J. SCHARL.

PROCESS OF PRODUCING ARTICLES OF QUARTZ GLASS.

APPLICATION FILED SEPT. 18, 1918.

1,368,990. Patented Feb. 15, 1921.

Fig. 1.

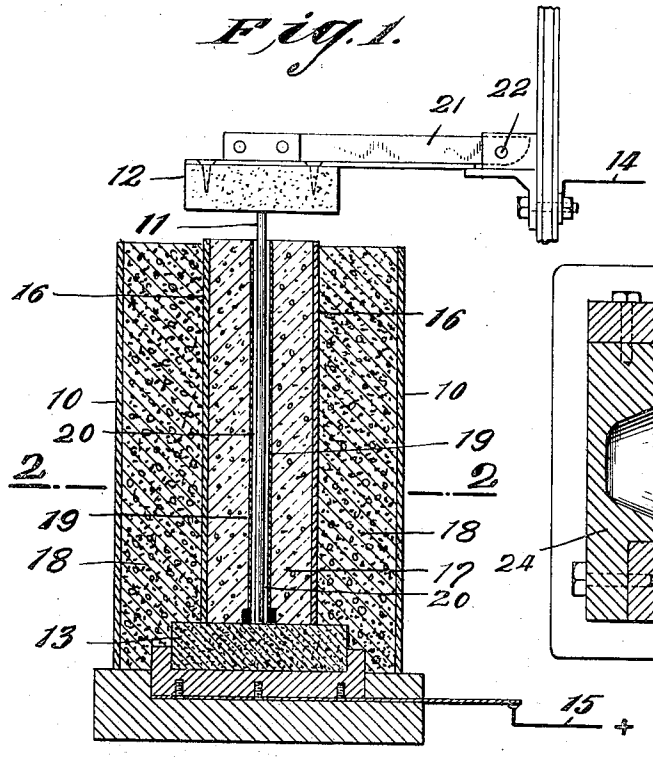


Fig. 2.

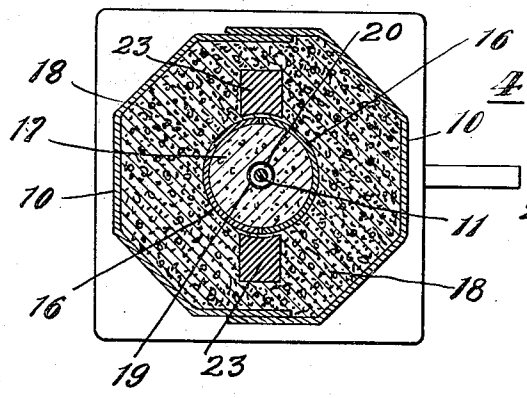


Fig. 4.

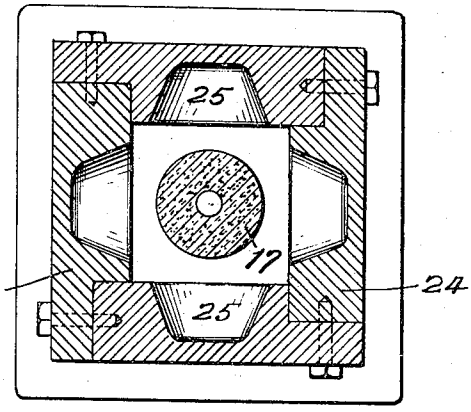
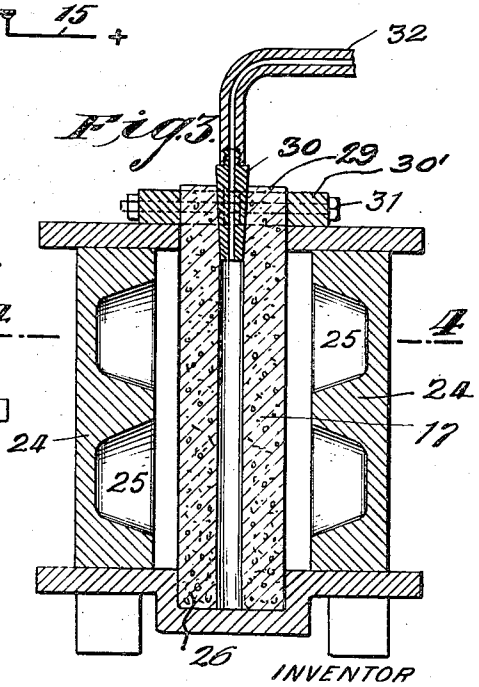


Fig. 3.



INVENTOR

JOHN SCHARL

BY Morris Hirschstein

HIS ATTORNEY

UNITED STATES PATENT OFFICE.

JOHN SCHARL, OF NEW YORK, N. Y., ASSIGNOR TO GENERAL CERAMICS COMPANY, OF JERSEY CITY, NEW JERSEY, A CORPORATION OF NEW JERSEY.

PROCESS OF PRODUCING ARTICLES OF QUARTZ GLASS.

1,368,990. Specification of Letters Patent. Patented Feb. 15, 1921.

Application filed September 18, 1918. Serial No. 254,560.

To all whom it may concern:

Be it known that I, JOHN SCHARL, subject of the Emperor of Austria, resident of New York city, in the county of New York and State of New York, have invented certain new and useful Improvements in Processes of Producing Articles of Quartz Glass, of which the following is a specification.

This invention relates to processes of producing articles of quartz glass and is directed particularly to improvements in the well-known process of reducing the quartz to plasticity in an electric resistance furnace with a resistance core and then blowing the plastic mass into molds.

A great difficulty that has been experienced with this process arises from the fact that a comparatively high temperature is required to reduce the silica to plasticity. It has been found that at the temperature required for this purpose gas is given off from the carbon or graphite core. This gas diffuses through the plastic mass of quartz and the finished article molded therefrom is consequently unclean and not homogeneous.

The main object of my invention is to provide a process of the character described in which the gas formed on the resistance core is prevented from diffusing into the plastic quartz mass.

A further object of my invention is to provide a process whereby an externally glazed product may be produced without necessitating separate treatment of the plastic mass of quartz in a separate furnace.

The various further objects and advantages of this invention will appear from the detailed description and the features of novelty will be particularly pointed out in the claims.

My improved process will now be described with the aid of the accompanying drawing illustrating a preferred form of apparatus for the carrying out thereof, and in which—

Figure 1 is a sectional elevation of an electric furnace showing the quartz disposed around the resistance core and means for preventing the gas formed on the latter from permeating the plastic mass;

Fig. 2 is a section taken along line 2—2 of Fig. 1;

Fig. 3 is a sectional elevation of a mold showing the plastic mass positioned therein ready to be blown into the desired shape, and

Fig. 4 is a section taken along line 4—4 of Fig. 3.

The quartz is fused in an electric resistance furnace consisting of a shell 10 and a resistance core 11 removably held between the electrodes 12, and 13. Current is supplied to the electrodes as by the leads 14 and 15. A two-part jacket 16 of heat resistant material, such as carbon or graphite is positioned in the shell and within this jacket is placed a fine grade of silica 17 from which the quartz articles are to be formed. Outside of this jacket, the shell is filled with heat insulating means, as for example coarse silica 18. Surrounding the resistance core 11 is the tube 19 of heat resistant material impervious to gas such as carbon or graphite forming a space 20 between said tube and the core through which the gas formed at the core may escape, the tube preventing said gas from diffusing into the fused mass of quartz.

It will be clear from Fig. 1 that the resistance core 11 may be readily removed from the furnace. In a preferred form of construction there shown, it is pressed down in position against the bottom electrode by the weight of the top electrode secured to the metal bar 21 which is pivoted as at 22 so that the top electrode may be swung outward and then the resistance core easily withdrawn.

The carrying out of my process will now be readily understood. The jacket, 16, is positioned in the furnace and the core inserted in the tube 19 and the silica filled in around the tube. The current is then passed until the silica is fused into a plastic cylinder, the gas formed at the resistance core during the fusing operation escaping through the tubular space 20. The fused mass is then withdrawn from the furnace, the two halves of the jacket being caused to fall apart. Inasmuch as when the silica is fused it becomes somewhat conductive the current may pass through it and through the jacket and thus fuse some of the course silica on the outside of the jacket. This may cause difficulty by preventing the halves of the jacket from falling apart I therefore provide vertical members 23 of refractory material, such as carbon or graphite, spaced

a little from the jacket to prevent the coarse silica therebetween and the latter from fusing against it. The plastic quartz is then removed from the furnace and inserted into mold 24 where it is blown into articles of any desired shape such as shown at 25. In blowing the plastic quartz into molds I employ a hot gas under pressure, preferably steam. The handling of the plastic quartz must be very rapid and by the use of a preheated gas such as steam I obtain the desired pressure and at the same time do not permit the plastic mass to harden too quickly. This gives more time for operation and thus greater accuracy of shape of the finished product is insured. The blowing out process may be carried out as follows: The plastic mass when pressed in the mold extends beyond the ends of the mold. The lower portion 26 is closed in some suitable manner as for example sealed by the bottom of the mold as shown, while at the top an airtight joint may be procured by pressing the top 29 of the plastic mass against the nozzle 30 by means of the plates 30′ and the bolts 31. This nozzle 30 is made preferably of highly heat resistant material, such as carbon or graphite and the steam injecting tube or blow-pipe 32 may be threaded or in any other suitable way connected thereto.

During the fusing of the mass, the thin carbon tube 19 is raised to a high temperature and turns into a fragile body which is blown into the finished product during this blowing operation, but no trace of it is found in the finished product and the latter is not in any way affected thereby.

By providing the jacket I make it possible to use the same electrodes to provide the finished product with a glazed surface if desired, since as the quartz fuses it becomes conductive and the current flows from the resistance core to the jacket and thus fuses the layer of silica on the inner surface of the jacket.

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

1. The process of making articles of quartz glass, consisting in heating the quartz into a plastic mass in an electric resistance furnace about a resistance core and providing a space between the quartz to be heated and the resistance core by inserting therebetween a heat resisting tube impervious to gas for allowing the escape of the gas formed during the heating process.

2. The process of making articles of quartz glass, consisting in heating the quartz into a plastic mass in an electric resistance furnace about a resistance core, providing a space between the quartz to be heated and the resistance core by inserting therebetween a heat resisting tube impervious to gas for allowing the escape of the gas formed during the heating process, withdrawing the core from the plastic mass and subsequently blowing or similarly manipulating said plastic mass.

3. The process for making articles of quartz glass, consisting in disposing the quartz about an internal-resistance core, heating the latter until gas forms on the surface thereof and the quartz is fused into a plastic mass, and separating the resistance core from the quartz by heat resisting material impervious to gas, to allow said gas to escape.

4. The process of making articles of quartz glass consisting in disposing the quartz about an internal-resistance core, heating the latter until gas forms on the surface thereof and the quartz is fused into a plastic mass, separating the resistance core from the quartz by a tube of heat resisting material impervious to gas to provide a space between the quartz to be heated and the resistance core, to allow said gas to escape thereby, withdrawing the core from the plastic mass and finally withdrawing the plastic mass for blowing or similar manipulation while still plastic.

Signed at New York city in the county of New York and State of New York this 12th day of September A. D. 1918.

JOHN SCHARL.

Witnesses:
AARON H. RUBIN,
MORRIS KIRSCHSTEIN.