June 9, 1942. H. JOHANNSON 2,285,437

HIGH FREQUENCY SYSTEM

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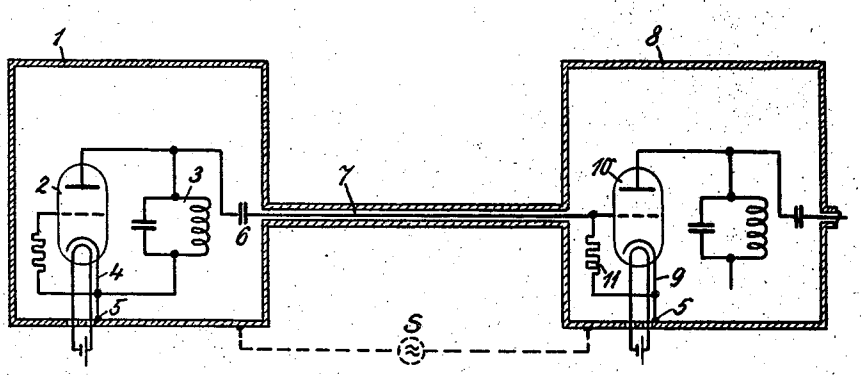

Fig.1

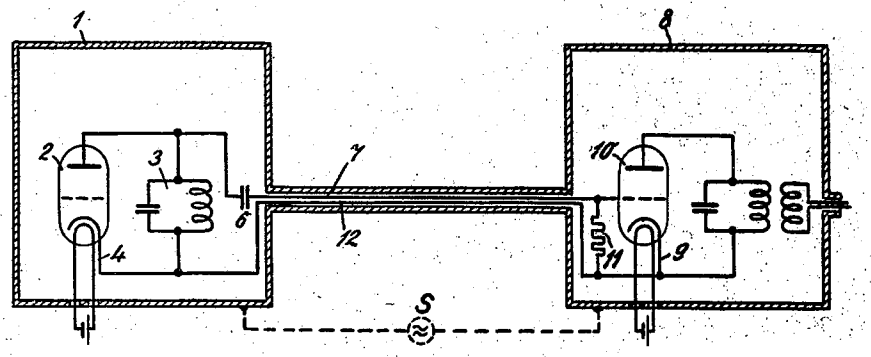

Fig.2

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HIGH FREQUENCY SYSTEM

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3 Claims. (Cl. 250—16)

The invention relates to high frequency systems and particularly to improvements in the shielding arrangements employed between the different stages of such systems.

It is a well known measure to arrange the individual stages of high frequency generating or amplifying systems in separate shielding arrangements in order to protect the high frequency circuits against extraneous interfering fields.

The present invention consists in certain features of novelty over such known arrangements. These features will be readily understood from the following description and pointed out in the appended claims, reference being made to the accompanying drawing, in which:

Fig. 1 diagrammatically illustrates a known shielding arrangement for high frequency systems; while Fig. 2 shows the application of the inventive idea to the known system of Fig. 1.

Fig. 1 by way of an example illustrates one of the known shielding arrangements above referred to. The first high frequency amplifying or generating stage comprises a tube 2 and an oscillatory circuit 3 arranged together in a shielding device 1. It is common practice in such arrangements to connect the cathode 4 to a point 5 of the shielding device. The high frequency oscillations generated or amplified in this stage are applied to the succeeding stage through a condenser 6 and a shielded line 7. The second stage is likewise provided in a shielding device 8 and the cathode 9 of the tube 10 is connected to the point 5 of this shielding device.

However, experience teaches that the above mentioned type of shieldings is insufficient in many cases, and particularly for devices which operate with ultra short waves, where interfering oscillations may reach the apparently completely shielded stages. This may be explained in the following manner: It is not possible in each case to maintain the shielding devices 1 and 8 at the same high frequency potential. It may occur that these shields together with the interconnecting line pick-up interfering voltages which will cause a potential drop across these two shielded stages. This interfering voltage drop is indicated in Fig. 1 as a current source S. The interfering voltages betwen the two shields travel over the connecting point 5 of the cathode of tube 2 and through the capacity 6 to the shielded line 7 and set up a potential drop across the grid resistance 11 of the second stage. This voltage change is then amplified in the second stage and becomes audible as disturbing noise.

This disadvantage is avoided according to the present invention by omitting in each stage the connection between the cathode of the tube and the associated shield and by conducting the cathode potential independently of the shield over a special lead within said shield and insulated therefrom.

This arrangement applied between two amplification stages is illustrated in Fig. 2. The individual circuit elements carry the same reference numerals as in Fig. 1. The connections between the cathodes and the shield members of each stage have been omitted, while a particular cathode potential line 12 has been added and placed within the shield members 1, 7 and 8 insulated therefrom. If desired one of the cathodes may be connected to the shielding within the scope of my invention. Voltage differences now set up by the interfering voltage source 8 between the individual stages cannot be transmitted to the line which conducts the useful voltage.

For the sake of simplicity, the above mentioned arrangement has been illustrated for two stages only. Nevertheless, it will be obvious that a plurality of stages may be interconnected with one another in the same manner as above described. The shielding arrangement according to the invention is applicable to all receiving, transmitting and amplifying high frequency devices.

What is claimed is:

1. A multi-stage high frequency system of the type comprising first and second vacuum tubes each having an indirectly heated cathode, a grid and an anode, first and second separate conductive chambers respectively enclosing said tubes, a conductive conduit extending between said chambers and connected therewith, high frequency coupling means of the condenser-and-resistance coupling type including an interstage lead extending through said conduit for transferring high frequency energy from the anode of said first tube to the grid of said second tube, characterized in that at least one of said cathodes is electrically separate from the corresponding conductive chamber and that a cathode potential lead distinct from said conductive chambers is provided which extends through said conduit to connect said two cathodes together.

2. A high frequency system comprising a plurality of tubes each having an indirectly heated cathode, a grid and an anode, circuit elements including a high frequency connection from the anode of one of said tubes to the grid of another of said tubes which together with said tubes form a plurality of cascade connected high frequency

stages, a shield for each of the high frequency stages said shields being formed as separate screening boxes, further shielding means surrounding said high frequency connection said further shielding means being formed as a conduit of substantial length interconnecting said separate boxes, and a separate cathode potential lead interconnecting the cathodes of the individual tubes and disposed within said further shielding means but insulated therefrom, at least one of said cathodes being electrically insulated from its shield.

3. A multi-stage high frequency system comprising first and second vacuum tubes each having indirectly heated cathode, grid and anode, first and second separate conductive chambers respectively enclosing said tubes and electrically connected together, said interconnected chambers being electrically connected to at most one of said cathodes, a high impedance circuit between the grid and the cathode of said second tube, a conductive and capacitative connection from the anode of said first tube to the grid of said second tube for transferring high frequency energy from the anode of said first tube to the grid of said second tube, a lead connecting the cathode of said first tube to the cathode of said second tube independent of said conductive chambers, and a common shielding conduit shielding both said leads but insulated therefrom.

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