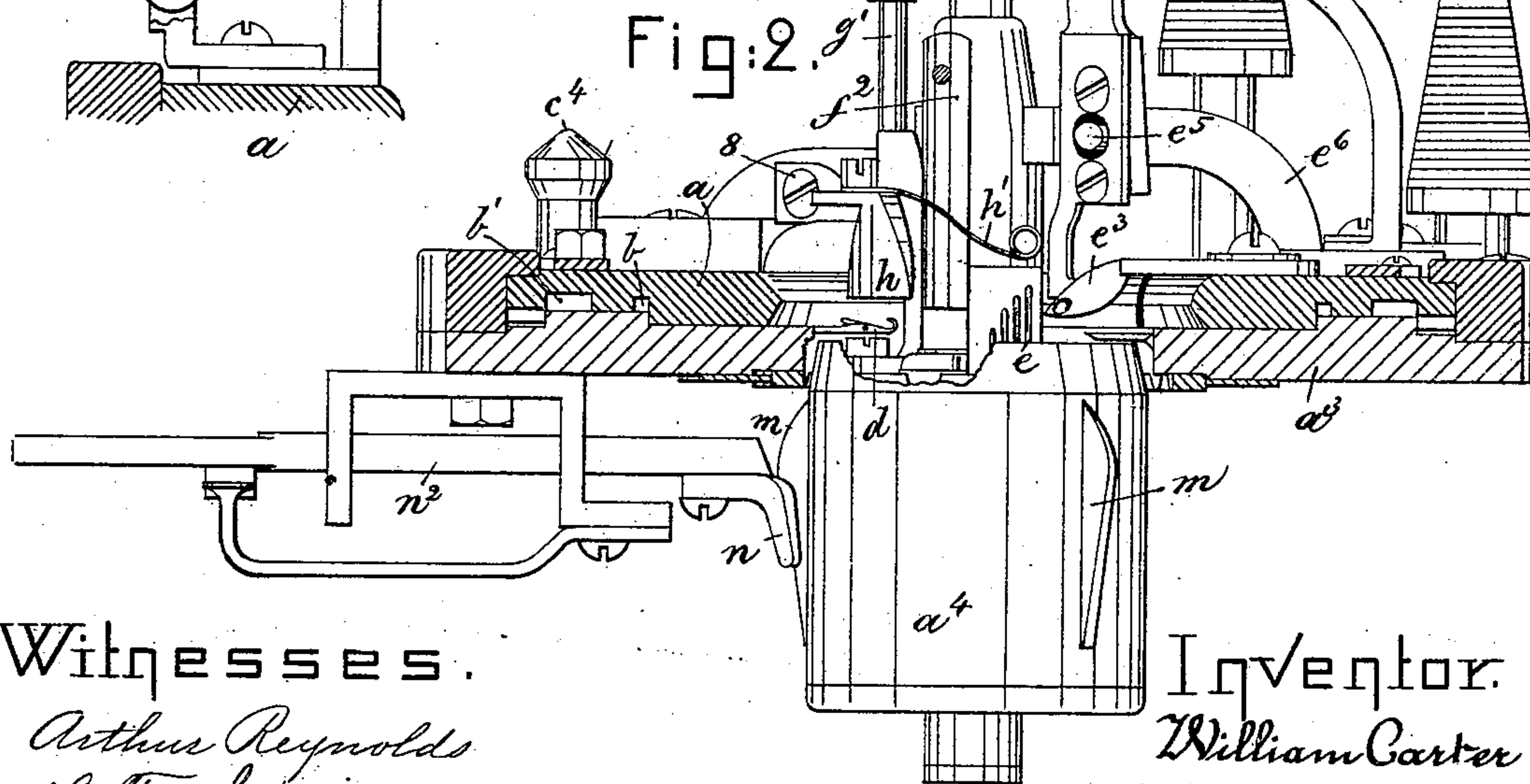
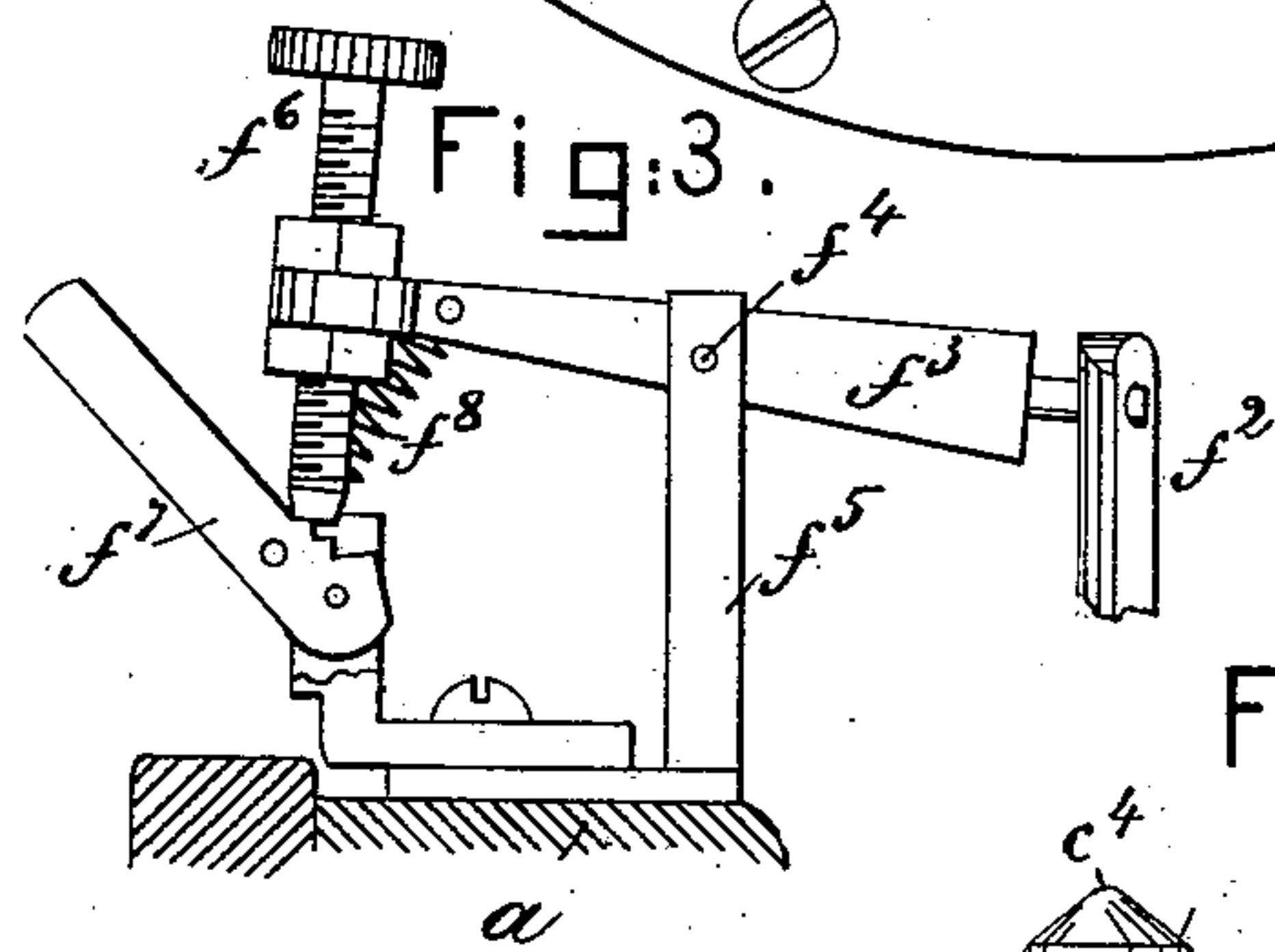
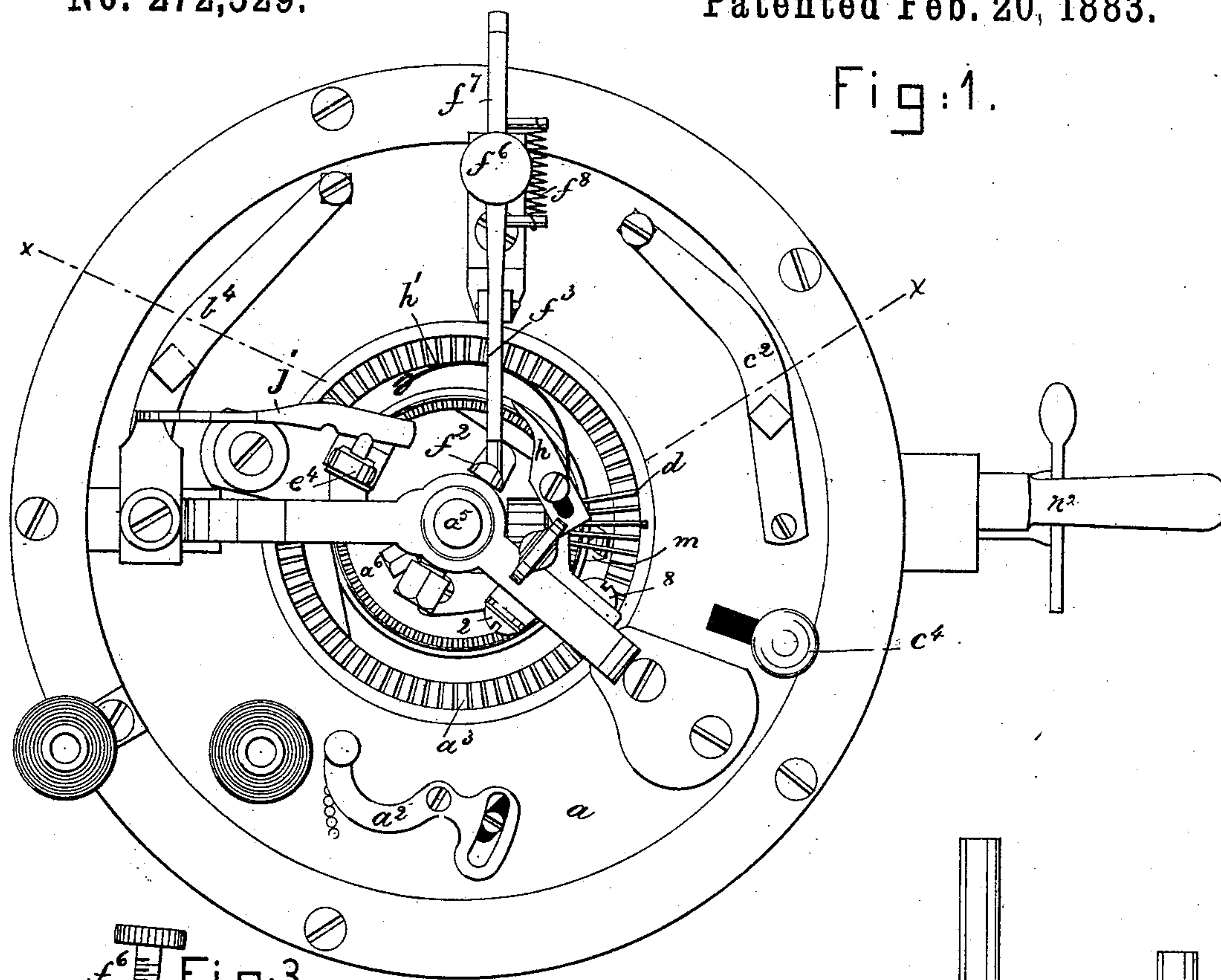
4 Sheets—Sheet 1

W. CARTER.
KNITTING MACHINE.

No. 272,529.

Patented Feb. 20, 1883.

Fig:1.



Witnesses.

Arthur Reynolds
L. F. Cosmior

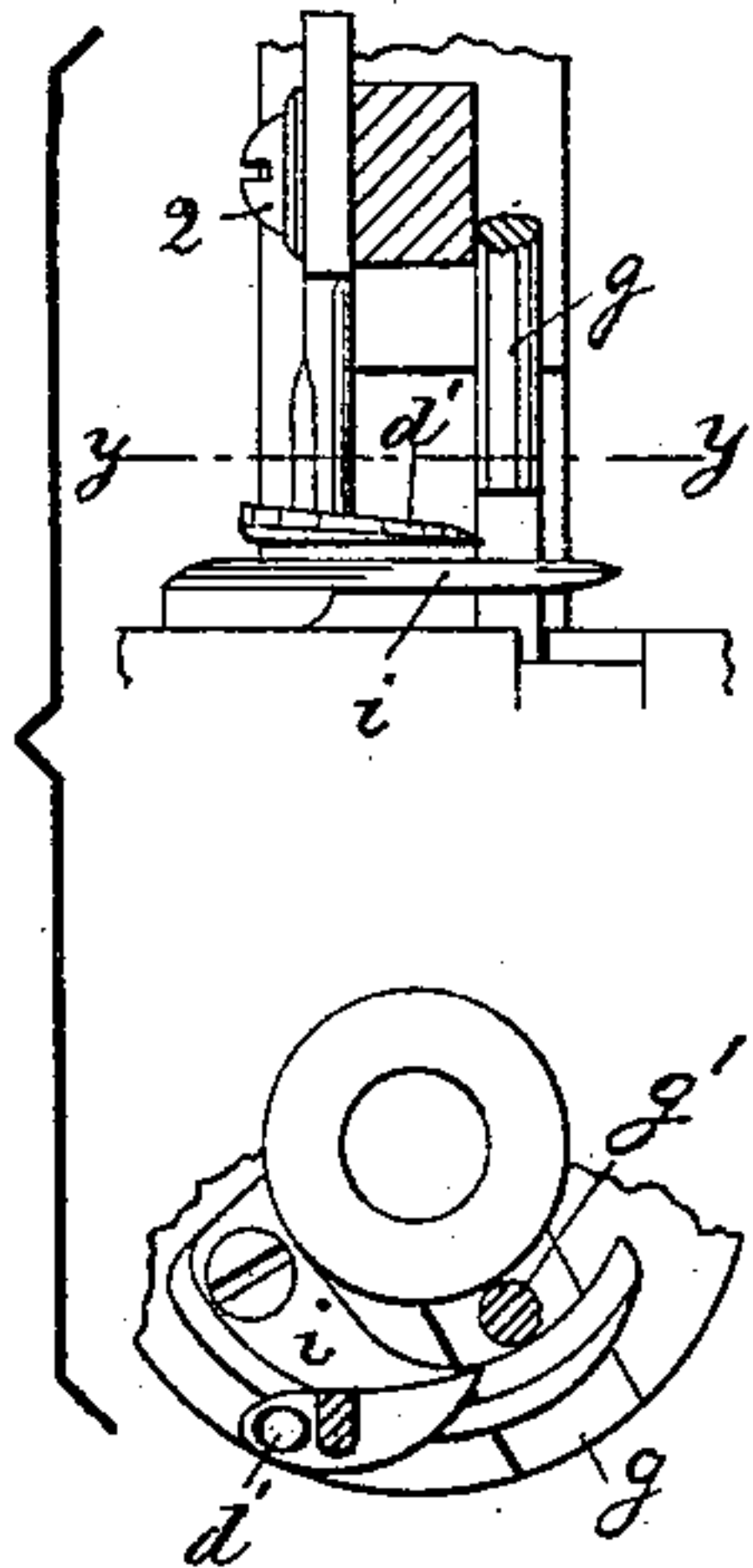
Inventor.

William Carter

by Crosby & Gregory Attys

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KNITTING MACHINE.

No. 272,529.
Fig: 4.



Patented Feb. 20, 1883.
Fig: 5.

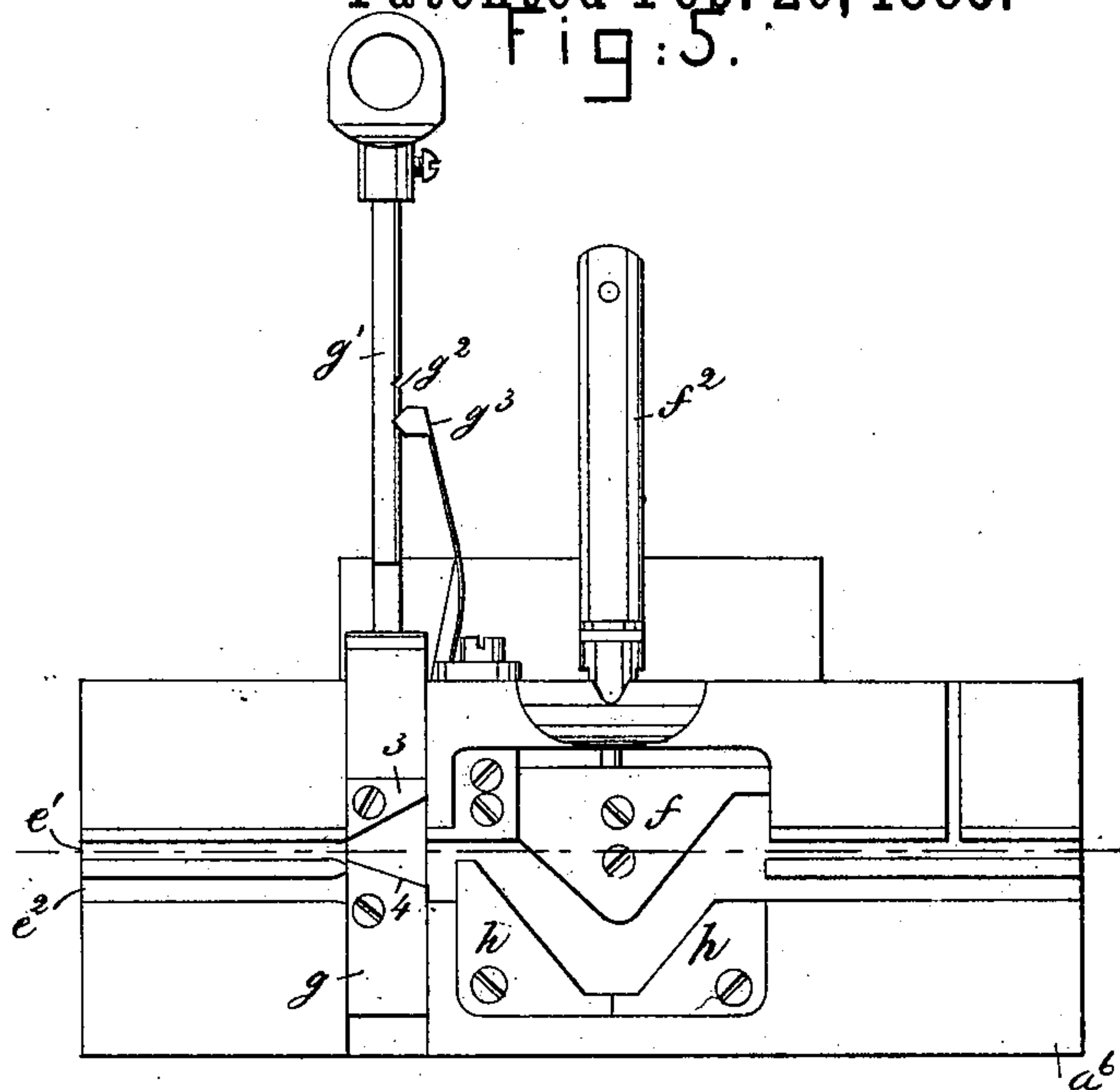


Fig: 7

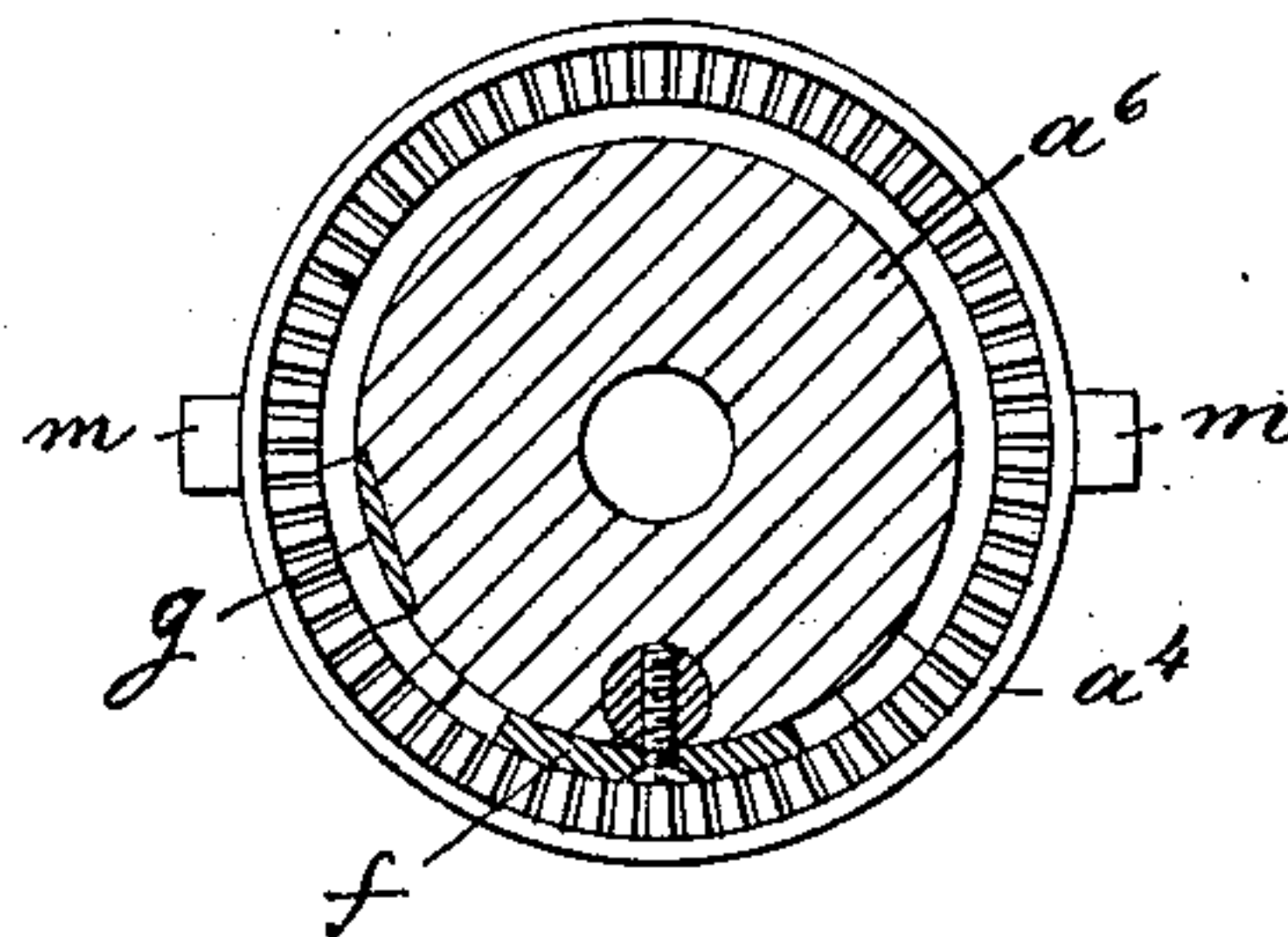
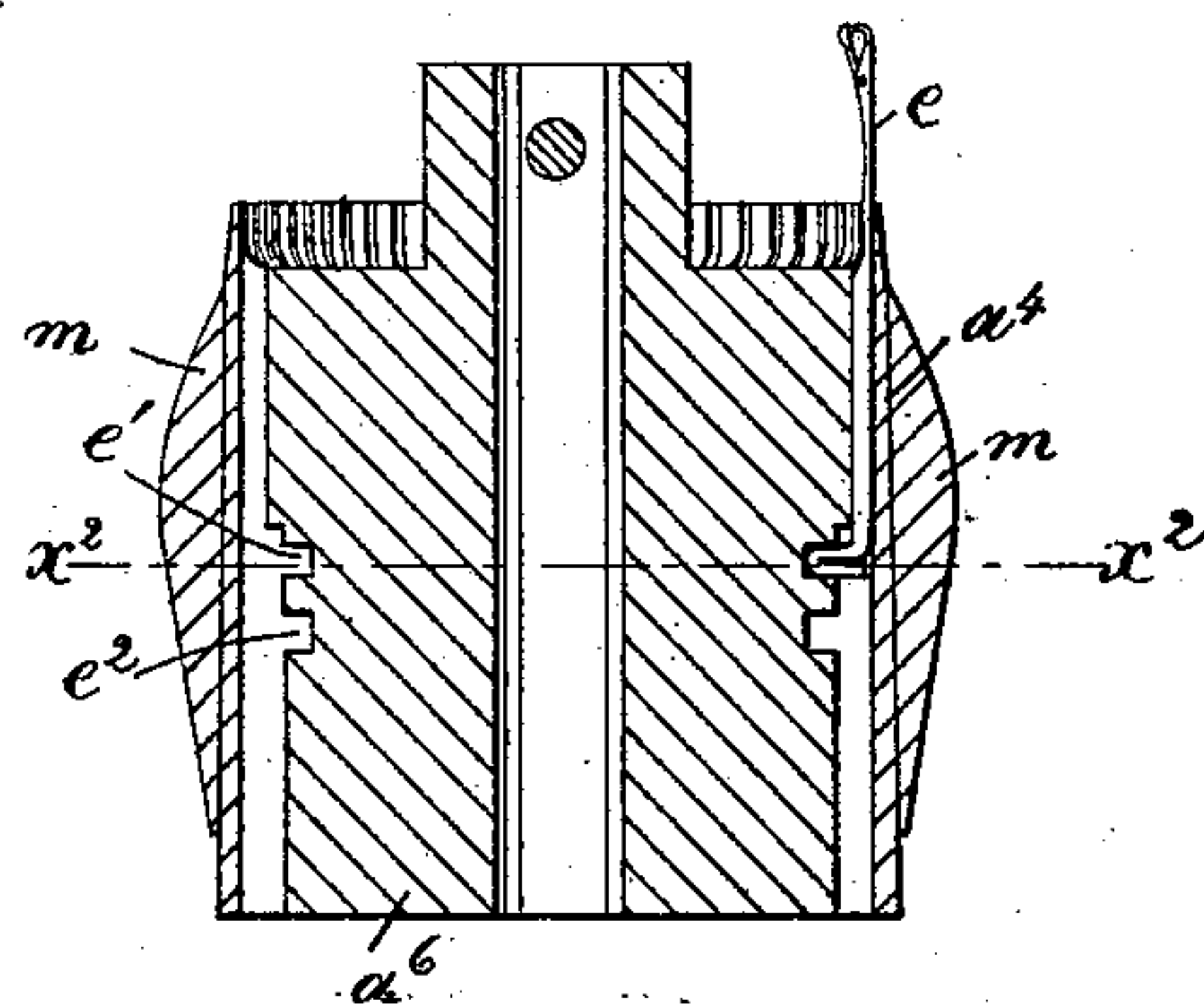


Fig: 6.



Witnesses.

Arthur Reynolds.
L. F. Connor.

Inventor.

William Carter
by Crosby & Morgan Attys

(No Model.)

4 Sheets—Sheet 3.

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KNITTING MACHINE.

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Fig: 9.

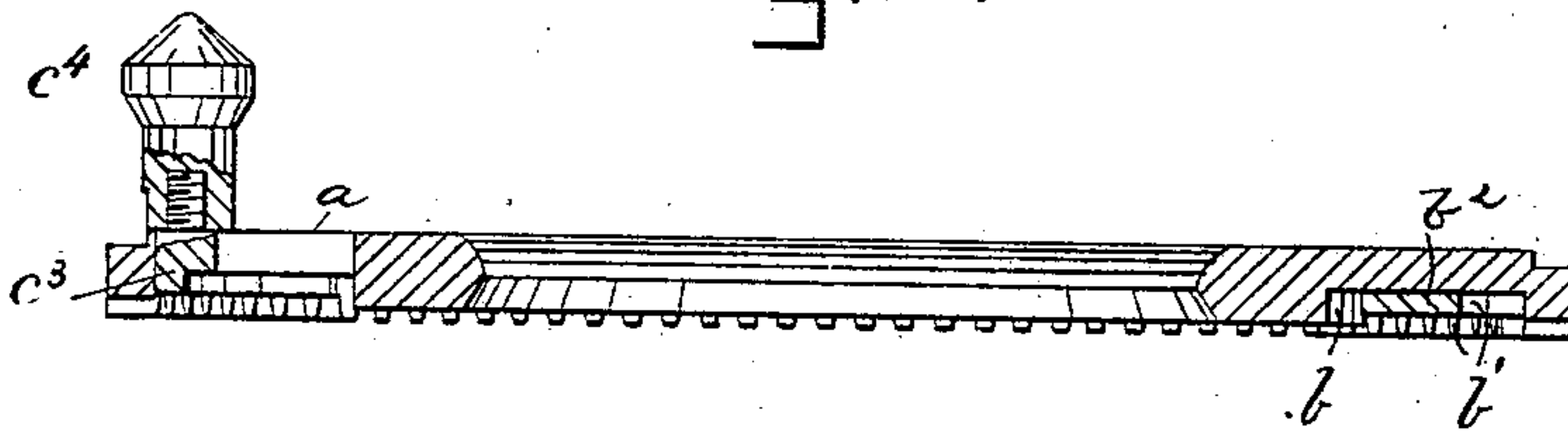
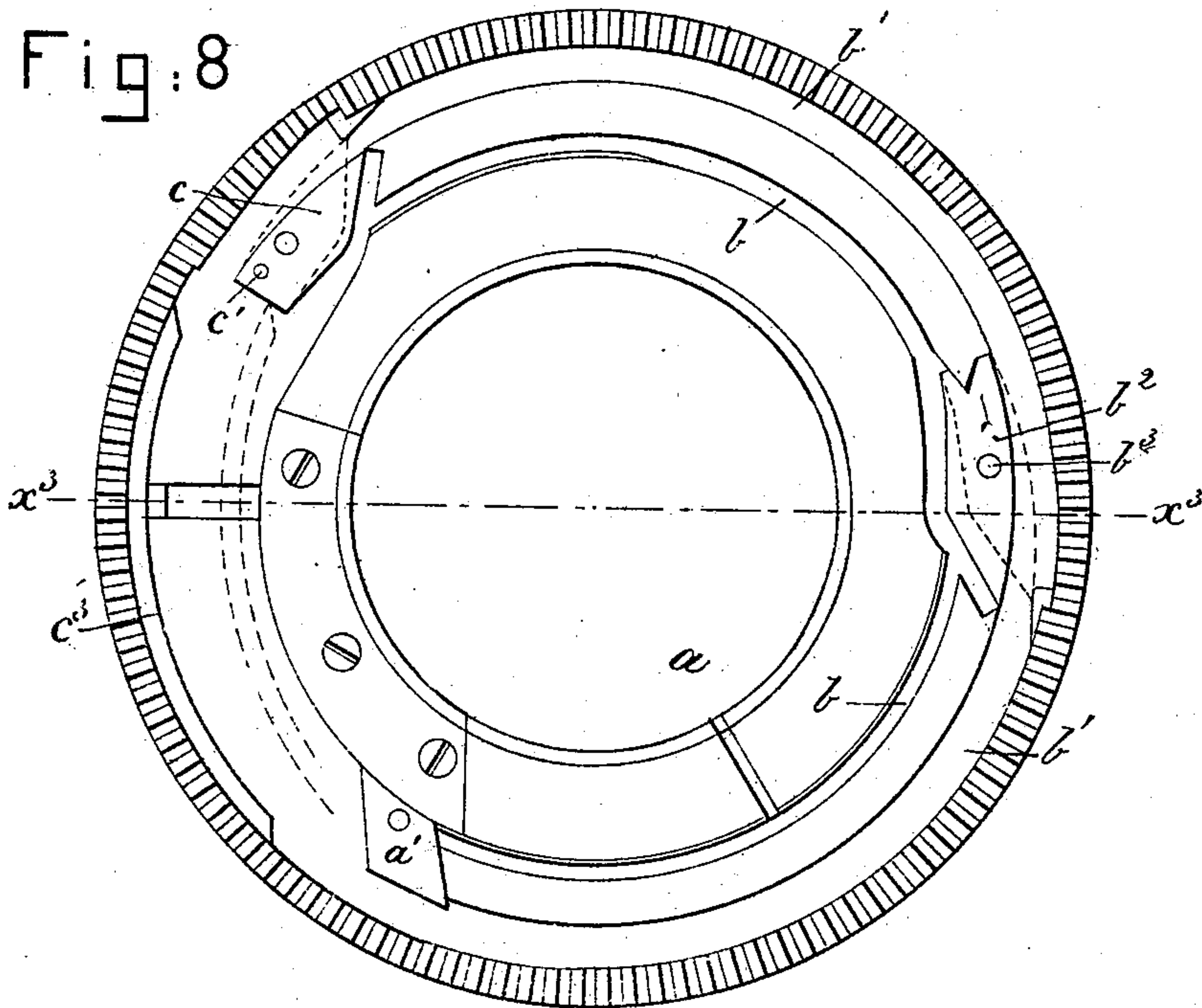


Fig: 8



Witnesses.

Arthur Reynolds
L. F. Connor

Inventor.

William Carter
by Crosby Gregory Atty.

(No Model.)

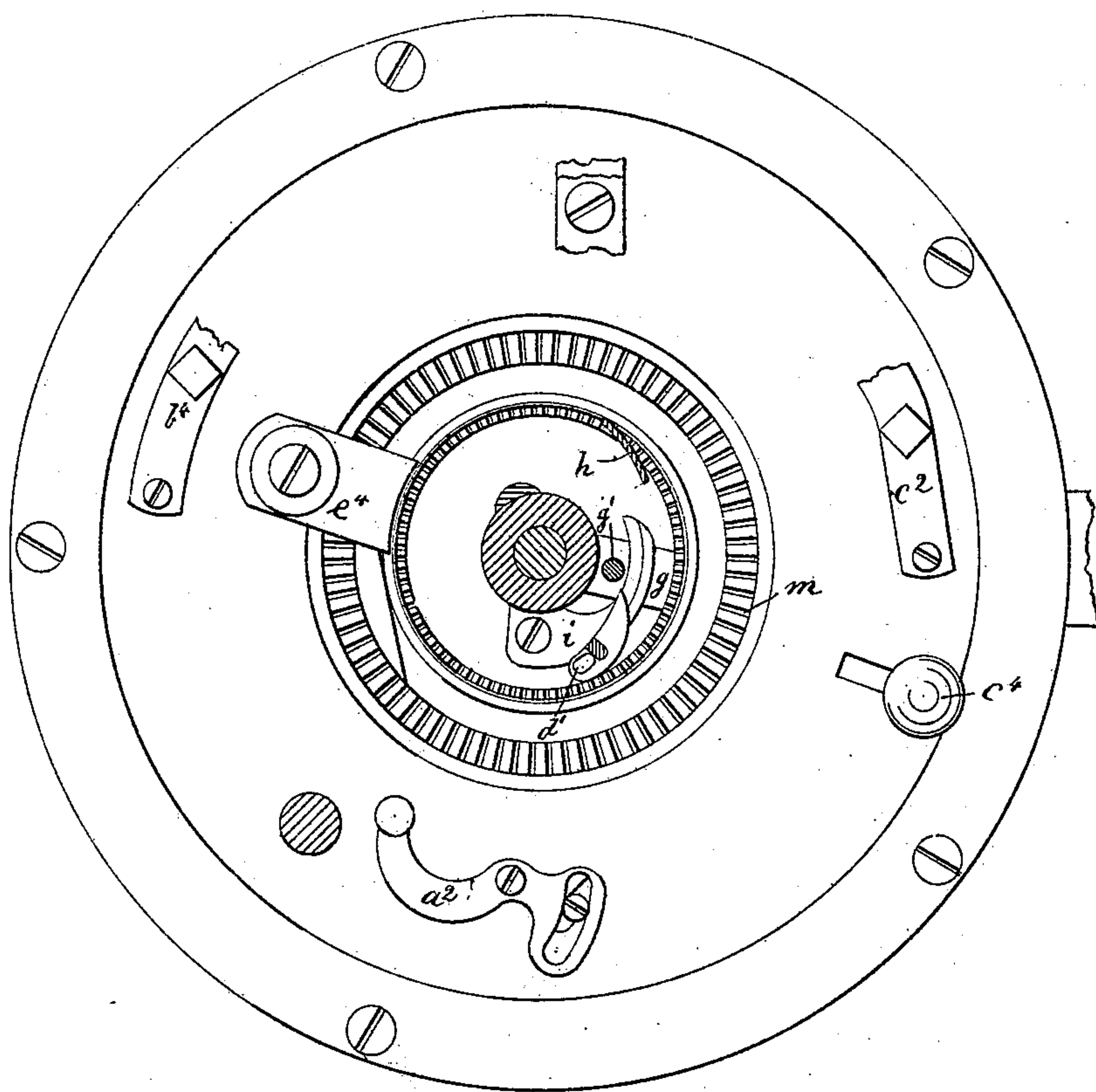
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W. CARTER.
KNITTING MACHINE.

No. 272,529.

Patented Feb. 20, 1883.

Fig: 10.



Witnesses.

John F. C. Brinkley
L. F. Connor

Inventor.

William Carter
by Crosby & Gregory Attys

UNITED STATES PATENT OFFICE.

WILLIAM CARTER, OF HIGHLANDVILLE, MASSACHUSETTS, ASSIGNOR TO
GEORGE A. LEIGHTON, OF MANCHESTER, NEW HAMPSHIRE.

KNITTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 272,529, dated February 20, 1883.

Application filed December 29, 1880. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM CARTER, of Highlandville, county of Norfolk, State of Massachusetts, have invented Improvements in Knitting-Machines, of which the following description, in connection with the accompanying drawings, is a specification.

This invention in knitting-machines is embodied in that class of machines known as "circular," and employing two series of latched needles.

The object of my invention is the production of a circular-ribbing machine capable of knitting what is known as "cardigan" and "one-and-one" rib-stitch—such as used for the cuff of a cardigan-jacket, or the ends or small parts of leggings, or the cuffs of shirts, bottoms of drawers, and tops of stockings—the machine being capable of finishing the small or first-made end of the said cuff or like part in a novel manner.

My invention consists in a series of horizontal or plate needles, means to actuate them, and a thread-guide to supply with thread only the hooks of the plate-needles, combined with a series of vertical needles, their holding-bed, and actuating cam-cylinder, and a thread-guide to supply with thread only the hooks of the vertical needles, and means to move the said thread-guide for the vertical needles into and out of action or position with relation to the vertical needles when it is desired to change to cuff-work, as will be described.

My invention also consists in combinations of mechanisms which will be hereinafter described, and fully set forth at the end of this specification.

Figure 1 represents in top view a circular-knitting machine containing my invention. Fig. 2 is a vertical section thereof on the dotted line xx , Fig. 1. Fig. 3 is a detail representing the devices employed to raise and lower the stitch-forming cam for the vertical needles. Fig. 4 is a side elevation, showing the plate-needle-thread guide, the support for outer ends of the plate-needles, and the rod for moving the switch, the under view shown in said figure being top view of the said parts below the dotted line yy . Fig. 5 is a detail showing the cam-cylinder for moving the vertical needles

as laid out flat. Fig. 6 is a vertical section of the said cam-cylinder and needle-bed, one needle being shown. Fig. 7 is a section of Fig. 6 on the dotted line x^2 . Fig. 8 is an under side view of the cam-plate for moving the plate-needles. Fig. 9 is a section of Fig. 8 on the dotted line $x^3 x^3$; and Fig. 10 is a partial horizontal section immediately above the top of the plate a of the machine, to show in position at the center of the machine the parts shown in Fig. 4.

The cam-plate a for the plate-needle d , its needle-drawing-back cam a' , lever a^2 for moving it, the plate-needle bed a^3 , cylinder a^4 , and the spindle a^5 are as common in other knitting-machines. The cam-plate a in this my machine has two grooves to receive the butts of the needles d , the latter traveling at times in the said grooves, except in that small part of groove b between the drawing-back cam a' and throwing-out cam b^2 , pivoted at b^3 , the cam b^2 having connected with it a lever, b^4 , by which to move it at the proper times into its full or dotted line position, (see Fig. 8.) the said cam occupying its dotted-line position when knitting full cardigan and its full-line position when knitting cuffs or half-cardigan. Two threads are used in half-cardigan and full cardigan and one in one-and-one or cuff work.

The usual throwing-out cam common to other well-known machines is in this my invention shown as a pivoted cam, c , its pivot being at c' on plate a , and above the said plate the said cam is connected with a lever, c^2 , by which to move it at the proper times from its full to its dotted line position, (see Fig. 8,) the said cam being in its dotted-line position when the machine is doing cardigan, cuff, or half-cardigan work, and in its full-line position only when the butts of the plate-needles are to be drawn back into the outer groove, b' , in order that they may hold loops of thread in their hooks while the cylinder for the vertical needles is shogged after the completion of the so-called "binding course," or that course which forms the first row or course at the commencement of a cuff or other part of the article being produced, which part is to present a finished end, or one which will not ravel or show loose loops, or need to be bound by a regular binding or by

hand-crocheting. The plate *a* has also connected with it, at its under side, a curved slide, *c*³, it being placed in a wide space where the two grooves, *b* *b'*, unite or form one open space.

5 This slide is made radially movable from its full to its dotted line position by the knob *c*⁴, it occupying its full and dotted line positions only at such times as the cam *c* occupies like positions, it being in its full-line position only
10 when the needle-cylinder *a*⁴ is shogged, as before described.

The plate-needles are designated by the letter *d* and the vertical or cylinder needles by *e*. The plate-needles receive yarn from the
15 yarn-guide *d'*, secured to the machine by screw 2, (see Fig. 1,) as usual. The butts of the vertical needles *e* travel in the upper groove, *e'*, during such times as full or half cardigan work is being done, the hooks of the said needles
20 then receiving yarn from the vertical-needle-yarn carrier *e*³, herein shown as attached to the lower end of a lever, *e*⁴, pivoted at *e*⁵ on a stand, *e*⁶, connected with plate *a*, the said needles drawing the yarn received by them down
25 between and over and across the shanks of the plate-needles, they then being thrown toward the center of the machine by reason of their butts being in the groove *b*. If half-cardigan work is being done, the plate-needles directly
30 contiguous to the vertical needles then being drawn down by the stitch-forming cam *f* will be held back (their butts then resting in groove *b'*) and the loops of yarn in the hooks of the vertical needles will be drawn directly through
35 the loops then held by the said vertical needles or loops of the same thread. The butts of the vertical needles travel in the groove *e*² of the vertical-needle cam-cylinder *a*⁶ when knitting one-and-one or cuff stitch, and at
40 such time but one thread is employed, it being supplied to the plate-needles by the plate-needle-thread guide *d'*.

To change the butts of the vertical needles from the groove *e'* to the groove *e*², and vice
45 versa, at the proper times, I have grooved the said cylinder vertically or transversely to the direction of the grooves *e'* *e*², and have fitted therein a block or switch, *g*, having inclines 3 4 to act upon the butts of the vertical needles as they pass from under the stitch-forming cam *f* and over the point of the usual needle-elevating cam, *h*, so as to direct the said
50 butts into one or the other of the said grooves. This switch has connected with it, at its upper side, a lifting-rod, *g*¹, and in connection therewith is a suitable locking mechanism, herein shown as notches *g*² in the said rod, and a
55 spring device *g*³, to enter or engage one of the said notches and hold the switch elevated or depressed. The under sides of the plate-needles *d*, when fully thrown toward the center of the machine, rest at their forward ends upon the needle-rest *i*, to keep them at the proper
60 level for the action of the usual thread-guide and latch-opener.

To vary the length of the loops of yarn of the vertical needles, the cam *f* has connected

with it a lifting-rod, *f*², which is extended upward through the top of the vertical-needle cam-cylinder above the plane in which the
70 plate-needles *d* reciprocate, to thus enable the said rod to be engaged readily and the cam *f* to be quickly lifted, avoiding the use of a screw-driver to turn a screw to move the said cam, as heretofore practiced.

I have herein shown the machine as provided with cam-lifter *f*³, shown as a lever pivoted at *f*⁴ on a stand, *f*⁵, secured to the cam-plate *a*, the said lifter having at its rear end
75 an adjusting device by which to establish the initial position of the said cam *f* with relation to the knitting parts, while to vary from the long and short stitch—as when changing from cardigan to the short stitch employed in cuff-work—I employ a pivoted lever, *f*⁷, (see Fig. 3,) upon which are formed two or more shoulders or rests, upon one of which the point of
80 the screw *f*⁶ is made to rest, the screw being held down against the lever by a spring, *f*⁸.

The vertical needles, in cuff-work, have to
85 be lifted far enough to permit their loops to pass below their latches, and at such time the plate-needles draw their yarn between and across the said vertical needles, just below the pivots of their latches, thus enabling the same
90 yarn to be engaged by both series of needles; and during this operation, to prevent the latches of the vertical needles from being accidentally closed, I have provided the machine with a latch-guard, *h*, composed of a block
95 having an arm attached at 8, and having a wire, *h'*, the latter merely forming a continuation of the block.

When it is desired to knit full or half cardigan the vertical-needle-thread guide *e*³ supplies thread to the vertical needles; but when
100 a cuff is to be knitted, the yarn for the plate-needles being the only one then to be employed, the vertical-needle-thread guide is to be turned upward on its pivot *e*⁵, in order to remove it and its thread from the path of the
105 hooks of the vertical needles, so that the hooks or tops of the vertical needles, when the butts of the said needles are in the lower groove, *e*², will not strike the thread-guide *e*³ or receive thread from it. When this thread-guide is so
110 turned up or back it is caught and locked in position by a spring-catch, *j*. To connect a series of tubular articles—such as cuffs, &c.—together, just as the article is completed its
115 thread is broken off and a piece of cotton or smooth thread is tied to the thread extending to the fabric, and then two or more courses are knitted with such smooth cotton thread preparatory to commencing the new cuff, which
120 will be commenced with the cuff-yarn, it being in turn tied to the end of the cotton thread after knitting the two or more courses. These courses knitted with the cotton thread are subsequently withdrawn to separate the cuff of,
125 say, one sleeve from the large or cardigan part of another sleeve and leave the cuff bound or finished at its end, as will be hereinafter described.

In cuff-work with one thread, when a vertical needle is depressed so that its butt lies in groove e^2 , the plate-needles immediately at the right and left of it are fully drawn back, and hold the loops of the plate-needle yarn only in their hooks, thus drawing the plate-needle yarn about the open latches of the cylinder-needles e . Let it be supposed that the main part of a sleeve has been knitted up to the shoulder by both series of needles, each with its own thread, and operated as usual for the production of full cardigan—as, for instance, in United States Patent No. 136,012. When it is desired to make a cuff for a new sleeve, a single thread supplied by the plate-needle-thread guide being then used, the switch g is depressed, the throwing-out cam b^2 is put into its full-line position, Fig. 8, and the machine is rotated until the last needle, the butt of which is in the upper groove, e' , of the cam-cylinder a^6 , back of the switch g in the direction of its rotation, has passed the thread-guide e^3 , after which the said thread-guide is turned up so that it ceases to supply yarn to the hooks of the said vertical needles, and the yarn is immediately thereafter broken off near the fabric or article being knitted; but the yarn is not removed from the eye in the said thread-guide e^3 . The parts in this condition, further movement of the machine will enable one-and-one or cuff work to be done. I then break off the thread being fed to the plate-needles and tie upon its end connected with the knitted goods a smooth cotton thread, which is then fed to the plate-needles, and one or more courses are then knitted with this cotton thread on the plate-needles. In this condition of the machine the cuff may be commenced with the cuff-yarn, which is in turn tied to the end of the smooth cotton thread.

To commence the cuff and manipulate the yarn to be used in it so that the first series of loops may serve as a binding course for the cuff to be knit, I turn the machine part of a revolution and deliver the cuff-yarn in the plate-needle-thread guide, it having, as stated, been tied to the end of the short cotton thread into hooks of the plate-needles, until in the rotation of the machine that one of the horizontal plate-needles next behind the bed-plate needle to receive the cuff-yarn is started out. Then I stop the machine. Should I continue the rotation of the machine beyond this point without changing the position of the throwing-out cam c , the knitting would be plain one-and-one rib; but to "bind," as I denominate this first course, I stop the rotation of the machine at this point and move the cam c into its full-line position and move the slide c^3 out into its full-line position, so that the butt of the first plate-needle then drawn back and the butts of all the plate-needles drawn back in advance of it in the direction of the rotation of the plate a will be passed by the throwing-out cam c , and will not be actuated or thrown toward the center of the machine, and the needles so passed over will remain held back out of action in the

groove b' , Fig. 8, and retain their loops. All the needles of the first course at the rear of the first needle passed over by the throwing-out cam c will be drawn back in the regular manner by the cam a' , and the rotation of the machine will proceed until all the plate-needles are drawn back out of action, when the machine will be stopped, and the grooved needle-bed a^4 , carrying the cylinder or vertical needles having on them loops of only the yarn of the plate-needle-thread guide, will be turned axially in one or the other direction for a distance equal to the space between one and the next plate-needle, the said vertical needles so moved or shogged carrying the loops of yarn of the plate-needle-thread guide held by them into positions at the sides of the plate-needles opposite the sides that the said loops occupied before the said cylinder a^4 was so moved, which action so places the loops of yarn of the vertical needles in such position that when the plate-needles d are again thrown into action the stitch will be such as to "bind," as I denominate it, or finish, the end of the cuff with a cross-stitch. After the vertical needles have been shogged aside, as described, the throwing-out cam c for the plate-needles is again moved into dotted-line position to operate the plate-needles; but by this cam c alone, with all the plate-needles drawn back out of action, as described, I could not knit the first course complete, for those needles the butts of which are left immediately at the rear of the throwing-out cam c and in the groove b' of the plate a , between the cam c and the drawing-back cam a' , would not be moved forward to receive yarn from the yarn-carrier d' for the plate-needles; but to obviate this and throw toward the center of the machine the said plate-needles left at the rear of the cam c soon enough to receive yarn from the plate-needle-thread guide for the formation of loops, I have provided the machine with the slide c^3 , which I move forward into the dotted-line position, this being done at the same time that I move the cam c' into its dotted-line position. As this slide c^3 is moved forward, as described, into the dotted-line position it carries in front of it the butts of all the plate-needles then in front of it, placing them in such position that their hooks may receive yarn from the yarn-carrier d' during the further rotation of the plate a . The butts of the needles in front of the slide c^3 having been so moved forward, the said slide is at once returned by hand into full-line position while the plate a is yet at rest, and the machine is turned until the butts of all the plate-needles at the rear side of the cam c and between its point and the point of the slide c^3 next to it come in front of the slide c^3 , when the plate a is again stopped and the slide c^3 is pushed forward into its dotted-line position, where it remains. All the plate-needles having been properly thrown toward the center of the machine, into position to receive yarn from the plate-needle-thread guide, plain one-and-one knitting may be done by them and the

cylinder-needles with one yarn supplied directly to the plate-needle by the plate-needle-thread guide, and may be continued until the cuff or article being knitted is of proper length.

5 While the cuff is being knitted by the plate-needles, as described, with one thread, the thread-guide of the vertical needles has its thread disconnected from the fabric, and the vertical needles *c* are held so low by groove *e*² as to pass under the vertical-needle-thread guide without receiving yarn therefrom, the said thread-guide *e*³ at such time being turned up through its handle *e*⁴, where it is held by the catch *j*.

15 If a sleeve or other tubular part of cardigan-stitch is to follow or succeed the cuff, I lift the switch *g* by its rod *g'* into the position Fig. 5, lifting the cylinder or vertical needles then above the part 4, usually two or three needles, placing them on the line of the upper groove *e'* in the cylinder *a*⁶, after which the butts of all the remaining vertical needles in the further rotation of the machine will pass from under the cam *f* and be directed positively into the upper groove, *e'*, of the said cylinder, which will hold the vertical needles so high while opposite the drawing-in cam *a'* of the plate-needles that the vertical needles cannot receive yarn in their hooks from the plate-needle-thread guide *d'* as they did when knitting one-and-one work. When the vertical needles *c* are so lifted into groove *e'* the yarn thereafter supplied to the plate-needles will be drawn by the plate-needles across the shanks of and into the spaces between the adjacent elevated vertical needles *c*, below their latches. At this time, also, the yarn-guide *e*³, which was turned up during cuff-knitting, is turned down into the position Fig. 2, and the machine thereafter, if revolved, will knit half-cardigan; but if full cardigan is desired it would be necessary to move the auxiliary cam *b*² into its dotted-line position, in order to throw toward the center of the machine the plate-needles sufficiently far to rest in such position that the vertical needles, when descending, may draw their yarn between the plate-needles and across them back of their latches.

Having described the manner of finishing or binding cuff work, I will now describe how cardigan-work may be bound or finished, as for the tops of leggins and the bottoms of jackets.

With the machine set as just above described for cardigan-work, it is preferred to break and tie upon both of the threads used for cardigan-work a separate smooth thread, and turn the machine for, say, one or more revolutions, after which the regular yarn will be tied to the smooth threads referred to, and one course will be almost knitted with both regular yarns, and then the machine will be stopped to make the changes in the cams and slide, as before described, previous to shogging the needle-bed *a*⁴, as hereinbefore stated.

The operation of finishing or binding cardigan-work is the same as that described for

cuff-work, except that the cam *b*² is moved to occupy its full-line position, Fig. 8. The bed *d*⁴ has on it the usual lugs, *m*, which, as the said bed is shogged, as described, will be arrested by a suitable stop, *n*, properly supported from the bed *a*³ of the machine.

The stop *n* herein shown is connected with a lever, *n*²; but that I do not claim specifically, as it was applied to my machine by G. A. Leighton, instead of a rigid stop.

In half-cardigan work, two threads being used, the yarn supplied to the cylinder-needles is manipulated by the said needles as in regular or plain knitting, with only one set of needles; but the yarn supplied to the plate-needles is at such time held about and between the vertical or cylinder needles below their latches, so that as the vertical or cylinder needles descend with loops of their own thread they draw such loops down through the loops of their own thread then on their shanks below their latches, and at the same time draw the said new loops through the loops of the yarn then held by the hooks of the plate-needles and extended across and between the vertical needles, as described, and both of the said loops are cast off the tops of the cylinder-needles, and the cylinder-needles at the termination of their next upward stroke have but one loop—viz., that of their own thread—such loop being below their latches. In full-cardigan work, however, the yarn supplied to the cylinder-needles is drawn over between and about the plate-needles back of their latches, and the yarn supplied to the plate-needles is drawn about the cylinder-needles below their latches, as in half-cardigan. In full-cardigan each needle of both sets of needles has two loops below its latch when descending or drawing in, whereas in half-cardigan the plate-needles have but one such set of loops. In full cardigan both sides of the fabric are alike, the yarn supplied to the cylinder-needles appearing on the inner side of the fabric and that to the plate-needles on the outer side of the fabric; but in half-cardigan work the outside of the fabric is ribbed and the inner side is flat. Thus, it will be seen, to make cardigan or half-cardigan two independent threads must always be used, each with its own set of needles, each thread having its own carrier, and that in one-and-one rib but one thread is used, it being introduced alternately into the hooks of both sets of needles. One-and-one or single rib work presents single longitudinal rows of knitted loops turned in opposite directions, and double-ribbed work presents a series of two adjacent rows of such knitted loops turned in one or the same direction, each series of two loops being separated by a single longitudinal row of loops turned in the opposite direction.

I have herein described, though do not in this application claim, the novel tubular-knitted ribbed fabrics having their commencing course of loops crossed to form a finished end to avoid crocheting loose loops, as heretofore common in this class of work, as such fabric

forms the subject-matter of an application, No. 47,091, split off from this application.

I claim—

1. The series of horizontal or plate needles, means to actuate them, and a thread-guide to supply with thread only the hooks of the plate-needles, combined with a series of vertical needles, their holding-bed and actuating cam-cylinder, and the thread-guide to supply with thread only the hooks of the vertical needles, and with means to move the thread-guide for the vertical needles into and out of action or position with relation to the vertical needles when it is desired to change to cuff-work, substantially as and for the purposes described.

2. In an organized circular-knitting machine, a cam-cylinder and needle-bed for the vertical needles, and a series of vertical needles, combined with a series of plate-needles, a grooved plate, *a*, and its drawing-back cam, throwing-out cam, and means to move forward the butts of the plate-needles at the rear of the said throwing-out cam, whereby the introduction of yarn into the hooks of all the vertical and plate needles is insured during the first course after shogging the vertical needles, to thus bind or finish a cuff, substantially as described.

3. The cam-cylinder and needle-bed for the vertical needles, and the vertical needles, the series of plate-needles, and two yarn-guides—one for each set of needles—combined with the cam-plate *a*, its drawing-back cam, two independent throwing-out cams, and means to move forward the butts of all the plate-needles left at the rear of the throwing-out cam *c*, to insure the introduction of yarn into the hooks of all the vertical and plate needles during the first course after shogging the vertical needles, to bind or finish cardigan-work, substantially as described.

4. The herein-described method of binding or finishing the commencing course of tubular rib-knitted work composed of two threads—one for the outer side and the other for the inner side of the fabric—which consists in tying to

the knitting-yarns one or more smooth threads, to be afterward withdrawn, knitting one or more courses with the smooth threads and one course with the knitting-yarns, and immediately thereafter shogging one series of needles past the other the distance of the space between adjacent needles, thus crossing the stitch, and then knitting on all the needles at the next course to finish and bind the commencing course, substantially as described.

5. The herein-described method of finishing or binding the commencing end of a tubular rib-knitted cuff, which consists in tying to the yarn of the plate-needles a smooth thread, to be subsequently withdrawn, knitting one or more courses with it, and then attaching to it the regular yarn to knit one course only for the fabric, and then shogging the needles holding the last course of loops made, crossing the stitch, and then knitting on all the needles at the next course to finish and bind the commencing course, substantially as and for the purpose described.

6. In combination, the series of horizontal or plate needles, their holding-bed, means to actuate the said needles, a thread-guide to supply with thread only the hooks of the plate-needles, a series of vertical needles, their holding-bed, cam-cylinder to actuate the said vertical needles, a thread-guide to supply with thread only the hooks of the vertical needles, means to move the thread-guide for the vertical needles into or out of action or position with relation to said needles at certain times, the stitch-forming cam for the vertical needles, and the cam-lifting rod *f*², extended upward above the plane in which the plate-needles reciprocate, all as and for the purposes set forth.

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

WILLIAM CARTER.

Witnesses:

G. W. GREGORY,
ARTHUR REYNOLDS.