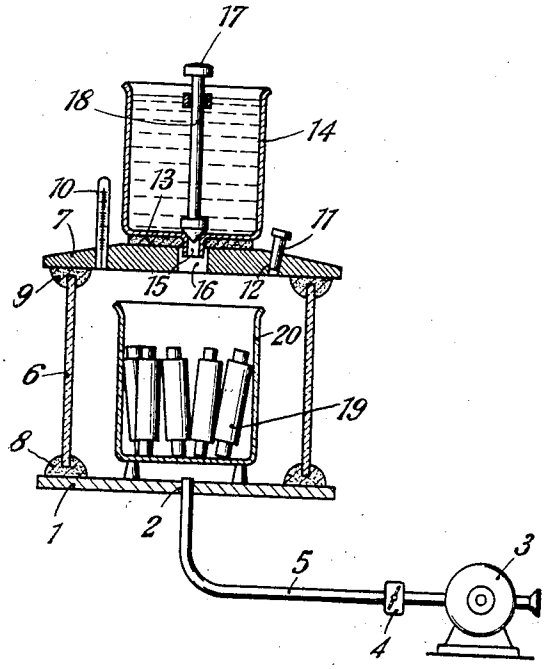
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PROCESS AND DEVICE FOR THE PRODUCTION OF ELECTROLYTIC CONDENSERS

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PROCESS AND DEVICE FOR THE PRODUCTION OF ELECTROLYTIC CONDENSERS

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For the production of the highest grade electrolytic condensers it is very important that the intermediate layer between the two plates which contains the electrolyte should be as thin as possible so that the current path in the electrolyte is a minimum and so that thereby the resistance is reduced to as small a value as possible. It would be most satisfactory if as thin as possible a sheet of the electrolyte could be used without any other support. This however is impossible on account of the properties of the electrolyte and it is necessary to provide a support for the electrolyte in the form of an absorbent porous body. At present multiple layers of paper are used as a support for the electrolyte. If paper is to be used it must be made without, or substantially without size. It must also be kept as thin as possible for the reason set out above. Unsized paper of small strength has a correspondingly small rigidity which is practically completely lost when it becomes impregnated. This increases the difficulty of working with it to a maximum so that it has not been possible hitherto to effect the necessary impregnating of the paper with the electrolyte in a completely satisfactory manner.

It is the subject of the invention to make this possible and this is realised in that a solution of the electrolyte is prepared by heating in the normal way, this solution is then rapidly cooled so as to produce a super-cooled, super-saturated solution with which the evacuated roll comprising the electrodes and the absorbent porous intermediate layer (paper) is impregnated in vacuo the vacuum being then removed and the complete impregnation of the electrolyte effected by heating the roll in the electrolyte.

As electrolyte a known mixture of boric acid, glycol or glycerine and ammonia is used. This mixture is brought to the necessary concentration by heating in the known way. Its boiling point lies approximately at 115° C. The correct concentration is, however, in some cases only reached at a boiling point of 132° C. In such cases it is heated further until this boiling point is reached.

According to the invention it has further been established that the heating only needs to be carried out to a boiling point of 125° C. for producing the super-cooled solution and the final heating to a boiling point of 132° C. can take place later after removing the vacuum when the roll impermeated with the electrolyte is heated.

The carrying out of the process according to the invention can conveniently take place with the aid of a receptacle for holding the roll into which the electrolyte fluid can be passed from a supply container without air having access at the same time. This can be arranged in a simple manner in that the supply container for the electrolyte fluid is connected to the evacuable receptacle by way of a valve which is arranged at a point in the supply container which remains always below the level of the fluid. For example the supply container can with advantage be arranged on the cover of the receptacle and can connect with the latter by way of a valve in its base.

In the attached drawing there is shown an embodiment of the device for carrying out the process according to the invention.

The device comprises a base plate 1 for example of iron which possesses one or more apertures 2. To these apertures is connected a vacuum pump 3 by means of a conduit 5 adapted to be closed by a valve 4. On the base plate 1 is set a receptacle comprising a cylinder 6, for example of glass, and a cover plate 7, for example of aluminium or other light material. The packing between the cylinder and the base plate 1 or between the cylinder and the cover plate 7 comprises rings 8 and 9 of rubber or the like. The cover plate 7 possesses a flat under-surface in order to be easily removable and lies solely on the corresponding flat rubber ring 9 on which it is adapted to be pressed by reason of the reduced pressure in the receptacle. In the cover plate 7 is inserted a manometer 10. In addition the cover plate possesses an aperture 12 closable by means of a plug 11 and preferably conical in shape. On the upper side of the cover of the receptacle which is also flat is disposed a supply container 14 for the electrolyte fluid this also being supported on an intermediate rubber disc 13. This possesses a basal aperture 15 which is preferably conical and which may be produced to form a small channel which projects into a corresponding hole 16 in the cover plate 7 and is adapted to be closed by means of a valve member 18 provided with handle portion 17. The condensers 19 to be impregnated are placed inside the lower receptacle preferably in a separate receptacle 20. The size of the receptacle 20 is adapted to the number of condensers to be treated simultaneously. The size of the supply container 14 is adjusted so that it can hold an amount of fluid sufficient for completely covering the condensers in the receptacle 20.

The carrying out of the process according to the invention with the aid of the device described takes place as follows:

First, the known electrolyte solution of glycol, boric acid and ammonia is prepared and heated until is possesses a boiling point of about 125° C. preferably:

	Grams
Boric acid	620
Ethylene glycol	580
25% ammonia	140

are mixed together. This solution is cooled as rapidly as possible, for example by setting it in cold water, and it has been established that if considerable mechanical disturbance is avoided no separation of crystals takes place but a supercooled, super-saturated solution is produced, the boiling point of which in a vacuum corresponding to a pressure of 15 mm. of mercury is at room temperature. At the same time or before or after, the rolls are heated for about two hours at approximately 100° C. in order to dry them completely. This heating can take place either within or outside the impregnating device. The rolls are then placed in the device and evacuated for about an hour at a pressure of 10 mm. of mercury. It is possible alternatively to do with a less intense drying but normally this necessitates a longer period for evacuation.

The super-cooled electrolyte fluid is then carefully poured into the upper receptacle 14 and the valve 15/18 carefully opened. The electrolyte fluid accordingly flows into the receptacle 20 without air being able to enter. The vacuum is accordingly maintained. The pressure may be prevented from rising above about 15 mm. of mercury by operating the pump.

As soon as the rolls are completely covered, at which time the electrolyte has to be caused to impermeate the pores of the evacuated and very porous material, the cock 4 is opened and the vacuum is destroyed by withdrawal of the plug 11. The external pressure now presses the electrolyte well into the pores. In order to realize the complete impermeation of the porous intermediate layer the receptacle 20 is then heated immediately. The electrolyte then becomes of low viscosity and can thus fill all the pores of the absorbent porous intermediate layer. The heating is continued until the electrolyte reaches the boiling point of 132° C.

It has been established that in this way condensers can be produced which are considerably superior to all the known condensers since the thin layers holding the electrolyte which are now able to be used give the finished condenser particularly small dimensons, and moreover the complete impregnation produces a high dielectric strength.

The carrying out of the process according to the invention is of course not limited to the device shown but this may be varied in the most diverse ways as regards the construction of the receptacles, their relative position, the establishment of a connection between the two receptacles without destroying the vacuum, etc., without departing from the scope of the invention.

I claim:

1. A process for impregnating electrolytic condensers having absorbent, porous, intermediate layers consisting in evacuating the condenser bodies, adding a supercooled solution of an electrolyte of the polyhydroxy alcohol, weak acid salt type, which has been heated until the solution has a certain boiling point to the evacuated condenser bodies so as to cover them, destroying the vacuum to which the condenser bodies are subjected and finally heating the bodies in the electrolyte solution.

2. A process for impregnating electrolytic condensers having absorbent, porous, intermediate layers consisting in evacuating the condenser bodies, adding a supercooled solution of an electrolyte of the polyhydroxy alcohol, weak acid salt type, which has been heated until the solution has a boiling point of 125° C., to the evacuated condenser bodies so as to cover them, destroying the vacuum to which the condenser bodies are subjected and finally heating the bodies in the electrolyte solution until a boiling point of 132° C. is reached.

3. A process for impregnating electrolytic condensers having absorbent, porous, intermediate layers consisting in drying the condenser bodies by heating, evacuating said dry condenser bodies, covering said evacuated bodies with an electrolyte solution containing boric acid, glycol and ammonia which has been heated until the solution has a boiling point of about 125° C., and rapidly cooled to room temperature to produce a supercooled, saturated solution, while maintaining the vacuum, destroying the vacuum and finally heating the solution and bodies until a boiling point of about 132° C. is reached.

4. A process for impregnating electrolytic condensers having absorbent, porous, intermediate layers consisting in drying condenser bodies by heating, evacuating said dry condenser bodies, covering said evacuated bodies with an electrolyte solution containing boric acid, glycerine and ammonia which has been heated until the solution has a boiling point of about 125° C., and rapidly cooled to room temperature to produce a supercooled, saturated solution, while maintaining the vacuum, destroying the vacuum and finally heating the solution and bodies until a boiling point of about 132° C. is reached.

5. A process for impregnating electrolytic condensers having absorbent, porous, intermediate layers consisting in drying condenser bodies by heating to approximately 150° C., evacuating said dry condenser bodies at a pressure of about 10 millimeters of mercury, covering said evacuated bodies with an electrolyte solution containing 620 grams of boric acid, 580 grams ethylene glycol and 140 grams of ammonia, which has been heated until the solution has a boiling point of about 125° C., and rapidly cooled to room temperature to produce a supercooled, saturated solution which boils at room temperature when subjected to a vacuum corresponding to a pressure of 15 millimeters of mercury, while maintaining the vacuum, destroying the vacuum and finally heating the solution and bodies until a boiling point of about 132° C. is reached.

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