

(No Model.)

3 Sheets—Sheet 1.

F. TERSTEGEN.
REPEATING MECHANISM FOR TIMEPIECES.

No. 502,918.

Patented Aug. 8, 1893.

Fig-1.

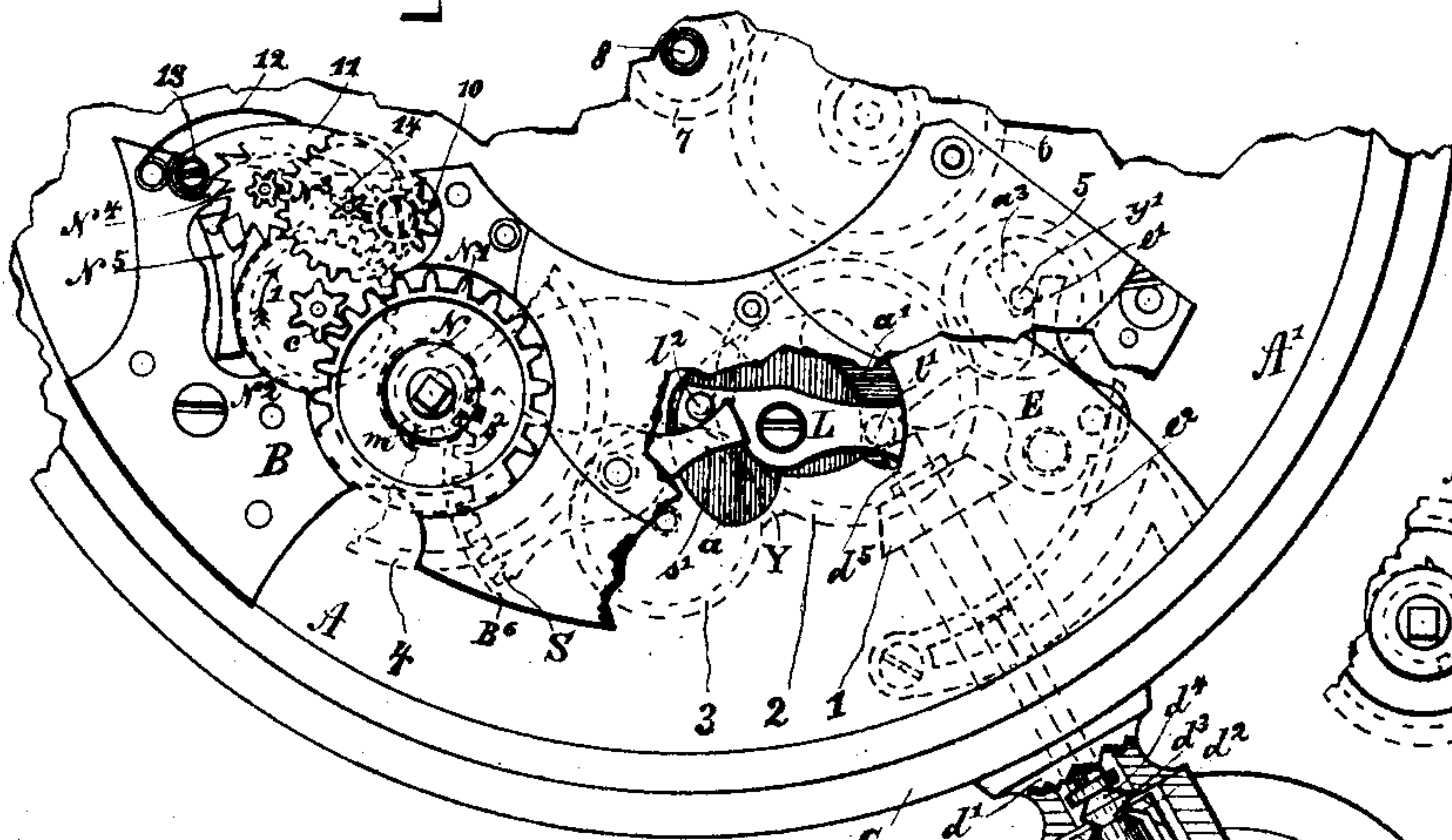
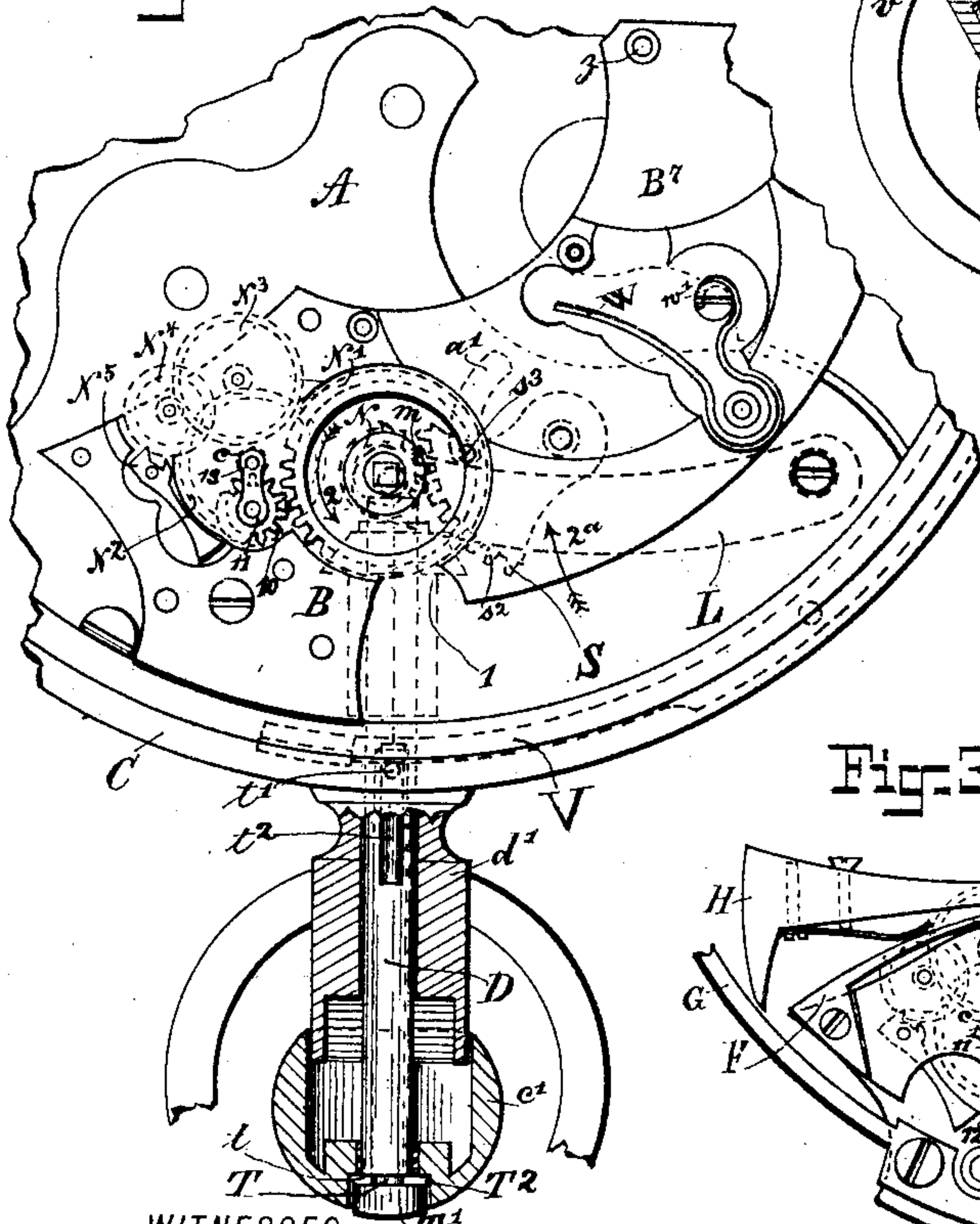


Fig-2.



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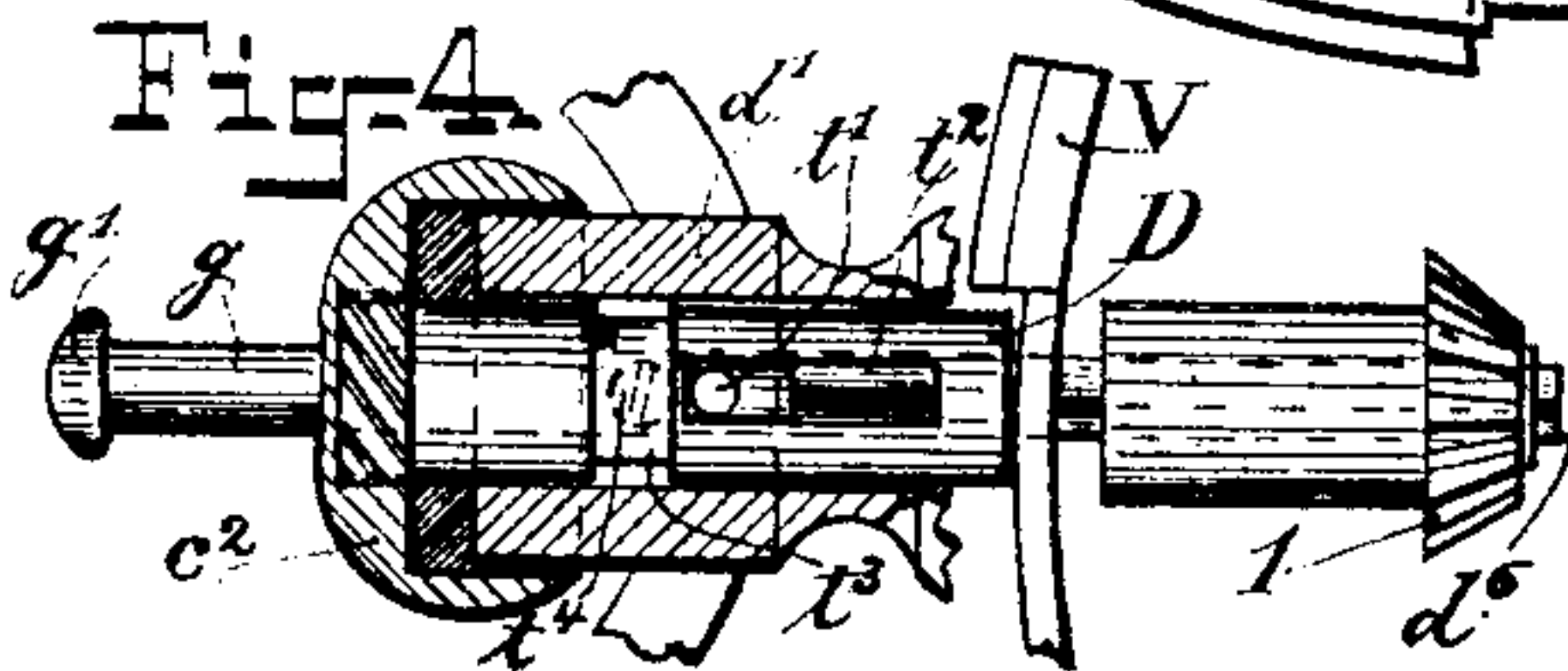
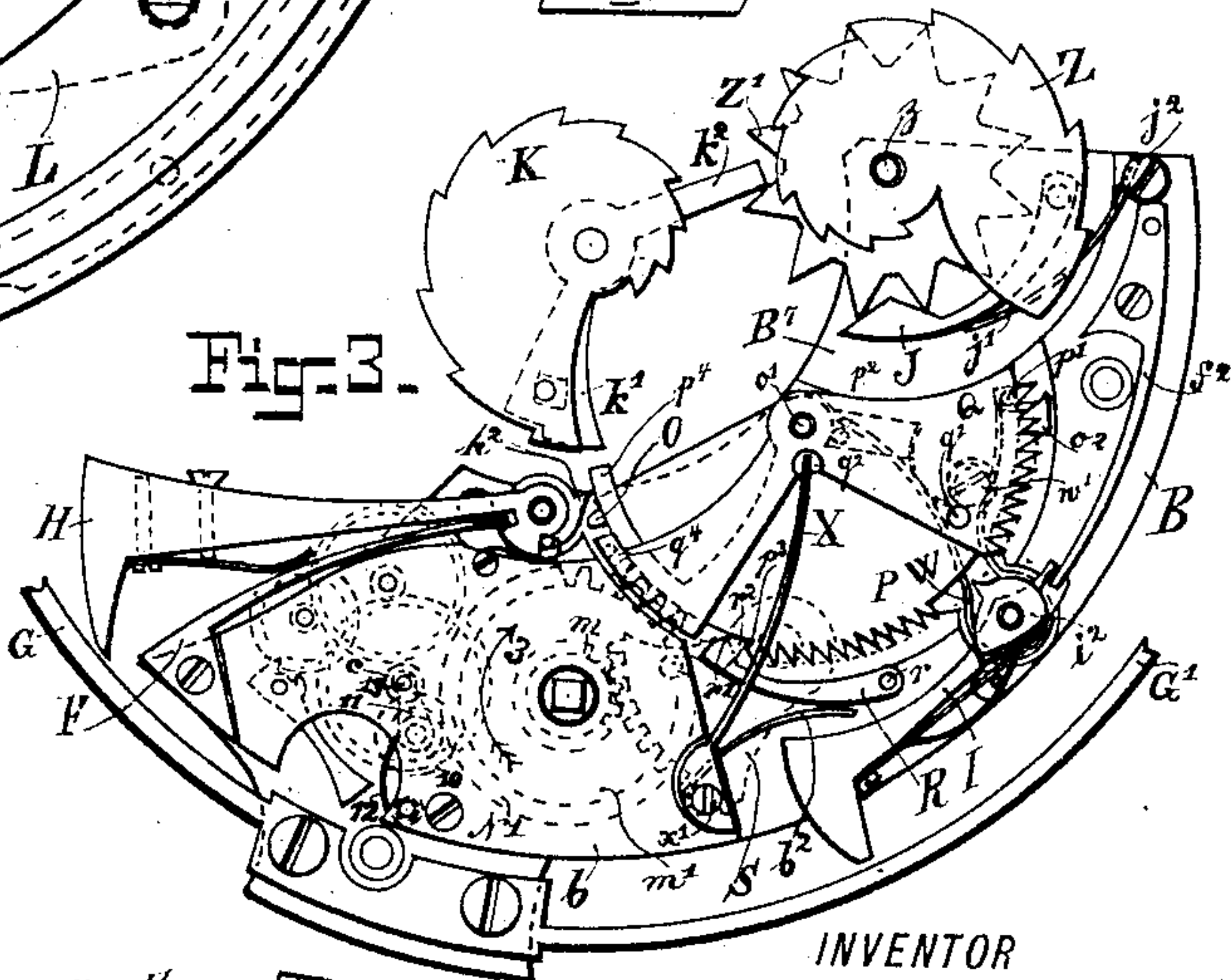


Fig-4.

Fig-3.



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Fig-3b

Fig-3a

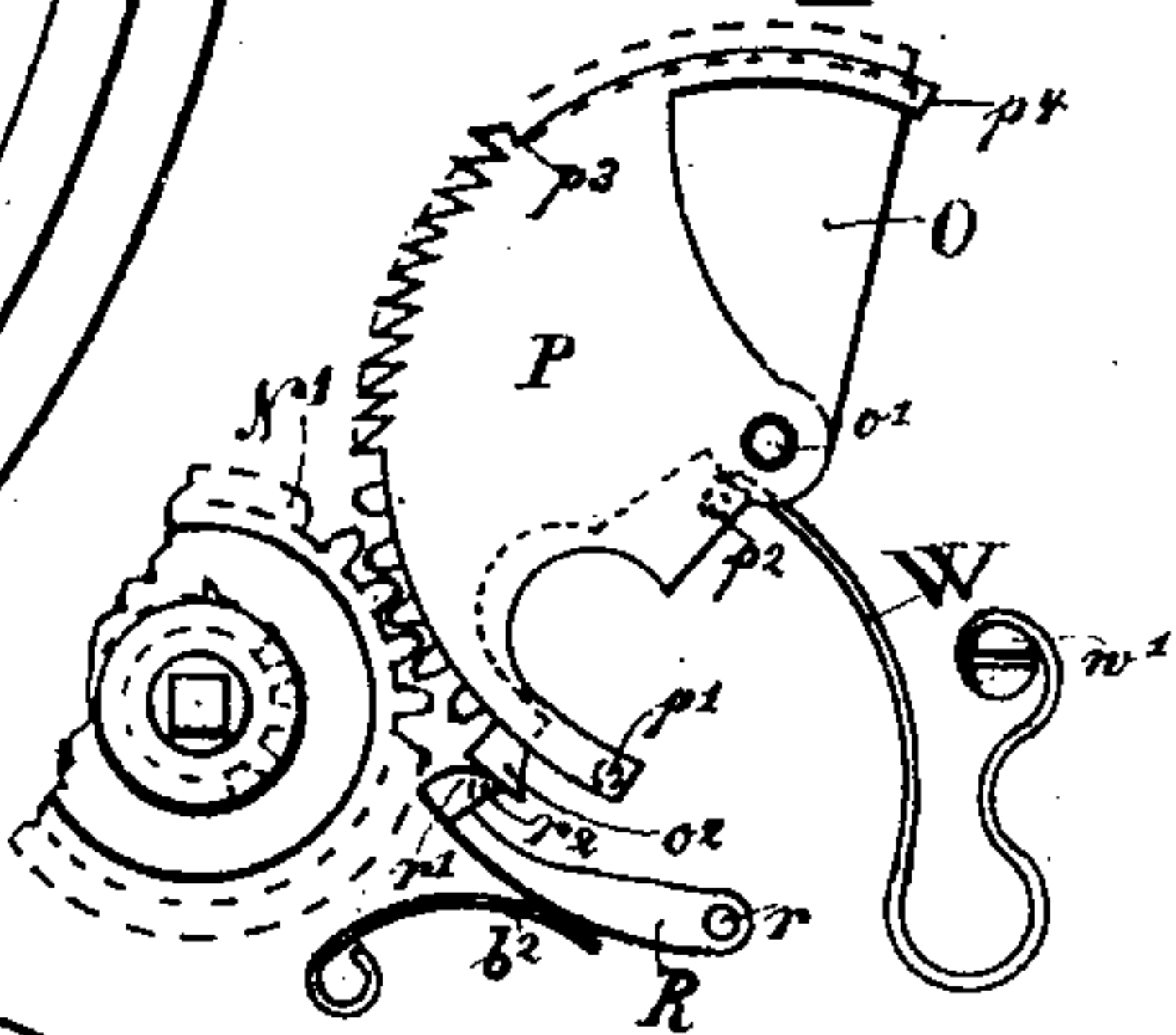


Fig-2a

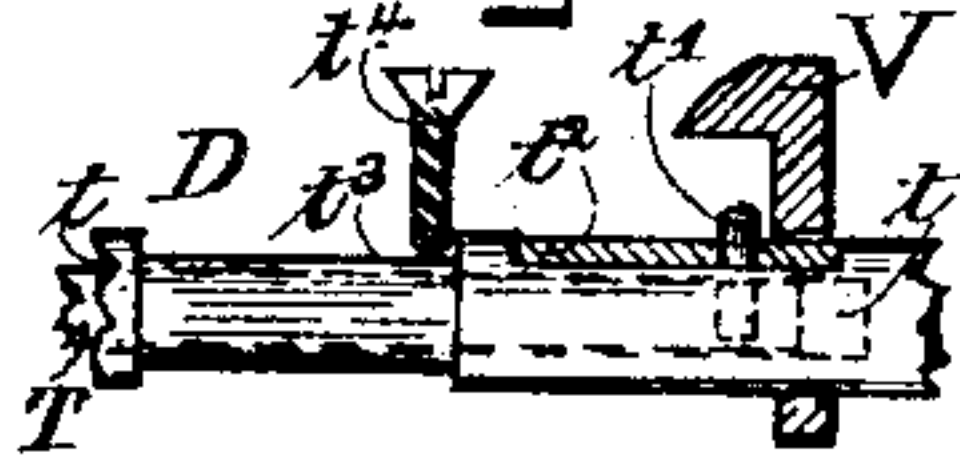
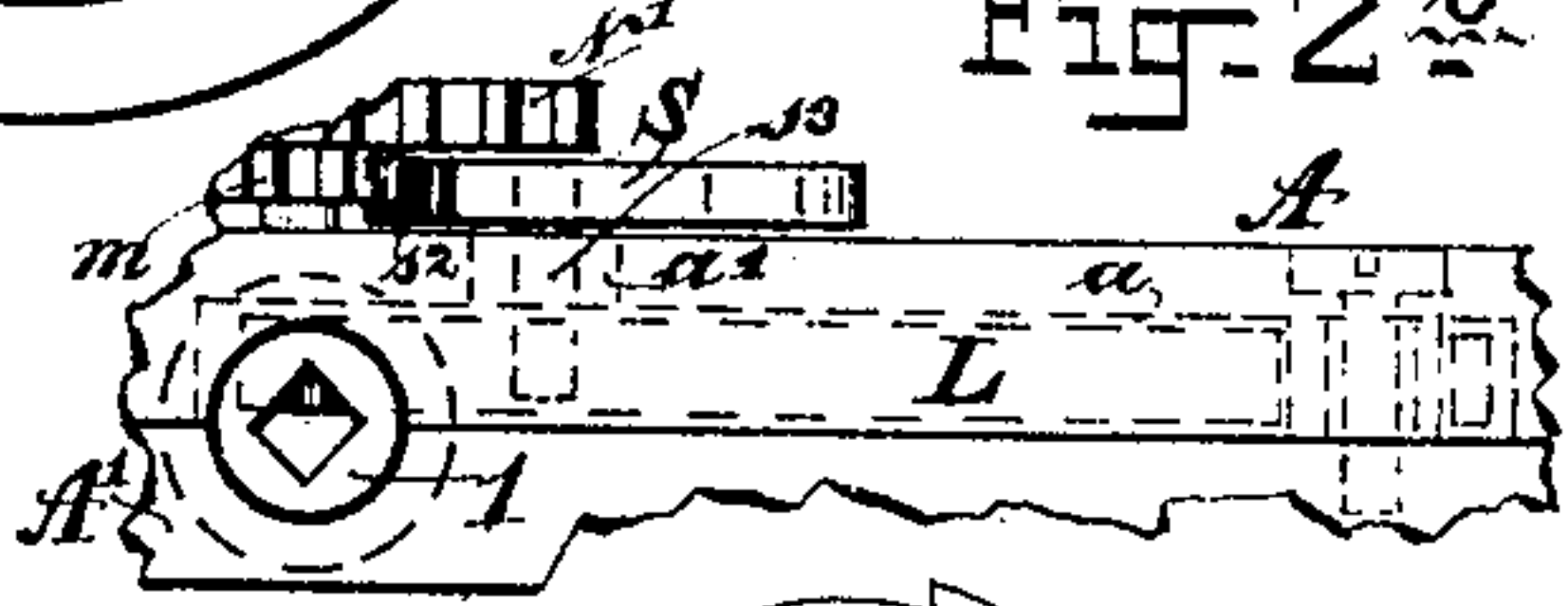


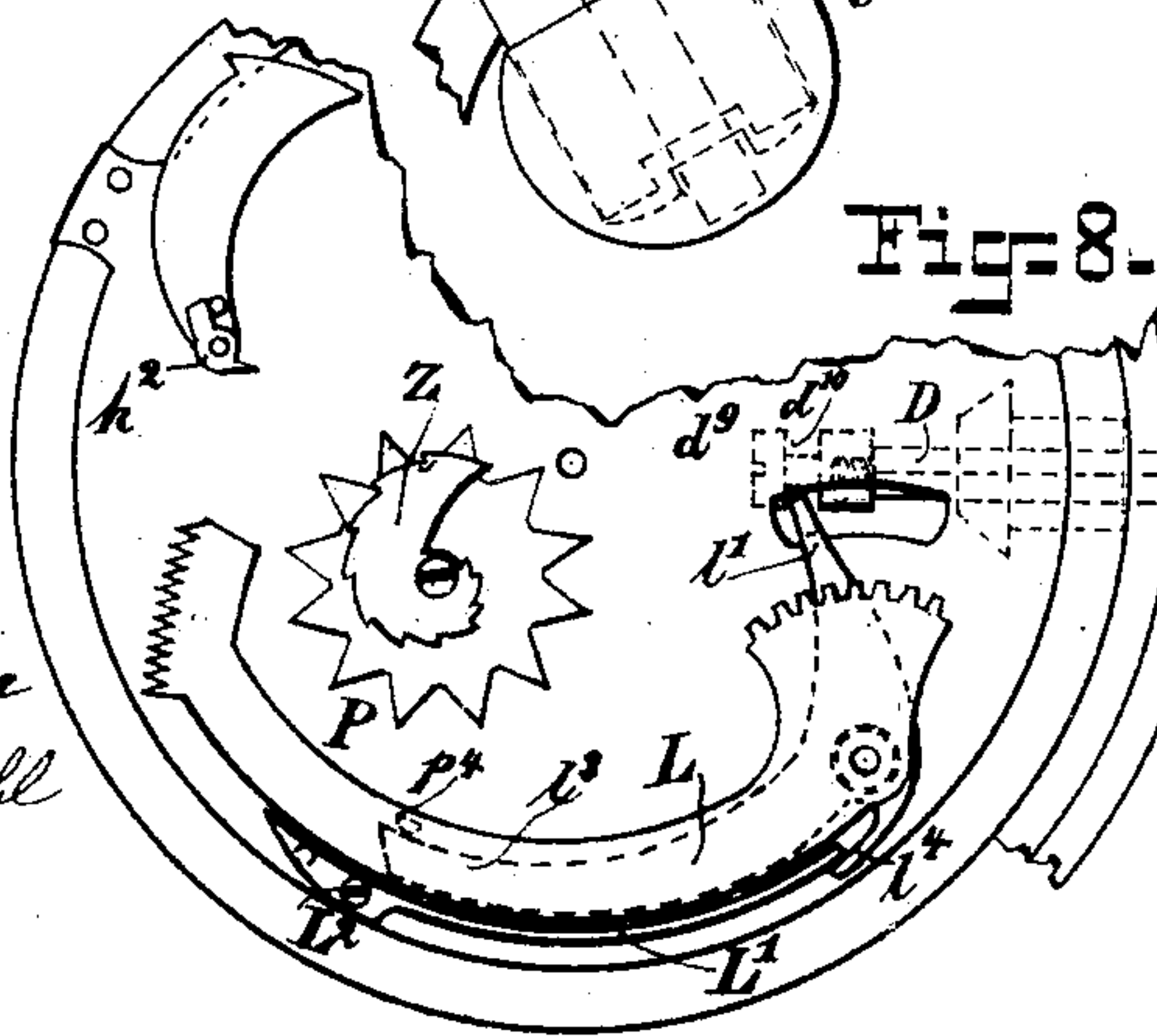
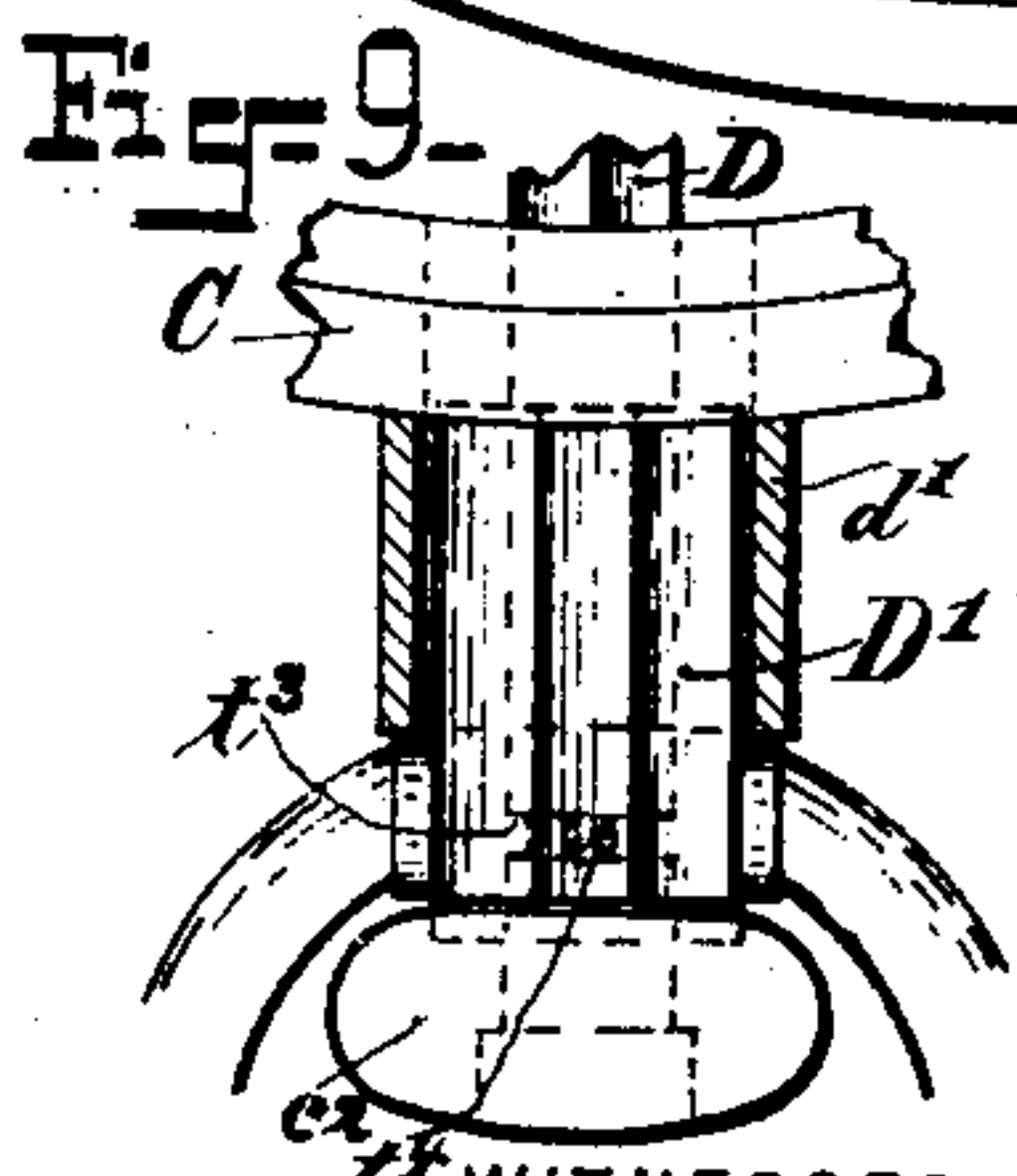
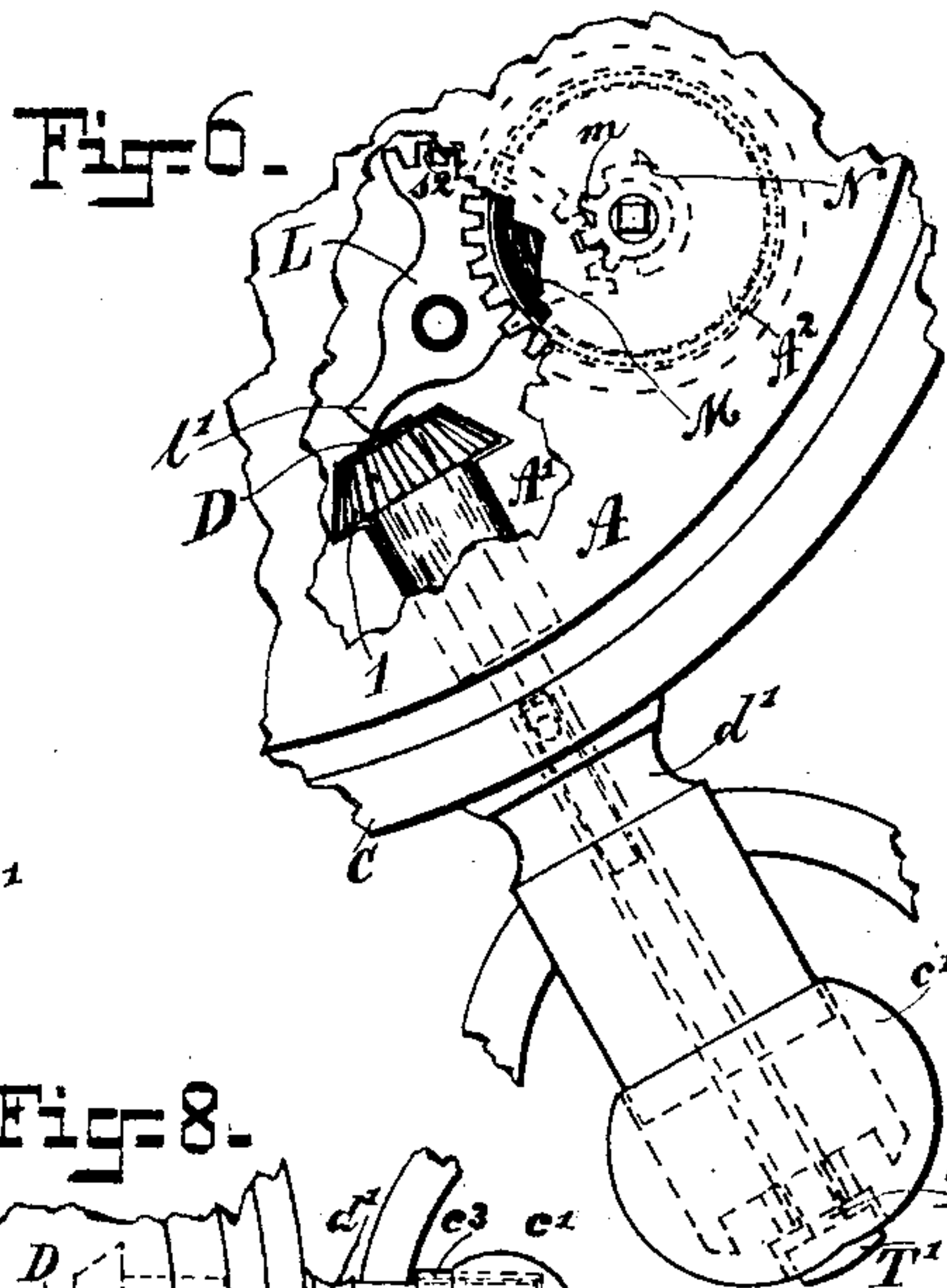
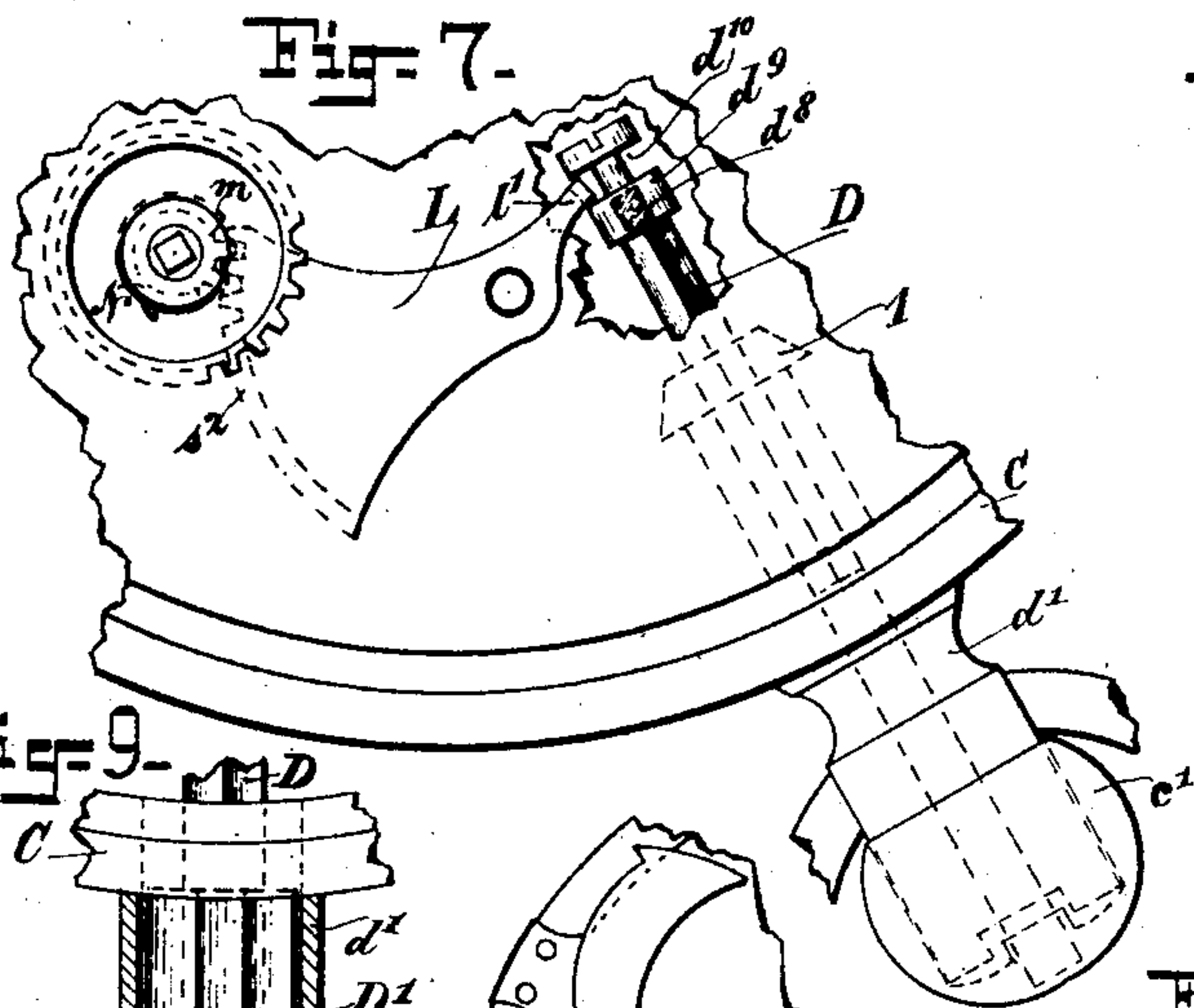
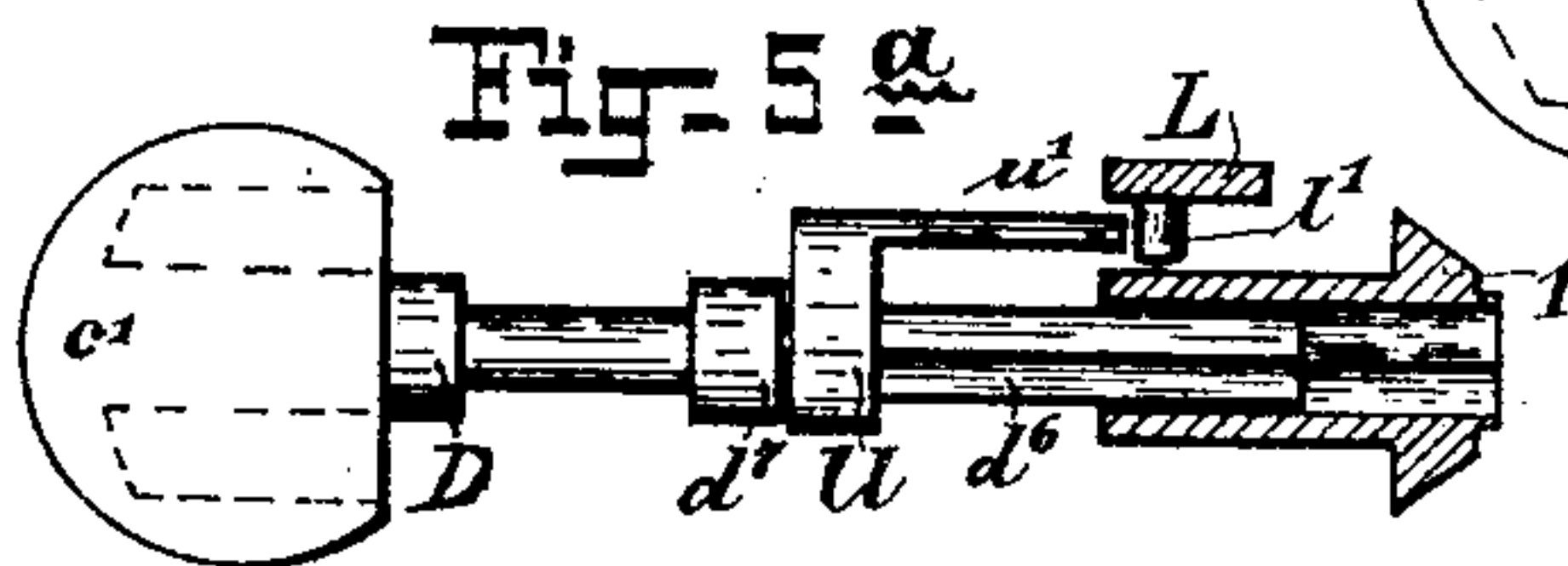
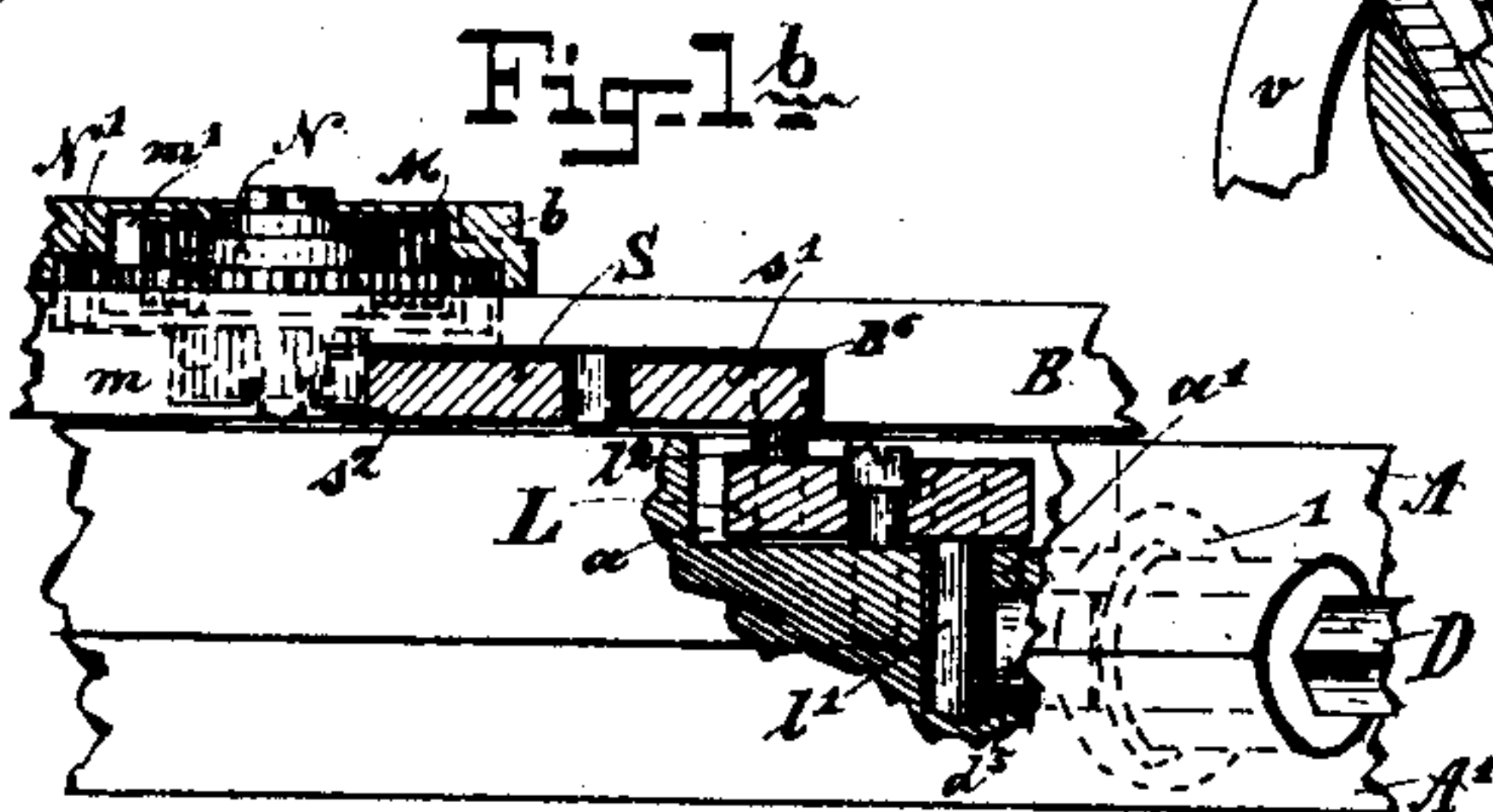
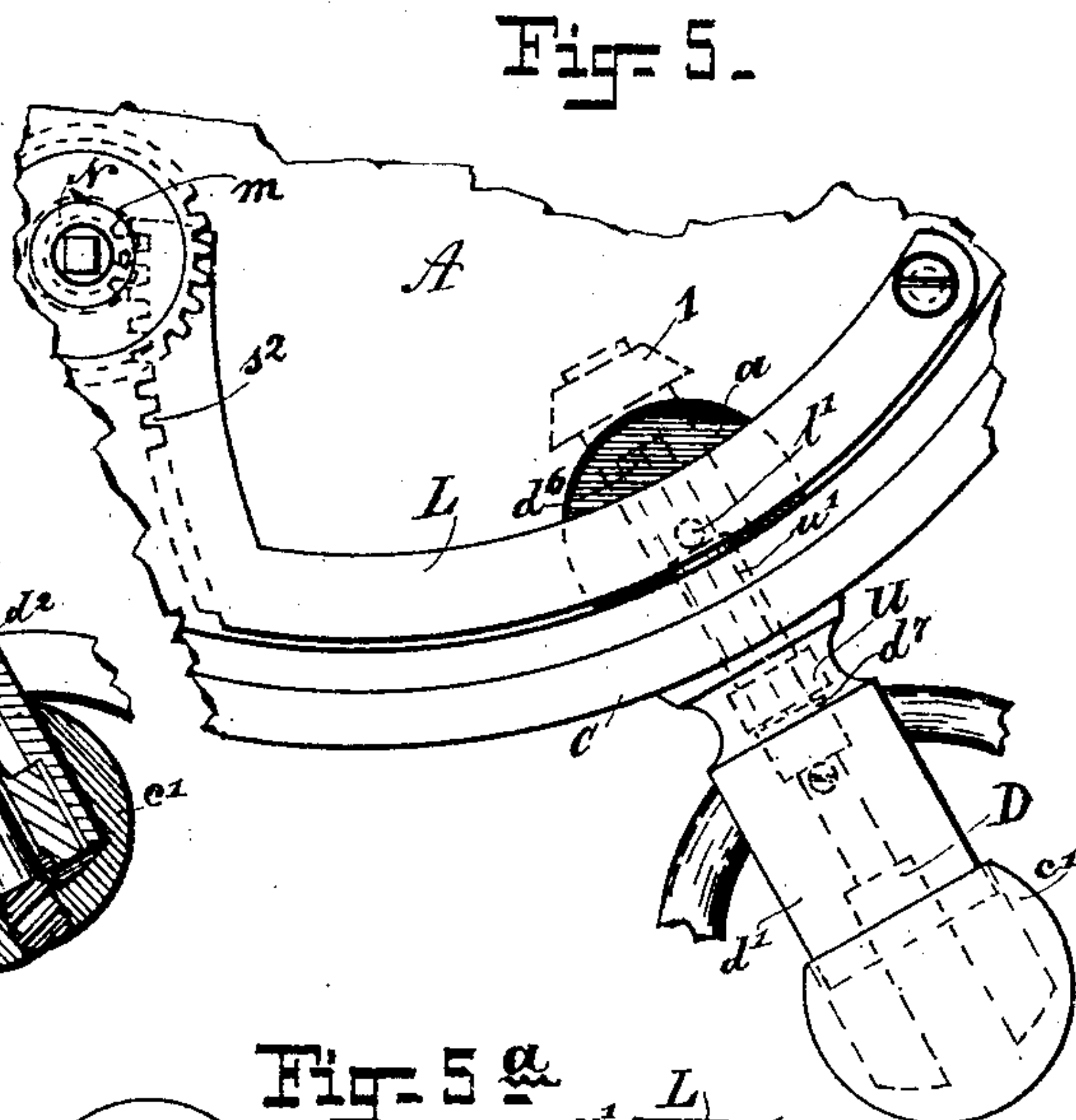
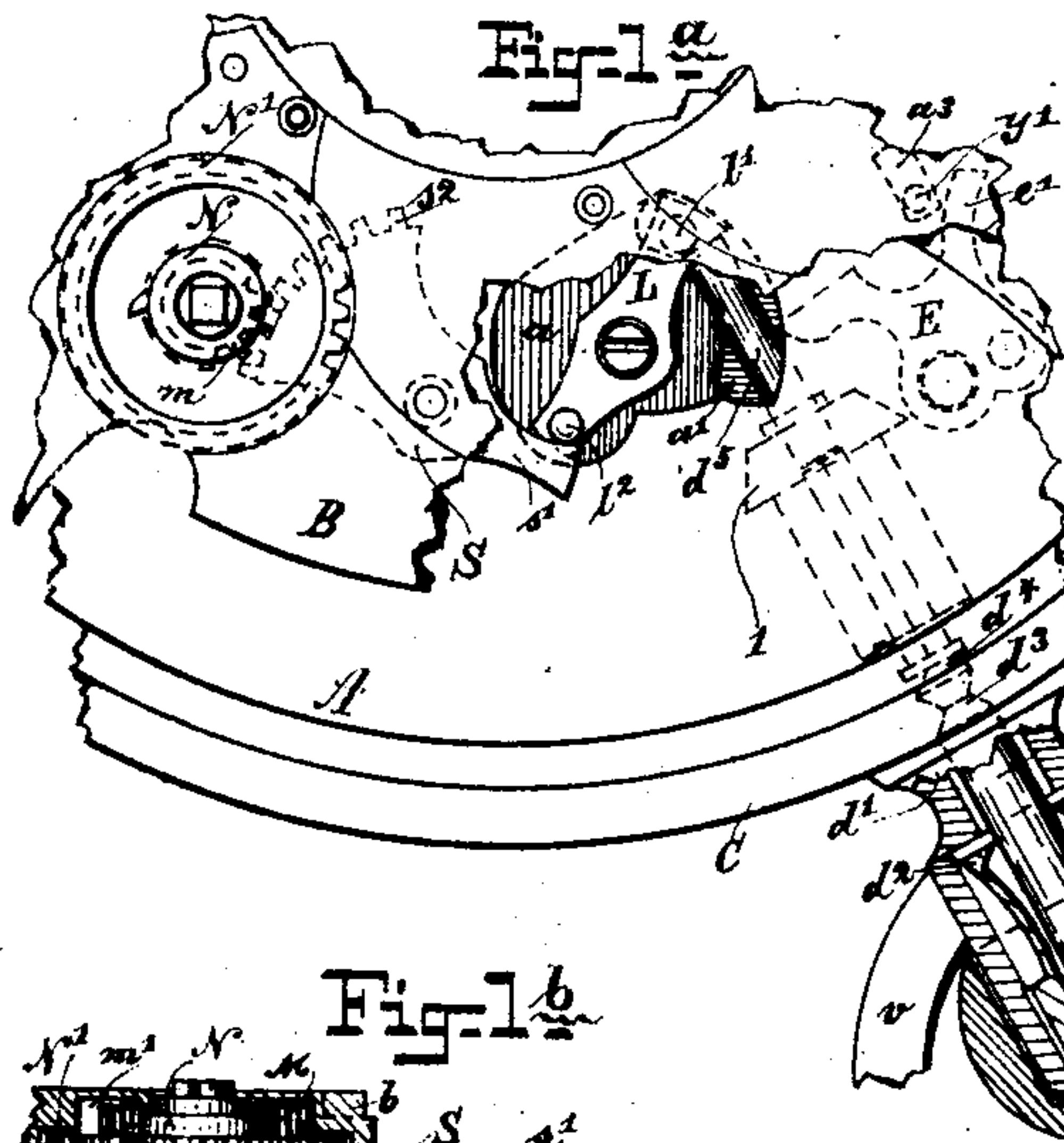
Fig-2b



F. TERSTEGEN.
REPEATING MECHANISM FOR TIMEPIECES.

No. 502,918.

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No. 502,918.

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Fig. 1^d

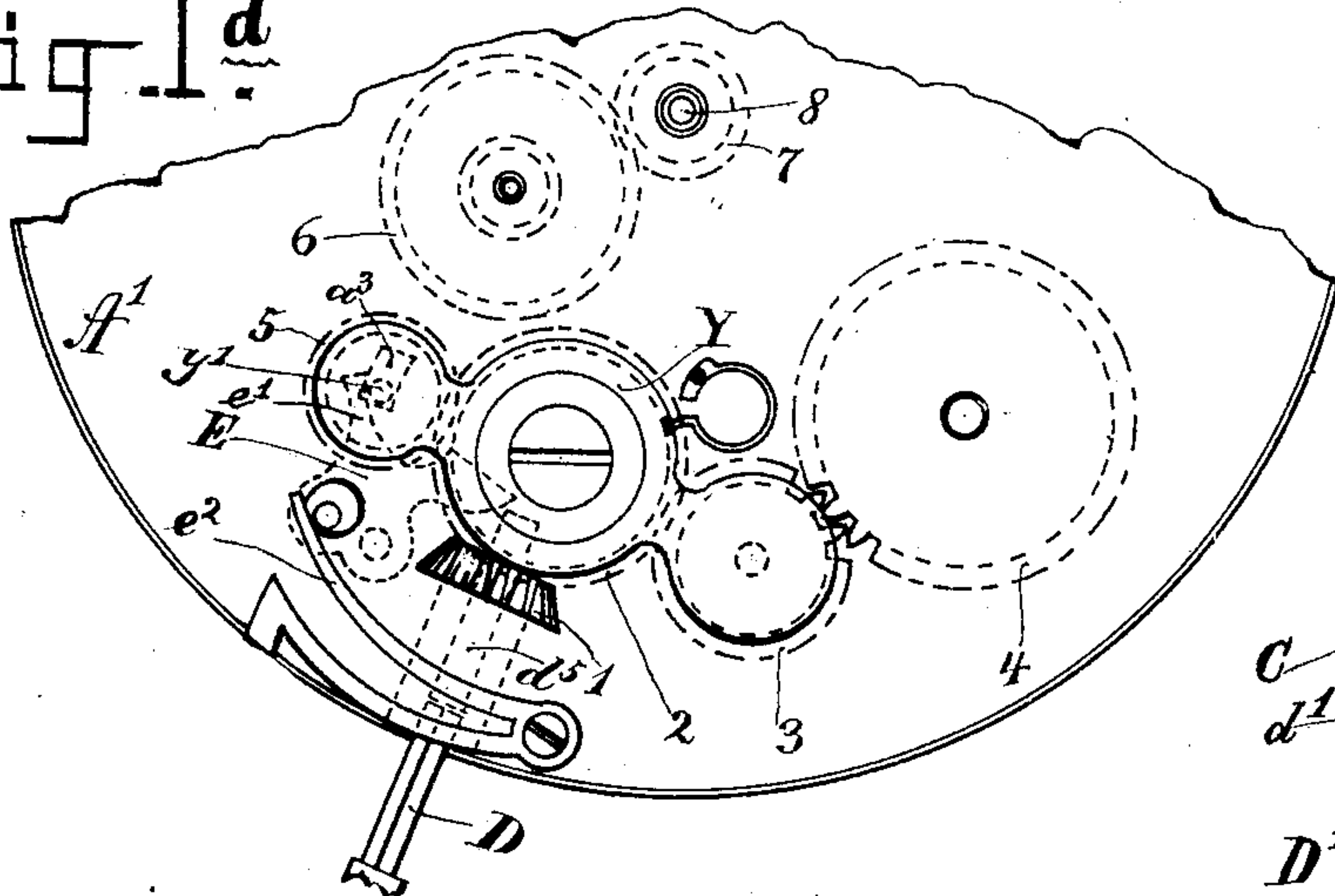


Fig. 9^a

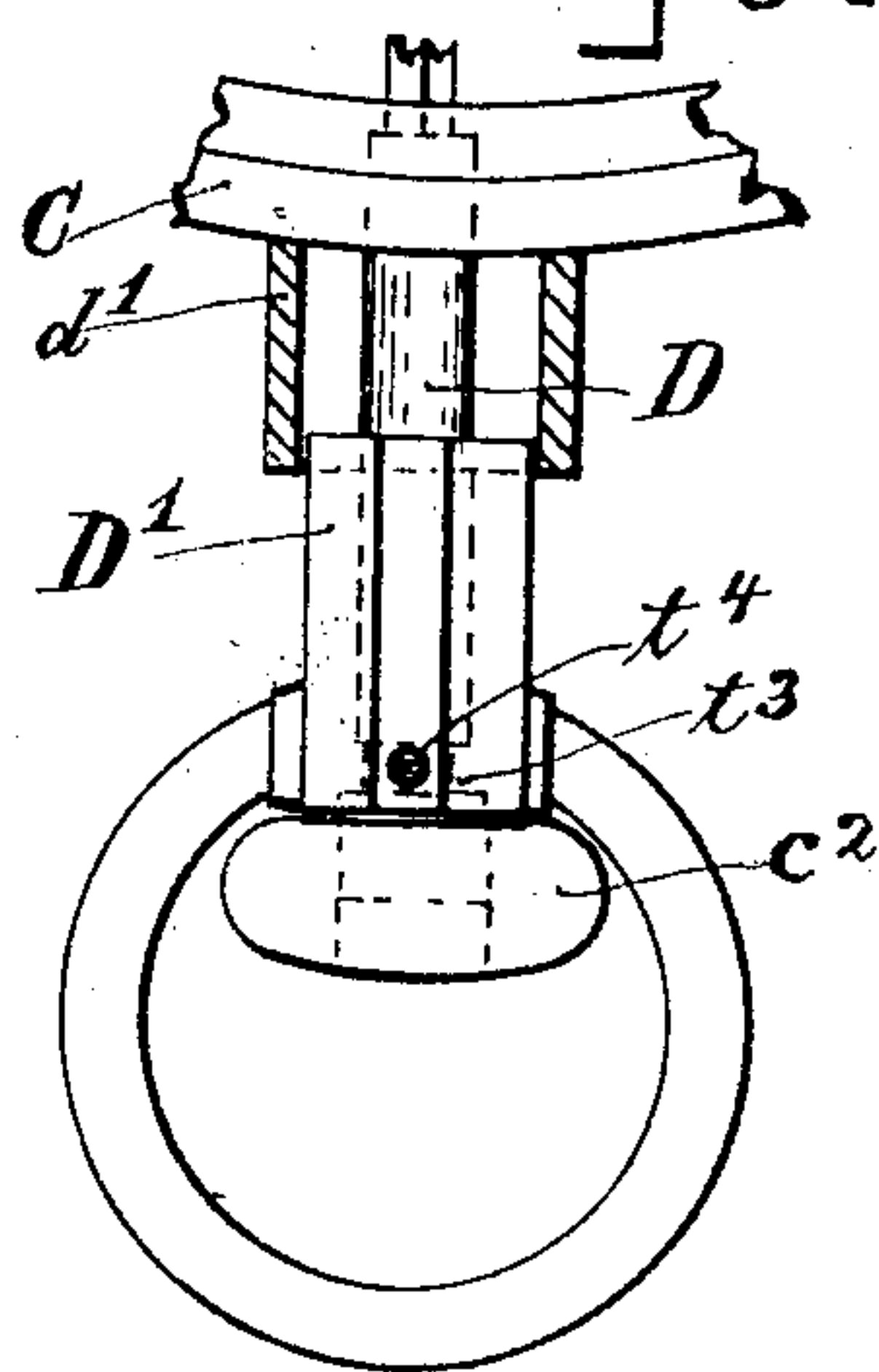


Fig. 1^c

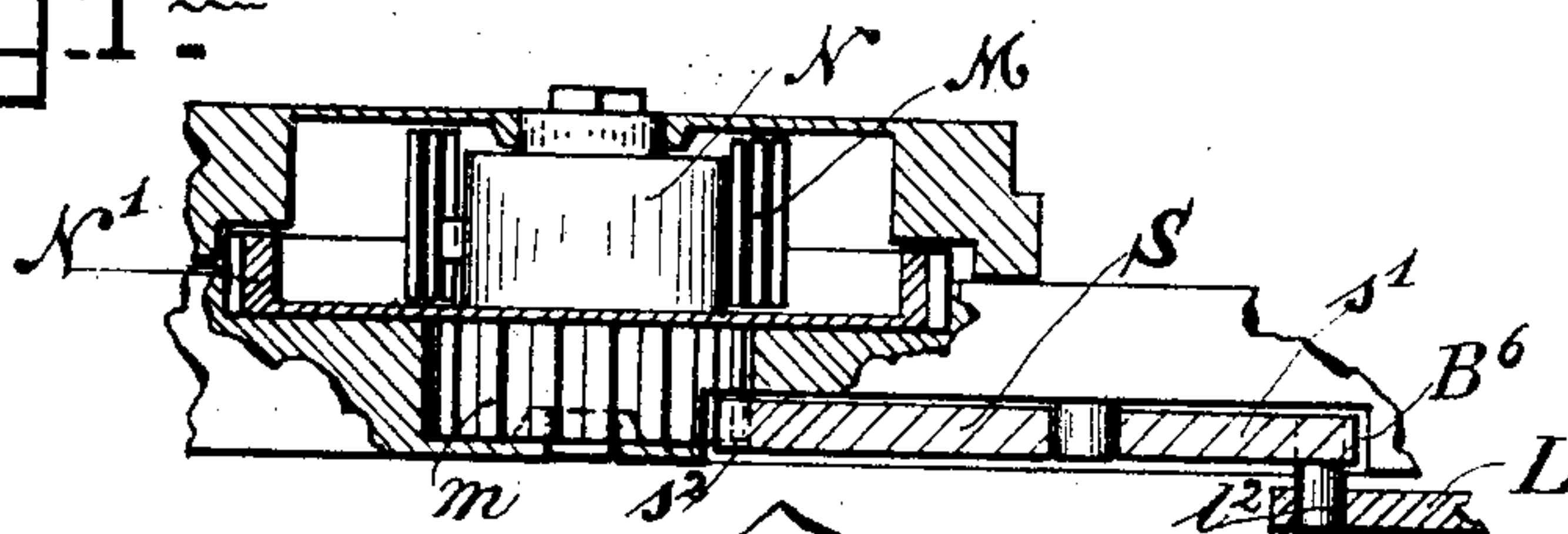


Fig. 2^c

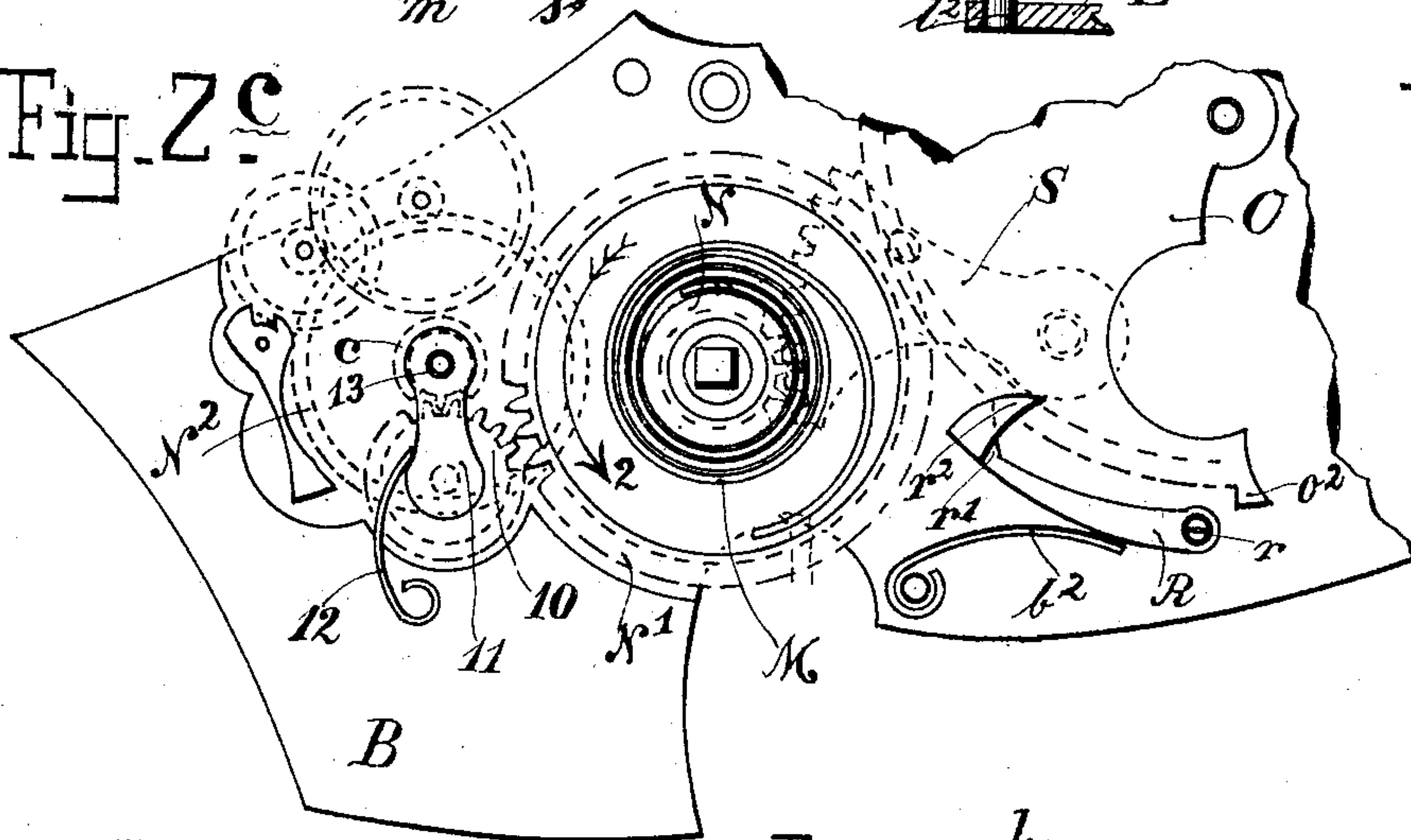
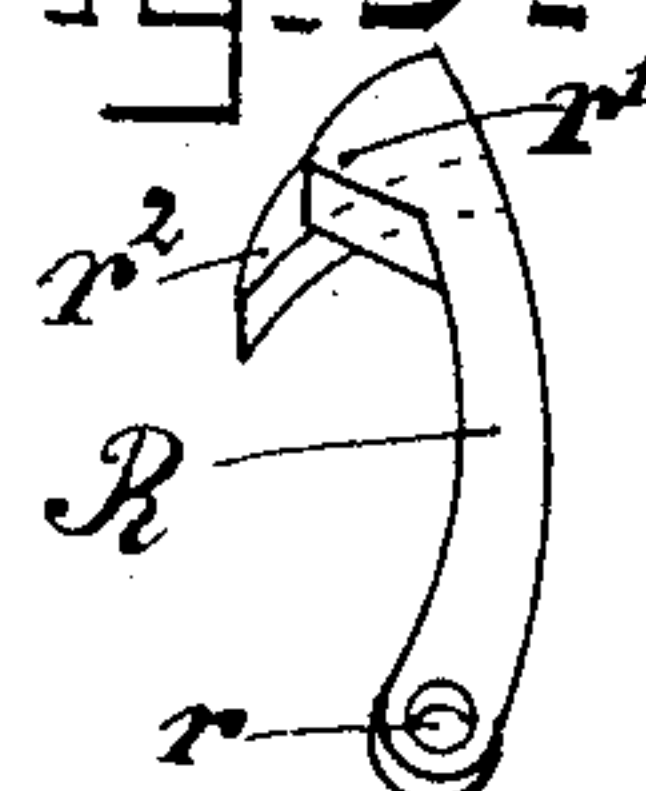


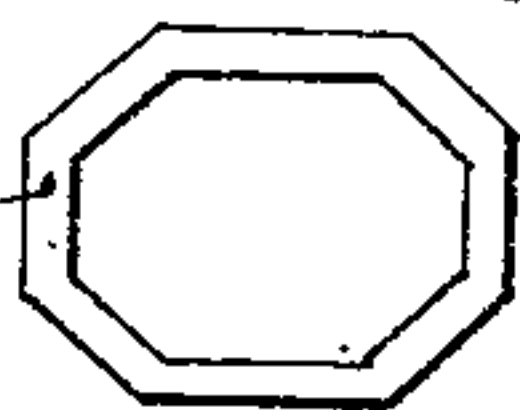
Fig. 3^c



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Fig. 9^b



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FRED TERSTEGEN, OF ELIZABETH, NEW JERSEY.

REPEATING MECHANISM FOR TIMEPIECES.

SPECIFICATION forming part of Letters Patent No. 502,918, dated August 8, 1893.

Application filed June 16, 1890. Serial No. 355,671. (No model.)

To all whom it may concern:

Be it known that I, FRED TERSTEGEN, a citizen of the United States, and a resident of Elizabeth, in the county of Union and State of New Jersey, have invented a new and useful Improvement in Repeating Mechanism for Watches and other Timepieces, of which the following is a specification.

This invention relates to an improved repeating mechanism for watches and other time-pieces and the manner of actuating the repeating mechanism by means of a longitudinally-movable stem.

The invention consists in actuating a repeating mechanism by means of a longitudinally-movable stem, that is also adapted to operate a winding mechanism of a watch by turning the said stem and that actuates a repeating mechanism, when the said stem is moved lengthwise.

The invention also consists in the construction and combination of parts and details of construction as will be fully described and set forth hereinafter and finally pointed out in the claims.

In the accompanying drawings Figure 1 is a face view of a part of a watch and watch-case showing my improved stem shifting mechanism for repeating watches, by which the watch can be wound and set and by which a motor-spring of a repeating mechanism can be retracted and the said mechanism started, parts being broken out and the case-pendant mechanism shown in section, also showing the moderating-gear. Fig. 1^a (Sheet II) is a similar view representing a part of Fig. 1 and representing the action of the stem shifting mechanism in connection with the levers of the repeater motor. Fig. 1^b is a sectional edge elevation of Fig. 1^a showing the stem and lever motions for retracting the motor spring M and the seat therefor in the bridge *b* (partly shown in section). Fig. 1^c represents the motor spring in tension. Fig. 1^d represents a part of the front plate of the watch showing the winding and setting mechanism. Fig. 2 (Sheet I) is a face view of a part of a watch and watch case showing a modified construction of the stem shifting mechanism, adapted for closed or hunting case watches and showing the case-pendant in section, also showing a modified construction of the lever actuat-

ing mechanism and of the moderating gear. Fig. 2^a is a side view of a part of the stem, detached from the pendant, also showing the closing or case-spring V in section and illustrating the manner of operating the same. Fig. 2^b is a sectional edge elevation of a part of Fig. 2, showing by dotted lines the seat for the lever L, that is engaged by the stem (the said stem being detached) also showing the segment S engaged by the said lever, by which the same is operated and which actuates the arbor-wheel N' (partly shown). Fig. 2^c represents on an enlarged scale the motor spring and shiftable wheel of the winding gear and the releasing lever. Fig. 3 is a face view of my improved repeating mechanism arranged on the plate B and detached from the watch. Fig. 3^a is a detail face view of the arbor-wheel for moving the segmental wheel O and illustrating the action thereof in connection with the releasing-lever R and rack P controlled by its spring. Fig. 3^b is a side view of the said wheel O, rack P and releasing-lever R. Fig. 3^c is a detached perspective view of the releasing lever showing its hook and step. Fig. 4 is a detail view of a modified construction of the stem shifting mechanism, adapted to closed or hunting case watches and showing the case-pendant in section and the other parts detached from the watch-case and watch. Fig. 5 (Sheet II) is a face view of a part of a watch and watch case, showing a modified construction of the stem shifting mechanism, and a modified construction of the lever actuating mechanism of the arbor for the motor. Fig. 5^a is a detail view of the stem actuating mechanism for the lever L, detached from the case and watch. Fig. 6 is a face view of a part of a watch and watch case, showing a modified construction of the lever actuating mechanism for the motor. Fig. 7 is a similar view, showing a modified construction of the stem shifting mechanism, also of the lever actuating mechanism for the motor. Fig. 8 is a similar view, showing a modified construction of the lever actuating mechanism directly in connection with the rack for setting the same. Fig. 9 is a detail view of a modified construction of the stem shifting mechanism, showing a part of a watch-case and the pendant modified. Fig. 9^a represents on an enlarged scale the pendant with the

stem drawn out, and Fig. 9^b is an end view of the pendant, which is preferably of an octagonal form.

Similar letters and figures of reference indicate corresponding parts.

A' represents the front watch-plate, which is fitted to and secured in the case C in the usual manner. Within the pendant *d'* is journaled a stem-arbor D, the inner end of which enters into and engages the winding-pinion 1 which is journaled in a suitable bearing between the front watch plate A' and top or back plate A. The winding-pinion 1 engages a crown-wheel 2 (shown in dotted lines in Fig. 1) placed on the exterior surface of the front plate and under a yoke Y pivoted in the usual manner to the said plate. At one end of the yoke is pivoted an intermediate winding-wheel 3 engaging the barrel-arbor wheel 4 (partly shown) when the yoke is in its winding position.

5 is the intermediate setting-wheel for transmitting the motion of the winding stem D to the dial-wheels, when the yoke is in its setting position.

6 is the minute-wheel and 7 the cannon-pinion, placed on the center-post 8, these wheels being called the dial-wheels as shown in Fig. 1^a.

The stem-driven train as described and illustrated in dotted lines in Fig. 1 is in its winding position and is brought to the hand-setting position in the following manner: In the pendant *d'* of the watch-case is placed a sleeve carrying the stem-springs *d*², which catch the stem D in the annular grooves *d*³ and *d*⁴ formed in the said stem. In the hollow winding-pinion 1 is inserted a sliding or push-piece *d*⁵ which bears against a setting-piece E, pivoted to the watch-plate and provided with an arm *e'* that turns the yoke by a stud *y'* fastened to the said yoke and projecting through an opening *a*³ of the plate A'. When the stem D is drawn out a short distance until the stem-springs engage the groove *d*⁴ of the stem and hold the same, the sliding-piece *d*⁵, the end of which within the pinion bears against the end of the stem, is caused to follow the motion of the stem by the pressure against it of the setting-piece E, the said setting-piece being turned on its pivot by the spring *e*², thereby moving by its arm *e'* the stud *y'* of the yoke toward and onto the end of the said arm, whereby the yoke is turned so that the setting wheel 5 is brought in gear with the dial-wheel 6, and the stem-driven train is in the hand-setting position. But when the stem is pressed inwardly until the stem-springs *d*² catch the stem in the groove *d*³, the sliding-piece *d*⁵ is forced against the setting-piece E and turns the same so that the end of its arm *e'* is moved away from under the stud *y'* of the yoke and the same is swung back by its yoke-spring as usual, whereby the setting-wheel 5 is disconnected from the dial-wheel 6 and the wheel 3 is brought in gear with the barrel-arbor wheel 4 and the stem-

driven train is in the winding position, as shown in Fig. 1^a.

At one end of the stem is fastened a crown *c'* by which the same is operated and on its other end is provided with a square whereby the winding-pinion is turned.

The above described mechanism of a stem winding and setting watch is of well known construction and my invention which is applied thereto will now be described.

The stem D is arranged to be movable longitudinally inside the winding-pinion so that the crown *c'* can be pressed fully toward the watch-bow or ring *v*, where the same is attached to the pendant *d'* as shown in Fig. 1^a. The sliding-piece *d*⁵ being pressed inward turns the setting-piece E aside and it rests against the edge of the said sliding-piece so that the arm *e'* is moved away from the stud *y'* of the yoke. A lever L is pivoted to the watch-plate A, a suitable seat *a* in the same being arranged for it. The said lever is provided with studs or pins *l'* and *l*². The stud *l'* projects from the lever on its under side and passes through an opening *a'* provided for it in the said plate so that it can be engaged by the sliding or push-piece *d*⁵. The other stud *l*² projects from the said lever on its upper side and engages a segment-lever S provided with an arm *s'* and thereby turns the same. The said segment is pivoted in a seat B⁶ provided for it on the under side of the plate B, the said plate being arranged to carry a repeating mechanism; but the racks, snails, hammers and springs are removed therefrom and will be hereinafter described. The said plate is broken out so as to expose the parts placed under the same. The segment S has on its opposite end teeth *s*² which engage the pinion *m*, suitably attached to the arbor N and gear-wheel N', as shown in Figs. 1, 1^a and 1^b. The said arbor is provided with a suitable catch for retracting the motor-spring M of a repeating mechanism placed in a seat *m'* provided for it in the bridge *b*, as shown in Fig. 1^b.

The operation of winding the motor-spring of the repeater is as follows: The stem D by its crown *c'* is pressed or pushed inwardly from its normal position of rest (shown in Fig. 1) into the position shown in Fig. 1^a, whereby the sliding-piece *d*⁵ presses against the stud *l'* of the lever L and turns the said lever, which by its other stud *l*² engages the arm *s'* of the segment S and turns the same, so that its teeth *s*² in gear with the pinion *m* on the arbor N turn the same, as shown in Fig. 1^a, whereby the said arbor with its catch retracts the motor-spring M, so that the same is brought in tension as shown in Figs. 1^b and 1^c and has a tendency to return the said parts to their normal positions, as shown in Fig. 1.

The arbor N, that engages the motor-spring may be fastened to the wheel N', so that the said wheel is turned by the pinion *m* as before described. The wheel N' is in gear with a pinion *c* fastened to the wheel N². The said wheel

N² engages a pinion or wheel 10, pivoted to one end of a lever 11, which is pivoted at its other end at 13 to the plate and is controlled by a spring 12. The said pinion 10 gears with pinion 14 attached to the wheel N³, which meshes with a pinion attached to the escapement-wheel N⁴ that oscillates an escapement N⁵. When the arbor N is turned to retract the motor-spring, the wheel N' turns the pinion c and wheel N² in the direction of its arrow 1, whereby the pinion 10 on the lever 11 clears the teeth of the said wheel N² and is pressed aside as shown, while when the wheel N² is moved in the opposite direction the pinion 10 is engaged thereby, its lever 11 being pressed back by its spring 12 and the said pinion is rotated and turns the pinion 14 of the wheel N³ which transmits the motion to the escape-wheel and escapement. The said parts form together the moderating-gear, which serves to regulate the speed of the wheel N' on the arbor N for the motor-spring on its return motion.

In Figs. 2 and 3 the shiftable pinion or wheel 10 is arranged in gear with the other or first pinion c of wheel N² and is brought in and out of engagement with the wheel N' on the arbor N in the following manner: On the staff of the pinion c is pivoted at 13 the lever 11 which carries the said pinion 10, which is in gear with the pinion c, as shown. During the motion of the arbor-wheel N' in the direction of its arrow 2 (shown in Figs. 2 and 2^c) the moderating-gear is not operated as the said pinion 10 on the lever 11 is moved aside and clears the teeth of the said arbor-wheel, while the motor-spring is being retracted while during the return motion of the same, (shown by the arrow 3 in Fig. 3) the said pinion 10 by its lever 11, is thrown in gear with the arbor-wheel N' by the action of the lever-spring 12, fastened to the bridge b.

The arbor-wheel N' may be actuated by a stem shifting mechanism as follows: In Fig. 2 the stem D is provided with a push-pin that operates a case-spring or closing-spring V of a watch-case. The said spring is for the purpose of holding the front cover of the watch-case closed. The stem D passes through the hole of the closing-spring V and engages the winding-pinion 1. The said stem is partly hollow and into the hole t a push-pin T is placed, provided on its end with a pin or screw t' which projects through an opening or slot t² in the hollow part of the stem D and shown in detail in Fig. 2^a. The said projecting pin bears against the case-spring V. The push-pin T is also provided with a push-plate T' attached on its outer end and is arranged to press against it with a finger, so that the push-pin T with its pin t' presses the closing-spring V backward or away from the cover of the case to release the same. The stem D can also be pressed inward and independently of the push-pin T as the shape of the slot or opening t² does not interfere with the pin t' of the push-pin. The said stem may be provided with a broad annular groove t³ to

receive the point of a screw t⁴ by which the said stem may be held in the pendant as shown in Fig. 2^a. The crown c' is suitably fastened to the stem D and may be arranged with a seat T² for the push-plate T' as shown in Fig. 2. In this figure is also shown the lever L modified. The same is placed on the under side of the back plate A in a seat a provided for it, as shown in dotted lines in Fig. 2^b and is pivoted to the same at one end. The other free end of the lever rests against the hollow center of the winding-pinion 1 in position to be engaged by the stem D. The toothed segment S is provided with a pin s³ projecting through an opening a' arranged for it in the plate A and bears against one side or edge of the lever L. The said parts are operated in the following manner: The crown c' is pressed toward the watch-case C, whereby the stem D is moved inward. The end thereof bears against the lever L and turns the same on its pivot. The opposite edge of the lever L bears against the pin s³ of the toothed segment S, which is turned thereby. The said segment is, as before described in gear with the pinion m of the arbor N and wheel N', which retracts the motor-spring.

The mechanism for transmitting the motion from the motor-spring to the racks and hammers consists of the wheel O engaged by the arbor-wheel N'. The said wheel O is preferably made as a segment pivoted to the plate B at o' and is provided on its end with a projection or shoulder o², as shown in Figs. 3 and 3^a. The hour-rack P is placed above the wheel O, said rack P being provided with a pin or screw-head p', projecting from its under side which rests behind the shoulder o² of the wheel O and by which the said rack P is carried along and returned to its normal position of rest as shown in Fig. 3. The rack P has another pin or screw-head p² near its center or pivot, projecting also from its under side and against which the free end of the rack-spring W is placed, the other end of the said spring being fastened to the plate B at w' by a suitable screw. The said spring W serves for setting the said rack with its snail-piece p⁴ against the hour-snail Z. The rack P is further provided with a notch or shoulder p³ arranged preferably on its first ratchet-tooth, which is engaged by a releasing-lever R, when the rack P is in its normal position of rest as shown in Figs. 3 and 3^b. The said releasing-lever R is pivoted at r to the plate B, and is controlled by its spring b². The said lever is provided with a sharp-pointed hook or detent r², which projects from its upper side face and engages the said shoulder p³ of the rack P, and holds thereby the said rack in this position, until it is moved aside or away from it. The lever R is provided with another step r' (Fig. 3^c) arranged below the said projecting hook and which comes in contact with the projection or shoulder o² of the wheel O, when the same is turned toward and

against the said step r' of the releasing-lever R, whereby the same is moved aside and its upper hook r^2 being disengaged from the notch or shoulder p^3 of the rack P, the said rack is oscillated by its spring W as soon as released from the said hook of the lever R as shown in Fig. 3^a. Another rack Q is placed above the rack P, having near its center-hole an incut or shoulder q^2 , against which the free end of the rack-spring X is placed, which is fastened at x' to the bridge b . Said spring serves for setting the rack Q with its snail-piece q^4 against the snail K. The said rack Q is further provided with a pin or screw-head q' projecting from its under side and which rests behind an edge or shoulder of the rack P by which the said rack Q is carried along and returned to its normal position as shown in Fig. 3. The snail K is placed on the center-post. In connection with the snail K, the arm k^2 of the surprise k' at the full hour turns one tooth of the star-wheel Z', attached to the hour-snail Z, as usual in repeaters.

On the star-wheel Z' the jumper J acts, being controlled by its spring j' , the spring being secured at one end to the plate B by the screw j^2 . The star-wheel and snail Z are placed on a pivot at z in its seat B⁷ provided for it in the plate B as shown in Fig. 3.

The operation of the repeating mechanism is as follows: The crown c' is pressed toward the watch, whereby its stem D is moved inwardly through the winding-pinion 1 and its end behind the said pinion acts on the lever L and moves said lever in the direction of the arrow 2^a shown in Fig. 2. The lever L engages the pin s^3 of the segment S and turns the same, whereby its teeth s^2 in gear with the pinion m of the arbor N and wheel N' turns the same in the direction of the arrow 2, whereby the catch on the arbor N in engagement with the motor-spring M (shown and described in Fig. 1^b) actuates the same. At the same time the arbor-wheel N' in gear with the segmental-wheel O turns the same from its normal position of rest (shown in Fig. 3) into the position shown in Fig. 3^a, whereby the projection or shoulder o^2 is brought in contact with the step r' of the releasing-lever R so that the said projection o^2 of the wheel O presses the releasing lever aside and disengages the hook or catch r^2 of the same from the shoulder p^3 of the rack P. The spring W instantly sets the said rack with its snail-piece p^4 against the snail Z. The other rack Q being released, simultaneously follows by the action of its spring X in the same direction the movement of the rack P, but is stopped by its snail-piece q^4 coming in contact with the snail K sooner. During the said movement of the arbor-wheel N' in the direction of its arrow 2, Fig. 2, the moderating-gear is not actuated, the pinion or wheel 10, that transmits the motion from the arbor-wheel to the moderating-gear, being disengaged, while during the return motion of the said arbor-wheel the pinion 10 is engaged and ro-

tated thereby, so that the speed of the wheel O and racks P and Q is regulated on their return motion. The motor-spring in the seat m' and arranged on the under side of the bridge b (shown in Figs. 1^b and 3) now being retracted and brought in tension, has a tendency to return the said parts back to their normal position, whereby the segmental-wheel O with its shoulder o^2 engages the pin p' of the rack P and turns the same back and the ratchet-teeth which are set beyond the hammer-tooth h^2 engage the same and operate the hour-hammer H which is forced by its spring F against the bell-wire G. After the last stroke of the hour the said rack P then by its return motion comes in contact with and against the pin q' of the rack Q (which is in this case a five-minutes' rack) and turns the same back to its normal position as shown in Fig. 3. At the full hour the said rack is stopped by the longest step of the snail K, so that no rack-teeth are set beyond the hammer-tooth i^2 which therefore cannot be actuated, but if the snail K is turned, so that the snail-piece q^4 of the rack can be set against the second step of the said snail, the first tooth of the said rack next the hammer-tooth i^2 is moved beyond the said hammer-tooth and actuates the same by the return motion, which operates the hammer I, that is forced against the bell-wire G' by its spring f^2 , and each stroke represents five minutes past the full hour. When the racks are returned to their normal position, the catch or hook r^2 of the releasing-lever R is pressed by its spring b^2 behind the ratchet teeth of the rack P and engages the notch or shoulder p^3 and holds thereby the said rack in place.

The repeating mechanism, described and shown may be attached directly to the watch instead of to the plate B and thereby placed in the watch. If desired, quarter and minute-striking devices may be arranged in connection with the rack P, in which case differently divided striking-racks are employed.

The stem-shifting mechanism for retracting the motor-spring and for starting the repeating mechanism may be arranged in various ways, for instance: In Fig. 4, the stem D is used to act upon the case-spring V and is provided with a crown c^2 . The said stem has a short annular groove t^3 to receive the point of a holding screw t^4 by which it is held in the pendant d' . The stem D is also provided with a narrow slot or opening t^2 in which a pin or screw t' attached to the push-pin or stem g projects and slides lengthwise and is used for holding the said push-pin g in the stem D. The end of stem D bears against the case-spring or closing-spring V and operates the same. The push-pin g passes through the tubular stem D and case-spring V and is provided with a square part d^6 which engages the winding-pinion 1 and is also arranged to engage a lever L as before described. When the crown c^2 is turned, the said slot t^2 of the stem D bears against the

pin t' and turns the same and the push-pin g with it, which turns by its square part d^6 the winding-pinion 1. When the push-plate or head g' of the push-pin g is pressed toward the crown c^2 , the squared part d^6 is moved forward and away from the said pinion and this motion is used for operating a lever L as described.

In Fig. 5 the lever L is not engaged by the square end of the stem from behind the winding-pinion 1 as before described, as it is not necessary to my invention that the lever should be operated in that manner.

The stem D is provided with an annular projection or collar d^7 against which a sleeve U is placed. The shape of the hole in the said sleeve is preferably round and such as to fit loosely upon the square d^6 , so that the sleeve cannot be turned, when the stem is revolved. The said sleeve is engaged by the collar d^7 of the stem, when the same is pressed by the crown c' inward, and the said sleeve is provided with an arm u' as shown in detail in Fig. 5^a, which bears against the stud or projection l' arranged on the lever L and by which the said lever is oscillated. The lever L is pivoted at one end to the watch-plate and in place of engaging a separate toothed segment S, as before described, the said lever L is provided with teeth s^2 , and engages thereby the pinion m on the arbor N directly. When the stem D presses the sleeve U inward its arm u' acts upon the stud l' of the lever L, and operates the same. A suitable seat a is provided in the plate A for the movement of the projection l' on the lever and for the arm u' of the sleeve U as shown in Fig. 5.

In Fig. 6 the manner of operating the stem is substantially the same as described and shown in Figs. 2 and 2^a, and illustrates the manner of actuating a lever L provided with a toothed segment s^2 , which meshes with and turns a pinion m of the arbor N, that retracts the motor-spring M. The said motor-spring is placed in a seat A^2 arranged on the under side of the plate A and the said lever L being pivoted to the front plate A', bears by its arm l' against the square end of the stem D, which is actuated by the pressure of the crown c' , toward the watch.

Instead of pressing the stem or push-pin inward, as before described, the stem may be arranged to be drawn or pulled out and this longitudinal motion of the stem may be used to retract the motor of the repeating mechanism as shown in Fig. 7.

The end of the stem D, which passes through the winding-pinion 1, is provided with a screw-thread d^8 , on which may be screwed a sleeve or nut d^9 , having an annular groove d^{10} that forms a seat for an arm or projection l' of the lever L and the sides of the said groove d^{10} engage the said lever and operate the same when the stem D is drawn or pulled out. The said lever is provided with a toothed segment s^2 engaging the pinion m of the arbor N. When the stem D by the crown c' is

drawn or pulled out the lever L is turned thereby on its pivot and its gear s^2 in engagement with the pinion m turns the same, so that the arbor N is revolved, which retracts the motor-spring and starts the repeating mechanism as described and shown in Figs. 1, 2 and 3.

Fig. 8 illustrates the manner of operating the lever L by the stem D as described and shown in the form of Fig. 7. The said lever actuates a rack P directly and sets the same with its snail-piece p^4 against the step of the snail Z, whereby its ratchet-teeth are set beyond the hammer-tooth h^2 . The said rack P may be returned to its normal position by a suitable motor-spring. The lever L is provided with two arms l' and l^2 , the former engaged by the nut d^9 attached to the end of the stem, the arm l' being placed in the groove d^{10} of the same, and the other arm l^2 engages the rack P at p^4 and sets the same. The lever L is also provided near its pivot with an arm or notch l^4 that is acted upon by the free end of the lever-spring L' fastened to the plate at L^2 , said spring causing the lever L to move back whenever it is released from the movement and pressure of the stem, and carries or shifts the said stem backward to its former position, so that it does not exert a retarding action on the return movement of the rack P. The stem D is attached to the crown c' , which is provided with a sleeve c^3 , to reduce in appearance the size of the crown. When the stem D is drawn or pulled out as described, the nut d^9 on its end acts on the arm l' of the lever L and turns the same on its pivot, whereby the other arm l^2 turns the rack P and sets the same in contact with its snail Z. The lever-spring L' moves the lever L back, which acts on the stem and shifts the same back to its normal position. If desired, quarter or minute striking devices may be arranged in connection with the rack P.

In Figs. 9 and 9^a instead of a crown c' which shifts over the pendant d' to actuate the stem D as described, I may employ a two part pendant d' and D' , the former attached to the case C and the latter placed inside of part d' and is shiftable lengthwise therein. The stem D is passed through the shiftable pendant D' and secured therein by a suitable screw t^4 engaging its annular groove t^3 . In order when the crown c^2 is turned to operate the winding pinion of a watch, that the shiftable pendant D' may not be turned the said pendant may be made square or polygonal or may be provided with a screw or pins or a suitable slot whereby the same may be guided; but I prefer to shape it hexagonal or octagonal, the latter being illustrated, the opening of the stationary pendant being of the same shape so that the shiftable pendant D' fits properly therein. The pendant D' being prevented by its angles from turning a shiftable or longitudinal motion only can be imparted to the same. In this case the stem D being held by its screw t^4 may be pressed inward to actuate

a lever L or may be arranged to be drawn or pulled out to actuate the same, as heretofore described in connection with Figs. 7 and 8.

Instead of arranging the shiftable pendant D' to slide in the stationary pendant, the latter pendant d' may be provided with suitable guides or angles and the hole of the shiftable part D' formed to fit upon the same and guided thereon, so that the pendant D' may be shifted over the stationary pendant d'.

In so far as the above description of my invention relates to pushing the stem inward to actuate the repeating mechanism, or to pulling it outward for the same purpose, I do not wish it understood that the devices to which this motion is applied may not also be actuated by giving a reverse motion to the stem, to actuate the repeating mechanism, and such modifications of my invention, I wish it understood that I claim as equivalents or substitutes for the devices and motions described and shown.

I claim—

1. A stem-winding watch having a rotatable and longitudinally movable stem, the rotatable movement for operating a stem winding mechanism of a watch and the longitudinal movement for actuating a repeating mechanism, substantially as specified.

2. A stem winding and setting watch having a rotatable and longitudinally movable stem, the rotatable movement for operating a winding and setting mechanism of a watch and the longitudinal movement for operating a repeating mechanism substantially as specified.

3. A repeating-watch provided with a winding-pinion for operating a motor-spring of a time mechanism, a longitudinally-movable stem for operating the said pinion and the said stem adapted by its longitudinal motion to actuate a repeating mechanism, substantially as specified.

4. A stem winding watch provided with a lever for setting a repeating mechanism, in combination with a stem placed in the pendant of the watch case and having a rotary motion for winding the watch, and a longitudinal motion to operate the repeating mechanism, substantially as specified.

5. In a repeating-watch, the combination with a longitudinally-movable stem for operating a winding and setting mechanism of a watch, of a lever for actuating a repeating mechanism, that is operated by a lengthwise motion of the said stem, substantially as specified.

6. The combination of a winding-pinion, wheels 2 and 3 and barrel-arbor wheel 4, of a stem, that operates the said wheels, when the same is turned, and a lever for actuating a repeating mechanism and operated by the same stem, when the same is moved lengthwise, substantially as specified.

7. The combination of a winding-pinion, wheel 2, setting-wheel 5 and suitable dial-

wheels, a stem that operates the said wheels, when the same is turned, and a lever for actuating a repeating mechanism and operated by the same stem, when the same is moved lengthwise, substantially as specified.

8. In a stem-winding watch, the combination with a winding-pinion, of a longitudinally-movable stem for operating the same, the said stem being provided with a suitable device for engaging a lever that actuates a repeating mechanism, and a lever, interposed between the said device and the repeating mechanism which is operated by the lengthwise motion of the said stem, substantially as specified.

9. In a stem-winding watch, the combination with a winding-pinion, of a longitudinally-movable stem for operating the same, a push-pin placed in the said pinion, that is engaged by the end of the said stem, and a lever for actuating a repeating mechanism and which is operated by the lengthwise motion of the said stem, substantially as specified.

10. In a repeating-watch, the combination of a longitudinally-movable stem for operating a winding mechanism of a watch, and a lever for actuating a striking rack directly, the said lever being operated by moving said stem lengthwise, substantially as specified.

11. In a stem-winding watch, the combination with a winding-pinion, of a longitudinally-movable stem for operating the same, a lever for actuating a repeating mechanism, that is operated by the lengthwise motion of the said stem in one direction, and a suitable lever-spring engaging the said lever and returning it with the said stem in the opposite direction, substantially as specified.

12. In a repeating-watch, the combination of a lever L that actuates a repeating mechanism, of a lever-spring L' engaging the said lever, a longitudinally-movable stem, that operates the said lever and moves it in one direction, and the said spring L' for moving the said lever and stem in the opposite direction, substantially as specified.

13. The combination of a winding-pinion, a lever for actuating a repeating mechanism, a suitable stem that operates the winding-pinion, when the same is turned and which when moved lengthwise operates the said lever, substantially as specified.

14. In a repeating-watch, the combination of a stem attached to a shiftable crown c' arranged on a pendant of a watch-case, a winding-pinion that is operated by the said stem by turning the same, and a lever for actuating a repeating mechanism that is operated by the said stem by moving its crown lengthwise, substantially as specified.

15. In a repeating-watch, a stem provided with a slot t² in combination with a push-pin T for operating a case-spring V, and a crown C' that is shiftable over the pendant substantially as specified.

16. The combination with a push-pin T, hav-

ing a head T' , of a crown attached to a stem, the said crown provided with a seat T^2 for the said head T' , substantially as specified.

17. The combination with a watch-case pendant of a hollow stem, a stem g placed through the same, the said stem g adapted to operate a repeating mechanism by moving it lengthwise, substantially as specified.

18. In combination with the hollow stem D , of a stem g placed through the same for actuating the lever of a repeating mechanism, the said stem g provided with a suitable projection by which the same is held in the stem D , substantially as specified.

19. The combination with a watch-case pendant, of a winding-stem, provided with a suitable collar or shoulder d' , a shiftable sleeve that is moved by the said collar of the stem, a lever for actuating a repeating mechanism engaged by the said sleeve and operated thereby when the said stem is moved lengthwise, substantially as specified.

20. In combination with a watch-case provided with a stationary pendant fastened to the center of the case, and a shiftable pendant provided with a winding-stem and crown, the said stem adapted to operate a winding-pinion of a watch by turning the same by its crown, and adapted to actuate a repeating mechanism by moving it lengthwise by its shiftable pendant, substantially as specified.

21. The combination of a winding-stem for operating a winding-pinion of a watch, the said stem provided with a crown by which the same is turned, of a shiftable pendant, that is movable lengthwise with the crown and stem and adapted to actuate a repeating mechanism, substantially as specified.

22. The combination of a shiftable pendant provided with a stem attached to a crown, the said stem having an annular groove, that is engaged by a screw of the shiftable pendant and held thereby in the same, the said stem arranged to operate a winding-pinion of a watch, by turning the same by its crown and adapted to actuate a repeating mechanism by moving the same lengthwise by its pendant, substantially as specified.

23. The combination of a shiftable pendant, a stationary pendant of a watch-case provided with a suitable guide, which engages the said shiftable pendant and insures a lengthwise motion to the same, of a winding stem, that is placed through the said shiftable and stationary pendant and arranged to be turned therein for operating a winding pinion of a watch and adapted to actuate a repeating mechanism by moving the same and the shiftable pendant lengthwise, substantially as specified.

24. In a repeating-watch, the combination of a longitudinally-movable stem, a lever for actuating a repeating mechanism and operated by the said stem, when the same is drawn or pulled out, substantially as specified.

25. In a watch the combination with a stem

winding mechanism of a longitudinally movable stem D with a crown c' attached thereto and provided with a sleeve c^3 , and a repeater operating lever engaged by the said stem D substantially as specified.

26. In a stem-winding watch the combination of a longitudinally-movable stem for operating a winding mechanism of a watch, by turning the said stem, a lever for actuating a releasing device of a striking rack, suitable mechanism and a striking-rack that is held by a releasing-device, the said releasing-device being released and the repeating mechanism thereby started when the stem is moved lengthwise, substantially as specified.

27. In a stem-winding watch, the combination of a longitudinally-movable stem for operating a winding mechanism of a watch by turning the said stem, of a lever for retracting a motor-spring of a repeating mechanism, and a motor-spring that is caused to be brought in tension when the said stem is moved lengthwise, substantially as described.

28. The combination of a longitudinally-movable stem for operating a winding pinion by turning the said stem, of a lever pivoted to plate A' and that retracts a motor-spring placed in a seat and between the plates A' and A for operating a repeating mechanism, when the said stem is moved lengthwise, substantially as specified.

29. In a stem-winding watch, the combination of a longitudinally-movable stem, a lever for actuating a repeating mechanism and provided with teeth s^2 , the said lever operated by the said stem, when the same is moved lengthwise, substantially as specified.

30. The combination in a moderating-gear of wheel N^3 having a pinion 14, in gear with a shiftable pinion or wheel 10 pivoted to a lever 11 controlled by spring 12, wheel N^2 attached to pinion c and which is turned by the wheel N' that is operated by a motor-spring, the said shiftable pinion 10 adapted to disengage the said wheel N^2 when the motor-spring is retracted and to engage and rotate with the said wheel, when the motor-spring actuates the said wheels N' and N^2 backward, substantially as specified.

31. In a repeating mechanism the combination of wheel N^2 attached to pinion c in gear with a shiftable wheel or pinion 10, pivoted to a lever 11 controlled by spring 12, of wheel N' that engages the said pinion 10 and rotates the same when moved in one direction and disengages the said pinion 10 when moved in the opposite direction, substantially as specified.

32. The combination of a wheel O provided with a projection or shoulder o^2 , of a spring controlled lever R , provided with the step r' that is engaged by the said shoulder o^2 of wheel O and moved thereby parallel to the plate, substantially as specified.

33. The combination of a releasing-lever having a step r' and hook or catch r^2 , a wheel

O provided with a projection o^2 that operates the releasing lever and a rack that is released thereby, substantially as specified.

34. The combination of an hour-rack P 5 provided with a notch or shoulder p^3 , of a lever R having a hook or catch r^3 and which engages the shoulder p^3 of the rack P, when the same is in its normal position, substantially as specified.

10 35. The combination of a repeater-plate B provided with a seat B^6 on its under side with a toothed lever S seated therein, that engages a pinion m of the arbor N, substantially as specified.

36. The combination of a repeater-plate B 15 provided with a seat B^7 on its upper side and having a stud z for the star-wheel Z' of an hour-snail Z, and the jumper J, all the said parts being placed in the said seat B^7 , substantially as specified. 20

In testimony that I claim the foregoing as my invention I have signed my name, in presence of two witnesses, this 13th day of June, 1890.

FRED TERSTEGEN.

Witnesses:

FREDK. HAYNES,
WILTON C. DONN.