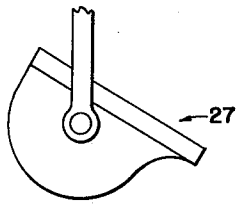
Oct. 22, 1957 C. D. PEARCE 2,810,170

SPLASH CONTROL MEANS FOR CASTING COPPER CAKES

Filed June 4, 1954



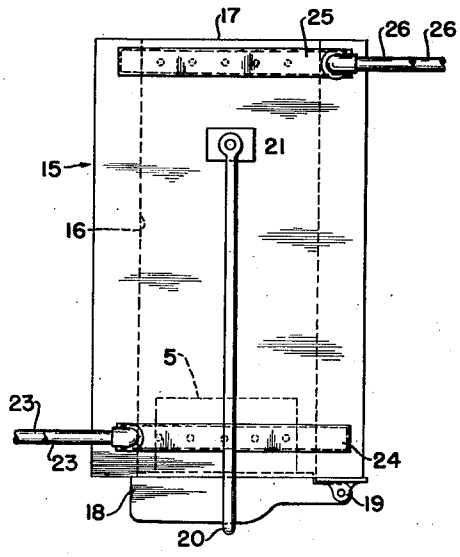


FIG. 3

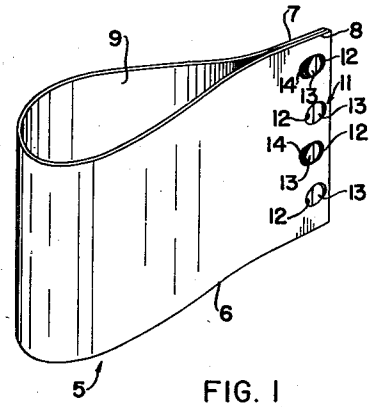


FIG. 1

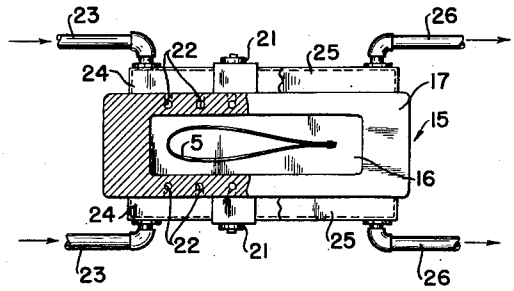


FIG. 2

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SPLASH CONTROL MEANS FOR CASTING COPPER CAKES

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Application June 4, 1954, Serial No. 434,396

1 Claim. (Cl. 22—139)

This invention relates to the casting of copper. More particularly, it relates to the casting of large copper cakes.

The production techniques used in the fabrication of products made from sheet copper have given rise to a demand for longer copper sheets and, therefore, larger copper cakes from which sheet copper is rolled. This demand can be satisfied most economically by supplying rolling mills with long copper cakes which are not unduly thick, for thereby the amount of work that must be expended in rolling the cake into thin sheet metal is minimized.

The mold in which copper cakes are cast preferably is arranged in an upright position such that the longest dimension of the mold cavity is its height (which corresponds to the length of the copper cake cast therein). The upper end of the mold is open and serves as an entrance for the molten copper. In order to cause rapid solidification of the molten copper, the mold itself is made of copper because of its high heat conductivity, and passageways are formed in the walls of the mold so that water may be circulated therethrough. Upright positioning of the mold is preferred because it minimizes the area of the copper-air interface and thereby concentrates surface imperfections and irregularities at a place where they will be the least objectionable. The practice of casting copper in a mold positioned in this manner is known as end-pouring.

In end-pouring, particularly in deep molds, special precaution must be taken to avoid casting defects which are likely to result as a consequence of the splashing of the molten copper when it strikes the bottom of the mold. In the absence of such precaution, masses of copper which rebound as splash from the bottom of the mold strike the cold walls of the mold cavity and solidify thereon. Although such masses are later inundated by molten copper as the mold is filled, frequently the surfaces of such copper masses are not fully remelted, and as a result the finally solidified copper cake is defective in that it contains deep pits and crevices, and even whole masses of copper which are not integral with the bulk of the cake. These defects are significant, because when the cake is rolled into sheet, cracks and folds corresponding to these defects appear and must be cut out, thus resulting in short lengths of sheet and defeating the purpose for which the large cake was cast. This phenomenon is especially aggravated when long copper cakes are end-poured (i. e. when molds having cavities of considerable height are used), as the molten copper then falls through a greater distance and therefore splashes more and to a greater height. Moreover, excessive cooling of masses splashed high on the walls of the cavity occurs because considerable time elapses before these masses become inundated.

Heretofore, splashing has been avoided by catching the molten copper as it first falls toward the open upper end of the mold cavity in a hand-operated ladle which is

positioned on the end of a long handle and, in form, resembles a pelican's pouch (from which it derives the name "pelican ladle"). The ladle is then quickly lowered to the bottom of the mold cavity, dumped, and withdrawn. This operation is hazardous and must be performed by a skilled workman.

The present invention provides an improved method and apparatus for casting large copper cakes which eliminates the undesirable consequence of splashing, and which does not involve any hazard or require the services of skilled workmen.

In accordance with the invention, a bottomless copper box is provided, the top of said box being open and its sides being substantially vertical. The box comprises a thin sheet of copper of rectangular shape bent back on itself so that opposite end portions of one surface of the sheet are contiguous, said end portions being secured together so that the horizontal cross section of the box thereby formed resembles the conventional outline of a teardrop. This bottomless box is used in combination with a vertical copper cake mold in which the height of the cavity is substantially greater than its length, and the length thereof is substantially greater than its width, and which has water-cooled side walls, by positioning the box inside the mold cavity with the lower edge of the box resting on the bottom of the mold, and with the walls of the box spaced all around from the sides of the mold.

When molten copper is poured into the mold, the stream of copper is directed so that the lower end thereof which first strikes the bottom of the mold is enclosed by the walls of the box, whereby the splash which occurs when the stream of molten metal first strikes the bottom of the mold is confined and is prevented from rebounding into contact with the chilled sides of the mold. Thereafter, the box is completely inundated with molten copper as the mold is filled, with the result that the box is melted and the copper thereof becomes an integral part of the copper cake cast in the mold.

A preferred embodiment of the invention is shown in the accompanying drawings, in which:

Fig. 1 is a perspective view of a bottomless copper box according to the invention;

Fig. 2 is a plan in partial section of a copper cake mold with a bottomless box according to the invention positioned therein; and

Fig. 3 is an elevation of the mold shown in Fig. 2.

Referring to Fig. 1, a bottomless box **5** is formed by a thin copper sheet **6** bent back so that opposite end portions **7** and **8** of one surface **9** of the sheet are contiguous. The thickness of the sheet **6** may be about 0.025 inch, but thinner sheets may be used, and if necessary the effective thickness of the box may be built up by using two or more sheets. The contiguous end portions **7** and **8** are secured together by copper fasteners. Conveniently, these end portions may be secured together by clips **11** which are integral with the sheet. Each clip is formed by making a semi-circular cut, as indicated at **12**, through the end portions **7** and **8** while they are bent back as hereinbefore described, and bending back the resulting two half discs **13** and **14** (one half disc being formed of the metal of each end of the sheet) so that they press the end portions **7** and **8** together.

Referring now to Figs. 2 and 3, a mold **15** is formed with a cavity **16** which, for a typical large cake, may have a height of 5 to 6 feet, a length of about 20 inches, and a width of about 5 inches. The upper end **17** of the mold cavity is open. The bottom of the mold is closed by a base-plate door **18** which is hingedly attached, as shown at **19**, to one end wall of the mold. During casting, the door is held closed by a bail **20** which spans the

width of the door and is pivotally connected at its ends **21** to each side of the mold. The bail thus can be swung out from under the door so the latter may be opened in order to remove a copper cake cast in the mold cavity.

The mold **15** is itself of copper, and is formed with vertical passageways **22** in its side walls so that cooling water may be circulated therethrough. The water is introduced into the passageways **22** through feed pipes **23** and inlet headers **24**, and is discharged from these passageways **22** through outlet headers **25** and offtake pipes **26**.

The bottomless copper box **5** hereinbefore described (which advantageously has a height of about 9 inches) is positioned lengthwise in the mold **15** with its lower edge resting on the closed bottom door **18** and with its sides spaced all around from the sides of the mold, as shown in Figs. 2 and 3.

Casting is commenced by pouring molten copper into the mold cavity from a ladle **27** so that it falls into the bottomless box **5** about midway between the ends thereof. The splash which occurs when the stream of molten copper first strikes the bottom of the mold is confined by the walls of the box so that it does not strike and congeal on the chilled side walls of the mold. As casting continues and the molten metal rises in the mold, the thin box is melted and thus is integrally incorporated in the cast cake. Melting of the box begins even before the box is covered by the molten metal, but once a pool of molten copper has formed at the bottom of the mold, no further objectionable splashing occurs.

I claim:

The combination with a copper cake mold having water-cooled side walls and a cavity for casting a copper cake therein, the height of the cavity being substantially greater than its length, and the length of the cavity being substantially greater than its width, and the upper end of said mold being open and serving as an entrance for the copper to be cast therein, of splash control means consisting of a bottomless copper box having an open top and substantially vertical side walls and comprising a thin imperforate sheet of copper bent back on itself and having its ends joined together so that the horizontal cross section thereof resembles the outline of a teardrop, said box being positioned inside said cavity with the lower edge of the sheet resting on the bottom of the mold and with the walls of said box spaced all around from the sides of said mold.

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