

# PATENT SPECIFICATION

264,270

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## PROVISIONAL SPECIFICATION.

### Improvements in or relating to Crystal Apparatus for use in Connection with Electric Oscillations.

We, JOHN WILCOCKSON and HAROLD WILLIAM ROBERTS, both of 783 and 785, Abbeydale Road, Millhouses, in the City of Sheffield, and both of British nationality, do hereby declare the nature of this invention to be as follows:—

This invention relates to crystal apparatus for use in connection with electric oscillations, its object being to provide an improved device for performing the functions of a thermionic valve in rectifying and amplifying radio waves.

A rectifying and amplifying device according to the present invention comprises an alum crystal which is connected between the positive and negative terminals of an electrical potential which may conveniently be provided by the usual high tension battery of a radio receiving or transmitting set. The alum crystal is in physical contact with a nitre or salt-petre crystal which is connected between the positive and negative terminals of another electrical potential of a relatively lower tension which may be provided by two dry cells, for example, in series.

The device comprising these two crystals in physical contact may be made up in any desired form. Conveniently

the two crystals may be held in a container of insulating material in physical contact with one another at one or more points or surfaces, two conductors being attached to each crystal, preferably on opposite sides thereof and connected to four terminals. These four terminals may be disposed at one end or side of the device so as to be connected to the usual valve circuits of a receiving or transmitting set, the alum crystal being connected to the plate and grid circuit and the nitrate crystal to the filament circuit.

The device may be used to replace the thermionic valve or valves of any radio set and experiments indicate that more powerful effects are obtained.

It is found that when the device is under the influence of radio oscillation it appears to emit an unknown ray or rays having the properties of oxidizing metals and of operating an electroscope in the vicinity. The device may be used for the purpose of generating and applying such ray or rays.

Dated this 30th day of October, 1925.

ARTHUR H. GREENWOOD,  
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39, Bank Street, Sheffield.

## COMPLETE SPECIFICATION.

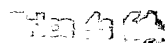
### Improvements in or relating to Crystal Apparatus for use in Connection with Electric Oscillations.

We, JOHN WILCOCKSON and HAROLD WILLIAM ROBERTS, both of 783 and 785, Abbeydale Road, Millhouses, in the City of Sheffield, and both of British nationality, do hereby declare the nature of this invention and in what manner

[Price 1/-]

the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to crystal apparatus for use in connection with electric oscillations, its object being to provide



Price 25p

an improved device for performing the functions of a thermionic valve in rectifying and amplifying radio waves.

According to the present invention a crystalline block of alum is connected between the positive and negative terminals of an electrical potential and is in physical contact with a crystalline block of nitre or salt-petre which is connected between the positive and negative terminals of another electrical potential of a relatively lower tension.

Conveniently the crystalline blocks of alum and of nitre or salt-petre are secured in a container or holder of insulating material in physical contact with one another at one or more points, edges or surfaces, four terminals being fitted to the container or holder and two electrical conductors being attached to each block and each leading to one of the terminals.

Apparatus according to the present invention may be employed for the rectification or amplification of radio oscillations by connecting the alum to the plate and grid circuit and the nitre or salt-petre to the filament circuit of a radio receiving or transmitting set. The apparatus may also be used to emit and to apply a ray or rays generated thereby.

In the accompanying drawing, which is diagrammatic in character, Figure 1 is a sectional elevation and Figure 2 an underside plan of a device according to the present invention. Figure 3 is a diagram of a wireless receiving circuit showing the application thereto of the invention.

A rectifying and amplifying device according to the present invention may be made up in any desired form, the drawing illustrating a construction which may be used to replace the valves in a radio receiving or transmitting set. In this construction a crystalline block of alum 3 is mounted in suitable insulating material 4 and is held with one point or edge in contact with the surface of a crystalline block of nitre or salt-petre 5 which is likewise mounted in insulating material 6. The two insulating holders 4 and 6 are each secured in a casing, 7 and 8 respectively, one or both of these casings being preferably of insulating material. In the construction illustrated the casing 7 is shown extended and connected to the casing 8 or the holder 6 to provide a container in which the two crystalline blocks 3 and 5 are thus mounted. Any desired means may be used for ensuring physical contact of the crystalline blocks 3 and 5. For example the connection between the casings

may be a sliding one and contact be retained by spring means. If desired means may be provided for automatically feeding the crystalline blocks 3 and 5 towards, and for holding them in contact with, one another as, or if, either of them crumbles, wears away or is consumed in use.

Two conductors 9 and 10 are attached to the crystalline block of alum 3 and two separate conductors 11 and 12 are likewise attached to the crystalline block 5 of nitre or salt-petre, the pair of conductors for each of the blocks 3 and 5, preferably being attached on opposite sides thereof. From the blocks 3 and 5, the four conductors 9, 10, 11 and 12 lead to four terminals 9<sup>A</sup> 10<sup>A</sup> 11<sup>A</sup> and 12<sup>A</sup> respectively, the terminals being situated at the base of one of the insulating holders 4 or 6 (the holder 6 in the construction illustrated) and being arranged, as shown, to be connected to the usual valve circuits of a radio receiving or transmitting set, the alum crystal 3 being connected to the plate and grid circuit and the nitrate crystal 5 to the filament circuit as indicated in the diagram shown in Figure 3. The alum crystal is thus connected between the positive and negative terminals of the usual high tension battery and the nitrate crystal 5 between the terminals of a relatively lower electrical potential which may be provided by two dry cells, for example, in series.

The value of the electrical potential applied to the alum crystal varies from twenty to one hundred and twenty volts according to the type of circuit, and may be derived from the usual high tension battery. For the nitrate crystal the potential may vary from two to four and a half volts, the preferred value being three volts which may be derived from dry cells.

In this manner the device may be used to replace the thermionic valve or valves of any radio set and experiments indicate that more powerful effects are obtained.

Both of the crystal blocks 3 and 5 may be made by cooling a hot saturated solution of the requisite salt in a vessel having a base of the internal shape required for the crystalline block. Any of the various forms of alum may be used for the blocks 3 and either potassium nitrate or sodium nitrate for the block 5.

The conductors 9, 10, 11 and 12 may be inserted in holes drilled in the crystalline blocks and be secured in any desired manner or may be bound in contact with the crystals.

Physical contact of the crystalline blocks 3 and 5 at one or more points, 13)

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100

105

110

115

120

125

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edges, or surfaces is essential. Metal may also be in contact with both crystals, but such metallic contact is preferably avoided owing to the risk of short circuiting the conductors 9 and 10 or 11 and 12.

It is found that when the device is under the influence of radio oscillation it appears to emit an unknown ray or rays having the properties of oxidizing metals and of operating an electroscope in the vicinity. The device may be used for the purpose of generating and applying such ray or rays to, for example, the embellishment of metal articles.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. Crystal apparatus for use in connection with electric oscillations comprising a crystalline block of alum connected between the positive and negative terminals of an electrical potential and in physical contact with a crystalline block of nitre or salt-petre connected between the positive and negative terminals of another electrical potential of a relatively lower tension.

2. In apparatus for use in connection with electric oscillations the combination

of a container or holder of insulating material, crystalline blocks of alum and of nitre or salt-petre secured therein in physical contact with one another at one or more points edges or surfaces, four terminals fitted to the container or holder and two electric conductors attached to each block and each leading to one of the terminals, substantially as described.

3. The employment of apparatus according to Claim 1 or Claim 2 for the rectification or amplification of radio oscillations by connecting the alum to the plate and grid circuit and the nitre or salt-petre to the filament circuit of a receiving or transmitting set, substantially as described.

4. The employment of apparatus according to any of the preceding claims to emit and to apply a ray or rays generated thereby.

5. The combination and arrangement of parts providing a crystal apparatus for use in connection with electrical oscillations, substantially as described or as illustrated in the accompanying drawing.

Dated this 28th day of July, 1926.

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*[This Drawing is a reproduction of the Original on a reduced scale.]*

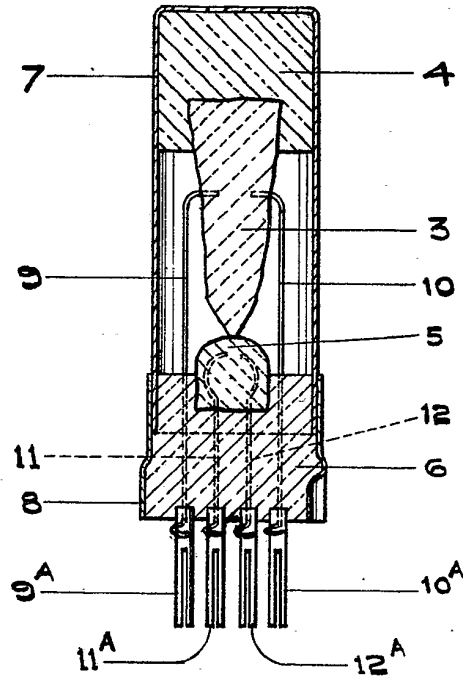


FIG. 1.

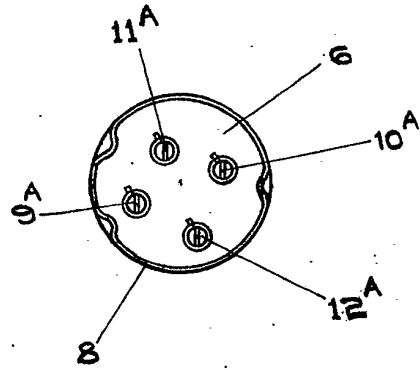


FIG. 2.

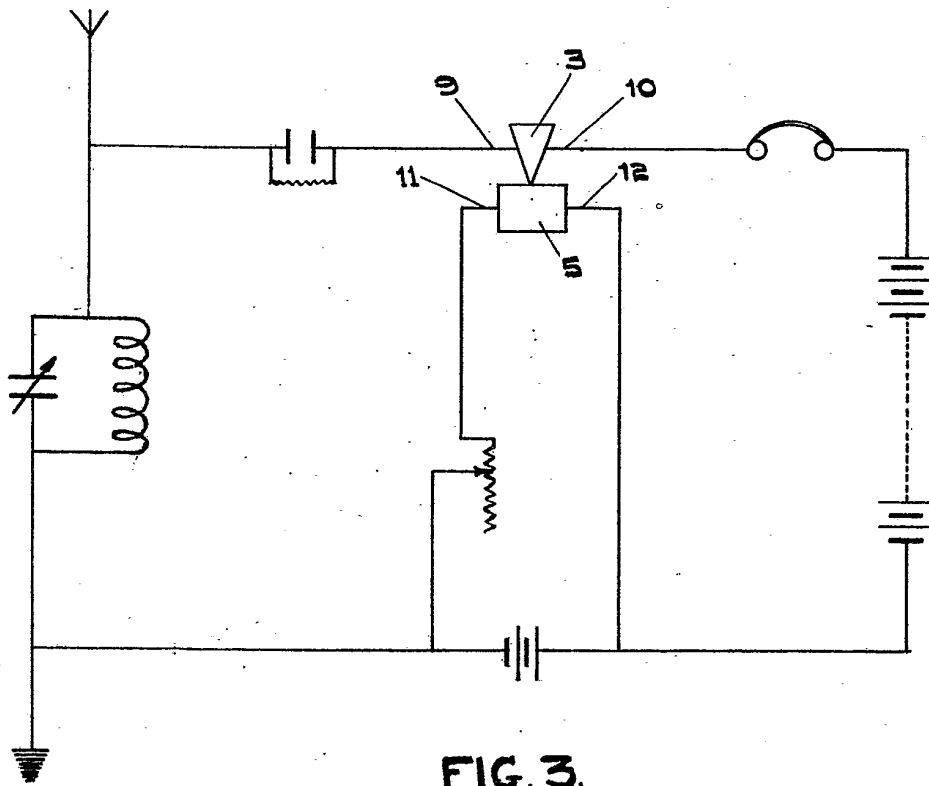


FIG. 3.