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H. E. DILLER.

ELECTRICAL HEATING MEANS FOR MOLDS.

APPLICATION FILED JAN. 14, 1907.

Fig. 1.

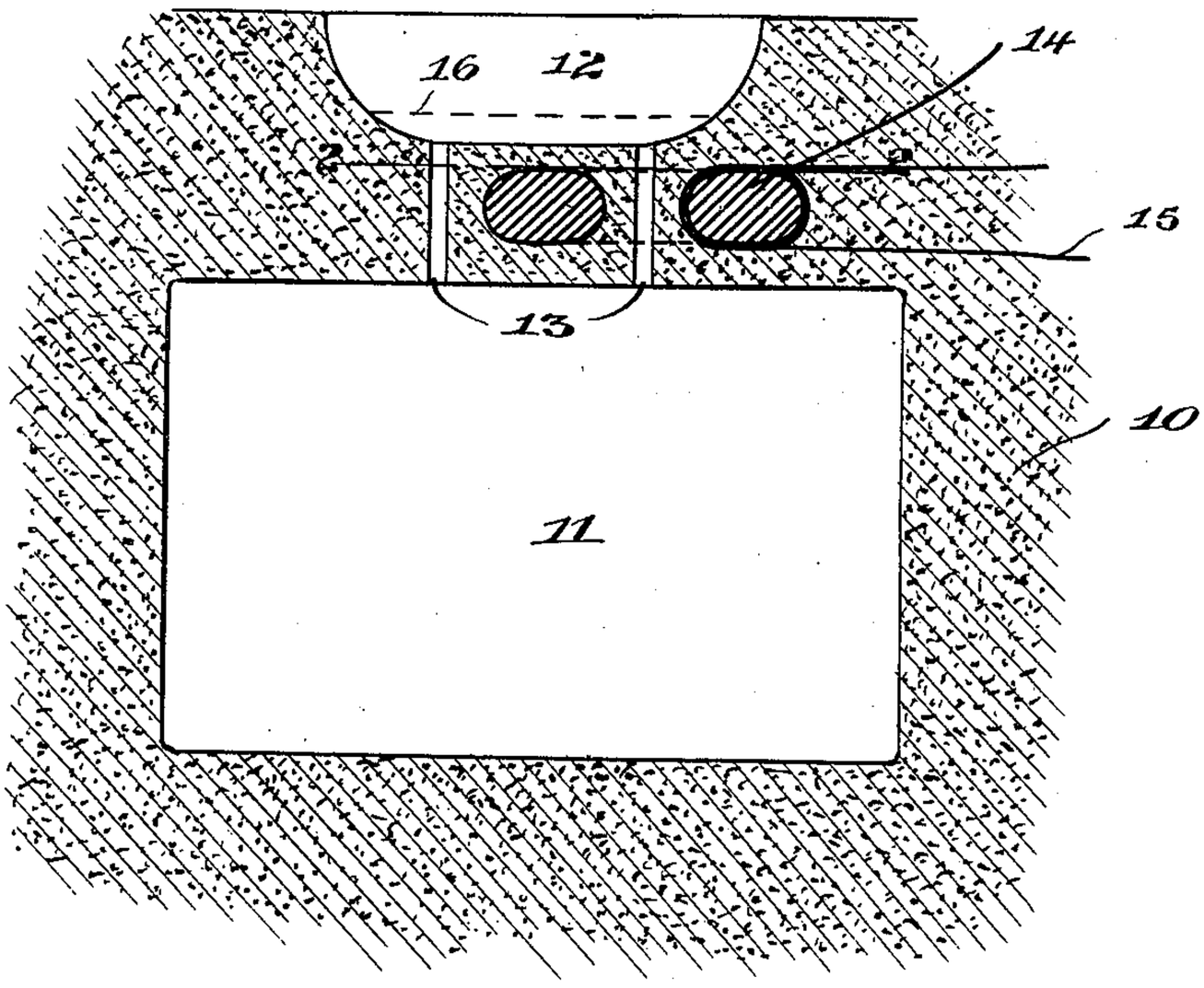


Fig. 2.

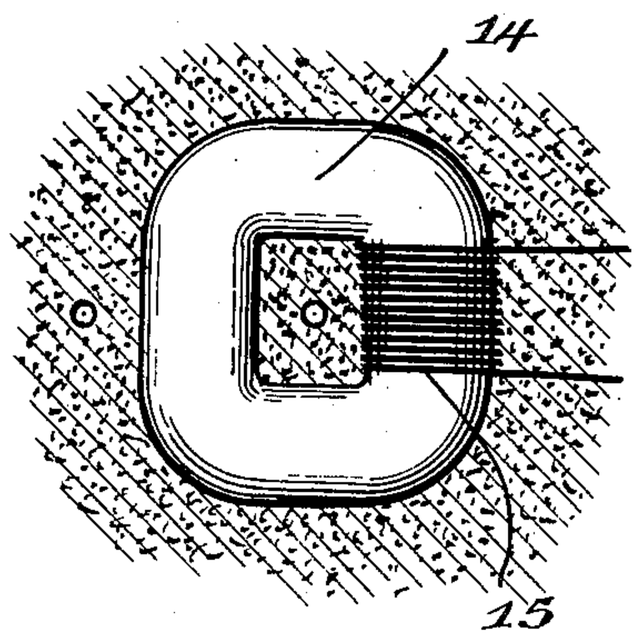
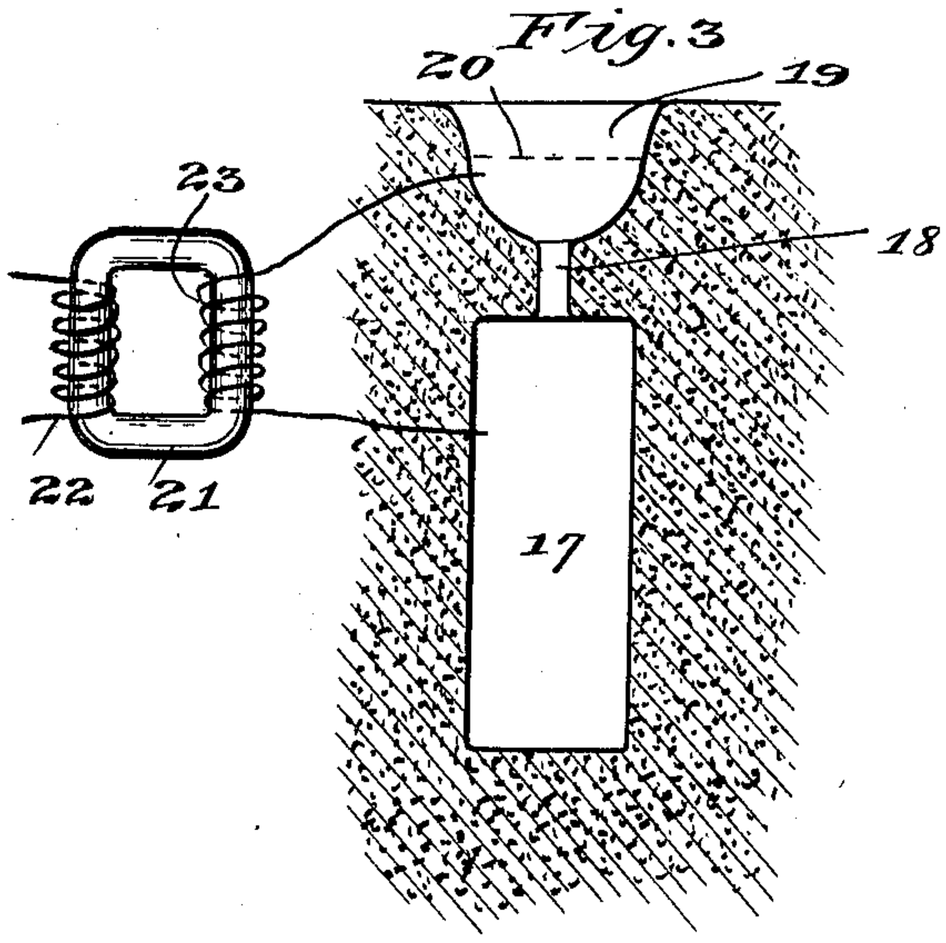


Fig. 3



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ELECTRICAL HEATING MEANS FOR MOLDS.

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Application filed January 14, 1907. Serial No. 352,226.

To all whom it may concern:

Be it known that I, HARRY E. DILLER, a citizen of the United States, residing at Oak Park, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Electrical Heating Means for Molds, of which the following is a specification.

My invention relates to means for heating and maintaining in a fluid state the metal in the risers or inlets of a mold whereby as the casting cools and shrinks the hot melted metal will flow into the mold to completely fill it and compensate for the contraction of the casting.

If no heating means be used the metal in the risers or intakes, because of their small cross-section, cools first and solidifies, while the main casting, because of its large size, is still in a fluid or semi-fluid state. Upon the cooling and contraction of the casting no additional metal can flow in because the inlets or risers are clogged with the solid metal.

For a heating means I prefer to use electricity and cause the current to traverse the metal in the risers which, because of its resistance to such passage, becomes or remains heated and continues in its fluid molten state until the casting has cooled whereby as the contraction or shrinking takes place more metal may flow in to fill the mold.

In the accompanying drawing which forms a part of this specification I have illustrated two desirable and preferred embodiments of my invention.

Figure 1 is a vertical section of a mold showing two risers or feeding passages and an electrical transformer so placed that the metal in the risers forms part of the secondary circuit; Fig. 2 is a horizontal section looking downwardly on line 2—2 of Fig. 1; and Fig. 3 is a vertical section of a modified form of means for accomplishing the desired result.

In Fig. 1 I have illustrated a mold of the simplest character including sand or other similar material 10, a mold cavity 11 in the same, and a receptacle 12 formed in the top of the mold and connected to cavity 11 by small risers or inlets 13. To those skilled in this art it will be apparent that the molten metal is poured into the receptacle or chamber 12 from which it passes through the inlets or passages 13 to the mold cavity 11 where is solidifies and forms a casting of the corresponding shape and size. In the sand 10 I place an electrical transformer 14 equipped with the usual primary conducting coil 15, the transformer being so placed that one inlet or riser 13 passes through the center thereof and the other riser is outside of the transformer, as is clearly shown in Figs. 1 and 2. If sufficient metal is poured into the mold so that the mold itself is not only filled but also the risers or inlets and the receptacle 12 to the level 16, then the secondary coil of the transformer, which in the present instance comprises a single loop, is composed of the metal in the two risers, that portion of the metal in the receptacle 12 between the risers, and the metal in the casting adjacent to the lower terminals of the risers. A current of electricity therefore passes through the metal of the risers, receptacle, and the casting near the delivery ends of the risers provided a current is sent through the primary coil 15.

Owing to the fact that the cross-section of the risers is small their contents either remain in a molten state or are heated sufficiently to become melted, then as the casting in the cavity 11 solidifies and contracts the metal contents of the inlets 13 may flow down into the mold to compensate for the shrinking and fill the mold. It will be observed also that the metal in the receptacle 12 may be sufficiently heated to remain in a molten state whereby a delivery of melted metal from the inlets or risers to the mold will result in a corresponding feeding of metal to the upper ends of the risers. Ordinarily an electrical current in the primary coil 15 would be maintained continuously until the casting had cooled sufficiently so that no advantage would result in maintaining the contents of the risers in a heated and fluid state. One great advantage of the construction shown in Fig. 1 is that the metal itself forms the complete secondary coil of the transformer and no electrical conducting wires come in contact with the molten metal.

In Fig. 3 there is illustrated a modification in which the metal forms only a part of the secondary circuit of the transformer. The mold 17 has a single inlet or riser 18 and a depression in the sand or receptacle 19 into which the molten metal is poured. Ordinarily sufficient molten metal would be

poured into the mold to rise to the level 20 above the upper end of the inlet 18. As in the previous instance an electrical transformer 21 is employed, the same having a primary coil 22 and a secondary coil 23, the terminals of which protrude into the mold 17 and into the receptacle 19 below the surface 20 of the metal so as to form a complete secondary electrical circuit, the metal in the riser 18, in the receptacle 19, and in the mold 17 forming a part of this circuit. The same result accrues from this construction as in the previous instance, that is, the contents of the inlet and receptacle are kept in a hot fluid state so as to be capable of flowing into the mold upon contraction or shrinkage of its contents. In Fig. 3 I have shown the ends of the wire constituting coil 23 as projecting into the mold and receptacle but it will be apparent to those skilled in the art that any suitable means for securing a conducting electrical connection between the secondary coil and the metal of the mold may be used, such for instance as plate terminals.

Although in both embodiments of my invention I have shown and described the use of an electrical transformer, it should be noted that the transformer may be dispensed with if desired and the connections so made that the metal to be heated will form a part of an ordinary electrical circuit supplied with a current either direct or alternating. The advantage of using a transformer in the relation shown in Fig. 1 is apparent since no insulated wire secondary coil is needed as the metal in the mold forms a complete secondary circuit of one convolution. The action of the electrical current on the metal is well understood. Since the cross-sections of the inlets are small the metal therein offers a considerable resistance to the passage of an electrical current with the result that the metal becomes heated, in fact it may be heated sufficiently to render it fluid or keep it fluid after it has once been poured in in a melted state.

Numerous modifications of the method of employing this invention to advantage will occur to those skilled in the art, and it should be understood that my invention is not restricted to the exact details shown and described but that the same may be varied within wide limits without sacrificing the benefits of my invention or departing from the substance thereof. Instead of using the passages 13 or 18 for the introduction of the main body of molten metal to the mold, it may be poured through a larger main riser or inlet to a depth such that it will rise in the auxiliary electrically heated risers to perform the functions outlined above.

I claim:

1. The combination of a mold having one or more risers or inlets, and an electrical means to heat the metal in said riser or risers, said metal forming a part of the electrical conducting circuit, whereby as the metal in the mold cools and shrinks additional hot molten metal in the riser or inlet may flow into the mold to compensate for the shrinkage of its contents, substantially as described.

2. The combination of a mold having one or more risers or inlets, and an electrical means for heating the metal in said riser or risers, said means including a transformer of which the metal in said riser or risers forms at least a part of the secondary circuit, whereby as the metal in the mold cools and shrinks additional hot molten metal in the riser or inlet may flow into the mold to compensate for the shrinkage of its contents, substantially as described.

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