F. O. STROMBORG.

METHOD OF MAINTAINING A CONSTANTLY OPEN FEEDING PASSAGE INTO THE INTERIOR OF MOLTEN BATHS.

APPLICATION FILED JULY 8, 1907.

905,948.

Patented Dec. 8, 1908.

FIG. 3

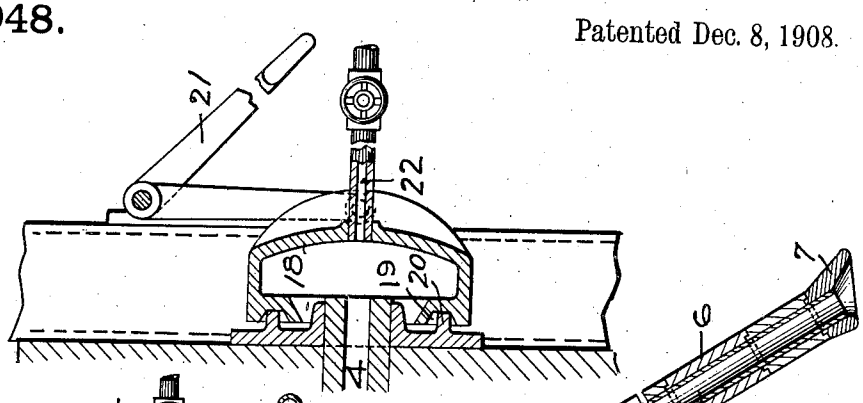


FIG. 2

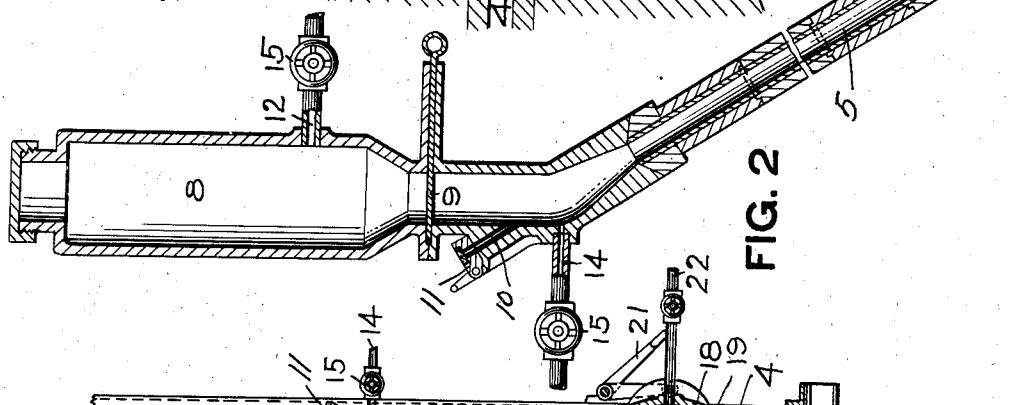
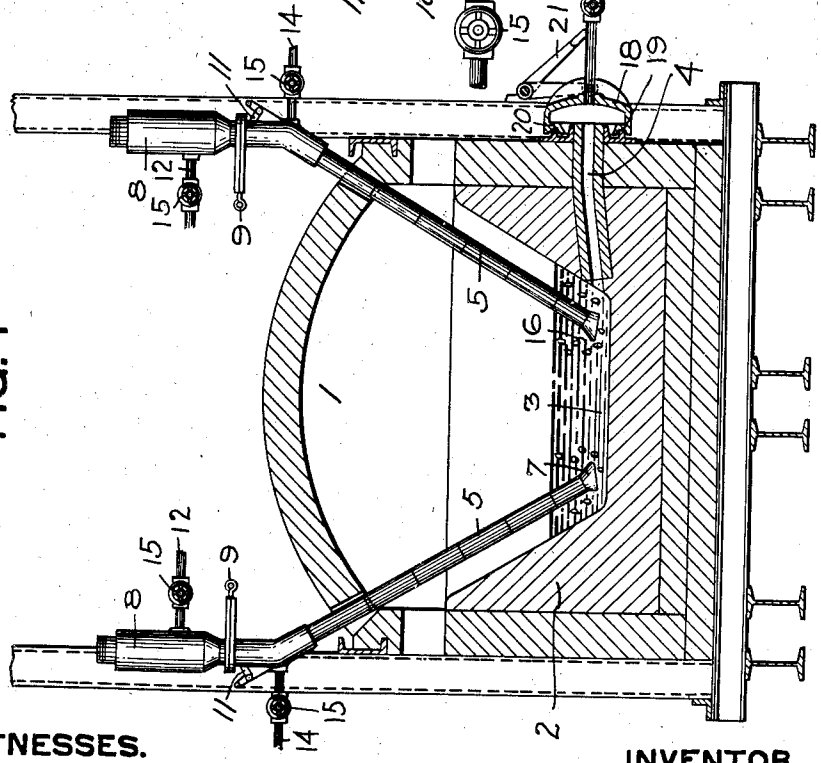


FIG. 1



WITNESSES.

Robert C. Totten

J. R. Keller

INVENTOR.

Fritz Oscar Stromberg

By Ray Totten & Winter

attorneys

UNITED STATES PATENT OFFICE.

FRITZ OSCAR STROMBORG, OF YOUNGSTOWN, OHIO.

METHOD OF MAINTAINING A CONSTANTLY-OPEN FEEDING-PASSAGE INTO THE INTERIOR OF MOLTEN BATHS.

No. 905,948. Specification of Letters Patent. Patented Dec. 8, 1908.

Application filed July 8, 1907. Serial No. 382,637.

To all whom it may concern:

Be it known that I, FRITZ OSCAR STROMBORG, a resident of Youngstown, in the county of Mahoning and State of Ohio, have invented a new and useful Improvement in Methods of Maintaining a Constantly-Open Feeding-Passage into the Interior of Molten Baths; and I do hereby declare the following to be a full, clear, and exact description thereof.

This invention relates to a method of maintaining an open passage or communication to the interior of molten baths.

In many arts it is desirable to have an open communication or passage to a molten bath beneath the surface of the latter, such for instance, as conduits or tubes for feeding into the bath fluxes, ore, alloying materials, reducing gases or other substances, as well as many other uses. One of the difficulties in maintaining such open communication or passage is due to the fact that the molten bath backs into the passage or tube and solidifies, or freezes, therein, thus clogging such passage.

The object of this invention is to provide a simple method for maintaining such communication or passage open at all times and irrespective of the character of the bath.

The invention consists essentially in providing in such pipe or passage a fluid pressure sufficiently high to prevent the molten bath from entering the passage or tube.

In the accompanying drawing Figure 1 is a vertical section through a metal reducing or melting furnace showing my invention applied thereto; Fig. 2 is an enlarged sectional view of one of the feeding tubes, and Fig. 3 is an enlarged sectional view of the cap for closing the tap hole.

The invention is shown applied to a metal melting furnace 1 which may be of any desired construction, that shown being similar to an open hearth furnace, having the hearth 2 upon which is the molten bath 3. The tap hole is shown at 4 and two tubes 5 are shown for supplying the bath with ore, fuel, flux, alloying material, or any other desired substance.

The tubes 5 are shown as projecting down into the bath so that their discharge ends are located in the interior of the bath in order to introduce the substance fed through them down in the bath. These tubes are covered with fire brick, fire clay, or other refractory material 6, and their lower ends 7 preferably are formed of graphite. These tubes are shown as connected to a supply chamber 8, and are provided with the gate or cut-off valve 9. They also are provided with a peep hole 10 preferably formed in a hinged end portion 11 which can be swung out of the way to allow poking down into the tubes. Inasmuch as the ends of these tubes project down into the bath the latter ordinarily would back up into the tubes and solidify, or freeze, therein. To prevent this I maintain in the tubes a fluid pressure slightly in excess of the pressure due to the head of the bath. The pressure medium may be of any desired kind, such as air, or gas, and may also, if desired, be heated, although this is not necessary. The source of fluid pressure may be connected to the interior of the tubes in any suitable way, such as through the opening 12 in the supply chamber 8, or through the pipe connection 14 at a lower point. The fluid pressure will be regulated by any suitable means, such as valves 15, so that it can be maintained sufficiently high to slightly exceed the pressure due to the head of the bath but without producing any decided blast which would agitate the bath. The lower ends 7 of the tubes are preferably formed as mouth pieces so shaped as to form a bubble of air or gas and the current of air or gas will be such as to cause the formation of bubbles slowly, which, when fully formed, escape and rise up through the bath, as indicated at 16. Generally one to four bubbles per second indicate a sufficient volume of air or gas to prevent the bath from backing up into the tubes, but not sufficient to agitate the bath to any material extent.

The same principle is applied to the tap hole 4, this as shown leading slightly upwardly instead of being horizontal or downwardly, and at its outer end being provided with a cover 18 of any suitable construction, preferably formed with a groove 19 fitting over a flange 20, so providing a recess for a filling of clay or other material for rendering the joint substantially air tight. The cover can be closed and opened by any suitable means, such as a lever 21, and is provided with a fluid inlet pipe 22 which is connected to any suitable source of fluid pressure, such as air or gas, and acting in the same way as heretofore described to prevent entry of the

bath into the tap hole, said fluid holding the bath back and escaping at the inner end of the tap hole in the form of bubbles. The method of maintaining an open tap hole is, however, not claimed herein.

My invention is applicable for maintaining an open passage or communication with the interior of a molten bath of any character, and can be applied in any case where the passage to be maintained open is inclined above the horizontal to any degree, either a slight upward inclination, as shown in the tap hole, or a passage or pipe which is perpendicular, and all angles between these two. The method is easy of application and also of regulation as it is merely necessary to maintain a sufficient pressure to cause a very slow bubbling of the air or other fluid through the bath. It is effective to prevent entry of the bath into the tube or passage, thus keeping the same always open for the purpose of either by gravity introducing material into the bath or drawing the bath itself from the furnace chamber, or permitting the escape of gases out of the bath. While it has been shown and described particularly with reference to a metal melting furnace it is not limited in its use to that art, but can, as above stated, be applied in any art in which it is necessary or desirable to maintain an open passage into a molten bath below the surface of the same.

What I claim is:

1. The method of maintaining a constantly open feeding passage into the interior of a molten bath, consisting in providing a passage communicating with the interior of the bath, and constantly maintaining in said passage fluid under pressure in excess of the pressure of the head of the bath but only sufficient to cause a slow bubbling of the pressure fluid through the bath.

2. The method of maintaining a constantly open feeding passage into the interior of a molten bath, consisting in providing a passage arranged at an angle above the horizontal and communicating with the bath below its surface, and constantly maintaining in said passage fluid under pressure in excess of the pressure of the head of the bath but only sufficient to produce a slow bubbling of the pressure fluid through the bath.

3. The method of maintaining a constantly open feeding passage into the interior of a molten bath, consisting in providing a passage communicating with the interior of the bath, maintaining in said passage fluid under pressure, and regulating the pressure and volume of said fluid to slightly overbalance the pressure due to the head of the bath and produce only a slow bubbling of the pressure fluid through the bath.

4. The method of maintaining a constantly open feeding passage into the interior of a molten bath, consisting in providing passages communicating with the interior of the bath, and maintaining in each passage fluid under controllable pressure in excess of the pressure of the head of the bath but only sufficient to cause a slow bubbling of the pressure fluid through the bath.

In testimony whereof, I the said FRITZ OSCAR STROMBORG have hereunto set my hand.

FRITZ OSCAR STROMBORG.

Witnesses:
W. W. MELANDER,
NILS M. WESTON.