M. SAUVAGEON.

ELECTRIC FURNACE FOR THE CONTINUOUS MANUFACTURE OF GLASS.

APPLICATION FILED AUG. 2, 1910.

972,779.

Patented Oct. 11, 1910.

FIG. 1.

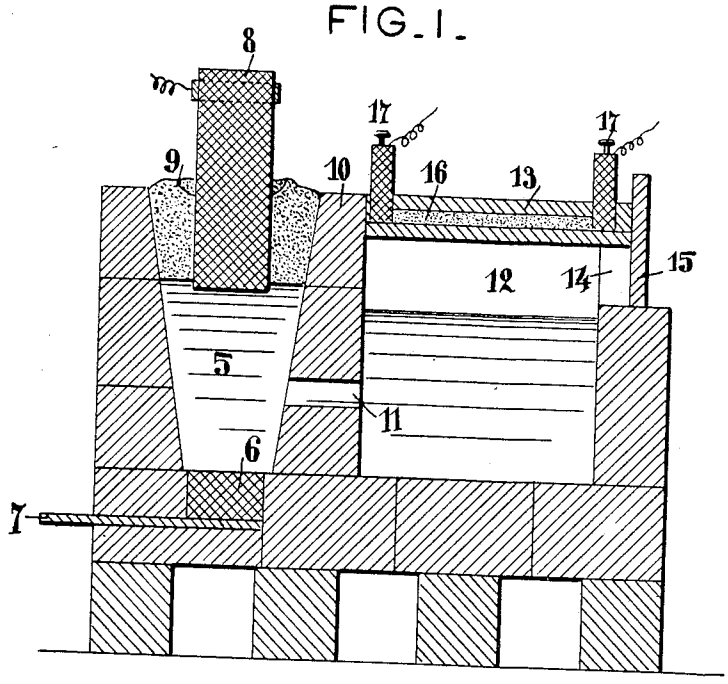
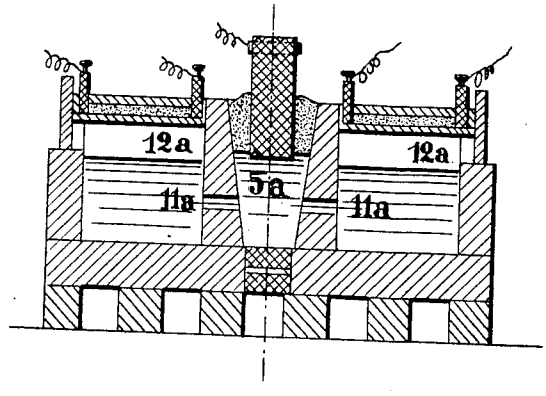


FIG. 2.



Witnesses:
Thomas J. Byrnes
A. L. Duncan.

Inventor,
M. Sauvageon,
by his attorneys
Kerr, Page, Cooper & Hayward

UNITED STATES PATENT OFFICE.

MARIUS SAUVAGEON, OF COLOMBES, FRANCE.

ELECTRIC FURNACE FOR THE CONTINUOUS MANUFACTURE OF GLASS.

972,779. Specification of Letters Patent. **Patented Oct. 11, 1910.**

Original application filed August 5, 1909, Serial No. 511,375. Divided and this application filed August 2, 1910. Serial No. 575,092.

To all whom it may concern:

Be it known that I, MARIUS SAUVAGEON, a citizen of the Republic of France, residing at Colombes, Department of the Seine, France, have invented certain new and useful Improvements in Electric Furnaces for the Continuous Manufacture of Glass, of which the following is a full, clear, and exact description.

The invention which forms the subject of my present application (a division of my earlier application Ser. No. 511,375, filed Aug. 5, 1909) relates to electric furnaces for the continuous manufacture of glass, or vitreous silicates generally, and pertains more particularly to furnaces of the type in which the high resistance of molten glass to the passage of an electric current is availed of for the heat required to melt down the raw materials.

The chief object of the invention is to provide a furnace of this character in which the minimum amount of electric energy will be required, and further object is to provide a convenient and effective arrangement of the electrodes whereby the operation of the furnace may be readily started by the agency of an electric arc.

To these and other ends the invention consists in the novel features of construction and combinations of elements hereinafter described.

In the annexed drawing, Figure 1 is a longitudinal vertical section showing a simple and effective furnace embodying my invention. Fig. 2 is a similar section, showing an additional working chamber.

In Fig. 1, 5 designates a melting and refining chamber of the upwardly flaring form shown and of relatively small capacity, having an electrode 6 embedded in or forming its bottom; said electrode having a terminal 7 for connection with a source of current, not shown. The coöperating upper electrode is designated by 8, and is capable of being raised and lowered by any suitable means, not shown. In the melting and refining chamber is a mass of molten glass into which the upper electrode dips, and floating on the molten glass, in the space provided around the upper electrode by the flaring melting and refining chamber is shown a mass of glass-forming material 9, for example frit. Separated from the melting and refining chamber by a wall 10, but in communication therewith through a passage 11 in said wall, is a working chamber 12 of relatively large capacity, and over the working chamber is a roof 13 having an opening 14 provided with a removable closure 15 to afford access to the refined glass within said chamber.

The operation of the furnace may be started by charging into the two chambers a quantity of previously melted glass sufficient to reach to about the normal level, for example to the height indicated in the drawing. Preferably, however, the furnace is started by means of an arc. In this case, the upper electrode being raised, a suitable quantity of glass-producing material, for example frit, is deposited in the melting and refining chamber, and an arc is struck between the electrodes. The frit is thus melted, and eventually the molten glass thus produced reaches the upper electrode, after which the heat is produced by resistance only. As the level of the glass rises the upper electrode is raised, finally reaching its normal position, and as the frit is reduced to glass additional frit is supplied to the space around the electrode. The heat produced by the flow of the current through the molten glass in the melting and refining chamber reduces the glass to a fluid state, permitting bubbles of air or other gas to rise rapidly to the top. The refined glass flows through the passage 11 into the working chamber, which, as stated, is of relatively large capacity, and hence permits the glass to cool rapidly to a suitable working temperature. The glass is removed from the working chamber by means of blow-pipes or ladles introduced through the opening 14.

The furnace illustrated in Fig. 2 is exactly like that shown in Fig. 1 in construction and operation, except that two working chambers 12^a, are provided on opposite sides of a single melting and refining chamber 5^a, with passages 11^a for the delivery of refined glass to said working chambers.

It will be observed that in both the furnaces illustrated the path of the current from electrode to electrode is short in length, and of large cross section. This is an important feature of the invention, as it materially reduces the total resistance of the glass and permits the use of low voltage current instead of the high tension current heretofore used. In this way the danger incident to the handling of high voltage

current is eliminated and persons engaged about the furnace can pursue their work in safety.

When low voltages are used the temperature in the melting and refining chamber will be lower, and hence it may happen that the temperature in the working chamber, or chambers, may be too low. To obviate such difficulty the working chamber roof may be provided with a heating resistance 16, having terminals 17 for connection with a suitable source of current, not shown. When a circuit is closed through this resistance the heat generated thereby raises the temperature of the glass in the working chamber and keeps the glass in the proper working condition.

From the foregoing it will be seen that in each case the heat is produced only when it is needed. Thus the current for melting and refining the glass is confined to the melting and refining chamber; and that for keeping the glass in the working chamber at the proper temperature (when additional heat for such purpose is required) is confined to the working chamber. In this way better regulation of the heat, and more economical consumption of current can be obtained.

It is to be understood that the furnaces herein specifically illustrated and described are merely convenient and effective forms of the invention, which is capable of other embodiments without departure from its proper spirit and scope.

I claim:

1. An electric furnace for the continuous production of glass, comprising in combination, a combined melting and refining chamber of relatively small capacity, a lower electrode at the bottom of said chamber, an upper electrode in the upper part of said chamber, a mass of molten glass in said chamber, in contact with said electrodes and constituting a heating resistance and serving to support by flotation a mass of glass-producing material around said upper electrode, and a working chamber of relatively large capacity in constant communication with the melting and refining chamber to receive refined glass therefrom and bring the same to a suitable working temperature.

2. An electric furnace for the continuous production of glass, comprising in combination, a combined melting and refining chamber of relatively small capacity, a lower electrode at the bottom of said chamber, an upper electrode in the upper part thereof, said melting and refining chamber being widened toward the top to provide a space around the upper electrode, a mass of molten glass in the melting and refining chamber, in contact with the said electrodes and constituting a heating resistance and serving to support by flotation a mass of glass-producing material in said space around the upper electrode, a working chamber of relatively large capacity in constant communication with the melting and refining chamber to receive refined glass therefrom, and means for heating the glass in the working chamber to bring such glass to a suitable temperature.

In testimony whereof I affix my signature in the presence of two subscribing witnesses.

MARIUS SAUVAGEON.

Witnesses:

DOMINIQUE CASALONGE,

DEAN B. MASON.