

No. 607,185.

Patented July 12, 1898.

W. D. MARKS.
ELECTRIC METER.

(Application filed Nov. 4, 1897.)

(No Model.)

2 Sheets—Sheet 1.

Fig. 1

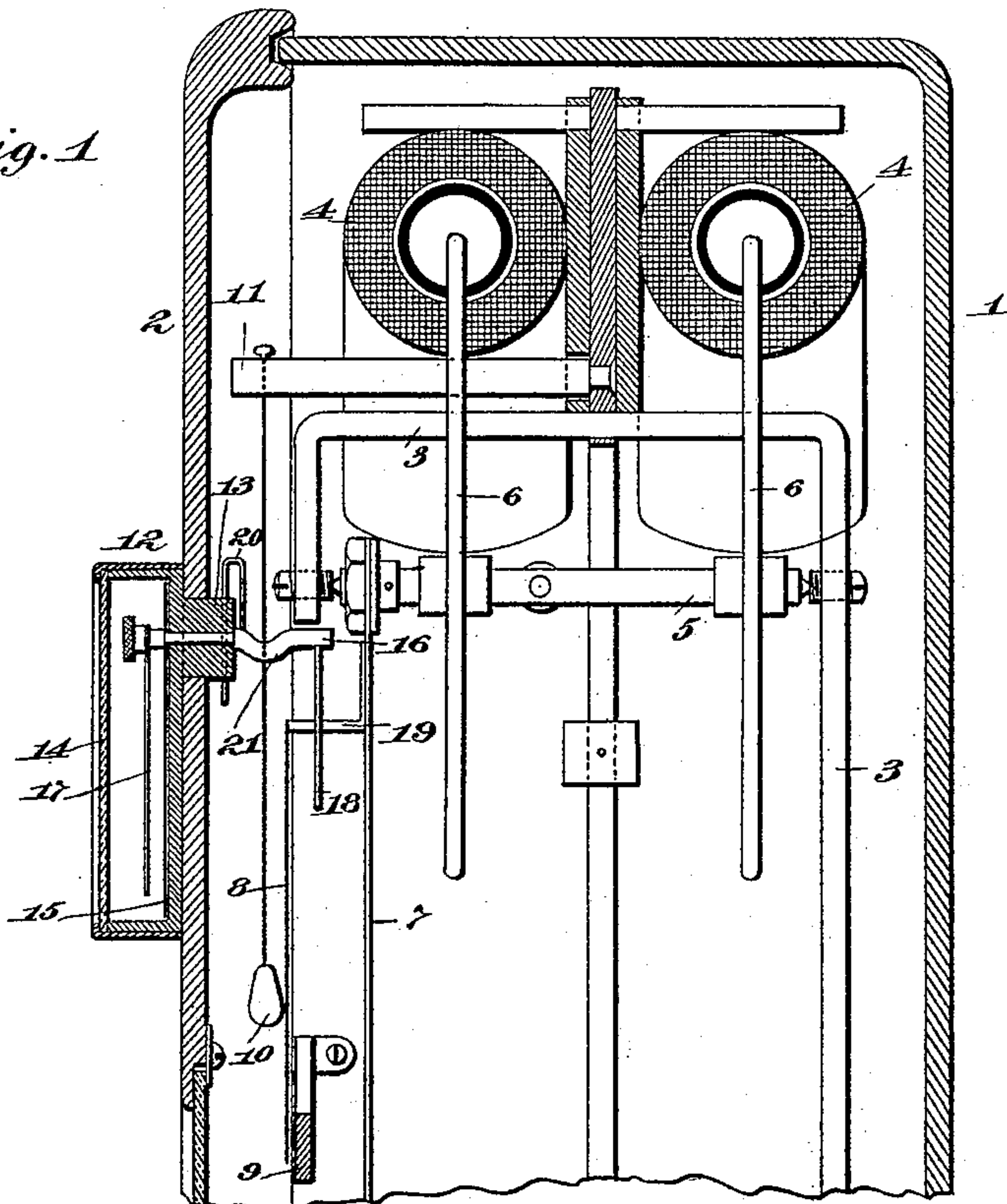


Fig. 2

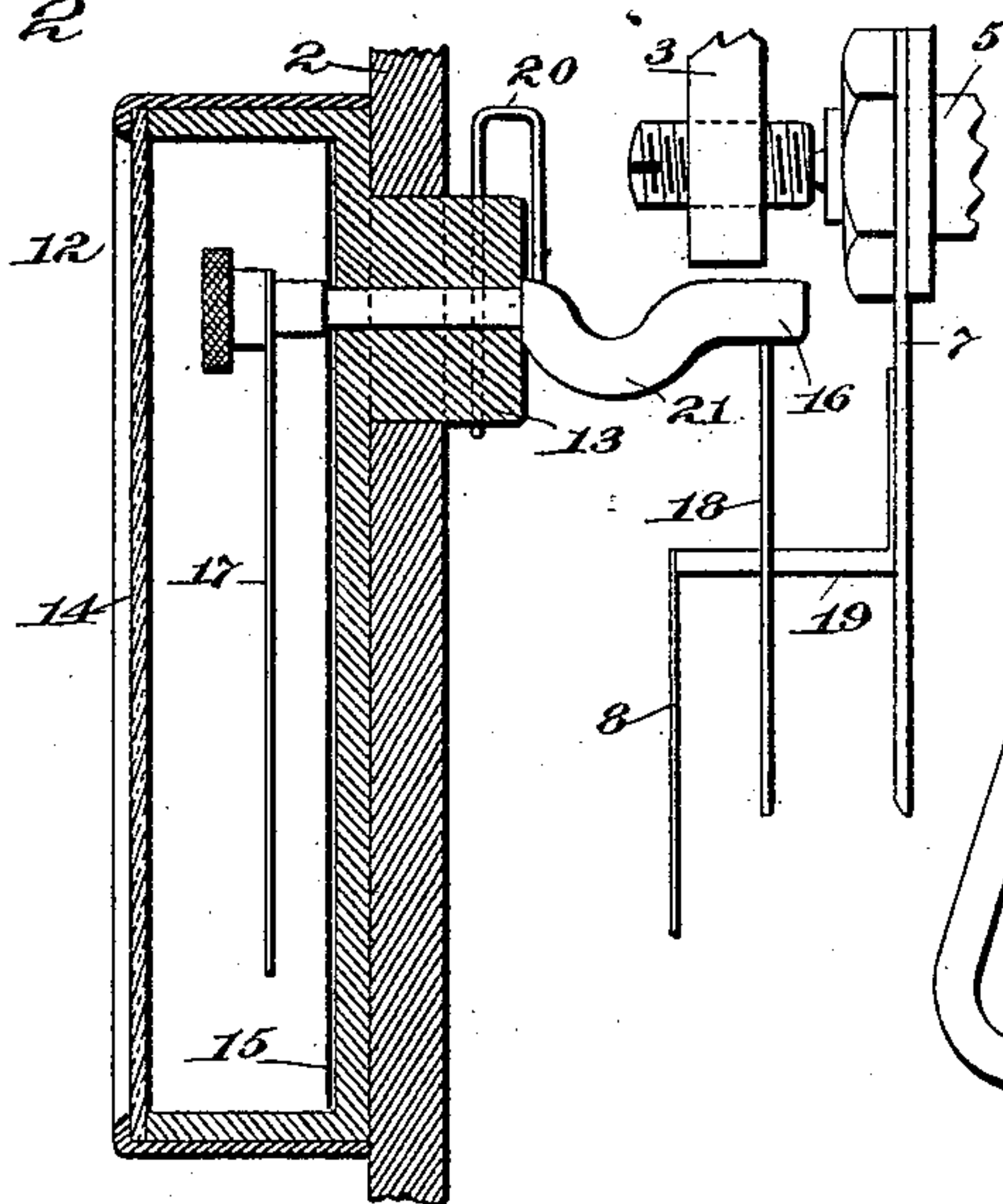
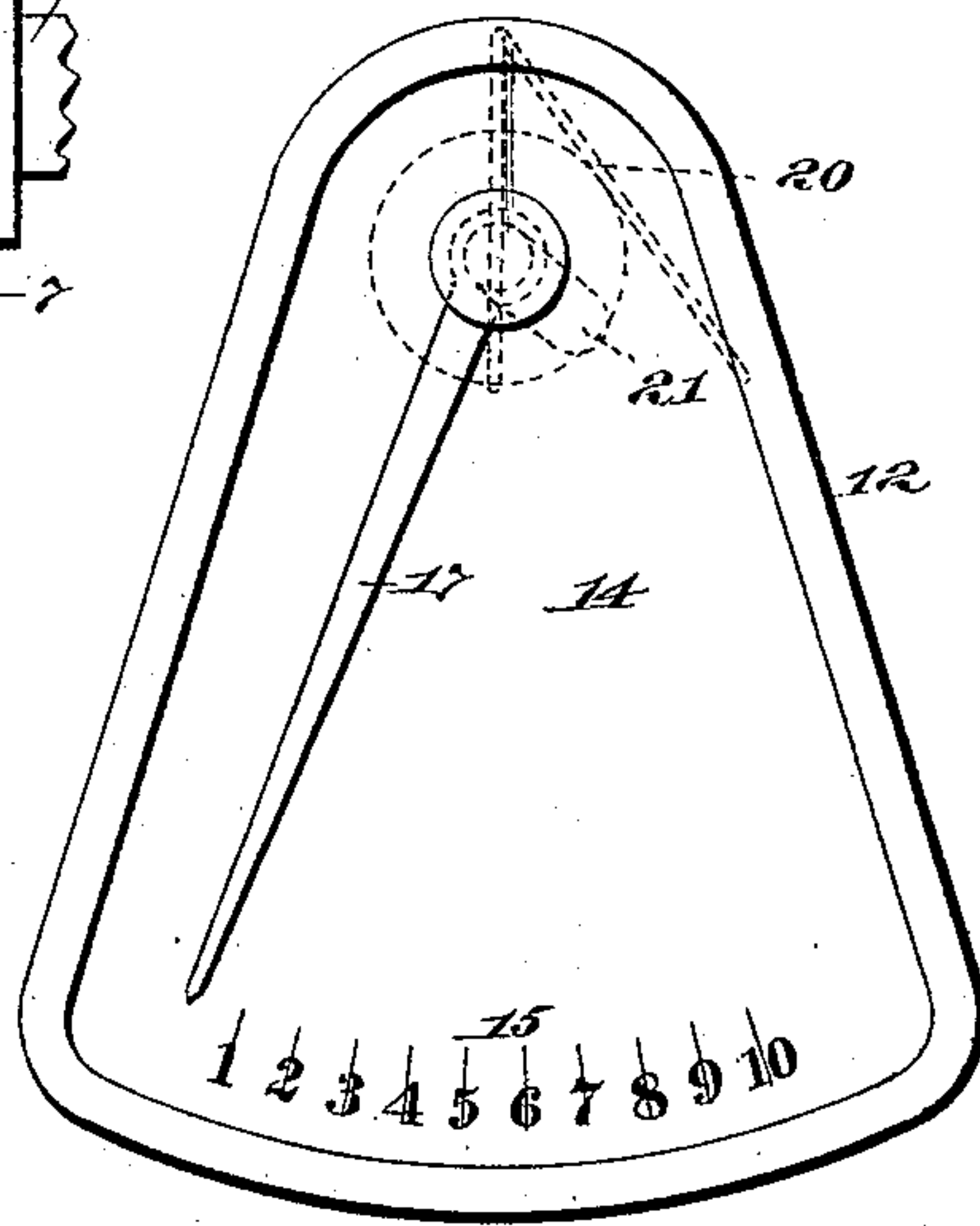


Fig. 3



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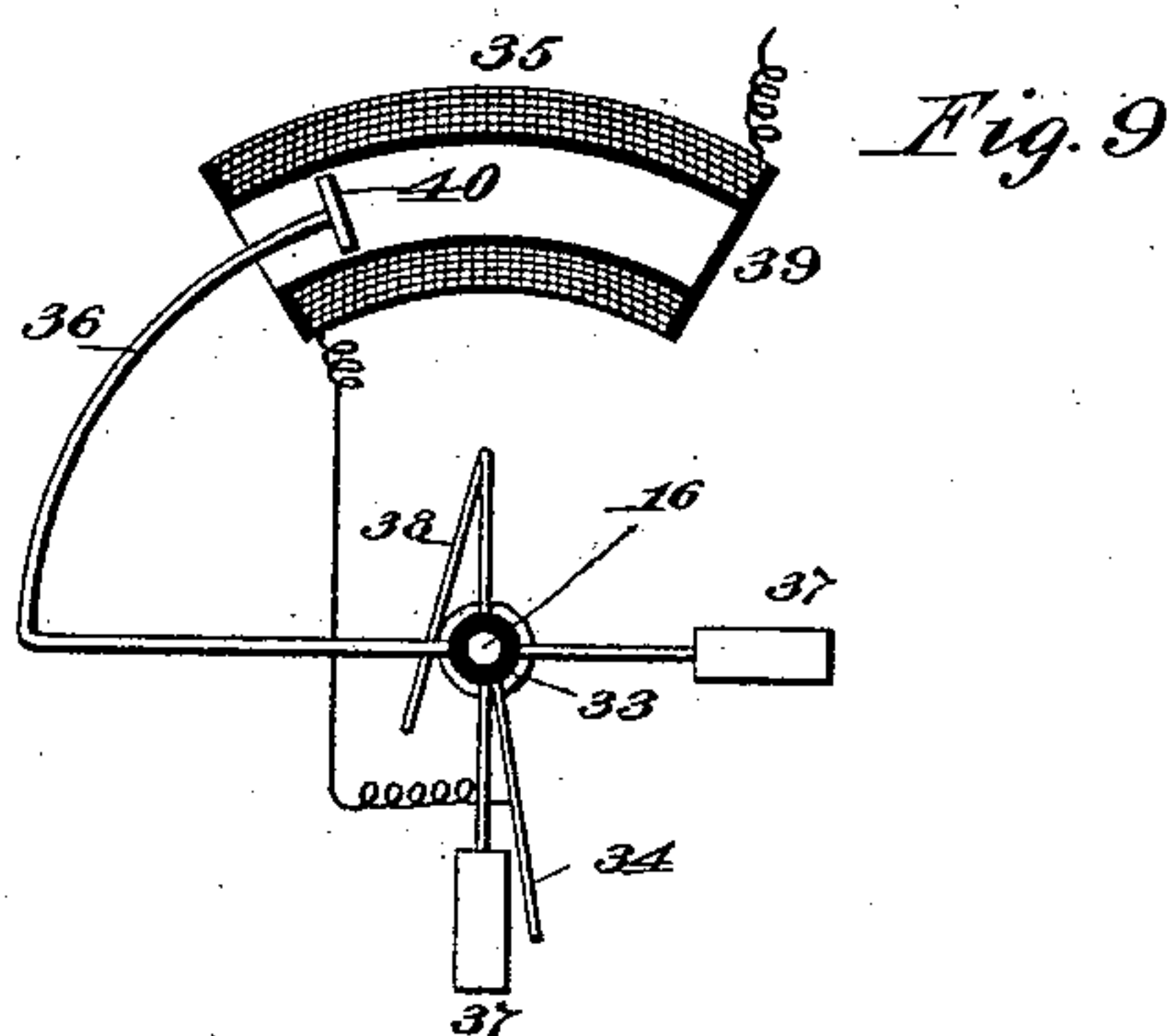
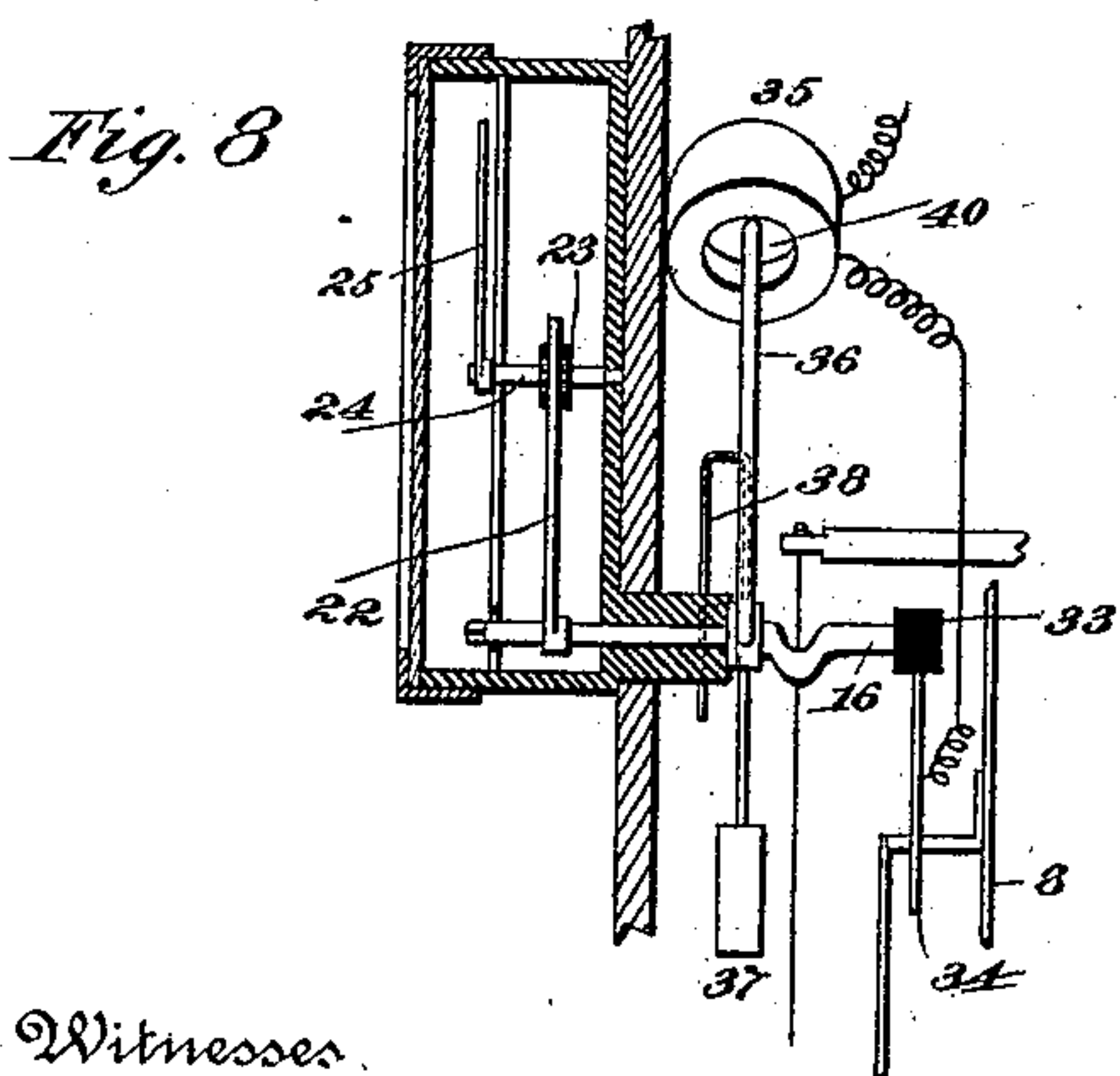
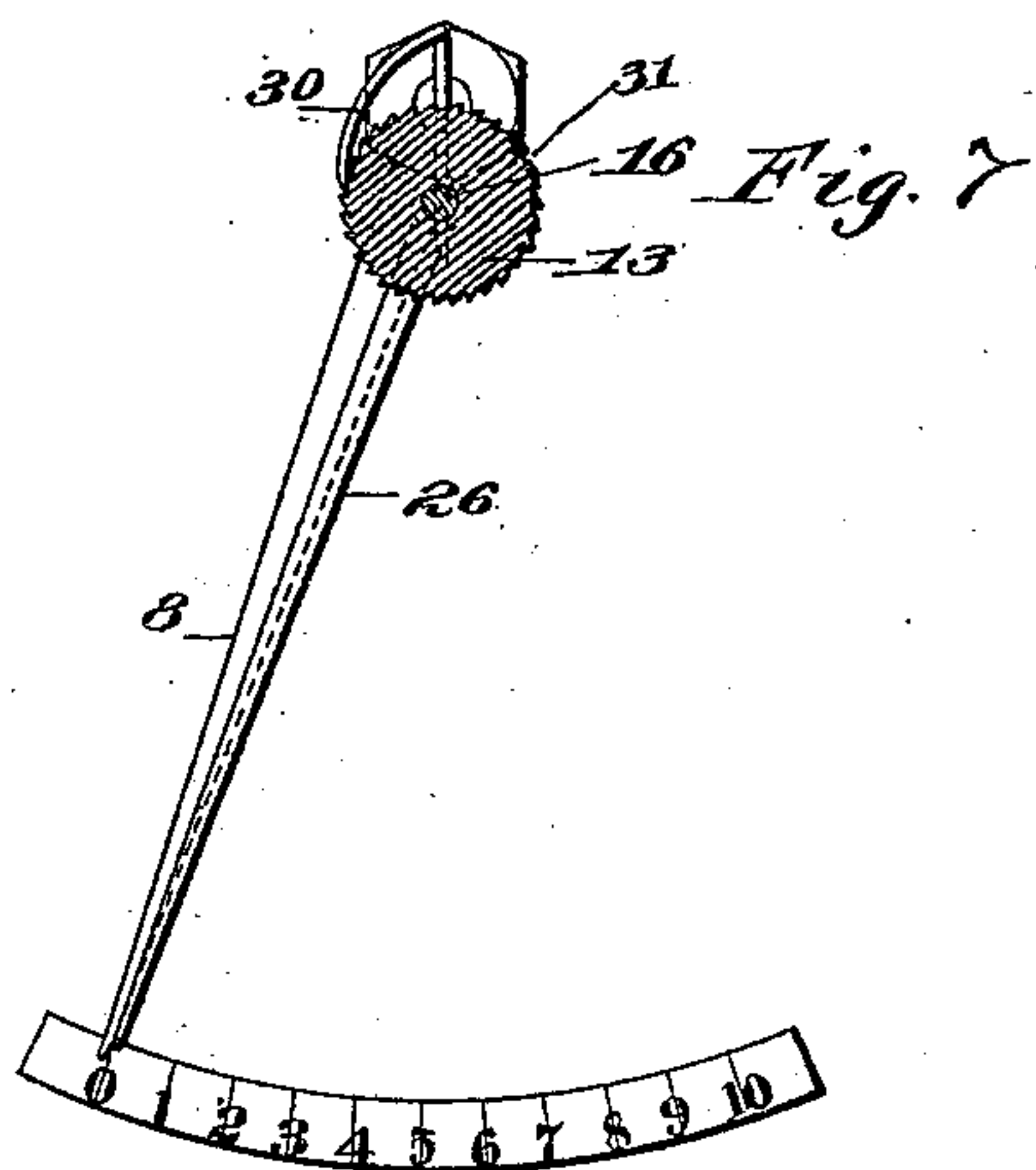
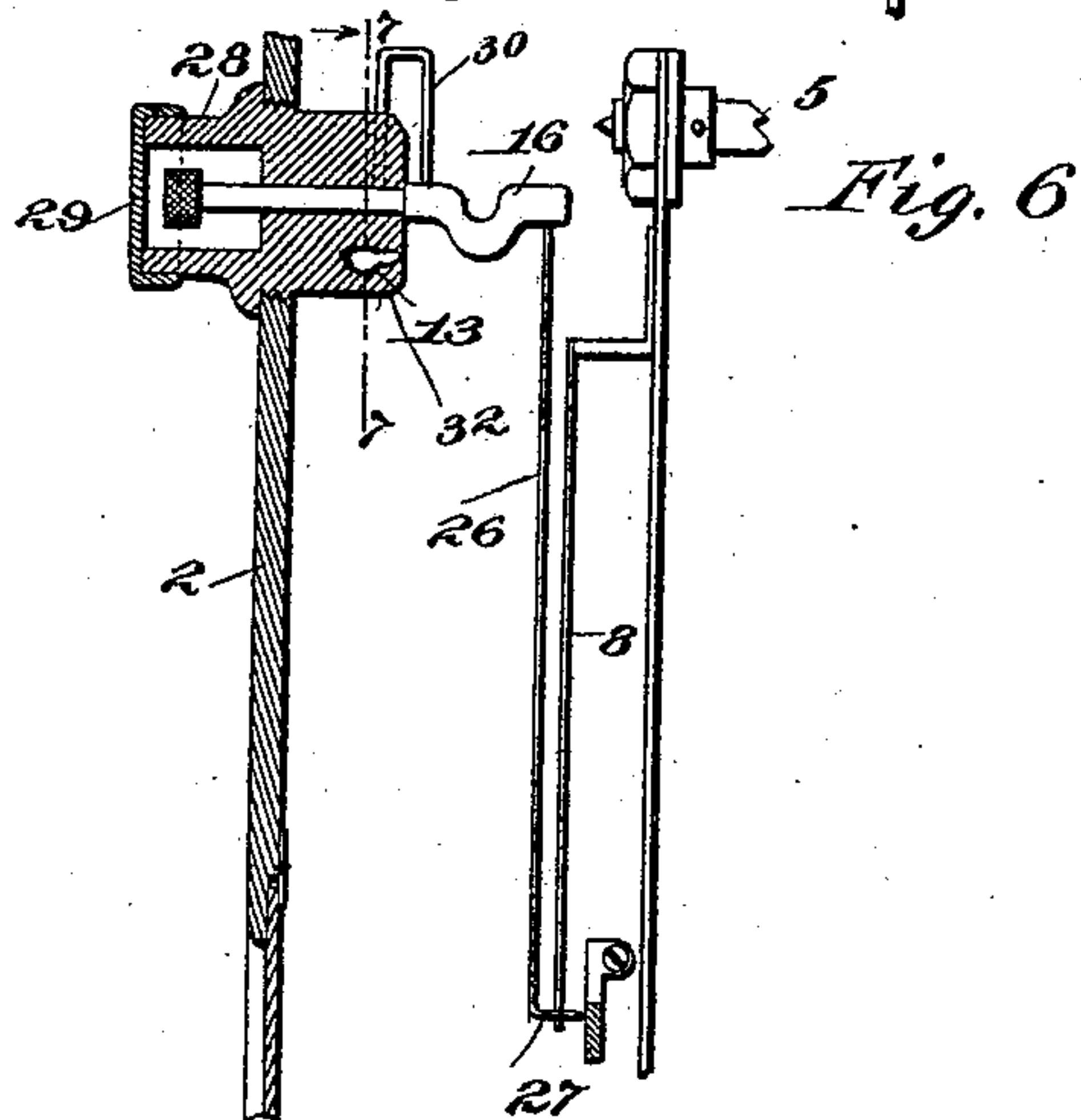
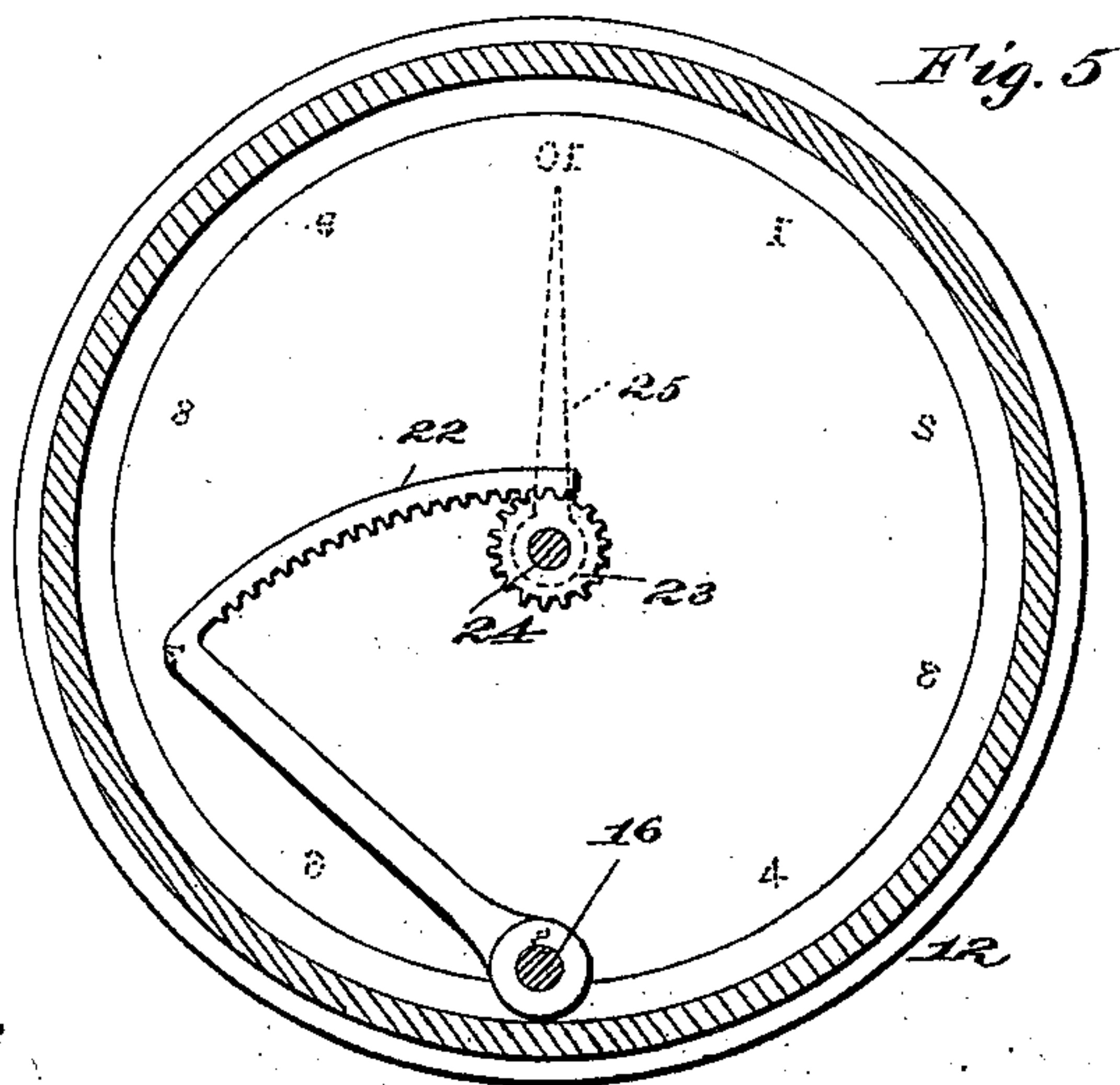
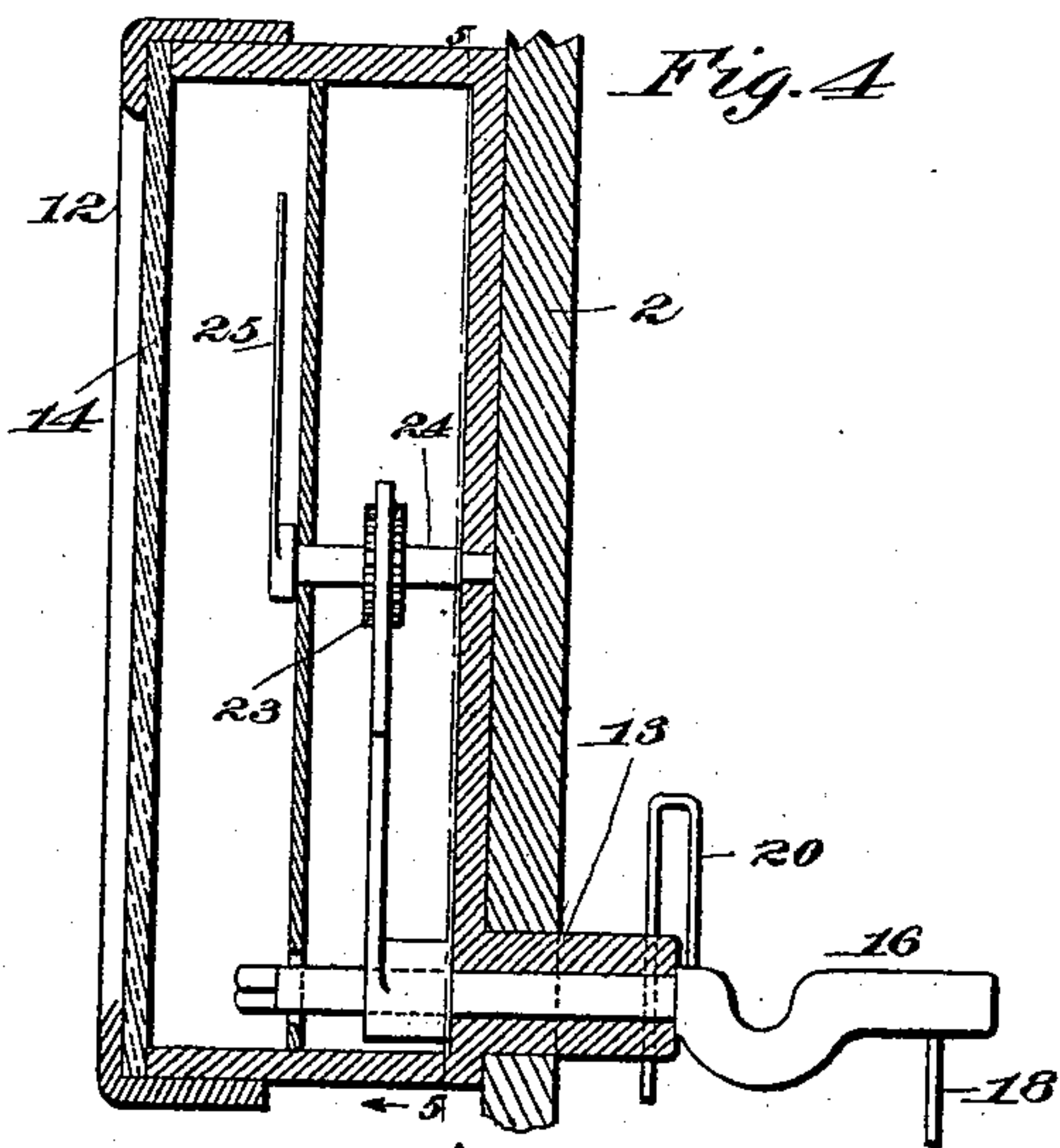
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2 Sheets—Sheet 2.



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UNITED STATES PATENT OFFICE.

WILLIAM D. MARKS, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO THE
AMERICAN ELECTRIC METER COMPANY, OF SAME PLACE.

ELECTRIC METER.

SPECIFICATION forming part of Letters Patent No. 607,185, dated July 12, 1898.

Application filed November 4, 1897. Serial No. 657,344. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM D. MARKS, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented a certain new and useful Improvement in Electric Meters, of which the following is a specification.

My invention relates to improvements in electric meters of the type described in Letters Patent No. 571,032, dated November 10, 1896. In that variety of meters an ampere-indicator is employed for indicating the number of amperes of current, which ampere-indicator controls the position of an eccentric arch, the latter acting as a variable limiting-stop for one direction of movement of a pawl-carrying arm or frame operating the registering mechanism, said pawl-carrying arm or frame being moved always to the same extent in the opposite direction by an oscillating motor or pendulum having a constant rate of movement. The position of the eccentric arch depending upon the amperes determines the extent of movement of the pawl-carrying arm or frame and the consequent movement of the registering mechanism.

My present improvements relate to means by which, in a meter of the type referred to, an indication may be given of the maximum amperes which have influenced the meter between the usual periods of inspection.

The objects of the invention are to provide means for this purpose which will be cheap, effective, capable of easy reading, and which may be readily applied to and removed from the meters referred to.

For a better comprehension of my invention attention is directed to the accompanying drawings, forming a part of this specification, and in which—

Figure 1 is a vertical sectional view through an electric meter of the type referred to, illustrating, however, only those parts which need be shown to offer a correct understanding of the invention applied thereto; Fig. 2, a corresponding view, on an enlarged scale, of the principal operative parts of the same form of indicator; Fig. 3, a front view of the dial for the indicator illustrated in Figs. 1 and 2; Fig. 4, a vertical sectional view of a modified

form of indicator; Fig. 5, a section on the line 5 5 of Fig. 4; Fig. 6, a vertical sectional view of a further modification; Fig. 7, a section on the line 7 7 of Fig. 6; Fig. 8, a vertical sectional view of a still further modification, illustrating electrical means for operating the indicator; and Fig. 9, a rear view of the same, the solenoid of the indicator being shown in section.

In all of the above views corresponding parts are represented by the same numerals of reference.

1 represents the inclosing casing of the meter, containing the operative parts, as referred to in said patent, and provided with a removable front or cover 2. Mounted within the casing 1 is a supporting-frame 3, which carries the mechanism of the meter.

4 4 represent solenoids in circuit with the line, two of said solenoids being used with a three-wire system in the outside main conductors, but only one of said solenoids being necessary with a two-wire system. Mounted upon a shaft 5 in the frame 3 are the two cores 6 6, which coöperate with the solenoids 4 4 and which with said solenoids form a simple type of ampere-indicator.

7 represents the eccentric arch, the position of which is determined by the quantity of current flowing through the solenoid or solenoids 4, which arch is rigidly connected with the shaft 5, as will be understood.

8 represents a pointer for indicating the amperes upon a suitable scale 9, as in ordinary ampere-meters. In order that the meter may be maintained in the necessary vertical position, a plumb-bob 10 is employed, suspended from a post 11, carried by the main frame 3, or in any other way.

The elements which have so far been described are common in the type of meter to which reference has been made.

The present invention relates to means which coöperate with or which are under the control of a moving element of the ampere-indicator—such, for instance, as one or the other of the cores 6, the arch 7, or the pointer 8, by which will be indicated the maximum position to which said element has moved between any given periods of inspection.

By preference the indicator forming the

subject of the present invention either mechanically coöperates with the pointer 8 or is under the control thereof.

Mounted upon the cover 2 of the casing 1 is a supplemental case or box 12, having a boss 13, which is seated in an opening in said cover and by which the supplemental case or box will be sustained in place. If desired, however, said supplemental case may be applied in position by means of screws or secured in any other suitable way. The supplemental case 12 is provided with a glass front 14, through which may be observed a scale 15, indicating the amperes which may influence the apparatus.

16 is a shaft mounted in the boss 13, so as to turn easily therein, and which carries a supplemental or maximum-load pointer 17 at its outer end, which pointer registers with the scale 15. The shaft 16 is provided with a downwardly-extending finger 18, which is arranged in the path of movement of a shoulder or bend 19, formed in the pointer 8, whereby when said pointer is moved by the attraction of the cores 6 it will engage the finger 18, so as to partially rotate the shaft 16 and swing the supplemental pointer 17 relatively to the scale 15 and indicate upon said scale the number of amperes which have passed through the apparatus to effect such movement. In order that the finger 17, when it has thus been moved, may occupy the position to which it has been brought by the action of the ampere-indicator, the bearing of the shaft 16 within the boss may be slightly frictional, or instead and preferably a spring 20 is employed, which is carried by the shaft 16 and is bent back upon itself with the free end in engagement with the boss 13, whereby the desired friction will be obtained, so as to prevent any accidental return movement of the supplemental pointer 17. To further increase this frictional engagement, the boss 13 may be slightly roughened, corrugated, or knurled. In order that the shaft 16 may pass the cord of the plumb-bob 10 and at the same time to allow the supplemental case or box 12 to be centrally arranged on the meter for appearance sake, the said shaft 16 is provided with a curved portion 21 therein, which clears said cord, it being understood that the maximum movement of said shaft is never greater than forty-five degrees, so that the curved portion thereof will be always free from engagement with said cord.

The operation of the improved maximum-load or ampere indicator will be readily understood and is as follows: As the ampere-indicator of the electric meter is operated to register the quantity of current or the number of amperes influencing the meter the pointer 8 will be correspondingly moved relatively to the scale 9, said pointer engaging the finger 18, partially rotating the shaft 16, and moving the supplemental pointer 17 relatively to the scale 15. If the quantity of current decreases, the pointer 8 retreats from

the finger 18 without affecting it; but if the quantity of current is increased a further engagement between the pointer 8 and the finger 18 will be effected, thereby moving the supplemental pointer 17 to a further extent and indicating the increased current which may have influenced the meter. Under all conditions, therefore, the supplemental index 17 will represent the maximum current which at any moment during a given period of time may have passed through the meter, and it will offer a convenient means by which the inspector of the meter may ascertain the maximum number of amperes which may have been registered by the same. The employment of my improved maximum-load indicator does not in any way disturb or affect the operation of the pointer 8, which, as heretofore, indicates the amperes in the meter at any given time.

After the meter has been inspected the supplemental pointer 14 is returned to zero in any suitable way—such, for example, as by removing the glass cover 14 and turning said supplemental pointer backward by hand.

Instead of making use of the supplemental pointer 17 for indicating the maximum number of amperes the modified arrangement illustrated in Figs. 4 and 5 may be employed. With such modification the shaft 16 carries a toothed arc 22, which engages a pinion 23 on a shaft 24, the latter carrying a supplemental pointer 25, which registers with a circular scale, as will be understood. The latter form of indicator possesses an advantage over the arrangement first described, inasmuch as the supplemental pointer travels over a larger scale, and hence is susceptible of closer reading.

In Fig. 6 a still further modification of the invention is illustrated. In this figure the shaft 16 is not provided with an arm 18, as in the other two forms of my invention, but instead is provided with a downwardly-extending supplemental pointer 26, having an intumed lower portion 27 arranged in the path of movement of the lower end of the pointer 8. By means of the latter arrangement the maximum-load indicator coöperates with the same scale 9 as the pointer 8 of the ampere-indicator. With the device shown in Fig. 6 the supplemental box or case 12 may be dispensed with, the boss 13 being simply screwed into the cap or outer plate 2 and being provided with a hollow projection 28, having a light sheet-metal cap 29, which can be removed, so as to disclose the end of the shaft 16. In the modification illustrated in this figure, instead of employing a spring 20, which frictionally engages with the boss 13, as in the other two forms, I employ a spring-pawl 30, carried by the shaft 16, and which engages a series of very fine teeth 31, cut in the periphery of said boss. The engagement between the pawl 30 and the teeth 31 will allow the supplemental pointer 26 to move in one direction, but will prevent

return movement. After the meter has been inspected and when it is desired to return the supplemental pointer 26 to the zero position the cap 29 is removed, so as to disclose the end of the shaft 16, which is pressed inward, so as to disengage the pawl 30 from the teeth 31. The shaft can then be turned so as to bring the supplemental pointer 26 back to its original position, after which the shaft 16 is moved outward, so as to again engage the pawl 30 with the teeth 31. In order to allow of this latter movement, the inner edge of the boss 13 is cut away at 32, so as to form an inclined portion up which the pawl 30 may ride into engagement with the teeth.

In Figs. 8 and 9 I show a still further modification of the device, which differs from the forms above described in the important respect that the pointer of the ampere-indicator or other element connected therewith controls the position and extent of movement of the supplemental pointer without, however, mechanically effecting such movement, so that there will be absolutely no retardation to the movement of the ampere-indicator and absolute accuracy will therefore be secured. With this form of my invention the shaft 16 carries a toothed arc 22, engaging a pinion 23 on a shaft 24, carrying a supplemental pointer 25, as in the modification illustrated in Figs. 4 and 5; but manifestly the said shaft 16 may be directly connected with the supplemental pointer, as in the other forms of the device. Upon the inner end of said shaft 35 is mounted an insulating hub or collar 33, from which depends a contact-finger 34, arranged in the path of movement of the shoulder on the pointer 8 of the ampere-indicator. Mounted above the shaft 16 and supported in any suitable way is a solenoid 35, with which a curved core 36 coöperates, said core being connected to the shaft 16, as shown. The core 36 is balanced by weights 37 37, so as to remain stationary in any position to which it may have been moved; but in order that the possibility of accidental derangement thereof may be overcome the said core carries the light spring 38, engaging frictionally with the boss 13. In order to prevent overthrow or false travel of the supplemental pointer, the solenoid 35 is preferably closed at the rear end, at 39, and the core 36 is provided with a vane 40, working closely within the bore of the solenoid, like an ordinary dash-pot. Current is adapted to be supplied to the solenoid 35 when the pointer 8 makes contact with the contact-finger 34. When used, for instance, with a three-wire system, one terminal of the meter will be connected to one end of the solenoid-coil, the other end thereof being connected, as shown, with the contact-finger 34, and the pointer 8 and frame of the meter will be in circuit with the neutral wire. With a two-wire system one of the mains will be connected to one end of the solenoid-coil, and the other main will be in cir-

cuit with the pointer 8, as will be understood. In either instance or if a separate source of supply, such as a battery, should be used there will of course be sufficient resistance in the circuit for the purpose—for instance, by making the solenoid-coil of very fine wire. The operation of this form of my invention is as follows: As the pointer 8 is moved by the influence of the ampere-indicator coil or coils it will be engaged with the contact-finger 34, completing the circuit through the solenoid 35, which will attract the core, partly rotating the shaft 16 and moving the supplemental pointer. This movement of the core will be relatively slow, owing to the vane 40 working in the closed bore of the solenoid, and will continue until the circuit is broken between the contact-finger 34 and the pointer 8, at which moment the movement of the core will cease. If the pointer 8 retreats from the contact-finger, due to a drop in the number of amperes, the supplemental pointer will be unaffected; but if the number of amperes is increased the pointer 8 will again engage the contact-finger 34, causing the solenoid 35 to be again engaged and resulting in a consequent further movement of the supplemental pointer. With this form of device it will be seen, therefore, that the pointer or index of the ampere-indicator is in no way retarded or affected by the supplemental pointer, so that absolute accuracy may be obtained.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is as follows:

1. The combination with an electric meter wherein is used an ampere-indicator, of a supplemental pointer the movement of which in one direction is effected or controlled by said ampere-indicator, and means for preventing return movement of said supplemental pointer, substantially as set forth.

2. The combination with an electric meter wherein is used an ampere-indicator, of a shaft, connections between said shaft and said ampere-indicator, and a supplemental pointer carried by said shaft, substantially as set forth.

3. The combination with an electric meter wherein is used an ampere-indicator and a plumb-bob, of a shaft, connections between said shaft and the ampere-indicator, said shaft being provided with a curved portion for passing the cord of said plumb-bob, and a supplemental pointer carried by said shaft, substantially as set forth.

4. The combination with an electric meter wherein is employed an ampere-indicator, of a pointer carried by said ampere-indicator, a supplemental pointer for indicating the maximum amperes which may be registered by said ampere-indicator, and connections between said supplemental pointer and the pointer of the ampere-indicator, substantially as set forth.

5. In an electric meter wherein is used an

ampere-indicator, the combination of a shaft, a finger on said shaft engaged by an element connected with said ampere-indicator, and a supplemental pointer operated by said shaft, substantially as set forth.

6. The combination with an electric meter wherein is used an ampere-indicator, of a shaft, connections between said shaft and said ampere-indicator, a supplemental pointer operated by said shaft, and a spring for preventing return movement of said shaft, substantially as set forth.

7. An improved maximum-load or ampere indicator coöperating with an electric meter, comprising a supplemental index movable only in one direction by said meter and co-

operating with a suitable scale, substantially as set forth.

8. A maximum-load or ampere indicator coöperating with electric meters, comprising a shaft, connections between said shaft and the meter by which the shaft will be turned in one direction only, and a supplemental finger connected to said shaft and coöperating with a scale, substantially as set forth.

This specification signed and witnessed this 28th day of October, 1897.

WM. D. MARKS.

Witnesses:

JOHN H. HUDSON,
GEORGE W. RUE.