March 23, 1965 R. MILLER 3,174,739

NOSE FOR FURNACE TAP-HOLE RUNNER

Filed Aug. 2, 1962

FIG. 1.

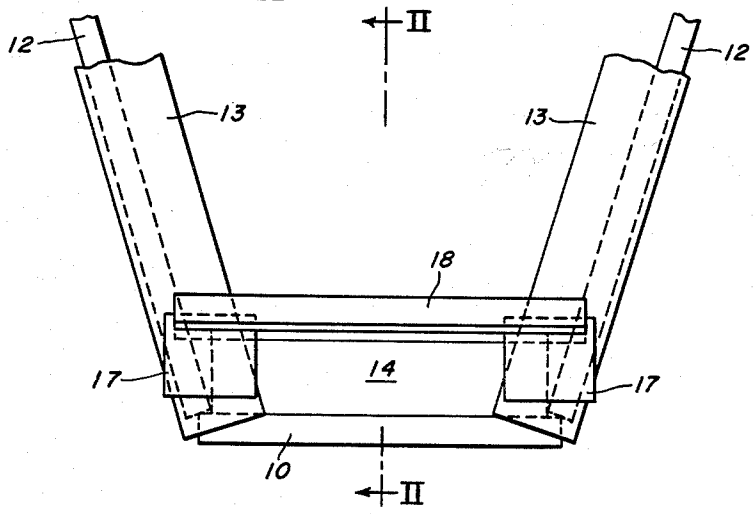


FIG. 2.

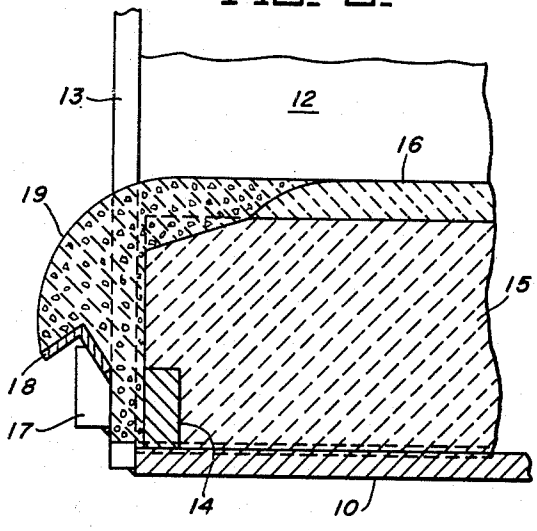
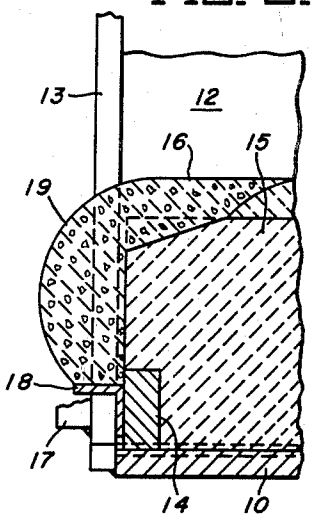


FIG. 3.



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NOSE FOR FURNACE TAP-HOLE RUNNER

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2 Claims. (Cl. 266—38)

This invention relates to an improved runner for handling molten metal and to a method of making the runner.

When molten metal is tapped from a furnace, such as an open hearth used in steelmaking, it flows down a runner into a suitable receiving vessel, usually a ladle. A conventional runner is formed of a metal shell which has a refractory lining, either of brickwork, monolithic or a combination. In service the refractory at the discharge end or "nose" of the runner wears rapidly. Such wear may cause permanent damage to the liner and shell, which desirably have a longer life than the "nose."

An object of my invention is to provide an improved runner which requires less maintenance than conventional runners, and the nose of which is more easily replaced.

A further object is to provide an improved runner which has a temporary or false nose of patching material over the permanent refractory lining and in which only the false nose requires frequent replacement.

A further object is to provide an improved method of making a runner which has the foregoing characteristics.

In the drawing:

FIGURE 1 is an end elevational view of a runner shell constructed in accordance with my invention before the refractory is installed;

FIGURE 2 is a longitudinal section of the nose portion of the runner on line II—II of FIGURE 1 with the refractory installed; and

FIGURE 3 is a view similar of FIGURE 2, but showing how I can install a temporary nose even after the supporting clips burn off.

FIGURES 1 and 2 show a runner shell which includes a bottom wall **10**, side walls **12**, side flanges **13** and a bottom flange **14**. The side walls **12** are welded to the edges of the bottom wall **10** and slope upwardly therefrom. The side flanges **13** are welded to the end faces of the side walls **12** and project inwardly therefrom. The bottom flange **14** is welded to the upper face of the bottom wall **10** and lies between the side walls **12** spaced inwardly from the end of the bottom wall and from the side flanges **13**. Conveniently both bottom and side walls are of 1¼ inch thick steel plates, the side flanges of 1 by 4 inch steel bars, and the bottom flange of a 1½ by 3 inch steel bar. The shell contains a refractory lining which is formed of a permanent monolithic layer **15** and a semipermanent bottom layer **16** overlying the monolithic layer, except at its discharge end or "nose." The monolithic layer **15** covers the inside of the bottom plate **10**, the bottom flange **14**, and the side plates **12** and preferably is of rammed magnesite. The bottom layer **16** can be of magnesite or dolomite of the type used in the bottom of a basic open hearth furnace.

In accordance with my invention, I weld steel clips **17** to the outer faces of the respective side flanges **13** adjacent their lower ends. I insert a metal retainer **18** between these clips and the faces of the side flanges. The retainer extends across the width of the runner and can be either an angle iron as illustrated or a flat bar. I build up a temporary refractory nose **19** in the space between the retainer **18** and the end of the permanent layer **15**, forming a continuation of the bottom layer **16**. This nose extends outwardly beyond the bottom plate **10** and bottom flange **14**. The nose can be of a refractory commonly known as "patching," which is a mixture of fire clay, crushed firebrick, and black pitch, with a small amount of water to form a mortar. After the nose refractory is laid, I dry it before using the runner. Conveniently I can install the runner on a furnace and dry the nose with a burner placed in the runner. The nose can be covered with sheet metal during the drying operation. As the runner is used to tap a heat of steel from an open hearth furnace, the nose is eroded but protects the permanent lining **15**. After each use, I clean out and replace the nose refractory and retainer, but I can use the semipermanent bottom **16** several times without replacement, and I replace the permanent lining **15** only occasionally as bad spots develop.

As the runner is used, clips **17** may burn off. Thereafter I can replace the nose additional times by inserting one leg of the retainer **18** in the space between the side flanges **13** and bottom flange **14**, as shown in FIGURE 3. Otherwise I follow the same procedure as I have already described.

From the foregoing description it is seen that my invention affords a simple and practical runner construction, and minimizes the quantity of refractory which must be replaced as the runner is used. Since the nose projects beyond the bottom flange and wall, the "whisker" which forms as molten metal discharges does not weld to the metal shell of the runner. Instead the whisker welds to the retainer **18** or merely hangs from the nose, where it can be removed easily without damaging permanent parts of the runner.

While I have shown and described only a single embodiment of my invention, it is apparent that modifications may arise. Therefore, I do not wish to be limited to the disclosure set forth but only by the scope of the appended claims.

I claim:

1. In a runner which includes a metal shell and a refractory lining, said shell being formed of a bottom plate, side plates sloping upwardly from said bottom plate, side flanges fixed to the ends of said side plates, and a bottom flange fixed to said bottom wall and lying between said side walls and spaced inwardly from the end of said bottom wall and from said side flanges, said lining being formed of a permanent monolithic layer covering the inside of said bottom plate, said bottom flange and said side plates, and a semipermanent bottom layer overlying said monolithic layer, the combination therewith of a temporary nose at the discharge end comprising clips fixed to the outside faces of the respective side flanges, a metal retainer supported by said clips and extending between said side flanges, and a body of replaceable refractory built up in the space between said retainer and said monolithic layer and forming a continuation of said bottom layer and extending beyond said shell.

2. A combination as defined in claim 1 in which said retainer is an angle iron, said bottom flange and said side flanges supporting said angle iron in the space therebetween when said clips burn off.

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