No. 778,275. PATENTED DEC. 27, 1904.

C. K. SALISBURY.

ADJUSTABLE BOLOMETER DETECTOR FOR ELECTROMAGNETIC WAVES.

APPLICATION FILED APR. 22, 1904.

Fig. 1.

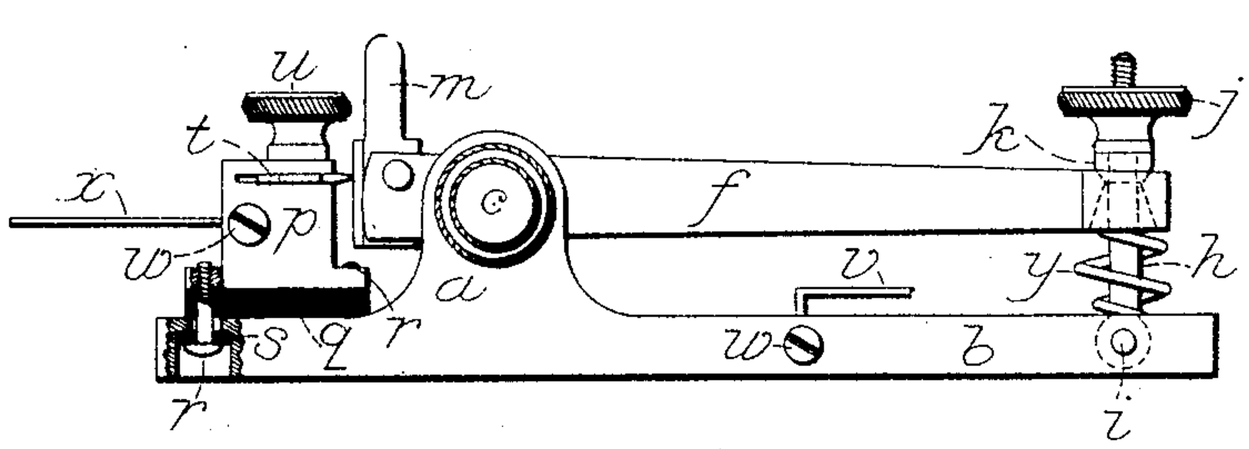


Fig. 2.

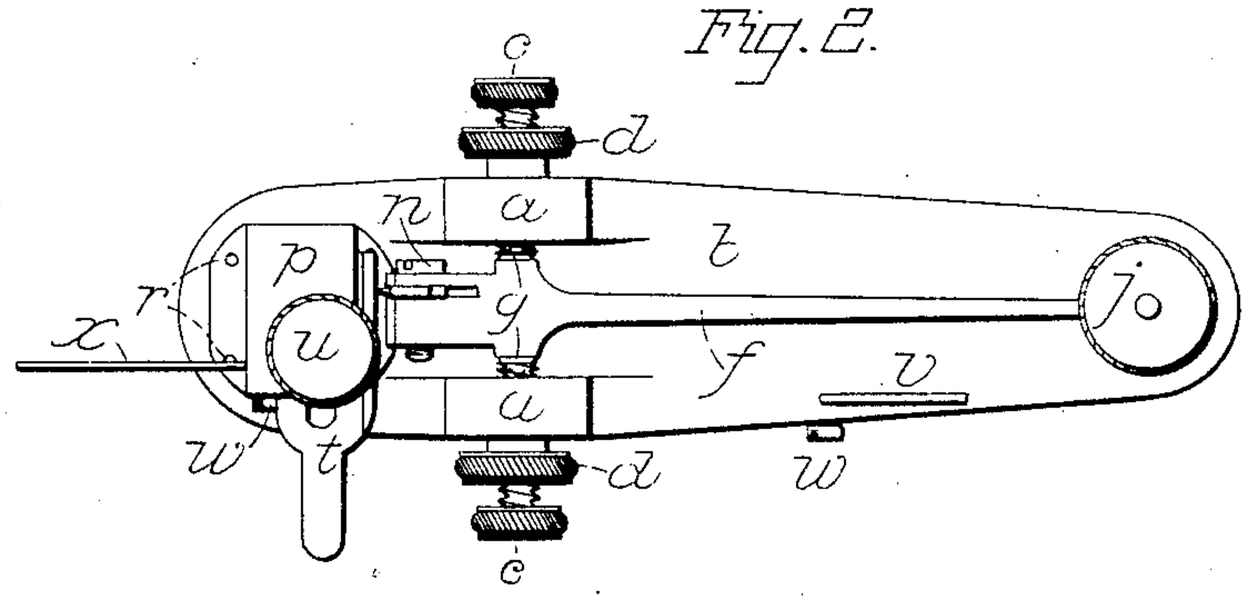


Fig. 3.

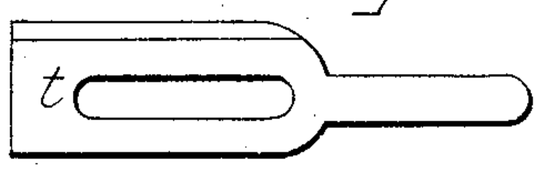


Fig. 4.

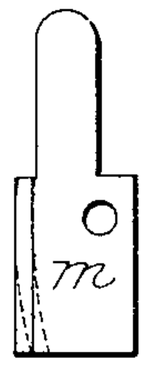
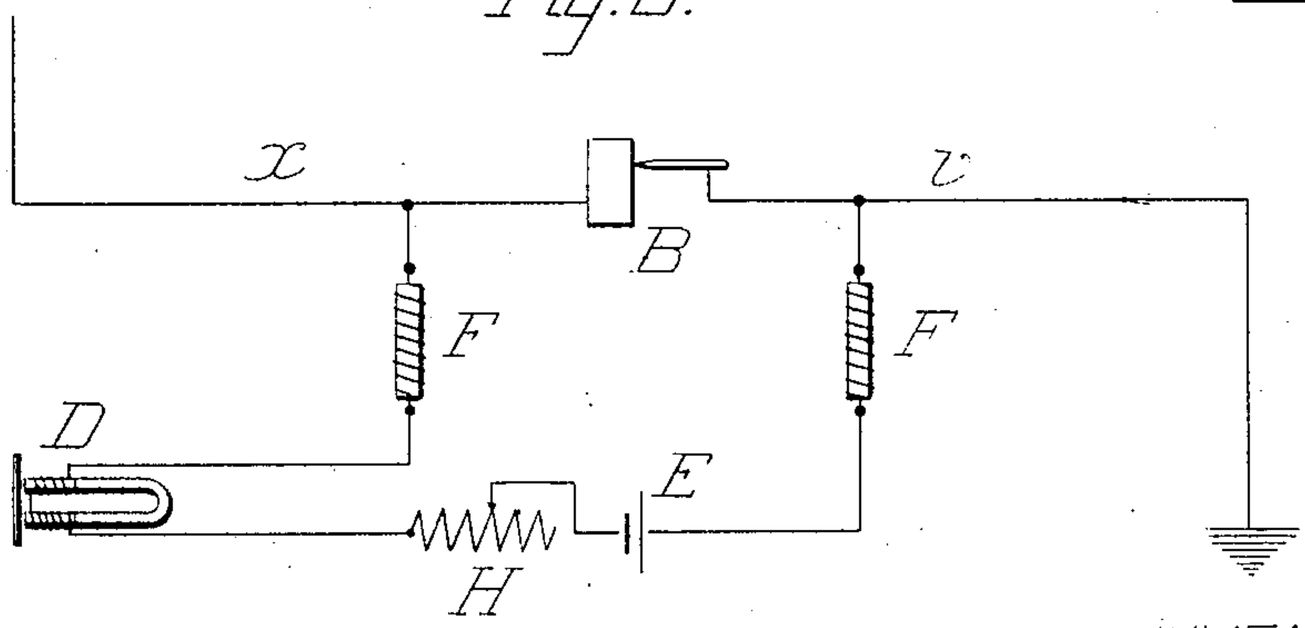


Fig. 5.



WITNESSES.

John C. Davis

E. L. Meyers

INVENTOR.

Charles K. Salisbury.

No. 778,275. Patented December 27, 1904.

UNITED STATES PATENT OFFICE.

CHARLES K. SALISBURY, OF LINCOLN TOWNSHIP, BLACKHAWK COUNTY, IOWA.

ADJUSTABLE BOLOMETER DETECTOR FOR ELECTROMAGNETIC WAVES.

SPECIFICATION forming part of Letters Patent No. 778,275, dated December 27, 1904.

Application filed April 22, 1904. Serial No. 204,413.

To all whom it may concern:

Be it known that I, CHARLES K. SALISBURY, a citizen of the United States, residing in Lincoln township, in the county of Blackhawk and State of Iowa, have invented a new and useful Adjustable Bolometer Detector for Electromagnetic Waves, of which the following is a specification.

My invention comprises two metallic plates, each of which has a very sharp knife-edge which crosses the knife-edge of the other.

It also comprises means for very accurately adjusting the knife-edges relative to each other.

The objects of my invention are to construct a bolometer detector of great sensitiveness and reliability that may be adjustable to any desired sensitiveness and which may be readily rendered sensitive after the minute column of metal has been accidentally destroyed by an excessive discharge through the same. I attain these objects by the apparatus illustrated in the accompanying drawings, in which—

Figure 1 is a side elevation of the detector. Fig. 2 is a plan view of same. Fig. 3 shows the stationary knife-edged detector-plate. Fig. 4 shows the adjusting knife-edged detector-plate. Fig. 5 is a diagrammatic drawing showing electrical connections and circuits of the detector when connected to vertical receiving-wire and translating device.

The standards *a a*, which are a portion of the base *b*, have therein screwed the thumb-screws *c c*, which may be rigidly locked in position by the lock-nuts *d d*. A lever *f* is pivoted between the standards *a a* by means of a pointed pivot *g* on either side of lever *f*, which engages with a centered depression in end of thumb-screws *c c* and allows motion of lever *f* in one plane only, substantially the same arrangement as is used in pivoting the sending-key of a telegraph instrument.

At one extremity of the lever *f* is an opening through which the threaded rod *h* passes. This rod is enlarged at the lower end and is securely pivoted to the base *b* by the pin *i*. At the other end rod *h* is threaded and engages with the thumb-nut *j*. Between the thumb-nut *j* and the lever *f* a ball-shaped piece *k* is placed to permit variations in the relative angular positions of lever *f* and rod *h* without interference. Between the base *b* and the lever *f* a strong coiled spring *y* is placed and tends to strongly force lever *f* from the base *b*. At the opposite end of lever *f* is a longitudinal slit cut in end of lever and is designed to hold a small piece of metal *m* or other electrical conductive substance having a very thin knife-edge facing outward. A screw *n* passes through a hole in plate *m* and forces the metal on either side of the slit against the plate *m* and rigidly secures same in any desired position.

The column *p* is thoroughly insulated from the base *b* by means of a rigid insulating-block *q* and is rigidly secured to the base *b* by means of the four screws *r*, which are thoroughly insulated from the base *b* by the insulation *s* and the air-space, as shown in broken section in Fig. 1. A slit is also cut in the column *p* to admit the knife-edged detector-plate *t*. The thumb-screw *u* passes through the slot in detector-plate *t*, is screwed into the column *p*, and rigidly secures the detector-plate *t* in any desired position.

The connecting-wires *x* and *v* are secured by inserting the end of each wire in a hole in base *b* and in column *p*, respectively, and securing same by means of the binding-screws *w w*.

The detector is preferably connected to the vertical receiving-wire and the translating device, as is shown in Fig. 5, in which the detector is represented by B, the connecting-wire *x* being joined to the vertical wire and the wire *v* to earth.

The translating device D is preferably a telephone-receiver, although a sensitive telegraphic relay may be used. The translating-circuit also includes the battery E, the inductive resistances F F, and the variable resistance H.

The object of the variable resistance H is to render it possible to vary the resistance of the circuit to a certain extent independent of the adjustment and resistance of the detector.

When using a telephone-receiver as a de-

tector, a galvanometer in circuit will be of service in adjusting the detector-contacts.

The method of adjusting the detector is as follows: The detector-plate *m* is first secured so that the knife-edge of same is at right angles with lever *f*. Lever *f* is now either raised or lowered by means of thumb-nut *j* until the center of screw *n*, which holds plate *m* in position, is nearly opposite to the detector-plate *t*. The thumb-screw *u* is now loosened and detector-plate *t* swung outward until knife-edge of same is in light contact with the knife-edge of plate *m*, when plate *t* is rigidly secured by thumb-screw *u*. By screwing the other end of lever *f* downward by means of the thumb-nut *j* the edge of detector-plate *m* is slightly drawn away from the edge of detector-plate *t* for the reason that the knife-edge of plate *m* forms the chord of an arc of which the radius is from the center of pivoted bearings of lever *f* to contact edge of plate *t*. By loosening the screw *n* detector-plate *m* may be swung either backward or forward, and thus vary the angular relations of knife-edge of plate *m* and lever *f*, which makes it possible to obtain any degree of sensitiveness of adjustment by varying the length of chord of the arc.

By reason of the very high self-induction of the circuit in which the detector is included when using a telephone-receiver the contact edges of the two detector-plates are invariably welded together when the same are composed of metals capable of being welded.

I have noted that the welding or coherence of the two contacts always takes place when metal to metal is used as a detector. This welding or coherence is absolutely necessary for the practical operation of the detector; but the area of the metal in contact and welded together must be small enough to produce a comparatively high resistance at contact.

The detector-plates *t* and *m* are preferably made of metal, preferably of a metal having a relatively high fusing-point and a high temperature coefficient.

I have found that two contacts of steel, or one of steel and the other of iron, give very certain results. Platinum also gives good results.

It will be noted that the detector-plate *t* has a long slot through which thumb-screw *u* passes. This slot is to permit of sliding plate *t* lengthwise, so that a sharp edge may be presented to the edge of plate *m* when any portion of plate *t* becomes dulled by continued service.

The contact edge of plate *t* and plate *m* is preferably surrounded by a drop of mineral or vegetable oil, such as paraffin or castor oil. This oil prevents, to a certain extent, the burning away of the minute contact.

The use of oil at the contact gives greater volume of sound in the receiver. A small drop of pure water at the contact also gives an increase of sound in the receiver.

To obtain certainty of results, the frame must be absolutely rigid and the points at which lever *f* is pivoted to frame must be solid. To this end the screws *c c* must tightly fit in standards *a a*. The inner ends of screws *c c* may have for a portion of their length a fine slit (not shown) through the center, which will aid in securing rigidness.

The knife-edge of plates *t* and *m* may be sharpened by means of a hone, so as to produce a fine edge.

I do not wish to be limited to the exact method of attaching the detector-plates to the adjusting-lever, as the plate *t* may be placed in the lever *f* in the same plane as it is shown in the column *p* in the drawings, the plate *m* being placed in the column *p* in the same plane as shown without modifying the results.

The plate *m* may be so placed in the lever *f* that the contact edge of same would face outward from side of lever instead of at the end, as is shown in the drawings. The plate *t* would in this case be so placed that contact edge of same and contact edge of plate *m* would be relatively the same, as is shown in the drawings.

The sharpened edge of plates *t* and *m* may be curved, as shown by dotted lines of Fig. 4.

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

1. In a detector for electromagnetic waves, an electrically-conductive plate having a sharpened edge thereon, said sharpened edge having greater length than breadth, and a second electrically-conductive plate, said sharpened edge of first said plate being placed in contact with the second said plate.

2. In a detector for electromagnetic waves, an electrically-conductive plate having a sharpened edge thereon, and a second electrically-conductive plate also having a sharpened edge thereon, the said sharpened edges of said plates being placed substantially traverse with each other and in contact.

3. In a detector of electromagnetic waves comprising two electrically-conductive plates in restricted contact, and means for varying said contact comprising an edge on one of said plates, one of said plates being moved in a direction which constitutes a small angular variation with said edge on said conductive plate.

4. In a detector of electromagnetic waves, an electrically-conductive plate having an edge thereon, a second conductive plate having also an edge thereon, said edges on said plates being substantially traverse with each other and in contact, and means for varying said contact by moving the first said plate traversely with the edge of the second said

plate and in a direction which constitutes a small angular variation with said edge of first said plate.

5. In a detector of electromagnetic waves, a base having a lever securely pivoted thereto, said lever having means for holding an electrically-conductive plate having a sharpened edge thereon, a second conductive plate in contact with said sharpened edge on first said plate, and means for varying said contact by adjusting position of said lever.

6. In a detector of electromagnetic waves, a base having a lever securely pivoted thereto, said lever having means for holding an electrically-conductive plate having a sharpened edge thereon, said sharpened edge on said plate being nearly parallel with the plane of motion of said lever, means for changing the said sharpened edge relative to plane of motion of said lever, a second conductive plate in contact with said sharpened edge on first said plate, and means for varying said contact by adjustably varying position of said lever.

7. In a detector of electromagnetic waves, a base having a lever securely pivoted thereto, said lever having means for holding an electrically-conductive plate having a sharpened edge thereon, said sharpened edge on said plate being nearly parallel with the plane of motion of said lever, a second conductive plate also having a sharpened edge, said sharpened edge of second said plate being substantially traverse with the sharpened edge of first said plate and in contact therewith, means for varying said contact by adjustably varying position of said lever.

8. In a detector of electromagnetic waves comprising two electrically-conductive plates in restricted contact and means for varying said contact comprising a sharpened edge on one of said plates, one of said plates being moved in a direction which constitutes a small angular variation with said edge on said conductive plate.

9. In a detector of electromagnetic waves, an electrically-conductive plate having a sharpened edge thereon and a second conductive plate having also a sharpened edge thereon, said sharpened edges on said plates being substantially traverse with each other and in contact, means for varying said contact by moving the first said plate in a direction which constitutes a small angular variation with said edge on first said plate.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

CHARLES K. SALISBURY.

Witnesses:
JOHN C. DAVIS,
E. G. MEYERS.