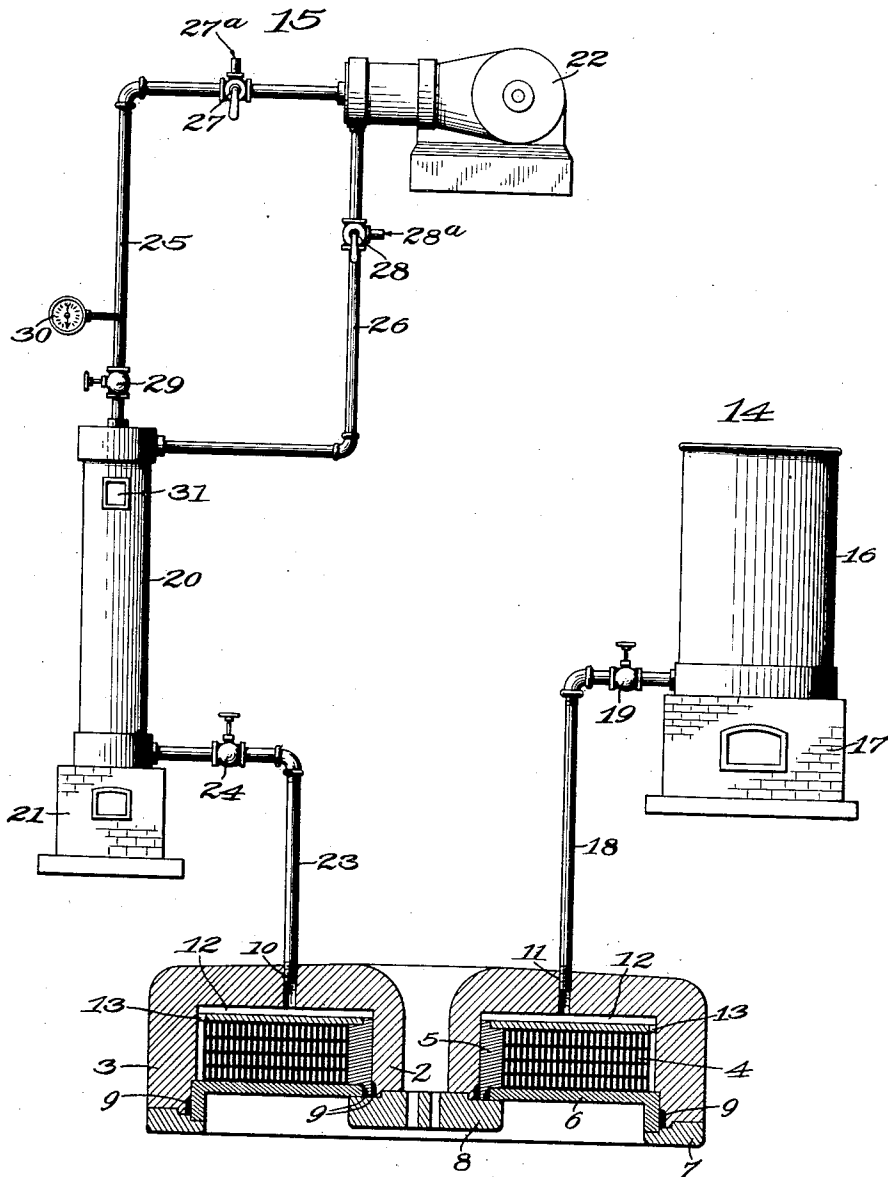


F. I. PARKER.
 PROCESS AND APPARATUS FOR SEALING ELECTROMAGNETIC WINDINGS.
 APPLICATION FILED MAR. 24, 1910.

1,270,969.

Patented July 2, 1918.



Witnesses:

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 atty.

UNITED STATES PATENT OFFICE.

FRANK I. PARKER, OF MILWAUKEE, WISCONSIN, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE CUTLER-HAMMER MFG. COMPANY, OF MILWAUKEE, WISCONSIN, A CORPORATION OF WISCONSIN.

PROCESS AND APPARATUS FOR SEALING ELECTROMAGNETIC WINDINGS.

1,270,969.

Specification of Letters Patent.

Patented July 2, 1918.

Application filed March 24, 1910. Serial No. 551,321.

To all whom it may concern:

Be it known that I, FRANK I. PARKER, a citizen of the United States, residing at Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented new and useful Improvements in Processes and Apparatus for Sealing Electromagnetic Windings, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawing, forming a part of this specification.

My invention relates to improvements in the process and apparatus for impregnating and sealing the energizing windings of lifting magnets and the like with a suitable insulating and moisture proof substance.

My invention has among its principal objects to render the process more expeditious and to simplify the apparatus required.

My invention also has other objects and advantages hereinafter set forth.

In practice, it has been found that the most thorough impregnation can be obtained by placing the winding in an air tight receptacle and creating a vacuum therein, then filling the receptacle with the impregnating and sealing material in a melted form and finally compressing said material to cause the same to penetrate into the winding and to cover all exposed parts thereof. Heretofore it has been customary to impregnate and seal the winding before the same is placed in its magnet frame. This method, however, is open to several objections, principally that elaborate and expensive apparatus is required, that the winding must be handled after it has been treated, and further, that air spaces are left between the winding and its magnet frame. According to my invention, I propose to eliminate all of these objectionable features by impregnating and sealing the winding after it has been adjusted and secured in its magnet frame and completely filling the magnet frame with the impregnating and sealing material.

For the purpose of more clearly disclosing the nature and advantages of my invention, as set forth in the description thereof, I have illustrated in the accompanying drawing a simple form of apparatus, by means of which my invention may be carried out in practice. It should, of course, be understood that the apparatus illustrated may be

modified without departing from the scope of my invention.

Referring to the drawing, I have shown therein, in cross section, a lifting magnet of substantially the construction disclosed in my co-pending application, Serial No. 545,646, filed February 24, 1910. I have chosen this form of magnet for illustration because it is the only one, so far as I know, which is sufficiently air-tight to permit of a vacuum being created therein. So far as my invention is concerned, however, it is applicable to any magnet having a magnet frame which is or may be rendered air-tight, or substantially air-tight. Furthermore, the magnet which I have shown is particularly adapted for the purposes of my process, owing to the details of construction hereinafter set forth. The structure of the magnet illustrated is described in detail in my co-pending application above mentioned, and I shall, therefore, only briefly describe the same herein.

The magnet is provided with a circular magnet frame having annular inner and outer poles 2 and 3 respectively between which is arranged the energizing winding 4. The energizing winding, as illustrated, is mounted upon a spool construction 5. The winding and spool construction are held in place by a removable protecting plate 6 which, in turn, is supported by removable pole shoes 7 and 8. The protecting plate 6 is arranged to completely close the opening in the magnet frame, and suitable packings 9 are provided for rendering all joints between said plate, the magnet frame and the spool construction air-tight, or substantially so. Extending through the top of the magnet frame are screw threaded openings 10 and 11, each of which communicates with a radial groove or slot 12, provided on the inner face of the top of the magnet frame. Also registering with the grooves or slots 12 in the magnet frame are notches 13, provided at the outer periphery of the spool construction. The function of the grooves 12 in the magnet frame and the notches 13 in the spool construction is to permit free circulation of air and free distribution of the impregnating and sealing material within the magnet frame.

The impregnating and sealing apparatus illustrated comprises two units 14 and 15.

The unit 14 comprises a tank or receptacle 16, containing the protecting material and having arranged beneath the same a suitable heating apparatus 17 for melting the impregnating and sealing material to such a degree that it will readily flow from said receptacle. The receptacle 16 is connected by suitable piping 18 to the opening 11 in the magnet frame, said piping containing a shut-off valve 19. The unit 15 includes, what I term, an overflow receptacle 20, having beneath the same a suitable heating device 21, and a pump 22 constructed to operate to produce either pressure or vacuum. The lower end of the overflow receptacle 20 is connected by suitable piping 23 to the opening 10 in the magnet frame, said piping containing a suitable shut-off valve 24. The upper end of said receptacle 20 has two pipes 25 and 26 leading therefrom to the pump 22. The pipes 25 and 26 are provided with three way valves 27 and 28 respectively. The pipe 25 is also provided contiguous to the receptacle 20 with a shut-off valve 29 and a vacuum gage 30.

For the purpose hereinafter set forth, I preferably provide the overflow receptacle 20 adjacent to its upper end with a gage glass 31. The pump 22 is caused to create either pressure or vacuum by manipulation of the three way valves 27 and 28. For instance, when it is desired to create a vacuum, the valve 28 is set to shut off the lower section of the pipe 26 and to connect the other section of said pipe to its port 28^a which is open to the atmosphere while the valve 27 is set to connect the two sections of the pipe 25 and to close its port 27^a. Thus, when the pump is set in operation it will draw the air from the receptacle 20 through the pipe 25 and discharge the air through the port 28^a of the valve 28. On the other hand, when it is desired to create pressure, the valve 28 is set to close its port 28^a and connect the two sections of the pipe 26, while the valve 27 is set to connect the pump 22 to its port 27^a and to close that section of the pipe 25 leading to the receptacle 20. Under these conditions, air is drawn through the port 27^a of the valve 27 into the pump and then forced through the pipe 26 into the receptacle 20.

Having described the apparatus, I shall now describe the manner of utilizing the same to carry out my process, assuming that the valves 27 and 28 have been set to cause the pump to operate to create a vacuum, that the shut-off valves 29 and 24 are open and the shut-off valve 19 closed. Prior to impregnating the winding, it is important that any moisture contained in the magnet frame be disposed of. To this end, as a preliminary step in my process, I energize the winding, thereby heating up the same, with the result that any moisture in the magnet

frame is converted into steam and drawn off by the suction of the pump 22. After this has been accomplished the pump is allowed to continue in operation until it creates the desired vacuum in the magnet frame and overflow receptacle 20. With the magnet disclosed in my co-pending application, I am enabled to secure an almost perfect vacuum. As soon as the desired vacuum has been created the shut-off valve 19 is opened, whereupon the impregnating and sealing material is drawn into the magnet frame; and, when the magnet frame is filled, is drawn into the overflow receptacle 20. The creation of a vacuum in the magnet frame insures a thorough distribution of the impregnating and sealing material over all of the electrical conducting parts, and eliminates the danger of formation of air pockets in said material. The impregnating and sealing material is allowed to flow into the overflow receptacle until it reaches the level of the gage glass 31. As soon as this occurs the shut-off valves 29 and 19 are closed, and the valves 27 and 28 adjusted to cause the pump 22 to supply pressure to the overflow receptacle 20. The overflow receptacle 20 being heated, will maintain the impregnating and sealing material in a melted condition with the result that when pressure is supplied to the receptacle 20, the material contained therein will be forced back into the magnet frame. This results in compressing the impregnating and sealing material, causing it to penetrate into and thoroughly impregnate the winding and to completely seal all exposed parts of said winding and other electrical conducting parts within the magnet frame. The compression of the sealing material is preferably continued until said material has been worked into all spaces between the winding and the magnet frame.

After the winding has thus been impregnated and sealed the pump 22 is stopped and the shut-off valve 24 closed, thereby holding the impregnating and sealing material under pressure until it cools. The pipes 18 and 23 are then disconnected from the magnet frame and pipe plugs inserted in the apertures 10 and 11. The magnet is then ready for shipment or for immediate use without requiring any further handling of the parts thereof.

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

1. The process or method of treating electromagnets consisting in impregnating the magnet winding and sealing the same in its magnetic frame at a single operation by evacuating the magnetic frame and introducing therein an impregnating and sealing material heated to a flowing point and adapted to solidify upon cooling.

2. The process or method of treating elec-

tromagnets consisting in introducing into the frame of the magnet an insulating material heated to a flowing point and subjecting such insulating material to pressure while
 5 heated to cause the same to impregnate and seal the magnet winding in the magnet frame.

3. The process or method of treating electromagnets after assembly of the magnet
 10 winding in its magnetic frame consisting in vacuating the frame and energizing the winding to drive off moisture and then introducing into the magnetic frame an insulating material in a heated form and under
 15 pressure to cause such insulating material to impregnate the magnet winding and seal the same in its magnetic frame.

4. The process or method of impregnating and permanently sealing an electromagnetic
 20 winding within a substantially fluid tight magnetic frame in which the former has been permanently mounted which consists in vacuating the interior of said frame by direct exhalation, admitting a suitable impregnating and sealing medium in liquid form to
 25 the interior only of said frame to fill the same, subjecting the impregnating medium within said frame to pressure and permanently closing the means of ingress and
 30 egress of said frame for permanently retaining all of its contents therewithin.

5. Apparatus for impregnating and permanently sealing a magnet winding within a substantially fluid tight magnetic frame in
 35 which the former has been assembled com-

prising means including an overflow receptacle for vacuating the interior of said frame, means for supplying impregnating and sealing medium in melted form to the interior only of said frame, both of said
 40 means being directly connected to said frame and means associated with said vacuating means for applying pressure to the interior of said overflow receptacle and of said frame.

6. Apparatus for impregnating and permanently sealing a magnet winding within
 45 a substantially fluid tight magnetic frame in which the former has been assembled comprising a main receptacle for impregnating and sealing medium, an auxiliary receptacle
 50 for said medium, both of said receptacles being adapted for direct connection to said frame and having heating means for maintaining the therein contained medium in
 55 fluid condition and combined vacuating and compressing pumping means directly connected with said auxiliary receptacle for first vacuating the same and said frame and later subjecting the contents of said receptacle to a substantial pressure to completely
 60 fill the interior only of said frame therewith.

In witness whereof, I have hereunto subscribed my name in the presence of two witnesses.

FRANK I. PARKER.

Witnesses:

FRANK H. HUBBARD,
 G. W. HAYNES.