No. 809,671. PATENTED JAN. 9, 1906.

P. F. COWING.

SHOT MAKING MACHINE.

APPLICATION FILED JUNE 26, 1905.

Fig. 1.

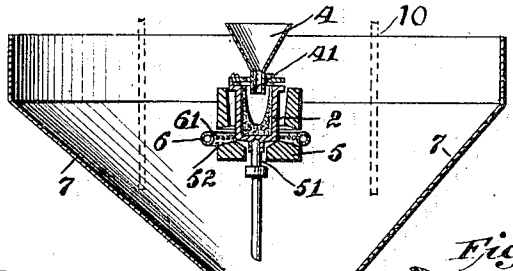

Fig. 2.

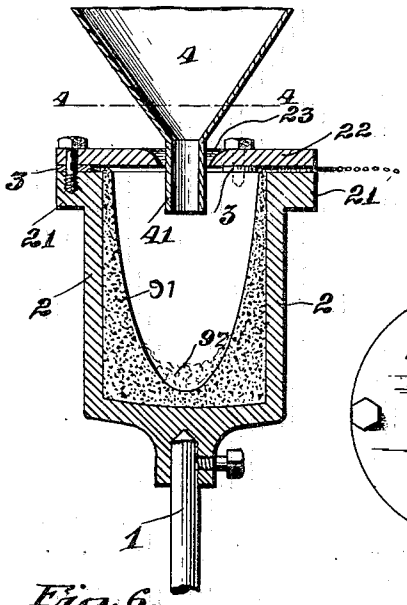

Fig. 3.

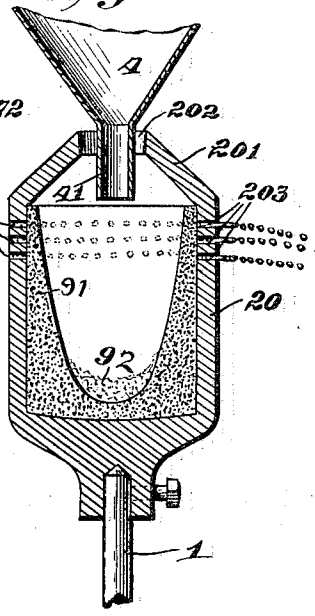

Fig. 4.

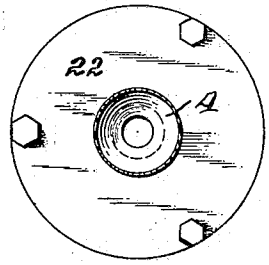

Fig. 6.

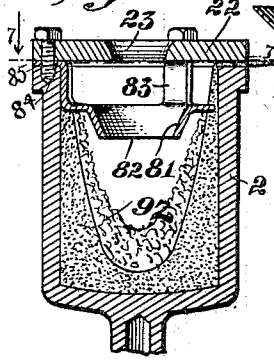

Fig. 5.

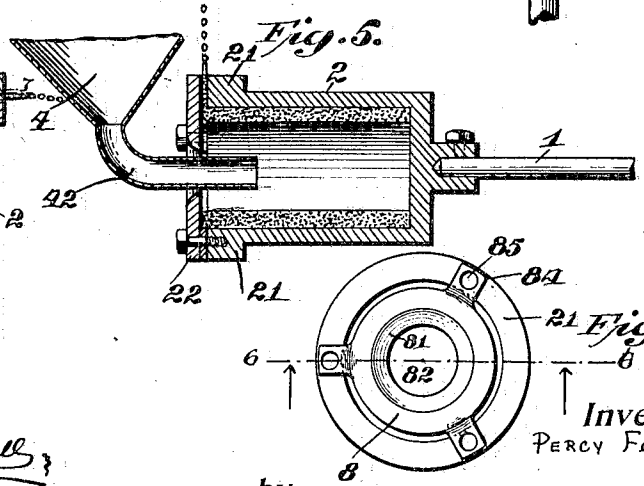

Fig. 7.

Attest:

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UNITED STATES PATENT OFFICE.

PERCY FOOTE COWING, OF NEW YORK, N. Y.

SHOT-MAKING MACHINE.

No. 809,671. Specification of Letters Patent. Patented Jan. 9, 1906.

Application filed June 26, 1905. Serial No. 266,936.

To all whom it may concern:

Be it known that I, PERCY FOOTE COWING, a citizen of the United States, and a resident of the borough of Manhattan, city, county, and State of New York, have invented certain new and useful Improvements in Shot-Making Machines, of which the following is a specification.

My invention relates to a machine for reducing molten metal into small solid particles, as shot, and provides a simple device capable of continuous operation. It also provides means for separating the dross from the metal and for adjusting the machine to produce shot or particles of any desired size.

In the drawings, Figure 1 represents in vertical section a shot-machine embodying my invention. Fig. 2 is an enlarged view of the vessel for holding the molten metal. Fig. 3 is a similar view showing a modified form of vessel. Fig. 4 is a view through the line 4 4, Fig. 2. Fig. 5 shows a modified form of the device. Fig. 6 is a vertical section of a modification of my device taken through the line 6 6, Fig. 7. Fig. 7 is a vertical section taken through the line 7 7, Fig. 6.

Referring to Figs. 1, 2, and 4 of the drawings, 1 designates a vertical rotary shaft having a step-bearing 11 and shown as actuated by a motor 12. Mounted on the shaft 1 is a metal vessel 2 for receiving the molten metal. As shown, the vessel 2 has a flange 21 surrounding its upper edge, to which is bolted a cap 22, having a contracted central opening 23. Between the cap 22 and flange 21 washers 3 of any desired thickness may be inserted. Above the vessel 2 is a funnel 4, having its tube 41 extending into the central opening or mouth 23 of the vessel. Surrounding the vessel 2 is a stationary jacket 5, of non-conducting material, as fire-brick or the like, provided with a bottom opening 51 for the passage of the shaft 1 and with a plurality of lateral openings 52 for the passage of burner-tubes 61, inserted in an annular gas-pipe 6. As shown, the vessel 2 and connected parts are inclosed within a funnel-shaped casing 7, which has a spout 71 leading into a receptacle 72.

The operation of the device will be readily understood from an inspection of the drawings. It is clear that the parts being assembled, as shown, and the motor 12 or other source of power being employed to rotate the shaft 1 at the desired speed a supply of metal poured continuously or discontinuously through the funnel 4 into the vessel 1 and marked 91 will by centrifugal force be first separated from its dross (shown at 92, Fig. 2) and will be ejected through the narrow annular slit between the flange 21 and the cap 22 substantially in the form of small particles or in a stream so fine as to break up into small particles as soon as it passes through the slit. These particles will be rapidly chilled in the air into shot or pellets the size of which will be in part determined by the width of the annular opening. It is obvious that by connecting the annular gas-tube 6 with a supply of heating-gas the metal vessel 2 will be maintained at a sufficient heat to keep the lead or other molten metal therein in flowing condition. As shown in Fig. 1, the shot or pellets ejected from the slotted opening at the top of the vessel 2 are caught in the casing 7 and delivered into the receptacle 72.

In Fig. 3 of the drawings I have shown a modified form of vessel 20, having an inturned flange 201 surrounding a contracted mouth 202, in which the tube 41 of the funnel 4 enters. In this form of the device the upper portion of the side walls of the vessel 20 is pierced with a plurality of apertures 203, through which the metal is ejected. It is plain that in this case the size of the shot produced may be determined by the speed of rotation of the shaft 1 and the fluidity of the metal.

In Fig. 5 of the drawings I have shown the vessel 2 as rotating on a horizontal axis. The form of construction is otherwise substantially like that shown in Figs. 1 and 2 of the drawings, except that necessarily the neck 42 of the funnel 4 is bent to enter the vessel 2. It is plain that by the contraction of the central opening or mouth 23 of the vessel 2 the only escape for the molten metal 91 will be through the peripheral apertures between the flange 21 and cap 22. It is obvious that any other form of peripheral aperture may be substituted—*e. g.*, the vessel shown in Fig. 3 might be turned into a horizontal position as well as that shown in Fig. 2.

In each of the drawings I have shown the vessel 2 as of cylindric form. It is obvious that any approximation to this form, whether

the vessel was somewhat larger or somewhat smaller at its open end, would be within the purview of the invention, it being only necessary that the vessel have a considerable depth as distinguished from a mere plate or saucer shaped vessel, so that space is provided for the accumulation of the dross. By the term "approximately cylindric," therefore, as used in the claims I intend to include any form of vessel by which this function is obtained.

It is evident that various modifications other than those shown may be made without departing from the spirit of my invention.

Where it is desired to divide the molten metal into small masses of other than globular form baffles 10 (indicated by dotted lines, Fig. 1) may be employed, against which the masses of metal will strike and flatten. It is obvious that these baffles or the continuous cylindric wall which they represent must be placed so near to the peripheral apertures of the vessel 2 as to assure the striking of the masses of metal against the wall or baffles 10 before it is entirely chilled.

Where, *e. g.*, the amount of dross or lighter impure material to be separated from the metal is considerable I provide a baffle—such, for instance, as is shown in Figs. 6 and 7 of the drawings. This essentially is a plate of metal of a diameter slightly less than the interior diameter of the vessel and secured in any suitable manner near its upper end, so that the heavy metal 91 may flow out through the annular space between the periphery of the baffle and the wall of the vessel while the dross 92 is retained below the annular plate. In the example shown the plate 8 is provided with a dished central portion 81, having an aperture 82. It is also provided with three approximately vertical arms 83, having outturned portions 84 at their upper ends, pierced at 85 for the passage of the bolts by which the cap 22 is secured to the flange 21 of the vessel 2. In this case the outturned portions 84 take the place of the washers 3 in separating the cap 22 the desired distance from the upper edge of the vessel 2.

By the phrase "so restricted in size as substantially to emit only small particles of metal," as used in the claims to qualify the emission-aperture, I of course intend to include an aperture of such size as to emit so fine a stream of molten metal as to break into small particles immediately on leaving the aperture.

Without specifying materials or enumerating equivalents, what I claim is—

1. In a machine for converting molten metal into small solid particles, an approximately cylindric rotatable vessel having a peripheral emission-aperture so restricted in size as substantially to emit only small particles of metal, said aperture being located near the open end of said vessel and at approximately its greatest diameter.

2. In a machine for converting molten metal into small solid particles, an approximately cylindric vessel rotatable on a vertical axis and having a peripheral emission-aperture so restricted in size as substantially to emit only small particles of metal, said aperture being located near the open end of said vessel and at approximately its greatest diameter.

3. In a machine for converting molten metal into small solid particles, an approximately cylindric rotatable vessel having its wall pierced by a plurality of emission-apertures so restricted in size as substantially to emit only small particles of metal, said apertures being located near the open end of said vessel and at approximately its greatest diameter.

4. In a machine for converting molten metal into small solid particles, an approximately cylindric rotatable vessel having an open mouth and a peripheral emission-aperture so restricted in size as substantially to emit only small particles of metal, said aperture being located below said mouth, and means for feeding a supply of metal into said mouth.

5. In a machine for converting molten metal into small solid particles, an approximately cylindric rotatable vessel having a peripheral emission-aperture so restricted in size as substantially to emit only small particles of metal, said aperture being located near the open end of said vessel and at approximately its greatest diameter, and means for maintaining the metal in said vessel in a molten condition.

6. In a machine for converting molten metal into small solid particles, an approximately cylindric rotatable vessel having a peripheral emission-aperture so restricted in size as substantially to emit only small particles of metal, said aperture being located near the open end of said vessel and at approximately its greatest diameter, a burner for heating the exterior of said vessel, and a non-conducting jacket surrounding said vessel and spaced away therefrom for holding the heated products of combustion in contact therewith.

7. In a machine for converting molten metal into small solid particles, an approximately cylindric rotatable vessel having a peripheral emission-aperture so restricted in size as substantially to emit only small particles of metal, said aperture being located near the open end of said vessel and at approximately its greatest diameter, and a baffle-wall so located with relation to said emission-aperture as that the particles of metal escaping from said aperture will strike against said baffle before chilling.

8. In a machine for converting molten

metal into small solid particles, a rotary vessel having a constricted emission-aperture near its open end, in combination with a baffle suitably supported in said vessel and spaced away from the inner wall of said vessel.

9. In a shot-making machine, a rotary vessel having a contracted mouth and constricted peripheral emission-apertures, in combination with a baffle suitably supported in said vessel and providing an annular space between its periphery and the inner wall of said vessel.

10. In a shot-making machine, a rotary vessel having a contracted mouth and constricted peripheral emission-apertures, in combination with an annular baffle having a central opening and a peripheral diameter slightly less than the interior diameter of the vessel, and means for supporting said baffle within said vessel.

11. In a shot-making machine, a rotary vessel, a cap secured on said vessel and having a contracted mouth and a baffle having an annular portion of less diameter than the interior of said vessel, and upwardly-extending arms having outturned portions for fitting between the upper edge of said vessel and said cap.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

PERCY FOOTE COWING.

Witnesses:
GEO. L. COOPER,
L. BLANKMAN.