

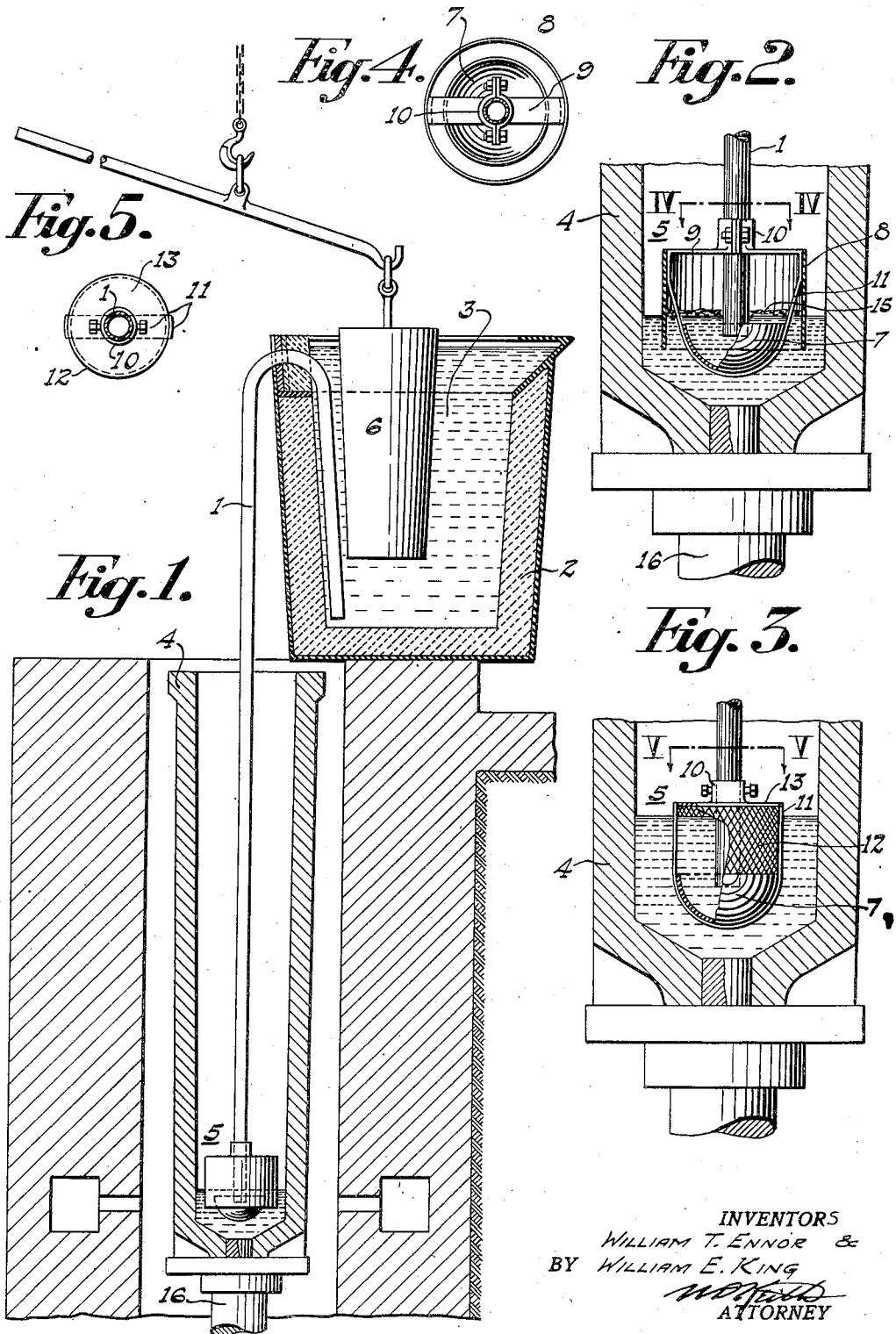
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METAL TRANSFER SYSTEM

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METAL TRANSFER SYSTEM

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This invention relates to the transfer of molten metal. It relates particularly to a new and improved system for the transfer of molten metal from one container to another, such as from a crucible to an ingot mold, for example.

The primary object of our invention is to provide an improved transfer apparatus or system for delivering a quiet flow of substantially dross-free metal.

Our invention contemplates accomplishing this and other objects which will be apparent from the following description and claims, in a simple and economical manner by the use of apparatus simple in construction and easy to keep clean and in operating order. In order that the nature of our invention may be more readily understood, it will now be described with reference to the accompanying drawing in which;

Figure 1 is a diagrammatic view in vertical section, with parts in elevation, of apparatus comprising a preferred embodiment of our invention in operative position;

Figure 2 is an enlarged sectional view of part of the apparatus shown in Fig. 1;

Figure 3 is a similar view of another embodiment of our invention;

Figure 4 is a plan view taken along the line IV-IV in Fig. 2; and

Figure 5 is a plan view taken along the line V-V in Fig. 3.

Like reference numerals have been used to designate like parts throughout the drawing.

The casting assembly shown in Fig. 1 consists of a siphon 1 connecting a crucible 2, containing molten metal 3, with a mold 4, a device 5 being associated with the siphon for collecting and removing dross from the metal transferred and diffusing the force of the flowing metal. Two forms of this device are shown in more detail in Figs. 2 and 3. The crucible 2 is equipped with means for starting the operation of the siphon, consisting preferably of a displacement device or member 6, which is adapted to be rapidly inserted in the molten metal in the crucible to temporarily raise its level above the level of the highest point of the siphon, thereby starting the flow of the metal through the siphon. The siphon is usually luted in position in a notch in the crucible wall, as shown in Fig. 1.

The diffusing and dross-collecting device 5, in the form shown in Figure 2, consists essentially of a substantially hemispherical bowl 7 positioned beneath the discharge end of the siphon 1, and means for collecting dross separating from the metal transferred, in the form of a plate or baffle

8 surrounding the pipe and bowl. As shown in Figs. 1 and 2, the end of the discharge pipe and the lower edge of baffle 8 extend below the surface of the metal contained in the mold or other receiving vessel 4, and the bowl 7 is completely submerged beneath the surface of the metal. The baffle 8 is usually supported by two or more ribs 9 extending from a clamp ring 10 on the discharge pipe 1. The bowl may be suspended from the ribs 9 or the clamp 10 by two or more rods or metal straps 11. Both the baffle and the bowl may be supported in any other convenient manner, but while not essential, it is preferable to arrange these parts in fixed relation to each other and to the discharge pipe prior to using. In the preferred relation or position of parts, the lower edge of the baffle 8 extends somewhat below the end of the discharge pipe, and the bowl 7 is placed with its edge surrounding and extending somewhat above the end of the discharge pipe. This relative position may be varied, however.

Another form of diffusing and dross-collecting device is shown in Figure 3. The bowl 7 positioned under the discharge pipe is similar to the bowl used in the alternative form hereinabove described. The essential difference between the two forms lies in the form of baffle employed for collecting the separated dross. In place of a solid baffle plate dipping below the surface of the metal, we use a screen or perforate member 12, which is preferably coextensive and concentric with the edge of the bowl 7, on which it rests. This screen may be provided with a solid cover 13, so that the device can, if desired, be totally immersed in the metal in the mold without permitting dross to escape over its top. The bowl can be conveniently supported by means of ribs 11 extending from the cover 13, which is usually fastened to the discharge pipe 1, or extending from the pipe if a cover is not used.

In the first-described form of diffusing and dross-collecting device, the bowl 7 and the imperforate cylinder or baffle 8 are customarily fabricated from metal plate, and in the device shown in Fig. 3 we have found it preferable to employ a screen or perforate member 12 made from "stainless steel" or "stainless iron", especially when the device is used for transferring molten aluminum. At times it may be necessary to protect the metal parts from attack or solution by the metal being transferred, and in that case part or all of the apparatus, including the siphon itself, may be given a lime wash. This is done by heating the apparatus somewhat above the boiling point of water and treating the heated

surface with a slurry of lime. Before use the apparatus is again heated sufficiently to drive off any moisture remaining on the surface or in the coating.

5 The operation of both forms of the diffusing and collecting device 5 is substantially the same. The metal discharged from the siphon impinges on the inner surface of a concave bowl 7 and the direction of its flow is substantially reversed, causing diffusion of the metal and producing a gentle rolling motion, which expedites the separation of dross entrained in the metal. With the device shown in Fig. 2, the separated dross 15 is collected on the surface of the metal in the receiver and held in the annular space between the discharge pipe and the baffle 8. Upon withdrawal of the transfer apparatus from the receiver 4, the dross not removed in the bowl 7 floats on the surface of the metal in the receiver in a compact mass and can be readily removed. With the device shown in Fig. 3, the dross is separated from the metal by a screen 12 and collects within the screen, and is removed from the receiver when the transfer apparatus is removed.

25 The operation of a casting assembly embodying our invention will now be readily understood. The siphon 1 or other transfer device, which preferably terminates in a vertical discharge pipe, is positioned, by means of an overhead crane or the like, to discharge into the mold or receiver 4. If the mold is empty, the discharge pipe is inserted therein until the device 5 is on or near the bottom of the mold, and if the mold is partially filled the discharge pipe is inserted until its end is below the surface of the metal. The bowl 7 positioned under the discharge pipe is then, of course, entirely submerged. When using a diffusing device of the type shown in Fig. 2, the lower edge of the cylinder or baffle 8 also extends below the surface of metal in the mold, either when starting the flow or very soon after starting it, so that the metal turned upwardly by impingement on the concave surface of the bowl 7 must then flow downwardly beneath the edge of the cylinder 8 into the mold. As the metal fills the receiver the transfer device is gradually raised, or preferably the receiver is lowered by means of a piston 16 or its equivalent, care being taken that the lower edge of the baffle 8 (if used), and preferably the lower end of the discharge pipe, are always beneath the surface of the metal. When the casting operation is complete the transfer device is removed, and any dross not removed therewith remains in a compact mass floating on the surface of the molten metal in the receiver, from which it is easily skimmed with a ladle.

Our diffusing and dross-collecting devices may take forms other than the two shown and described without materially changing the operation of metal transfer systems in which they are employed. While such devices are especially advantageous when employed with siphons or other transfer means of the vertical discharge type, they may readily be adapted for use with other types of transfer devices, including those types in which the transfer or discharge member is substantially horizontal. The size, both relative and absolute, and the relative position of the elements of our improved metal transfer system, may be varied in accordance with the amount of metal to be transferred and the desired rate of transfer. Our invention is therefore not limited to the exact structure and relative dimensions disclosed herewith, but may be variously embodied

within the scope of the following claims.

We claim:

1. A molten metal transfer system comprising a container for molten metal, a receiver for molten metal, a siphon adapted to deliver molten metal from said container into said receiver, means adapted to start a flow of molten metal through said siphon, and means associated with the discharge end of said siphon adapted to diffuse metal and collect dross delivered by the siphon.

2. In a molten metal transfer system, a container for molten metal, a receiver for molten metal, a siphon adapted to transfer molten metal from said container to said receiver, and means positioned within said receiver and adjacent the discharge end of said siphon for diffusing metal and collecting dross discharged by said siphon.

3. In a molten metal transfer system, a receiver for molten metal, a siphon having a discharge pipe extending into said receiver, a concave member positioned to receive metal discharge by said pipe and adapted to substantially reverse the direction of its flow, and means cooperating with said concave member to collect dross discharged with the metal.

4. In a molten metal transfer system, a discharge pipe, means positioned to receive metal discharged by said pipe and adapted to substantially reverse the direction of its flow, and a member extending above said means and downwardly at least to the top thereof and cooperating therewith to collect dross discharged with the metal.

5. In a molten metal transfer system, a discharge pipe, a concave member having edges surrounding and extending above the end of said discharge pipe, and a device at least co-extensive with said concave member and extending above the edges thereof and adapted to collect dross.

6. In a molten metal transfer system, a discharge pipe, a substantially circular concave member positioned to receive metal discharged by said pipe and having edges extending above the end of said pipe, and a substantially circular baffle extending above said concave member and having a diameter at least as great as the diameter of said member.

7. In a molten metal transfer system, a discharge pipe, a member with a concave surface positioned to receive the discharge from said pipe and adapted to substantially reverse the direction of its flow, and a cooperating member extending upwardly above and downwardly at least as far as the edge of said member with a concave surface and adapted to collect dross, at least one of said members being supported by the discharge pipe.

8. In a molten metal transfer system, in combination with a receiver containing molten metal, a discharge pipe extending into said receiver, a concave member positioned beneath the surface of the metal in said receiver and adapted to substantially reverse the direction of flow of metal discharged by said pipe, and means cooperating therewith for collecting dross discharged by said pipe.

9. In a molten metal transfer system, in combination with a receiver containing molten metal, a discharge pipe extending into said receiver, a concave member positioned beneath the surface of the metal in said receiver and adapted to substantially reverse the direction of flow of metal discharged by said pipe, and a device at least coextensive with said concave member and extending beneath the surface of the metal and

adapted to collect dross discharged by said pipe.

- 5 10. In a molten metal transfer system, in combination, a discharge pipe and a diffusing and dross-collecting device, said device comprising a concave member positioned to receive molten metal discharged by said pipe and adapted to substantially reverse the direction of its flow, and a baffle surrounding said concave member and adapted to collect dross.
- 10 11. In a molten metal transfer system, in combination, a discharge pipe and a diffusing and dross-collecting device, said device comprising a concave member positioned to receive molten metal discharged by said pipe and adapted to substantially reverse the direction of its flow, and a perforate member extending upwardly from the edge of said concave member and adapted to collect dross.
- 15 12. In a molten metal transfer system, a receiver containing molten metal, a discharge pipe extending into said receiver and terminating beneath the surface of metal therein, a concave member submerged beneath the surface of said metal with its edge extending above and surrounding the end of said discharge pipe, and a concentric baffle extending below the edge of said concave member and above the surface of the metal.
- 10 13. In a molten metal transfer system, a receiver containing molten metal, a discharge pipe extending into said receiver and terminating beneath the surface of metal therein, a concave member submerged beneath the surface of said metal with its edge extending above and surrounding the end of said discharge pipe, and a concentric perforate member extending upwardly from the edge of said concave member.

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