Dec. 28, 1948. J. R. VEST 2,457,756

VACUUM APPARATUS FOR INVESTMENT OF PATTERNS

Filed Feb. 24, 1947

Fig. 3.

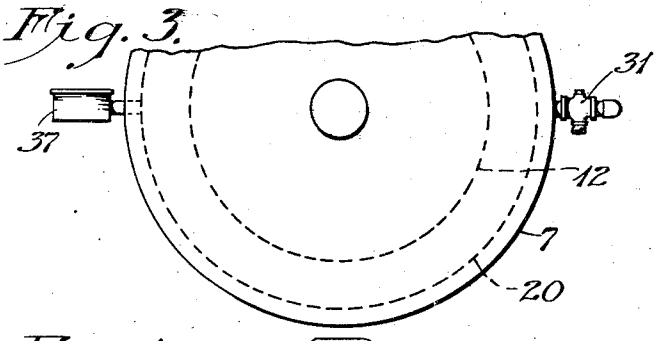


Fig. 1.

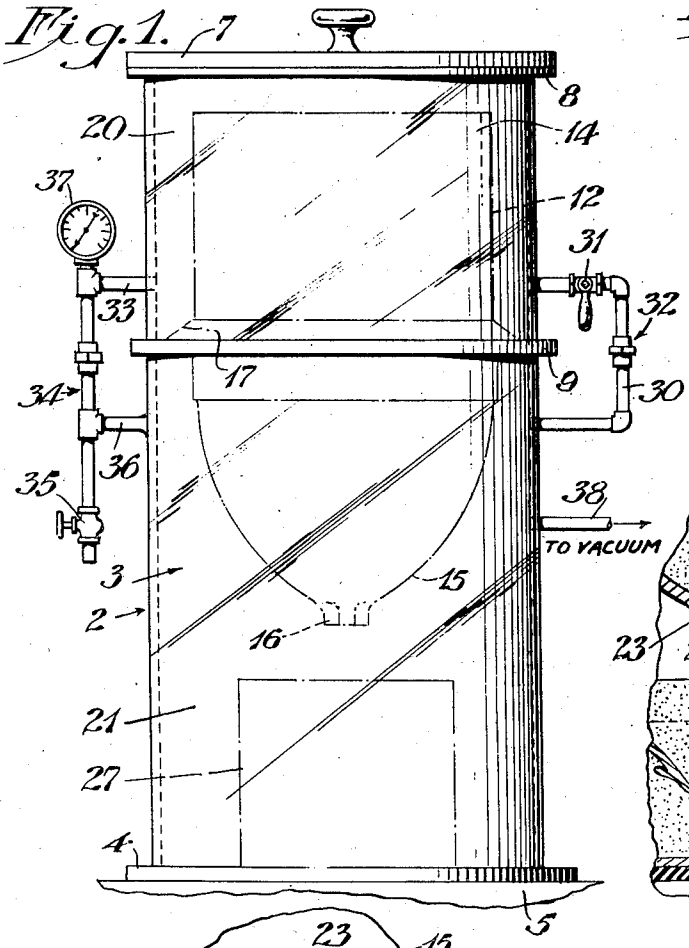


Fig. 2

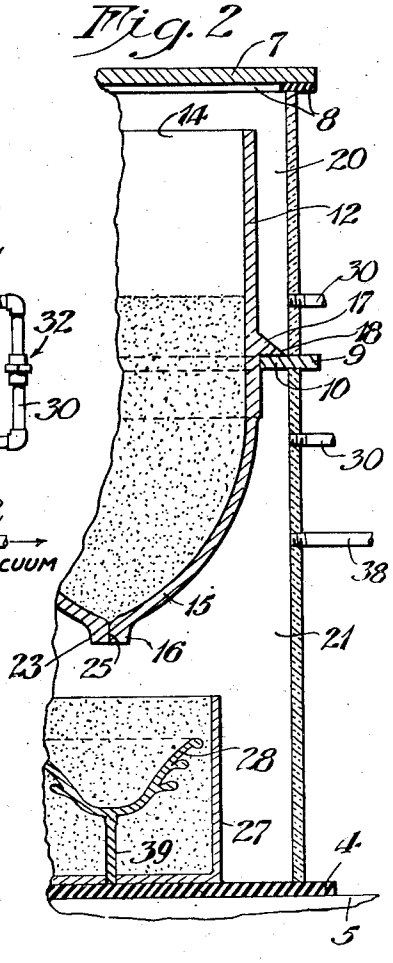
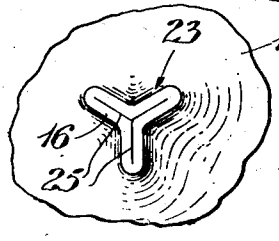


Fig. 4.



INVENTOR
Joe R. Vest
BY Scott L. Norval
ATTORNEY

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VACUUM APPARATUS FOR INVESTMENT OF PATTERNS

Joe R. Vest, Phoenix, Ariz.

Application February 24, 1947, Serial No. 730,386

2 Claims. (Cl. 22—36)

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This invention relates to apparatus for the investment of patterns by a molding composition, and is a continuation in part of my application entitled "Vacuum apparatus for investing patterns," Serial No. 557,520, filed October 6, 1944, and now issued Patent No. 2,416,506.

More specifically the invention concerns apparatus to be used in the process of the investment of wax patterns by plaster molding compositions to be used in casting metals by means of the lost wax process.

The objects of the invention include:

First, the provision of a means for subjecting a charge of plaster molding composition and a casting flask to vacuum and then filling the flask with the wax pattern therein with plaster molding composition;

Second, the provision of apparatus for filling molding flasks with plaster molding compound in a vacuum whereby all occluded air and gases are removed from the molding compound before setting, and from all parts of the flask as it is filled, but before the plaster sets;

Third, the provision of a vacuum apparatus having two horizontally divided compartments connected by suitably valved tubing; both compartments being made easily accessible for introduction of plaster containers and mold flasks, with the upper compartment arranged to receive and retain a flexible plaster container, so as to close communication into the lower compartment except thru an opening in the bottom of the container, and the lower compartment arranged to retain a mold flask beneath the opening in the bottom of said plaster container;

Fourth, the provision of a vacuum chamber having an upper and lower compartment separated horizontally by a plastic plaster container resting on a shelf within said chamber, opening into the upper compartment at its top and into the lower compartment at its bottom thru a resiliently closed valve; together with means for drawing a vacuum in said chamber and controlling differential pressures in between the two compartments therein.

Other objects will appear hereinafter.

I attain the foregoing objects by means of the device and construction shown in the accompanying drawings in which—

Figure 1 is a front elevation of the device incorporating my improvements;

Figure 2, a partial mid-sectional elevation thereof;

Figure 3, a partial plan view thereof, and

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Figure 4, a view of the resilient valve at the bottom of the plaster container.

Similar numerals refer to similar parts in the several views.

In its preferred form the device consists of a cylinder 2 forming the body of a vacuum chamber 3. The cylinder rests on, and is closed at the bottom by a rubber sealing mat 4 which may be placed on any smooth surface such as a table top 5. The top is closed by a disk-like lid 7 having an annular gasket 8.

Somewhat above the vertical center of cylinder 2 its walls are cut horizontally, and a flat dividing ring 9 inserted and cemented in place between the cut ends of the cylinder. The inner portion of this ring extends into the interior of the chamber 3 forming an annular shelf 10. Within the chamber 3 there is a mold composition container 12 made of flexible composition. The body of this container is cylindrical in shape, has an open top 14, and a funnel shaped bottom 15 provided with a resilient closure valve 16. About the middle of the body a retaining and sealing flange 17 is formed.

The cylindrical body of this container is sized so that it fits snugly within the dividing ring 9. The flange 17 rests on the shelf provded by this ring to afford support for the container. The top face of flange 17 is angularly disposed relative to its bottom face so that the flange tapers outwardly and downwardly terminating in a thin annular peripheral edge 18. This construction of the flange affords a sealing means on the upper face of shelf 10 and divides the chamber 3 into an upper compartment 20 and a lower compartment 21. The top of container 12 opens into compartment 20 and the lower or valve portion of the container opens into the lower compartment 21.

The resiliently closed valve 16 at the bottom of the container is made by forming a three armed star shaped boss 23 on the bottom of funnel shaped portion 15, and then cutting the central portions of the star arms, forming the radial slits 25. The resilience of the material of the container body normally holds these slits closed. The parts are made sufficiently heavy so that they stay closed even when the container is filled with fluid molding composition, but sufficiently pliant so that they will open when pressure is applied to the contained composition.

The cylinder 2 and its attendant parts are preferably made of transparent plastic, so that the contents are visible at all times. The lower compartment 21 is sufficiently large to accommodate

a molding flask 27 in which a wax pattern 28 may be invested.

A tube 30 connects the lower compartment 21 with the upper compartment 20. It is provided with a manually operable valve 31 and made in the form of a U shaped loop to constitute a handle 32 for lifting the cylinder 2.

Diametrically opposite this tube is a tube 33 which extends radially outward from the face of the cylinder then turns downward to form a handle portion 34, and terminates with an inlet valve 35. A radial strut rod 36 acts as a brace to complete the handle. A gauge 37 is conveniently placed on the upper portion of this tube to indicate vacuum within the upper chamber compartment 20. A tube 38 extends from cylinder 2 to provide a connection leading to a vacuum pump.

In use the cylinder 2 is placed on mat 4 over the investure flask 27 and a wax pattern 28 is set in flask 27 on a wax stem 39. The container 12 having been placed in position within the cylinder 2 is filled with plaster of Paris molding composition or the like. Lid 7 is placed on top of cylinder 2. Tube 38 is connected thru a flexible tube to a vacuum pump. Valve 35 is closed and valve 31 opened so that both compartments are subjected to vacuum equally. This treatment draws occluded air and other gases from the plaster of Paris in container 12. The plaster of Paris foams up as the air is withdrawn by the vacuum. When this action ceases valve 31 is closed and then a small amount of air let into upper chamber compartment 20 by valve 35 for an instant. The vacuum in compartment 20 drops and the differential pressure from compartments 20 to 21 forces the plaster of Paris out thru valve 16 from which it drops into flask 27 filling it. The deposit of this plaster of Paris mixture can be so finely controlled by the pressure differential between the two parts of the cylinder that even the finest wax patterns are not misshapen or disturbed as it is deposited. As this transfer and filling proceeds air is removed from all parts of the flask, from adsorption on the surface of pattern 28 and from of plaster of Paris. The flask is filled free of voids and completely invests all configurations of the pattern. Thereafter the vacuum is broken and the cylinder 2 removed from over the flask.

From the foregoing it will be seen that the mold flask can be filled, while maintained in a vacuum, with plaster mold composition from which air and gases have been drawn. The result is a solid voidless and clean cut mold. The wax pattern may then be melted out thru the sprue hole formed by melting onto stem 39 and the cavity filled with melted metal according to usual practice in this art. By investure under vacuum as here described finer castings may be made and they may follow very intricate designs. The apparatus here shown is best suited to carry out this process with the fewest number of parts and with the easiest manipulation.

Obviously the parts shown are subject to wide variation as to size, shape, structure and mechanical substitutions, therefore the following claims should be given a wide and broad interpretation.

I claim:

1. Apparatus for investment of patterns by plastic mold compositions, including a cylindrical vacuum vessel having a removable lid closing the top, a supporting sealing and closing mat, and an annular interior shelf positioned mid-way of the height of said vessel; a mold composition container positioned within said cylinder having an annular flange supported and sealing on said shelf so as to divide said cylinder into two vertically positioned compartments; the upper end of said container opening into said upper compartment, and the lower end thereof opening into said lower compartment; said container having a resiliently closed valve in its bottom adapted to retain plastic mold composition against gravity but to open upon the application of additional downward pressure; a tube in the lower compartment adapted to attachment to a vacuum pump; a tubular connection between said compartments having a manually operable valve therein, and an inlet tube connected into said upper compartment and closed by an air inlet valve.

2. Apparatus for the investment of patterns in flasks by plaster mold composition whereby occluded gases are removed from said mold composition and from the surfaces of said flask and pattern, comprising, in combination, a vacuum chamber composed of a cylinder having an open top and bottom, a removable lid fitted to close its top, and a supporting pad adapted to close its bottom, and having an inner annular shelf attached to its inner wall approximately midway of its height; a flexible cylindrical mold composition container having an annular flange approximately midway of its height, adapted to removably fit within said annular shelf with said flange sealing thereon whereby it is supported in said chamber and said chamber is divided into upper and lower compartments; the walls of said flexible container converging at the bottom and terminating in a slitted star-shaped boss forming a resilient plaster discharge valve; a pattern investing flask positioned in said lower compartment below said plaster discharge valve; a tube adapted to be connected to a vacuum pump inserted in said vacuum chamber and opening into the said lower compartment thereof; a tube closable by a valve leading from said lower compartment to said upper compartment of said vacuum chamber, and a tube closed by a valve attached to said vacuum chamber and opening into said upper compartment.

JOE R. VEST.

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