July 3, 1934. S. LOEWE 1,965,197

AMPLIFIER UNIT

Filed May 4, 1927

Fig. 1

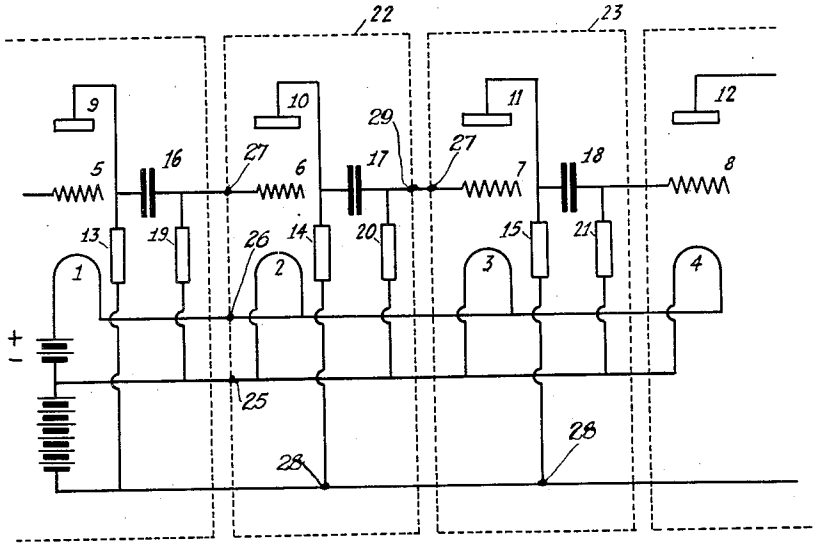


Fig. 2

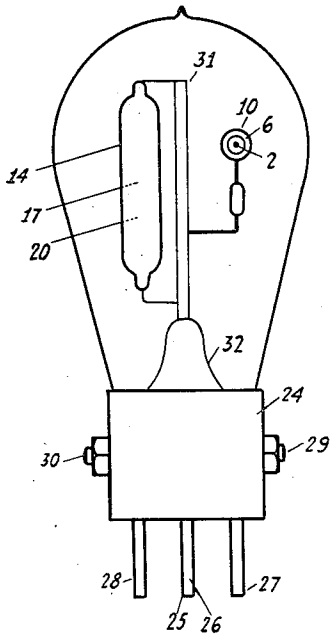
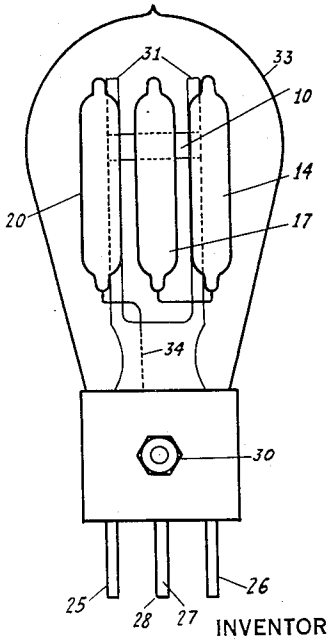


Fig. 3



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AMPLIFIER UNIT

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2 Claims. (Cl. 250—27.5)

This invention relates to a vacuum tube amplifier and especially to an amplifier wherein the interstage coupling elements for a tube are mounted within the tube evacuated vessel with the tube elements (plate, grid and filament).

Heretofore, vacuum tubes have been utilized in circuits wherein the coupling elements have been disposed externally of the tube, necessitating complicated external wiring. According to this invention many of the external coupling elements are placed within the tube thereby simplifying greatly the external amplification circuits, and further, allowing the amplifier and coupling elements to be handled as a unit.

Consequently, it is an object of this invention to provide a vacuum tube having coupling elements combined therewith within a single vacuous space. By such an arrangement, due to the decreased length of leads required, it is clear that harmful electrical effects such as that due from stray capacities between leads will be greatly diminished.

Another object of this invention is to provide an amplifier unit which may readily be removed from, and replaced into, circuit.

It is a further object of this invention to provide such a unit so that it shall have a minimum number of terminals.

Other objects and advantages of this invention will be apparent as the description thereof proceeds, which description will be given with the aid of the accompanying drawing, wherein:

Figure 1 shows the connection of a resistance coupled amplifier for which my unit is especially adapted,

Figure 2 is a side view of an embodiment of my invention and,

Figure 3 is a front view of the same.

Figure 1 shows the general diagram of connections of a four-tube resistance-coupled radio frequency and low frequency amplifier. The filaments are denoted by 1, 2, 3, 4, the grids by 5, 6, 7, 8; the plates by 9, 10, 11, 12; the plate resistances by 13, 14, 15; the coupling condensers by 16, 17, 18; the grid leaks by 19, 20, 21. The combination of such multi-stage amplifier arrangements is attended with a certain amount of circuit mounting work. It has been found convenient as pointed out before to evolve tubes of a kind permitting a substantial simplification in the work of combining such multi-stage amplifiers.

With this end in view, the circuit diagram shown in Figure 1 is separated so that there will be the two rectangles 22 and 23 as indicated by the broken lines. Rectangle 22, as will be noted, contains a filament (2), a grid (6), a plate (10), a plate resistance (14), a coupling condenser (17), and a grid leak (20), as well as a number of binding posts adapted to permit the connection of the different amplifier stages and establishing connection with the battery.

According to the invention, the said elements are so combined constructionally that the whole amplifier element can be used as a unit in proper circuit arrangements.

Figure 2 shows a side view of an embodiment of the invention, the coupler elements (plate resistance 14, grid leak 20 and coupling condenser 17) being built into the vacuous space in this form of construction, the latter containing at the same time the amplifier system comprising cathode 2, grid 6 and plate 10, whereas the supply electrodes are all united at the base 24, preferably made of insulating material. There are two plug pins 25, 26, projected on one another in lateral view and which supply current to heat filament 2; a plug pin 27 which leads to the grid 6, a pin 28 which is brought to the plate 10 by way of plate resistance 14; further, a lateral terminal 29 which is directly connected with the coupling condenser, and which serves for leading on to the grid 7 of the following amplifier stage 23; and if necessary a terminal 30 to which the end of resistance 20 is united. However, this lead-out is not absolutely necessary, since the end of resistance 20 may be connected also with one of the ends of filament 2 in the interior of the tube.

The whole structure is carried by glass rods 31 which are secured to the compressed stem 32. 33 is the exhausted glass bulb.

Figure 3 shows another view of the arrangement. The glass bulb is indicated by 33. The amplifier system comprising plate 10, grid 6 and filament 2 is located in the rear of the coupling elements and glass support 31. The connecting leads and lead-ins for the sake of clarity of illustration have been omitted with the exception of lead-in 34 which indicates also the seal-in points of the grid leak 20.

Amplifier units constructed as hereinbefore described, by simple seriation and connection of the grids in the cascade permit establishment of any desired number of amplifier stages with a negligible amount of installation work.

The coupler elements 14, 17, 20 need not necessarily be disposed inside the vacuous space, for they may also be arranged at or in the base 24.

The arrangement of the plug pins at the base is suitably so chosen that, in the usual way, two

pins are united with the ends of the filament, one with the grid, and the other one with the plate resistance to the plate of the built-in system. The lead-out of the coupling condenser which is to establish connection with the grid of the amplifier stage next above is suitably brought to a binding post at the base of the tube.

I claim as my invention:

1. A multiple unit resistance coupled amplifier tube comprising a base and an evacuated envelope; an anode, a control electrode and a cathode mounted concentrically with respect to each other within the evacuated envelope; a leak resistance, a coupling condenser and another resistance mounted in substantially one plane within the envelope; the common axis of said anode, control electrode and cathode being substantially parallel to the plane of said resistances and coupling condenser; contact pins on said base having connections leading to the control electrode, cathode and anode within said envelope; and other connecting means on said base having connections leading to the leak resistance and coupling condenser within said envelope.

2. A single stage amplifier comprising in combination, a vessel, a grid, an anode and a cathode disposed within said vessel, a base affixed to said vessel, a plurality of contact terminals mounted on said base, a connection within said vessel between said anode and one of said terminals comprising an impedance means, a connection within said vessel between said anode and another one of said terminals including a condenser, a connection within said vessel between the terminal side of said condenser and said cathode comprising a resistance and connections from said cathode to others of said terminals.

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