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METHOD OF MOLTEN METAL FEED FOR DIE CASTING.

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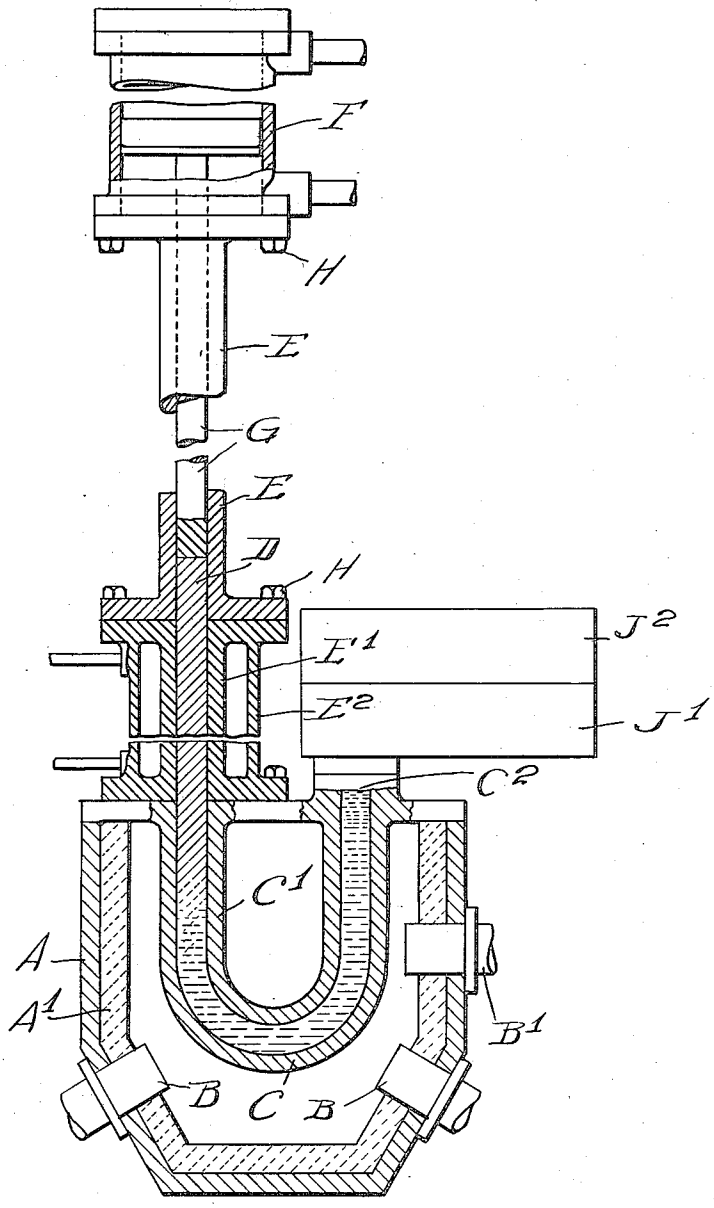
1,219,358. Patented Mar. 13, 1917.



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UNITED STATES PATENT OFFICE.

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METHOD OF MOLTEN-METAL FEED FOR DIE-CASTING.

1,219,358. Specification of Letters Patent. Patented Mar. 13, 1917.

Application filed November 20, 1915. Serial No. 62,525.

To all whom it may concern:

Be it known that I, JOHN K. STEWART, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented new and useful Improvements in Methods of Molten-Metal Feed for Die-Casting, of which the following is a specification, reference being had to the accompanying drawings, forming a part thereof.

The purpose of this invention is to provide an improved method for heating metal to be used for casting and feeding the molten metal to the molds under pressure. The means for putting this method into practice are somewhat diagrammatically illustrated in the drawings, but the method itself comprises certain essential features hereinafter described and indicated by the appended claims.

In the drawings:

The figure is a vertical sectional view of an apparatus for heating and feeding molten metal according to this invention.

The apparatus illustrated in the drawings and the process it is adapted to perform has been particularly worked out with reference to casting aluminum which by virtue of its basic or alkaline nature rapidly attacks metallic containers and fittings such as valves on such containers, and when used in the usual die casting process with air pressure for forcing the metal into the mold, the presence of the air under pressure tends to increase the chemical action between the aluminum and the other metal of the container, making frequent replacements necessary and seriously hampering the work.

The present process is designed to dispense with the use of air pressure by substituting therefor mechanical pressure exerted directly upon the molten metal as hereinafter indicated. The metal is prepared for use by rolling it into bars of uniform cross-section, preferably round, and of convenient diameter, say about one inch. Within the fire box or retort, A, suitably lined with fire-clay or fire-brick, A^1, in the usual manner, and provided with gas burners, B, there is mounted a substantially U-shaped tube or pipe, C, having a vertically disposed section, C^1, which may be termed its intake end, and a similarly disposed parallel section which constitutes its discharge end and may be formed with any convenient shape of discharge nozzle, C^2, adapted for connection to a mold for receiving the molten metal. The tube, C, is of the same uniform cross-section and has the same sectional shape as the prepared rod of metal indicated at D. Leading to the intake end, C^1, there is mounted a straight container, E, also of the same cross-sectional shape and area as the rod, D, and communicating directly with the upwardly open portion, C^1, of the pipe, C. If desired the container, E, may be made in two parts of which the lower part, E^1, is fitted with a water cooling jacket, E^2, and being permanently fixed at the top of the retort, A, the upper part, E, being separable from said lower part and secured thereto by bolts, H. Above the container, E, there is shown a hydraulic cylinder, F, having a ram or plunger, G, formed to fit the bore of the container, E, and adapted to descend therein when said container, E, is mounted in registration with the lower section, E^1, and curved conduit, C.

The operation of the apparatus is as follows: A section of aluminum or alloy rod, D, is placed in the upper section of the container section, E, while the latter is detached from and out of registration with the lower section, E^1. Said under section of the container, E, is then placed in registration with the section, E^1, and secured in place by said bolts, H. The plunger, G, by the application of hydraulic pressure in the cylinder, F, is then caused to descend into contact with the upper end of the rod, D, and moves farther to force the rod through the section, E^1, of the container and into the initial portion of the curved conduit, C. Heat being applied to said curved conduit, C, by means of the gas burners, B, in the retort, A, the lower end of the rod, D, soon becomes molten so that it is adapted to flow through the curved portion of the conduit, C, whereupon the hydraulic plunger, G, is lowered still farther to force the rod, D, farther into the retort, A. This may be continued until the entire length of the conduit, C, is nearly filled, whereupon if a suitable die be connected with the nozzle at C^2, and the plunger, G, moved a short distance downward, the molten metal will be discharged from the nozzle into the die and by reason of the pressure supplied through the plunger, G, and the upper end of the rod, D, will be forced into said die as completely and effec-

tively as if air pressure were employed for that purpose acting directly upon the molten metal. The die is shown in two parts, J^1 and J^2; the lower part, J^1, may have a duct, not shown, leading from the nozzle, C^2, to the mold, and the upper part, J^2, may be raised for removal of the casting after the usual chilling process. If desired a special burner, B^1, may be located near the nozzle, C^2, to insure that the metal at this point shall be maintained in a thoroughly molten condition. It will be further understood that the water cooling jacket at E^2, will serve to dissipate the heat conducted from the melting conduit, C, to the upper portion of the rod, D, so as to prevent said portion from unduly enlarging and becoming tight in either section of the container, E, or from softening prematurely therein.

I claim:—

1. The method of feeding metal for casting, consisting in advancing a rod of the metal as required through a confining conduit whose cross-sectional area is substantially that of the rod, and applying heat to a portion of said conduit in sufficient quantity to melt the rod therein, whereby the unmelted portion of the rod operates as a piston for expelling the melted portion through the heated portion of the conduit.

2. The method of feeding metal for casting, consisting in advancing a rod of the metal as required through a confining conduit and applying heat to a part of said conduit in sufficient quantity to melt the rod therein, and also applying cooling means to a part of the conduit immediately preceding such heated portion for dissipating the heat conducted thereto.

3. The method of feeding metal for casting, consisting in advancing a rod of the metal as required through a substantially straight confining conduit whose cross-sectional area is substantially that of the rod into an approximately U-shaped conduit and applying heat to said latter conduit in sufficient quantity to melt the metal contained therein.

4. The method of feeding metal for casting, consisting in forcing a rod of the metal through a substantially straight confining conduit into one arm of an approximately U-shaped conduit, applying heat to said U-shaped conduit in sufficient quantity to melt the metal therein, and further advancing the rod for discharging the molten metal from the other arm of the heated conduit.

In testimony whereof I have hereunto set my hand at Chicago, Illinois, this 18 day of November, 1915.

JOHN K. STEWART.