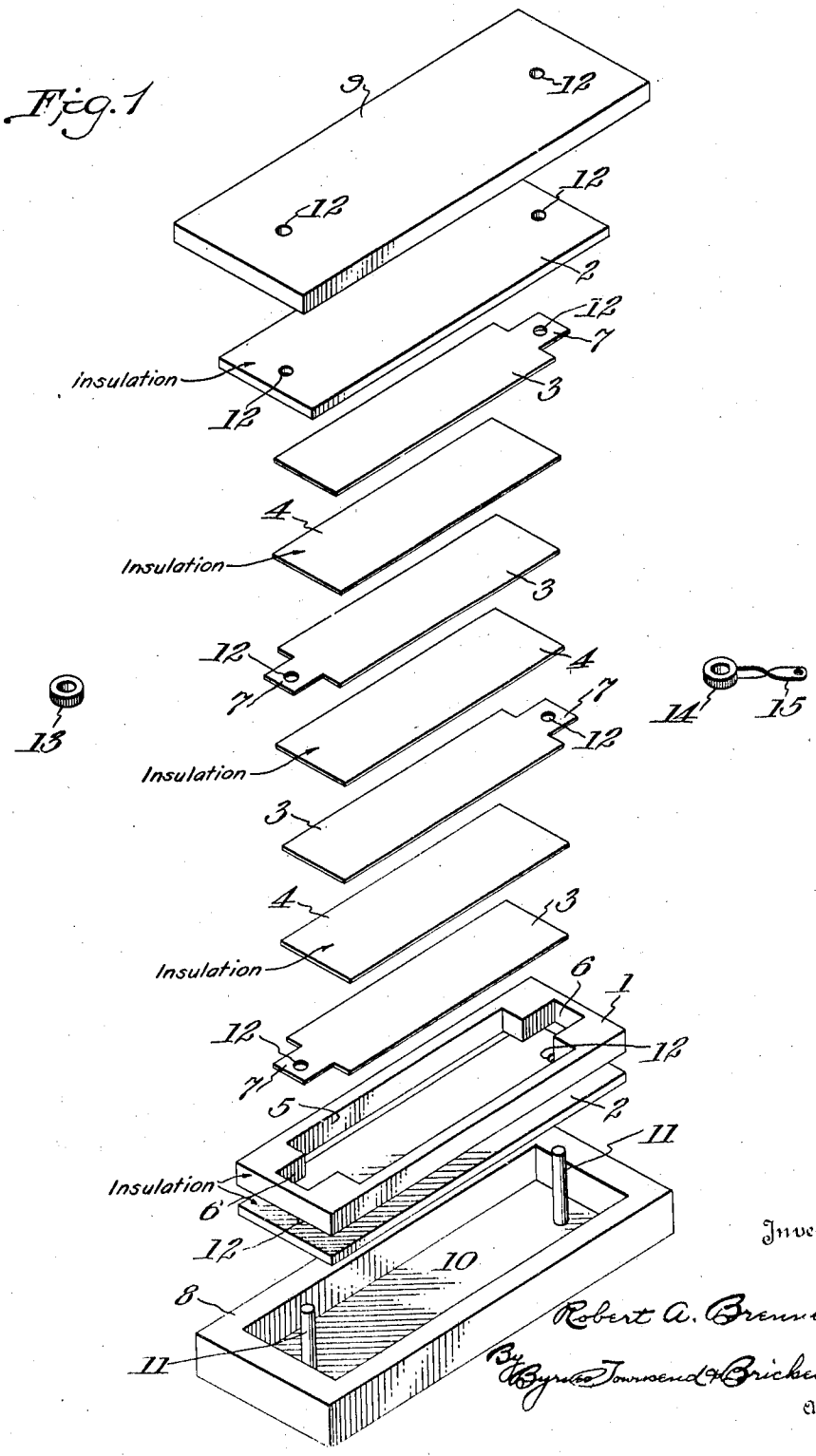
Aug. 16, 1932. R. A. BRENNECKE 1,871,492

METHOD OF FORMING MOLDED ARTICLES

Filed March 10, 1927 2 Sheets-Sheet

Fig. 1



Inventor:

Robert A. Brennecke,

By Byron Townsend & Brickenstein,

Attorneys

Aug. 16, 1932. R. A. BRENNECKE 1,871,492

METHOD OF FORMING MOLDED ARTICLES

Filed March 10, 1927 2 Sheets-Sheet 2

Fig. 2.

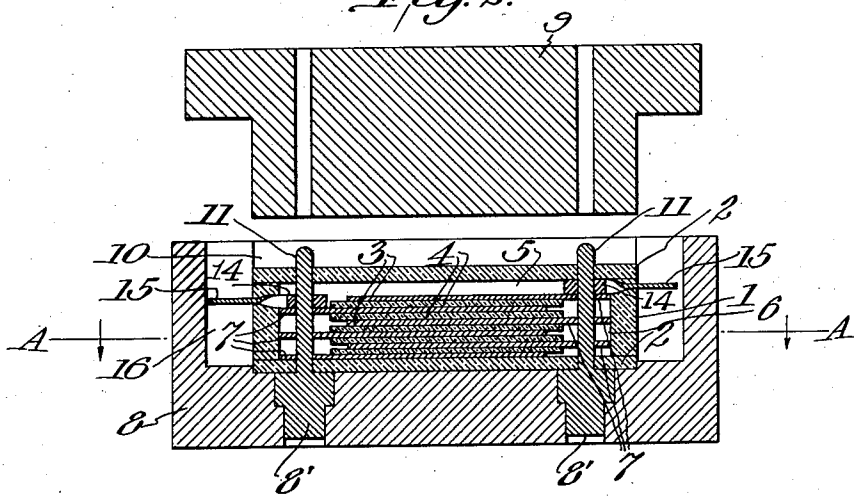


Fig. 3.

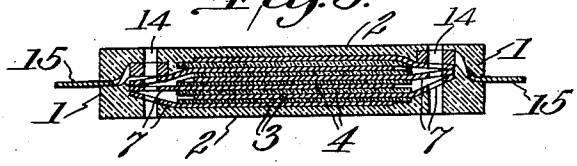
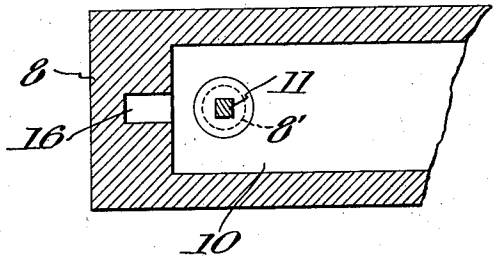


Fig. 4.



Inventor:

Robert A. Brennecke,

By Byron, Townsend & Brickenstein,

Attorneys

Patented Aug. 16, 1932 1,871,492

UNITED STATES PATENT OFFICE

ROBERT A. BRENNECKE, OF CHICAGO, ILLINOIS

METHOD OF FORMING MOLDED ARTICLES

Application filed March 10, 1927. Serial No. 174,373.

This invention relates to methods of forming molded articles, especially of the assembled type, such as electrical condensers and the like. In one aspect it constitutes an improvement upon the invention described and claimed in my copending application, Ser. No. 53,659, filed August 31, 1925, now Patent No. 1,745,400 of which this application is a continuation in part.

While my invention is not limited to an electrical condenser, it is especally applicable thereto. I shall therefore describe it in that connection, and particularly as applied to the type of condenser referred to in my above-mentioned application.

Figure 1 illustrates a mold and assembly according to my invention. Figure 2 is a cross section of a mold with a condenser assembly therein. Figure 3 is a cross-sectional view of a completed condenser, the thickness of the elements being greatly magnified for the sake of clearness. In an actual molded assembly it should be understood that the extensions 7 lie substantially parallel. Figure 4 is a plan view of the lower part of the mold through section A—A.

Referring to the drawings, such a condenser may suitably comprise a frame or wall portion, 1, of insulating material, provided with an opening 5, therein, for receiving the condenser elements. Top and bottom closures, 2—2, of insulating material are provided for the frame 1. Alternatively the frame may be made integral with one of these closure elements. Condenser leaves, 3, are assembled within the frame 1, alternately with insulating sheets 4. The frame, 1, is provided with extensions 6—6 of the opening 5, one at each end. These extensions of the opening may be square, rectangular, and so forth, and are adapted to receive extensions 7 of the condenser leaves 3. These extensions 7 are formed at one end only of each condenser leaf, and the leaves are assembled with their extensions alternately at opposite ends of the frame 1.

The lower part of the mold is shown at 8 and the upper part at 9. The lower part is provided with a cavity, 10, of the proper size to receive the frame 1 and closure 2. Within the mold cavity 10 are arranged pins, 11, preferably integral with the mold or at least with the knockout members 8′, and of a suitable size and shape to assist in positioning the assembly. The closures 2, and extensions 7 of condenser leaves 3 are provided with perforations 12, which are adapted to fit over the pins 11. The pins being positioned so as to fall within the extensions 6 of the frame opening and extensions 7 of the condenser leaves, the insulating sheets 4 need not be pierced. Moreover each condenser leaf 3 is made somewhat shorter than the length of the main opening 5 of the frame. It may also be made slightly narrower than the opening if desired. There is then a slight margin of insulation at the inner end of each leaf, and on the sides thereof if desired.

The insulating material may be of various sorts. I ordinarily prefer to use a phenolic resin material. This may be a molding mixture of the familiar type, in which case it is advantageously preformed or cold molded into the proper shape for the frame, closures, and so forth. One of the closures is then made integral with the frame with some advantage. Alternatively the insulating material may be formed from laminated stock or impregnated sheets of the well known forms. These are readily punched to the proper shape, including the perforations. The frame may be composed of several superposed layers. The insulating sheets 4 are also advantageously made of one or more layers of impregnated material, although they need not be composed of a moldable material, but may be of mica, etc. When a laminated or impregnated stock is employed it may be either uncured or partially cured. In the latter event there is less flow in the mold, and the resulting product is sometimes superior for that reason. Whatever the insulating material may be it should be of a reactive or only partially reacted character, so as to be capable of transformation under heat, or heat and pressure, in the understood manner to a fully cured finished article possessing the well known desirable characteristics of such molded products. This molding operation

will then convert the assembly into an integral unit.

The process of assembly is to fit a closure element 2 into the mold cavity 10, with the pins 11 projecting through perforations 12. The frame 1 is then inserted in the cavity 10. The pins 11 protrude within the extensions 6 of the frame opening 5. Condenser leaves 3 are then arranged alternately with insulating sheets 4 to any desired number, depending upon the depth of the frame 1 and desired capacity of the condenser. The extensions 7 are arranged at opposite ends in alternate leaves. Each condenser leaf is securely held in place by the pin 11 which passes through perforation 12. The insulating sheets 4 fit within the body of the opening 5, and are thus positioned. When the condenser is built up to the desired extent, the upper closure 2 is fitted over the pins 11 and the mold is closed. The condenser is then subjected to pressure, or to heat and pressure, as in an ordinary molding operation. This may be accomplished in a steam-heated press or otherwise, as is well understood in the art.

If desired a sharp pin, insert, binding post stem or other contact element may be passed through the condenser leaf extensions 7, at each end, either before the mold is closed or by the molding pressure. Or the pressure of the mold may be sufficient to force the extensions 7 into contact with each other or with the above mentioned contact elements. Another alternative is to make the contact within the holes left by the withdrawal of the pins 11 when the condenser is removed from the mold.

A preferred method of making the contact, when the condenser is assembled according to this invention, is to place a small knurled metal bushing, 13, upon each pin, 11, after the condenser leaves are assembled, but before the top closure, 2, is laced in the mold. The holes, 12, in the top closure may be made sufficiently large to receive these bushings. The molding pressure is then sufficient to force the bushing into contact with the uppermost extension, 7, and to force this extension into intimate contact with the successive underlying ones.

A variation of this method is to make use of a bushing such as is shown at 14, provided with a lug 15 extending through a suitable slot, 16 in the mold 8. The condenser is thus provided with an external terminal at each end.

The result of the molding operation is to produce an integral molded unit. The condenser elements are embedded in a hard, glossy, moisture-proof, shock-resisting, unitary molded casing with which the internal insulation may be integral, especially when it is composed of moldable material. Such a condenser is well adapted to many purposes, and particularly to the severe requirements of the wireless telephone or radio industry.

The pins 11 need not be circular in cross-section. A square or rectangular cross-section may hold the assembly more firmly. The pins may be slightly tapered if desired. They may also be used as a means for causing the two parts of the mold to register properly, the pins 11 fitting into corresponding holes in the upper part of the mold. Other variations and modifications fall within the scope of my invention.

A marked advantage of my invention is that it provides a method of both assembling and molding a condenser in the mold itself. Only a single piece of equipment is thus required, and I am enabled to dispense with the numerous and expensive pieces of apparatus hitherto employed in the manufacture of condensers. This results in a saving of time and labor, in the production of more uniform condensers, and of fewer defective ones. The method of assembly also results in more accurate positioning of the condenser plates, and consequently in greater accuracy in obtaining the desired capacity when the condensers are produced on a large scale.

I claim:

1. Method of making an electrical condenser which comprises assembling in a mold, with the aid of pins located therein, a plurality of alternate insulating and conductive elements, and frame and closure elements of moldable insulating material, and subjecting the assembled elements to a molding operation to unite them into an integral unit.

2. In a mold comprising a lower part or chase having a mold cavity therein, and an upper part or force for closing said cavity, and provided with assembling pins projecting into said mold cavity, the method of making an electrical condenser which comprises positioning a frame and lower closure element therefor, composed of moldable insulating material, within said lower part of said mold with said assembling pins projecting through said lower closure element; assembling upon said assembling pins a plurality of conducting elements positioned with the aid of said pins and arranged alternately with a plurality of insulating elements positioned with the aid of said frame member; positioning an upper closure element composed of moldable insulating material over said assembly; and subjecting the assembled elements to a molding operation in situ to unite them into an integral unit.

In testimony whereof, I affix my signature.

ROBERT A. BRENNECKE.