No. 809,793. PATENTED JAN. 9, 1906.

J. FERGUSON.

ELECTROSTATIC VOLTMETER.

APPLICATION FILED MAR. 29, 1904.

2 SHEETS—SHEET 1.

Fig 2.

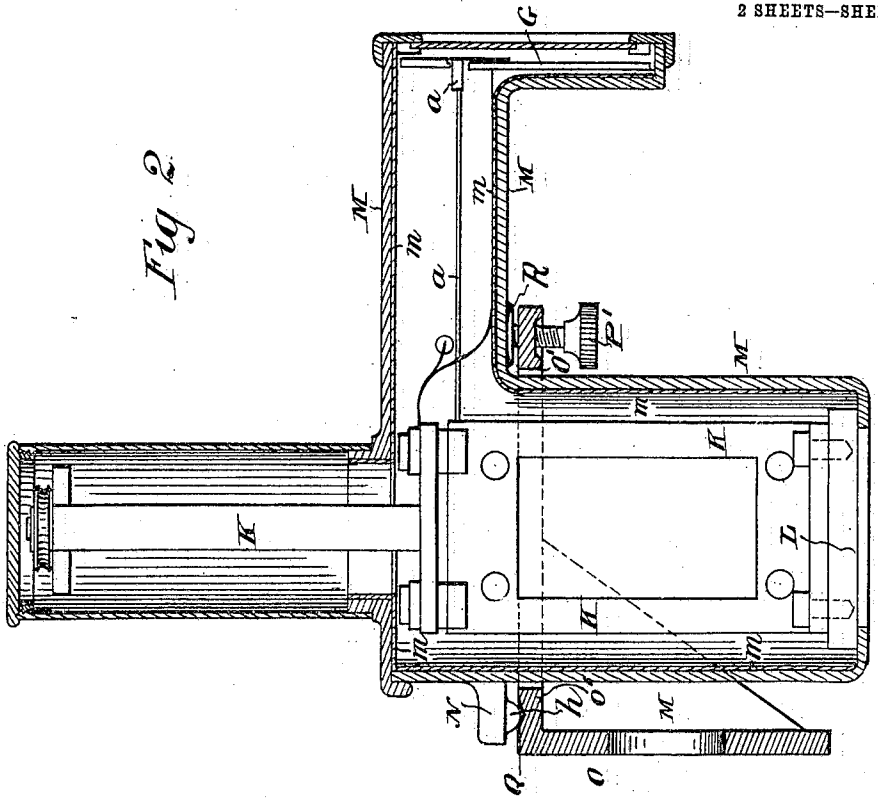
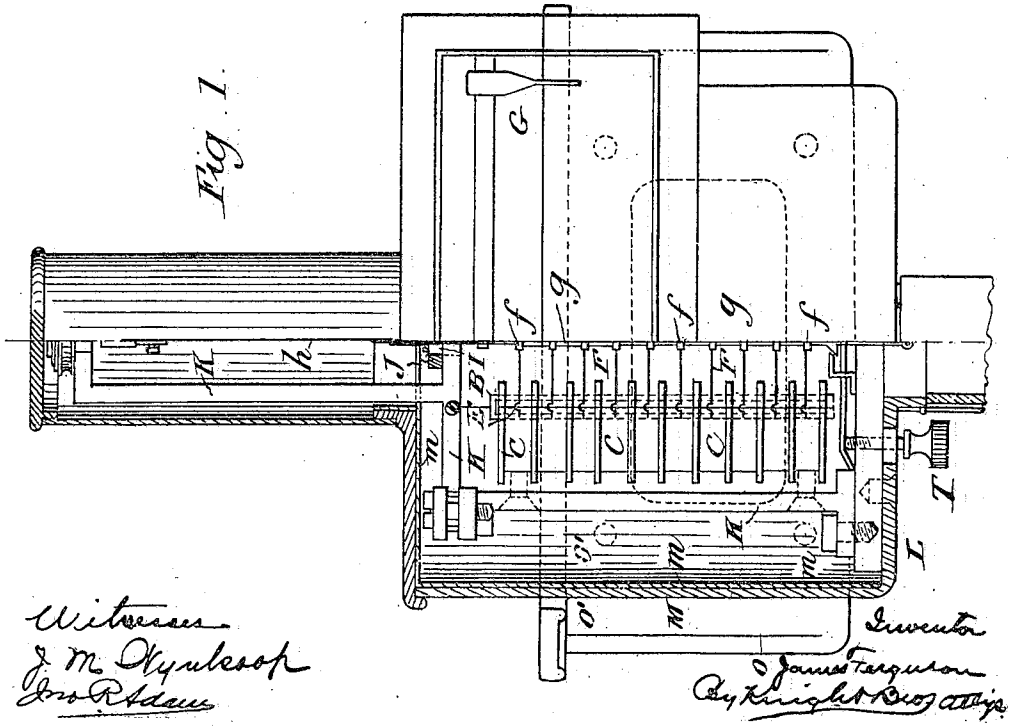


Fig 1.



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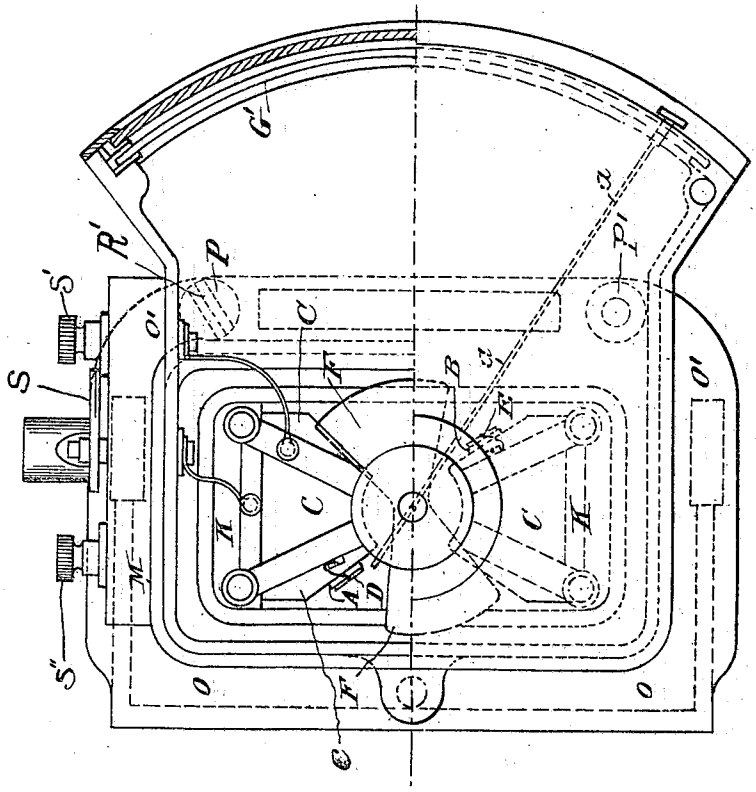
2 SHEETS—SHEET 2.

Fig. 3.



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UNITED STATES PATENT OFFICE

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ELECTROSTATIC VOLTMETER.

No. 809,793. Specification of Letters Patent. Patented Jan. 9, 1906.

Application filed March 29, 1904. Serial No. 200,603.

To all whom it may concern:

Be it known that I, JAMES FERGUSON, electrical engineer, residing at 18 Cambridge street, in the city of Glasgow, Scotland, have invented certain new and useful Improvements in Electrostatic Voltmeters, of which the following is a specification.

This invention relates to improvements in voltmeters of the electrostatic type, and specially those with multicellular system.

The main object of my invention is to obtain a longer and more open scale without increasing the size of the instrument to any appreciable extent.

In order that my invention may be properly understood and readily carried into effect, I have hereunto appended two sheets of drawings, of which—

Figure 1 is a part elevation and part vertical section of an electrostatic voltmeter embodying my invention. Fig. 2 is a sectional side elevation, and Fig. 3 is a part horizontal section and part plan, of the same.

In carrying out my invention I remove the repelling plates or screens which are fitted in the instrument hitherto constructed for the purpose of guarding the movable system against attraction by the back of the cells. As a substitute for these repelling-plates I fit narrow backs (indicated by letters A B) of vulcanite or other insulating material to the cells C. These backs A B have attached to them on the side remote from the cells C and nearest to the vanes F (comprising the movable system) when the pointer *a* is at zero (which position is shown in Fig. 3) a coating of tin-foil D E or other conductor narrower than the vulcanite itself to insure sufficient insulation between it and the cells C. To keep the conductor D E at the same potential as the movable system, it is permanently in metallic connection with the movable system. It will be seen in Fig. 3 that by this arrangement considerable angular space is left free, allowing the use of cells C and vanes F of wider angle with a correspondingly greater angle of travel of the pointer *a* and a longer scale G without increasing the length of the said pointer.

The vanes F are made from exceedingly thin aluminium-foil and are ribbed, as seen in Fig. 1, to obtain the necessary rigidity. To the center of each vane F an eyelet *f*, of brass or other easily-soldered alloy, is clenched or riveted. The hole in said eyelet *f* is of a size to fit a hard-drawn wire of one-half to one millimeter diameter, which forms the spindle of the movable system, as indicated by the letter *g*. The vanes F are properly spaced on the said spindle *g* by placing them in an accurately-constructed gage. After passing the spindle *g* through the said vanes F the eyelets *f* are soldered to the spindle *g* while in the gage. The advantage of this method of construction, reference being made to Figs. 2 and 3, is that the movable system can be constructed with the wider angle-vanes F lighter than was possible with the narrow vanes by the older method of construction.

As in the older electrostatic instruments, the movable system is suspended with a fine wire strip *h* of platino-iridium or bronze. If from any cause a spark should pass between the cells C and vanes F, the suspension will act as a fuse, but as soon as fused will allow the movable system to drop.

In the improved instrument short-circuiting between the movable system—namely, the vanes F and the cells C—is prevented. To effect this, I bush the hole I, through which the top end of the spindle *g* of the movable system passes, with vulcanite or other insulating material J, thus preventing connection between the movable system and its terminal.

The whole of the fixed and movable systems is carried on a frame K, attached to a vulcanite base L and quite independent of the case M of the instrument. The case M has no electrical connection to either the fixed or movable systems. To avoid error through the case M attaining a different potential to the vanes F, I coat the whole of the inside of the case with insulating material, and to this is attached a coating of tin-foil or other conducting material *m*. The lining or screen of conducting material *m* does not come quite close to the edge of the insulating-lining, thus allowing ample insulation between the conducting material and the case aforesaid. This inner lining *m*, as well as the scale-plate G′, which is also insulated from the case M, is in electrical connection with the movable system.

To allow the instrument to be easily and accurately set up and leveled, we arrange a geometrical fitting N between the case of the instrument and a bracket O. Said bracket has a rim O′ passing round the body of the case and provided, further, with leveling-screws P

and P′ and a center hole Q, formed in said bracket. The leveling-screws P and P′ support the instrument, P′ engaging with a plane *p* and R with a slot R′, while the pin *h* rests in the small hole Q in the bracket. By this arrangement the instrument when once leveled may be removed if necessary and replaced without again releveling.

S is a revolving contact-piece for connecting either of the terminals S′ and S″.

T is a screw for locking the movable system for the purpose of transit.

I claim—

A voltmeter of the electrostatic type comprising a case, a coating of insulating material on the interior surface of said case, a coating of conductive material on the interior surface of said insulating-coating, a fixed system of cells within said case, a vertical back of insulating material fitted to each set of fixed cells, a coating of conductive material on the exposed surface of said back, and a movable system of vanes to which the conductive coating of said backs is permanently connected.

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

JAMES FERGUSON.

Witnesses:

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AGNES MACKINTOSH.