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Examiner

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Sawdust + binder (Na silicate) may coat with fireproofing as alum, NaCl etc.

UNITED STATES PATENT OFFICE

LEWIS GERALD FIRTH, OF PITTSBURGH, AND ELMER B. WELCH, OF McKEESPORT, PENNSYLVANIA, ASSIGNORS TO FIRTH-STERLING STEEL COMPANY, OF McKEESPORT, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA

HOT TOP

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This invention relates generally to hot tops commonly used in pouring steel ingots. Hot tops are refractory forms placed on the top of the ingots and into which the metal is poured in order to maintain the top portion of the ingot in a molten condition so as to prevent or decrease the formation of shrinks and pipes in the ingot.

Up to the present time, these hot tops have been made of clay or other similar refractory material. Clay hot tops do, to a certain extent, decrease the amount of shrinks and pipes in an ingot, but they are not of sufficiently good insulating characteristics to prove satisfactory in some cases where it is desired to substantially eliminate entirely any shrinks or pipes in the ingot. Furthermore, clay hot tops are relatively expensive. In using clay hot tops it is necessary to heat them before applying them to the ingot molds. Even when the hot tops are heated before placing them on the ingot molds, they sometimes cool to such an extent before the metal is poured into the mold that shrinks or pipes form.

In accordance with our invention, we provide hot tops which have a much greater insulating value than those heretofore employed. Accordingly, it is not necessary to preheat our hot tops before applying them to the mold. They have an insulating value sufficiently great so as to materially decrease the amount of shrinks and pipes that would ordinarily be formed in an ingot, and are mainly composed of material which is much cheaper than clay.

We take a carbonaceous material or mixture of carbonaceous materials, such as sawdust, wood pulp, shavings, charcoal, coke, paper pulp, ground vegetable matter, such as corn cobs, corn stalks, straw, or hay, and mix this with a refractory binder. The mixture is then formed into the desired shape and dried.

If desired, instead of using the carbonaceous material and the binder alone, we can first coat the carbonaceous material with a fire-proofing solution such, for example, as sodium chloride, sodium tungstate, or alum. This may be accomplished by immersing the sawdust or other carbonaceous material in a solution of the fire-proofing salt, and thereafter evaporating the water. This deposits a coating of a fire-proofing salt on the particles of the sawdust. The sawdust is then mixed with a binder, preferably a silicate binder, such as sodium silicate or potassium silicate, and the mixture is then pressed into the desired shape. The article so formed is dried in order to eliminate any excess water which, if present, might tend to cause the hot top to disintegrate when subjected to heat.

After the hot top has been dried it preferably is coated with a coating of a silicate cement, such for example, as sodium silicate. This coating may be accomplished by dipping the article or by painting it with the coating material or by any other desired method. The coating prevents the article from absorbing moisture and also tends to more firmly bind together any loose particles which might have resulted from the forming operation and prevents these loose particles from burning out when the hot top is used.

As a specific example of the manner of carrying out our invention, sawdust is first dried and then immersed in a solution of sodium chloride. It is then heated to drive off the water and deposit a layer of sodium chloride on the particles which acts as a fire-proofing medium. The dried coated particles are then mixed with sodium silicate in such proportion as to cause the particles to adhere to each other when they are pressed to shape. In practice, we have found one part, by volume, of sodium silicate to about ten parts, by volume, of sawdust makes the mixture of a consistency which can be satisfactorily pressed into the desired shape. This proportion of binder and sawdust or other carbonaceous material can be varied within fairly wide limits and still give satisfactory results. The hot top, after being pressed to shape, is dried and then coated with sodium silicate.

In some cases, it is not necessary to coat the sawdust with fire-proofing material. This is particularly true where the hot tops are relatively small and will not be subjected to such large volumes of molten metal.

In such cases, we have found it satisfactory to mix sawdust or other carbonaceous material with sodium silicate, without the use of a fire-proofing compound, and then press the article to shape as previously described.

In cases where it is desired to make large hot tops adapted to hold large amounts of molten metal, it has been found desirable to use some refractory material in addition to the sawdust and binder. For example, we may mix clay, dolomite, magnesite, or a refractory cement, with the sawdust and binder, or with the fire-proofed sawdust and binder in order to prevent the hot top from smouldering too greatly. The proportions of sawdust to clay or other refractory material may be varied to suit the conditions. We prefer to employ not less than fifty percent sawdust and not more than fifty percent clay. For many purposes a mixture of about eighty percent sawdust and twenty percent clay has proved very satisfactory. If clay or other refractory material is mixed with the sawdust, a fire-proofing material such as sodium chloride, sodium tungstate, or alum, may or may not be used.

In the description we have referred to sawdust as being a carbonaceous material suitable for making hot tops. It is to be understood, however, that other carbonaceous materials having similar properties may be used in place of sawdust.

Aside from the fact that hot tops may be made very cheaply according to our invention, our hot tops retain the heat much better than those now in use and, accordingly, decrease the amount of shrinks and pipes ordinarily present in ingots. We have referred specifically to the pouring of steel ingots, but it should be understood that the hot tops may be used in pouring other metals.

We have described several preferred compositions and methods by which our invention may be carried out, but it should be understood that the invention may be otherwise embodied or practiced within the scope of the following claims.

We claim:

1. A hot top comprising carbonaceous material, said carbonaceous material being impregnated with a fire-proofing material, and a binder.

2. A hot top comprising carbonaceous material, said carbonaceous material being impregnated with a fire-proofing material, a refractory, and a binder.

3. A hot top comprising carbonaceous material, a fire-proofing salt, and a silicate binder.

4. A hot top comprising carbonaceous material, sodium chloride, and sodium silicate.

5. A hot top comprising carbonaceous material, sodium chloride, clay, and sodium silicate.

6. A hot top comprising sawdust, sodium chloride, clay, and sodium silicate.

7. A hot top composed mainly of sawdust bonded with sodium silicate, and having materially greater heat insulating value than hot tops made of clay.

8. A hot top comprising sawdust and sodium silicate, the sawdust constituting at least half of the constituents of the hot top.

9. A hot top comprising sawdust, clay, and sodium silicate, the sawdust constituting at least half of the constituents of the hot top.

In testimony whereof we have hereunto set our hands.

L. GERALD FIRTH.
ELMER B. WELCH.