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2,574,003

SPRAY NOZZLE

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Fig. 1.

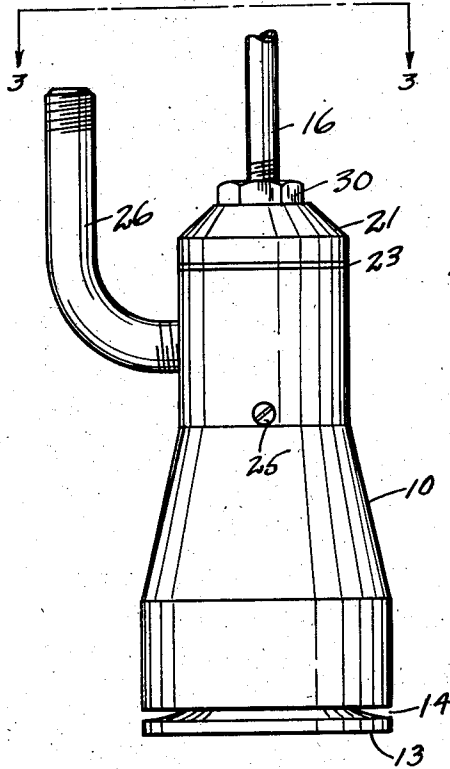


Fig. 2.

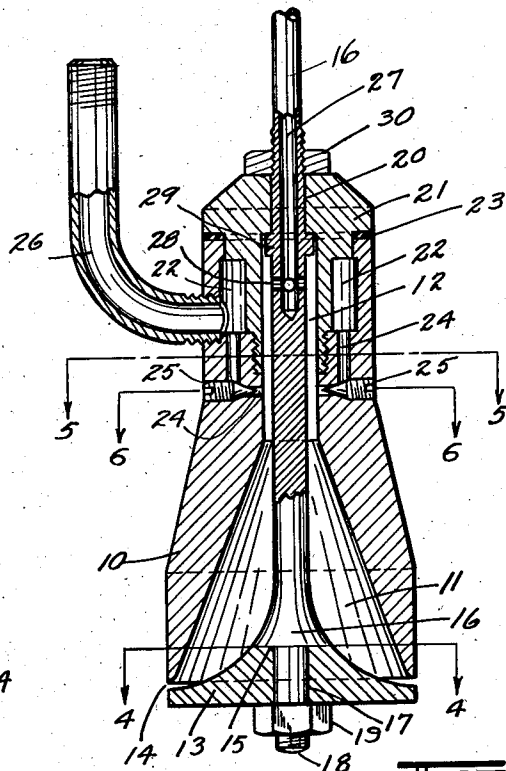


Fig. 3.

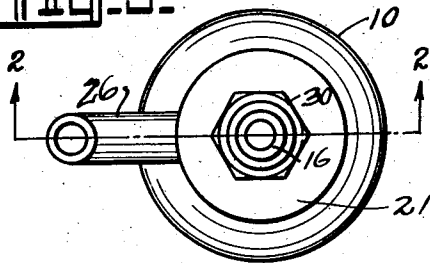


Fig. 4.

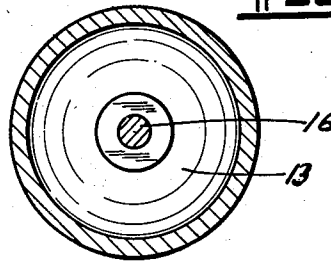


Fig. 5.

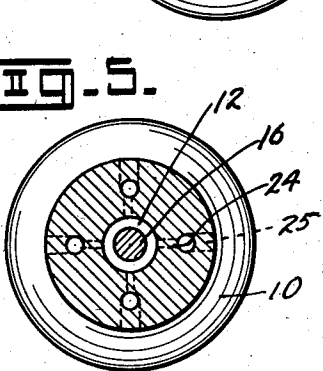
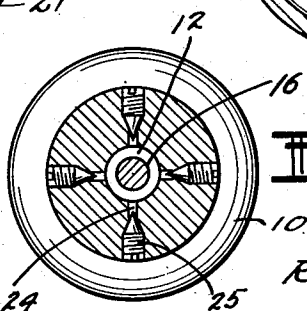


Fig. 6.



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## UNITED STATES PATENT OFFICE

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## SPRAY NOZZLE

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5 Claims. (Cl. 299—120)

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This invention relates to a spray nozzle and more particularly to a spray nozzle adapted for applying materials to the interior of semi-cylindrical objects.

The principal object of the invention is the provision of a spray nozzle having a spray pattern of 360 degrees in area.

A further object of the invention is the provision of a spray nozzle incorporating means for accurately controlling the amounts of materials handled thereby.

A still further object of the invention is the provision of a spray nozzle, the component parts of which may be readily disassembled for cleaning.

A still further object of the invention is the provision of a spray nozzle of simple construction and thereby capable of economic formation.

A still further object of the invention is the provision of a spray nozzle particularly adapted for applying liquid coating materials to ingot molds and the like.

The spray nozzle shown and described herein has been devised to form a suitable device for applying coating materials to the interior of cylindrical or semi-cylindrical objects such as, for example, ingot molds as used in casting of ingots. It is well known that various materials and methods of spraying the same have been used for coating the interior surfaces of ingot molds. For example, liquid tar has been applied to the interior surfaces of the mold in various ways usually with the result that some portions of the mold are not sufficiently coated and others are too heavily coated and pools of the liquid tar are frequently found on the bottom of the mold. In recent years various improved mold coating materials have been introduced, the characteristics of which have made their application to the interiors of molds difficult.

It is desirable to coat the inner surfaces of the ingot molds to effectively prolong their life and the present invention relates to a nozzle which will successfully apply various mold coating materials in a film of uniform thickness over the entire inner surface of such ingot molds.

An example of a mold coating material which is handled effectively by the improved nozzle herein disclosed is found in a commercially available mold coating material comprising a pigment, resin, drying oil and thinner.

With the foregoing and other objects in view which will appear as the description proceeds, the invention resides in the combination and arrangement of parts and in the details of con-

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struction hereinafter described and claimed, it being understood that changes in the precise embodiment of the invention herein disclosed can be made within the scope of what is claimed without departing from the spirit of the invention.

The invention is illustrated in the accompanying drawing, wherein:

Figure 1 is a side elevation of the nozzle.

Figure 2 is a vertical cross section of the nozzle.

Figure 3 is a top plan view of the nozzle.

Figure 4 is a horizontal cross section on line 4—4 of Figure 2.

Figure 5 is a horizontal cross section on line 5—5 of Figure 2.

Figure 6 is a horizontal cross section on line 6—6 of Figure 2.

By referring to the drawings and Figures 1 and 2 in particular it will be seen that a nozzle of compact design has been disclosed which is particularly adapted to atomize and distribute a fluid material over a 360 degree area about the delivery end thereof. The nozzle comprises a body member 10 of a cylindrical construction and defines in the lower half thereof an outwardly tapered chamber 11, the lower portion of which is of a diameter only slightly smaller than the outer diameter of the lower body portion 10 of the nozzle and the upper portion of which is substantially smaller than the diameter of the body 10 of the nozzle and in communication with a secondary chamber 12 in the upper half of the cylindrical body member 10.

The secondary chamber 12 is adapted to receive material to be applied and a propelling medium such as air under suitable pressure therein for mixing purposes. The chamber 11 is adapted to equally distribute the atomized material handled by the nozzle and direct the same from the nozzle. A circular baffle 13 is spaced immediately below the lower end of the cylindrical body member 10 and defines an annular slot 14 through which the material handled by the nozzle is delivered in a 360 degree pattern. The circular baffle 13 has an upwardly tapering cone-like center section 15, the exterior curving surface of which continues in a supporting stem 16 to which the circular baffle 13 is attached. Attachment of the circular baffle 13 is effected by reason of an opening 17 formed centrally therein which registers with a projecting stud 18 formed on the stem 16, the lowermost end of which is threaded and adapted to receive a nut 19 which in turn holds the circular baffle 13 thereon.

As may be seen by referring to Figures 2, 4, 5 and 6 of the drawings, the stem 16 is centrally

positioned in the cylindrical body member 10 and more specifically in the chambers 11 and 12 as it extends upwardly therethrough. The uppermost end of the stem 16 extends outwardly through an opening 20 in a cap 21 which is threadably engaged in the cylindrical body member 10 and which cap 21 defines, in combination with the interior of the cylindrical body member 10, an annular chamber 22. A gasket 23 is positioned between the cap 21 and the uppermost portion of the cylindrical body member 10 and a plurality of passageways 24 are formed in the body member 10 so as to establish communication between the annular chamber 22 therein and the chamber 12 therein. Each of the plurality of passageways 24 is L-shaped in that their lowermost portions run at right angles to the uppermost portions thereof and thereby provide a plurality of valve seats.

Valve members 25 are threadably engaged in the cylindrical body member 10 so that pointed inner end portions thereof control the degree of opening through the passageways 24. Material to be applied by the nozzle is introduced into the annular chamber 22 by way of a tubular fitting 26, and a propellant medium such as compressed air is introduced into the nozzle and the chamber 12 thereof by way of a passageway 27 in the uppermost end of the stem 16. A plurality of openings 28 provide communication between the passageway 27 in the stem 16 and the chamber 12.

The stem 16 is positioned in the cap 21 by means of an annular shoulder 29 thereon registering with the inner surface of the cap 21 and a nut 30 is threadably engaged on the exterior portion of the stem 16 so that the stem is securely positioned with respect to the cap 21 and hence appropriately positioned centrally in the chambers 11 and 12.

It will thus be seen that when a coating material to be applied by the nozzle is supplied thereto by way of the tubular member 26 to the annular chamber 22 therein, the material will flow downwardly through the plurality of L-shaped passageways 24, past the controlling valves 25 and enter the chamber 12. The propelling medium such as compressed air enters the nozzle through the passageway 27 in the stem 16 and enters the chamber 12 by way of the openings 28. The propelling medium so introduced picks up the material being handled by the nozzle and efficiently atomizes the same and directs it downwardly through the outwardly tapering chamber 11 and with the circular baffle 13 directs the material outwardly in a 360 degree fan-like radius from the nozzle.

The amount of coating material applied and the degree of atomization thereof is readily controlled by setting the individual valve members 25 (see Figures 2 and 6) which directly control the amount of material introduced into the atomizing zone of the nozzle which is the chamber 12 therein. The nozzle is therefore capable of handling many and various materials, as the amount of material introduced into the mixing area thereof is individually controlled by the valve members 25 as well as by possible variations in the propelling air pressure.

The nozzle may be readily cleaned by disassembling the several parts and it will be seen that the nozzle comprises a minimum number of parts, each being of relatively simple and inexpensive construction and which parts will, in assembly, perform their intended purpose efficiently.

Having thus described my invention, what I claim is:

1. A nozzle for applying coating materials to the interior of hollow objects, the said nozzle comprising a cylindrical body member having an outwardly tapering chamber formed in one end thereof, a cap for closing the other end thereof, the said cap having a depending annular flange formed thereon, the said annular flange threadably engaging the said body member and forming with the body member cooperatively, an annular chamber about the exterior of the depending flange of the cap and within the said body member, a plurality of passageways establishing communication between the said annular chamber and the interior of the body member and individual valve elements disposed in the said passageways and operable exteriorly of the said body member, means for introducing material into the said annular chamber, an opening in the said cap, a stem positioned in said opening, a passageway for a propelling medium formed in said stem and forming means of communication between the exterior of the said cap and the interior of the body member, the said stem extending through the hollow body member and a circular baffle positioned on the said stem and spaced with respect to the open end of the cylindrical body member.

2. A nozzle comprising a body member having an outwardly tapering chamber in one end thereof and a mixing chamber in the other end thereof, an annular shoulder in said body member, a cap closing the end of the body member adjacent the mixing chamber, said cap having an annular depending flange threadably engaging the said annular shoulder and with the body member cooperatively forming an annular chamber, a plurality of passageways in said body member establishing communication between said annular chamber and said mixing chamber and individual valve elements in each of said passageways and operable exteriorly of the said body member, means for introducing material into the said annular chamber, an opening in said cap and a stem secured in said opening, a passageway in said stem establishing communication between the exterior of the said cap and the said mixing chamber, the said stem extending through the said body member and a disc secured to said stem exteriorly of the said body member and adjacent the tapering chamber therein.

3. A nozzle comprising a cylindrical body member having an outwardly tapering chamber in one end thereof and a cap on the other end thereof, a mixing chamber in the body member adjacent said cap, passageways through said body member for introducing material into the said mixing chamber, valves in said passageways and means for introducing a propelling medium into the mixing chamber, said propelling medium introducing means including a stem, one end of which is hollow, centrally disposed in the said body member and extending through the mixing and tapering chambers and outwardly beyond the end of said body member, openings in the hollow end of the stem communicating with the said mixing chamber and a circular baffle positioned on the other end of the stem and spaced with respect to the body member and forming means for directing the material from the nozzle in a 360 degree pattern.

4. A nozzle comprising a cylindrical body member having an outwardly tapering chamber

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in one end thereof and a closure in the other end thereof, a centrally disposed elongated mixing chamber in the body member adjacent said closure, an annular depending flange on said closure forming an outer wall of said mixing chamber, an annular chamber in said body member on the other side of the said depending annular flange, passageways establishing communication between said annular chamber and said mixing chamber and positioned below said annular flange, a stem extending longitudinally through said body member and centrally of said depending flange and spaced with respect thereto, one end of the stem being hollow and openings in said hollow end communicating with said elongated mixing chamber near said closure, means for introducing material into the said annular chamber and a circular baffle secured to the other end of the said stem and spaced with respect to the body member to direct material from the tapering chamber thereof in a 360 degree pattern.

5. A nozzle comprising a cylindrical body member having an outwardly tapering chamber in one end thereof and a cap on the other end thereof, a stem positioned through said cap and extending through said cylindrical body member, an annular elongated mixing chamber in the cylindrical body member adjacent said cap and an annular depending wall on said cap spaced with respect to said stem and said cylindrical body member and forming a secondary annular chamber in said body member around the said annular elongated mixing chamber, a passageway in said stem communicating with said annular mixing chamber for the introduction of a

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propelling medium thereinto, a passageway in the side of said cylindrical body member establishing communication with said secondary annular chamber and forming means for introducing material into said secondary annular chamber and a secondary passageway in said cylindrical body member establishing communication between the said secondary annular chamber and said elongated mixing chamber and at a point therein spaced with respect to said annular depending wall and a conoidal baffle secured to the other end of said stem and spaced with respect to the body member for directing material from the tapering chamber in a 360 degree pattern.

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