Aug. 23, 1932. S. I. COLE 1,873,548

CONDENSER

Filed Jan. 29, 1930

FIG. 1.

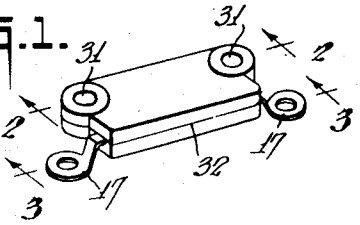


FIG. 2.

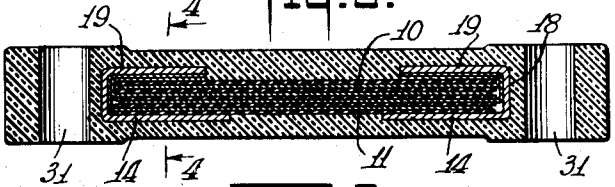


FIG. 3.

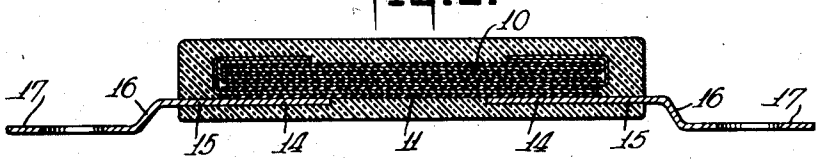


FIG. 4.

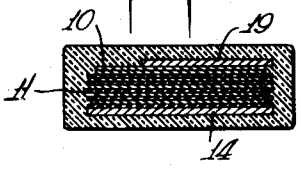


FIG. 5.

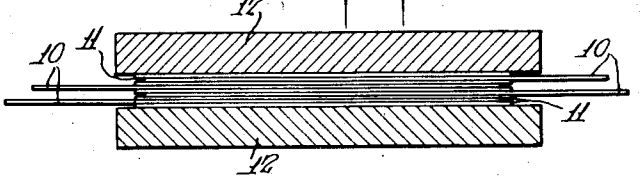


FIG. 6.

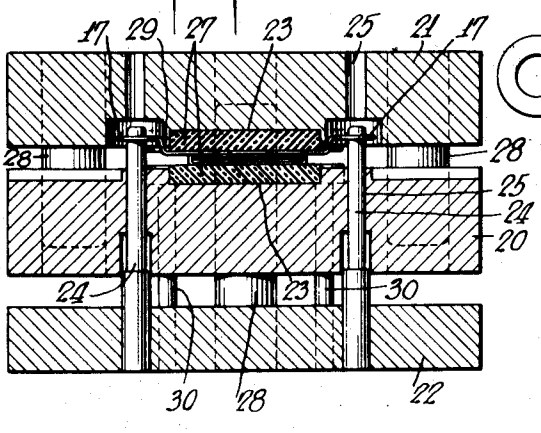


FIG. 7.

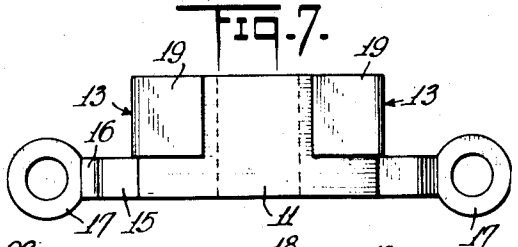
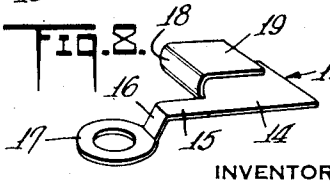


FIG. 8.



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A-250

Patented Aug. 23, 1932 1,873,548

UNITED STATES PATENT OFFICE

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CONDENSER

Application filed January 29, 1930. Serial No. 424,219.

The device of the present invention and the method of manufacturing it may find a wide and varied range of utility, but both the article and method are peculiarly applicable to small fixed capacity condensers for use in radio receiving sets.

An object of the invention is to fabricate expeditiously by mass production methods, a simple, rugged, durable condenser of this type, the capacity of which is accurately predetermined within narrow limits and maintained substantially invariant under all conditions of use.

Another object is to provide a condenser which may be readily and firmly attached to the chassis or frame of a radio receiving set and electrically connected in the receiving circuit without the need for special insulating fittings even though the chassis be of conductive material.

In a preferred embodiment of the invention, the condenser comprises a stack of conductive and dielectric sheets with stack-straddling terminal members at opposite ends of the stack. The stack is completely embedded in a body of molded insulating material with the terminal ends projecting beyond the body and with the body itself apertured for the reception of supporting screws or the like.

A feature which contributes materially to the expeditious fabrication of the article is the fact that the stack with its terminals may be handled as a unit. The material to be molded is in dry tablet form. It is thus merely necessary to place the stack and terminal unit between a pair of tablets in the mold and apply the necessary heat and pressure to effect the flux and welding of the molding material. The capacity of the stacks before they are molded is predetermined in a known manner at a rating somewhat below desired rating of the finished condenser, the pressure of the molding press being relied upon uniformly to raise the capacity to the desired standard.

The invention may be more fully understood from the following description in connection with, the accompanying drawing wherein:

Fig. 1 is a perspective view of a condenser embodying the invention,

Fig. 2 is a longitudinal sectional view through the condenser on a considerably magnified scale, and taken approximately on the line 2—2 of Fig. 1,

Fig. 3 is another enlarged longitudinal sectional view of the condenser taken approximately on the line 3—3 of Fig. 1,

Fig. 4 is an enlarged transverse sectional view on the line 4—4 of Fig. 2,

Fig. 5 is a diagrammatic sectional view illustrating the manner in which pressure is applied to the condenser stack in the early stages of its manufacture,

Fig. 6 is a vertical sectional view through one of the molds in which the condensers are formed, this view showing the various elements of the completed condensers in the mold prior to the time that the molding pressure is applied,

Fig. 7, is a view on an enlarged scale of the condenser stack and its associated terminal clips ready for application to the mold, and

Fig. 8 is an enlarged perspective view of one of the terminal clips.

A full understanding of the construction of the condenser itself may best be had by following the various steps in the method of manufacturing it.

The condenser stack which appears in Fig. 5 consists of a plurality of alternate laminations of foil 10, and dielectric sheets 11, preferably of mica, the ends of alternate foil sheets projecting from opposite ends of the stack. The method of impregnating the stack with paraffin or the like, as well as the method of compressing the impregnated stack may, if desired, closely follow the method disclosed in the prior Patent No. 1,650,395 of Samuel Siegel, granted November 22nd, 1927. Briefly, the stack is first immersed in a body of melted impregnating material, such as paraffin which enters between the adjacent foil and dielectric laminations and forms an insulating coating over the entire stack to prevent subsequent attack by moisture. The stack is next placed between a pair of plates 12 (Fig. 5). Pressure and heat are then applied concurrently to thor-

oughly compact the stack, and squeeze out excess impregnating medium from between the stack laminations. In order that uniformity of capacity may be obtained, the foil and mica surfaces are originally calculated so that the condenser will have a capacity slightly above that required when the stacks enter the press and then part of the outer foil sheet is trimmed off until measurement shows that the capacity has been brought down to the desired value.

After folding the protruding ends of foil on the stack which is, as above explained, thoroughly impregnated and proof against moisture, I apply the terminal members, designated generally at 13, over the ends of the stack, these members serving to electrically connect alternate foil sheets and to provide means for applying the condenser in an electrical circuit.

The terminal members in the present instance, are designed not only to perform their electrical functions but to serve as convenient handles and centering devices for the stack, when the latter is emplaced in a mold as will be later described. Each terminal includes a flat plate-like portion 14, having a tab 15 projecting from one edge thereof and formed integral with a terminal eye 17, lying in a plane parallel to the plane of the plate to which it is connected by offset bridge 16. Laterally of the tab 15, plate 14 is bent upwardly as at 18, and then turned backwardly, providing a second plate portion at 19, parallel to, but spaced from the plate portion 14. When these terminals are slipped over the ends of the condenser stack, portions 14, 19 straddle the stack and grip the terminal ends of the respective series of foil sheets, sufficiently firmly so that the terminals may serve as handle members in subsequent handling of the pre-formed stack. The projecting terminal eyes 17 may be conveniently used as handles for lifting the stack about.

It will be understood that the pressure exerted on the stack by the terminal members which embrace it is less than the pressure originally applied in forming the stack so that the terminal members or clips whether of soft bendable metal or spring metal, can have no effect on capacity determination in the completed condenser, nor can they vary the original capacity determination resulting from the original forming pressure.

The next step of the process is completely to embed the stack in molded insulating material, leaving only the terminal eyes 17 protruding. In Fig. 6 is shown a three part mold for the purpose, consisting of a center section 20 and upper and lower sections 21 and 22. The sections 20 and 21 of the mold are formed with complementary mold defining depressions 23, whereas, the lowermost section 22 carries aligning pins 24 accommodated in suitable bores 25 in the plates 20 and 21. These pins receive the terminal eyes 17 of the terminal clips 13, whereby the stack is held in proper position within the mold. In practice, two tablets 27 of powdered bakelite are placed at opposite sides of the condenser stack. The lower tablet is first positioned in the mold recess of the plate 20, the preassembled condenser stack with its terminal clips is then laid upon this tablet, the eyes of the terminal clips being slipped over the posts 24 to center the stack. The upper tablet 27 is then laid on the top of the condenser stack and the topmost section of the mold applied. The various sections of the mold are equipped with suitable guiding pins 28 maintaining alignment of the mold sections when the mold is placed under a press and subjected to heat and pressure.

As the various sections of the mold move together under pressure, the two tablets 27 flow and weld to each other and take a smooth hard surface finish, the bakelite material completely embedding the stack and leaving only the terminal eyes projecting. The upper mold section 23 is provided with a cut away portion 29 to accommodate the tabs 15 and thereby prevent them from being broken off under the press.

As the molding operation is carried out, not only are the mold sections 20 and 21 moved together but the mold section 22 moves upwardly relatively to its section 20 and carries a pair of fixed pins 30 through the bakelite at a point beyond the condenser stack. These pins form a pair of eyes 31 in the completed condenser which serve for the reception of suitable attachment devices to connect the condenser to the chassis of a radio receiving set or to mount it in any other convenient location.

Inasmuch as the eyes 31 are formed in the bakelite, they permit the condenser to be mounted upon metal chasses such as those now employed, without the use of supplemental insulating means associated with the attaching devices.

The line 32 in Fig. 1 indicates the line of division of the two mold sections, a flash of excess bakelite being extruded from the mold under the press and when broken off leaving the slight line of demarcation apparent in Fig. 1.

This molding operation when carried out under proper pressure raises the capacity of each condenser to the desired capacity rating for the finished product, moderate care in the performance of the method assuring accurate capacity predetermination, within narrow limits. Obviously after the molding operation is over the capacity of the condenser will not be subject to change by varying weather conditions or changing conditions of use since the stack is held against expansion of the hard molded body and is thoroughly

protected against access of air or moisture.

The condenser is flat, narrow and slightly elongated and both the attachment openings 31 and the terminal eyes 17 are disposed at the ends of the condenser in a position for most convenient attachment to a support or lead wire respectively. Thus when connecting the condenser in an electrical circuit, there is no need for fumbling about with the wires or using any excess wire or excess length of bus-bars to establish a circuit through the condenser stack.

The finished condenser thus affords convenient mounting facilities and convenient electrical terminal facilities distinct therefrom, each having specialized adapation for its intended purpose. Yet the condenser is of compact dimensions the over-all width thereof in a convenient commercial embodiment being not more than ½ inch.

It will thus be seen that there is herein described a method and article in which the several features of this invention are embodied, and which method and article in its action attains the various objects of the invention and is well suited to meet the requirements of practical use.

As many changes could be made in the above method and article, and many apparently widely different embodiments of this invention could be made without departing from the scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawing shall be interpreted as illustrative and not in a limiting sense.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:—

1. As a new article of manufacture, a condenser of fixed capacity, including a preformed condenser stack having terminal clips pre-assembled therewith, and only frictionally engaging the stack and protruding from the opposite ends thereof, a body of molded insulating material of but slightly greater area than the stack embedding said stack and locking stack and clips together and through the ends of which the terminal clips protrude, said molded body having apertures in its ends through the thickness thereof just beyond the ends of the embedded stack and just laterally of said clips.

2. As a new article of manufacture, a condenser as set forth in claim 1, and wherein the clips include eyes at the exposed ends thereof offset to a plane parallel to and beyond that of the molded casing.

3. As a new article of manufacture, a condenser of fixed capacity, including a preformed condenser stack having terminal clips including portions frictionally embracing the stack and portions protruding from the opposite ends thereof, a body of molded insulating material embedding said stack and leaving exposed the protruding ends of the terminal clips, said molded body having apertures through the thickness thereof beyond the ends of the embedded stack and laterally of said clips, said terminal clips protruding substantially from one of the lateral edges of the condenser case, and said mounting apertures being disposed substantially at the ends of the opposite lateral edges of the condenser.

4. As a new article of manufacture, a condenser of fixed capacity, including a preformed condenser stack having terminal clips only frictionally attached thereto and protruding from the opposite ends thereof, a body of molded insulating material embedding said stack and permanently locking the clips thereto and through the ends of which the terminal clips protrude, said molded body having apertures through the thickness thereof beyond the ends of the embedded stack and laterally of said clips.

Signed at Brooklyn in the county of Kings and State of New York this 22nd day of January A. D. 1930.

SAMUEL I. COLE.