

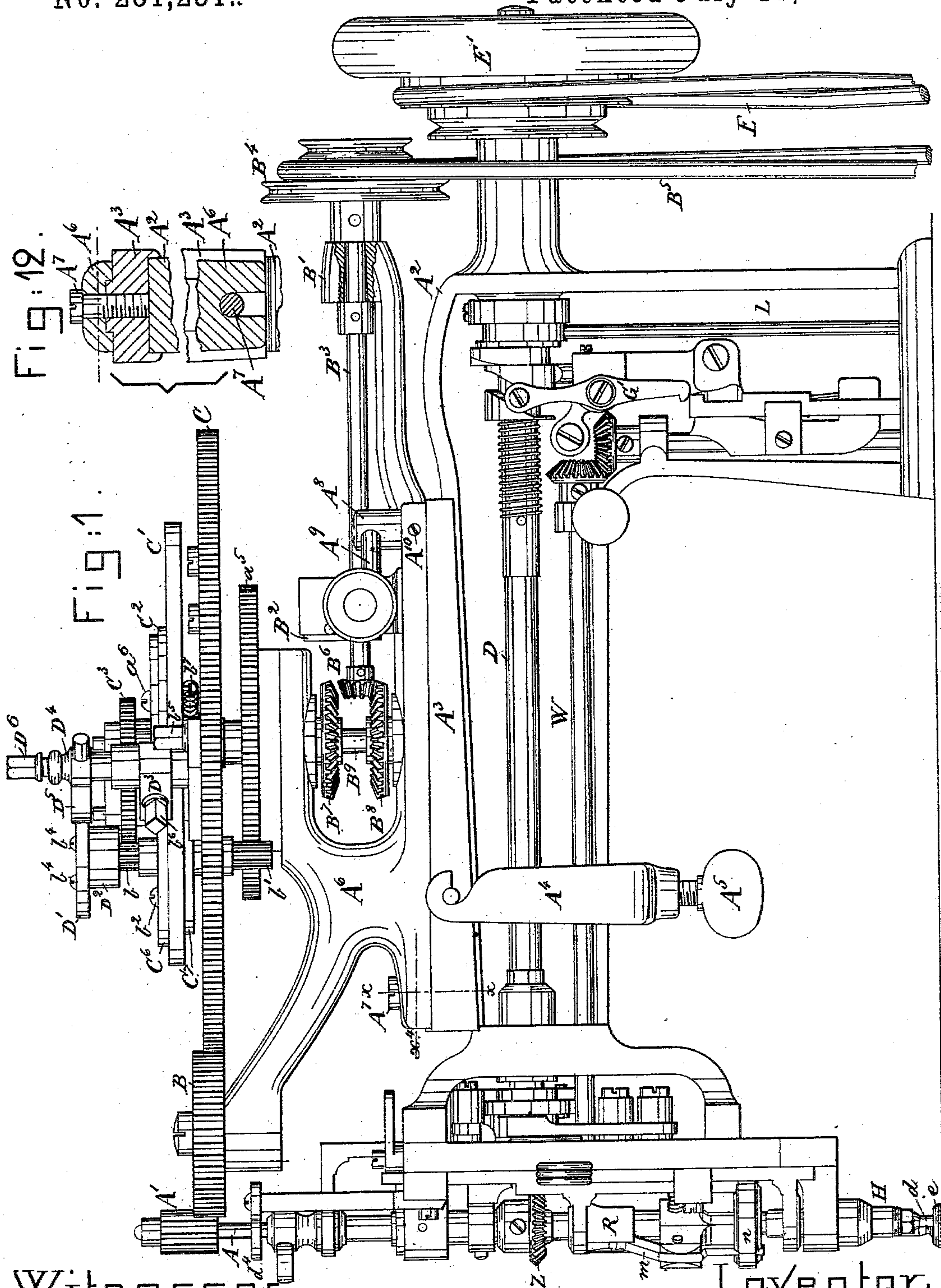
(No Model.)

4 Sheets—Sheet 1.

J. BECKER.
EMBROIDERING MACHINE.

No. 281,231..

Patented July 17, 1883.



Witnesses.

Fred A. Powell
John F. C. Prinkert

Inventor.

John Becker
by Crosby & Gregory attys.

(No Model.)

4 Sheets—Sheet 2.

J. BECKER.

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Fig:2.

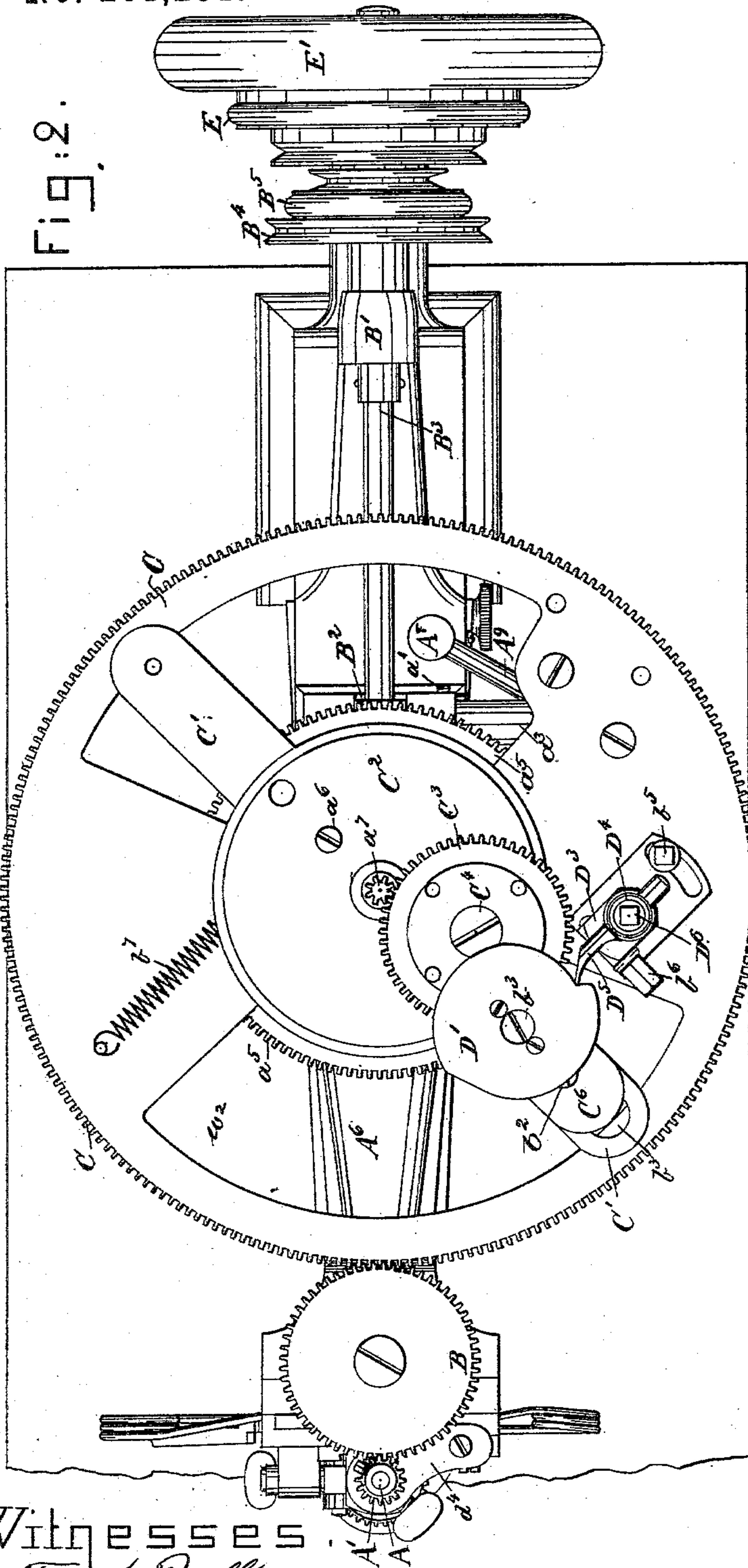


Fig:4.

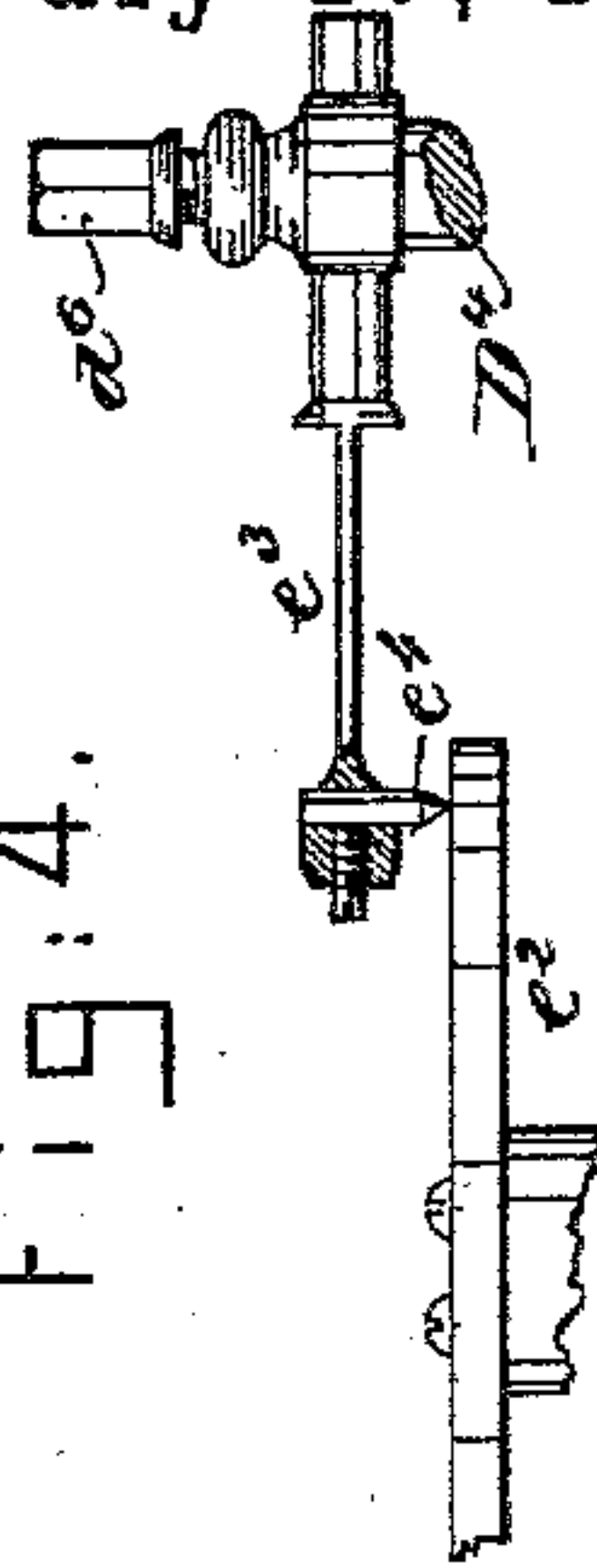


Fig:3.

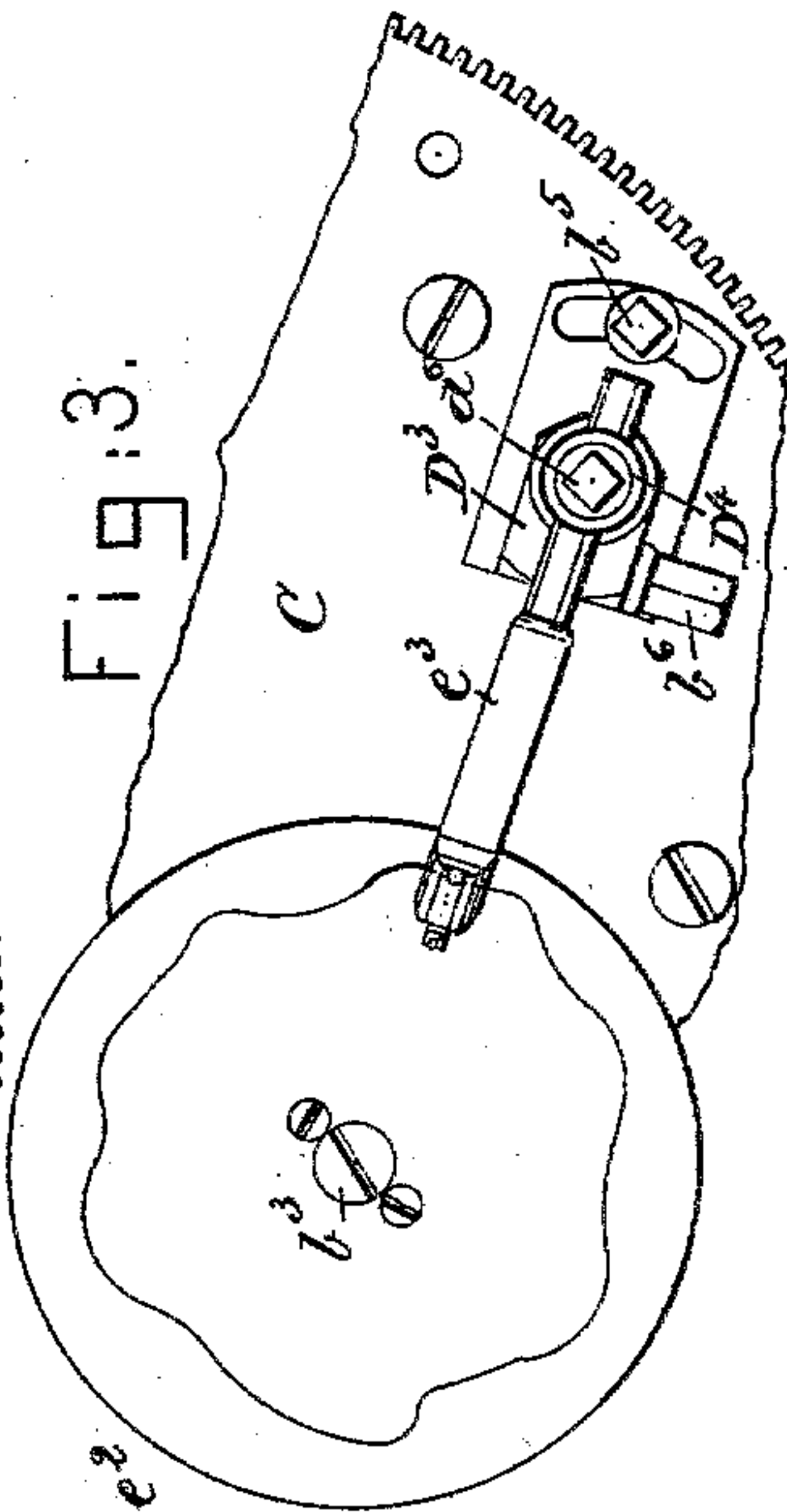


Fig:5.



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Fig:6.

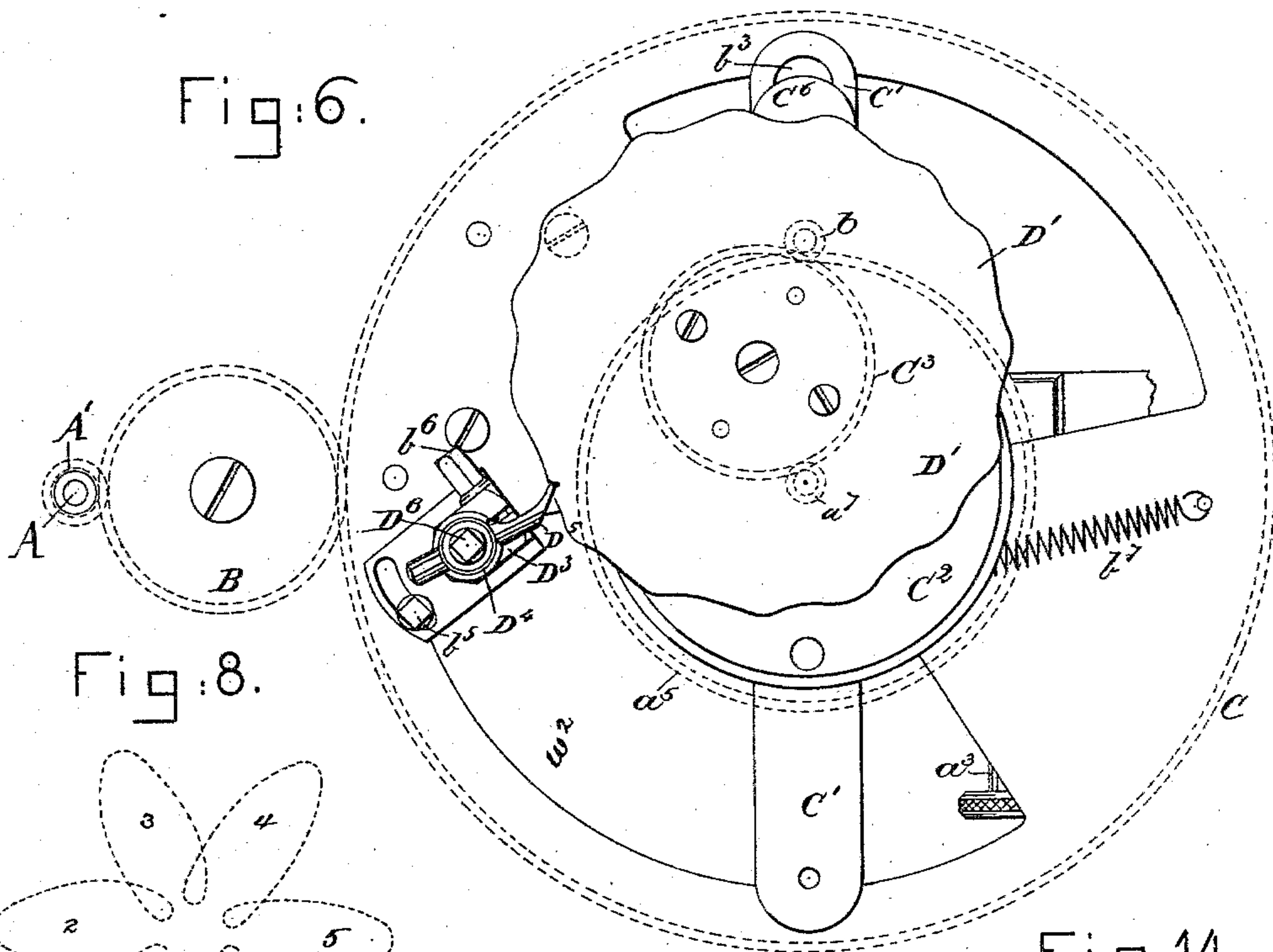


Fig:8.

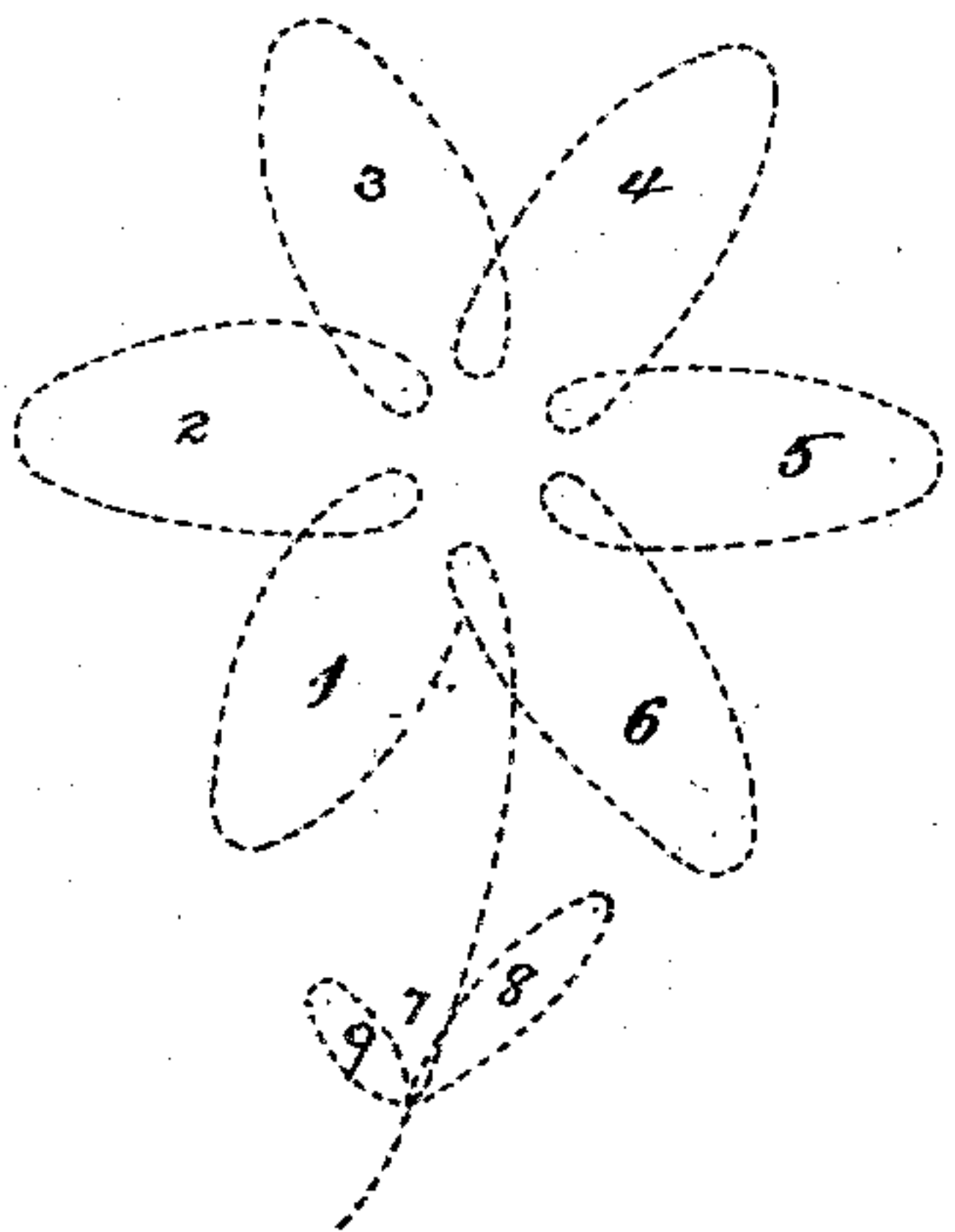


Fig:7.

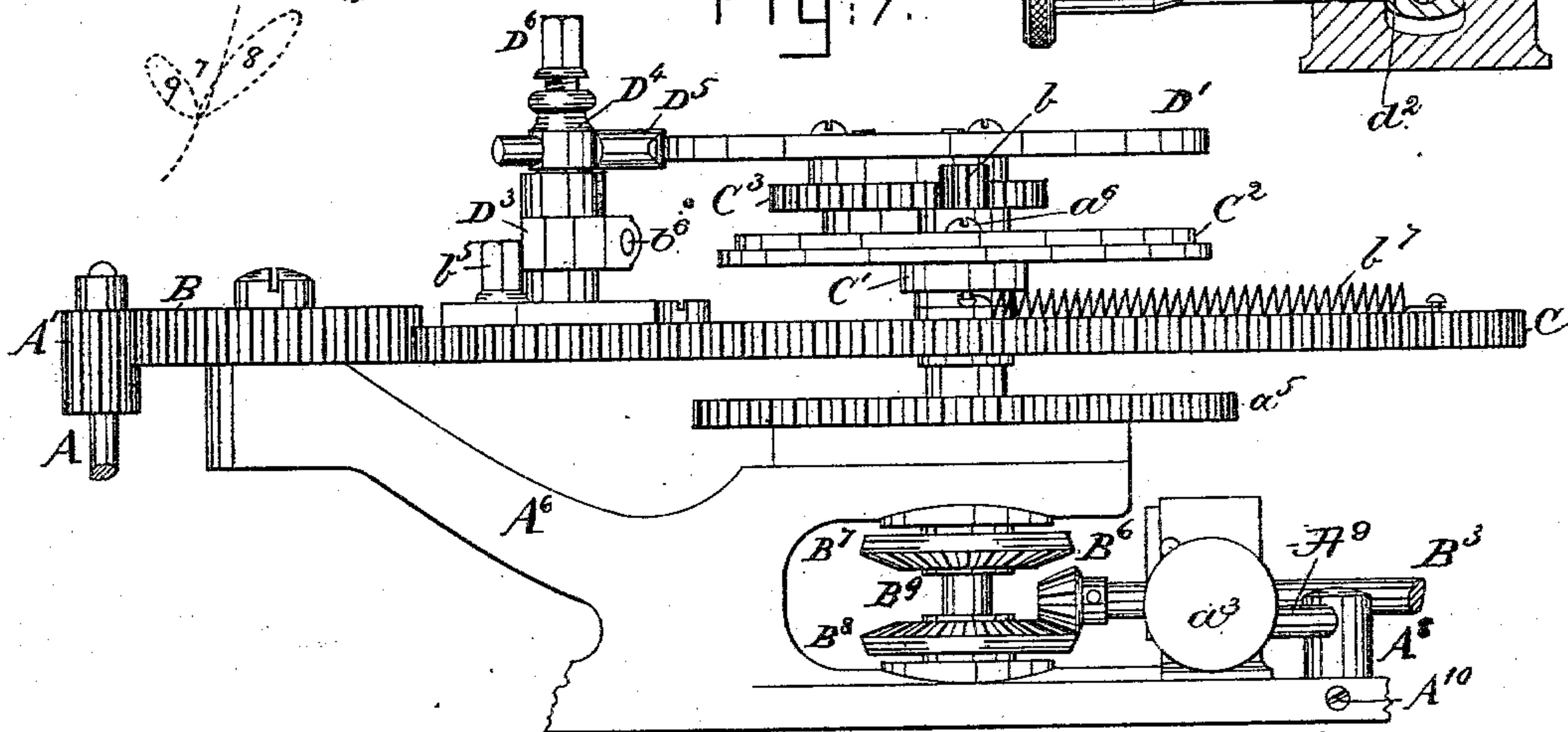
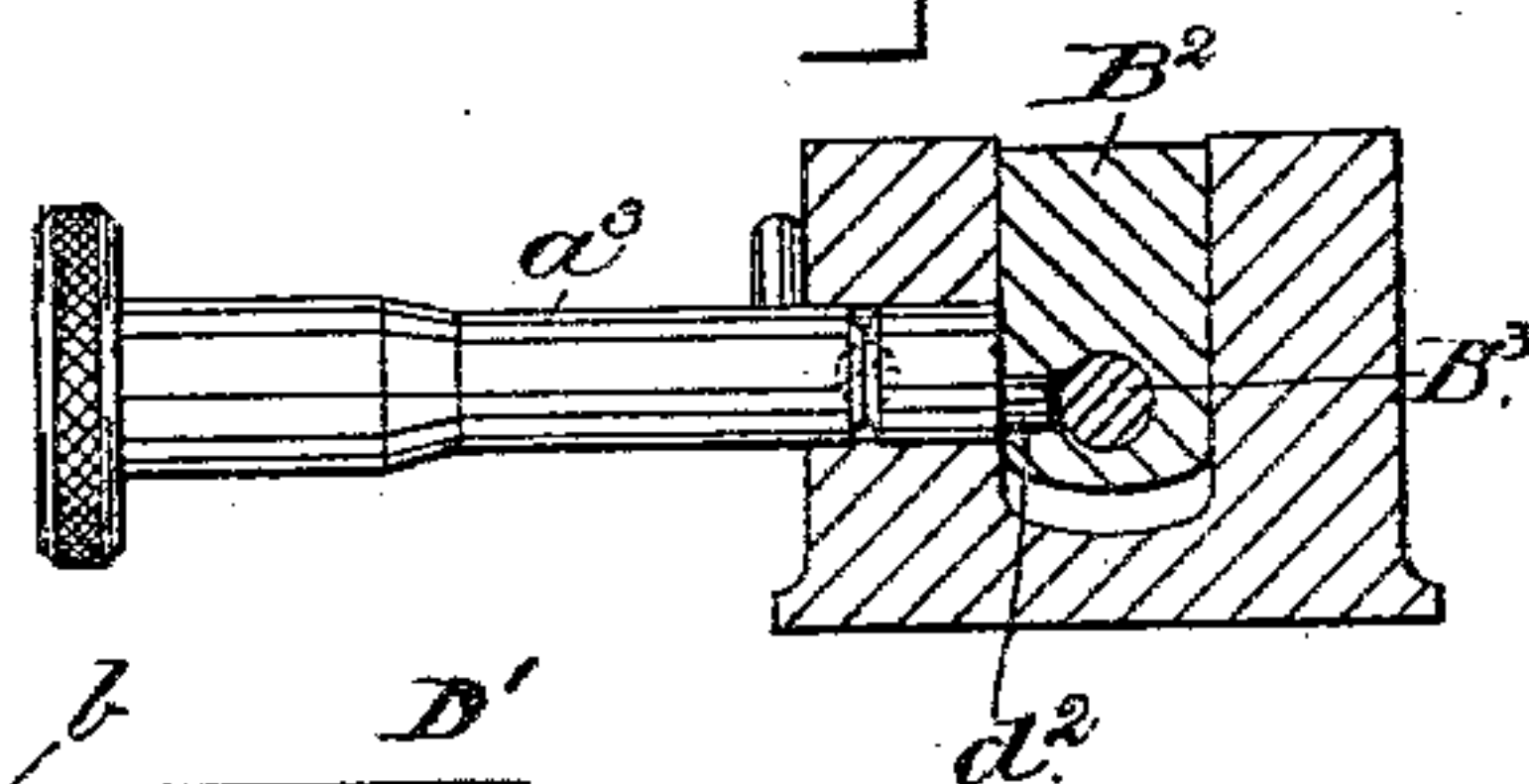


Fig:14.



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Fig:9.

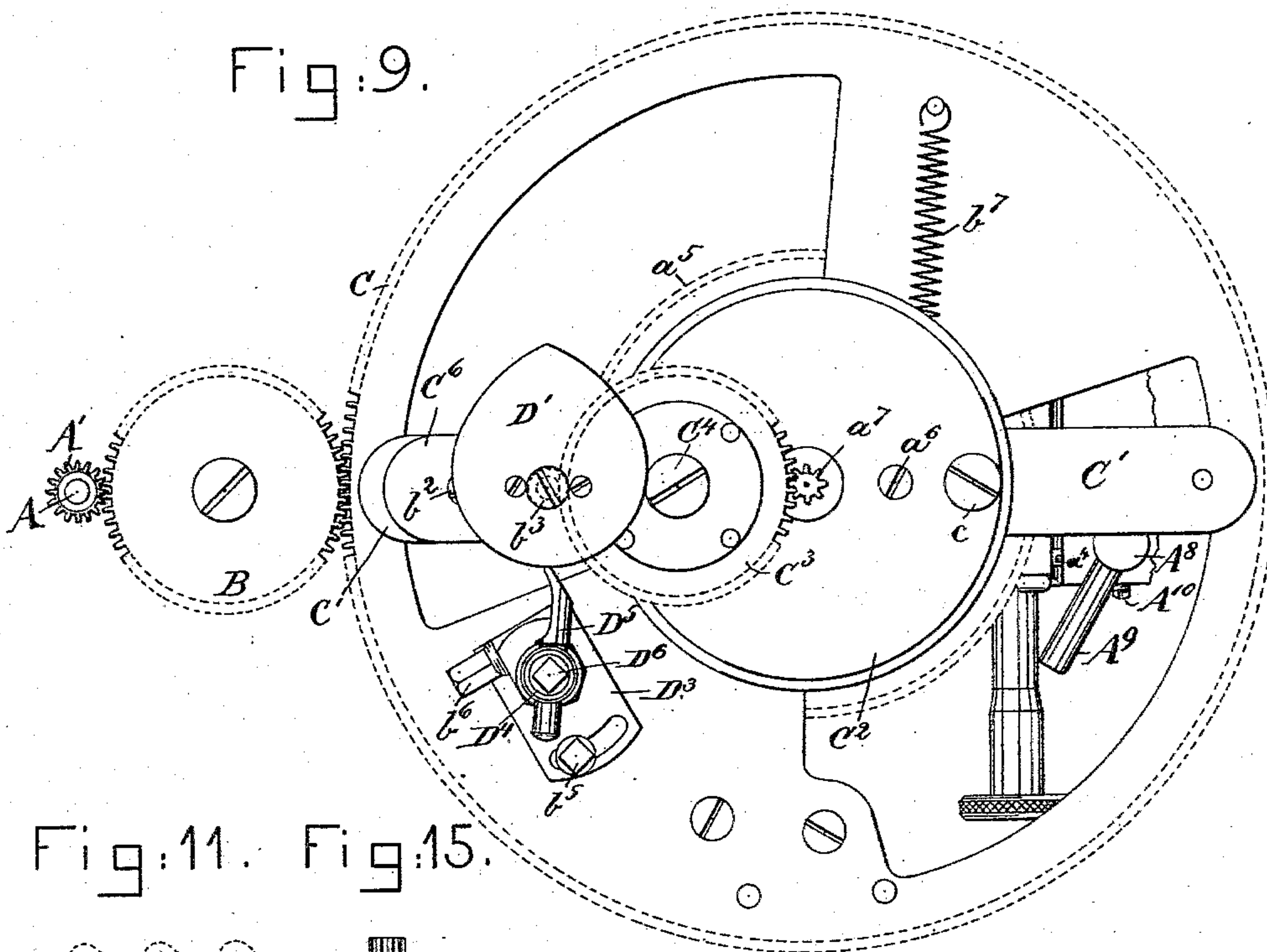


Fig:11. Fig:15.

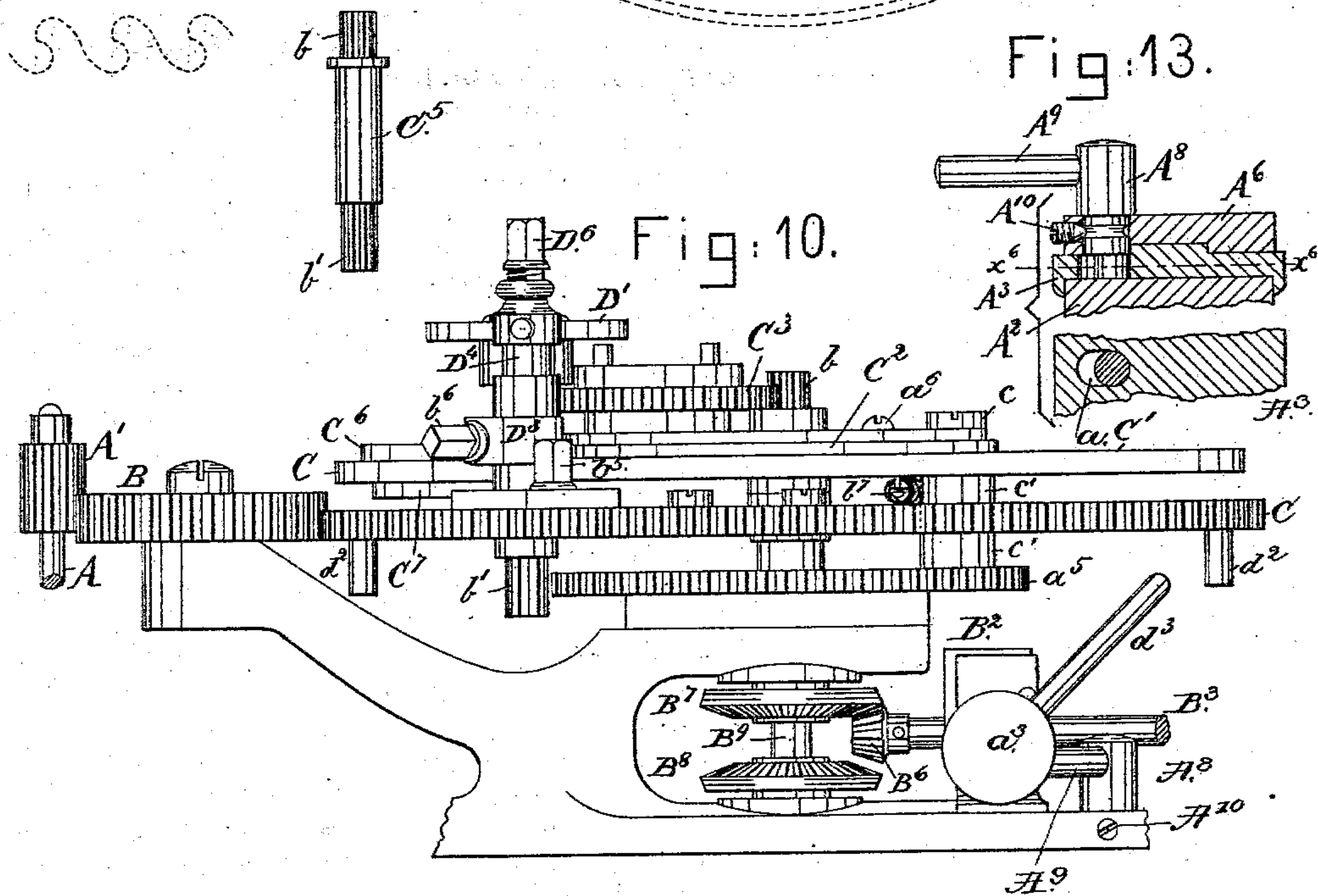


Fig:13.

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UNITED STATES PATENT OFFICE.

JOHN BECKER, OF BOSTON, MASSACHUSETTS.

EMBROIDERING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 281,231, dated July 17, 1883.

Application filed November 13, 1882. (No model.)

To all whom it may concern:

Be it known that I, JOHN BECKER, of Boston, county of Suffolk, State of Massachusetts, have invented an Improvement in Embroidering or Sewing 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 has for its object the production of an organized mechanism or apparatus for attachment or addition to an embroidering or sewing machine of any usual construction having a universal feeding device to move the fabric or material in any desired direction, whereby the said feeding device may be automatically moved to feed the material in a circle of greater or less radius, or to so move the said material as to enable the needle to produce on the fabric, with its thread, lines of stitches varying more or less from a true circle or from a straight line.

In this my invention I employ an actuating-gear which acts directly or indirectly to rotate the universal feeding device, and I have provided a pattern-plate to move this gear so that it imparts a more or less irregular motion to the said actuating-gear, and to the universal feeding device moved by it, whereby the fabric or material is moved in a more or less irregular line for the automatic production upon it by the needle-thread of a figure such as is demanded by the shape of the pattern-plate employed, thus relieving the operator of the machine from all care in feeding or directing the material, yet enabling the exact reproduction continuously of any desired figure.

My invention also has for its object a novel manner of producing patterns for the reproduction of any desired figure, as will be hereinafter described.

My invention consists in certain features and organizations of mechanism, as will be hereinafter described in the specification and set forth in the claims at the end thereof, whereby, by first producing a pattern-plate of the proper shape and applying it to an embroidering or sewing machine, in connection with other devices herein described and incorporated in the apparatus invented by me, any desired ornamental figure or design in thread or silk may be automatically made or produced by the needle.

Figure 1 represents in side elevation a sufficient portion of an embroidering-machine of usual construction with my apparatus added to illustrate my invention; Fig. 2, a top or plan view of Fig. 1; Fig. 3, a top view of a part of my apparatus, sufficient in connection with the parts shown in Fig. 2 to enable one to understand the method of producing a pattern-plate to be applied to the apparatus to effect the movement of the universal feeding device in definite directions, according to the figure desired to be produced upon the material by the thread being employed; Fig. 4, a detail of part of Fig. 3. Fig. 5 represents the figure which will be produced when a pattern-disk such as shown in Fig. 2 is employed. Fig. 6 represents in top view an apparatus with a different pattern-disk; Fig. 7, a side elevation of Fig. 6. Fig. 8 represents the figure which will be produced upon the material when the pattern-disk shown in Fig. 6 is employed. Fig. 9 is a top view of my apparatus, showing yet another form of pattern-disk; Fig. 10, a top view of Fig. 9; and Fig. 11 represents the figure which will be produced when the pattern-disk shown in Fig. 9 is employed; Fig. 12, sections of Fig. 1 on the dotted lines xx and x^1 . Fig. 13 is a detail showing the eccentric stud A^8 and a section thereof on the dotted line x^6 ; Fig. 14, a detail of the eccentric stud a^2 and bearing B^2 ; Fig. 15, a detail showing the stud-gear and pinion at its ends.

Referring to the drawings, wherein I have shown my apparatus applied to a Bonnaz machine, substantially such as represented in United States Patent No. 83,910, to which reference may be had, I have employed the letters of reference $A Z R D W L G' H d e n m$ to represent parts the same as in the said patent; and it will be understood in the Bonnaz machine herein represented, to which my apparatus to be described is attached, that the needle A and universal feeding device or foot e will be operated as in the said patent; and it will be also understood that the said machine will in practice have as part of it the hand-crank, (marked S in the said patent,) by which to turn the universal feeding device and needle-bar in either direction. So the stitching devices and universal feeding mechanism, being well known and common, need not be herein further described.

In this my invention I apply to the usual needle-bar, A, a long pinion, A'. Upon the arm A² of the said Bonnaz machine I place my attachment, the foot-plate A³ of which is held
 5 on the said arm by a suitable dog, A⁴, having a clamping-screw, A⁵. Upon the foot-plate A³, I place the frame-work A⁶ of the attachment; and to connect the foot and frame-work together so that the frame may be adjusted
 10 longitudinally, the upper side of the foot is provided with a rib, as shown in the section, Fig. 12, which co-operates with the under side of the frame-work A⁶, of suitable shape to fit. The frame-work A⁶ is slotted at its front
 15 end to receive the guiding-stud A⁷, and at its rear end the frame-work is provided with an eccentric stud, A⁸, (shown separately in Fig. 13,) and having a handle, A⁹, by which it may be turned. The lower or eccentric portion of
 20 the stud A⁸ enters and fits between the walls of a slot, a, in the foot A³, (see detail Fig. 13,) and as the said stud, held in the frame-work A⁶ by the screw A¹⁰, entering an annular groove of the said stud, is turned by the handle A⁹,
 25 the frame-work may be moved backward and forward upon the said foot-plate, so as to insure the engagement of the intermediate gear, B, with the long pinion A' on the needle-bar.

The frame-work A⁶ has bearings B' B² for
 30 the shaft B³, having upon one end of it the set of cone-pulleys B⁴, driven by a belt, B⁵, which will extend from a corresponding but reversely-placed set of cone-pulleys, (not shown,) but placed on the shaft of the usual fly-wheel of
 35 the driving or treadle stand, the latter set of cones being located just between the stand and the inner side of the said fly-wheel, the transfer of the belt B⁵ from one to the other of the grooves of the said cone-pulleys oper-
 40 ating in well-known manner to vary the speed of the shaft B³ with relation to the speed of the driver-shaft of the stand, the shaft to which the lower set of cones referred to is se-
 45 cured. The forward end of the shaft B³ is provided with a bevel-gear, B⁶, which is adapted to be engaged at will with either of the bevel-gears B⁷ or B⁸, fast on the main shaft B⁹ of my apparatus. To enable the gear B⁶
 50 to be engaged with either of the said gears B⁷ or B⁸ at will, so as to rotate the shaft B³ in either direction, I have made the bearings B' B² of the shaft B³ so as to permit the said shaft to rise and fall somewhat at its front end.

The bearing B' may be made globular or ball-
 55 like, if desired, and the bearing B² has entered into it, at one side, a pin or eccentric part, a², (see detail, Fig. 14,) forming part of an eccentric stud, a³, held against longitudinal movement by a screw, a⁴, which enters an an-
 60 nular groove in the said stud. Upon the top of the frame-work A⁶ is attached a stationary circular toothed track, a⁵. Upon the shaft B³, just above this stationary track, is placed loosely the actuating-gear C, for turning the
 65 needle-bar, needle, and universal feed continuously in one direction, or backward and forward, or, rather, for imparting to the said nee-

dle-bar and feed a continuous rotary motion, or a rotary reciprocating motion.

Placed loosely upon shaft B³, above the actu-
 70 ating-gear C, is the pattern-carrying arm C', and to the latter is attached, preferably in an adjustable manner, by a screw, a⁶, a plate, C². The upper end of shaft B³ is made to extend
 75 above this plate C², and has attached to it the main pinion a⁷, the said pinion being herein shown as forming part of the said shaft. The plate C² has an intermediate gear, C³, attached to it in an adjustable manner by the screw C⁴,
 80 and the said intermediate gear drives the stud-gear C⁵, (shown separately in Fig. 15,) said stud-gear having at its ends pinions b b'. The stud-gear C⁵ has its bearing in an adjustable collar, C⁶, attached to the pattern-carrying
 85 arm C' by a screw, b², extended through a slot, b³, in the said arm, (see Figs. 2 and 6,) and screwed into a bottom plate, C⁷. (Shown clearly in Fig. 1.) The adjustment of the collar C⁶
 90 upon the arm C' permits the pinion b' of the stud-gear to engage the teeth of the stationary track a⁵, as in Figs. 1 and 2, or to be dis-
 95 engaged from the said track, as it will be when the pattern-plate represented in Figs. 9 and 10 is employed, as will be hereinafter de-
 100 scribed.

The pattern-plate D', shaped as represented
 in Fig. 2, to produce the figure represented in Fig. 5, is attached to the pinion b of the stud-
 105 gear C⁵ by a screw, b³. As shown in the drawings, Fig. 1, the pattern-plate D' has a hub, D², attached to its under side by the set-screws b⁴, the said hub fitting over the end of the gear b.

The intermediate gear, C³, driven by the
 110 main pinion a⁷, drives the stud-gear C⁵, so that its lower pinion, b', in engagement with the stationary track a⁵, is caused to travel around the said track and move the stud-gear C⁵ and the pattern-carrying arm C', and during this
 115 movement of the arm the rotation of the stud-gear on its axis will, it is obvious, cause the pattern-plate D' to be rotated in unison with the said stud-gear C⁵. The actuating-gear C referred to has a socket, D³, adjustably at-
 120 tached to it by a set-screw, b⁵, and the said socket, split at one side, as shown in Fig. 6, has a binding-screw, b⁶, by which to tighten the said socket to properly hold in adjusted
 125 position a tool-post, D⁴, provided with a finger, D⁵, adjustably attached to the said post by a set-screw, D⁶. The socket D³ and tool-
 130 post and finger are so adjusted that the end of the said finger bears against the periphery of the pattern-plate being used, and the said finger is maintained in contact with the said
 135 pattern-plate by a suitable spring, herein shown as a spiral spring, b⁷, connecting the arm C' and the actuating-gear C.

With a pattern-plate such as represented in
 140 Figs. 1 and 2, the intermediate gear, B, being in engagement with the pinion A' on the nee-
 145 dle-bar A, the shaft B³ may be started, and the gears B⁶ B⁸ a⁷ will drive the intermediate gear, C³, and, as before described, will turn the pat-

tern-plate on its axis, while the said pattern is moved in a circular path about the stationary track; and the said pattern-plate D' thus having a planetary motion, I shall hereinafter designate it as a "planetary pattern-plate." The finger D^5 , being held against the planetary pattern-plate by the spring b^7 , will cause the actuating-gear C to follow the said pattern-plate as it moves in a circle about the axis of shaft B^9 ; but, owing to the cam-shaped or irregular periphery of the planetary pattern-plate, it is obvious that the actuating-gear C will have an intermitting or reciprocating movement during its rotation about the shaft B^9 , the extent and frequency of the said reciprocating movements depending, it will be understood, upon the shape of the pattern-plate; or, in other words, the shape of the cam and its speed of rotation is such as compared with the speed of rotation of the planetary arm that one counteracts the other, and practically results in temporarily keeping the actuating-gear C at rest. With a cam such as shown in Fig. 2, the straightest parts of the figure in Fig. 5 are produced when the gear C is substantially at rest, and the curved parts when the finger D^5 is moving toward the center of the pattern-plate.

When a pattern-plate such as shown in Fig. 2 is used to make a figure such as represented in Fig. 5, the needle-bar or the universal feed is not actually turned except in one direction; but the speed at which it is turned in that one direction is made variable.

It will be understood that the gear C, if left to follow the planetary arm, and the pattern-plate did not rotate, would travel forward at a speed depending upon the speed of shaft B^3 ; but as the pattern-plate also rotates, it will be seen that it, by acting on the finger D^5 , carried by the gear C and held pressed against the said plate by a spring, will move the said gear G backward in opposition to the forward movement just stated, which will act to retard or completely check the forward movement of the gear C; and with a pattern-plate of proper shape the forward movement of the gear C may be overcome or reversed to the extent of the length of the space w^2 cut out of the said gear, as in Figs. 2 and 6. When the backward movement of the gear C by the pattern-plate is equal to the forward movement of gear C by shaft B^3 , it will be seen that practically the gear C will stand still; but if the finger D^5 rests on a portion of the pattern-plate which is the arc of a true circle described from the spur-gear, then the forward movement of the gear C will be dependent entirely upon the speed of shaft B^3 , and a figure represented by a true circle would be formed on the material by the thread.

To produce irregular curves, it is necessary to make the movement of the gear C variable, or fast and slow at intervals, and this may be done just in the proportion that the speed of the gear C derived from shaft B^3 is permitted to exceed the movement of the said gear in the reverse direction derived from the particular

shape of the pattern-plate. The variation in speed of the gear C and of the universal feed is in proportion to the deviation of the pattern-surface from a true circle. The actuating-gear C, having imparted to it a progressive but reciprocating movement during its rotation, will, it is obvious, turn the intermediate gear, B, needle-bar, and usual universal feed mechanism in like manner, enabling the said feed to move the material upon which it rests in the proper direction, so that the usual needle will loop the thread delivered to it always in the proper line to produce on the material a line of stitches in strict accordance with the requirements of the pattern-plate, thus entirely relieving the operator of the machine from any care as to the feeding of the material.

In order to produce a set figure—such, for instance, as shown in Fig. 8—the said figure always having a fixed number of loops or curves, and then being repeated, it is necessary that the teeth of the stud-gear C^5 be always a multiple of the teeth of the intermediate, C^3 , so that the complete figure will be produced during each complete revolution of the pattern-plate about its own axis. To illustrate, Fig. 8 contains nine loops in nine different positions, six in the main part of the figure and three in the stem, the central loop of the stem being a very small sharp loop. Therefore the pattern-plate D' (see Fig. 6, it being of the proper shape to produce the figure shown in Fig. 8) must be so geared with and driven by the main pinion a^7 as to rotate once while the said main pinion rotates nine times, thus enabling the pattern-plate to reciprocate the actuating-gear as it is being revolved, so that it will turn the needle-bar and feed to automatically move the material under the feeding device in the direction required by the pattern to produce the said figure. In Fig. 8 I have marked the loops 1 to 9. In Fig. 6 the pattern-plate D' is attached directly to the intermediate gear, C^3 . It will be understood that the shape of the planetary pattern-plate may be varied at pleasure, according to the figure to be produced by the needle-thread on the fabric or material.

To increase or decrease the number of stitches in each loop or repeat of a figure to be produced, it is only necessary to alter the speed of the shaft B^3 , as before stated—as, for instance, the faster the speed of the shaft B^3 with relation to the speed of the usual stitching parts the less the number of stitches in each loop or repeat of the figure, and vice versa.

In Figs. 9 and 10, I have shown another modification of my apparatus or attachment adapted to produce the figure represented in Fig. 11, or a figure produced by giving to the cloth or material a movement sufficient to produce a certain number of stitches in one and then in another direction. In this modification the actuating-gear C has only a movement of reciprocation, and never makes a complete rotation, as in the plan previously described,

and the pattern-carrying arm C' is made stationary, it being secured to the stationary track by the screw c , extended through the plate C², and a hub, c' , placed between it and the stationary track, the said hub extending down through and opening in the actuating-gear C. In this modification the pattern-plate D' is secured to the stud-gear C⁵, and the collar C⁶ is so adjusted on the arm C' as to disengage the pinion b' from the stationary track a^5 , so that the stud-gear may be rotated by the intermediate gear, C³, when the arm C' is fastened, as stated. In this modification the pattern-plate has only a movement of rotation about its own axis. The stud-gear and the actuating-gear C are reciprocated by the action of the said pattern-plate on the finger D⁵.

Instead of securing the pattern-plate upon the stud-gear, as in Figs. 9 and 10, I may, if desired, attach a pattern-plate to the intermediate gear, C³, as in the modification represented in Fig. 6, such position of pattern-plate enabling the production of more complex and intricate figures.

I do not limit my invention to the employment of an intermediate gear, C³, of any particular size, as intermediate gears of different sizes may be employed, according to the pattern desired to be produced.

Assuming that the figure delineated in Fig. 8 was produced while the bevel-gear B⁶ was in engagement with the bevel-gear B⁸, and I should desire to reverse the figure, it is only necessary to engage the bevel-gear B⁶ with the bevel-gear B⁷ to reverse the direction of movement of the apparatus.

To automatically effect the reversal of the parts of the apparatus to reverse the figure being formed, I may attach a series of tappets, d^2 , in an adjustable manner upon the actuating-gear C, and provide the eccentric stud a^3 with one or more suitable fingers or arms, d^3 , to be struck by the said tappets, the turning of the eccentric stud moving the gear B⁶ into engagement with one and then with the other of the gears B⁷ B⁸.

Referring to Fig. 10, let it be supposed that the pin d^2 at the right is about to strike the arm d^3 , to throw B⁶ into engagement with B⁸, such movement will result in changing the direction of rotation of all the parts and of the gear C, so that as soon as the pin d^2 at the left of Fig. 10 arrives at d^3 it will turn it back in the opposite direction.

In the drawings I have shown a variety of pattern-plates for producing different figures. The method of producing these pattern-plates is an important feature of my invention. It being desired to produce a certain figure in thread or silk upon the material by the usual needle, the operator will turn the universal feed by means of the usual crank-handle, represented below the bed-plate in Figs. 1 and 2 of the said Bonnaz machine, taking care that the figure is made as perfectly as possible. Before starting, however, to produce the figure desired, a plain metal or stiff plate,

e^2 , will be attached to either the stud-gear or the intermediate, C³, and the tool-post will be provided with an arm, e^3 , instead of the finger D⁵. The arm e^3 , at its front end, is provided with an adjustable marker or point, e^4 , to work or trace a line upon the plate e^2 as the latter is rotated under the said marker or tracer, as in Fig. 3. In Fig. 3 it will be assumed that the operator has turned the universal feed by the usual hand-crank, during which time the needle-bar is also turned, and the latter, by the gear A' thereon, turns the intermediate gear, B, and the latter drives the actuating-wheel C and its parts to rotate the plate e^2 . The plate e^2 having been marked or traced, all that part of it outside the line traced or marked thereon will be completely cut away or removed, thus forming a pattern-plate which, employed as herein described of the pattern-plates D', will enable the automatic production upon the material of a figure like the one just produced by the manipulation of the machine by the operator, and any number of the said figures may be produced rapidly and correctly without further care by the operator. I have provided the head of the machine with a stationary guide or support, d^4 , for the needle-bar A, as in Fig. 1, so as to insure the proper engagement of the pinion A' and intermediate gear, B. The belt E on the wheel E' is extended about the larger belt-wheel of the treadle mechanism.

It is obvious that the apparatus herein described as of my invention may be employed to rotate or impart a rotary reciprocating movement to any usual universal feed by properly connecting the gear C therewith.

I desire it to be understood that the intermediate gear, B, is not essential, but may be omitted, and the gear C directly engage pinion A', without departing from my invention.

By adjusting the tool-post and finger, and placing the end of the finger in contact with the periphery of the pattern-plate more or less out of a straight line drawn through the stud-gear and the center motion of the tool-post, the figure to be produced on the material by the needle and thread may be more or less contracted or expanded.

Having described my attachment as added to a Bonnaz machine, I desire it to be understood that it may be added to other well-known sewing-machines having a universal feed—as, for instance, I may cause the actuating-gear C to engage and move a gear attached to an arbor having upon it an oblique cam fitted to slide in a ring-plate, as shown in United States Patent No. 134,463, wherein the said gear is marked t and the oblique cam is marked r .

I claim—

1. The needle-bar, universal-feed device, a pinion, A', and toothed actuating-gear suitably connected therewith to move it, combined with a rotary pattern-plate and suitable intermediate connections to enable the said gear to be rotated and to be reciprocated, substantially as described.

2. In an attachment for automatically operating the universal feeding device of an embroidering or sewing machine, the toothed actuating gear-wheel and pattern-carrying arm, 5 combined with a pattern-plate having a planetary movement, substantially as described.

3. The pattern-carrying arm, stud-gear having pinion b , and the main gear a' , combined with the intermediate gear, C^3 , and pattern-plate having a planetary movement, substantially as described. 10

4. The pattern-carrying arm, stud-gear having pinions $b b'$, and the main gear a' , combined with the intermediate gear, C^3 , stationary track, 15 and pattern-plate having a planetary movement, substantially as described.

5. The main gear a' , the intermediate gear, C^3 , stud-gear having pinions $b b'$, and the stationary track, combined with the pattern-carrying arm, and adjustable collar C^6 , thereon, 20 carrying the shaft of the spur-gear, substantially as described.

6. The pattern-carrying arm, the stud-gear having pinions $b b'$, the main gear a' , the intermediate gear, C^3 , stationary track, and actuating-wheel C , combined with the rotating pattern-plate and a finger or projection carried by the actuating-gear to be acted upon by the 25 said pattern-plate to reciprocate the actuating-gear C , and through it effect the feeding movement of the material in the desired direction, substantially as described. 30

7. The actuating-gear C , rotating pattern-plate, stud-gear on which it is mounted, arm C , the intermediate gear, C^3 , and main gear a' , to rotate it, combined with the shaft B^9 and means to turn the latter in one or the opposite direction at will when it is desired to reverse the figure to be produced on the fabric being embroidered, substantially as set forth. 35 40

8. The actuating-gear C , rotating pattern-plate, stud-gear on which it is mounted, arm C , the intermediate gear, C^3 , and main gear a' , to rotate it, combined with the shaft B^9 and means to rotate the said shaft at different speeds with relation to the established speed of the main shaft D of the machine, substantially as and for the purpose set forth. 45

9. The actuating-gear C , the tool-post made 50 movable with it, and the finger, combined with

the rotating pattern-plate and means to keep the finger against the pattern-plate, substantially as described.

10. The universal feeding device and needle-bar, pinion A' , moving in unison with them, 55 the intermediate gear, B , gear C , arm C' , and stud-gear, stationary track, and plate e^2 , combined with a marking or tracing tool to mark or trace the said plate while the feeding device is being turned by or through the shaft W , as 60 usual, to thus outline the form of the cam suitable to enable the automatic reproduction of the figure made while actuating the feeding device by hand, substantially as described.

11. In an attachment for automatically operating a universal feeding device, the pattern-carrying arm, means to move it continuously in one direction at a uniform speed, a pattern-plate mounted on an axis made to travel with the pattern-carrying arms, and means to rotate 65 the said pattern-plate, combined with the actuating-gear having its speed of movement made variable by deviation of the pattern-plate from a true circle to thus enable the universal feeding device to move the fabric or material in 70 suitable directions for the production by the needle and its thread of irregular figures, substantially as described. 75

12. The main pinion a' , the pattern-plate, and intermediate gearing to rotate the said 80 plate, combined with the actuating-gear and finger made movable with the said actuating-gear and held against the pattern-plate, substantially as and for the purpose described.

13. That improvement in the art or method 85 of producing pattern-plates for embroidery-machines which consists in automatically working or tracing on a revolving plate an outline for a figure while the feed of the fabric is being effected by hand, and then shaping the 90 said plate according to the said outline, substantially as described.

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

JOHN BECKER.

Witnesses:

G. W. GREGORY,
B. J. NOYES.