

June 22, 1926.

1,589,692

E. E. HILER

CHOKE COIL AMPLIFICATION UNIT

Filed August 27, 1925

2 Sheets-Sheet 1

Fig. 1

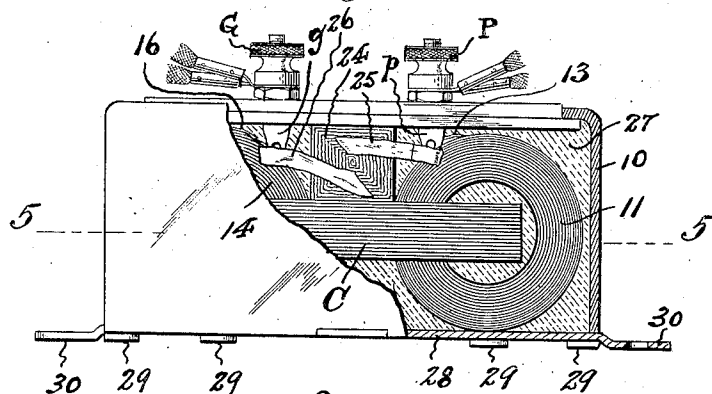


Fig. 2

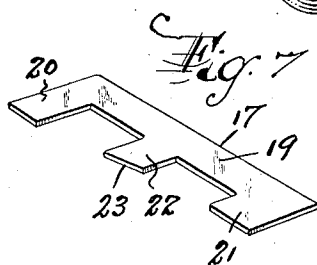
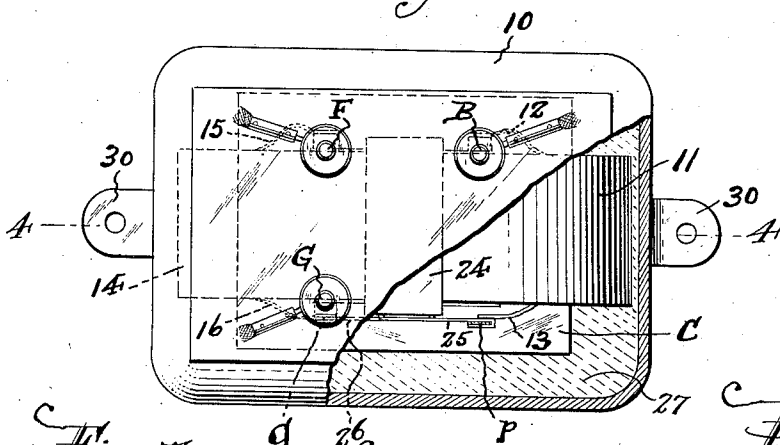


Fig. 3

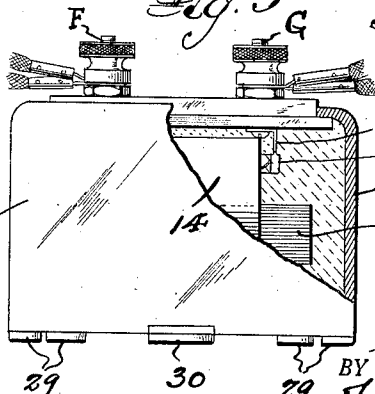
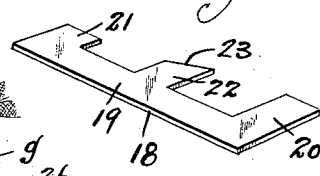


Fig. 8



INVENTOR.

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ATTORNEYS.

June 22, 1926.

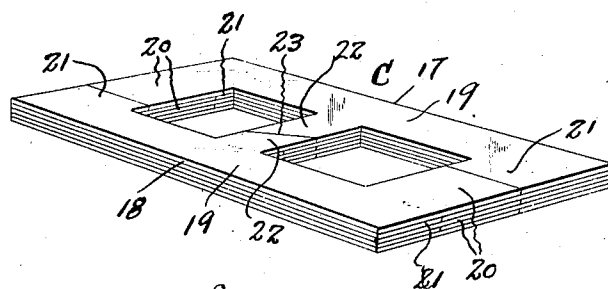
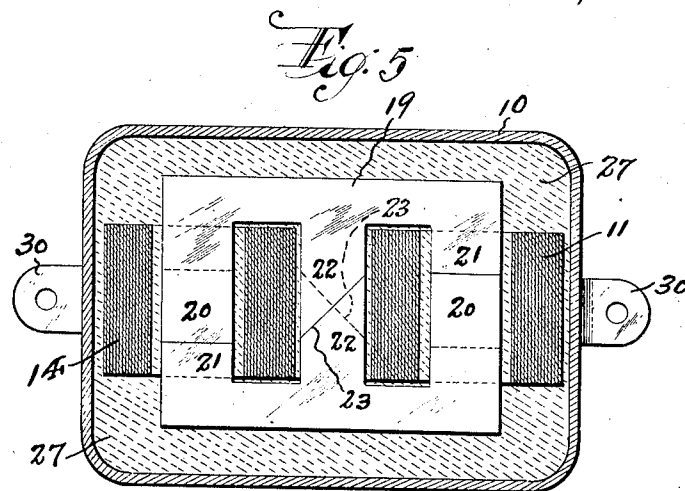
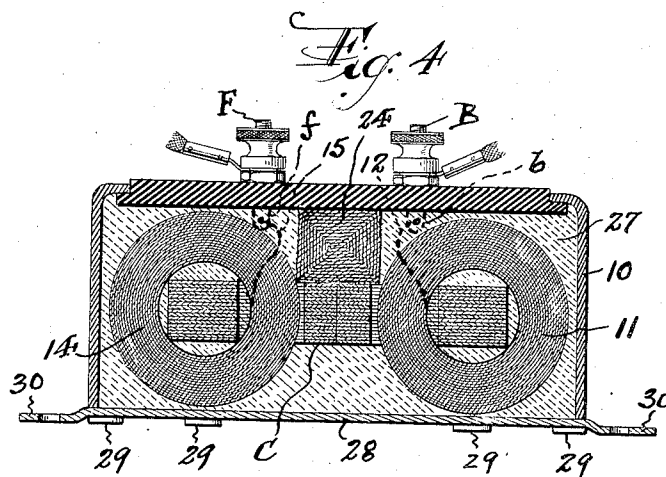
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2 Sheets-Sheet 2



UNITED STATES PATENT OFFICE.

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CHOKE-COIL AMPLIFICATION UNIT.

Application filed August 27, 1925. Serial No. 52,853.

This invention relates, generally, to an improved construction of choke coil amplification unit for use in radio signal amplifying circuits of the kind described in my copending application for United States Letters Patent, Ser. No. 684,931/15, filed January 8th, 1924.

This invention has for its principal object to provide a compact, simple and effective device in a unitary form adapted to provide two choke coils on a circuit together with a coupling grid condenser, and so interrelated in the unitary structure that only four wires issue from the unit in connection with external terminals or binding posts, whereby the elements of the unit may be readily connected in an audio circuit in proper functioning relation thereto.

Other objects of this invention, not at this time more particularly enumerated, will be clearly understood from the following detailed description of the same.

This invention is clearly illustrated in the accompanying drawings, in which:—

Figure 1 is a side elevation of the novel choke coil amplification unit, with a portion of the casing broken away to show the arrangement and connections of the internal elements, Figure 2 is a top or plan view of the same, with the casing partially broken away; and Figure 3 is an end view of the same, also with the casing partially broken away.

Figure 4 is a vertical longitudinal section, taken on line 4—4 in Figure 2; and Figure 5 is a horizontal section taken on line 5—5 in Figure 1.

Figure 6 is a perspective view showing the manner of assembling the core laminations for the choke coils; Figure 7 is a perspective view to show the disposition of a core lamination at one side, and Figure 8 is a similar perspective view to show the disposition of a core lamination at the opposite side of the pile, whereby the novel substantially figure 8 shape of core is obtained.

Similar characters of reference are employed in all of the hereinabove described views, to indicate corresponding parts.

Referring now to said drawings, the reference character 10 indicates a suitable casing, open at one side, for example at its bottom side, and provided in its opposite side with suitably disposed insulated external binding

posts or contact terminals, viz, a battery terminal connection B, a filament terminal connection F, a plate terminal connection P, and a grid terminal connection G, each respectively possessing terminal lugs *b, f, p* and *g*, which extend into the interior of said casing 10. The reference character 11 indicates a choke coil arranged for electrical connection between the battery terminal connection B and the plate terminal connection P, and to this end having the internal end 12 of its winding connected to the terminal lug *b*, and the external end 13 of its winding connected to the terminal lug *p*. The reference character 14 indicates a second choke coil arranged for electrical connection between the filament terminal connection F and the grid terminal connection G, and to this end having the internal end 15 of its winding connected to the terminal lug *f*, and the external end 16 of its winding connected to the terminal lug *g*. As arranged in the unit the said choke coils are mounted adjacent to each other, that is side by side, upon a novel arrangement of laminated metallic core made, e. g., of annealed carbon sheet steel substantially in the form of a figure 8, with the respective coils disposed around the respective outer lateral members of said core, but with the intermediate lateral member of the latter disposed between the choke coils, thus assuring a proper magnetic circuit for each coil without intervening air gap. Preferably each lamination comprises two matched members 17 and 18 as shown respectively in Figures 7 and 8 of the drawings. Each member 17 and 18 comprises a longitudinal member 19 having at one end a long lateral arm 20 and at the other end a short lateral arm 21 and intermediate said lateral arms a middle lateral arm 22 with a diagonally cut free end as at 23. In assembling the matched members 17 and 18 to produce the substantially figure 8 shape, the same are opposed to each other so that the short lateral arm 21 of the one abuts the long lateral arm 20 of the other, respectively at each end of the assembled lamination, thus bringing the diagonally cut ends 23 of the middle lateral arms 22 into abutting relation. In assembling the pile of laminations thus formed, the same are so relatively disposed that the long arm 20 of alternate laminations overlie the short arms 21 of intermediate laminations, while at the same time

the diagonal subdivisions of adjacent laminations cross each other, all of which is more particularly shown in Figure 6 of the drawings. By thus assembling the lamination members, there is produced an interlocking contact one with the other which assures a complete magnetic path throughout the body of the core, without interruptions or internal air gaps. Another advantage of the above-described core structure resides in the ease with which the same may be assembled with pre-wound coils by inserting the separable members 17 and 18 respectively through opposite ends of the coils until the same abut in desired cooperative relation. It will be understood, however, that I do not limit myself solely to the illustrated specific shape of the lamination members 17 and 18, since variations of such particular shape may be made while still retaining the advantages of the overlapping interlock of adjacent laminations in the total assembly of the core.

The reference character 24 indicates a coupling grid condenser element of suitable construction, the same being mounted intermediate the top of the casing 10 and the intermediate lateral member of the laminate core structure, so as to lie between the respective choke coils 11 and 14. One pole, as 25, of said condenser element is electrically connected with the terminal lug *p* of the plate terminal connection P, and the other pole, as 26, of said condenser element is electrically connected with the terminal lug *g* of the grid terminal connection G, thus positioning the condenser, when the device is included in a radio receiving circuit, between the output side or plate of one amplifying vacuum tube and the grid of a succeeding amplifying vacuum tube with which the receiving circuit may be provided.

When the choke coils with the novel core structure and the condenser element are assembled in the manner above described and inserted within the casing 10, the interior of the latter is filled with paraffin, pitch or other suitable compound 27 which entirely surrounds the said internal assembled elements within casing, so that the same are immovably retained therein.

When the device is thus assembled and provided with the filling compound 27, the open bottom of the casing 10 is closed by a cover or closure section or plate 28, which may be fastened in any suitable manner in connection with the body of the casing 10, as, e. g., by clenching lugs 29 connected with the latter so as to be turned over into holding engagement with said cover or closure.

The casing 10 is further provided with perforate ears 30 at any suitable point, so that the complete unit may be attached to a support in such position as may be deemed desirable.

From the above description it will be evident that a very complete and compact choke coil unit suitable for connection in radio receiving circuits, and which is capable of independent manufacture and sale as an accessory, is provided.

Having thus described this invention, I claim:—

1. A unitary device of the kind described, comprising an enclosing casing having external circuit connections, a pair of choke coils within said casing electrically interconnected between certain of said circuit connections, a laminate core substantially in the form of a figure 8, said choke coils being respectively mounted on the respective outer lateral members of said core so that the intermediate lateral member of said core lies between said coils, and a condenser element within said casing disposed intermediate said coils and electrically connected between certain of said circuit connections.

2. A unitary device of the kind described, comprising an enclosing casing having external circuit connections consisting of a battery connection, a plate connection, a filament connection and a grid connection; a pair of choke coils within said casing, one of said choke coils being electrically connected between said battery and plate connections, and the other of said choke coils being electrically connected between the filament and grid connections; a laminate core substantially in the form of a figure 8, said choke coils being respectively mounted on the respective outer lateral members of said core so that the intermediate lateral member of said core lies between said coils; and a condenser element within said casing disposed intermediate said coils and electrically connected between said plate and grid connections.

3. A unitary device of the kind described, comprising a laminate core substantially in the form of a figure 8, each lamination comprising opposed members having abutting lateral extensions of various lengths, and said laminations being assembled in alternated arrangement so that the divisions of their members are staggered to form an interlocking contact of one lamination with another; a pair of choke coils respectively mounted on the respective outer lateral portions of the core so that the intermediate lateral member of said core lies between said coils; a casing to enclose said coils and core; said casing having external circuit connections between certain of which the said coils are respectively electrically connected; and a filler compound within said casing in which said coils and core are imbedded.

4. A unitary device of the kind described, comprising a laminate core substantially in the form of a figure 8, each lamination comprising opposed members having abutting

lateral extensions of various lengths, and said laminations being assembled in alternated arrangement so that the divisions of their members are staggered to form an interlocking contact of one lamination with another; a pair of choke coils respectively mounted on the respective outer lateral portions of the core so that the intermediate lateral member of said core lies between said coils; a casing to enclose said coils and core; said casing having external circuit connections between certain of which the said coils are respectively electrically connected; a condenser element also enclosed within said casing and electrically connected between certain of said external circuit connections; and a filler compound within said casing in which said coils and core, and said condenser element are imbedded.

5. A unitary device of the kind described, comprising an enclosing casing having external circuit connections, a pair of choke coils within said casing electrically interconnected between certain of said circuit connections, a laminate core substantially in the form of a figure 8, said choke coils being respectively mounted on the respective outer lateral members of said core so that the intermediate lateral member of said core lies between said coils, a condenser element within said casing disposed intermediate said coils and electrically connected between certain of said circuit connections; and a filler compound in said casing in which said coils and core, and said condenser element are imbedded.

6. A unitary device of the kind described, comprising an enclosing casing having external circuit connections consisting of a battery connection, a plate connection, a filament connection and a grid connection; a pair of choke coils within said casing, one of said choke coils being electrically connected between said battery and plate connections and the other of said choke coils being electrically connected between the filament and grid connections; a laminate core substantially in the form of a figure 8, said choke coils being respectively mounted on the respective outer lateral members of said core so that the intermediate lateral member of said core lies between said coils; a condenser element within said casing disposed intermediate said coils and electrically connected between said plate and grid connections; and a filler compound in said casing in which said coils and core, and said condenser element are imbedded.

7. A unitary device of the kind described, comprising an enclosing casing having external circuit connections consisting of a battery connection, a plate connection, a filament connection and a grid connection; a pair of choke coils within said casing, one of said coils being electrically connected be-

tween said battery and plate connections, and the other of said coils being electrically connected between the filament and grid connections; and a laminate core upon which said coils are mounted in side by side relation, said core having means to provide a magnetic shield intermediate said coils.

8. A unitary device of the kind described, comprising an enclosing casing having external circuit connections consisting of a battery connection, a plate connection, a filament connection and a grid connection; a pair of choke coils within said casing, one of said coils being electrically connected between said battery and plate connections, and the other of said coils being electrically connected between the filament and grid connections; a laminate core upon which said coils are mounted in side by side relation, said core having means to provide a magnetic shield intermediate said coils; and a filler compound in said casing in which said coils and core are imbedded.

9. A unitary device of the kind described, comprising an enclosing casing having external circuit connections consisting of a battery connection, a plate connection, a filament connection and a grid connection; a pair of choke coils within said casing, one of said coils being electrically connected between said battery and plate connections, and the other of said coils being electrically connected between the filament and grid connections; a laminate core upon which said coils are mounted in side by side relation, said core having means to provide a magnetic shield intermediate said coils; and a condenser element also enclosed within said casing and electrically connected between said plate and grid connections.

10. A unitary device of the kind described, comprising an enclosing casing having external circuit connections consisting of a battery connection, a plate connection, a filament connection and a grid connection; a pair of choke coils within said casing, one of said coils being electrically connected between said battery and plate connections, and the other of said coils being electrically connected between the filament and grid connections; a laminate core upon which said coils are mounted in side by side relation, said core having means to provide a magnetic shield intermediate said coils; a condenser element also enclosed within said casing and electrically connected between said plate and grid connections; and a filler compound in said casing in which said coils and core, and said condenser element are imbedded.

In testimony that I claim the invention set forth above I have hereunto set my hand this 20th day of August, 1925.

EDWARD E. HILER.