

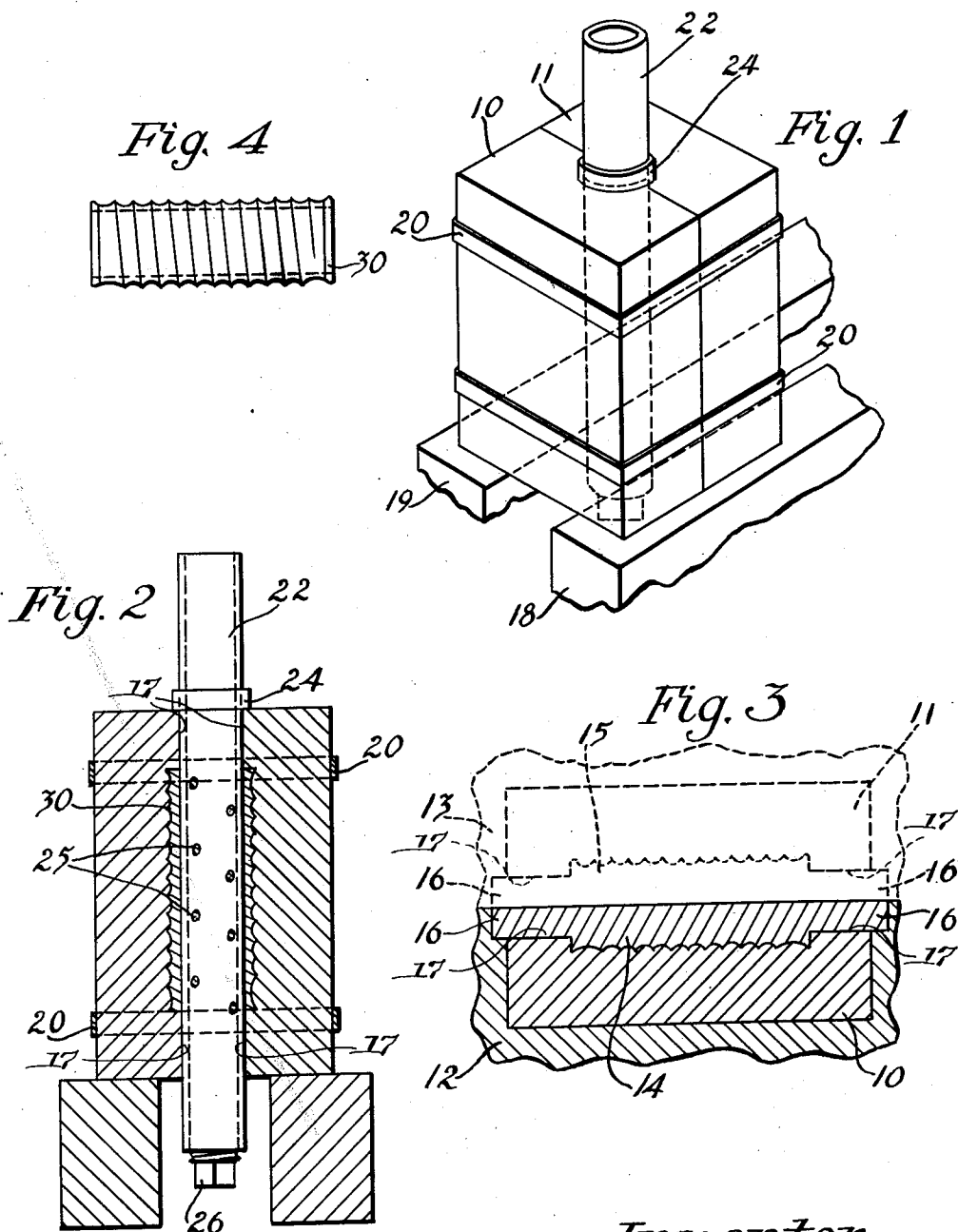
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METHOD OF AND MEANS FOR CASTING ARTICLES

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UNITED STATES PATENT OFFICE.

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METHOD OF AND MEANS FOR CASTING ARTICLES.

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To all whom it may concern:

Be it known that I, CHARLES CLAFLIN RAND, a citizen of the United States, residing at Lombard, in the county of Du Page and State of Illinois, have invented certain new and useful Improvements in Methods of and Means for Casting Articles, of which the following is a full, clear, concise, and exact description.

This invention relates to methods of and means for casting articles, and more particularly to methods of and means for casting refractory articles.

In making articles by the introduction of a casting slip into a mold composed of water absorbing material, it is desirable to insure a uniform and perfect product and that the slip shall reach all parts of the mold approximately simultaneously and under substantially the same unit pressure.

In some cast refractory articles, for instance, a tube serving to support resistance material for forming a heating element in an electric soldering iron, it is desirable that it have a predetermined uniform outside diameter and wall thickness. This is due to the restricted space in which a heating element may be placed in a soldering iron.

An object of this invention is to insure the simultaneous introduction of a casting slip into a plurality of portions of a mold under a substantial uniform unit pressure.

Another object is to produce a cast article having a predetermined and uniform wall thickness.

A further object is to introduce casting material into a mold through a core member.

A still further object is to improve and simplify methods of and means for manufacturing refractory articles.

In accordance with one embodiment thereof, the invention may comprise a separable mold of plaster of Paris or similar material adapted to surround and to center therebetween a perforated vertical conduit, which not only serves as a core for the article to be cast, but also to direct the casting material or slip through the perforations thereof into all parts of the surrounding mold cavity, thus producing an article having a wall of predetermined and uniform thickness. The

separable mold is also adapted when positioned around the conduit to seal the mold cavity.

These and other features not specifically mentioned may be clearly comprehended from the following description and the accompanying drawings, in which

Fig. 1 is a perspective view of a mold which may be used in practicing the invention, assembled in its casting position;

Fig. 2 is a sectional view of the assembled structure shown in Fig. 1;

Fig. 3 is a fragmentary view, partially in section, showing the method of producing separable molds used in casting, and

Fig. 4 is an elevation of a tube produced in accordance with the invention.

In order to successfully cast articles including silicon carbide, it is necessary to employ it in a very finely divided condition, preferably of the character known as "220 mesh." As is sometimes the practice in connection with casting refractories, it is often desirable to employ as a binder a combination of different clays possessing somewhat different characteristics. For instance, a plastic clay is often combined with a less plastic clay so as to properly regulate the shrinkage due to the firing of the cast article and the strength of the completed article. In order to maintain the various ingredients of the casting slip in suspension, suitable deflocculating agents are also usually employed, such agents also serving to reduce the quantity of water required in the slip.

A casting slip which has been found to be very satisfactory in the casting of silicon carbide is composed of the following ingredients in the proportions noted: 50 parts silicon carbide (220 mesh); 12 parts Florida clay; 12½ parts English China clay; 1/8 part solid sodium carbonate; 3/8 part liquid sodium silicate; 40 parts water.

The various ingredients are wet ground together in a pebble mill of the type usually employed in mixing ceramic compositions. After they are thoroughly mixed, the slip should have a specific gravity of approximately 2.25.

An apparatus shown in Figs. 1, 2 and 3 of the drawings may be used to advantage in casting articles in accordance with the

invention, although any suitable apparatus may be employed for this purpose.

Referring to the drawings, and more particularly to Figs. 1, 2, and 3, a separable mold composed of portions 10 and 11 may be formed by using suitable molding flasks 12 and 13 and a separable pattern composed of portions 14 and 15, preferably of brass, the openings in the flasks around the portions 14 and 15 being filled with plaster of Paris or other similar material. After this plaster of Paris has hardened sufficiently, the flasks 12 and 13 are separated in the usual manner, and the pattern portions 14 and 15, and the plaster of Paris portions 10 and 11 are removed from the flask. The pattern portions 14 and 15 are provided with semi-circular extensions 16 at either end (see Fig. 3), which provide the mold portions 10 and 11 (see Fig. 2) with aligned reduced semi-circular depressions 17 at either end. These mold portions 10 and 11 are then placed on end on separated supports 18 and 19 with suitable retaining bands 20, which may be of rubber or other material, a conduit or tube 22 being placed between the portions 10 and 11, and projecting from the top and bottom of the assembled mold. The depressions 17 form an opening at either end of the mold for centering the conduit 22 within the cavity formed by the mold portions 10 and 11. The depressions 17 serve to engage the tube 22 and to effectively seal the openings at either end of the mold. A collar 24 attached to the conduit 22 serves to position it vertically within the mold. The conduit 22 is provided with a plurality of openings 25 occurring within the mold cavity, and is also provided with a plug 26 suitably screwed into the bottom of the conduit.

In casting the article the tube 22 is completely filled with a casting slip produced as outlined above, and due to the openings 25 which are uniformly located throughout the extent of the mold cavity, the slip flows therefrom into all portions of the cavity simultaneously and with substantially the same pressure. This arrangement insures the uniform and complete filling of the cavity around the conduit 22, thereby producing an article with a predetermined and uniform wall thickness. Some of the moisture in the slip within the cavity is withdrawn by the moisture absorbing walls of plaster of Paris which serve to retain the material firmly in contact with the cavity walls. The mold is allowed to remain in this condition for a period extending from one to two minutes and the plug 26 is then removed from the conduit 22, permitting the excess slip to flow out of the conduit. The conduit 22 is then removed by a rotation through a small arc and an upward pull, which serves to break the small projections

of casting material extending into the openings 25 and to form a perfectly smooth inner wall for the cast tube. The mold is then laid on its side and maintained in this position for a period of from one to two minutes, and the bands 20 are then removed and the mold portions 10 and 11 separated. The cast tube 30 is removed from the lower portion of the mold by the reinsertion of the conduit 22 therein, after which the tube is placed on a mandrel, preferably composed of brass, and allowed to dry at room temperatures for from eight to ten hours, after which period it is practically free from moisture. The dry tube is then put in a cold furnace, the temperature of which is raised to approximately 1600° F. within two hours, and further raised to 2300° F. in three hours. The heating means is then dissociated from the furnace and the furnace is allowed to cool for from eight to ten hours, whereupon the cast and fired tube 30 is ready for service.

What is claimed is:

1. The method of casting an article, which consists in directing a slip against the wall of a mold cavity from a position within the cavity.
2. The method of casting an article, which consists in introducing a quantity of slip into the interior of a mold cavity, directing a portion thereof against the wall of the cavity, and removing the remainder of the quantity introduced.
3. The method of casting a walled article, which consists in introducing a stream of slip into the interior of a mold cavity, dividing said stream into smaller streams, and directing the smaller streams against the wall of the cavity in such manner that they unite and form a wall of the article.
4. The method of casting an article, which consists in introducing a slip into a mold cavity at a plurality of levels by the action of gravity.
5. The method of casting a walled article, which consists in centering a column of slip within a mold cavity, directing portions of the slip at different levels against the wall of the cavity to form the wall of the article, preventing the return to the column of such portions, and removing the slip remaining in the column.
6. The method of casting a walled article, which consists in introducing a slip against the wall of a mold cavity from a position within the cavity, maintaining the directed slip against the wall of the cavity, and partially drying the maintained slip.
7. The method of casting a walled article, which consists in introducing a chamber into a mold cavity, introducing a slip into the chamber and therefrom into the mold cavity surrounding the chamber, releasing the surplus slip from the chamber, partially drying

the slip remaining within the cavity, causing a relative rotation between the chamber and the slip surrounding it, and contemporaneously therewith withdrawing the chamber from the mold to produce a smooth surface on the interior of the wall of the cast article.

8. The method of casting a walled article, which consists in directing a slip against the wall of a mold cavity from a position within the cavity, partially drying the slip within the cavity, removing the cast article from the cavity, drying the cast article at room temperature conditions, and then hardening it by increased temperatures.

9. In a casting apparatus, a mold having a cavity for forming casting material into an article, and common means for simultaneously directing casting material into a plurality of portions of the cavity and for forming an opening in the cast article.

10. In a casting apparatus, a mold having a cavity for forming casting material into an article, and common means for intro-

ducing casting material into the cavity and for forming an opening in the cast article.

11. In a casting apparatus, separable mold portions of water absorbing material having cooperating cavities therein, a hollow perforated member surrounded by the cavities for introducing casting material into the cavities, and means for retaining an excess amount of material within the member.

12. In a casting apparatus, a mold having a cavity for forming casting material into an article, and a hollow perforated member extending into the cavity of the mold for introducing casting material into the cavity and serving as a core for the article to be cast, said mold having alined shouldered portions engaging said perforated member for centering it transversely of the mold and for sealing the mold cavity.

In witness whereof, I hereunto subscribe my name this 21 day of Sept. A. D., 1923.

CHARLES CLAFLIN RAND.