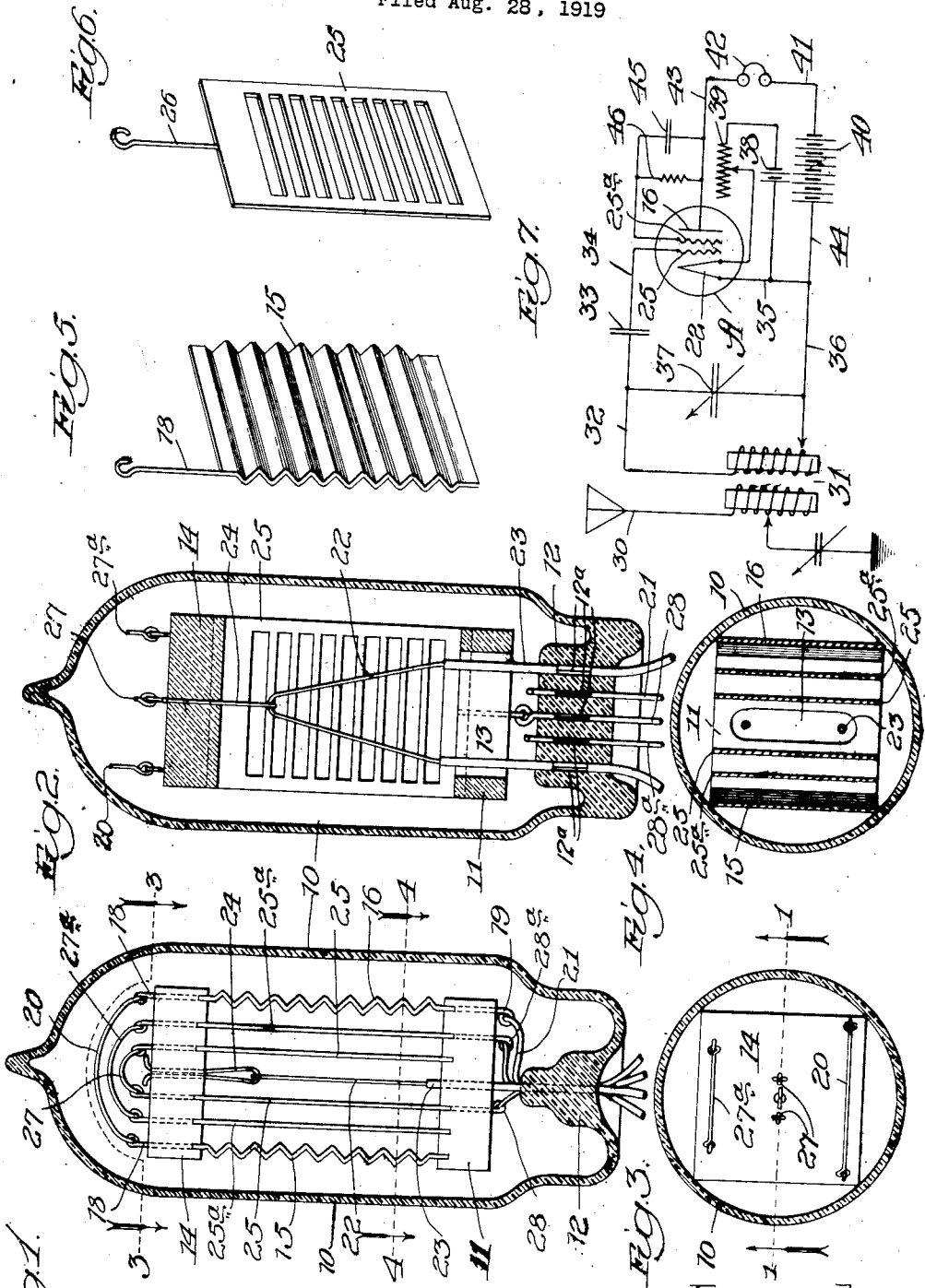


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H. K. SANDELL
SPACE CURRENT DEVICE
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UNITED STATES PATENT OFFICE.

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SPACE CURRENT DEVICE.

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To all whom it may concern:

Be it known that HENRY K. SANDELL, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, has invented a new and useful Improvement in Space Current Devices, of which the following is a specification.

The present invention relates to vacuum tubes, or space current devices, and particularly to those capable of use as detectors, amplifiers, or the like, and to the arrangement of circuits wherein such vacuum tubes are used.

In order that the invention may be clearly understood, it is illustrated in the form of an embodiment thereof in the accompanying drawings, in which—

Fig. 1 is a vertical, sectional view through a device embodying the invention;

Fig. 2 is a vertical sectional view of the device through a plane at right angle to the plane of Fig. 1;

Fig. 3 is a horizontal section on line 3—3 of Fig. 1;

Fig. 4 is a horizontal sectional view on line 4—4 of Fig. 1;

Fig. 5 is a perspective view of a plate electrode, removed from the device;

Fig. 6 is a perspective view of a grid electrode removed from the device, and

Fig. 7 is a diagrammatic view of an arrangement of circuits employing the vacuum tube of the present invention.

Referring more particularly to the drawings, the numeral 10 indicates an evacuated, sealed tube, the lower portion of which is adapted to be secured in a base plug (not shown) of any desired construction. Within the tube 10 a block 11 of suitable insulating material, such as lava, is mounted upon the relatively heavy connectors 21 and 28 attached to the leading-in wires 12^a sealed in stem 12 formed integral with the body of the tube. The block 11 which fits closely within the tube (see Fig. 4) is provided centrally with an elongated opening 13, intended for the passage of the filament electrode supports, as hereinafter described.

A second block 14, of insulating material such as lava, is supported within the tube in spaced relation to the block 11, and likewise fits closely against the wall of the tube (see Fig. 3). As shown in the construction illustrated the supporting and spacing

means may be constituted by the grid and plate elements of the tube.

The metallic plate elements 15 and 16 of the tube are preferably rectangular in shape. The central portions thereof may be formed with undulations or corrugations extending, if desired, substantially the entire distance between the supporting and spacing blocks 11 and 14. The plates 15 and 16 are secured in suitable slots 17 in blocks 11 and 14 and are provided with connecting stems or wire 18, shown in full lines in Fig. 5 and in dotted lines in Fig. 1, extending through the outer block 14. Where more than one interconnected plate is utilized, as illustrated in the drawings, at least one plate 16 is provided with a connecting stem or wire 19. A suitable metallic conductor 20 may be employed to connect the projecting stems 18 of the plates 15 and 16, and a suitable leading in conductor 21 passes from the projecting end 19 of one of the connected plates 16 through the stem 12 of the tube to the exterior.

The filament 22 of the tube is preferably centrally disposed, and may be formed as illustrated, in substantially inverted V-shape, the legs of the V being mounted upon the leading-in conductors 23, 23 which pass through the central opening 13 of the block 11. The filament may be supported in position by any suitable means, for example, the loop 24 of nickel or other resistant wire, affixed to the blocks 14 and insulated from the other electrodes of the tube. The filament, which may be suitably formed of platinum, is preferably coated with an oxide, such as barium oxide.

Between the filament and each plate of the tube a plurality of metal grids, are interposed. The grids 25 may be formed, as illustrated in Fig. 6 of rectangular metal plates in which slots are formed, for example, by cutting or stamping, thereby producing a ladder like construction having closed or solid ends. The grids are likewise provided with suitable means for connecting them with each other and with the leading in conductors, such as the stems or wires 26. As illustrated, two grids 25 and 25^a may be interposed between the filament 22 and each plate, these grids being insulated from each other, and supported in slots in blocks 11 and 14. The projecting stems

pass through suitable openings in the blocks 11 and 14. The grids having the corresponding positions with reference to the plates 15 and 16 may be conductively connected, for example by connections 27 and 27^a, thereby forming two sets of grids insulated from each other. Each set of grids is connected to one of the leading-in conductors 28 and 28^a sealed into the stem 12 of the tube.

The tube constructed as above described is particularly adapted for use in regenerative amplifying circuits, for example, as illustrated in Fig. 7. In the circuit illustrated the numeral 30 indicates a grounded aerial, in circuit with which is the primary of transformer 31. One terminal of the secondary of transformer 31 is connected through conductor 32, condenser 33 and conductor 34 with the grid 25 of the vacuum tube A. The grid or input circuit is completed through heated filament 22 and conductors 35 and 36 to the other terminal of transformer 31. A condenser 37 may, if desired, be connected across the grid circuit between conductors 32 and 36.

The filament 22 is heated by a closed circuit comprising the battery 38, variable resistance 39 and the filament itself. The plate circuit comprises the B-battery 40, conductor 41, receiver 42, conductor 43, plate 16, filament 22, conductor 35 and conductor 44. The regenerative grid circuit is completed by connecting a condenser 45 between the conductor 43 of the plate circuit and the grid 25^a, a high resistance leak 46 being shunted across the condenser, if desired.

It is readily apparent that the present invention may be embodied in other forms of construction than that specifically illustrated and described hereinbefore and that its utility is not limited to the specific circuit arrangement described, the details of construction and circuit arrangement not being included as limitations upon the invention, except as recited in the following claims.

I claim:

1. In a space current device, a supported block of insulating material, a plurality of electrodes mounted thereupon and non-conductive spacing means independent of said block supported by said electrodes.

2. In a space current device, a supported non-conductive block, a plurality of electrodes mounted thereupon, and a non-conductive block supported by said electrodes, said block being provided with means for spacing the electrodes.

3. In a space current device, a supported non-conductive block provided with slots, a plurality of electrodes mounted in said slots, and a non-conductive block mounted on said electrodes, said block being provided with slots wherein the electrodes are engaged.

4. In a space current device, a supported non-conductive block provided with slots, a slotted plate electrode and a corrugated plate electrode mounted in said slots, a non-conductive block mounted on said electrodes, said last-mentioned block being provided with spacing slots wherein the electrodes are engaged, and a filament electrode supported in position from said last mentioned block.

HENRY K. SANDELL.