Dec. 26, 1933. R. C. BROTZ 1,941,199

CASTING APPARATUS

Filed April 18, 1932

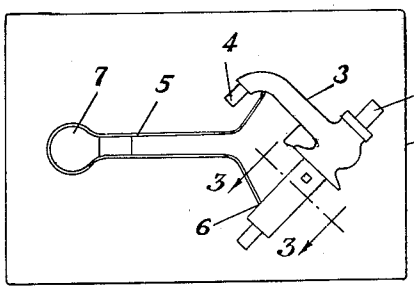

Fig. 1.

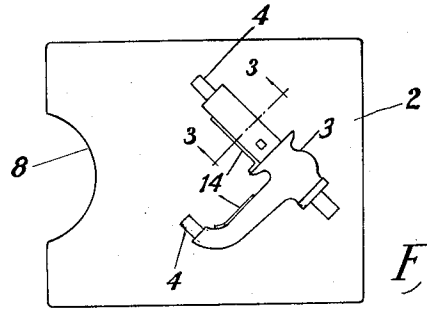

Fig. 2.

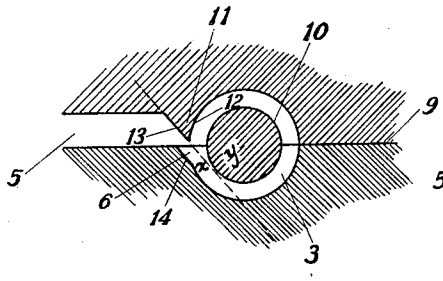

Fig. 3.

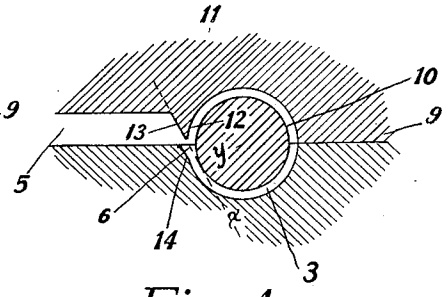

Fig. 4.

ROMAN C. BROTZ
INVENTOR

BY Lyman C. Conger

ATTORNEY

Patented Dec. 26, 1933 1,941,199

UNITED STATES PATENT OFFICE

1,941,199

CASTING APPARATUS

Roman C. Brotz, Kohler, Wis.

Application April 18, 1932. Serial No. 605,936

7 Claims. (Cl. 22—68)

My invention relates to an improved casting apparatus, more particularly to that class of molding known as die or pressure casting. My invention is particularly adaptable to pressure die casting, wherein molten or semi-molten metal is forced under considerable pressure into a mold formed in dies of metal or other suitable material. In order to secure the best results with this method, high pressures are necessary; for example, in the pressure casting of brass the metal is forced into dies at pressures often in excess of 10,000 pounds per square inch.

This renders the casting of an article having hollow portions and requiring the use of a core difficult as, the gate being of necessity somewhat narrow, the metal is forced into the mold in the manner of a jet, the force and heat of which rapidly erodes and destroys that portion of the core opposite the gate, resulting in an imperfect casting. The eroded portions of the core become mingled with the inflowing metal and have a detrimental effect on the casting, particularly where sand cores are used. Further, the stream of metal is broken up by impinging against the core, causing spray, counter currents, and a general turbulence of the metal introduced, which has a tendency to cause blow holes, spotty and otherwise defective castings.

These difficulties present such obstacles that, so far as I am aware, articles requiring the use of a core have never heretofore been successfully die cast by any method suitable to the needs of commercial production except from metals or alloys having a low fusing point and requiring but little pressure to force them into the die. Such metals, for various reasons, are unsuited for many purposes for which metals such as brass or bronze are commonly used.

It is an object of my invention to obviate the abovementioned difficulties and to provide a commercially practicable method whereby articles requiring cores may be readily cast from metals, such as brass, which require a high casting temperature and pressure.

I attain these objects by the mechanism illustrated in the accompanying drawing, in which Figure 1 is a plan view of the top die, Fig. 2 is a plan view of the bottom die, Fig. 3 is a cross section of the mold assembled for casting, the section being taken along the lines 3—3 of Figures 1 and 2, and Figure 4 is a cross section, along similar lines of the mold for another type of casting. Similar numerals refer to similar parts throughout the several views.

The numeral 1 indicates the upper die, and the numeral 2 indicates the lower die. The dies have formed in them complementary portions 3 of a mold for the article to be cast. For illustration I have shown the dies formed into the mold for a faucet body. It will, of course, be understood that my invention is adaptable to molding or casting many and varied articles.

Core prints 4 for supporting and positioning a core are formed at suitable places adjacent the mold 3. As shown, a sprueway 5 is formed in the upper die 1 and terminates in a gate 6. In this case the sprueway 5 is bifurcated so as to feed rapidly to all parts of the mold. However, the precise form and location of the sprueway will vary considerably with the article being cast and the method of casting.

The sprueway 5 may have an enlarged portion 7 which is adapted to fit above a pressure piston, not shown, of a die or pressure casting machine. One form of casting machine for which this arrangement is adaptable is that wherein the metal is forced into the sprueway by means of a pressure piston, the die 2 being recessed at 8 to fit around this piston. However, the specific means of introducing the metal under pressure into the sprueway forms no part of my present invention, and although I have described the dies as upper and lower dies, my invention is adaptable to machines wherein the dies are located side by side instead of one above the other.

It will be noted from Figs. 3 and 4 that the sprueway 5 extends along the parting line 9 between the dies 1 and 2, and that the gate 6 enters the mold at the parting line 9 and approximately the median point of the mold 3. This construction is necessary in order to allow the finished casting and sprue to be removed from the mold with ease. It will also be noted that the longitudinal axes of the core lie in substantially the same horizontal plane as the parting line or substantially parallel thereto.

The construction so far described is well known and has been described for illustration only, as there are many other forms of die and pressure casting machines to which my invention is applicable.

In a construction such as that described, the metal issuing from the gate impinges directly upon the core 10 at about its median point, and the difficulties hereinbefore referred to, that is, the destruction or damaging of the core by the impinging of the hot metal upon it, turbulence of the metal, etc., become a serious problem. I obviate these difficulties by the following means:

I terminate the sprueway 5 in a downwardly

beveled or chamfered shoulder 11. This shoulder extends downward at an angle to the parting line 9 for some distance. The shoulder 11 may extend to a point below the parting line 9, although preferably it is terminated a short distance thereabove.

The interior face 12 of the shoulder 11 forms a part of the mold 3 and the exterior face 13, adjacent the sprueway 5, is disposed at an angle to the parting line 9.

The angle which an extension X of the exterior face 13 of the shoulder 11 forms with the parting line 9 is important and must be kept within definite limits for successful operation. This angle will vary according to the relative sizes of the mold and core, a relatively small core allowing a more acute angle and vice versa, as will be seen by reference to Figs. 3 and 4.

Whatever the relative size of the core, the angle should be such that line X, forming an extension of the face 13 of the shoulder 11, will pass outside of the periphery of the core 10 and perpendicular to a radius Y thereof and will be approximately tangential to the core 10. The lower die 2 is preferably cut away at 14 on a line substantially parallel with the line X. It will thus be seen that the discharge orifice of the gate is so disposed that the inflowing metal is given a direction such that it will not impinge directly upon the core 10 but will pass outside the core in a direction approximately tangential to the core. This prevents damage to the core and causes the metal to flow into the mold smoothly and quietly in a rotary direction.

Although I have shown the shoulder 11 as extending downwardly from the upper die and the lower die cut away, the shoulder 11 may extend upwardly from the lower die and the upper die be cut away.

The core 10 may be composed of sand or other refractory material, fusible metal or other suitable material, and it is one of the advantages of my invention that the core need not possess high tensile strength to resist the eroding effects of jets of metal, but cores of the same composition as are used for sand casting are suitable.

Equivalents of the exact construction shown will suggest themselves to those skilled in the art, and I do not limit myself to it, but claim the use of all constructions within the spirit of my invention and the scope of the appended claims.

I claim:

1. Casting apparatus comprising a plurality of complementary dies a parting line therebetween, a mold formed in said dies, a core positioned in said mold with its longitudinal axis extending in a plane substantially parallel to said parting line, a sprueway extending along the parting line between said dies and a gate forming shoulder positioned at the termination of said sprueway and disposed at such an angle to said sprueway that the extension line of said shoulder is approximately tangential to said core.

2. Casting apparatus comprising a plurality of complementary dies a parting line therebetween, a mold formed in said dies, a core positioned in said mold with its longitudinal axis extending in substantially the same horizontal plane as said parting line, a sprueway extending along the parting line between said dies, and a gate disposed angularly to said sprueway and having a discharge orifice extending in a direction approximately tangential to said core.

3. Casting apparatus comprising a plurality of complementary dies a parting line therebetween, a mold formed in said dies, a core positioned in said mold with its main axes extending in substantially the same plane as said parting line, a sprueway extending along the parting line between said dies, a beveled gate forming shoulder at the termination of said sprueway, the angle between said gate and said sprueway being such that the extension line of said gate is approximately tangential to said core.

4. Casting apparatus comprising a plurality of complementary dies a parting line therebetween, a mold formed in said dies, a core positioned in said mold with one or more of its axes extending in substantially the same plane as said parting line, a sprueway extending along the parting line between the aforesaid dies, and a gate having one or more walls disposed at such an angle to said sprueway that the extension line of said wall approximates a tangent of said core.

5. Casting apparatus comprising a plurality of complementary dies a parting line therebetween, a mold formed in said dies, a refractory core positioned in said mold with one or more of its axes extending in substantially the same plane as said parting line, a sprueway extending along the parting line between said dies, and a gate positioned at the termination of said sprueway and having walls so positioned to said sprueway that the extension line of said walls passes outside the periphery of said core.

6. A casting apparatus comprising a plurality of complementary dies a parting line therebetween, a mold formed in said dies, a core positioned in said mold with one or more of its axes extending in substantially the same plane as said parting line, said core being removable from said mold with the casting, a sprueway extending along the parting line between the aforesaid dies, and a gate forming shoulder extending into said sprueway at an angle substantially tangential to said core.

7. A pressure die casting apparatus comprising a plurality of complementary dies, a parting line therebetween, a mold formed in said dies, a core positioned in said mold with its main axis in substantially the same horizontal plane as said parting line, a sprueway extending along said parting line, and a gate positioned at the termination of said sprueway and at an angle thereto an extension of said gate passing substantially tangent to said core.

ROMAN C. BROTZ.