July 16, 1940. J. HAUCK 2,208,368

APPARATUS FOR THE PRODUCTION OF GOODS BY CENTRIFUGAL CASTING

Original Filed May 15, 1937 5 Sheets-Sheet 1

Fig. 1

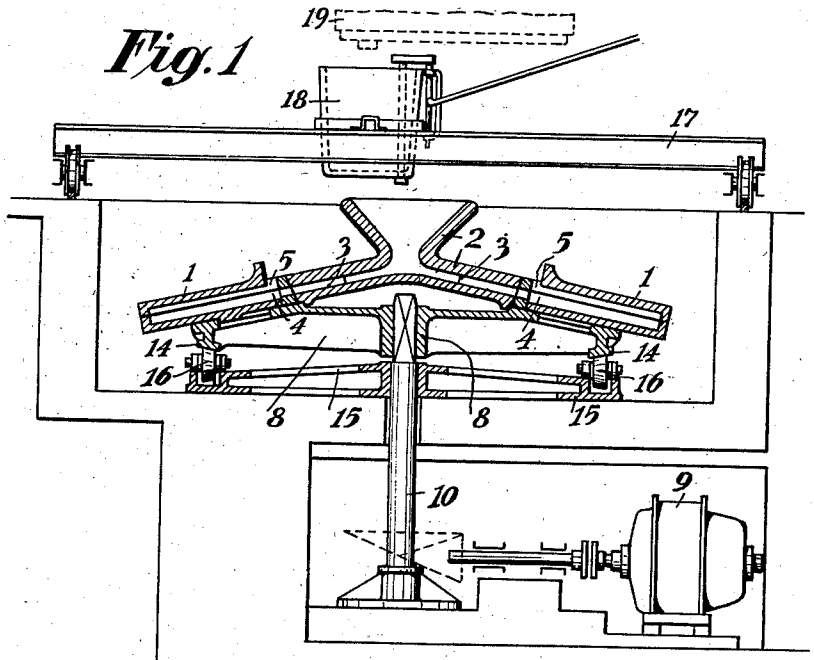
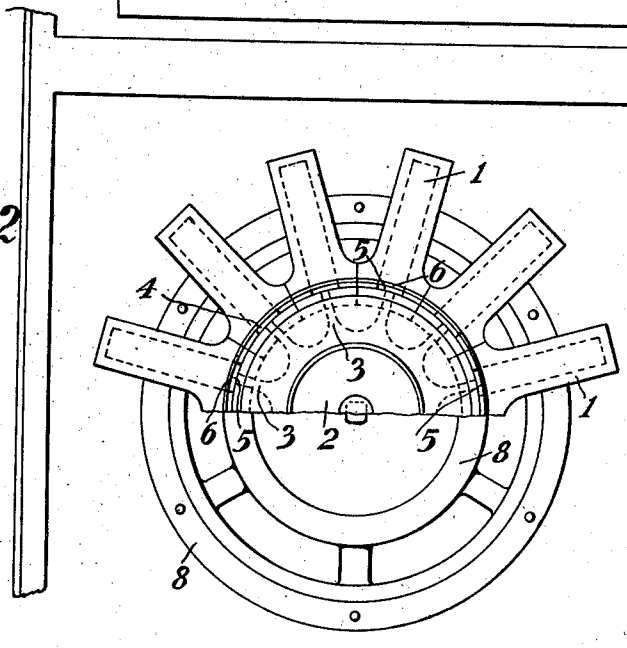


Fig. 2



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Fig. 3

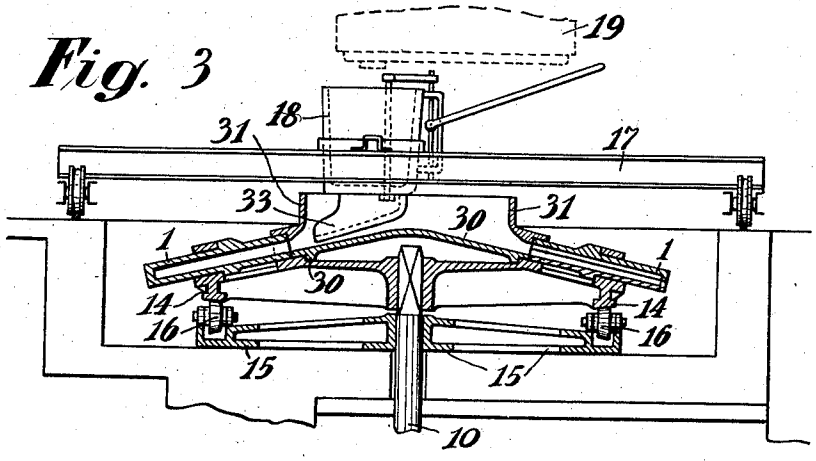
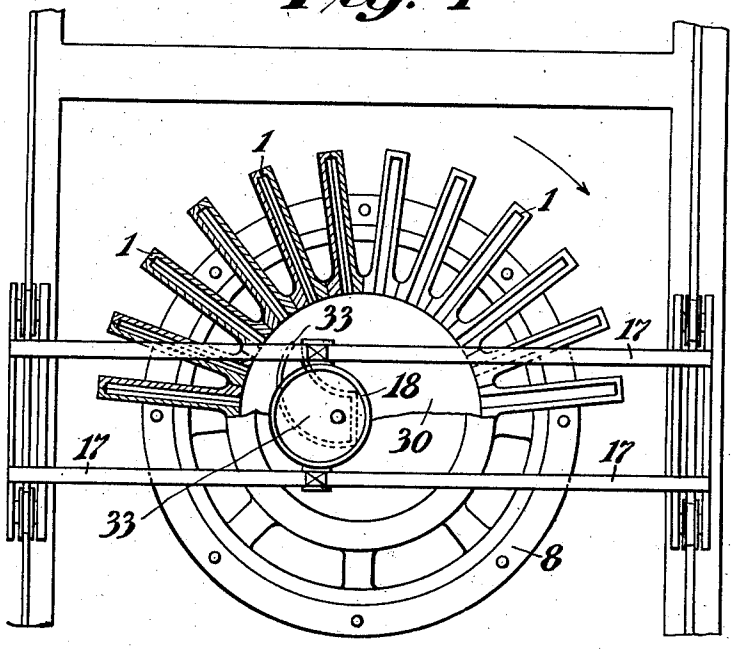


Fig. 4



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Fig. 7

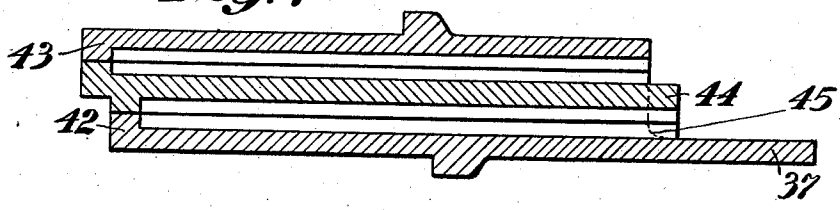


Fig. 5

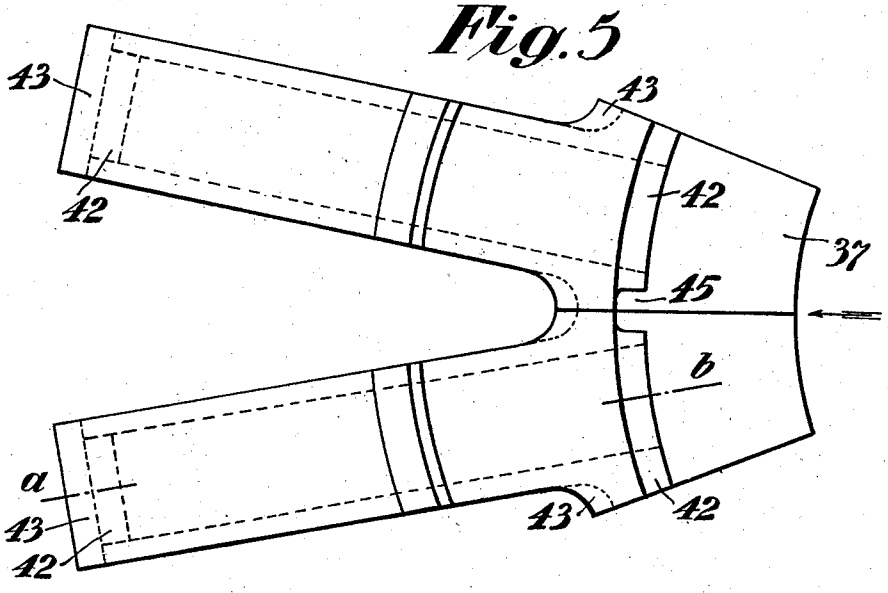


Fig. 6

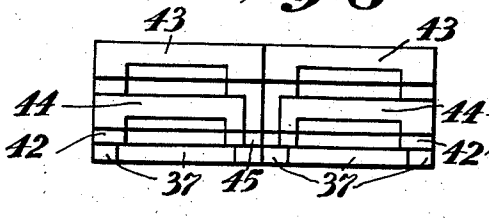
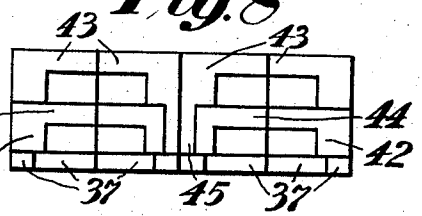


Fig. 8



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Fig. 9

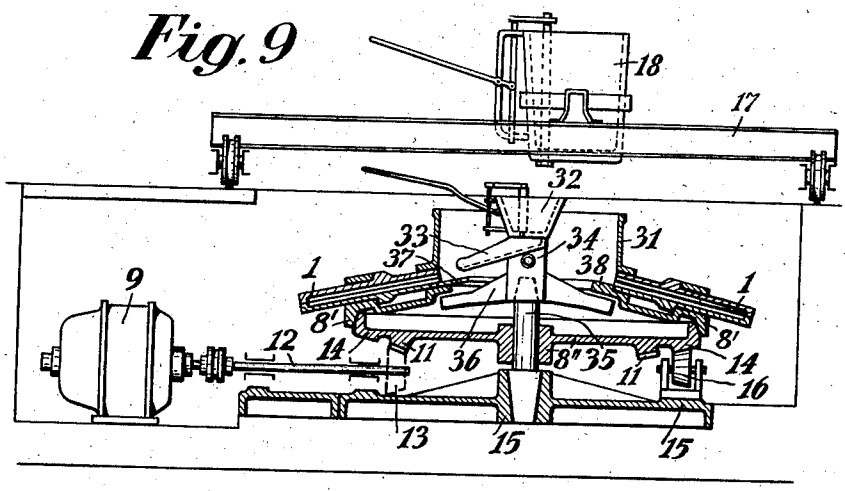
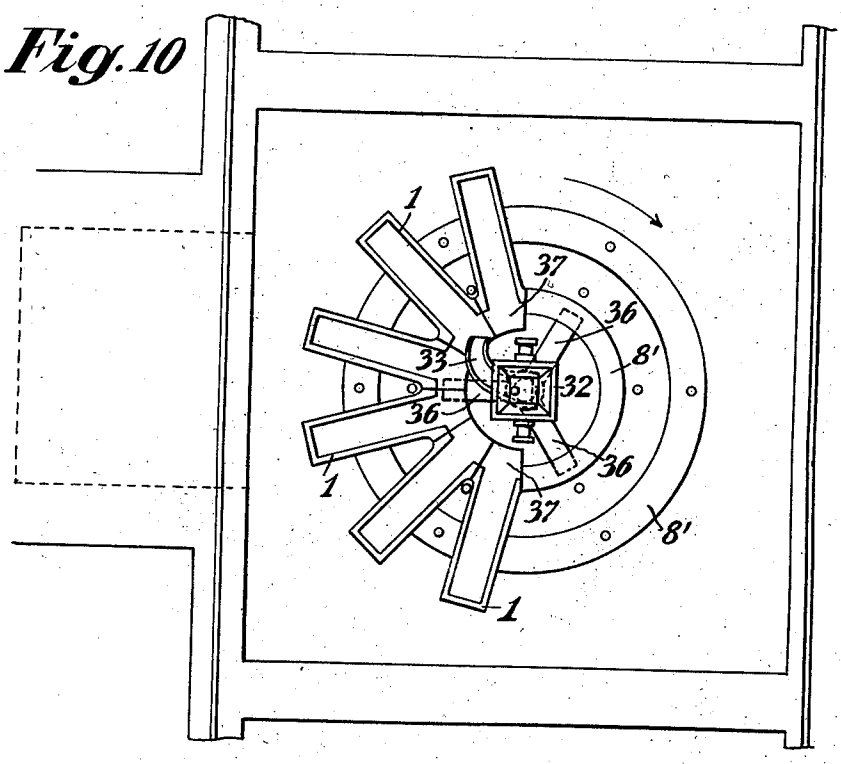


Fig. 10



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Fig. 11

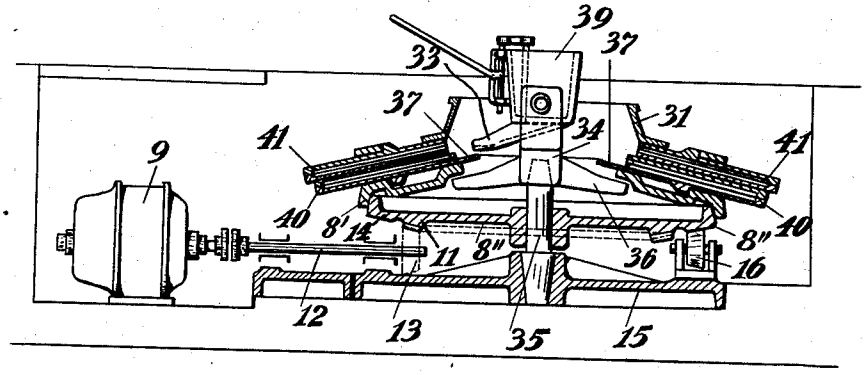
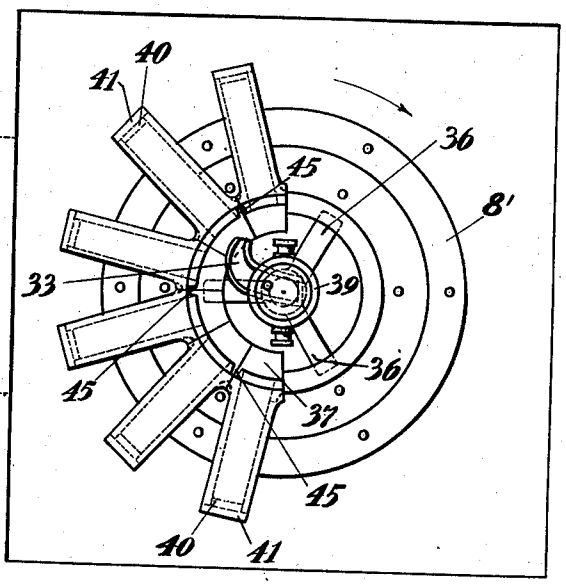


Fig. 12



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Patented July 16, 1940 2,208,368

UNITED STATES PATENT OFFICE

2,208,368

APPARATUS FOR THE PRODUCTION OF GOODS BY CENTRIFUGAL CASTING

Julius Hauck, Ternitz, Austria

Original application May 15, 1937, Serial No. 142,842. Divided and this application January 6, 1938, Serial No. 183,733. In Austria May 20, 1936

1 Claim. (Cl. 22—65)

The invention refers to an apparatus for commercial mass production, especially of semi-manufactures (for example bars, billets, blooms, vessels, etc.), by means of centrifugal casting, in which certain difficulties that were encountered heretofore are avoided as far as possible.

This application is a division of my application Serial No. 142,842, filed May 15, 1937.

The new apparatus is intended to allow the casting of the metal in moulds which are arranged so as to be permanently inclined downwardly with respect to the vertical axis, the inclination preferably corresponding to the direction of the resultant of the centrifugal and gravitational forces acting upon the metal which is being cast, and room being left for the air contained in the moulds to escape unhindered.

In order to have all of the moulds filled evenly and quietly, the apparatus according to the invention comprises a plurality of moulds arranged around a vertical axis and means constituting in the centre of the apparatus a conical distributor for supplying molten metal to said moulds substantially in the direction of the centrifugal force.

In one species of this type of apparatus, said conical distributor and said moulds are mounted on a base member adapted to be driven by a motor or other driving means rotationally, said conical distributor being adapted to be removed separately from said base member, and also being adapted to be removed from the driving means as well as mounted thereon conjointly with said base member. Hereby a great facility in operation of the whole apparatus is attained.

In another species of said apparatus it is provided to arrange the moulds so as to form substantially continuations of the conical plane of the said distributor, the moulds being arranged in a plurality of superposed circles.

In a preferred embodiment of this kind of apparatus the individual moulds are so positioned that the moulds of the uppermost circle are parallel to, and extend outwardly beyond, those of the next following lower circle.

Hereby a definite sequence of filling of the individual circles of moulds is ascertained without losing the control of molten metal, since the latter will first fill the lowermost circle and after completing this rise and fill the superposed circle and so on. It will easily be understood that such casting with multiple circles of moulds is much more effective and quicker than it would be otherwise.

In order to further assist the molten metal in the rising and filling the superposed circle of moulds, it is further provided to make certain recesses in the inwardly directed front walls of the moulds between the entering openings of adjacent molds of a lower circle whereby molten metal is caused to flow into the moulds in the next following superposed circle when the moulds of the lower circle are completely filled.

In certain cases it will be advisable to let each of the moulds in a lower circle and the corresponding superposed moulds in the next following upper circle constitute a twin mould, preferably divided along the central vertical plane which they have in common.

As a third species of my new apparatus I provide each mould having at its bottom side near the pouring in opening an inclined projection adapted to form a portion of a conical plane which is built up in consequence of the close juxtaposition of all of said projections. The juxtaposition of the said inclined projections fitting to each other will result in the formation of a conical plane being a substitute for a conical distributor firmly and permanently constructed.

Instead of providing the said projections at the inner ends of the moulds, it may also be satisfactory to provide such projecting plane by constructing a protruding inclined rim extending beyond the pouring in opening of each mould, said rim being integral with the base member, and thus constituting a conical plane.

In Figures 1 to 12 there are illustrated by way of example, some forms of apparatus in accordance with the invention. Figs. 1 and 2 show a casting device in sectional elevation and in part-sectional plan view respectively. Figs. 3 and 4 illustrate a modified casting device in sectional elevation and in part-sectional plan view respectively. Figs. 5 and 7 show two adjoining moulds (twin mould) in plan view and in sectional elevation respectively. Figs. 6 and 8 are front views of the twin mould provided with distributing members. Figs. 9 and 10 illustrate in sectional elevation and in plan view respectively a casting device with a cone-shaped distributor of modified construction. Figs. 11 and 12 show in sectional elevation and in plan view respectively a casting device provided with a superposed and outwardly displaced mould.

Figure 1 is an elevation of a device for the centrifugal casting of semi-manufactures, such as bars or the like. Fig. 2 is the corresponding plan view. The molten metal is fed to the moulds 1 by means of a central pouring head 2, known per se, which is provided with ducts 3 and is situated adjacent to the moulds, completely enclosing their pouring apertures 4; the moulds 1 are provided, preferably above their pouring apertures 4, with one or more correspondingly large openings 5, through which the air, gases and the like contained in the moulds, and perhaps in the molten metal, can escape unhindered when the molten metal is poured.

The central pouring head 2 and the moulds are arranged on the base member 8, which carries them, so that they can be removed individually,

but could be placed upon and removed from the driving element conjointly with the base member. It is thus possible easily and quickly to place on the driving element another base member with empty moulds and another central pouring head, so that the process can, in some cases, be continued by repeated use of the same moulds and the same central pouring head with one and the same charge. In order that it may not be necessary, upon removal of the moulds, to remove the whole relatively heavy base member 8, this may be carried out in two parts comprising, for example, as shown by Fig. 9, the lighter upper part 8' upon which the moulds and the central pouring heat are arranged, and the lower part 8'', upon which the upper part 8' is placed. The drive of the base member about the vertical axis may be effected by a motor 9 and driving shaft 10, for example, as illustrated in Fig. 9, by means of a spur gear 11, arranged on the underpart 8'' of the base member system 8', 8'' and with which a pinion 13 mounted on a horizontal driving shaft 12 meshes, or by a roller system, friction system etc. The relatively large rotating parts are firmly borne in that the base member is supported, for example by its rim 14, on a number of rollers 16 arranged, for example, on a base plate 15. Above the centrifugal casting device, there is arranged a travelling frame or the like 17, which is, for example, capable of travelling on rails, and which carries the auxiliary ladle 18, which is preferably movable upon it and into which it is preferred to pour, from the main ladle 19 only so much metal at a time as is necessary for one filling of the moulds, as described in my copending application of even date, Ser. No. 183,684.

The form of apparatus shown in vertical section in Fig. 3, and in Fig. 4 in plan, partly in section through the moulds (the one half of the base member 8 being shown without moulds), is again intended for carrying out the centrifugal casting. In this case, instead of the central pouring head 2, there is provided a conical distributor for leading the metal to the moulds, which, like the moulds 1, is arranged on the base member 8 so as to be individually removable, but can be mounted upon and removed from the driving element conjointly with these parts. The conical distributor has, above all, the advantage that it is simpler, lighter and cheaper than the central pouring head 2 and has no ducts and therefore none of the attendant disadvantages. A further advantage of the conical distributor lies in the fact that the metal can be poured onto it at any desired point on its upper surface, the stream of molten metal not being required to strike at a particular narrowly defined spot. Further, the conical distributor is able to lead the metal to the moulds with greater certainty and more evenly distributed than is a central pouring head 2. Finally, the conical distributor makes it possible well to observe whether the metal is correctly poured and when the moulds are filled so that the pouring from the ladle can be correspondingly regulated.

According to a further form intended for carrying out the centrifugal casting, which is shown in section in Fig. 9 and in plan view in Fig. 10, partly in section through the moulds, both the central pouring head 2 and the conical distributor are absent insomuch as an intermediate funnel 32 with a spout 33, which feeds the metal to the moulds, is fixed within the circle formed by the moulds 1 being preferably removably arranged. In order to form a platform for the pouring of the metal, the bottoms of the moulds 1 have each a projection 37 at the pouring aperture. In place of these projections at the bottom of the moulds, the base member which carries the moulds, for example the upper part 8' of the base member system 8', 8'', can have an extension 38 which projects beyond the pouring apertures of the moulds.

A further advantageous form of apparatus in accordance with the invention for carrying out the process of centrifugal casting consists in the arrangement of one or two further rows of moulds over the first row. In this manner, the capacity of the apparatus, per cast, is doubled or trebled. Fig. 11 shows an example of this form in section with two rows or circles of moulds 40 and 41 for bars. Fig. 12 is a plan thereof. According to the invention, the upper moulds 41 are here outwardly and parallely displaced relatively to the moulds 40 immediately beneath them, for example, a distance corresponding to the thickness of the back wall of the moulds. Recesses 45 are provided between the lower moulds 40 for the purpose of feeding the metal to the upper moulds 41, of which recesses 45 a plurality may be provided, as shown by Fig. 12. A convenient arrangement of two superposed moulds is illustrated in Figs. 5 to 8. Fig. 5 is a plan view of the moulds 42 and 43. Figs. 6 and 7 are views in the direction of the arrow marked in Fig. 5, the moulds in Fig. 6 being divided horizontally and those in Fig. 8 vertically along their longitudinal axis. Fig. 7 is a section along the line *a*—*b* of Fig. 5. These moulds differ from those illustrated in Figs. 11 and 12 in that each pair of upper and lower moulds 43 and 42 forms a twin mould divided either horizontally or vertically along its longitudinal axis with a common middle dividing wall 44. In this case also recesses 45 are provided between the pouring openings of the lower moulds for the purpose of feeding the metal to the uppermost.

I wish it to be understood that I do not desire to be limited to the exact details of construction shown and described, for obvious modifications will occur to a person skilled in the art.

What I claim is:

An apparatus for producing goods, more particularly semi-manufactures, by centrifugal casting, comprising a plurality of molds arranged around and spaced from a vertical axis and having filling openings at their front sides facing said axis, a conical distributor having a smooth and unobstructed upper surface arranged within the space enclosed by said molds for supplying molten metal immediately to said molds, said molds arranged in a plurality of superposed circles, the molds of the lowermost of said circles arranged so that the surface of said distributor lies flush with a lowermost point of the filling openings of said molds, and means for rotating said molds and distributor around said vertical axis so that molten metal deposited upon said surface when rotated is freely distributed over said surface and immediately delivered to the molds of said lowermost circle and, after said molds are filled, rises to the molds of a next following upper circle, and so forth, until the molds of all said circles are filled with molten metal by centrifugal action.

JULIUS HAUCK.