May 31, 1932. W. H. GOODMAN 1,861,006

ELECTRICAL CONDENSER

Filed Nov. 15, 1926 2 Sheets-Sheet 1

Fig. 1

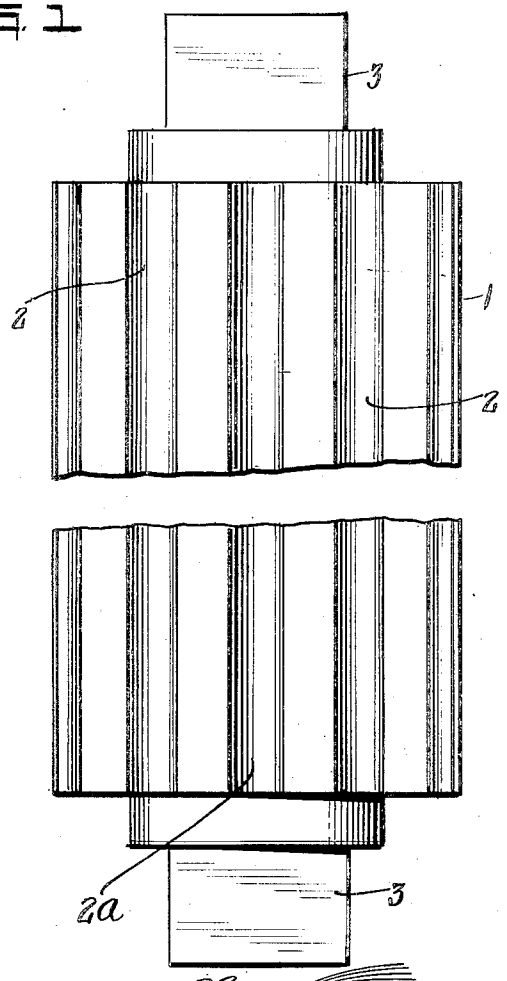
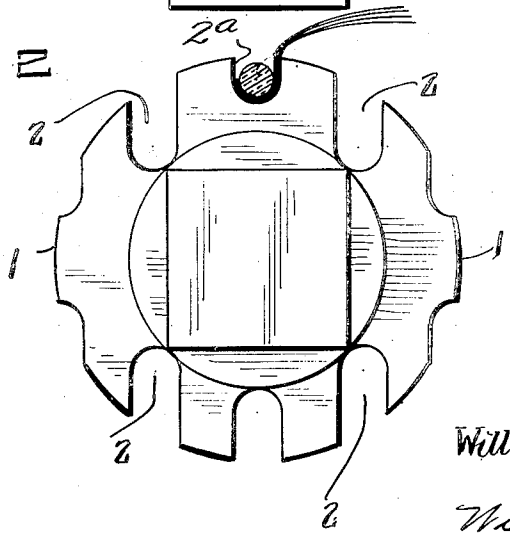


Fig. 2



INVENTOR
William Henry Goodman
BY
William F. Nickel
ATTORNEY

May 31, 1932. W. H. GOODMAN 1,861,006

ELECTRICAL CONDENSER

Filed Nov. 15, 1926 2 Sheets-Sheet 2

Fig. 3

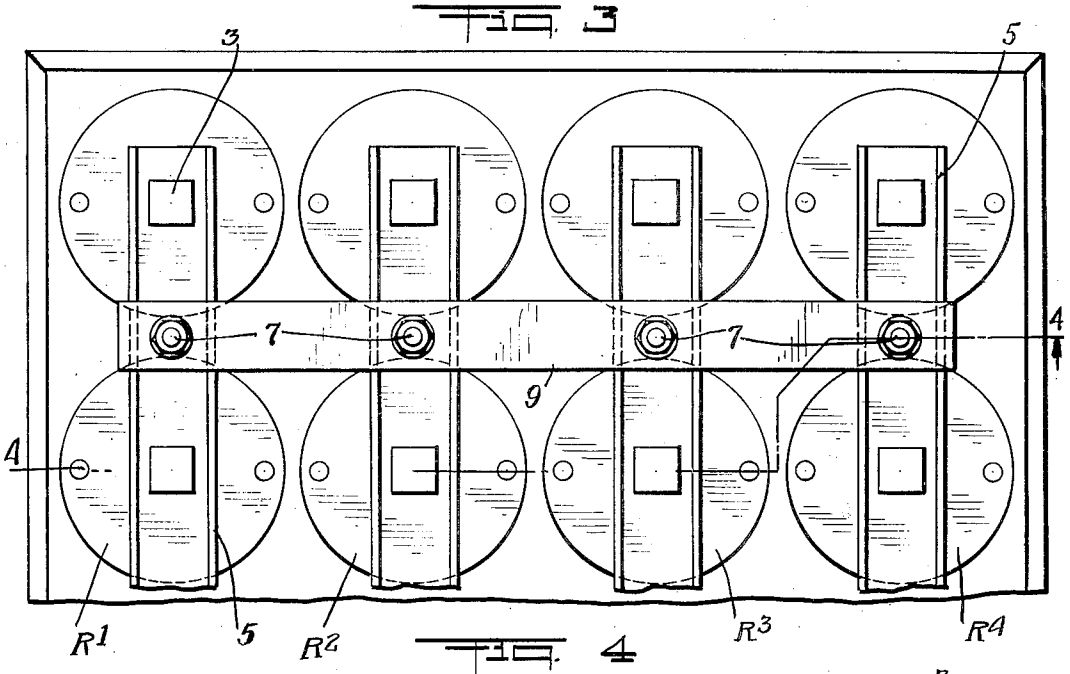
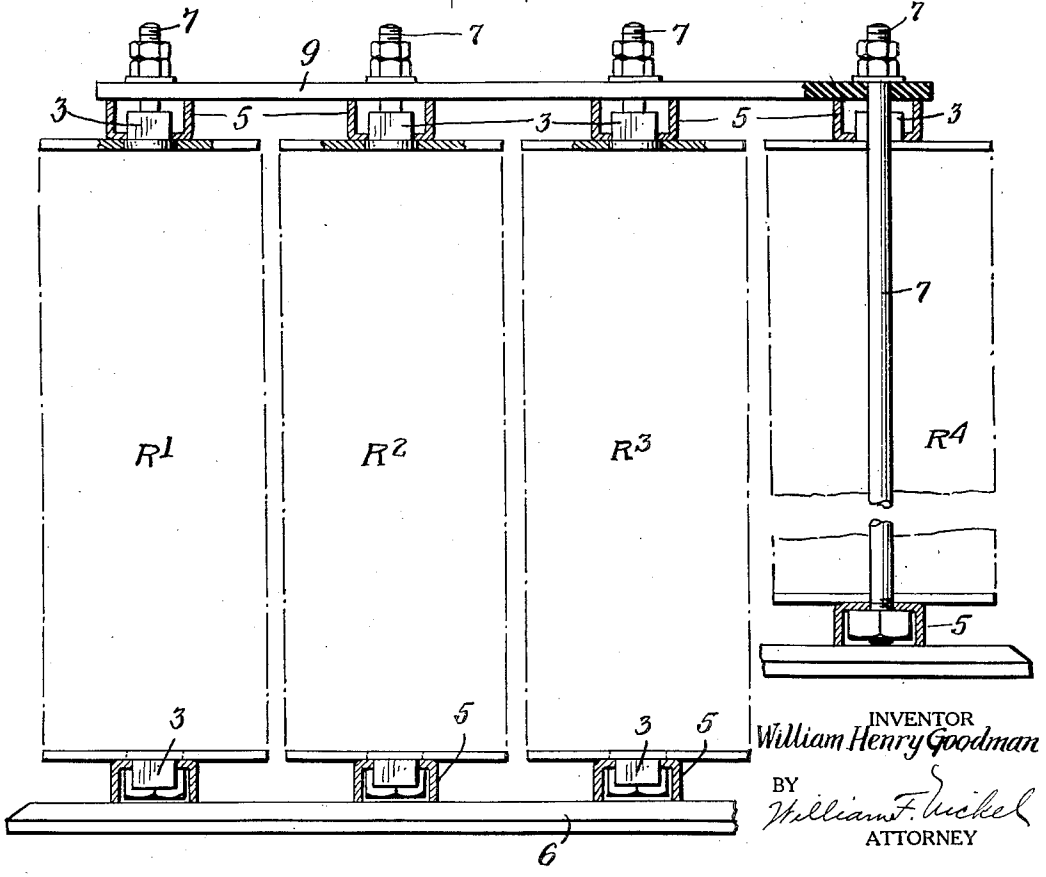


Fig. 4



INVENTOR
William Henry Goodman
BY
William F. Nickel
ATTORNEY

Patented May 31, 1932 1,861,006

UNITED STATES PATENT OFFICE

WILLIAM HENRY GOODMAN, OF LONDON, ENGLAND, ASSIGNOR TO DUBILIER CONDENSER CORPORATION, OF NEW YORK, N. Y., A CORPORATION OF DELAWARE

ELECTRICAL CONDENSER

Application filed November 15, 1926, Serial No. 148,487, and in Great Britain June 21, 1926.

This invention relates to electrical condensers and has particular reference to condensers of the roll or spool type in which the condenser elements are wound upon a central tube or former which may, if desired, be used as a support for the finished condenser.

In the manufacture of such condensers, some form of dielectric impregnating material is used to impregnate the paper and for the production of a satisfactory condenser it is essential that this impregnating material should reach all parts of the condenser. An object of the invention is to provide an improved form of condenser of the character above specified and, in particular, an improved form of former or mandrel by which access of the impregnating medium to the interior parts of the condenser is facilitated.

Condensers of the above character are also liable to become overheated owing to the fact that the heat evolved in the central part of the coil cannot readily escape and it is a further object of the invention to provide an improved form of condenser in which this difficulty may be more readily and efficiently overcome.

Another object of the invention is to provide an improved form of former or core which will lessen considerably the cost of manufacture of this type of condenser.

A further object of the invention is to provide improvements in the mode of mounting or supporting such condensers.

The invention consists in a former for the winding of condenser of the roll or spool type comprising a member of prismatic, cylindrical or tubular formation provided (preferably by moulding) with a plurality of grooves, ducts, channelways or conduits for the purpose specified.

The invention also consists in an electrical condenser comprising sheets or strips of metal-coated paper or thin conducting material, such as metal foil, with separating strips of flexible dielectric material, such as paper, wound upon a central tube or former provided with a plurality of grooves, channelways or conduits.

Preferably the grooves, channelways or conduits are formed in or upon the periphery of the former. The purpose of the grooves, channelways or conduits is not only to afford improved means for enabling an efficient circulation of the cooling or insulating medium to be effected in the finished condenser, but also to facilitate and cheapen the manufacture of condensers of the type described. In this connection it is pointed out that it is usual after the winding of a condenser of this type to impregnate the paper layers with oil and that the said grooves or channelways materially assist the carrying out of this step. In some instances the former with the condenser elements wound thereon is placed in a vessel which is first evacuated and thereafter filled with the impregnating medium. It will be seen that by the use of the improved former produced according to the present invention, impregnation carried out in this manner is rendered more complete in that the grooves or channelways assist in the withdrawal of air from the pores of the paper and enable the oil to be brought into close proximity with the layers located in and around the central part of the condenser.

Referring now to the accompanying drawings which illustrate by way of example one convenient mode of carrying the invention into effect:—

Figure 1 is a front elevational view of one form of former produced according to the invention.

Figure 2 is an end view of the former shown in Figure 1.

Figure 3 is a fragmentary plan view showing the preferred manner in which a series of roll type condensers produced in accordance with the invention are mounted in order to produce a multiple condenser; and

Figure 4 is a sectional elevation taken on the line 4—4 of Figure 3.

In carrying the invention into effect according to one convenient mode a former is provided by moulding a rod or tube of suitable insulating material with a series of peripheral flutes or grooves extending in a direction substantially parallel with the longitudinal axis of the former. Preferably the said flutes or grooves are shaped and disposed in such positions that the rod or tube

may be moulded in a two-part mould having the joint located in a diametrical plane of the former. It will be appreciated, however, that the formation and disposition of the flutes or grooves may be varied according to the wishes or requirements of the user and that, if desired, instead of producing the flutes or grooves by moulding they may be cut out of a solid or hollow rod of cylindrical, elliptical or other prismatic formation.

In Figures 1 and 2 of the accompanying drawings there is shown a former 1 provided with a series of flutes or grooves 2 produced by moulding in a two-part mould of the character above specified. The former is preferably provided at each end with suitable extensions or projections adapted to facilitate the mounting or supporting of the finished or partly formed condenser in an appropriate position for use or for further treatment or completion of manufacture. In the preferred embodiment of the invention the extensions or projections are integral with the body of the former and are produced in the moulding operation. As illustrated the projections shown at 3 are of square formation or cross section but it will be appreciated that they may take any other desired polygonal or non-circular form so as to prevent rotary movement of the finished condenser when mounted for use. Further, if desired, the projections may take the form of separate screw-threaded studs moulded in or screwed into position at each end of the former.

From Figure 2 of the accompanying drawings it will be observed that one of the flutes or grooves, namely that indicated by the reference 2*a*, is of lesser depth than some of the other flutes or grooves. This is important in that it provides for a preliminary locking of one end of the paper or foil layers during the commencement of the winding operation. To commence winding the end of the first layer is inserted in the groove 2*a* and fixed in position by a suitable keying member which may take the form of a rod of insulating material of circular cross section. Successive layers of thin sheet metal or metal-coated paper with separating layers of a suitable dielectric material, such as paper, are then wound upon the former until a predetermined thickness of conducting and dielectric layers has been attained.

Upon the completion of winding it will be seen that an improved form of roll or spool type of condenser is provided having a plurality of channelways or conduits through which a cooling, insulating or impregnating medium may be passed. It will be observed that these spaces or channels formed by the grooves themselves are in contact with the underneath surface of the first layer of the winding and will permit the impregnating medium to be conveyed readily to the inner layers of the condenser winding and will thus enable the manufacture of the condenser to be improved and a more reliable electrical operation of the finished condenser to be secured thereby.

The preferred mode of effecting impregnation is to mount the former upon the completion of winding in a suitable vessel which is first evacuated and then filled with a suitable impregnating medium such as oil. In connection with this step it should be observed that the channelways or conduits provided in the improved condenser produced in accordance with the present invention assist in the removal of air from and ensure more reliable impregnation of the dielectric layers.

Referring now to Figures 3 and 4 which illustrate the preferred mode of assembling a series of roll type condenser units to form a multiple condenser, the rolled condensers are indicated at R_1, R_2, R_3, R_4, etc. and the insulating cores on which they are wound are not shown except for the squared projections 3 extending through the ends of the rolls. The rolls are arranged in rows, each row consisting of a series of rolls mounted and held in position between a pair of channel-shaped strips of metal 5. The lower of each pair of channel-shaped strips of metal is secured to a base 6 or the bottom of the metal tank or container for the multiple condenser in any suitable manner as by soldering or riveting and the metal strips are provided with holes corresponding in shape and size (preferably square) to accommodate the projections on the cores or formers of the condenser rolls. The top and bottom strips of metal 5 of each row of rolls are secured together in any appropriate manner as by metal bolts 7 which extend between the two strips of metal and are provided with fixing nuts at their upper ends.

In order to tie a number of these rows of condenser rolls together transverse insulating strips 9 are arranged so as to be secured in place by the bolts 7 which pass through them. These insulating strips 9 are used at the upper ends of the bolts 7 only as the lower ends of these bolts are held in place by the fixed metal strips 5.

In this construction the complete condenser is divided up into a number of rows of rolls each of which is independent of the other except insofar as they are tied together by the strips 9, and a condenser unit in any one row is thus readily removable for replacement, if necessary, by loosening the nut holding the appropriate upper strip 5 in position. The strip may then be raised sufficiently to permit the removal of any of the condensers which are positioned thereby. Any convenient number of condenser rolls may be included in each of the rows and any convenient number of rows may be mounted in parallel to each other to produce a condenser

battery or multiple condenser of the desired size.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. A former for a wound condenser comprising a member having a plurality of grooves on the periphery thereof, certain of the grooves being adapted to cooperate with a securing means for certain of the condenser elements, and other of the grooves being adapted as a circulating means for a fluid medium.

2. A multiple condenser comprising rows of wound condenser units of the character described, each row consisting of a plurality of condenser units mounted between a pair of channel-shaped metallic strips, the condenser units being arranged in a vertical position, the lower channel shaped members being mounted upon a suitable base, and the upper channel-shaped members being tied together by suitable transverse insulating strips.

In testimony whereof I affix my signature.

WILLIAM HENRY GOODMAN.