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SHRINK HEAD CASING

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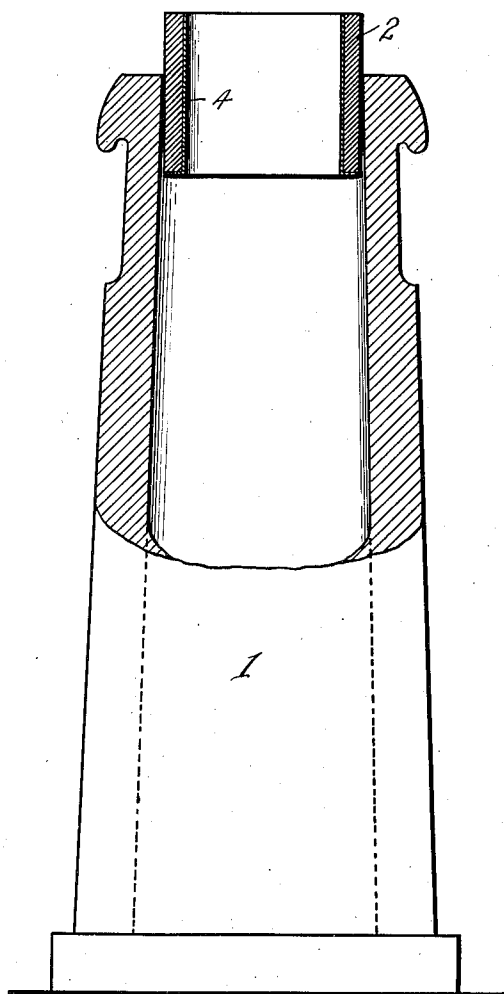
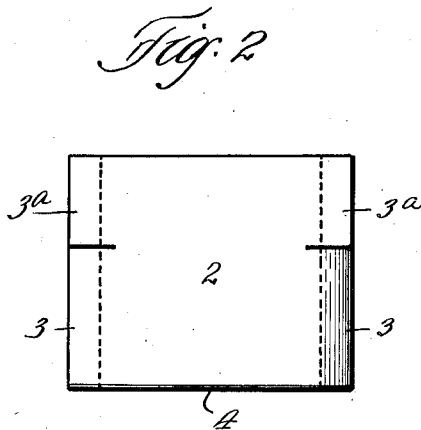
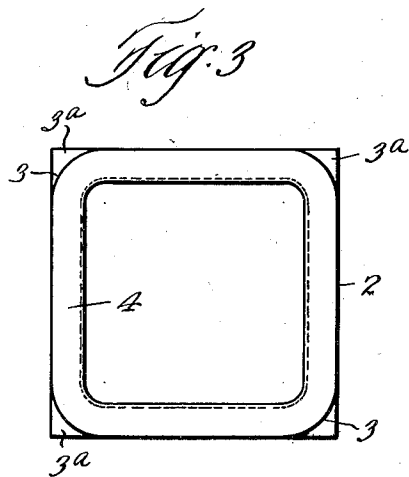


Fig. 1



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UNITED STATES PATENT OFFICE.

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SHRINK-HEAD CASING.

Application filed December 29, 1924. Serial No. 758,594.

This invention relates to shrink-head casings or "hot tops" for ingot molds, and has for its general object to produce an article of the character above identified which is capable of economical and convenient production at the plant in which the said articles are used and which is particularly efficient in realizing the purposes for which such articles are designed.

As is well known, the principal function of these hot tops or shrink-head casings is to delay the freezing of the top of the mass of molten metal within the mold, thereby eliminating the piping which would otherwise occur within the body of the metal through premature freezing of such top portion of the molten mass. The present invention enables the aforesaid articles to be produced at a great saving of expense over articles for the same purpose now on the market and also results in the production of such articles which are more efficient than those now on the market. The manner in which the foregoing advantages are realized will be set forth hereinafter.

In the drawing forming a part hereof, Fig. 1 represents a sectional elevation of an ingot mold having a casing or hot top applied thereto, which casing or hot top is produced in accordance with my invention; and Fig. 2 a side elevation, and Fig. 3 a bottom plan view, of the said casing.

Describing the various parts by reference characters, 1 indicates an ingot mold of any ordinary construction, the one shown herein being of the "big-end-down" type.

2 indicates the shrink-head casing, which is generally rectangular in outline, having the corners rounded off, as shown at 3, and providing thereabove lugs 3^a which are adapted to support the said casing within and extending above the neck of the mold. The particular shape of the shrink-head casing is immaterial, provided that it is adapted to be supported in proper operative relation to and within the top of the neck of the mold.

Shrink-head casings as usually constructed are made from fire clay, which must be burned and shipped to the steel plants for use; and, as these casings are capable of being used but once, the use of the same entails a considerable expense, which must be included in the cost of the steel. Furthermore, the insulating qualities of such molds are imperfect, making it necessary to lose a con-

siderable quantity of metal in the top of the mold in which the gases or "pipings" accumulate.

In making shrink-head casings in accordance with my invention, I mold the same in ordinary cement molds, using for the material about four parts of blast furnace slag to one part of Portland cement, with sufficient water to make a proper mixture for molding. When shrink-head casings are produced from such material, it has been found that the lime constituent in the cement produces an endothermic action in connection with the molten metal contacting therewith, producing what is referred to in the art as a "boil", with detrimental results. I have found that, by coating the portions of the molded shrink-head casings which contact with the molten metal with a substance which serves to render inactive the gas-producing constituents of the material of which the casing is made and thus to prevent the formation and liberation of gases from the casing when the latter is subjected to the intense heat of the forming ingot, I am enabled to obtain an absolutely quiet pour and without any detrimental action between the metal and the part of the shrink-head casing contacting therewith. The material which I employ for this purpose is a sludge formed by an admixture of water with loam, fireclay, silica flour, or a compound employed by foundrymen as a binder and sold under the trade name of "goulac", well known to foundry men and which consists mainly of organic matter (cellulose), with the following additional ingredients: Aluminum oxide (Al_2O_3), ferric oxide (Fe_2O_3), manganese oxide (Mn_2O_3), calcium oxide (CaO), magnesium oxide (MgO), sulphur (S). The cellulose in the "goulac" is that obtained from the dried liquor from the manufacture of sulphite pulp. As soon as the mixture described herein has "set" in the molds, the insides and bottoms of the shrink head casings will be coated or luted with such sludge, after which the molds can be subjected to the action of the waste-hot blast gases, which will insure a quick and complete drying of the molded casings. By drying the molded casings in this manner, they are not only produced quickly, but their porosity is greatly increased, with a corresponding increase in their insulating properties. The coating referred to is indicated at 4.

Shrink-head casings made in this manner are not only extremely cheap of production, but are capable of being manufactured in an ordinary steel plant at small expense without involving the outlay and floor space required for special equipment. By reason of their high insulating qualities, the freezing of the top of the metal within the lower ends of the casings is materially delayed as compared with the freezing action in casings now in general use, with the result that there is less waste of metal within such casings, due to a smaller accumulation of gases, etc. beneath the frozen top of such metal. Furthermore, by coating the metal-contacting portions thereof with material which is capable of preventing the formation and liberation of gases when the casing is subjected to the intense heat of the forming ingot, all of the objections to the use of the slag-cement casings are obviated. Furthermore, with the relatively high proportion of slag employed, the metal-contacting surface of the casing will fuse to such an extent as to permit the upper or top portion of the ingot within the casing to slide downwardly without moving the casing or imposing any harmful strains thereon. The treatment of the metal-contacting surface or surfaces of the casing with the "goulac" or equivalent material prevents the swelling or spawling of the slag constituent of the casing and thus facilitates the freeing of the ingot from the casing during the cooling and shrinking of the ingot.

While the slags mentioned hereinbefore will produce casings having the advantages referred to, the best results are obtained by using a slag containing a substantial proportion of magnesia.

This application is a continuation in part of my application No. 738,774 filed September 20, 1924.

Having thus described my invention, what I claim is:—

1. A shrink head casing for ingot molds comprising a mixture of cement and slag in the proportions of substantially four parts of slag to one part of cement.

2. A shrink-head casing for ingot molds made from a mixture of cement and slag in the proportions of substantially four parts of slag to one part of cement and having the metal-contacting portions thereof treated with material which serves to render inactive the gas-producing constituents of the casing.

3. A shrink head casing for ingot molds comprising a mixture of cement and furnace slag, the said casing being porous and the metal-contacting portions of said casing having a coating of material which serves to render inactive the gas-producing constituents of the casing.

4. A shrink head casing for ingot molds comprising a mixture of cement and slag in the proportions of substantially four parts

of slag to one part of cement, the said casing being porous.

5. A shrink head casing for ingot molds comprising a mixture of cement and slag in the proportions of substantially four parts of slag to one part of cement, the said casing being porous, and the metal-contacting portions of the said casing having applied thereto a coating which serves to render inactive the gas-producing constituents of the casing.

6. A shrink head casing for ingot molds comprising a mixture of cement and slag of high insulating qualities, the said casing having applied to the metal-contacting portions thereof a coating of material which serves to render inactive the gas-producing constituents of the casing.

7. A shrink head casing consisting principally of a mixture of refractory material and a binder which is fusible at the temperature of the molten metal of the ingot, the said casing being moisture-free and having its metal-contacting surface coated with material which serves to render inactive the gas-producing constituents of the casing.

8. A shrink head casing for ingot molds comprising a mixture of furnace slag and cement in the proportions of about four parts of such slag to one part of cement, the metal-contacting portions of the casing being treated with material which serves to render inactive the gas-producing constituents of the casing.

9. A shrink head casing for ingot molds comprising a porous mixture of furnace slag and cement in the proportions of about four parts of such slag to one part of cement, the metal-contacting portions of the casing being coated with material which serves to render inactive the gas-producing constituents of the casing.

10. A shrink-head casing for ingot molds comprising a mixture of cement and slag, the said casing being porous thereby to impart high insulating qualities thereto.

11. A shrink-head casing for ingot molds comprising a mixture of cement and slag in the proportions of substantially four parts of slag to one part of cement, the said casing being porous thereby to impart high insulating qualities thereto.

12. A shrink-head casing for ingot molds comprising a mixture of cement and slag, the proportion of slag in said mixture being materially greater than the proportion of cement therein.

13. A shrink-head casing for ingot molds comprising a mixture of cement and slag, the proportion of slag in said mixture being more than twice as great as the proportion of cement therein, said casing being porous whereby it possesses high insulating qualities.

In testimony whereof, I hereunto affix my signature.

FRED H. CHAPIN.