

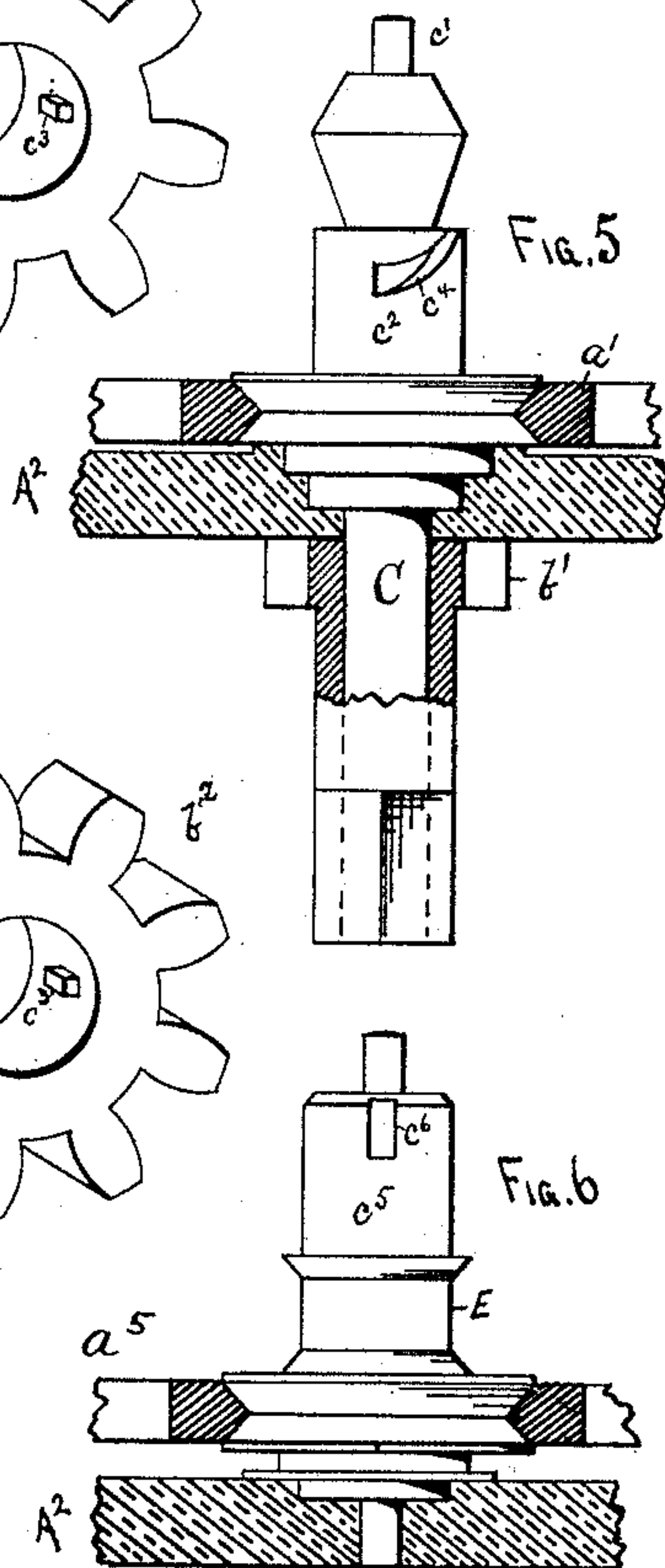
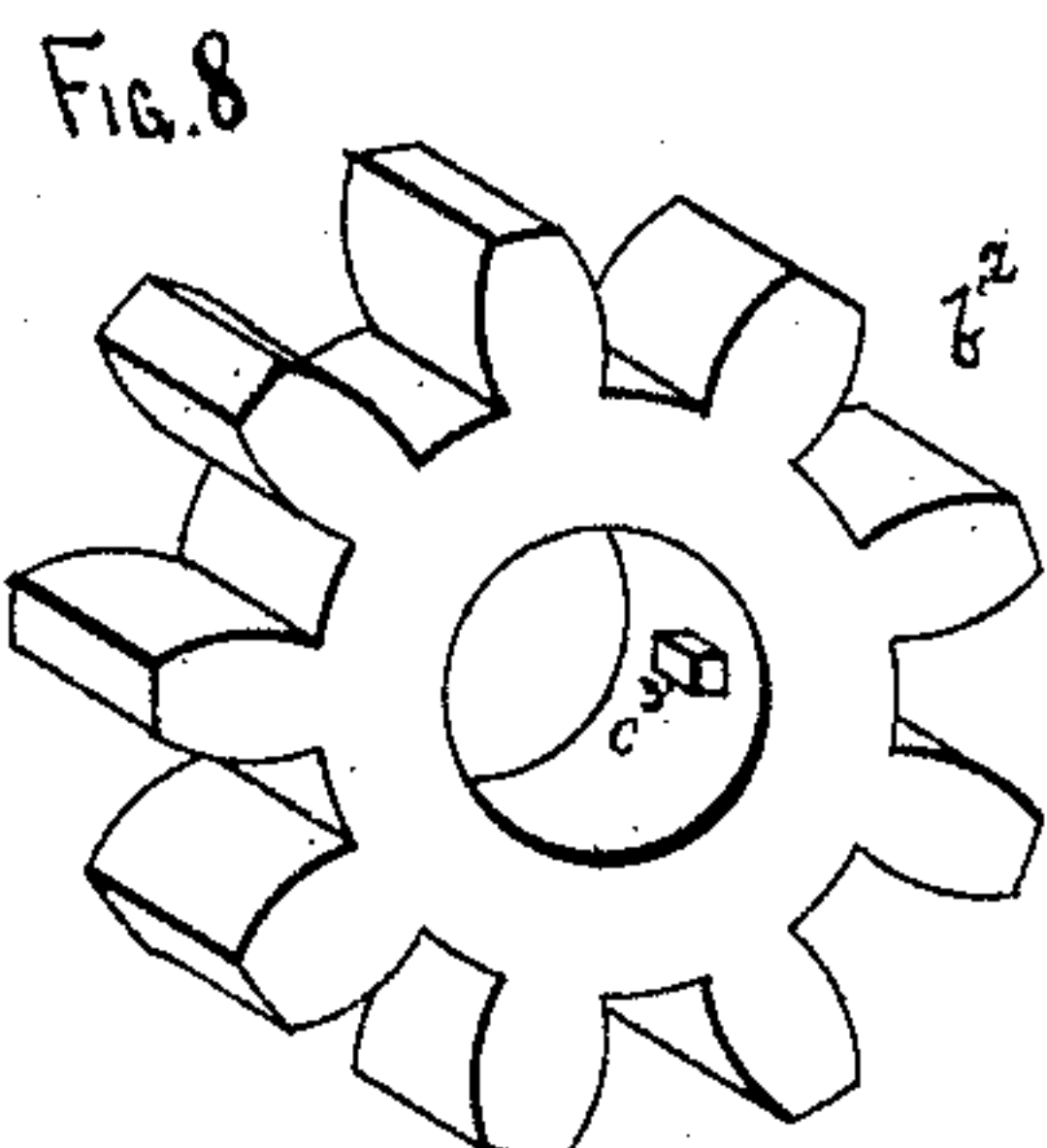
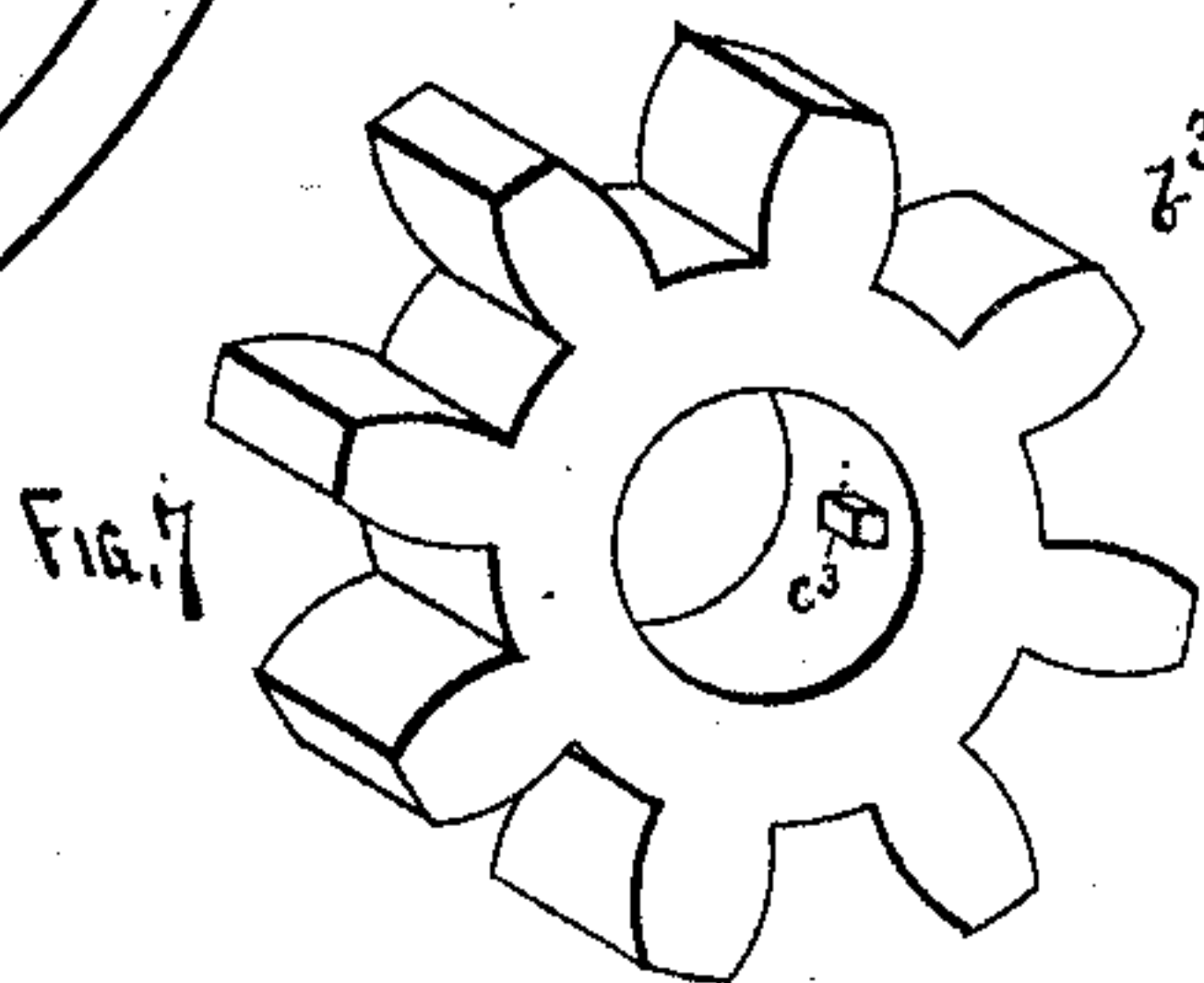
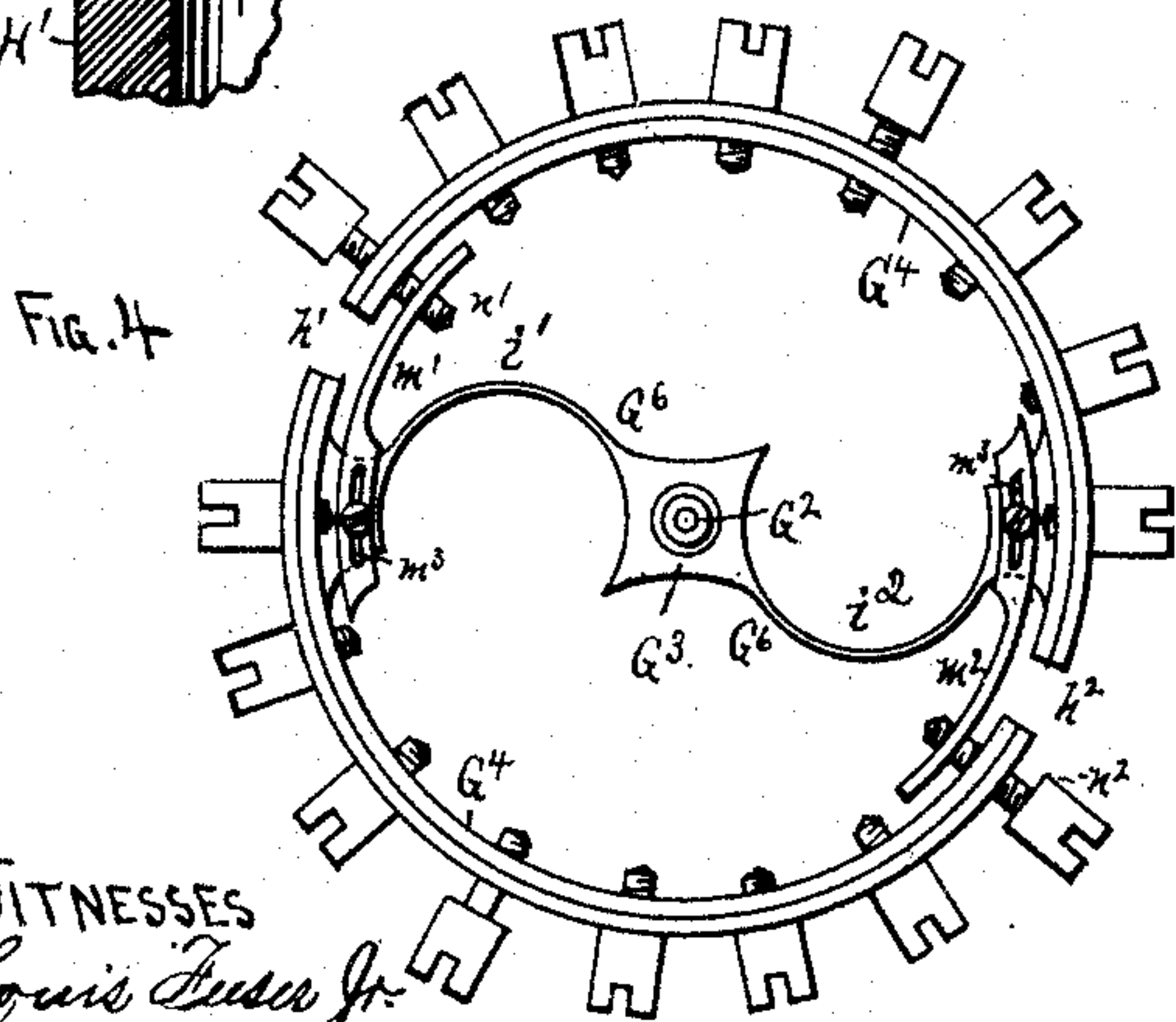
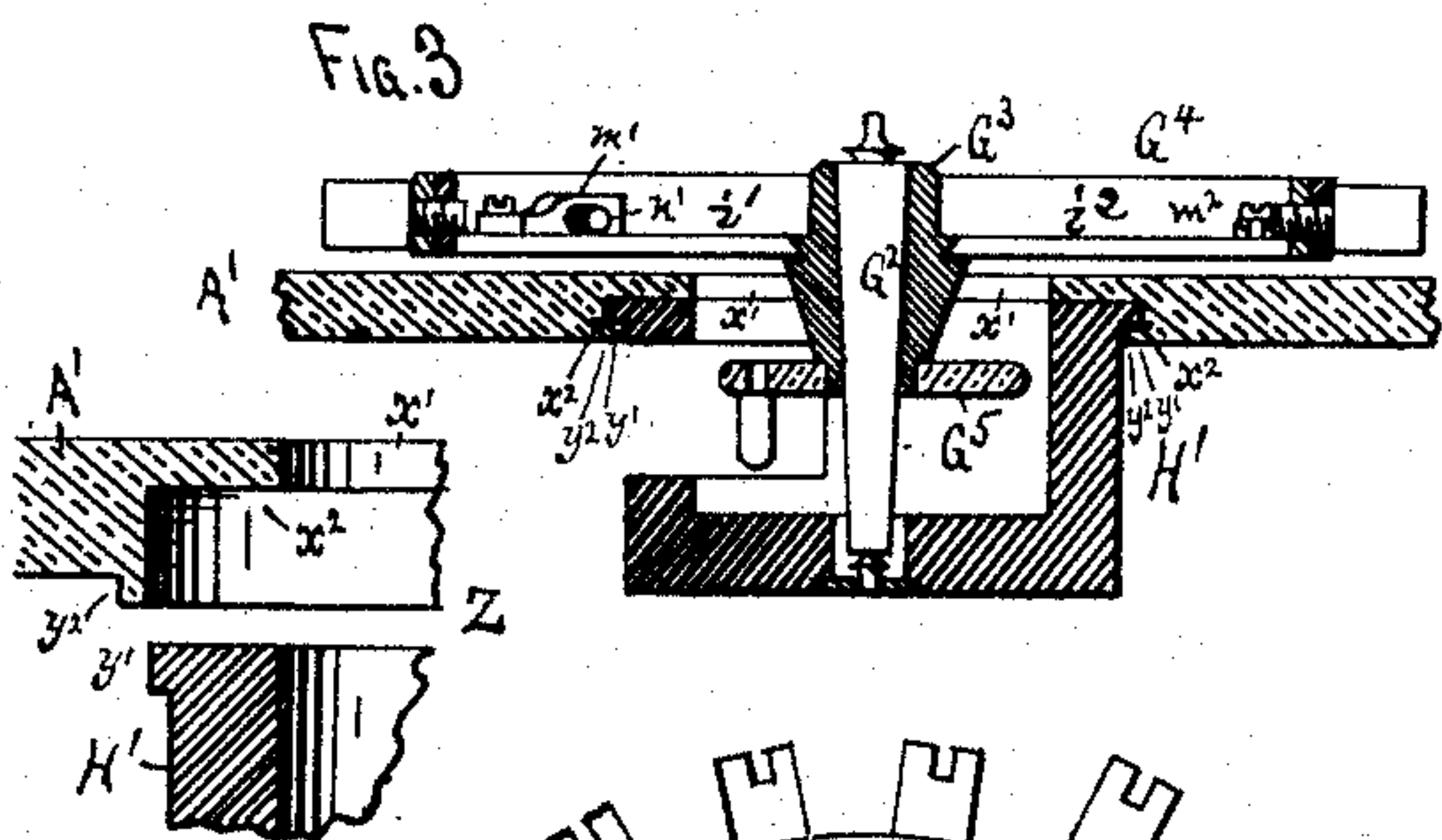
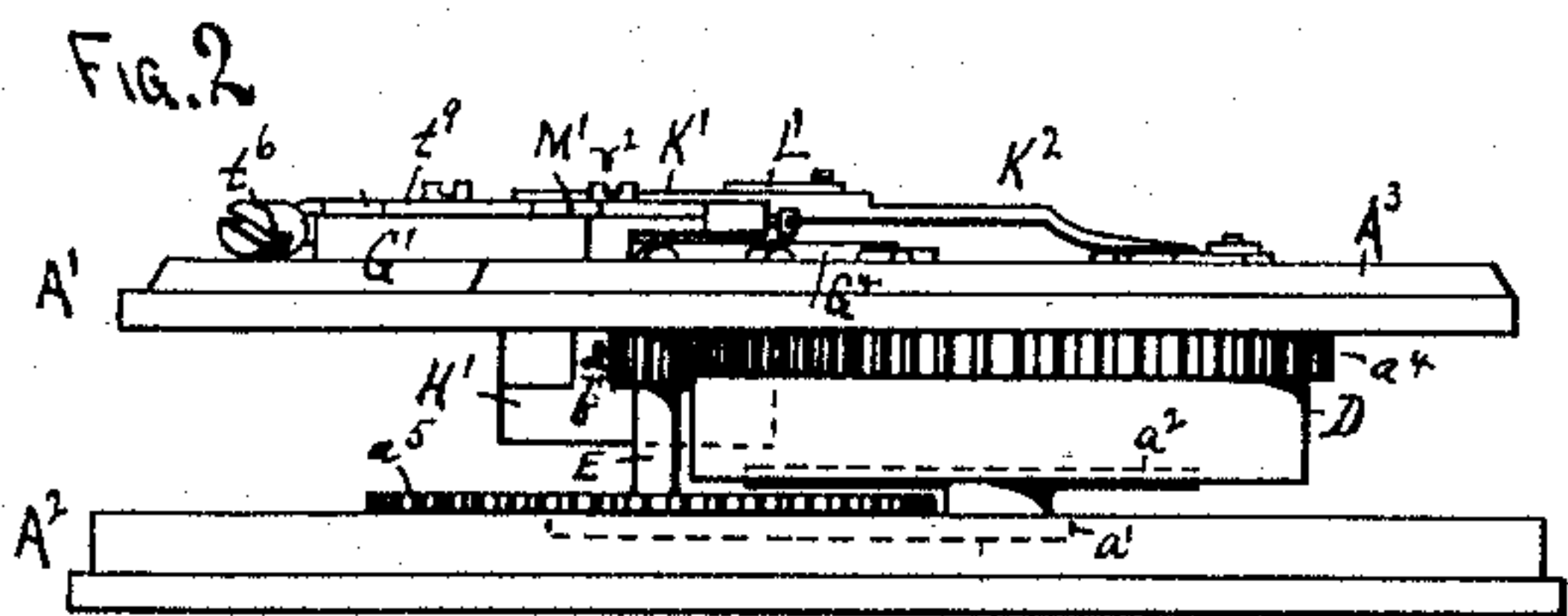
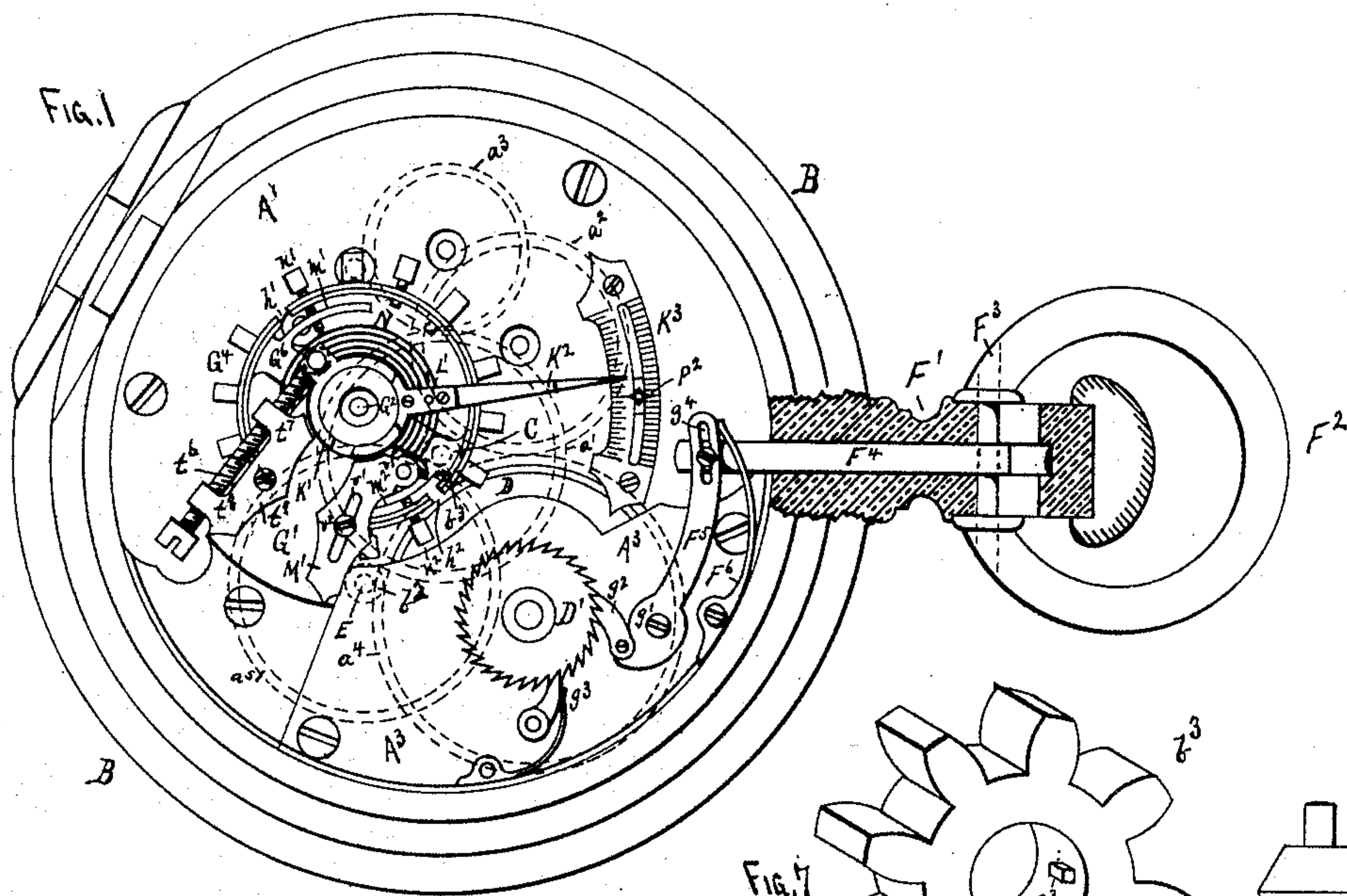
(Model.)

3 Sheets—Sheet 1.

C. G. SCHELLENBERGER.
WATCH.

No. 352,935.

Patented Nov. 23, 1886.



WITNESSES
Louis Fessenden
H. B. Weber.

Charles Gustav Schellenberger,
INVENTOR, BY
Louis Fessenden
Atty's.

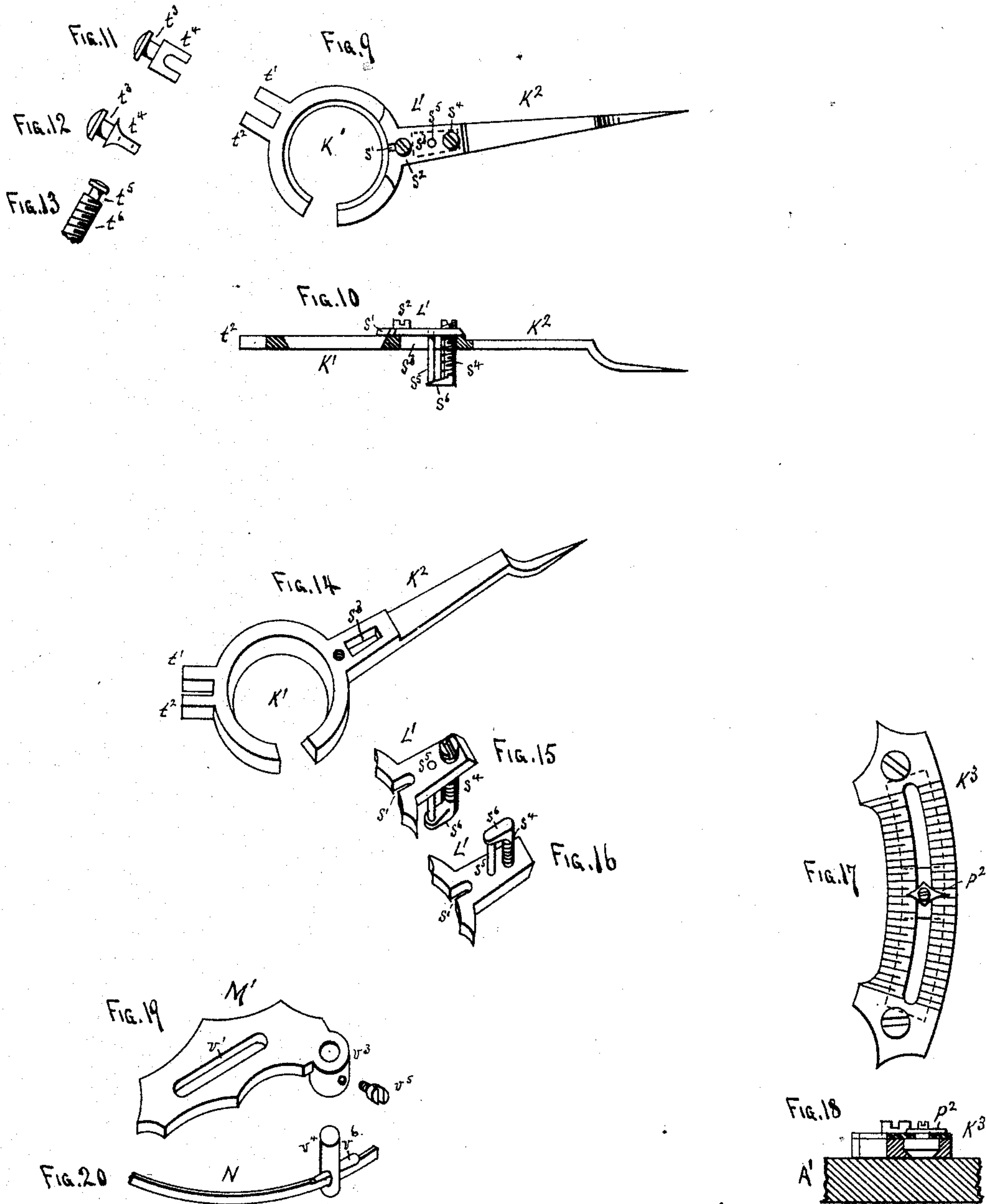
(Model.)

3 Sheets—Sheet 2.

C. G. SCHELLENBERGER.
WATCH.

No. 352,935.

Patented Nov. 23, 1886.



WITNESSES.
Louis Fisser Jr.
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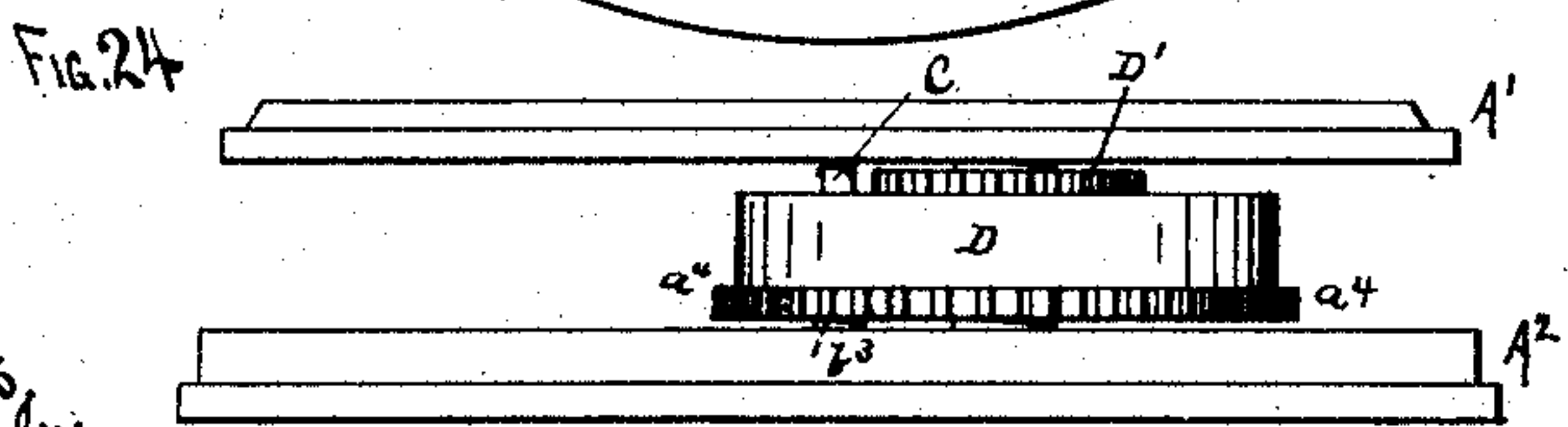
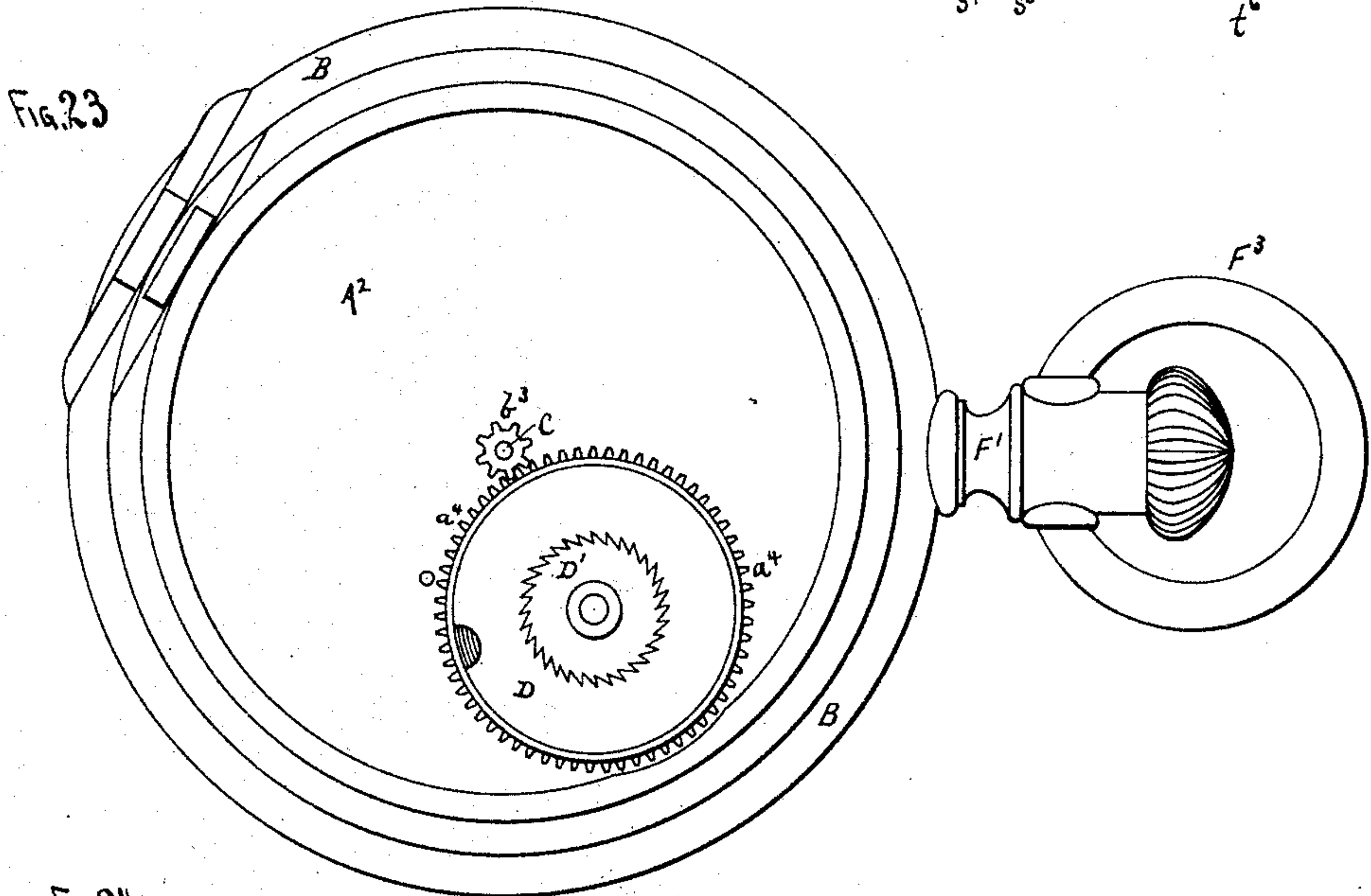
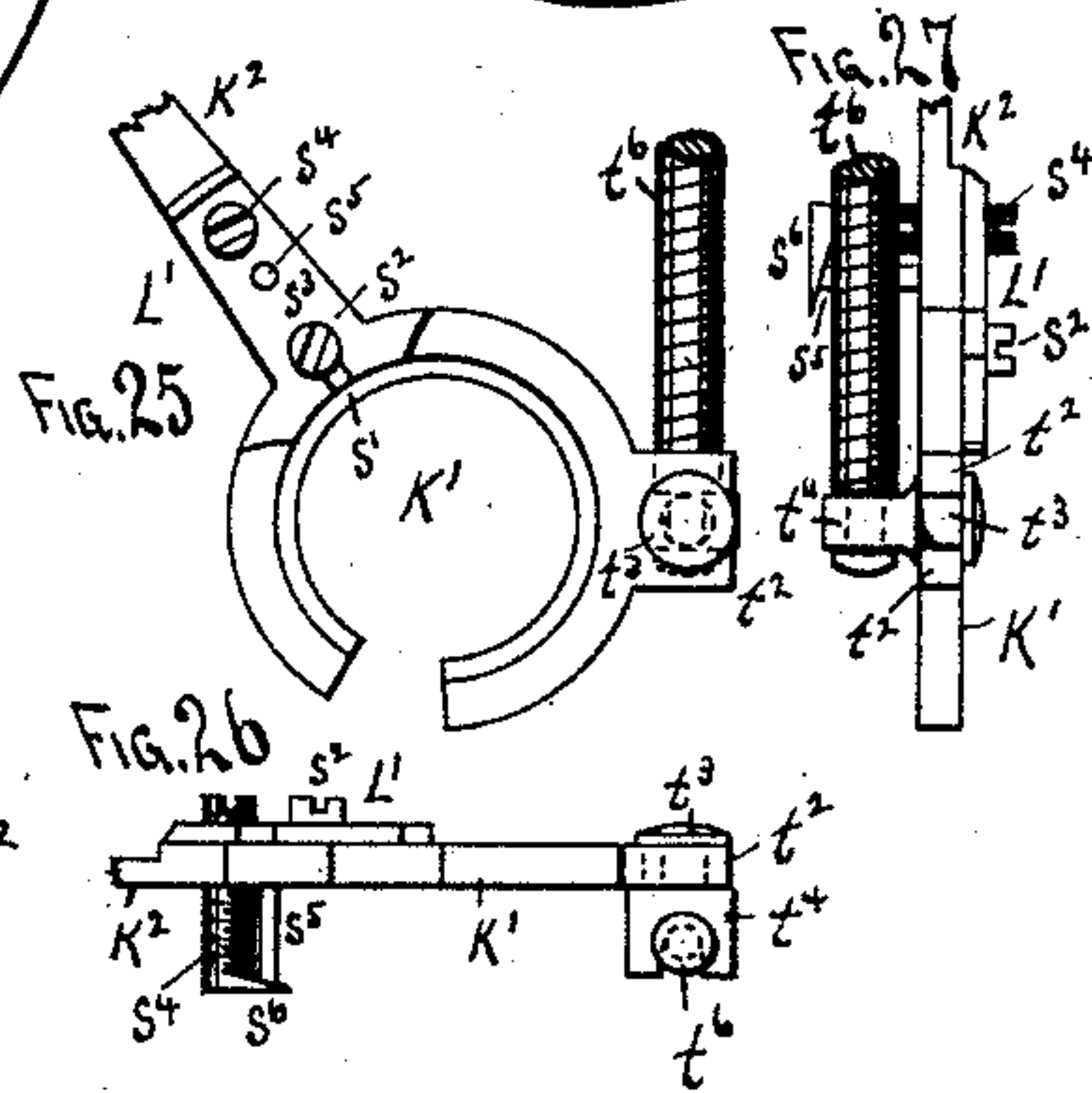
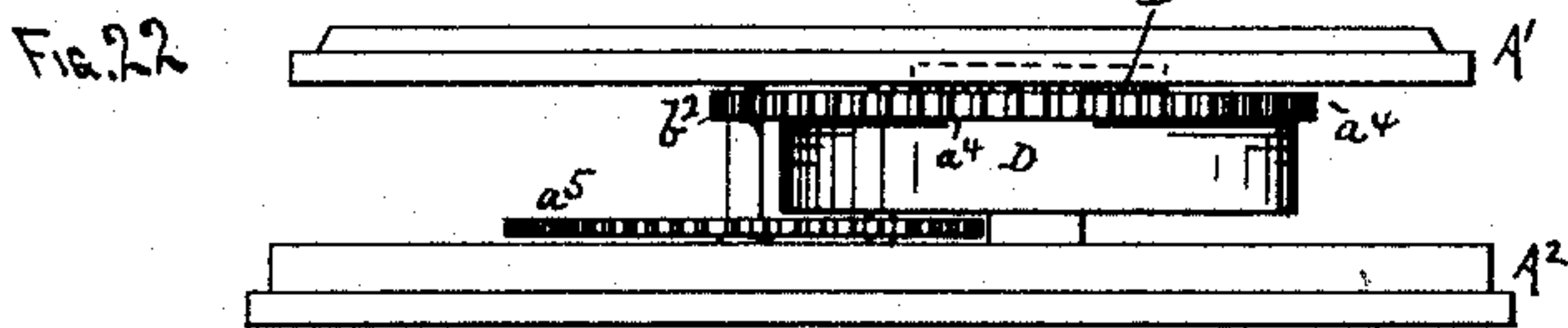
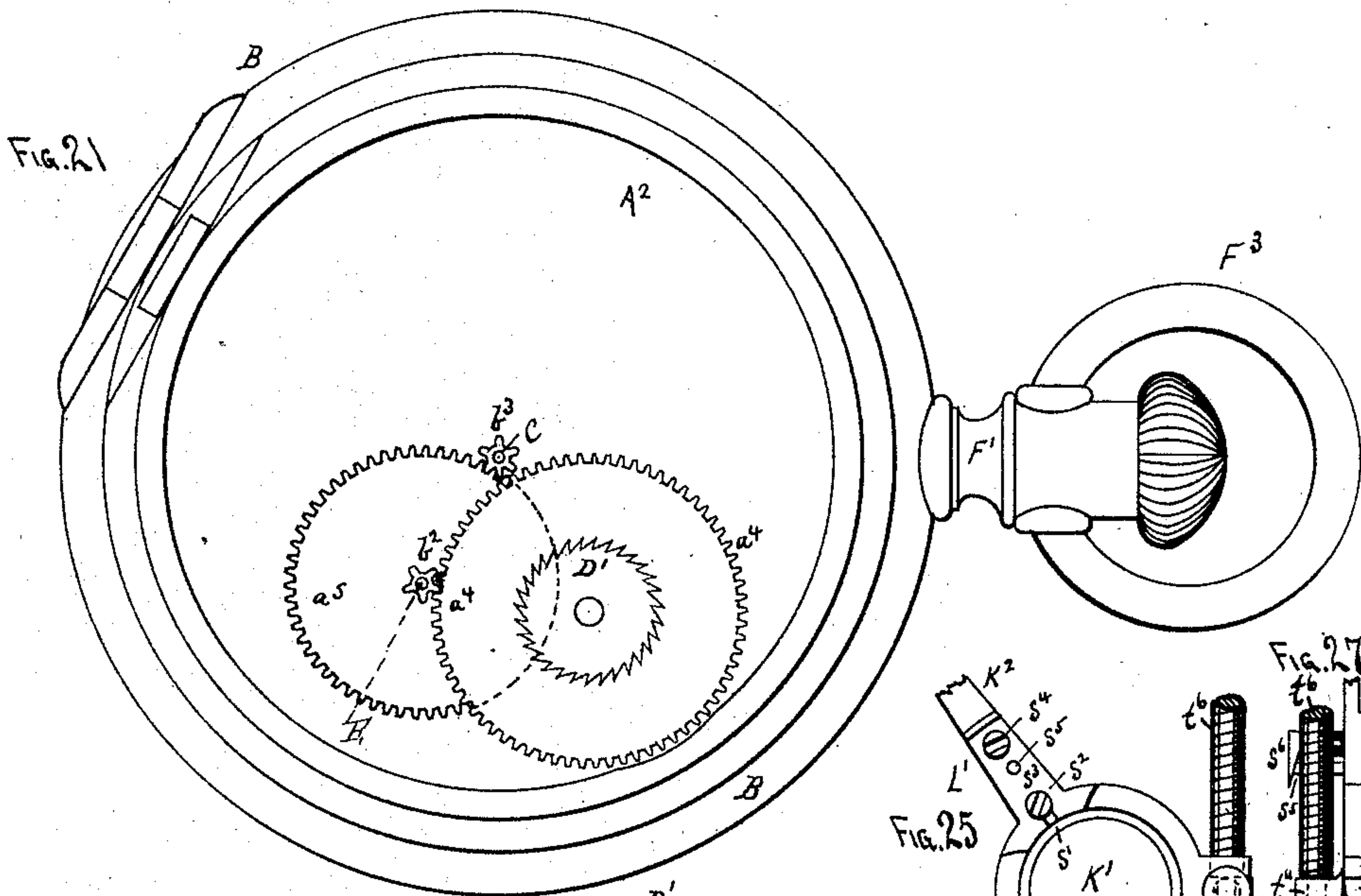
(Model.)

3 Sheets—Sheet 3.

C. G. SCHELLENBERGER.
WATCH.

No. 352,935.

Patented Nov. 23, 1886.



WITNESSES
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UNITED STATES PATENT OFFICE.

CHARLES GUSTAVUS SCHELLENBERGER, OF ST. PAUL, MINNESOTA.

WATCH.

SPECIFICATION forming part of Letters Patent No. 352,935, dated November 23, 1886.

Application filed March 25, 1884. Serial No. 125,444. (Model.)

To all whom it may concern.

Be it known that I, CHARLES GUSTAVUS SCHELLENBERGER, a citizen of the United States, and a resident of St. Paul, in the county of Ramsey and State of Minnesota, have invented certain Improvements in Watches; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, making part of this specification.

In the drawings, Figure 1 is a rear view of the movement of a watch constructed with my improvements, the back cover or covers being removed; Fig. 2, a side view of the top and bottom plates of the watch in relative positions, a portion of the movement being shown in place upon and between them; Fig. 3, a central section, on an enlarged scale, of the balance wheel and potance; Fig. 4, a plan of the balance-wheel on an enlarged scale; Fig. 5, a partial section, on an enlarged scale, of the center staff and adjacent parts of the watch; Fig. 6, a side view and partial section of the eight-day wheel-staff and a portion of the extra gear-wheel carried thereby, on an enlarged scale; Fig. 7, a view in perspective, on an enlarged scale, of a changeable center-staff pinion used with the one-day movement; Fig. 8, a similar view of an auxiliary-staff pinion used with my improved eight-day movement, showing the construction for removably coupling to its staff; Fig. 9, a plan on an enlarged scale of an index or pointer used by me in connection with my construction of the balance-staff; Fig. 10, a partial central longitudinal section and partial side view of the same; Figs. 11 and 12, side views in different directions of the regulator swivel-plate and a portion of the regulating-screw therein; Fig. 13, a side of the said regulating-screws; Fig. 14, a view in perspective, on an enlarged scale, of the balance-wheel index or pointer, the guide-plate thereof being removed in the view; Figs. 15 and 16, top and bottom perspective views, respectively, of the said guide plate on an enlarged scale; Fig. 17, a plan on an enlarged scale of the regulator index-scale; Fig. 18, a transverse section of the same on an enlarged scale; Fig. 19, a view in perspective, on an enlarged scale, of the hair-spring regulating-plate; Fig. 20, a view in perspective, on an enlarged scale, of a portion of the hair-

spring and of the pin in which it is held and adjusted; Fig. 21, a view corresponding with the view in Fig. 1, but showing only so much of the improved gearing, as is necessary to illustrate that part of my invention; Fig. 22, a view similarly corresponding with the view in Fig. 2; Fig. 23, a view corresponding with Fig. 20, but showing the gearing arranged for a one-day movement; Fig. 24, a view corresponding with the view in Fig. 22, the gearing also being arranged for a one-day movement; Fig. 25, a plan on an enlarged scale of the index-ring, swivel-plate, and adjusting-screw for adjusting the throw of the hair-spring and regulating the speed of the watch; Fig. 26, a side view of the same; Fig. 27, a view of the same in a different direction.

Like letters designate corresponding parts in all of the figures.

My several improvements in the watch will be described in order and the novel features distinguished from those in common use.

Let A' A^2 in the drawings represent the two plates between and upon which the works or movement of the watch are mounted, and B the case, which may be of ordinary construction; C, the center staff, carrying the center wheel, a' , of the movement pivoted at one end in the plate A' and extending through the other plate, A^2 , the cannon-pinion b' , Fig. 5, being mounted thereon near the said plate; D, the barrel containing the mainspring of the watch. A portion of the train of gearing leading to the escapement-wheel is indicated by dotted lines in Fig. 1.

One of the features of my invention is an additional device by which the watch may be converted into an eight-day watch, or one running several times longer than the usual one-day movement, and reconverted into a one-day watch, at pleasure. The means by which I effect this is substantially as follows.

By the usual construction a gear-wheel, a^4 , attached to or moving with the barrel D, gears directly into a pinion, b^3 , on the center staff, C, as shown in Figs. 23 and 24. I employ an intermediate gear-wheel, a^5 , arranged to gear into a pinion, b^3 , on the center staff, C, and I mount this additional or intermediate gear-wheel in such a position on a staff, E, that the gear-wheel a^4 on the barrel will gear into a pinion, b^2 , on the said staff E, as shown most

clearly in Figs. 21 and 22. Thus the motion from the barrel, instead of being communicated immediately to the center staff, is transmitted thereto through this intermediate gear, $a^5 b^2$.

5 The barrel D may remain the same or of the same size in both arrangements of the movement; but for the eight-day or other lengthened-time movement the mainspring therein should be sufficiently strong to compensate
10 for the loss of leverage in the movement, and therefore a mainspring of greater and the proper strength is used when the watch is arranged for running eight days or a week. One or two other changes in construction are made
15 to adapt the movement to this change of running time:

First. Since when the motion of the barrel D is transmitted to the center staff through the intermediate wheel and pinion, $a^5 b^2$, the
20 barrel gear-wheel a^4 cannot gear directly into the center-staff pinion, b^3 , as it does with the ordinary one-day movement, I provide two interchangeable pinions, $b^3 b^3$, (Shown respectively in Figs. 21 and 23.) The pinion
25 shown in Figs. 21 to be used with the intermediate gear-wheel, a^5 , is made of smaller diameter than the pinion shown in Fig. 23, to be used with the barrel gear-wheel a^4 direct, so that in the first case the pinion cannot touch
30 the said gear-wheel a^4 , as seen in Fig. 21, and in the other case the pinion shall gear fully into the said gear-wheel, as shown in Fig. 23. The larger pinion b^3 , of course, has more teeth or leaves than the smaller, but an
35 exact number in each is not essential.

Second. The interposition of the single intermediate gear-wheel, a^5 , would produce a reversal of the motion of the center staff, b^3 , if the motion of the barrel D should remain in the
40 same direction as when its motion is communicated directly to the said center staff. In order to obviate this disarrangement, the barrel D is reversed in position—that is, it is placed the other side up—when the said intermediate
45 gear-wheel is interposed as clearly indicated in Figs. 21, 22, 23, and 24. Thus in Fig. 22 it is seen that the gear-wheel a^4 of the barrel is at the upper side of the barrel and the intermediate gear-wheel, a^5 , is below the barrel,
50 while in Fig. 24 it is seen that the gear-wheel a^4 is at the lower side of the barrel, showing the latter to have been reversed in position. The mainspring also is reversed in the direction of its action by this change, as indicated
55 by the reversal of the direction of the holding-ratchet D' in Figs. 21 and 23.

To prevent any damage to the movement in case the mainspring should break and sudden back-action should result therefrom, otherwise liable to do damage to the works, I provide for automatically ungearing the center-staff pinion b^3 from the gear-wheel a^4 , by means
60 substantially as follows: In a hub or enlargement, c^2 , Fig. 5, of the center staff, C, is formed a spiral or curved groove or slot, c^4 , substantially as shown, into which a stud or projection, c^3 , Fig. 7, formed on the inner periphery

of the pinion b^3 , fits, so that while the pinion will hold the stud at the bottom of the groove and rotate the staff when moving in the proper
70 direction, if the motion of the pinion should be suddenly reversed by the breaking of the mainspring the said stud would run backward, rise in the slot c^4 , and thereby lift the pinion far
75 enough to ungear it from the gear-wheel which turns it, and thereby prevent damage to the train and works beyond the center staff.

The above device is especially useful in case a stronger mainspring than usual is used in the barrel with a view to the employment,
80 when desired, of the eight-day arrangement above set forth. A similar construction of the auxiliary staff E and connection of the pinion b^2 therewith may be used; but such a provision is hardly necessary when the inter-
85 mediate gear-wheel, a^5 , is interposed between the barrel and center staff, so that although the pinion b^2 , Fig. 8, used therewith may have the interior coupling-stud, c^2 , the same as the other pinion shown in Fig. 7, the center staff,
90 E, used with it, may have simply the construction shown in Fig. 6, wherein the hub c^5 has a vertical coupling-groove, c^6 , or one parallel with the axis of the staff, for readily removing the pinion. The potance H' is set and held in
95 the plate A' by means shown in Fig. 3, and in the section Z, under the same figure, on a larger scale. A hole, x' , is formed through the plate A' of the same diameter as the interior
100 of the potance, and through one-half or more of the thickness of the plate, the whole is enlarged to form a socket, x^2 , into which the upper edge of the potance fits. This upper edge of the potance has an outwardly-projecting
105 lip or flange, y' , leaving a narrow space in the socket below the lip, so that by using a bur-nisher the metal of the plate is swaged or
"spun" into the socket, whereby the potance is firmly held in the socket, and is neither
110 liable to be forced out nor become loosened. In order to facilitate the swaging of the metal into the socket a downwardly-projecting lip, y^2 , may be formed around the socket in preparing the plate, as seen in the Fig. 3, annex.

I provide for the removal of the balance-
115 staff G² and its replacement without removing the balance-wheel or other parts connected therewith by means substantially as follows: The balance-staff is tapered downward, as shown in Fig. 3, and is provided around its
120 upper end with an enlarged hub or collet, G³, which has on its two ends, respectively, shouldered portions of its periphery, which receive, respectively, the balance-wheel G⁴ at its upper end and the escapement-roller G⁵ at its
125 lower end. By this construction, in case of breakage or of any cause requiring the removal of the balance-staff, it is only necessary to knock the tapered staff endwise to remove it from the hub G³ and insert a new staff with-
130 out disturbing the balance-wheel and roller in their positions; and when a new staff is thus inserted no readjustment of the balance-wheel is required, all the adjustment required be-

longing to the staff itself—a simple and easy matter.

If preferred, the hub and arms of the balance-wheel may be formed in one piece, or the lower part of the hub and the staff may be formed in one piece, and an additional hub carrying the balance-wheel may be attached to the upper portion of the staff, which in this case is to be tapered only from the hub around its upper end down to the other end. The result would be the same in all these constructions—namely, the staff and hub of the balance-wheel would be formed separately.

The balance-wheel G^4 is constructed with the usual combined steel and brass rim and with opposite portions, h^1 and h^2 , thereof separate, but connected by a cross-arm, G^6 , which includes the central hub, G^3 .

For the purpose of endowing the balance-wheel with an elastic yield at the terminations of its vibrations, and thereby relieving its staff from undue strain, the arm G^6 , which connects the opposite severed parts of the rim, is formed of an oppositely-curved or S shape, substantially as shown in Fig. 4, and made thin and elastic in the portions i^1 i^2 , between the hub G^3 and ends which are attached to the rim.

For adjusting the balance of the balance-wheel having the cross-arm G^6 , as above described, small plates or extensions m^1 m^2 are respectively attached to the two ends of the said cross-arm, one end of each plate being secured to the cross-arm by means of slots m^3 m^3 in the respective plates, and set-screws, as shown in Fig. 4, whereby the plates may be extended more or less from the arm, in directions substantially parallel with the rim, and extending across the open spaces between the severed portions of the rim, as shown. The projecting ends of the plates are respectively connected with the opposite portions of the rim by screws n^1 n^2 . Thus the two portions of the rim are firmly and adjustably connected, and without interfering with their free expansion and contraction under variations in temperature.

Instead of the construction shown in Fig. 4, (which I prefer,) the extension-plates m^1 m^2 may be made in one piece with the arms, as shown in Fig. 1, the adjustment being effected by the screws n^1 n^2 , which connect the plates with the parts of the rim.

Since any change in the force of the main-spring involves a readjustment of the throw of the hair-spring and balance-wheel, I provide for such readjustment by means substantially as follows: The index-pointer is composed of the usual divided ring, K^1 , encircling the upper end of the balance-staff and secured upon the balance-bridge in the ordinary manner by a beveled edge plate, and having a long pointed arm, K^2 , extending outward over the index-plate K^3 , as shown in Figs. 1, 9, and 10. Upon one side of the ring K^1 two tangs, t^1 t^2 , are formed, between which the neck t^3 of a swivel-plate, t^4 , fits, and this swivel-plate is arranged to receive a neck, t^5 , on the end of an adjust-

ing-screw, t^6 , tapped through lugs t^7 t^8 on a plate, t^9 , secured to the balance-bridge plate G^1 , as shown in Fig. 1. The swivel-plate t^4 is shown separately in Figs. 11 and 12, and the adjusting-screw in Fig. 13. Their position and arrangement in relation to each other and to the ring K^1 are shown in the views, Figs. 25, 26, and 27. By this arrangement the turning of the screw t^6 causes the ring K^1 to turn around the balance-staff, and thereby to regulate the throw of the hair-spring. The swivel-plate t^4 , sliding inward and outward between the tangs t^1 t^2 of the ring K^1 , allows the adjusting-screw t^6 to move in a straight line, while the ring K^1 is moved thereby in the arc of a circle, all the motions of the said parts being free.

The readjustment of the index or pointer involves a corresponding adjustment of the index-plate K^3 . (Shown separate in Figs. 17 and 18 on an enlarged scale.) The said index-plate is formed with a curved slot parallel with its sides, in which may slide a pointer, p^2 , and be adjusted therein, as required, to adapt it to the adjustment of the index. The pointer p^2 may be clamped fast to the index-plate by a set-screw screwing into a piece or block on the under side of the plate, as shown in the drawings.

The connection between the index and the hair-spring, by which the vibrations of the latter are both regulated and guided, is by the following means: A small forked plate, L^1 , (shown separate in Figs. 15 and 16,) is arranged to rest upon the top of the arm K^2 of the index-pointer, next to and partially overlapping the ring K^1 , as shown in Fig. 9, and it is made adjustable nearer to or farther from the balance-staff by means of a slot or notch, S^1 , in the plate, and a set-screw, S^2 , passed through the said slot or notch into the index-ring, as clearly shown in the drawings. The index-arm K^2 is also provided with a longitudinal slot or aperture, S^3 , as shown, under the plate L^1 , down through which slot both a screw, S^4 , and pin S^5 , secured to the plate L^1 and projecting downward from its under side, extend. The screw S^4 is provided with a laterally-projecting foot, S^6 , which extends under the pin S^5 , as shown in Figs. 10, 15, and 16. The outer coil of the hair spring of the watch is arranged to pass between the said screw S^4 and pin S^5 , so that when the rim K^1 is moved around by the adjusting-screw t^6 the vibrations of the hair spring are lengthened or shortened, as required. When the outer coil of the hair-spring is to be placed in position between the screw S^4 and pin S^5 , the screw is turned partially around to carry its foot S^6 away from the pin, and the hair-spring coil is then readily entered between the screw and pin. Then the foot of the screw is turned back into position under the pin, thereby retaining the hair-spring in position.

The device is simple, convenient, and effectual. The screw is formed without a head, as shown, so that it can be screwed up or down to regulate the height of its foot S^6 and make

it correspond with the plane of the coils of the hair-spring and with the adjustment thereof in position. The pin S^5 may be lengthened or shortened to correspond with the height of the screw-foot S^6 . It may be remarked that the lugs t^7 and t^8 , above set forth, may be formed directly upon the balance-bridge G^3 , instead of upon the plate t^9 , above described; but I prefer the construction shown in Fig. 1.

For a perfect adjustment of the hair-spring the following device is employed: A small plate, M' , is fastened to the balance-bridge G' by means of a slot, v' , in the plate, and a fastening-screw, v^2 , so that the position of the plate on the bridge is adjustable. The plate M' , as shown in Fig. 19, is provided at one end or corner with a socket, v^3 , in which a vertical pin, v^4 , (shown in Fig. 20,) fits, and is held by a set-screw, v^5 , (shown separate in Fig. 19,) but screwing into the side of the socket v^3 . The lower end of the pin v^4 is provided with a transverse hole or slot, in which the outer end of the hair-spring N (partly shown in Fig. 20) is held by a wedge or key, v^6 , driven into the hole by the side of the spring, as indicated in the said figure. By this means the hair-spring is not only firmly held, but may be accurately adjusted both in relation to the balance staff by moving the plate M' with its slot v' , and higher or lower in position by adjusting the pin v^4 up or down in the socket v^3 .

With the vertical adjustment of the pin v^4 the coils of the hair-spring may be held in a perfectly true plane, and the dishing thereof be avoided.

I claim as my invention—

1. In a watch, the combination of the center staff, center wheel, center-staff pinion, a removable gear-wheel and pinion interposed between the center-staff pinion and barrel-gear, and mounted on an auxiliary staff, the barrel-gear, and a reversible mainspring-barrel, substantially as and for the purpose herein specified.

2. The combination of the center staff, C , center-staff wheel a' , reversible mainspring-barrel D , carrying a gear-wheel, a^4 , center-staff hub c^2 , constructed with a spiral groove, c^4 , and the pinion b^3 , having an interior coupling projection, c^3 , fitting in the said groove, substantially as and for the purpose herein specified.

3. The combination of the center staff, center wheel, a reversible mainspring-barrel carrying a gear-wheel, and a removable gear-wheel and pinion mounted on an auxiliary staff gearing into the gear-wheel on the barrel and adapted to gear into a center-staff pinion of smaller diameter than the pinion which gears into the barrel-wheel, substantially as and for the purpose herein set forth.

4. The combination of the center wheel and train leading to the escapement-wheel, and a balance-wheel constructed with its rim in two separate parts, with a doubly-curved elastic arm, G^6 , connecting opposite ends of the parts of the rim, and two adjusting-plates, $m' m^2$, connecting the arm G^6 at its two ends, respectively, with the adjacent ends of the rim parts and united with the said parts by screws $n' n^2$, substantially as and for the purpose herein set forth.

5. The combination of the center wheel and train leading to the escapement-wheel, the balance-wheel, hair spring, an index-pointer constructed with a divided ring, K' , provided with projecting tangs $t' t^2$, a swivel-plate, t^1 , playing between the said tangs, and an adjusting-screw, t^6 , substantially as and for the purpose herein specified.

6. The combination of a center wheel and train leading to the escapement-wheel, the balance-wheel, hair-spring, index-pointer adapted to be adjusted around the balance-staff and provided with an adjustable hair-spring, regulating-plate L' , screw S^4 , pin S^5 , and screw-foot S^6 , substantially as and for the purpose herein specified.

7. The combination of a center wheel and train leading to the escapement-wheel, balance-wheel, hair-spring, plate M' , adjustable upon the balance bridge G' , and a hair-spring-holding pin, v^4 , adjustable up and down in the socket of the said plate, the hair-spring being held in the said pin by a wedge or key, substantially as and for the purpose herein specified.

8. The combination of a center wheel and train leading to the escapement-wheel, balance-wheel, hair-spring, index-pointer provided with an adjustable hair-spring regulating-plate, L' , adjustable hair-spring-holding plate M' , and hair-spring-holding pin v^4 , adjustable up and down in a socket of the plate M' , substantially as and for the purpose herein specified.

9. The combination of a center wheel and train of gear leading to the escapement-wheel, balance-wheel, hair-spring, an adjustable index-pointer, and an index-plate, K^3 , provided with an adjustable pointer, p^2 , substantially as and for the purpose herein specified.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

CHARLES GUSTAVUS SCHELLENBERGER.

Witnesses:

C. N. WOODWARD,
LOUIS FEESER, Sr.