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A. B. MOULTON

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INDICATING DEVICE

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Fig. 1

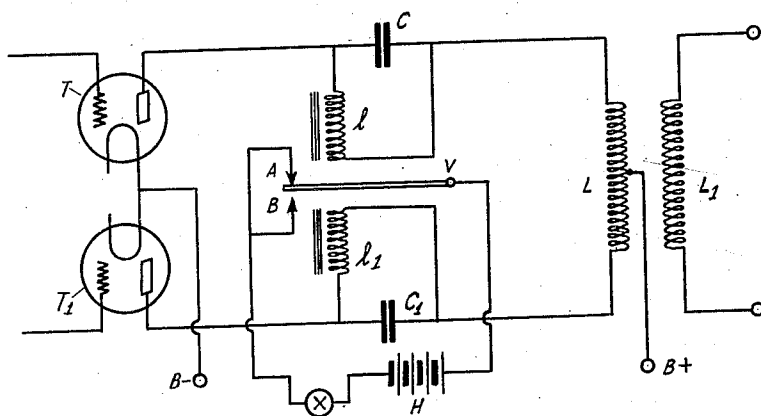


Fig. 2

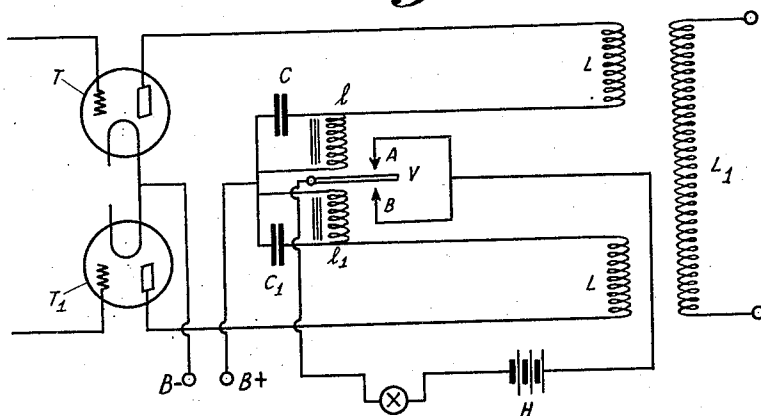
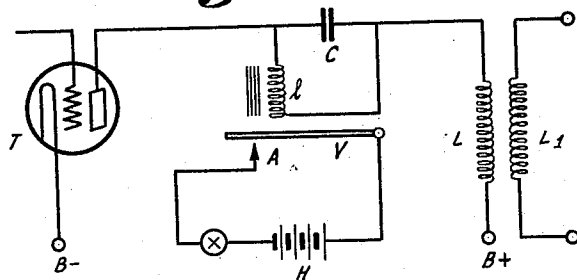


Fig. 3



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INDICATING DEVICE

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This invention relates to radio apparatus and particularly to indicating devices, adapted to denote the failure of any part of the radio apparatus in which it is installed.

5 In radio apparatus and especially in push-pull stages which are operating under a comparatively light load it often happens that one tube or the circuit associated therewith gives out, and as the remaining tube and its
10 circuit will carry the load the stage may be allowed to operate inefficiently for some time before the operator becomes aware of the defect.

Push-pull circuits which are operating at
15 maximum load must be constantly watched by an operator because if one tube or its circuit should fail unless the defective part is promptly replaced the remaining tube or circuit will be injured by overloading.

20 The primary object of this invention is to provide a simple but novel indicating device which will instantly indicate the failure of a tube or part of the circuit with which it is associated, so that whether the stage is under
25 heavy or light load it can be kept in operation at maximum efficiency without being constantly watched by the operator.

Another object of this invention is to provide a novel though simple apparatus which
30 will ring a bell or light a danger lamp when the circuit in which it is installed fails.

A further object of this invention is to provide an indicating device which can be readily adapted to control push-pull stages now
35 in use without materially altering the arrangement thereof.

Preferably to accomplish these objects I utilize the differential direct current which will be caused to flow in the output circuit
40 of a push-pull stage on the failure of a tube thereof, to close a circuit and thereby operate a bell, danger lamp or other signalling device.

Other objects and advantages will be in
45 part indicated in the following description and in part rendered apparent therefrom when read in connection with the annexed drawings in which:

Fig. 1 shows a circuit arrangement of the
50 signalling device, while

Figs. 2 and 3 each show a modification of Fig. 1.

In the drawings in which like letters indicate like parts, T and T₁ are the vacuum tubes of a push-pull stage. L and L₁ respectively are the primary and secondary windings of the coupling transformer in the plate circuit of tubes T and T₁. The output of secondary winding L₁ may be utilized in any known manner.

Referring in particular to Figure 1 of the drawings the plate circuit of T is composed of a winding 1, and half of the primary winding L. The winding 1 is shunted by a radio frequency bypass condenser C. The plate
65 circuit of T₁ is composed of a winding 1₁ and the remaining half of the primary winding L. The winding 1₁ is shunted by a radio frequency bypass condenser C₁. Both of these
70 circuits are completed through a source of high potential not shown and the output elements of tubes T and T₁ respectively. A contact armature V is fixed between the windings 1 and 1₁. The armature V forms part of
75 a circuit which is completed under certain conditions through one of the contact points A or B. X is a danger lamp, bell or other signalling device that is operated when the armature circuit is completed. The signalling device X may be located adjacent the
80 apparatus to be controlled or at a point remote therefrom, the location thereof depending on the convenience of the station operator.

Assuming that the stage is in operation, if the tube T or its circuit should give out there
85 would be a differential direct current flowing in the output circuit of the stage, that is there would be no current in 1 and L while there would be current flowing in 1₁L. The armature V actuated by the winding 1₁ would close
90 the circuit of the indicating device through one of the contact points A or B. The indicating device would be actuated thereby and the operator's attention would be instantly
95 called to the defect in the circuit.

The apparatus and operation of the modification shown in Figure 2 is similar to that of Fig. 1, except that the windings for controlling the armature V are at the low potential end of the primary windings L of the
100

transformer. This modification is for that reason preferable to the device shown in Fig. 1 in some instances.

In Fig. 3 I have shown my indicating device as applied to the output circuit of a single vacuum tube. In this instance a single winding 1 cooperates with the armature V to close the circuit of the signalling device α through the contact point A on the failure of the tube T or any portion of the output circuit thereof.

Although for the sake of illustration I have shown and fully described the at present preferred form of my invention it will be understood that I do not limit myself thereby except as marked out in the following claims:

1. In radio apparatus comprising a push pull stage having a pair of vacuum tubes, an output circuit connected to the output elements of each of said tubes including a capacity shunted winding, an output winding in series therewith and a source of high potential common to both of said circuits, an armature associated with said capacity shunted windings, contacts associated with said armature, a circuit including a source of power connecting said contacts and armature, and a signalling device actuated by said last named circuit when closed.

2. In radio apparatus comprising a push pull stage having a pair of vacuum tubes, an output circuit including a capacity shunted winding connected to the output elements of each of said tubes, an armature adapted to be actuated by one of said windings, on the failure of the tube in circuit with the other of said windings, a pair of contacts, a circuit including a source of power connecting said armature to said contacts and adapted to be closed by said armature when actuated by said winding, and a signalling device adapted to be actuated when said last named circuit is closed.

3. In relay apparatus utilizing a pair of vacuum tubes, an output circuit including an inductance, a winding connecting each terminal of said inductance to the anode of one of said tubes, and means associated with said windings to actuate an indicating device on the failure of either of said tubes.

4. In apparatus including a thermionic tube, an output circuit including an inductance connected between the anode and cathode of said tube, a winding connecting one terminal of said inductance to said anode, said winding being in shunt with a portion of said output circuit, an armature associated with said winding and a signalling circuit including a power source and an alarm adapted to be actuated on the failure of said tube.

5. A signalling device to be used with relay apparatus utilizing thermionic tubes in push-pull relation comprising an alternating current output circuit connected between the

anodes of said tubes, a pair of windings, a connection between one terminal of each of said windings and the anode of one of said tubes, a connection between the other terminal of each of said windings and a point on said output circuit, an armature associated with said windings and a signalling device including a circuit adapted to be closed by said armature when either of said output circuits fail.

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