L. P. TENCA.

DIE CASTING MACHINE.

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1,226,408.

Patented May 15, 1917.

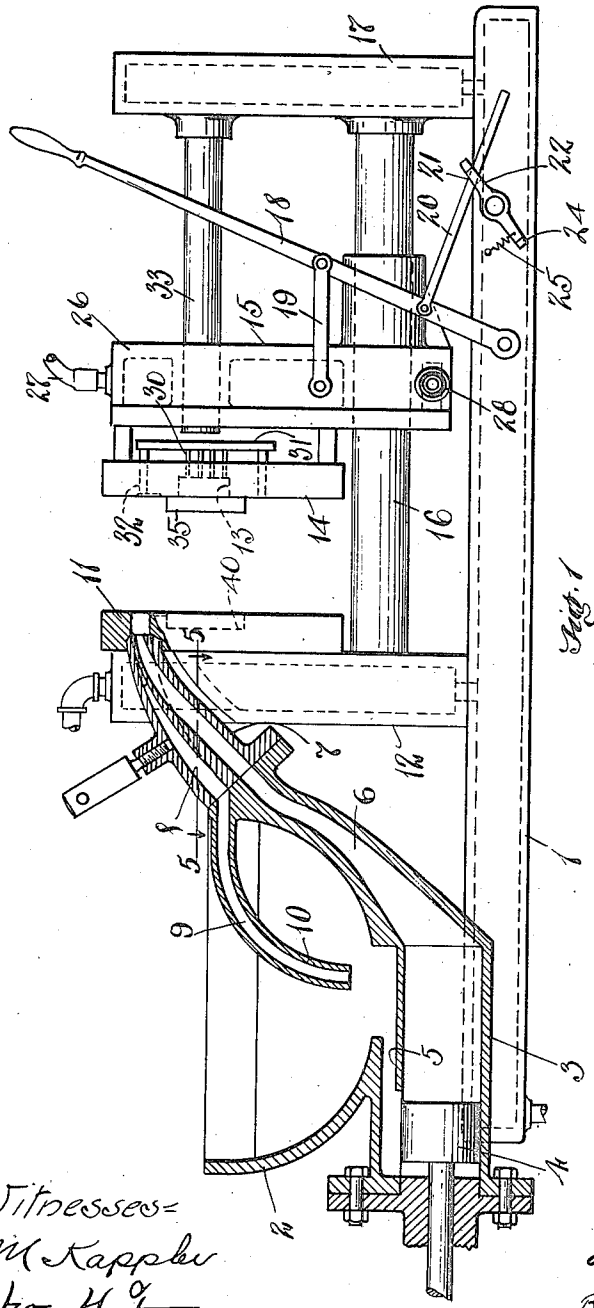


Fig. 1



Fig. 4

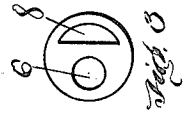


Fig. 3

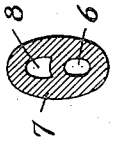


Fig. 5.

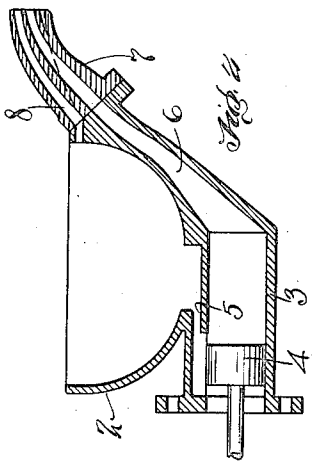


Fig. 2

Witnesses=
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UNITED STATES PATENT OFFICE.

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DIE-CASTING MACHINE.

1,226,408. Specification of Letters Patent. Patented May 15, 1917.

Application filed April 26, 1915. Serial No. 23,962.

To all whom it may concern:

Be it known that I, LOUIS P. TENCA, a citizen of the United States, and a resident of Cleveland, county of Cuyahoga, and State of Ohio, have invented a new and useful Improvement in Die-Casting Machines, of which the following is a specification, the principle of the invention being herein explained and the best mode in which I have contemplated applying that principle, so as to distinguish it from other inventions.

The present invention relates to casting mechanism and is designed particularly for use in a machine for casting under pressure, which is a method employed in forming small articles which must be cast to very close dimensions and with smooth finished surfaces, thus obviating the necessity for further machining. It is well known that the difficulty with this method of casting is the escape of the air confined in the empty mold chamber, and that if this air does not escape, it diffuses through the molten metal, and produces a casting containing many blow-holes, and even if so well diffused that no blow-holes are produced, it nevertheless renders the casting lighter and weaker than is desirable. The present invention relates to a mechanism which entirely eliminates this difficulty, and is provided with means for accurately controlling the temperature of the metal poured into the mold chamber. Furthermore, simple mechanism is provided for the discharge of the finished casting from the mold chamber. To the accomplishment of the foregoing and related ends, said invention, then, consists of the means hereinafter fully described and particularly pointed out in claims.

The annexed drawing and the following description set forth in detail certain mechanism embodying the invention, such disclosed means constituting, however, but one of various mechanical forms in which the principle of the invention may be used.

In said annexed drawing:—

Figure 1 is a side elevation, partially in section, of my improved apparatus; Fig. 2 is a section through a modified type of nozzle and melting pot; Fig. 3 is an end view of the nozzle shown in Fig. 1; Fig. 4 is a second end view illustrating a modified type of nozzle; and Fig. 5 is a horizontal section through the nozzle.

In Fig. 1 there is shown a frame-work or body 1, upon which there is mounted a metal reservoir or melting pot 2 connecting at its bottom with the usual pressure cylinder 3, having therein a piston 4, operated in any suitable manner, for compressing the metal and forcing the same into the mold. Leading from this cylinder 3, which is connected to the melting pot by a passage 5, is a passage 6, extending longitudinally through the nozzle 7. The nozzle 7 is provided with a second separate, and longitudinally extending passage 8, connecting at its lower end with the passage 9 formed in an extension 10 of the nozzle, such extension extending below the normal level of the molten metal in the reservoir 2. The nozzle 7 is adapted to be snugly inserted in a mold plate 11, which may be attached by any suitable means, to a support 12 fixed upon the frame or body 1.

The mold plate 11 is formed with a mold chamber 40 therein, which coöperates with a second chamber 13 formed in a movable mold plate 14, to form the desired shape of mold chamber to form the casting. The second mold plate 14 is attached to a movable support 15, which is slidably mounted upon guides 16 attached to the support 12, and to a second permanent support 17 mounted at the other end of the frame. In order to conveniently move the support 15, and with it the mold plate 14, into proximity to the stationary plate 11, I provide a pivoted hand lever 18 attached by means of a link 19, to the slidable support 15 for this purpose. Means for locking the lever 18, and therefore the slidable support 15, are provided, and comprise a bar 20, attached to the lever and passing through an aperture 21 in the pivoted latch 22, which may be released by pressure on a pedal 24, but is normally held in close locking engagement with the bar 20 by means of a spring 25. This locking means is of a well known type and need not be further described.

In order to cool the cast metal as rapidly as possible, and to maintain a substantially even temperature in the mold chamber, I provide temperature regulating means comprising chambers formed in the body 1, and supports 12 and 17, such chambers being suitably connected together, and being provided with inlet and discharge connections for water, at either end, and at the top of the support 12. Similarly, the sliding support 15 is formed with an internal chamber

26 having flexible connections 27 and 28, to a source of water supply and to a drain.

In order to insure rapid operation of the device by cutting down as many as possible of the operations to be performed by the operator, I provide means for automatically discharging the cast article from the mold chamber. The cast article will be carried away in the mold plate 14 when the latter is moved away from the plate 11. Slidably mounted in the plate 14 are a plurality of pins or plungers 30, connected together behind the mold plate 14 by means of the plate 31, the latter having guides 32 slidable in the plate 14 and extending through the same a certain distance when the plate 31 has been brought into contact with the rear face of the mold plate, at which time the pins 30 extend into the chamber 13, and will have discharged any casting that was held therein. The support 15 is provided with an aperture through which projects a plunger 33, mounted upon the fixed support 17.

The operation of my improved apparatus will be as follows: The lever 18 will be moved to the left by an operator, until the mold plate 14 is brought into contact with the mold plate 11. This contacting of the surfaces of the two plates will force the guides 32 to the right, thus drawing the pins 30 back until flush with the inner surface of the mold chamber 13. The piston 4 is then operated to the right, thus forcing the metal in the passage 6, through the end of the nozzle and into the mold chamber formed by the recesses 40 and 13. The air caught in such chambers will escape through the same nozzle by way of passages 8 and 9, and will be forced into the metal in the melting pot. The latter being heated, will, of course, rapidly drive off the air, and the diffusion of air therethrough will not have the same effect which it would have if trapped in the metal being cast. The movement of the piston 4 is continued until the mold chamber is entirely filled, and until metal has been forced through passages 8 and 9, and into the reservoir, so that the passages 6, 8 and 9 are entirely filled with metal and have removed all the air. The mold plate 14 is then drawn back, carrying with it in the chamber 13, the completed article 35, which is removed from such chamber upon the engagement of the plunger 33 by the plate 31, which operates the pins 30 to force the article out of the chamber, as already described. The mold plate 14 is then again brought into contact with the plate 11, and the piston 4 is withdrawn, thus sucking the air out of the mold chamber into the passage 6, and at the same time forcing the metal in the passages 8 and 9 into the mold. After the chamber has been filled, the metal from the passage 8 passes down into passage 6, thus trapping a certain amount of air therein, and entirely removing all of the air from the mold chamber.

The apparatus is thus seen to be a double acting die casting machine which is obviously of high capacity, and in service has been found to produce a very much larger number of castings than any of the prevailing types in general use.

In Fig. 2 I have shown the passage 8 as terminating above the level of the metal in the reservoir. When using this type of nozzle, the operator will know by seeing the metal drop from the passage 8 into the reservoir, that the mold chamber has been filled, and will then withdraw the movable mold plate and discharge the article. In Figs. 3 and 4 I have illustrated two ways of arranging metal supplying and air discharging passages in the nozzle. In Fig. 3 a metal supplying passage 6 is seen to have its highest point at a lower level than the highest point in the air discharge passage 8. In this way it is rendered impossible to ever trap any air in the mold or at the entrance to the same, as might otherwise be done. In Fig. 4 I have shown concentric passages, the inner one 6, being the metal supplying passage, and the outer passage 8, being for the escape of air. It will be understood that any of my improved types of nozzles may be used either with a return conduit extending into the metal reservoir as in Fig. 1, or above the same as in Fig. 2. Similarly, the present perfected nozzle may be of service to other types of casting machines beside that here illustrated.

Other modes of applying the principle of my invention may be employed instead of the one explained, change being made as regards the mechanism herein disclosed, provided the means stated by any of the following claims or the equivalent of such stated means be employed.

I therefore particularly point out and distinctly claim as my invention:—

1. In a pressure casting apparatus, the combination of a metal reservoir, a nozzle adapted to be snugly inserted in a mold plate, means connected to said reservoir and said nozzle for supplying metal under pressure from the former into the latter, said nozzle being provided with separate metal supplying and air discharging passages arranged to discharge all of the air from such mold plate while the same is being filled with metal.

2. In a pressure casting apparatus, the combination of a metal reservoir, a nozzle adapted to be snugly inserted in a mold plate, means connected to said reservoir and said nozzle for supplying metal under pressure from the former into the latter, said nozzle being provided with separate metal supplying and air discharging passages, the terminal opening of such air passage extend-

ing to a higher level than the terminal opening of such metal passage.

3. In a pressure casting apparatus, the combination of a metal reservoir, a nozzle adapted to be snugly inserted in a mold plate, means connected to said reservoir and said nozzle for supplying metal under pressure from the former into the latter, said nozzle being provided with separate metal supplying and air discharging passages, the terminal opening of such air passage extending to a higher level than the terminal opening of such metal passage and returning to discharge into said reservoir.

4. In a pressure casting apparatus, the combination of a metal reservoir, a nozzle adapted to be snugly inserted in a mold plate, means connected to said reservoir and said nozzle for supplying metal under pressure from the former into the latter, said nozzle having an extension extending beneath the level of the metal in said reservoir and being provided with separate passages, one such passage extending from the outer end of the nozzle to such pressure metal supplying means, and the other passage extending from the outer end of the nozzle to the end of such extension.

5. In a pressure casting apparatus, the combination of a metal reservoir, a nozzle adapted to be snugly inserted in a mold plate, means connected to said reservoir for supplying metal under pressure to said nozzle, the latter having passages connecting said means and the mold chamber in such mold plate and the latter and said reservoir, thereby forming a complete circuit through said reservoir, said nozzle, such mold chamber and said metal supplying means.

Signed by me, this 7th day of April 1915.

LOUIS P. TENCA.

Attested by:—
H. B. FAY,
D. T. DAVIES.