No. 776,359. PATENTED NOV. 29, 1904.

A. SLABY.

INDICATOR FOR ELECTRIC OSCILLATIONS.

APPLICATION FILED JULY 26, 1904.

NO MODEL.

Fig. 2.

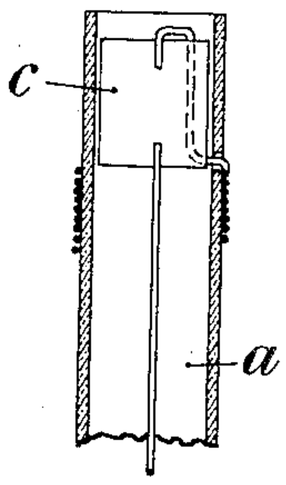
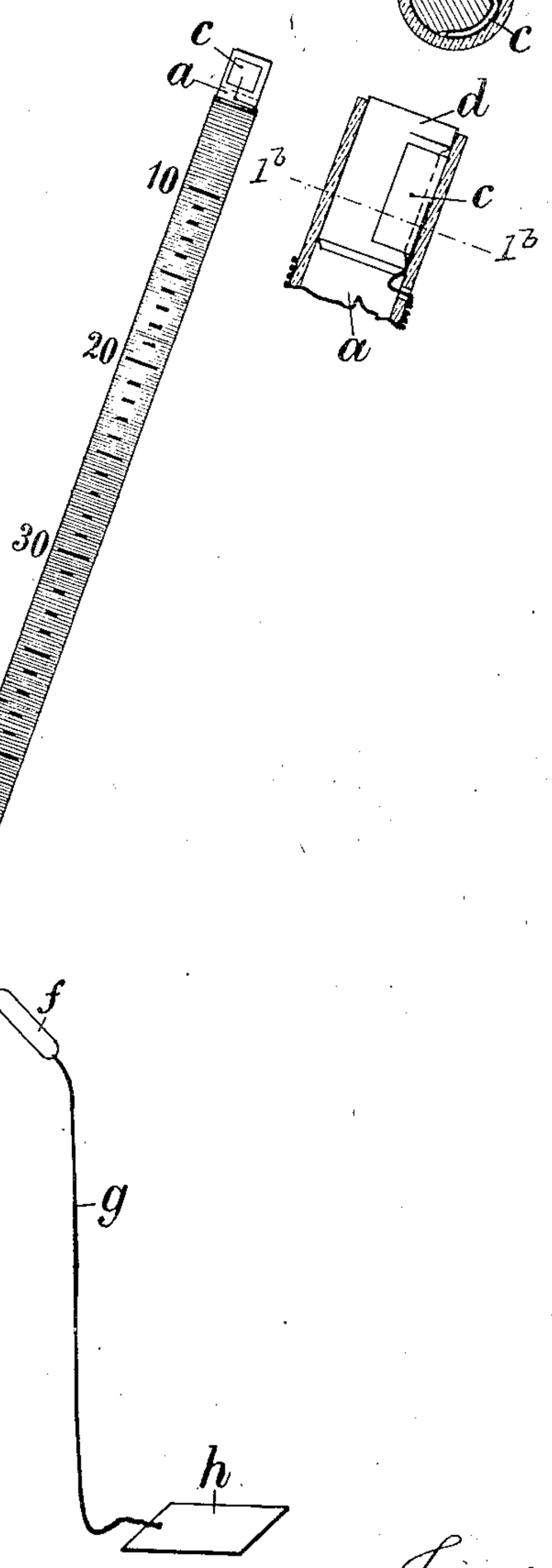


Fig. 1.



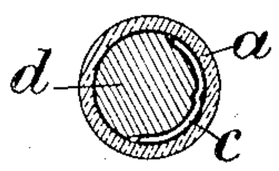


Fig 1b

Fig 1a

Witnesses
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No. 776,359. Patented November 29, 1904.

UNITED STATES PATENT OFFICE.

ADOLF SLABY, OF CHARLOTTENBURG, GERMANY.

INDICATOR FOR ELECTRIC OSCILLATIONS.

SPECIFICATION forming part of Letters Patent No. 776,359, dated November 29, 1904.

Application filed July 26, 1904. Serial No. 218,293. (No model.)

To all whom it may concern:

Be it known that I, ADOLF SLABY, professor, a subject of the German Emperor, residing at Sophienstrasse 33, Charlottenburg, Germany, have invented a certain new and useful Improvement in Indicators for Electric Oscillations, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

Among the numerous instruments which are used for indicating electric oscillations one class may be distinguished by its great sensitiveness. To this belong, for example, the coherer, the microphone, in combination with a telephone, and the magnetic detector. The same are suited for the reception of very weak electric indications, and therefore are used at receiving-stations for wireless telegraphy. Another group, consisting of hot-wire ammeters, air-thermometers, sparking gaps, and the like, permits of a quantitative measurement of the potential and current strength, but is far inferior to the first in sensibility and is therefore only used at transmitting-stations.

The present invention relates to an indicator of electric oscillations of medium sensibility the employment of which is very convenient and the manufacture of which by reason of its simplicity is remarkably cheap. The phenomenon which led to the discovery of the same is as follows: When a strip of so-called "gild paper" was laid under the terminals of a resonator-coil, long lightning-like sparks of a greenish color were produced which were also visible in daylight. A simple closed oscillating circuit served as wave-producer. The effect due to the phenomenon was materially strengthened when small sheets covered with barium platino cyanid crystals were brought under the terminals of the resonator-coil, and the maximum radiation resulted when gold-leaf was rubbed on the fluorescent sheet.

It has not hitherto been possible to explain or determine the phenomenon with any certainty from a physical standpoint. Probably the cathode-rays resulting from the discharges and possibly also the ultra-violet rays are the cause of the light phenomenon.

Figure 1 is a side elevation of my improved indicator. Fig. 1^a is a longitudinal section of the upper end thereof. Fig. 1^b is a transverse section taken on the line 1^b 1^b of Fig. 1^a. Fig. 2 is a longitudinal section of an indicator, showing a modification.

In the accompanying drawings a form of construction of the invention is shown. An insulated copper wire of comparatively thin cross-section is wound in a close spiral on a glass tube *a* of about 0.75 inch diameter. The lower end of the copper wire preferably is conductively connected with a metal handle *b*, which handle is formed by a metal tube drawn over the glass tube. The upper end of the copper wire is connected with a fluorescent sheet *c*. The latter is preferably formed of a small sheet of paper which is coated on one side with barium platino cyanid crystals. Metal in a fine state of division is then applied to the rough crystal surface. This is preferably accomplished by rubbing gold-leaf on the crystal-coated surface. Instead of the barium platino cyanid any other fluorescent substance can be used. Also instead of gold other metals can be employed. Preferably, however, precious metals which are not subject to oxidation are used for the purpose. The fluorescent sheet made in this way is preferably inserted in at the upper end of the glass tube, which is not wound with copper wire, and is by means of a stopper *d* pressed from inward against the glass wall.

Supposing the copper-wire coil is in resonance with a neighboring vibration system and oscillates in a wave of one-quarter the length of that of the primary system, while the end of the coil earthed by the hand of the person holding the rod forms the potential node, the upper end connected with the fluorescent sheet forms the point of greatest variation of potential, the fluorescent body becomes powerfully illuminated and easily visible in full daylight.

In order to be able to use the indicator for determining the wave length or periods in an oscillating system in a practical and simple way and make the earthing of the coil independent of the body of the person holding the rod, a tuning-rod *f* of metal is provided, which is connected by a conductor *g* with a plate *h*,

preferably of lead, serving for earthing the rod. In using the apparatus the plate is laid on the ground, this fully sufficing for the establishment of a good earth connection of the rod *f*, and then the metal rod *f* is moved along the coil until the fluorescent body is brightly illuminated. A scale arranged on the coil allows the wave length or period at which resonance commences to be seen. It is understood therefrom that the adjoining oscillating system from which the excitation proceeds oscillates in correspondence or with equal wave length. The scale can be united in various ways with the rod. It is preferable to indicate it with suitable colors on the wire winding itself. The excitation of the coil by the system to be tested can take place in various ways. If the coil is brought very near to the vibration system, especially to the coils thereof, the excitation of the indicator-coil would take place by means of electromagnetic radiation, while in cases where the indicator-coil is held further removed from the oscillating system an electrostatic transfer would take place principally through the earth.

In general in all transfers inductive coupling between the secondary coil and the system to be tested is shown to be essential, while direct coupling, for example, by the conductive junction of the secondary coil and the system is not advisable, and considerable errors of ten to twenty per cent. result therefrom.

In order to increase the sensibility of the indicator or the light action of the light-sheet, it is preferable to bring the lower end of the coil connected with the handle into connection with the fluorescent sheet, which can easily be done, as shown in Fig. 2, by carrying the end of the coil from below upward through the glass tube *a*. The maximum light action in this case coincides with the greatest difference of potential existing between the two ends of the coil. In order to be able also to measure with the indicator comparatively long waves without exceeding reasonable limits in the length of the rod, it is preferable to use a wire for making the coil which is wound spirally round an insulating-core—for example, round silk thread.

Having explained my invention, what I claim, and desire to secure by Letters Patent, is—

1. A wave-indicator consisting of a resonator in combination with fluorescent substances in such a way that these bodies are illuminated when electric oscillations arise in the resonator.

2. Wave-indicator consisting of a resonator in combination with fluorescent substances arranged at places of maximum potential of the resonator and in such a way that the substances are illuminated when electric oscillations arise in the resonator.

3. Wave-indicator consisting of a resonator in the form of a wire coil in combination with fluorescent substances at places of maximum potential of the coil.

4. Wave-indicator consisting of a wire coil which can be earthed at one point and whose other free end is connected with fluorescent substances.

5. Wave-indicator consisting of a resonator in combination with fluorescent substances at points of maximum potential of the resonator in which metal in finely-divided form is applied to the fluorescent substance.

6. Wave-indicator consisting of a resonator in the form of a wire coil one end of which is connected with a metal handle, in combination with fluorescent substances to which metal in finely-divided form is applied at places of maximum potential.

7. Wave-indicator consisting of a wire coil one end of which is earthed and whose other free end stands in connection with fluorescent substances to which metal in finely-divided form is applied.

8. Wave-indicator consisting of a wire coil one end of which stands in connection with fluorescent substances to which metal in finely-divided form is applied and an arrangement for tuning the coil to a neighboring oscillating system.

9. Wave-indicator consisting of a wire coil one end of which is connected with a fluorescent substance to which metal in finely-divided form is applied in combination with an earthed arrangement for tuning the coil to a neigboring oscillating system and a scale divided into wave lengths or oscillation periods.

10. Wave-indicator consisting of a wire coil whose upper end is connected with barium platino cyanid crystals to which precious metal in finely-divided form is applied in combination with an earthed tuning arrangement for earthing a suitable point of the coil, and with a scale divided into wave lengths or oscillation periods.

11. Wave-indicator consisting of a wire coil both ends of which are connected with a fluorescent substance, and an arrangement for earthing a suitable point of the coil for the purpose of tuning the same to a neighboring oscillating system.

In witness whereof I hereunto subscribe my name this 9th day of July, A. D. 1904.

ADOLF SLABY.

Witnesses:

HENRY HASPER,

WOLDEMAR HAUPT.