April 21, 1925. R. BROWNLIE 1,534,769

OSCILLATION DETECTOR

Filed Jan. 19, 1924

Fig. 1

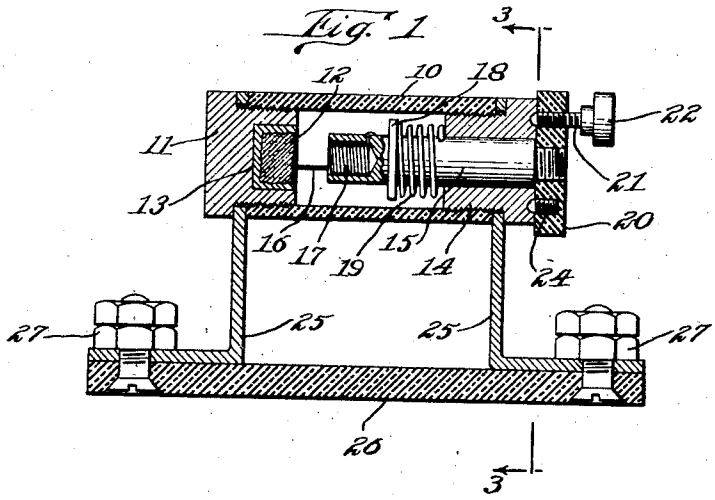


Fig. 2

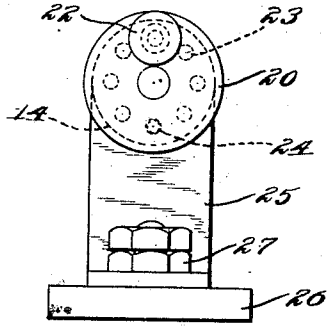
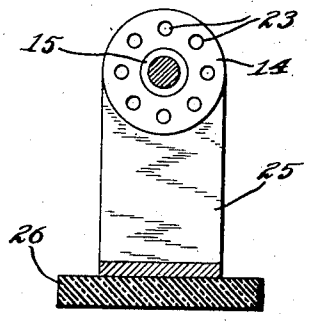


Fig. 3



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UNITED STATES PATENT OFFICE.

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OSCILLATION DETECTOR.

Application filed January 19, 1924. Serial No. 687,203.

To all whom it may concern:

Be it known that I, ROLAND BROWNLIE, citizen of the United States, and a resident of Medford, in the county of Middlesex and State of Massachusetts, have invented a new and useful Improvement in Oscillation Detectors, of which the following is a specification.

My invention relates to oscillation detectors of the crystal type and more especially to such detectors adapted for use in reflex radio telephone receiving systems.

In reflex radio telephone receiving systems in which the high frequency current after amplification is rectified by a crystal and the resulting low frequency current again passed through the vacuum tubes for amplification of the same, it is highly desirable to employ a crystal detector which does not require much attention on the part of the operator and which will remain at one adjusted position for a considerable period without loss in sensitiveness, so as to leave the operator free to manipulate the several tube and circuit controls. In crystal detectors of the prior art, a change in the point of contact between the small-areaed contact member and the crystal may involve the scratching of the face of the crystal by moving said contact member over the face of the same from one position to another, and although this may be avoided by raising the contact member from the crystal before moving the former to a new point on the surface of the latter, it is not generally known that the dragging of the contact member across the face of the crystal will impair its sensitiveness, and generally a new point of contact is obtained by slightly rotating or otherwise moving the contact member support without first drawing the same away from the crystal.

It is therefore the principal object of the present invention to provide means for automatically breaking the contact between the small-areaed member and the crystal when the point of contact between these elements is varied.

Other objects of my invention are to provide a crystal detector especially adapted for use in a reflex system which may be very simply adjusted both as to the point of contact between the crystal and the small-areaed member, and as to the presure of said contact.

With the foregoing objects in view my invention comprises means such as a cam for effecting the longitudinal movement of the small-areaed contact member away from the crystal upon a slight rotational movement of the member to which it is secured, one arrangement whereby this result may be effected consisting of a pin projecting laterally from a rotatable finger-piece or head rigidly secured to the stud which carries the contact member, said pin taking into any one of a series of indentations in the outer face of a flanged bearing in which said stud is journalled.

A practicable embodiment of my invention is shown in the drawings which accompany and form a part of this specification—

Figure 1 is a central longitudinal section of a crystal detector embodying my invention;

Fig. 2 is an end view of the same, and

Fig. 3 is a transverse section taken on the line 3—3 of Fig. 1.

In the drawings selected for more fully disclosing my invention 10 is a tubular casing of insulation material in one end of which is threaded the cap 11 which constitutes a support for the crystal 12 preferably embedded in a capsule of easily fusible metal 13. Threaded in the other end of said tubular casing is the flanged bearing 14 for the rotatable stud 15 which carries the contact member 16, said contact member being shown in the present instance as the end of a spiral 17 enclosed in a bore in the end of said stud. Interposed between the inner end of the bearing 14 and the collar 18, which preferably is integral with the stud, is a spiral spring 19 for maintaining the contact member in co-operation with the face of the crystal.

Preferably the contact member is arranged as shown eccentrically to the longitudinal axis of the crystal so that after the stud is adjusted axially, the end of the wire

may be brought into contact with any one of a series of points radially displaced from the center of the exposed face of the crystal.

A convenient means for adjusting the stud axially consists of the head 20 of insulation material rigidly connected with said stud, and in the present instance shown as having threaded engagement therewith. A pin 21 having a knurled head 22 is threaded into said head and the inner end thereof projects laterally therefrom and takes into any one of a series of indentations 23, herein shown as eight in number, formed in the outer face of the flanged bearing 14, the said pin performing two functions, viz, first it serves to vary the tension of the spring 19 and thereby the pressure of the contact member on the crystal, and, second, it makes it impossible to rotate the stud or adjust the same axially without breaking the contact between the small-areaed member 16 and the crystal.

In effect, the pin 21 and its co-operating indentations 23 constitute a cam and cam-follower, for the indentations are shallow, their depth being approximately equal to one-half the diameter of the pin, and as the head is rotated, the end of the pin will ride over the indented surface formed in the outer face of the flanged bearing 14 and thereby move the stud longitudinally away from the crystal a distance equal approximately to the depth of the indentation, and then after an eighth of a turn, in the present instance, the end of the pin will fall into the next adjacent indentation, and the end of the contact member will rest against the crystal at a point 45° away from that at which it previously rested, the proper pressure of contact being obtained by a slight adjustment of the head 22.

It will be observed that the eight indentations and the pin 21, co-operating therewith, constitute means for limiting the point of contact between the contact member and the crystal to any one of eight points radially displaced from the center of the exposed face of the crystal, it being understood of course that eight indentations are shown in the present instance merely for the purpose of illustration.

It will be obvious that after all the points of the crystal displaced a certain radial distance from the center have been used, other series of points may be obtained by varying the eccentricity of the contact member 16 with respect to the axis of the crystal.

In order to prevent the possibility of screwing the pin 21 out of the hole with which it has threaded engagement or turning it sufficiently to bring the end of the pin within said hole or flush with the inner face of the head, and then rotating said head without automatically breaking the contact between the small-areaed member and the crystal, and thereby scratching the surface of the crystal sufficiently to impair or destroy its sensitiveness, I provide a second pin 24 shown in the present instance as arranged diametrically opposite the pin 21, but not adjustable with respect to the head, the said pin being shown in the present instance as screwed into said head and projecting laterally therefrom.

Obviously the pin 24 co-operating with the apertures 23 will constitute a species of cam in the manner above described in connection with the pin 21.

A convenient means for mounting my improved detector consists as shown in the brackets 25 through apertures near the tops of which the members 11 and 14 pass, and which are interposed between said members and the enclosing tubular casing. The brackets 25 are shown in the present instance as secured to the insulation base 26 by the binding-posts 27.

Having thus described an illustrative embodiment of my invention, without however limiting the same thereto, what I claim and desire to secure by Letters Patent is:

1. An oscillation detector comprising in combination a crystal, a support for the same, a contact member co-operating with said crystal, a support for said contact member, and means automatically breaking the contact between said member and said crystal when the point of contact between said member and said crystal is varied.

2. An oscillation detector comprising in combination a crystal, a support for the same, a contact member co-operating with said crystal, a rotatable stud carrying said contact member, a bearing for said stud, two relatively movable abutting members, means securing said stud to one of said members and a cam effecting the longitudinal movement of said stud away from said crystal upon a slight rotational movement of one of said abutting members.

3. An oscillation detector comprising in combination a crystal, a support for the same, a contact member co-operating with said crystal, a rotatable stud carrying said contact member, a flanged bearing for said stud, a head secured to said stud and having its inner face abutting the outer face of said flanged bearing, a series of indentations in the outer face of said flanged bearing, a pin projecting laterally from said head and taking into any one of said indentations, and resilient means maintaining said pin in engagement with the outer face of said flanged bearing.

4. An oscillation detector comprising in combination a crystal, a support for the same, a contact member co-operating with said crystal, a rotatable stud carrying said contact member, a flanged bearing for said stud, a head secured to said stud and hav-

ing its inner face abutting the outer face of said flanged bearing, a series of indentations in the outer face of said flanged bearing, an adjustable pin projecting laterally from said head and taking into any one of said indentations, and resilient means maintaining said pin in engagement with the outer face of said flanged bearing, the tension of said resilient means being varied by the adjustment of said pin.

In testimony whereof, I have hereunto subscribed my name this 16th day of January, 1924.

ROLAND BROWNLIE.