April 2, 1940. F. SOUTH, JR 2,195,523

RUNNER SPOUT FOR TILTING CRUCIBLES

Filed Nov. 29, 1937

Fig. 1.

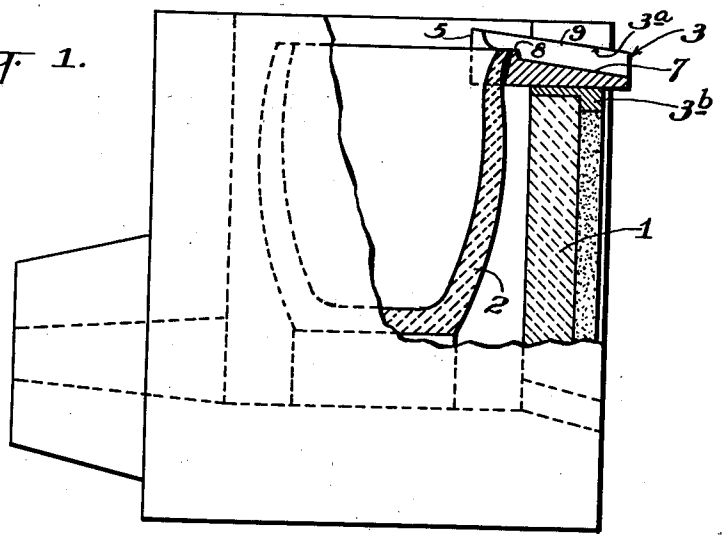


Fig. 3.

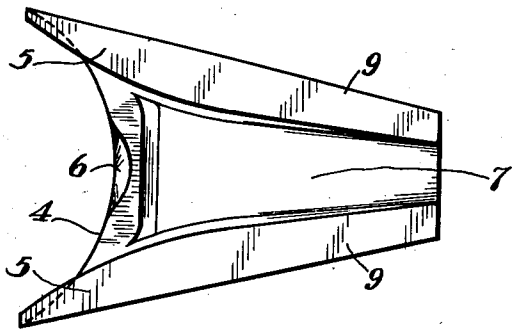


Fig. 2.

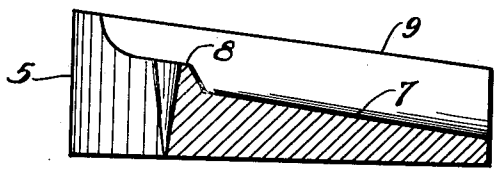


Fig. 5.

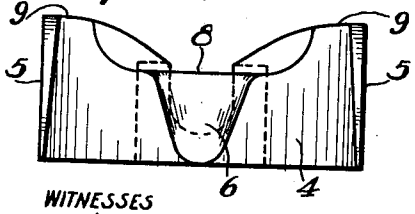
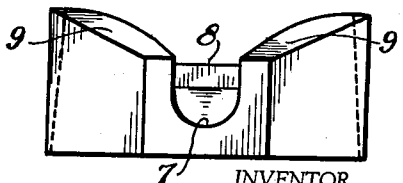


Fig. 4.



WITNESSES

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RUNNER SPOUT FOR TILTING CRUCIBLES

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2 Claims. (Cl. 263—13)

This invention relates to crucible melting furnaces and has particular reference to runner spouts for use with crucibles in tilting furnaces.

Heretofore it has been proposed to provide tilting crucible furnaces with runner spouts, but those proposed and used have been unsatisfactory for various reasons. Such spouts usually have been cemented against the crucible edge, whereby there has been difficulty and loss of time in changing crucibles, as is often desirable, because the furnace has had to be cooled down before the crucibles could be changed. Also these runner spouts may rapidly deteriorate the crucible wall, owing to leakage of metal through the joint between the spout and the crucible, and such leakage has been unavoidable with prior constructions. Not only is there this loss of metal, but melting costs are increased through the damage to the furnace. Also, since the crucible must be held securely positioned in the furnace, it has been necessary to support it with pillow, or wedge, blocks. For these and other reasons the prior runner spouts have been disadvantageous and unsatisfactory.

The general object of this invention is to eliminate or overcome the foregoing and other disadvantages attendant upon the use of crucible tilting furnaces, and to provide an inexpensive, long-lived, runner spout for crucibles in tilting furnaces which avoids leakage of metal into the furnace, acts itself to support the crucible without positive attachment thereto, permits ready and rapid changing of crucibles, and generally avoids the drawbacks of prior runner spouts.

Other objects of the invention will appear from the following specification.

The invention resides in a runner spout for removable association with a crucible, particularly in tilting furnaces. The runner spout is wedge-shaped and tapers inwardly from its inner end, or base, which is adjacent the crucible and adapted to removably engage therewith, so as to support the crucible when the furnace is tilted, and thereby to be forced into tight contact with its seat in the furnace wall. A bridge portion is provided adjacent the base of the runner spout to prevent molten metal or other liquid poured from the crucible from backing up in the runner spout and contacting the joint between the spout and the crucible, which constitutes a major feature of the invention. The runner portion, or spout, is formed between side walls which extend a substantial distance above the runner portion to prevent liquid from being spilled in pouring it from the crucible.

In the accompanying drawing Fig. 1 is a side elevation, partly in section, of a tilting furnace and crucible associated with the preferred embodiment of the invention; Fig. 2 an enlarged longitudinal section through the runner spout shown in Fig. 1; Fig. 3 a plan view of the runner spout of Fig. 2; and Figs. 4 and 5 front and rear elevations, respectively, of the runner spout of Figs. 1 to 3.

Referring more particularly to the drawing, Fig. 1 shows an ordinary tilting furnace 1 which has a standard type melting crucible 2 disposed therein. A runner spout 3 is removably disposed in a complementary opening 3a in the wall of the furnace 1. The runner spout may protrude from both sides of the furnace wall, as shown, or it may protrude from only the inner side of the wall. The runner spout is made from material suitable to the particular use for which it is intended; it should, of course, be adequately refractory, and it should be adapted to withstand substantial compressive loads, created when the crucible bears upon it in pouring, even when heated to a high temperature.

The runner spout provided by the invention is in the form of a wedge-shaped block which has a concave base 4, Fig. 3, that terminates at its sides in outwardly directed lips or arms 5. The side walls of the spout taper inwardly from their inner ends, or base, 4 which is adapted to engage and fit snugly against crucible 2 when both are in their operative positions, to avoid leakage of liquid poured from the crucible. Thus the runner spout supports the crucible 2, and is wedged more tightly into its seat in the furnace wall when the furnace is tilted. A tight joint between the spout and crucible is insured since base 4 of the spout is designed to mate with the crucible which is forced thereagainst by gravity when the furnace is placed in a pouring position. Since one form of crucible is made with a small integral spout, a recess 6 may be formed in base 4 to receive the spout and to aid in centering it on the runner spout 3.

An axially extending recessed runner portion 7 is formed in the runner spout 3 and preferably slants downwardly toward the apex thereof to provide means for directing and controlling the liquid flow from the furnace. As best seen in Fig. 1, a bridge portion 8 which is at and above the higher end of the runner portion 7 separates it from the base 4. Although this strengthens the base of the runner spout, the most important function of bridge 8 is to prevent, under all circumstances, metal from backing up in the runner

spout and from crossing the joint between the crucible and spout, which action will be pointed out more fully hereinafter.

To direct liquid flowing from the crucible into runner portion 7, side, or baffle, walls 9 are formed at the sides which extend the length of runner spout 3. The baffle walls 9 also strengthen the runner spout and adapt it to support the crucible without the use of the pillow blocks which heretofore have necessarily been wedged between the crucible and furnace to support the former during the pouring operation.

The runner spout and crucible preferably are positioned relative to each other so that bridge portion 8 is flush with and tightly against the upper edge of crucible 2. Then when the furnace is tipped the liquid flowing from the crucible arcs over the bridge wall and falls upon runner portion 7 without contacting the joint between the crucible and the runner spout, and when the furnace is returned to its normal position bridge 8 prevents metal remaining in the spout from running back into contact with the joint between the crucible and the spout. Thus joint leakage with its attendant disadvantages is positively prevented because the liquid is not only poured from the crucible without contacting the joint, but also it can not back up in the spout to contact or cross the joint when the furnace is returned to the melting, or normal, position. This is a most important feature of the invention which distinguishes it from and renders it a major advance over the runner spouts heretofore known in the art. Also, the baffle walls and furnace roof combine to practically eliminate loss of liquid by splashing whereby wear on the furnace wall is reduced.

As the spout is not positively attached to the crucible, crucibles may be removed from and inserted into the furnace according to need, either to replace defective crucibles or to melt different materials, without waiting for the furnace to cool, i. e., the new crucible can immediately be placed in operative position in the heated furnace. Preferably the same size standard crucible is always used in the furnace so that one runner spout will suffice for all. However, the spout, too, is readily changeable, or removable, since it is not permanently secured in the furnace wall.

A further advantage of the invention is that regardless of whether the crucible or the runner spout breaks or wears out, a new part can be inserted without cooling the furnace for there are no molded connections or joints to make in replacing either part. Ordinarily the runner spout will outlast several crucibles and any crucible breaking in the furnace can readily be withdrawn therefrom and the furnace immediately put back in service.

In certain instances it may be expedient to temporarily cement the crucible to the runner spout, as by clay or cement 3*b*, although this procedure is normally unnecessary in the preferred practice of the invention.

According to the provisions of the patent statutes, I have explained the principle and mode of operation of my invention, and have illustrated and described what I now consider to be its best embodiment. However, I desire to have it understood that, within the scope of the appended claims, the invention may be practiced otherwise than as specifically illustrated and described.

I claim:

1. The combination of a tilting furnace and a crucible removably received in said furnace with a runner spout fixedly positioned in and extending beyond a wall of said furnace, said runner spout comprising a wedge-shaped block having a concave crucible-engaging base, the block being adapted to support said crucible against tilting and to be forced into tight engagement with said furnace upon tilting said furnace, an axially directed runner portion formed therein, a narrow bridge portion closing the inner end of said runner portion and separating it from the base of the block, and side walls extending a substantial distance above said runner and bridge portions to strengthen the block, said runner spout normally being positioned with said bridge portion flush with the top of said crucible and the bridge portion being sufficiently narrow so that liquid flowing from said crucible when said furnace is tipped pours from the inner edge of said crucible, arches over the bridge portion without touching it and lands upon said runner portion.

2. The combination recited in claim 1 wherein further the side walls of the runner spout are constructed and arranged with flanges which extend vertically over the upper end of the crucible and in engagement therewith to thereby hold the spout against downward movement with respect to the crucible.

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