

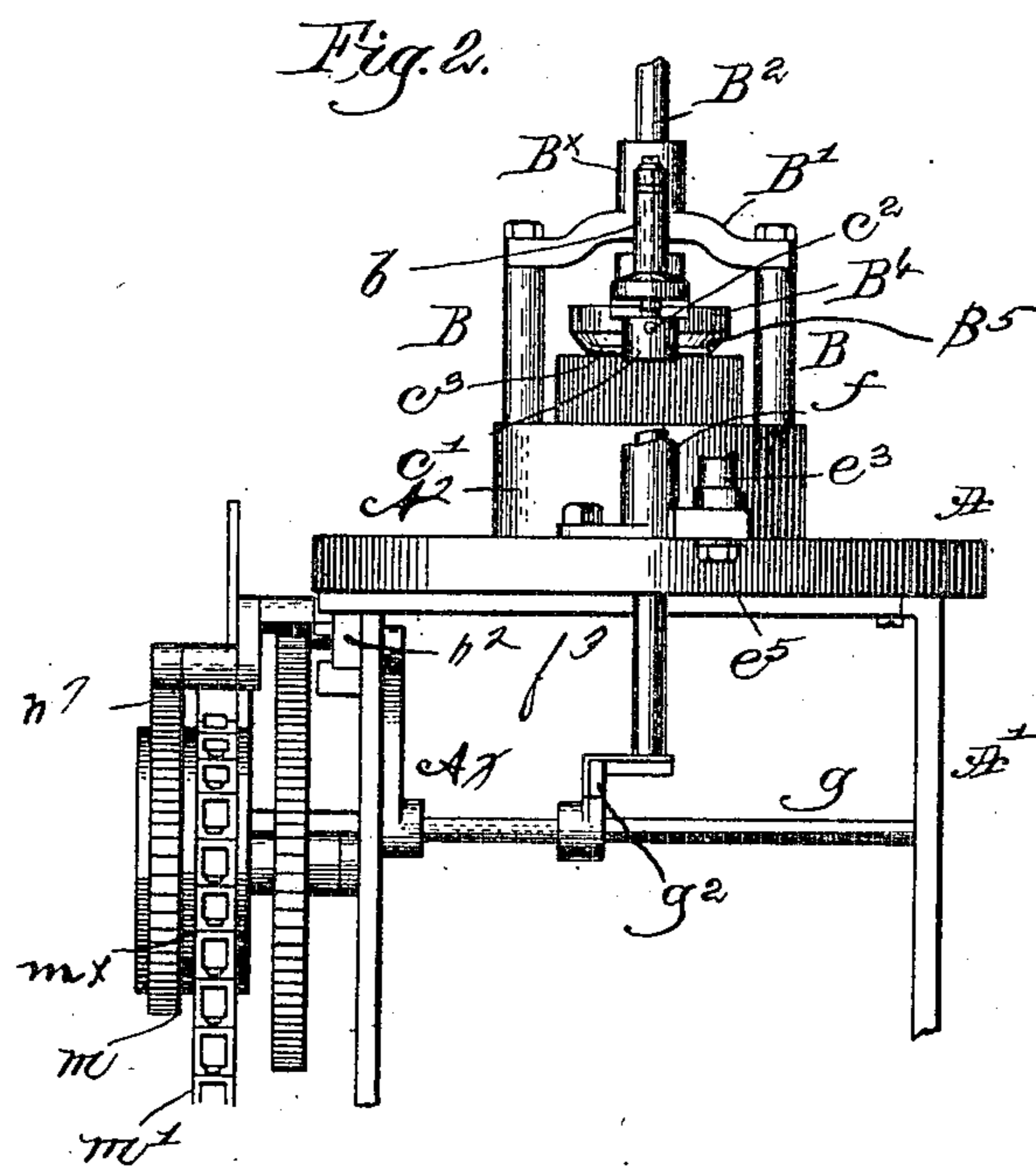
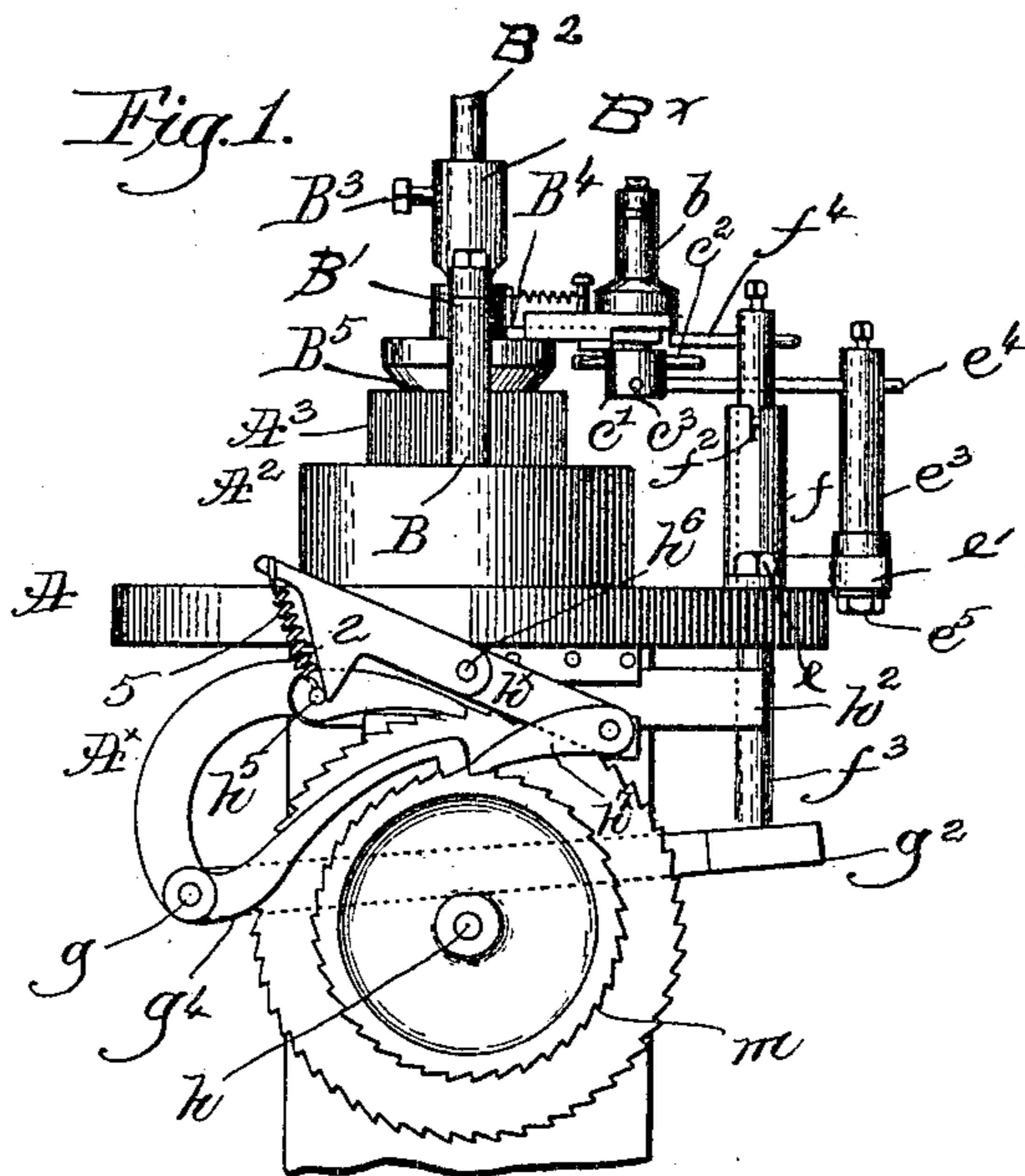
No. 812,314.

PATENTED FEB. 13, 1906.

C. H. WHITCHER.  
KNITTING MACHINE.

APPLICATION FILED DEC. 23, 1903.

2 SHEETS—SHEET 1.



Witnesses:  
Thomas J. Drummond  
J. Wm. Lutton.

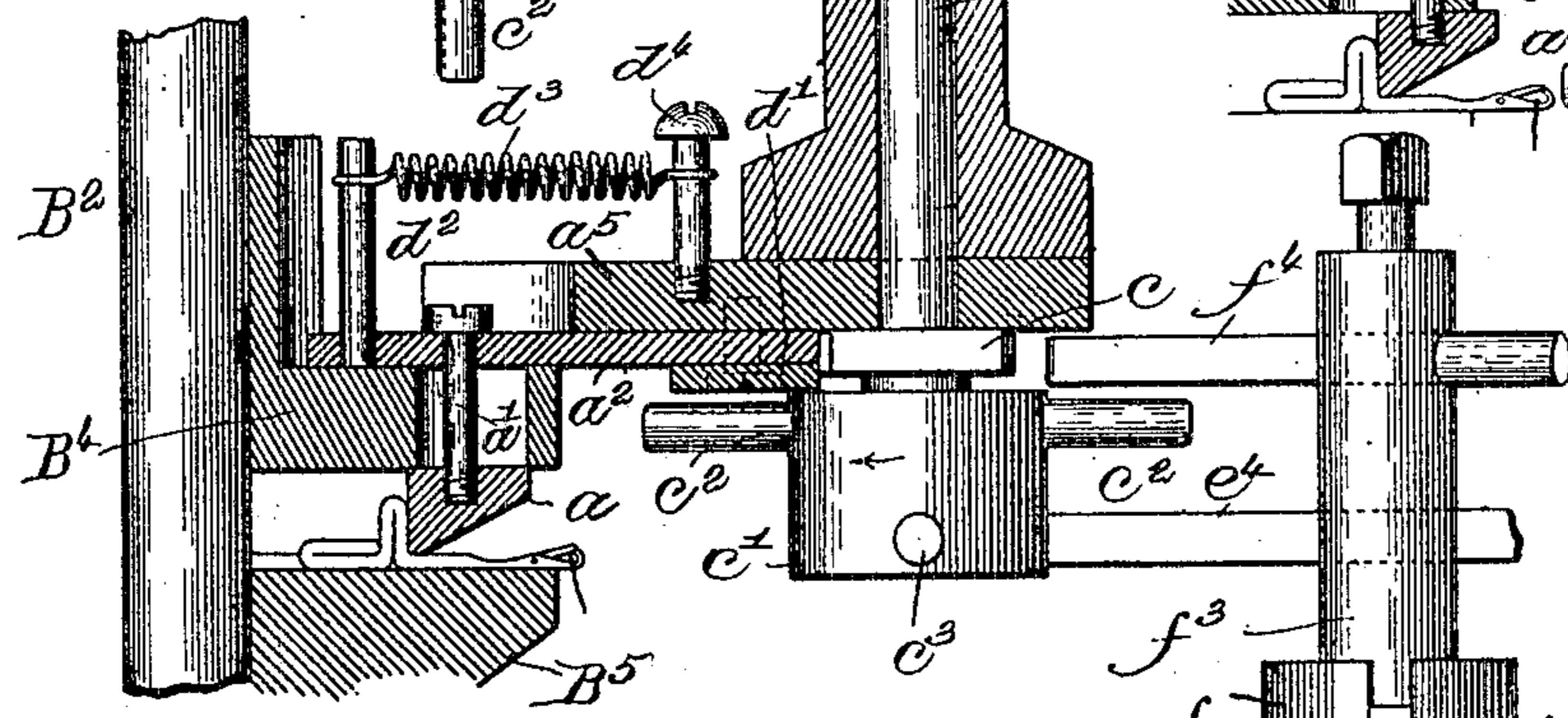
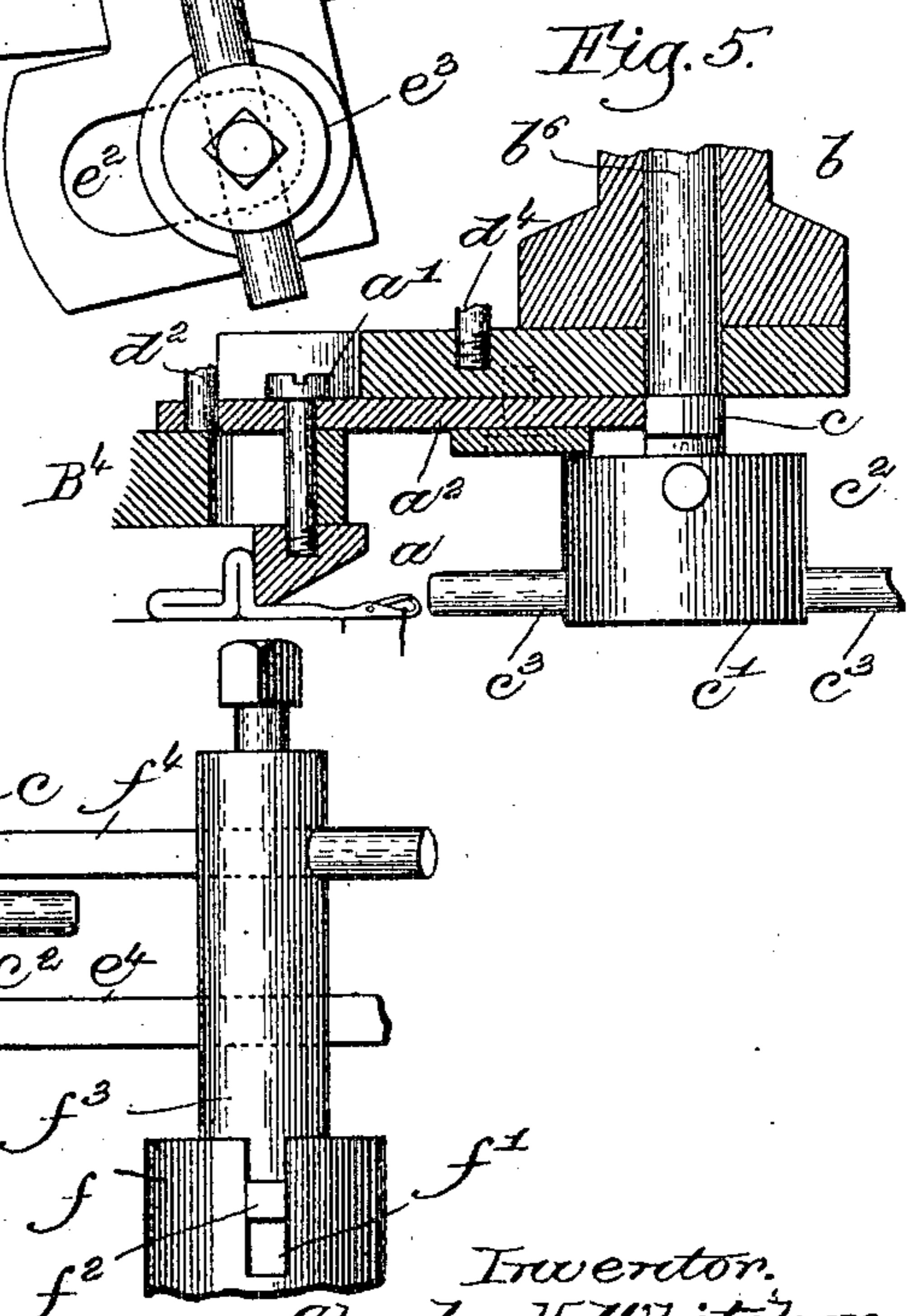
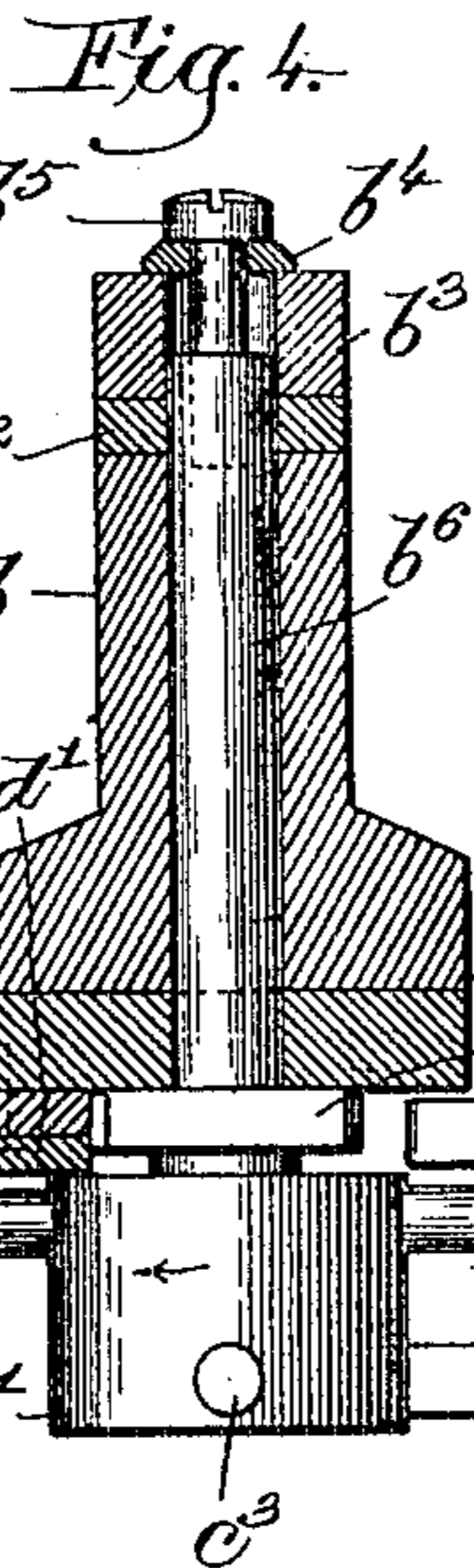
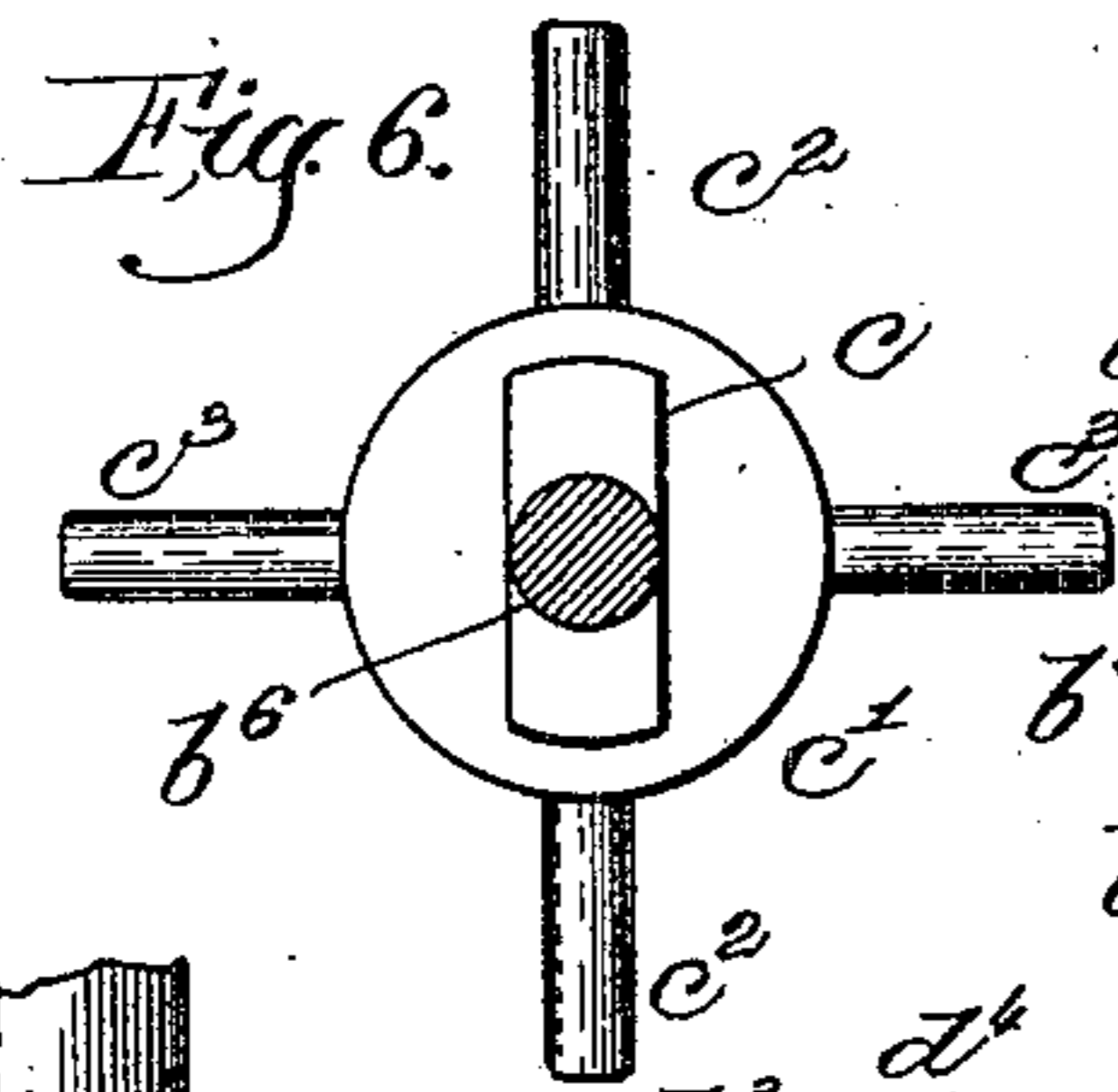
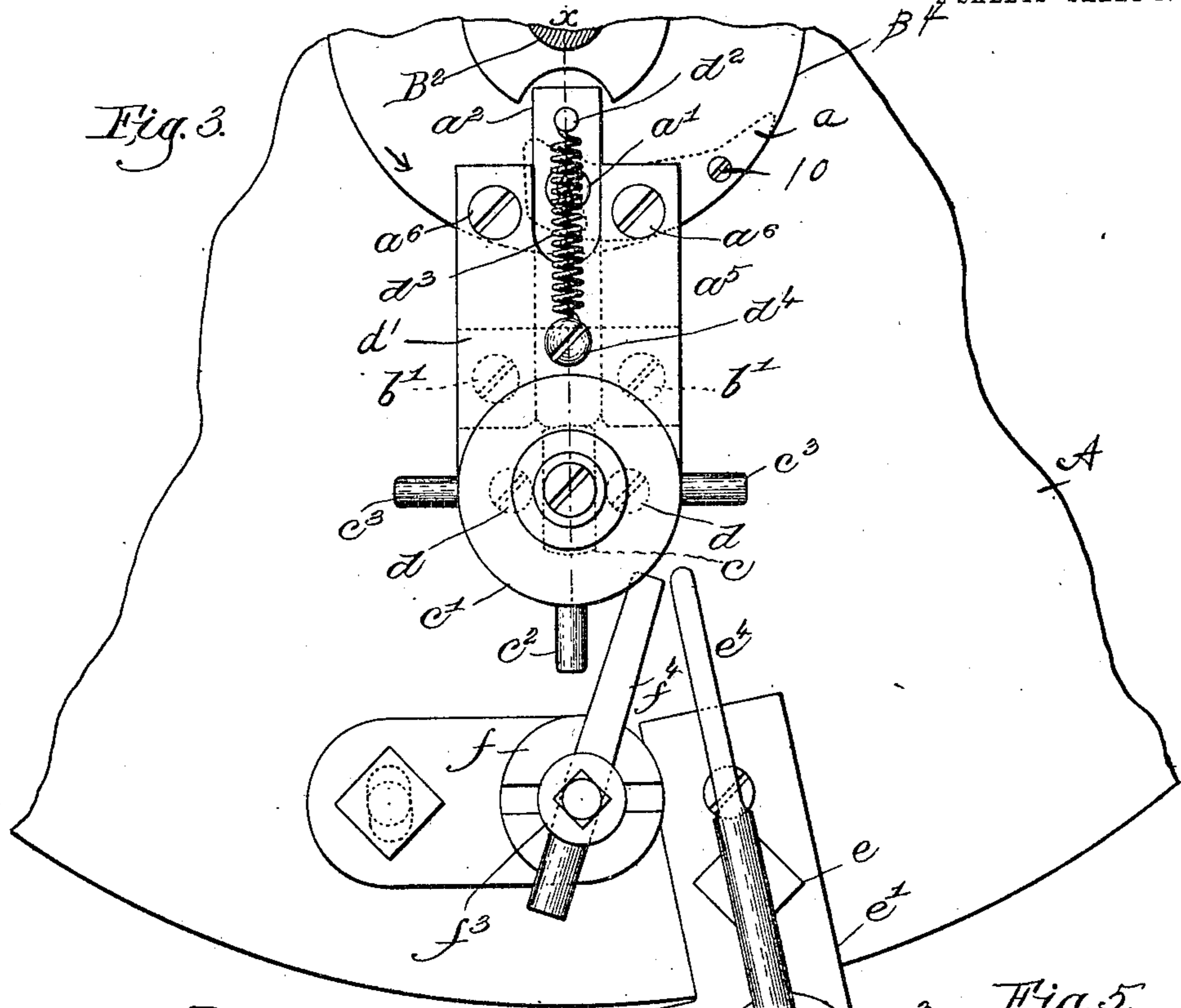
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2 SHEETS—SHEET 2.



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# UNITED STATES PATENT OFFICE.

CHARLES H. WHITCHER, OF IPSWICH, MASSACHUSETTS.

## KNITTING-MACHINE.

No. 812,314.

Specification of Letters Patent.

Patented Feb. 13, 1906.

Application filed December 23, 1903. Serial No. 186,267.

*To all whom it may concern:*

Be it known that I, CHARLES H. WHITCHER, a citizen of the United States, residing at Ipswich, in the county of Essex and 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 characters on the drawings representing like parts.

This invention has for its object to improve that class of knitting-machines employing cylinder and dial needles, my improvements being directed to novel means for automatically moving the drawing-in cam for actuating the dial-needles, whereby the needles may be used for knitting a fabric with either royal-rib stitch or plain-rib stitch, the fabric knitted being employed, it may be, for rib tops or cuffs. The plain-rib stitch courses will be used, as commonly done, in the formation of the welt for the top or cuff. The machine to be herein described may, however, be used for knitting any fabric wherein it is desired that portions of the fabric show the royal-rib stitch and other portions the plain-rib stitch.

In accordance with my invention the dial-cam plate sustains a plate that receives and guides a slide-bar connected with the drawing-in cam for the dial-needle, said plates, as shown, also sustaining a vertical shaft having a cam that acts in the rotation of said shaft directly on said slide-bar to move the dial-needle or drawing-in cam into position to coact with the cylinder-needles and take thread from the usual one-feed thread-guide for the production of a royal-rib or plain-rib stitch. The shaft at its lower extremity below its cam has two rows of arms occupying positions in different horizontal planes and one set of said arms in the rotation of the dial-cam plate being adapted to strike against a stationary finger, while the other set of arms contacts at times with a movable pattern-controlled finger. When both fingers occupy their operative positions, the royal-rib stitch will be knitted; but when the pattern-controlled finger occupies its inoperative position then the rib-stitch only will be knitted.

Figure 1 shows a sufficient portion of a knitting-machine with my improvements added to enable my invention to be understood. Fig. 2 is a view of the machine shown in Fig. 1 looking at the same from the right. Fig. 3 is an

enlarged detail in plan of the dial-cam plate and the means employed to shift the dial-cam. Fig. 4 is a section in the line  $x$ , Fig. 3, the dial-needle cam being in the position for plain-rib knitting. Fig. 5 is a similar section showing the dial needle-cam in the position for royal rib, and Fig. 6 is a plan view of the cam that is partially rotated at the proper times under the control of the pattern-surface to shift the dial needle-cam into one or its other operative position.

Referring to the drawings, A represents the bed of a knitting-machine, sustained on legs  $A'$ . The bed receives centrally a cam-ring  $A^2$ , having at its inner side usual cams to raise and lower a circular series of vertically-arranged latch-needles. Inside the cam-ring  $A^2$  is a cylindrical needle-bed  $A^3$ , grooved to receive the latch-needles. The bed has erected upon it in usual manner a series of posts B, sustaining a cross-head  $B'$ , having a hub  $B^x$ . This hub receives an upright shaft  $B^2$ , that is fixed in said hub by a suitable set-screw  $B^3$ . To the lower end of the shaft  $B^2$  is fixed in usual manner the dial-cam plate  $B^4$  for acting upon the butts of the dial-needles and moving them in the dial-bed  $B^5$ , said bed being loose with relation to the shaft  $B^2$  and coacting with the needle-cylinder in usual manner, so that said needle-cylinder and dial-bed remain stationary while the cam-ring and the dial-needle cam and plate revolve.

It will be understood that the lower end of the cam-ring has a series of bevel-teeth that are engaged by a bevel-pinion on a power-shaft, the rotation of which rotates said cam-ring for knitting. I have not herein shown the power-shaft, for the reason that it, as well as the parts so far described, are and may be as in common use.

The legs  $A'$  of the machine have a bracket  $A^x$ , that sustains a rock-shaft  $g$ , having connected with and extended therefrom an arm  $g^2$ . The machine-frame sustains a stud  $h$ , upon which is mounted a ratchet-wheel  $m$ , and behind this ratchet-wheel (see Fig. 2) and sustained by the hub of said ratchet-wheel is a pattern-surface  $m'$ , having suitable pins or projections, the chain being represented as driven by a sprocket  $m^x$ , that may form part of the hub of the ratchet-wheel  $m$ . The pattern surface or chain referred to acts intermittently against a finger  $g^1$ , fast to the rock-shaft  $g$ , and moves the lever  $g^2$  up or down, according to the requirements of the work, as

will be hereinafter described. The ratchet-wheel derives its movement from a pawl  $h^7$ , pivoted to one end of a lever  $h^8$ , pivoted at  $h^6$ , said lever being moved intermittently by a slide-bar  $h^2$ , having a pin  $h^5$ , that acts, when the slide is moved, against the incline portion 2 of the lever, a spring 5 acting normally to hold the left-hand end of the lever down.

The parts so far described and designated by small letters are common to my Patent No. 755,975, dated March 29, 1904 and, therefore do not need to be herein further described. I will now proceed to describe the parts that I have added to a machine of the general construction of that represented in my said patent, by which through the pattern-surface the knitting may be readily changed from royal rib to plain rib, and vice versa.

Referring to Figs. 3 and 5, where the dial cam-plate  $B^4$  is illustrated on a larger scale, it will be seen that said cam-plate has pivoted upon it at 10, Fig. 3, a drawing-in cam  $a$ , that may be of usual construction. This cam receives a screw-stud  $a'$ , that is extended through a hole in the dial cam-plate and through a slide-bar  $a^2$ , that is free to be moved longitudinally in a groove in a plate  $a^5$ , fixed to the cam-plate by screws  $a^6$ . The plate  $a^5$  has erected on it a hub  $b$ , that is connected therewith by screws  $b'$ . The upper end of this hub receives a friction-washer  $b^2$ , that may be of leather or other usual material, and on top of this washer is a metallic friction-washer  $b^3$ , and this latter washer sustains, as shown, a third washer  $b^4$ , through which is extended a screw  $b^5$ , said screw entering a shaft  $b^6$ , that takes its bearing in said hub. This shaft  $b^6$  just below the plate  $a^5$  has an attached cam  $c$ , and below said cam the shaft carries a hub  $c'$ , having arms  $c^2$   $c^3$  extended therefrom, as best shown in Fig. 6, the arms  $c^2$  being in the same line and the arm  $c^3$  being at right angles thereto and located in a different plane, as represented in Figs. 4 and 5. The plate  $a^5$  has connected to its under side by screws  $b'$  a plate  $d'$ , that sustains the inner end of the slide  $a^2$ . The slide  $a^2$  has erected upon it a pin  $d^2$ , that is connected by a spring  $d^3$  with a stud  $d^4$ , rising from plate  $a^5$ , said spring acting normally to move the slide  $a^2$  to the right, Figs. 1 and 4, and keep its end in contact with the cam  $c$ , and it will be understood that when said cam is rotated, as will be described, it will act to move the slide outwardly and take with it the drawing-in cam  $a$ . When the narrower ends of the cam  $c$  (see Fig. 6) act as in Fig. 4, the slide and drawing-in cam will be put in the position represented in said figure, where the dial-needles, one only being shown, will be drawn in to cast off their loops and knit a plain-rib fabric, as when knitting in the production of welts or tucks, which is effected by the plain-rib stitch following the production of the royal-rib stitch. When,

however, the longer face of the cam  $c$  acts against the inner end of the slide  $a^2$ , then the drawing-in cam is held in the position shown in said Fig. 5, the dial-needles not being drawn in far enough to cast off their loops, and as a result the stitch is that known as the "royal rib." To rotate this cam  $c$ , I have provided means which I will now describe.

The bed has secured to it by a suitable bolt  $e$  a stand  $e'$ , slotted at  $e^2$  to receive the foot of a post  $e^3$ , having a hole to receive an adjustable finger  $e^4$ . The post is locked in its adjusted position in the slot  $e^2$  by a suitable nut  $e^5$ . The finger  $e^4$  is extended forwardly in the path of the lowermost arms  $c^3$ , extended from the shaft  $b^6$ . The bed  $A$  also has rising from it a hollow post  $f$ , having a slot  $f'$  to receive a projection  $f^2$ , extended from a vertically-moving rod  $f^3$ , said projection and slot acting to prevent any rotation of said rod. The rod  $f^3$  sustains in an adjustable manner a finger  $f^4$ , that is extended therefrom, (see Figs. 3 and 4,) and this finger may be put into the path of movement of the arms  $c^2$ , extended from the shaft  $b^6$ , as when royal-rib knitting is to be done, or may be put into a position out of the path of movement of said arms, as represented in Fig. 4, as when plain-rib knitting is to be done, the presence of the finger  $b^4$  in its operative position insuring the relative step-by-step movement of the shaft  $b^6$  and the production of the royal-rib stitch.

In operation let it be supposed that the lever  $g^2$  has been raised through the action of the pattern-chain and has lifted the rod  $f^3$ , so that the finger  $f^4$  stands out of line with the path of movement of the arms  $c^2$  extended from the shaft  $b^6$ . In this condition the cam  $c$  may hold the drawing-in cam in the position Fig. 4 for as many courses as may be indicated by the pattern-chain, and at this time plain-rib stitch will be knitted. When, however, a change is desired in the knitting from the plain-rib stitch to the royal rib, then a projection of the pattern-cylinder will act to lower the rod  $f^3$ , putting the finger  $f^4$  in the path of movement of one of the arms  $c^2$ , then at the front of the head  $c'$ , and as soon as one of said arms in the rotation of the dial cam-plate in the direction of the arrow, Fig. 3, meets said finger the shaft  $b^6$  will be given a quarter-turn, moving it in the direction of the arrow thereon, Fig. 4. This movement will bring one of the arms  $c^3$  in the path of movement of the always-stationary finger  $e^4$ , so that in the continued rotation of the dial-cam plate the shaft  $b^6$  will immediately have imparted to it another quarter-turn while another course is being knitted; but this time the drawing-in cam will occupy the position Fig. 5. After the knitting of this first course another arm  $c^2$  in the rotation of the dial-cam plate meets the finger  $f^4$ , then occupying its depressed position, and the shaft  $b^6$  is again

given a quarter-turn. So long as the royal-rib stitch is being knitted course after course the shaft  $b^6$  and its cam will be moved a quarter of a turn for each rotation of the dial-cam plate, the needles at one rotation occupying the position Fig. 4 and at the next rotation the position Fig. 5. When, however, the pin  $f^4$  is raised by the pattern-chain and held up in the position Fig. 4, then during all the rotation of the cam-cylinder and the dial-cam plate carrying the drawing-in cam the knitting will be of the usual plain-rib variety.

I have not shown the usual thread-guide for supplying the thread to the needle, nor have I seen fit to herein illustrate the cylinder-needles, as they are and may be all as common in single-feed rotary-rib machines.

The ratchet-wheel  $h'$  herein shown is common to my said patent, and it may be used, if necessary, to operate the slack course and welt attachment as provided for in said patent, the slack course serving to separate the fabric at desired portions of its length to be used for rib tops or cuffs or to be applied to a transferrer that the loops may be picked onto any series of needles in order that a leg or foot or other portion of a garment may be knitted to the rib or cuff.

It will be noticed herein that the slide-bar connected directly with the drawing-in cam of the dial needle-plate is acted upon directly by a double-ended cam on a vertical shaft, and this shaft is rotated intermittently step by step during each rotation of the dial-cam plate so long as royal-rib stitch is desired; but whenever a plain-rib stitch is desired then through the pattern-surface described the finger  $f^4$ , under the control of the pattern-surface, is raised or put into its inoperative position, and immediately further rotation of the cam-shaft  $b^6$  is stopped, and thereafter plain-rib stitch will be made for as many courses as the dial-cam plate is revolved and the finger  $f^4$  is in its inoperative position.

Having described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a knitting-machine, the combination with a dial-needle bed, a dial-cam plate and its drawing-in cam, a vertical shaft having a cam, and means to rotate said shaft intermittently, and devices intermediate the cam on said vertical shaft and the said drawing-in cam that said cam on the vertical shaft may change the position of said drawing-in cam according to the class of knitting to be done.

2. In a knitting-machine having a needle-bed and cam-ring for moving a series of cylinder-needles; a dial-needle bed and dial-cam plate for moving a series of dial-needles to co-act with the cylinder-needles, a drawing-in cam for the dial-needles, a vertical shaft having a cam, means acting automatically to rotate said shaft, and means intermediate the

cam on said shaft and said drawing-in cam that said shaft as it is rotated may insure two different positions for said drawing-in cam according as it is desired to knit royal-rib or plain-rib stitch.

3. In a knitting-machine having a needle-bed and cam-ring for moving a series of cylinder-needles, a dial-needle bed and dial-cam plate for moving a series of dial-needles to co-act with the cylinder-needles, a drawing-in cam for the dial-needles, a slide-bar connected with said drawing-in cam, a vertical shaft having a double-ended cam, a spring acting normally to bear said slide-bar toward said double-ended cam, and means acting automatically to rotate said shaft that its cam may insure two different positions for said slide-bar and the drawing-in cam according as it is desired to knit the royal-rib or plain-rib stitch.

4. In a knitting-machine, a drawing-in cam, a connected slide-bar, a vertical shaft having a cam, and two series of arms below said cam, said arms occupying a position in different horizontal planes, two fingers one coacting with each set of said arms, and a pattern-surface to change the position of one of said fingers to stop the rotation of said cam when only plain-rib knitting is to be done.

5. In a knitting-machine, a drawing-in cam, a connected slide-bar, a vertical shaft having a cam, and two series of arms below said cam, said arms occupying positions in different horizontal planes, a stationary finger coacting with one set of said arms during the knitting of each course of stitches, and a pattern-controlled finger which may be put in position to be struck by the other set of said arms or into a position out of the path of movement of said set of arms to thereby arrest the rotation of the shaft having said cam.

6. In a knitting-machine, a dial-cam plate having a pivoted drawing-in cam, a slide connected with said drawing-in cam, a plate connected with said dial-cam plate and serving as a guide for said slide, a hollow hub, a shaft rotatably mounted in said hub and having a cam and projecting arms, a pattern-surface, a stationary finger, and a movable pattern-controlled finger, the position of the pattern-controlled finger determining whether or not the shaft having said cam shall be rotated intermittently for the production of a royal-rib stitch, or if said shaft and its cam shall be stopped, for the production of a plain-rib stitch.

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

CHARLES H. WHITCHER.

Witnesses:

GEO. W. GREGORY,  
EDITH M. STODDARD.