Sept. 29, 1925. 1,555,251

W. H. PRIESS

ELECTRICAL CONDENSER

Filed June 3, 1921

Fig. 1.

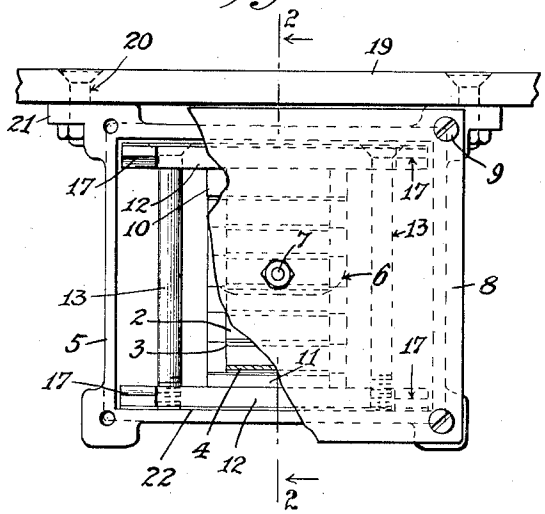


Fig. 2.

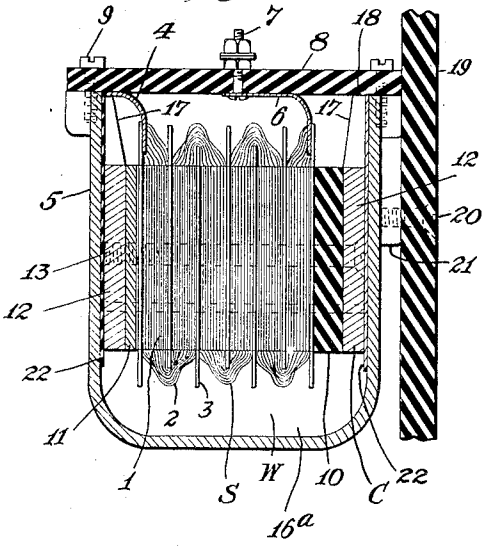


Fig. 3.

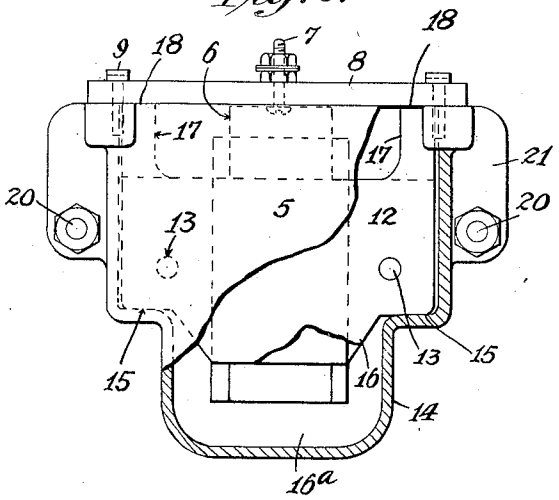
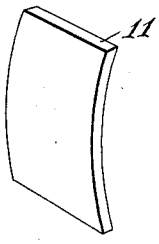


Fig. 4.



Attest:

William H. Priess Inventor:

by Philip Farnsworth his Atty.

Patented Sept. 29, 1925. 1,555,251

UNITED STATES PATENT OFFICE.

WILLIAM H. PRIESS, OF BELMONT, MASSACHUSETTS, ASSIGNOR TO WIRELESS SPECIALTY APPARATUS COMPANY, OF BOSTON, MASSACHUSETTS, A CORPORATION OF NEW YORK.

ELECTRICAL CONDENSER.

Application filed June 3, 1921. Serial No. 474,679.

To all whom it may concern:

Be it known that I, WILLIAM H. PRIESS, a citizen of the United States of America, and a resident of Belmont, State of Massachusetts, have invented certain new and useful Electrical Condensers, the principles of which are set forth in the following specification and accompanying drawing, which disclose the form of the invention which I now consider to be the best of the various forms in which the principles of the invention may be embodied.

This invention relates to electrical condensers and especially to the type adapted for use in radio transmitters.

The specific embodiment of the invention herein illustrated is a condenser especially adapted for use in pack sets; that is, compact radio transmitting and receiving sets extensively used by the Army and Navy for field, landing and other work. Such condensers have a capacity of .004 M. F. and are able to withstand a voltage of about 16,000 volts at six amperes at a wave-length of 600 meters.

The condenser of the type herein illustrated consists of a stack comprising several sections connected in series in order that the required potential may be withstood, and each section comprises alternate sheets of a suitable foil, such as lead foil, and dielectric, such as mica. The most satisfactory use of such condensers is under conditions in which the sheets of foil and dielectric are in intimate contact, as more fully described and discussed in my co-pending application Serial Number 456,903, filed March 30, 1921, that is, in which all air and moisture has been excluded and removed from between the sheets and also from which all impregnating or insulating waxes or fluids, or as much as possible, which may have been used during the process of building the stack are removed.

An object of the present invention is to provide a compact, cheap condenser adapted for efficient service.

Another object of the invention is to maintain the intimate contact between the sheets of foil and dielectric in service.

Another object of the invention is to provide a condenser in which the clamping means is independent of the casing in which such stack and clamping means is suitably secured.

In the accompanying drawings, I have illustrated one embodiment of the invention in which—

Figure 1 is a plan view of the condenser with portions of the cover broken away;

Fig. 2 is a vertical section on the line 2—2 of Fig. 1 looking in the direction of the arrows;

Fig. 3 is an elevation of the condenser with a portion of the casing broken away; and

Fig. 4 is a detailed perspective view of a spring pressure plate used in the construction of the condenser.

As herein illustrated, the stack S comprises a number of sections 1 connected in series at 2, mica separators 3 being interposed between the sections and extending beyond the connections to insulate the successive connections at opposite sides from each other. The stack at one end is provided with a copper lead 4 which is electrically connected to a metal casing 5, the casing constituting one terminal of the condenser, and the opposite end section is provided with a copper lead 6 electrically connected to a terminal 7 extending through an insulating cover 8, preferably of bakelite dilecto, secured to the casing 5 by means of the screws 9. This stack S consists of alternate sheets of foil and dielectric as above described, and may be built and constructed by the method described in the above-mentioned application, whereby all air, moisture and insulating material are excluded from between the successive sheets of the stack.

In order to maintain the intimate contact between the successive sheets of the stack, I have provided an all-metal clamp C, which is independent, as far as the clamping fea-

ture is concerned, of the casing 5 and also of the cover 8. The clamping means comprises also an insulating block or member 10 at that end of the stack which is connected to the terminal 7; and also a spring plate 11 at the opposite end of the stack. Metal end castings or pressure members 12 are arranged on the outside of the members 10 and 11, these castings extending over the entire active surface of the foil and dielectric and a substantial distance beyond the edges of the foil as illustrated in Figs. 1 and 2. The members 12 are preferably of cast steel, and are connected together by a pair of metal bolts 13, one bolt being located at each side of the condenser and centrally of the plates whereby upon the tightening of the bolts, uniform pressure is exerted over the opposite ends of the stack. These bolts are sufficiently spaced from the sides of the stack to prevent brushing or discharge between the same and the stack. In assembling the condenser, the end plates 12 with the stack and plates 10 and 11 between them are preferably placed in an arbor press or C clamp and pressure is applied until the plate 11 is flat. The bolts are then tightened to maintain this pressure. The plate 11 constitutes a spring plate which is normally bowed, as illustrated in Fig. 4, and may consist of any suitable spring material such as vanadium steel. Upon the tightening of the bolts 13, uniform resilient spring pressure is exerted upon the opposite ends of the stack to maintain the sheets in intimate contact, and any temperature changes resulting in varying length of the stack in service is compensated for or allowed by the spring 11. Upon the contraction of the stack, the spring follows up the contraction to maintain the pressure constant.

As more clearly illustrated in Fig. 3, the lower portion 14 of the casing 5 is reduced in size, forming shelves or ledges 15 at opposite sides thereof against which engage portions of the end pressure members 12 extending beyond opposite sides of the stack. These clamping end plates or members 12 also have reduced portions at 16 which extend into the reduced portion 14 of the casing, providing space 16^a between the stack S and the casing whereby the stack, although resting on the casing, is suitably spaced and insulated from the metal parts thereof, with correspondingly reduced volume and weight of insulating filler in space W (Fig. 2).

In the construction herein illustrated, the sheets of foil and dielectric are arranged vertically within the casing 6 at right angles to the cover 8. Hence insulating block 10 (Fig. 2) and adjacent clamp-portion C space the high potential end of the stack away from the adjacent side wall of metal casing 5; and high potential lead 6, at the point of connection with the high potential terminal-section of the stack is located close to the casing-opening and insulating cover 8 out through which said lead extends. At opposite sides of the bolts 13 are upwardly-projecting fingers 17 which are engaged at their upper ends 18 by the cover 8 to maintain the clamp and the stack in position within the casing. The condenser herein illustrated may be secured to any suitable frame 19 by means of screws 20 extending through the frame and into lugs 21 formed on the casing 5.

After the condenser stack and its clamp have been placed within the casing and before the cover 8 has been secured in place, space W within the casing 5 around the stack and clamp may be filled with any suitable insulating and embedding material such as paraffin. This embedment may be formed by the methods and by the means described in the application above-mentioned. This forms a compact, holosteric embedment within the casing 5 and around the stack, thoroughly insulating the stack in the casing. Fish paper sheets 22 may be interposed between the casing 5 and the ends of the clamp.

It is to be understood that the invention is not limited to the embodiments and features specifically shown and described herein, but that such embodiments and features are subject to changes and modifications without any departure from the spirit of the invention.

I claim:—

1. In an electrical condenser, a stack of sections connected in series and having its opposite ends at a difference of potential, a spring plate at one end of the stack, an insulating member at the other end of the stack, and an all-metal clamp enclosing said stack, spring plate and insulating member whereby resilient spring pressure is maintained upon the stack.

2. In an electrical condenser, a stack of conducting and dielectric sheets constructed to have a high potential difference between its ends in service; a metal casing for said stack having a cover of insulating material, the stack being located parallel to said cover with its sides spaced from the walls of the metal casing; an all-metal clamp extending from end to end of the stack, constructed to maintain the sheets from end to end of the stack under a high compression, the ends of said clamp extending parallel with opposite walls of the metal casing and located entirely within the casing; an insulating plate between and parallel to one end of the stack and the adjacent end of said all-metal clamp; a spring plate tending to bend but located for more or less flattening during service between and parallel to the other end of the stack and the adjacent end of said all-metal clamp; and means for securing the clamp in fixed position within the casing.

3. In an electrical condenser, a stack of

conducting and dielectric sheets constructed to have a high potential difference between its ends in service; a metal casing for said stack having a cover of insulating material; an all-metal clamp extending from end to end of the stack, constructed to maintain the sheets from end to end of the stack under a high compression during service, and located entirely within the casing; an insulating block between and parallel to one end of the stack and the adjacent end of said all-metal clamp; a spring plate tending to bend but located to be more or less flattened during service between and parallel to the other end of the stack and the adjacent end of said all-metal clamp; means for securing the clamp in fixed position within the casing; a lead connecting one end of the stack with the metal casing; and a condenser terminal extending through the insulating casing-cover and connected to a lead extending from the other electrical end of the stack.

4. In an electrical condenser, a stack of serially-connected sections having its ends at a high potential difference corresponding with such series connection, each section comprising armature sheets and intervening dielectric; and the several sections having intervening insulating separators; a metal casing enclosing said stack and having an opening for a circuit lead from the stack; a circuit lead extending from one terminal-section of the stack out through said casing-opening; the other terminal-section of the stack being electrically connected with said casing; an insulating member around said circuit lead and covering said casing-opening; metal clamping means extending from end to end of the stack and over the ends thereof, with an intervening insulating block of substantially greater thickness than said insulating section-separators and located between said clamping means and the terminal-section of the clamp from which said circuit lead extends out of the casing, said insulating block being held under compression by said clamping means; and said stack being arranged in said casing with its armatures and dielectric sheets and said insulating block located at right angles to said insulating covering member and parallel to the side walls of said casing, whereby said insulating block and adjacent part of the clamping means lie between the end of the stack and a side wall of the casing, and the side of the terminal-section of the stack which is adjacent to said insulating block is located near said insulating covering member.

5. In an electrical condenser, a stack of conducting and dielectric sheets constructed to have a high potential difference between its ends in service; a metal casing for said stack having a cover of insulating material; an all-metal clamp extending from end to end of the stack, constructed to maintain the sheets from end to end of the stack under a high compression, and located entirely within the casing; and a flat insulating block and spring plate located parallel to the sheets in the stack in positions in which they are held under compression with the stack by said clamp.

6. In an electrical condenser, a stack, a clamp for said stack comprising end plates extending beyond the stack at opposite sides, means for holding the end plates compressed together against the ends of the stack, and a metal casing for said stack and clamp, a portion of said casing being of less width providing ledges at an intermediate portion thereof, said end plates having portions of less width engaging said ledges, supporting the stack in spaced relation to the casing, and with correspondingly reduced space between the stack and the walls of the reduced portion of the casing.

7. In an electrical condenser, a stack, a clamp enclosing said stack, a metal casing provided with means upon opposite sides of the stack and engaging the clamp for supporting the stack within the casing, and spacing the stack from the casing, and a cover upon said casing and co-operating with said clamp for securing the same in position within the casing.

8. In an electrical condenser, a stack of sections connected in series, a clamp comprising end plates engaging the stack at opposite ends and extending over the active surface thereof and laterally beyond the stack, bolting means connecting said end plates, a metal casing having an opening, enclosing said clamp and stack and comprising a reduced portion forming ledges upon opposite sides, supporting the end plates, the stack being arranged in spaced relation to said casing at all points, means electrically connecting one portion of said stack to the casing constituting a terminal, fingers upon said end plates extending toward the open end of the casing, an insulating cover upon said casing engaging said fingers to hold the clamp and stack in position within the casing, and a second terminal connected to said stack and extending through said insulating cover.

9. In an electrical condenser, a stack of sections connected in series and comprising alternate sheets of foil and dielectric, the opposite ends of the stack being at a difference of potential, an all-metal clamp enclosing said stack and comprising end plates, insulating means interposed between one end of the stack and the end plates, bolting means extending along opposite sides of the stack and connecting the end plates clamping the stack, a metal casing haying an open end, enclosing said stack and clamp and comprising a reduced portion forming ledges upon opposite sides of

the stack and engaging portions of the end plates spacing the stack from the casing, fingers upon opposite portions of the end plates extending towards the open end of the casing, means electrically connecting one end of the stack to the casing, the latter constituting a terminal, an insulating cover upon said casing and engaging said fingers for holding the clamp and stack in position within the casing, a terminal connected to the opposite end of the stack and extending through said insulating cover, and an embedment of insulating material within said casing surrounding said stack.

WILLIAM H. PRIESS.