March 28, 1939. P. HAAS ET AL 2,152,589

ELECTRICAL APPARATUS

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FIG_1

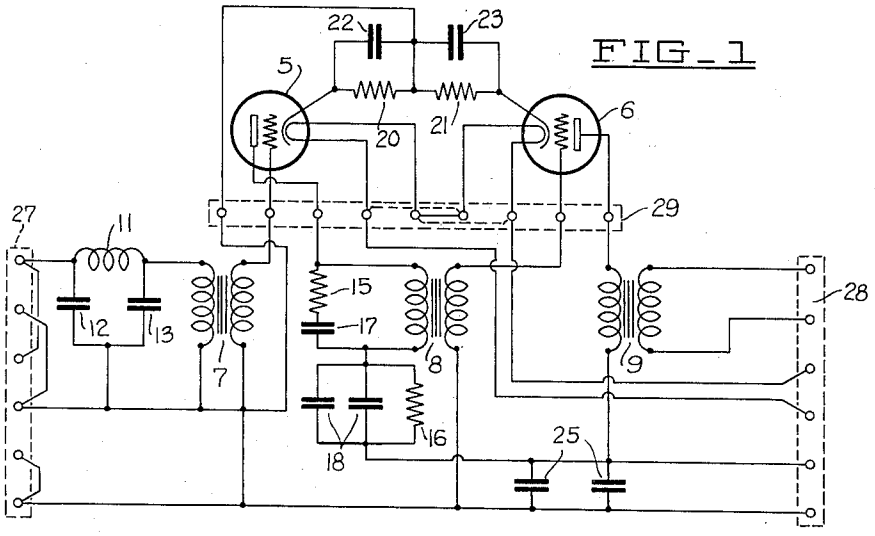


FIG_2

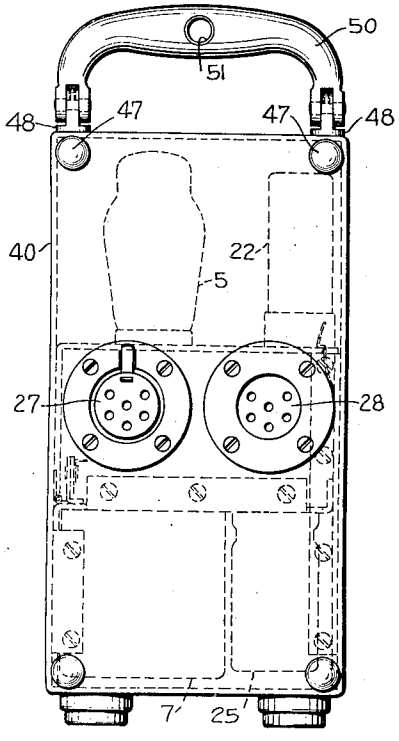
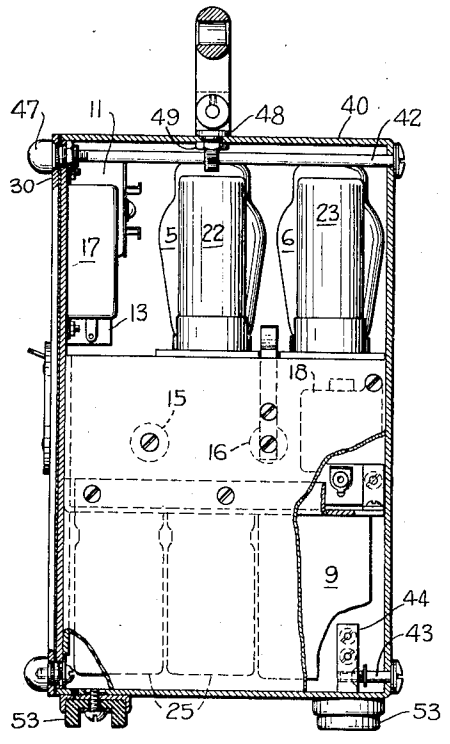


FIG_3



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ELECTRICAL APPARATUS

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FIG_4

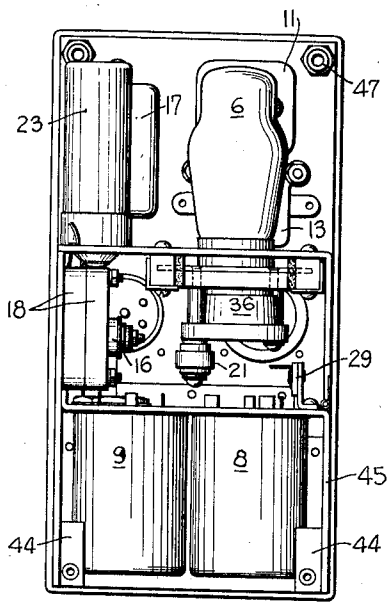


FIG_6

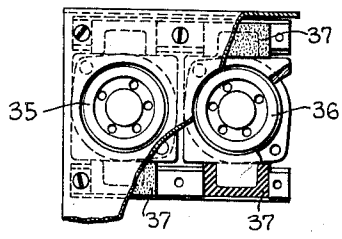
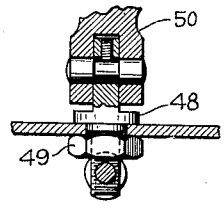


FIG_7



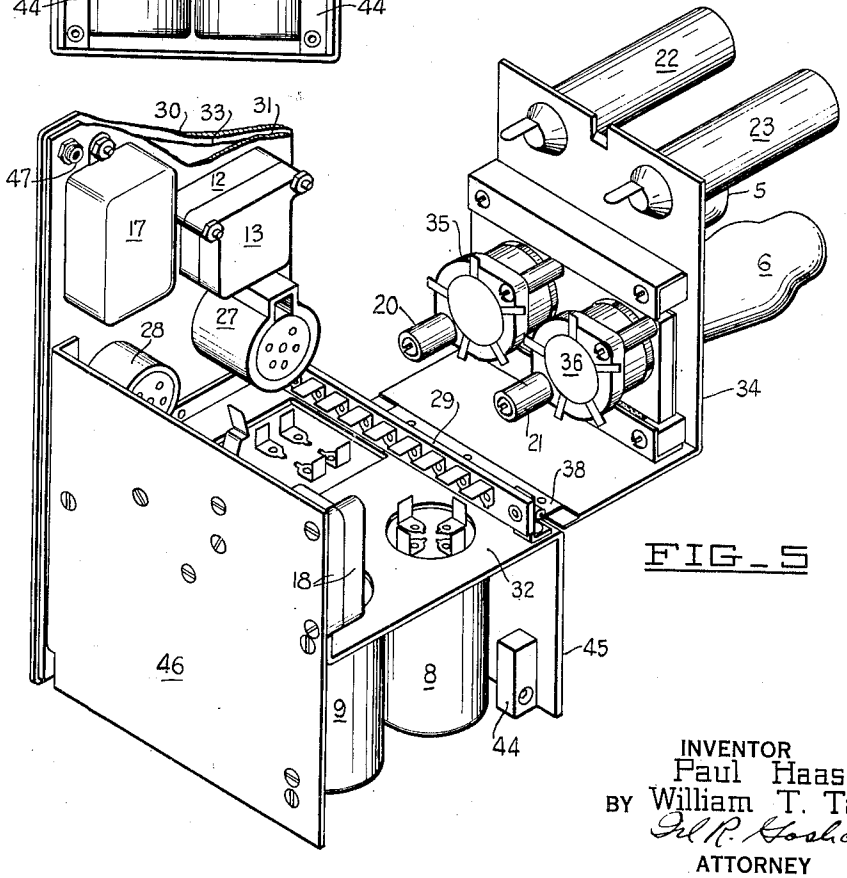


FIG_5

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UNITED STATES PATENT OFFICE

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ELECTRICAL APPARATUS

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Application November 14, 1935, Serial No. 49,768

5 Claims. (Cl. 179—171)

This invention relates to electrical apparatus and particularly to an audio frequency amplifier system which is compact, rugged, and easy to assemble.

In audio frequency amplifying systems, particularly at sound pick-up terminals for talking motion pictures or broadcast, it is desirable to have an amplifying unit located at a point in the proximity of the detector or microphone. This amplifying unit must, therefore, have as small over-all dimensions as possible in relation to the amplification desired in order that it may be placed near the microphone itself. The construction of the unit must be rugged, so that it may be moved about conveniently and particularly during use, without affecting the currents passing therethrough.

The present invention contemplates such an amplifying unit which has particularly small over-all dimensions in relation to its gain of approximately 50 db. The over-all dimensions of the unit are about 4½" x 5" x 8½", a handle being provided for carrying the unit from place to place or for mounting it by suspension. Rubber feet are also provided, so that the unit may be used in a standing position.

A particular feature of the invention is the arrangement of the elements of the unit in such a manner that the terminals are brought adjacent one another as closely as possible to permit short interconnecting conductors to be used, while the arrangement of some of the elements on a hinged platform or shelf permits accessibility thereto readily and quickly. The interior of the case is divided into three compartments vertically, the lower and upper compartments containing elements such as vacuum tubes, condensers and transformers, while the terminals thereof extend into the center compartment wherein the connections to each element are made. The elements mounted in the upper compartment are on the hinged shelf so that when the casing is removed they may be tipped to one side thus exposing the conductors interconnecting the elements.

Various objects and other features of the invention will be appreciated and the invention more fully understood from the following description read in conjunction with the accompanying drawings, in which—

Fig. 1 is a circuit diagram of the amplifying unit.

Figs. 2 and 3 are side and front views of the amplifier unit showing the positioning of certain elements therein.

Fig. 4 is a rear view showing the compartments of the unit.

Fig. 5 is a perspective of the unit with a shelf tilted; and

Figs. 6 and 7 are detail views of the tube socket mounting and handle mounting, respectively.

Referring now to a detailed description of the amplifier unit, the same numerals in each of the drawings relate to identical elements thus showing the arrangement of the circuit elements of Fig. 1 within the amplifier casing. The amplifier circuit comprises a two-stage amplifier employing indirectly heated vacuum tubes 5 and 6 together with input transformer 7, interstage transformer 8, and output transformer 9. Preceding the input transformer 7 is a low pass filter for the suppression of radio frequency pick-up and comprises a series inductance 11 and shunt condensers 12 and 13. A plate circuit equalizer is also employed in this amplifier which includes resistance elements 15 and 16 and condensers 17 and 18. The bias for the tubes 5 and 6 is obtained from resistances 20 and 21, respectively, shunted by condensers 22 and 23. By-pass condensers 25 are shown in the plate supply for the tubes. Terminal strips are employed for the input, output and tube connections within the unit, the input strip 27 and output strip 28 shown in Fig. 1 taking the form of terminal plugs, as shown in Fig. 2. The terminal strip 29 is shown in Fig. 5 with angle bars for making connections to the tube elements.

The above description discloses the elements of the electrical circuit in conventional form, while the following description refers to the same elements as actually employed and positioned. The elements are housed in a casing composed of mounting plates 30 and 31 separated by a gasket 33, plate 31 supporting most of the apparatus, either directly or indirectly. For instance, the condensers 12, 13 and 17 and terminal plugs 27 and 28 are directly attached to the upper portion of the back plate 31 while the transformers 7, 8 and 9 and condensers 25 are mounted in the lower compartment of the unit and attached to a shelf 32 which is attached to plate 31. Shelf 32 has a right angle extension 45 forming a leg of the unit. A second angle shelf 34 has mounted thereon the tubes 5 and 6 and condensers 22 and 23, the tubes being mounted in sockets 35 and 36 carrying grid biasing resistance elements 20 and 21. These tube sockets are mounted in sponge rubber mountings 37 as shown in detail in Fig. 6, to provide a resilient support which prevents microphonic pick-up by the tubes and protects them during any shock occasioned by moving the unit

from place to place. The angle shelf 34 is hinged at 38 so that when in normal position the terminals of the condensers 22 and 23 and tubes 5 and 6 are adjacent the terminals of the transformers 7, 8 and 9 and the terminals of the other elements of the amplifier.

A cover member 40 slides over all the units and is bolted to the back plates 30 and 31 by means of long upper bolts 42 and shorter lower bolts 43 which are attached to lugs 44 on extension plate 45 and a vertical plate 46. The upper bolts 42 are guided to their threaded sockets 47 through a hole in members 48, these members being attached to the upper portion of the cover 40 by means of nuts 49. The handle 50 is hinged upon the members 48, this handle having a hole 51 therein for suspending the unit if desired. On the bottom of the casing 40 are rubber foot members 53, one of which is shown in cross-section in Fig. 3.

In the above-described amplifier unit, a gain of 50 db. has been obtained within dimensions approximately 4½" x 5" x 8½", while the unit is rugged and stable in operation and has been found to be very simple to assemble and to inspect at any time. For inspection it is only necessary to loosen bolts 42 and 43, remove the cover 40, and tip the shelf 34 to the position shown in Fig. 5. This exposes all the elements and particularly the connections thereto to immediate view. The unit has been designed for operation on a microphone boom in the recording of talking motion pictures, but it is obvious that it is also suitable for use in any sound pick up system where a very portable amplifying unit is desired.

What is claimed is:

1. Electrical apparatus comprising a casing, a plurality of horizontal shelves and vertical plates in said casing forming a plurality of distinct vertically arranged compartments, and a plurality of electrical elements attached to said shelves disposed in upper and lower compartments, the terminals of said elements being positioned adjacent one another within a common central compartment and one of said shelves forming a right angle and tiltable to a vertical position to expose the terminals of said elements.

2. An electrical amplifier comprising a panel, a supporting plate for said panel having certain amplifier elements positioned thereon, a horizontal shelf mounted on said plate and having certain amplifier elements mounted thereunder with the terminals of said elements extending through the top of said shelf, a second horizontal shelf above said first shelf and spaced therefrom and having certain amplifier elements mounted thereabove with the terminals of said second elements extending under said second shelf, and means for tilting said second shelf to a vertical position.

3. An electrical amplifier in accordance with claim 2 in which said elements are encased within a housing, one side of which is formed by said panel.

4. An amplifier unit comprising a panel, a horizontal shelf projecting from said panel, a second horizontal shelf having a right angle riser integral therewith and positioned above said first shelf, said riser supporting said second shelf when said second shelf is moved with respect to said first shelf, certain electrical elements of said unit being attached under said first shelf with terminals thereabove, and certain other electrical elements being attached above said second shelf with terminals thereunder, and means to hinge said shelves to one another with said riser to provide access to the space between said shelves for making electrical connections between said elements, said second shelf being tiltable to a vertical position.

5. An amplifier unit comprising a casing, a right angle member within said casing forming a shelf and a lower compartment thereunder, a second right angle member hinged to said first member and forming a second shelf and a second compartment above said first compartment, a third and upper compartment being formed by said second shelf and said casing, a plurality of electrical elements attached to said shelves and positioned in said lower and upper compartments, and means provided on the ends of said elements and projecting within said second compartment for making interconnections therebetween.

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