F. R. SOMMER.

ELECTROMETER.

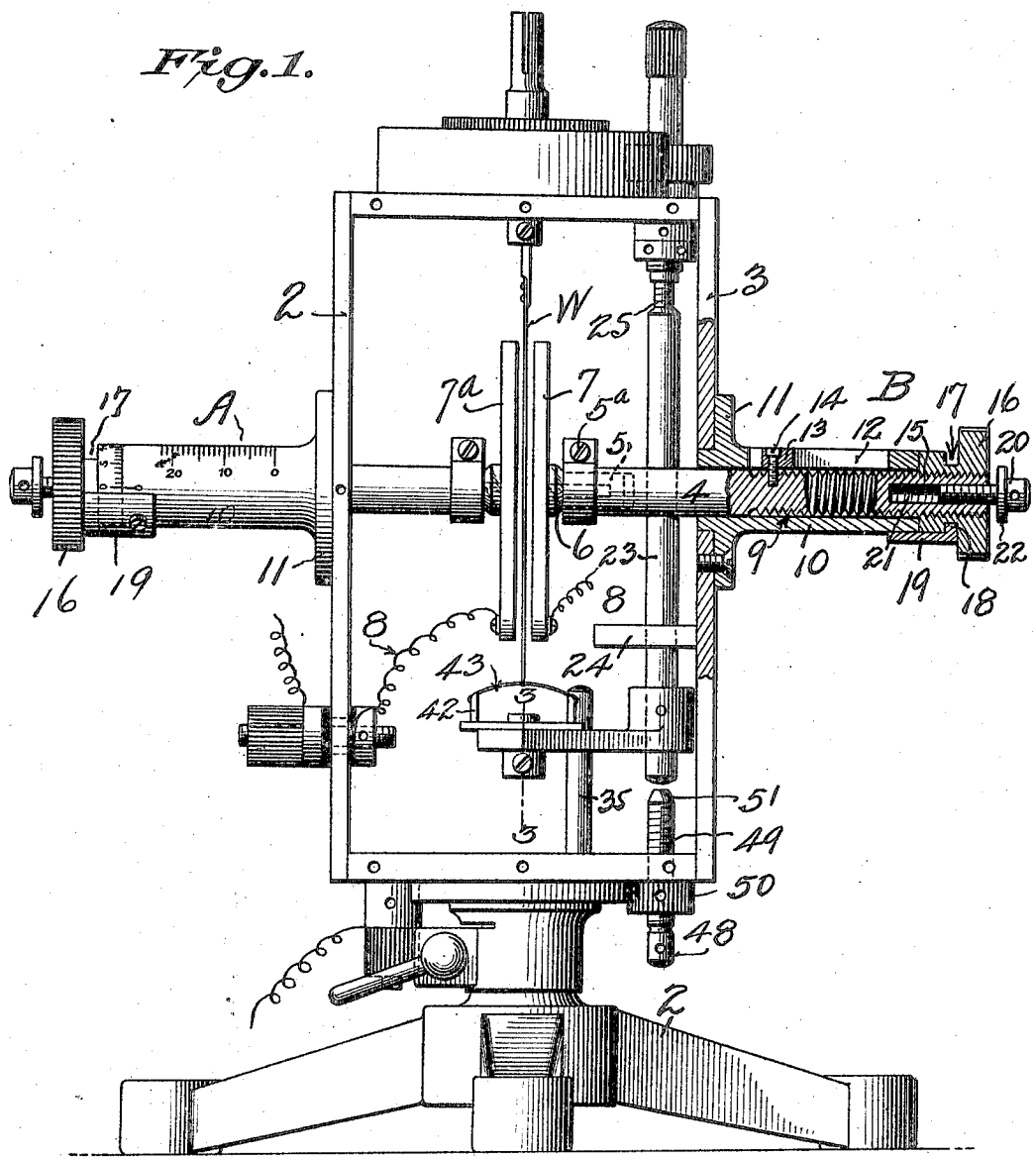
APPLICATION FILED JUNE 15, 1920.

1,417,114.

Patented May 23, 1922.

2 SHEETS—SHEET 1.

Fig. 1.



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2 SHEETS—SHEET 2.

Fig. 2.

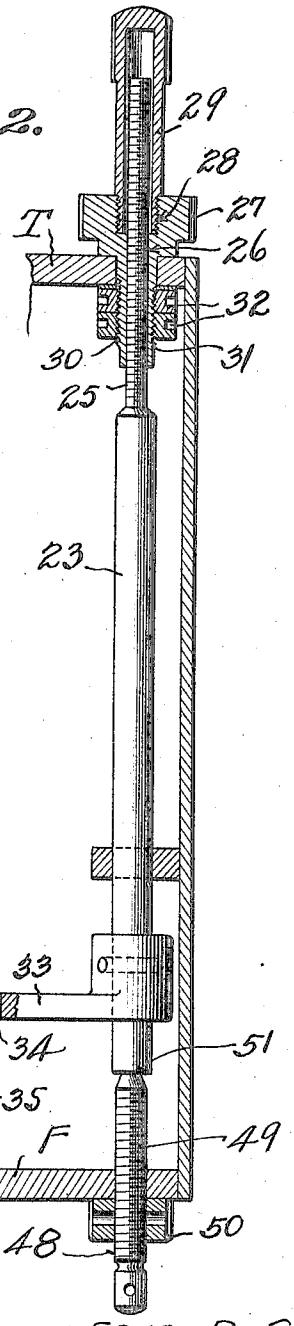


Fig. 3.

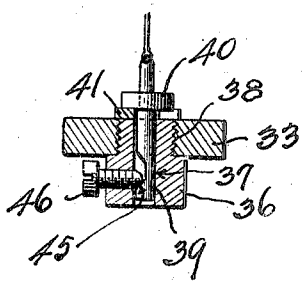
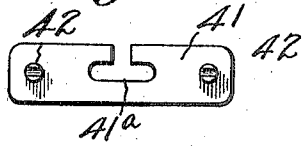


Fig. 4.



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ELECTROMETER.

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To all whom it may concern:

Be it known that I, FRED R. SOMMER, citizen of the United States, residing at Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Electrometers, of which the following is a specification.

This invention relates to electrometers, and has special reference to improvements therein for accurately adjusting the pole plates and tensioning the metallic conductor positioned between the pole plates.

A primary object of the invention is to provide means for expeditiously adjusting the pole plates to the desired position with reference to the quartz fibre or other metallic conductor with a great degree of precision, to thereby insure the accuracy and reliability of the results sought to be obtained through the use of this kind of instrument. In this connection the invention aims to elimintaate springs and other elements which are likely to become inaccurate under constant use, and which through fractional defections from the normal standard frequently vary the conclusions and data observed from the functioning of the metallic conductor under the influence of an electrical circuit.

A further object of the invention is to provide a safe and reliable supporting unit for the quartz fibre or other conductor, which not only facilitates the initial assembly of the same in position, but also permits of such adjustment thereof as desired to place the said wire under the proper tension.

With the above and other objects in view which will more readily appear as the nature of the invention is better understood, the same consists in the novel construction, combination and arrangement of parts hereinafter more fully described, illustrated and claimed.

A preferred and practical embodiment of the invention is shown in the accompanying drawings, in which:—

Figure 1 is an elevation, partly in section illustrating the improved adjustable pole plate support and the tensioning device for the metallic conductor.

Figure 2 is an enlarged detail sectional view of the novel means of adjustment for tensioning the quartz fibre.

Figure 3 is an enlarged detail view of the tensioning device shown in Figure 2.

Figure 4 is a detail plan view of the plate which carries the bridge wire, showing the type of slot utilized in connection with the holding pin.

Similar reference characters designate corresponding parts throughout the several figures of the drawings.

Electrometers which are used for measuring the potential difference in electrical currents by the attraction or repulsion of statically charged elements require accurate and reliable adjustments to obtain satisfactory results, and to this end the present invention has particularly in view novel and improved means for adjusting the pole plates of the divice as well as a novel tensioning device for positioning the metallic conductor between the pole plates. Accordingly, as will be observed from the drawing the housing or casing 1 which is supported on a suitable stand or base 2 has mounted in its side walls 2 and 3 the novel adjustable pole plate units A and B respectively. These units are of duplicate construction and therefore a description of one will suffice for the other.

Referring to the unit B for instance, which is shown in section in Figure 1 it will be observed that the same includes a supporting shaft 4 provided with a clamping socket 5 adapted to receive the insulated bushing 6 of the pole plate 7. This pole plate 7 may be electrically connected with a suitable source of curent through the wire connection 8 and occupies a vertical position within the casing parallel to the oposite pole piece 7^a. And, for the purpose of securely holding the said pole plate 7 in position within the socket 5, a suitable clamping screw 5^a may be utilized.

The said supporting shaft 4 is mounted to be shifted horizontally for the purpose of moving the pole plate 7 to and from the quartz fibre or metallic conductor wire W, and to facilitate the accurate adjustment of the said supporting shaft, the same is adapted to have a free sliding movement within the smooth bore 9 of the tubular bearing member 10. This bearing member 10 is provided with the attaching flange 11 for being secured to the wall of the casing, and is also provided in its side wall with a slot 12 which constitutes a guide for the nut element 13 carried by the shaft 4 through the medium of the fastening 14 or its equivalent. By reason of the engagement of the nut within the slot 12 it will be apparent that

the shaft 4 will have a true rectilinear movement in the bore 9 of the supporting member, and in order to enable this movement to be expeditiously and accurately effected the threaded portion 15 of the shaft 4 which projects beyond the end of the member 10 carries an adjusting nut 16 which is provided with an annular holding groove 17 that is adapted to receive the flanged end 18 of a check plate 19 carried by the outside of the tubular member 10. With this arrangement it will be apparent that the adjusting nut 16 will be held relatively stationary with reference to the tubular member 10 so that when it is turned it will cause the longitudinal shifting of the shaft 4. And, for the purpose of preventing the shaft 4 from moving too far inwardly and thus breaking the quartz fibre or filament, the same carries a stop nut 20 which in the arrangement shown consists of a screw threaded shank portion for fitting into the socket 21 in the shaft and having the flange 22 for engaging with the head of the nut 16 to constitute the desired abutment or stop.

In connection with this portion of the apparatus it will therefore be apparent that the invention aims to provide a novel pole supporting unit which essentially consists of the tubular bearing member 10 and the shaft 4 carrying the pole plate 7, the said shaft being engaged by the nut 16 which is rotatably held in a relatively fixed position whereby its rotation permits the shifting of the shaft to the desired degree. In this feature of improvement it is to be observed that the check plate 19 is important since it holds the nut 16 in a relatively fixed position though permitting of its rotation to propel the shaft 4. Also, the member 10 may be provided with a scale 5 for cooperating with the zero line on the nut 13, and to check with this scale S another scale S′ may be placed on the rim of the feed nut 16 this latter scale reading from a zero mark on the member 10.

A further feature of improvement resides in the tensioning device for mounting the wire W between the pole plates. This device includes in its organization a post 23 which is held in the guide-web 24 in such a manner that it may be freely shifted in the direction of its axis and to this end the top 25 thereof is preferably reduced and threaded to engage with the threaded bore 26 of the adjusting nut 27 as clearly shown in Figure 2. The said adjusting nut 27 is provided with an interiorly threaded socket 28 for receiving a suitable cap 29 for housing the upper threaded end of the post 23, and the sleeve portion 30 of said nut is preferably externally threaded as at 31 for a suitable distance of its length to receive the lock nuts 32. The arrangement here described therefore permits of the manipulation of the nut 27 in such a manner as to cause the longitudinal shifting of the post 23 while the nut itself remains in a fixed position within the top wall T of the casing. For the purpose of enabling the operator to accurately know the extent of movement given the post through the manipulation of the nut the exposed face thereof is preferably provided with a scale marked in suitable units of length.

The lower end of the post 23 rigidly carries therewith the offset arm 33 which is provided with a slot 34 for receiving a post 35 carried by the floor F of the casing to prevent the shifting of the said offset arm out of its proper position. The showing of the slot 34 in Figure 2 would give the impression that some play might be permitted between the arm and post but it is pointed out that the slot is longer than it is wide for the purpose of facilitating assembly, and that the width of the slot is just enough to clear the pin 35 without permitting any appreciable side motion.

The outer end of the offset arm 33 carries a novel wire supporting unit which includes the bushing 36 having the central bore 37 and the threaded portion 38 for fitting into the arm. The said bore 37 of the bushing 36 is adapted to receive the stem 39 of a clamping pin having a head 40 for engaging with the cross bar 41 which carries the anchor posts 42 at opposite ends thereof for the bridge wire 43, to which one end of the test wire W is attached. A novel and distinctive feature of improvement in connection with the mounting of the holding pin within the bore 37 is that the stem 39 of said pin is provided with a recess having an inclined wall 45 which cooperates with a set screw 46 in such a manner that the tightening of the said screw will have the effect of pulling the stem 39 downwardly through the bore to thereby cause the head 40 of the pin to firmly clamp the plate 41 in engagement with the upper surface of the arm 33.

The bridge wire 43 which is carried by the post 42 may be soldered or otherwise secured thereto, and since this fastening operation is perfomed outside of the apparatus and the wire is positioned before assembly it is desirable to provide the plate 41 with a suitable slot 41ª for receiving the stem or shank of the holding pin as will be readily apparent.

For the purpose of preventing the shifting of the post 23 to such a downward position as would cause the breaking of the wire W a suitable adjustable abutment or stop 48 may be employed. This abutment is preferably in the form of a screw 49 having the lock nut 50 thereon for the purpose of facilitating setting at any desired point while the upper end 51 thereof is adapted to engage directly with the end of the post 23.

From the foregoing it will be apparent

that the present invention provides a simple and novel type of pole plate carrier which is capable of facile adjustment without interfering with the metallic conductor, while at the same time adequate means is provided for adjusting the tension of the metallic conductor through the manipulation of the nut 27 which causes the shifting of the post 23. Also the replacement and removal of the wire W and may be readily effected through the provision of the novel holding unit which involves the pin 39 that is engaged by the set screw 46.

Without further description it is thought that the many features and advantages of the invention will be readily apparent, and it will of course be understood that changes in the form, proportion and minor details of construction may be resorted to without departing from the spirit of the invention or scope of the appended claims.

I claim:

1. In an electrometer, the combination with the casing and the test wire, of a pair of pole plate units carried by the sides of the casing, each unit including a tubular support, a pole plate carrying shaft adjustable therein, means for accurately shifting the pole plate carrying shaft, and means for preventing the movement of the same beyond a predetermined inward limit.

2. In an electrometer, the combination with the casing and the test wire, of a pair of pole plate units carried by the sides of the casing, each unit including a relatively shiftable shaft having a socket at one end, a pole plate having an insulating bushing for fitting in the socket of said shaft and maintaining the said pole plate at right angles to the shaft, a feed nut for shifting said shaft in the direction of its axis to vary the distance of the pole plate from the test wire, and means for preventing the shifting of the said shaft beyond a predetermined inward limit.

3. In an electrometer, the combination with the casing and the test wire, of a pair of pole plate units carried by the sides of the casing, each unit including a relatively shiftable shaft having a socket in one end and threaded at the other, a pole plate disposed at right angles to the said shaft and having an insulated support in the socket thereof, a tubular casing for receiving said shaft and having a guide slot, a guide member carried by the shaft and riding in said slot, a feed nut element engaging with the threaded portion of the shaft, means for holding said feed nut in a relatively fixed position at the end of the tubular member, and a stop element carried by the extremity of the shaft for engaging with the nut to prevent inward movement of the shaft beyond a predetermined limit.

4. In an electrometer, the combination with the casing and the test wire, of a pair of pole plate units carried by the sides of the casing, each unit including a tubular supporting member, a pole plate carrying shaft having threads thereon, a feed nut engaging with said threaded portion of the shaft, and means carried by the tubular member and engaging with the nut for holding the latter in a relatively fixed position, and a stop member adjustably engaging with the end of the shaft projecting beyond the nut and constituting a stop abutment to prevent movement of the shaft beyond a predetermined inward limit.

5. In an electrometer, the combination with the casing and the test wire, of a pair of pole plate units carried by the sides of the casing, each unit including a tubular supporting member, a pole plate carrying shaft having threads thereon, a feed nut having an annular groove, and a flanged holding plate screwed to the tubular member and having the off-set flange portion thereof engaging in the groove of the nut, and a relatively adjustable abutment stop carried by the end of said shaft.

6. In an electrometer, the combination with the casing, a test wire, a support for one end of the test wire and means for engaging the other end of the test wire for adjusting the tension thereof, said means including a post adjustably supported by the casing, an off-set arm carried by the post, means carried by said arm for engaging with the end of the wire opposite the end connected with said support, and means carried by the casing for adjusting said post in the direction of the axis of the test wire.

7. In an electrometer, the combination with the casing and the test wire, of means for adjusting the tension of the test wire including a post arranged in a plane parallel to the test wire and having a threaded upward end portion, a feed nut carried by the casing and engaging with the said threaded portion of the post to adjust the same in the direction of its axis, an adjustable stop abutment carried by the casing and adapted to abut against the end of the post to prevent movement beyond a predetermined point, an off-set arm carried by the post, means for preventing the lateral movement of the arm, and a bridge wire unit detachably carried by the outer end of the off-set arm and connected with the test wire.

8. In an electrometer, the combination with the casing and the test wire, of means for adjusting the tension of the test wire including a post arranged in a plane parallel to the test wire, and having a threaded end portion, a feed nut engaging with said threaded end portion of the post and having an externally threaded sleeve portion, lock nuts carried by the sleeve portion of the feed nut to maintain the latter relatively fixed

with respect to the casing, an off-set arm carried by the said post, and means carried by the off-set arm for engaging with the test wire.

9. In an electrometer, the combination with the casing and the test wire, of means for tensioning the test wire including a relatively shiftable post having an off-set arm, a hollow bushing fitted to said arm, a slotted cross bar having upstanding anchor posts at opposite ends thereof, a bridge wire screwed to the said upstanding anchor posts and connected with the test wire, and a holding pin for detachably screwing the cross bar within the bushing.

10. In an electrometer, the combination with the casing and the test wire, of means for tensioning the test wire including a relatively shiftable post having an off-set arm, a hollow bushing fitted to said arm, a slotted cross bar having upstanding anchor posts at opposite ends thereof, a bridge wire screwed to the said upstanding anchor posts and connected with the test wire, and a headed pin for detachably holding the cross bar to the off-set arm, the shank of said pin being provided with a recess having an inclined wall, and a set screw carried by the bushing and adapted to engage with the inclined wall of the recess in the shank of the pin to wedge the head of the pin in clamping engagement with the cross bar.

In testimony whereof I hereunto affix my signature in the presence of two witnesses.

FRED R. SOMMER.

Witnesses:

EMORY L. GROFF,

A. J. COOPER.