No. 753,194. PATENTED FEB. 23, 1904.

T. DUNCAN.

ELECTRIC METER.

APPLICATION FILED JAN. 2, 1904.

NO MODEL.

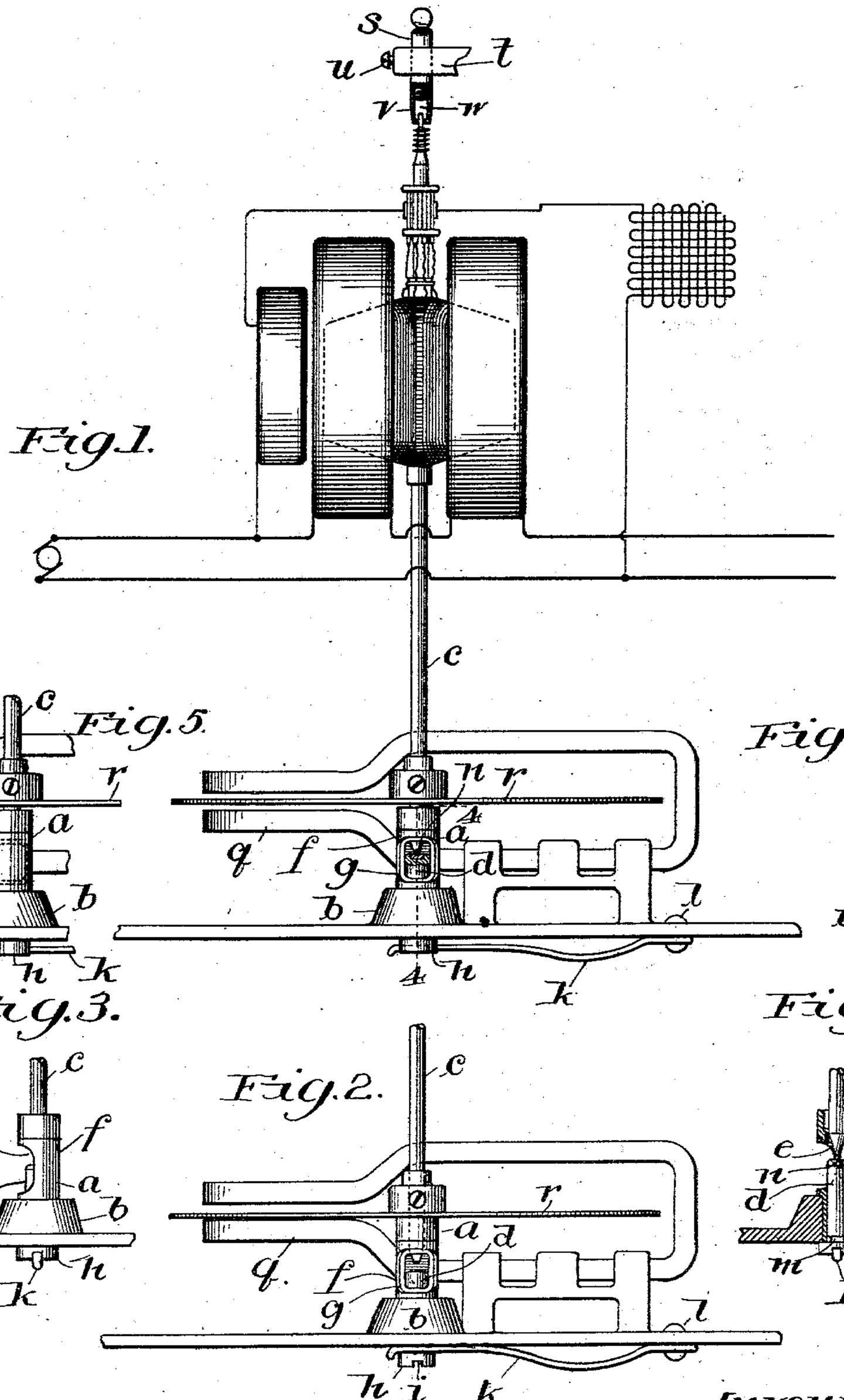

Fig. 1.

Fig. 5.

Fig. 6.

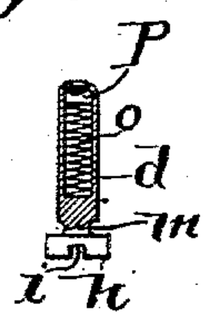

Fig. 3.

Fig. 2.

Fig. 4.

Witnesses:
C. H. Crawford
Leon Stroh

Inventor:-
Thomas Duncan
by G. L. Cragg
his Attorney

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 753,194. Patented February 23, 1904.

UNITED STATES PATENT OFFICE.

THOMAS DUNCAN, OF LAFAYETTE, INDIANA.

ELECTRIC METER.

SPECIFICATION forming part of Letters Patent No. 753,194, dated February 23, 1904.

Application filed January 2, 1904. Serial No. 187 533. (No model.)

To all whom it may concern:

Be it known that I, THOMAS DUNCAN, a citizen of the United States, residing at Lafayette, in the county of Tippecanoe and State of Indiana, have invented a certain new and useful Improvement in Electric Meters, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to electric meters, and has for its object an improved construction of the bearings thereof. The bearings of meters of the prior art are not easy of access, which renders the work of inspecting, cleaning, repairing, and renewing of their parts tedious and difficult. It is necessary in some makes of meters to employ a special tool to remove the end or bearing-point of the spindle. In other constructions the entire revoluble part, consisting of the spindle and other elements carried thereby, has to be taken out of the meter in order to examine or remove the spindle-point, which normally rests upon the jewel-bearing. Central stations, as a rule, object to having to resort to such unhandy methods of inspection. I am enabled by means of my present invention to afford a simple and effective means of gaining access to the meter-bearing without having to remove any of the meter parts. Hitherto, as is well known, the lower bearings of meters have been made of posts threaded upon their exteriors to hold the posts and provide for various adjustments thereof upon the meter-bases. This construction gives rise to expensive machine-work and provides no fixed means for determining the relative positions of the posts, meter-bases, and shafts.

In accordance with my invention I have provided an improvement in meters whereby the jewel-posts are incapable of assuming any except predetermined positions with respect to the meter-bases. This result is accomplished by relieving the posts of any threaded engagement with the balance of the meter structures.

In the preferred embodiment of the invention the posts in addition to being perfectly smooth upon their exteriors are made hollow upon their interiors to contain coil-springs and jewel-blocks, with jewels thrust upward by the coil-springs in bearing engagement with the lower end of the meter-shafts.

Another feature of my invention which may be practiced independently of the means by which the jewel-post is secured in place exists in improved means whereby the lower end of the meter-shaft may be readily inspected. This may be accomplished by the device of my invention without shifting the position of the jewel-post. To this end a casing or hollow stud, open at one side, is provided about the upper end of the jewel-post and the lower end of the meter-shaft. A door or covering is provided before this opening which when removed from the opening makes the lower end of the meter-shaft and the upper end of the jewel-post accessible to view. This covering is preferably in the form of a cylindrical sleeve, while the casing is also preferably cylindrical or tubular, the sleeve having an opening in one side which may register with the opening in the casing to render the bearing accessible, the opening being closed by rotation of the sleeve to prevent dust and other foreign matter from entering the casing.

Another feature of the invention resides in an improved construction of the upper bearing, which is made in two parts, one part in the form of a hollow sleeve, into which the upper end of the meter-shaft projects, while the other part constitutes a portion of the meter structure, with which the said sleeve has separable engagement. This other part is preferably in the form of a cylindrical stem, which itself may be removably secured to a bracket portion of the meter.

I will explain my invention more fully by reference to the accompanying drawings, illustrating the preferred embodiment thereof, in which—

Figure 1 shows enough of the mechanical elements of a meter structure necessary to an understanding of the invention, circuit connections of the meter being diagrammatically indicated. Fig. 2 is a view of the lower por-

tion of the structure shown in Fig. 1, wherein the lower bearing has another adjustment. Fig. 3 is a side elevation of the parts of the meter immediately in association with and including the lower bearing. Fig. 4 is a sectional view on line 4 4 of Fig. 1. Fig. 5 illustrates the lower portion of the meter, the bearing-casing being closed, this view being taken in the same direction as that in which Fig. 1 is taken. Fig. 6 is a sectional view of the jewel-post.

Like parts are indicated by similar characters of reference throughout the different figures.

In the preferred embodiment of the invention shown I have provided a stud *a*, which is enlarged at its upper end, is reduced at its intermediate portion, and is further reduced at its lower portion to afford a shoulder between the intermediate and lower portions that is forced against the base or bracket *b* of the meter, this portion of the bracket being preferably formed into a boss, the stud having at its lower extremity a driving fit with the said bracket in a corresponding recess or aperture provided in the bracket. This stud is made hollow to constitute what I term the "bearing-casing," the stud also being open from end to end to receive the meter armature-shaft *c* at its upper end and the jewel-post *d* at its lower end. In other words, the stud is provided with a bore extending longitudinally therethrough, receiving at its upper end the meter-shaft and at its lower end the jewel-post. The cylindrical stud is preferably cut away at *e*, so as to reveal the lower end of the meter-shaft and the upper end of the jewel-post. In order that the access of foreign material to the meter-bearing may be prevented, a sleeve *f*, which is made cylindrical in conformity to the cylindrical stud, is interposed between the large end of the stud and the boss, this sleeve having an opening *g* in one side that may register with the cut-away portion *e*, the sleeve being sufficiently loose with respect to the stud as to permit of its rotation about the stud to bring the openings *e* and *g* into register when the lower bearing is to be inspected and to bring the solid portion of the sleeve over the opening *e*, when the parts are in normal relation, this arrangement effectively preventing the entry of foreign matter within the casing formed by the stud. By this means the bearing can be oiled without having to remove it from the meter and other attention may be bestowed to the meter-bearing without materially disarranging the parts thereof. In order the more effectively to maintain the dust-proof character of the casing, the post *d* is provided with a circular disk-like head *h*, which is held against the lower end of the stud *a* and, preferably, a portion of the bracket supporting the same by means of a spring *k*, the said head also acting as a limiting means to determine the extent to which the post may be upwardly thrust. To enable the use of a simple form of spring to accomplish this purpose, I employ a head *h*, that may be provided with a groove *i*, that receives the free end of the spring *k*, the anchored end of the spring being secured to the base by a rivet *l*. By the provision of the slot *i* a spring in the form of wire may be employed. I do not wish to be limited, however, to the shape of the spring employed nor to the presence of the slot *i* nor to the formation of the head *h* and the function specified for it. When a wire spring is employed to hold the post in place, I desirably provide a second slot *m*, which desirably is in the form of a groove that preferably though not necessarily completely encircles the post just above the head *h*. If it should be desired to lower the post, the spring *k* is removed from the slot *i* and is shifted to one side and the post lowered until the groove *m* is in the same plane with the spring, whereupon the said spring (which may be termed "elongated spring") is permitted to engage said groove to hold the post in its lowered position. A complete removal of the post is accomplished by simply removing the spring from the path of the head *h*, whereupon the post is permitted to fall quickly, the post having no threaded engagement. When the post is out or lowered, the entire lower end of the spindle-point is easily inspected. If the post is provided with a removable end section, a small pair of tweezers or other suitable tool may be used to remove said end section. I have provided as an end section an iron or steel ball *n*, which is preferably held in position by magnetic attraction, the shaft being preferably magnetized for the purpose. If this ball on inspection is found to be rough, a new one can be inserted with ease, the ball readily being attracted by the shaft, or if the section *n* is in other form said section may be readiiy manipulated, and I do not, therefore, wish to be limited to this construction of the shaft-bearing. It is apparent with what ease the jewel-post may be removed and inserted, so that in the event of repair or substitution one post may be quickly inserted in place of another. It will also be apparent that it will be impossible for a careless operator to jam the jewel-post against the shaft, inasmuch as such operator is prevented from so doing owing to the absence of threads. After the lower meter-bearing has been given the desired attention the sleeve *f* is rotated to close the opening *e*, such opening preferably extending nearly one-half of the circumference of the stud to afford ample space for manipulation. The jewel-post *d* is preferably made hollow and contains a coil-spring *o*, that bears against a jewel-block *p*, carrying a jewel engaging the

shaft-section *n*, the said spring, in accordance with practice known for the last twelve or more years, acting to take up any jar to which the meter might be subject. The spring *k* supplements the spring *o* in this latter function. While I prefer a hollow jewel-post, I do not wish to be limited thereto. The upper surface of the stud *a* is preferably so positioned with respect to the lower pole of the damping-magnet *q* that the damping-disk *r* will strike said upper surface and will be prevented from striking the upper surface of said pole, which latter surface is slightly below the upper surface of the stud *a*, the said disk being prevented from bending, while at the same time the jewel in the post is protected.

It will be seen that I have provided a construction wherein the jewel-post is slid into and out of its opening in the post, said sliding motion being longitudinal of the armature-shaft of the meter, and that this sliding action occurs within a stud inserted within the base of the meter. I do not wish to be limited, however, to a construction employing the stud, nor do I wish to be limited to the presence of the groove *m* in the post, as this groove is simply provided to promote the frictional engagement between the spring *k* and the post to hold the post in a lowered position. The advantage of the construction in shipping will be apparent, for all that need be done in preparing the meter for shipment is to lower the jewel in the manner specified, whereupon the limiting-stop, the stud *a*, serves to prevent the damping-disk from being lowered too far, said limiting-stop even preventing the damping-disk from coming in contact with the damping-magnet.

For the upper bearing I preferably provide a staff *s* that is cylindrical and which has separable engagement with a bracket *t* through the agency of a set-screw *u*. The portion *s* of the meter has secured thereto a hollow thimble or sleeve *v*, that desirably has threaded engagement with a reduced portion of the element *s*, the interior of the said thimble being preferably threaded for this purpose. A pocket *w* is afforded by the sleeve or thimble *v*, the bottom of the pocket being preferably made fairly thin to act as a side thrust-bearing for the shaft and to afford as light friction as possible. The thinner the bottom wall of the pocket the less the surface of contact between it and the end of the spindle and the less the friction. The practice has been to drill a hole into the end of an element corresponding to the element *s* and extending transversely therethrough; but as the upper end of the spindle is raised into the hole the friction is increased, whereas in the present arrangement the line or surface contact remains the same whether the end of the spindle is up or down within the hole through which it projects into the pocket *w*. The pocket *w* affords a space for a small piece of sponge or wad of absorbent cotton containing porpoise or other oil and used as a lubricant for the upper bearing. This arrangement prevents the oil from getting down onto the worm or worm-wheel of the counting-train and the commutator, as frequently happens in cases where oil is used in the upper bearing. Moreover, I have provided an improved upper bearing made in sections, so that in the event of injury the sections of the bearing may be separated and replacement or repair effected.

It is obvious that changes may readily be made in the embodiment of my invention herein shown and particularly described without departing from the spirit of the invention, and I do not, therefore, wish to be limited to the precise construction shown; but,

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. In a meter, the combination with a meter-shaft formed in separable sections, one of said sections comprising a magnetizable ball or sphere, and a bearing supporting the ball and the balance of the shaft, the said shaft being magnetized to hold the ball in place, substantially as described.

2. In a meter, the combination with a meter-shaft formed in separable sections, one of said sections comprising a magnetizable ball or sphere, and a bearing supporting the ball and the balance of the shaft, said ball being held in place by magnetic attraction, substantially as described.

3. In a meter, the combination with a meter-shaft thereof, of a bearing therefor, a casing surrounding the bearing and the shaft where it engages the bearing, the said casing having a side portion cut away to reveal the bearing and the shaft portion engaging the same, and a movable covering for the cut-away portion, whereby the casing may be opened and closed, substantially as described.

4. In a meter, the combination with its shaft of a bearing therefor, a casing surrounding the bearing and shaft where the shaft engages the bearing, and a sleeve surrounding the casing and rotatable about the same, the said casing having an opening in its side to show the bearing and the shaft portion engaging the same, the sleeve having an opening in its side to register with the opening in the casing when in one position, the said sleeve serving to close the opening in the casing when the sleeve is in another position, substantially as described.

5. In a meter, the combination with its shaft of a damping-disk thereon, a damping-magnet between whose poles the disk may rotate, a displaceable jewel-bearing post serving to support the shaft in rotation, and a limiting-stop serving to prevent movement of said disk

into contact with the damping-magnet upon the displacement of said post, substantially as described.

6. In a meter, the combination with a bearing for its shaft, of means for inclosing the said bearing and the portion of the shaft engaging the same, said means permitting of access to said bearing and shaft where engaged without changing the relative positions of the shaft and bearing, substantially as described.

In witness whereof I hereunto subscribe my name this 30th day of December, A. D. 1903.

THOMAS DUNCAN.

Witnesses:

G. L. CRAGG,

C. H. CRAWFORD.