

Nov. 6, 1923.

1,473,246

L. MONTUPET

MACHINE FOR FILLING MOLDS

Filed July 12, 1922

2 Sheets-Sheet 1

Fig. 1.

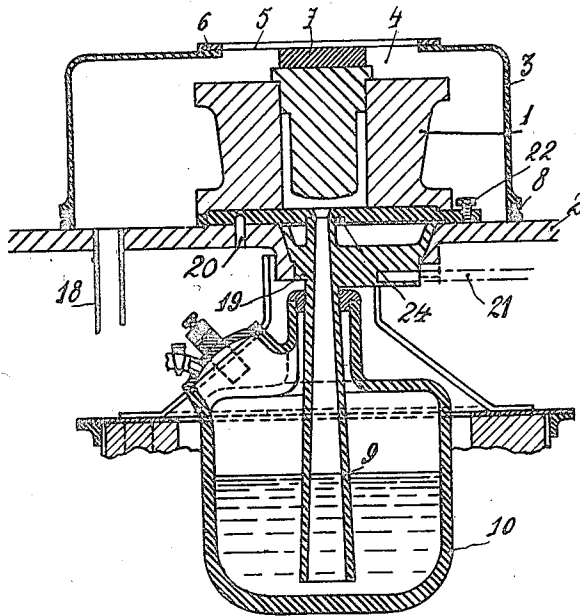
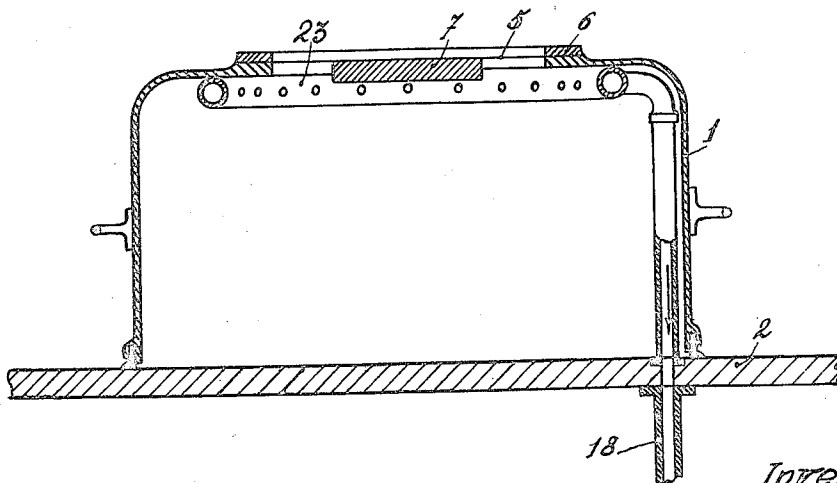


Fig. 3.



Inventor
L. Montupet
By *Mark Clark*
Attors

Nov. 6, 1923.

1,473,246

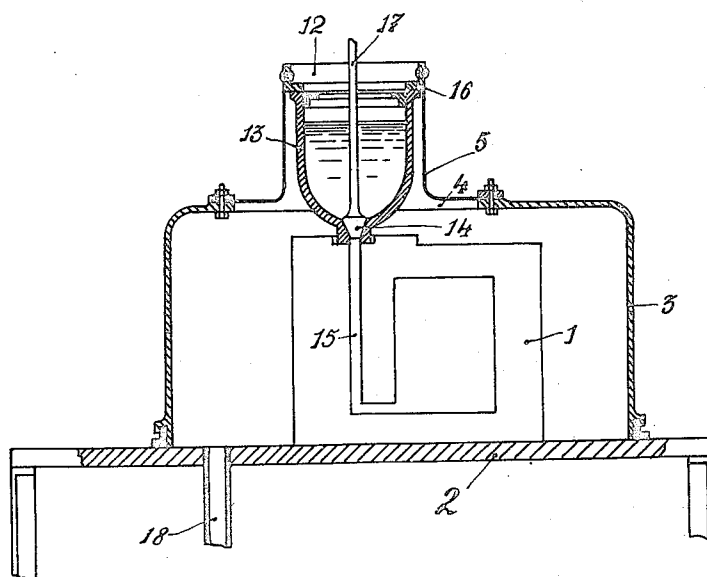
L. MONTUPET

MACHINE FOR FILLING MOLDS

Filed July 12, 1922

2 Sheets-Sheet 2

Fig. 2.



Inventor
L. Montupet

By Marks Clerk
Attys

UNITED STATES PATENT OFFICE.

LÉON MONTUPET, OF PARIS, FRANCE.

MACHINE FOR FILLING MOLDS.

Application filed July 12, 1922. Serial No. 574,451.

To all whom it may concern:

Be it known that I, LÉON MONTUPET, citizen of the Republic of France, residing in Paris, Seine, France, have invented new and useful Improvements in Machines for Filling Molds, of which the following is a specification.

The hand moulding process, which required great professional skill and affords but a limited output, has been replaced by machine moulding for the production of standard pieces. The sand molds require to be rapidly and properly made; the casting of the piece is a relatively easy matter, and in a well formed sand mold the piece will be successfully produced, save for negligence or lack of skill. Cases will occur however with certain metals or alloys, in which the pieces can only be produced with difficulty.

In the process of moulding in metal molds it is also required in various cases to deal with unexpected difficulties when casting by hand, for the mold is a good conductor of heat and the metal will thus be too rapidly cooled, and the air is sometimes given off in an incomplete manner. It thus becomes necessary to carry out manipulations which vary from one piece to another or a given piece from one operator to another; or for a given piece and operator, from one crucible full of metal to another.

The present invention relates to the substitution of machine moulding for hand moulding, the molds being filled in a reduced pressure or partial vacuum either by upward or downward flow of the metal, the mold being filled in both cases by the use of atmospheric pressure alone or by employing the additional pressure of a compressed gas.

Attempts have been already made to perform rapid the filling of molds with the melted metal by mechanical means, for example by casting under pressure, the pressure being obtained by actuating a piston or by the admission of compressed gas, but in this case the drawback consists in the fact that under the sudden impact of the poured metal the air in the mold is not given sufficient time to escape, so that it becomes divided up into small bubbles which remain in the metal and give it a certain porosity. While the piece cast under pressure may have an attractive appearance, its quality is not always of the best.

On the other hand, it is a difficult matter to perform the casting under pressure in the

case of metals having a melting point above 600° C.

Another method has been to cast the metal at atmospheric pressure by producing a vacuum in the molds. Among the known devices, a great number cannot be reduced to practice, while others which are for the major part the work of British or American inventors have indeed given good results, but only in the limited application to small pieces usually made of special alloys and designated in general by the terms "character", "hard metal", and the like.

The present invention provides for casting without accidental admission of air and in a partial vacuum, and its use is not limited to pieces of given size and shape; a great number of casting operations can also be performed in a simple and rapid manner.

For this purpose the mold is placed on a well smoothed table and is covered by a tight bell-shaped member of suitable dimensions, a tight joint being obtained at the bottom by means of a flanged packing member made of a plastic substance which is partially fitted into the lower rim of the bell. This latter has at the top a circular aperture which is closed by flexible sheet metal forming a diaphragm; under the action of the vacuum produced in the bell, said diaphragm is caused to yield, and it thus serves to maintain the mold pressed down upon the table.

Various forms of construction may be provided for the latter purpose:

(a) The diaphragm may be caused to bear through the intermediary of a suitable block upon the mold wherein a difference of pressure causes the liquid to rise from a crucible placed below the table, whilst a special device serves to cut off this column of metal at the proper time and in a suitable place.

(b) In a modified form, on the contrary, the metal is contained before the casting operation in a feeding receptacle which is disposed upon the mold, to which it transmits the pressure exerted upon its edge by the flexible diaphragm when the latter is caused to yield. This will afford castings which in all cases exactly reproduce the mold and have a perfectly homogeneous composition.

The accompanying drawings are given by way of example.

Fig. 1 is a diagrammatic sectional view

of an apparatus wherein the casting is effected by the rise of the metal into the mold through a straight tube.

Fig. 2 is a diagrammatic sectional view of a modified form of construction wherein the casting is performed by the descent of the metal and takes place by means of a feeding receptacle.

Fig. 3 is another modified form of construction which concerns the disposition of the suction piping.

These three cases are set forth hereunder together with the particular features of each.

(a) The first description corresponds to Fig. 1.

The mold 1 is disposed on the table 2 and is covered with a bell-shaped member 3. There is provided in the top of the latter a circular aperture 4 which is closed by a flexible plate of sheet metal 5 secured at its edges to the bell 3 by means of the frame 6. A block 7 of suitable material is disposed below said plate, and upon producing a vacuum in the bell 3 the said block is caused to bear upon the mold 1 so as to hold the latter in place. The bell 4 rests on the table 2 through the medium of a flanged rubber packing member 8 which is suitably secured thereto in an adequate recess as shown in Fig. 1, or by means of a separate attached piece.

The tube 9 connects the bottom of the mold with the crucible 10 and passes through the table 2 which supports said tube by means of a conical part properly centered in its seat by a cylindrical portion 19 and more or less hollowed to allow expansion without deformation of the conical joint. A lever 21 serves to pivot the whole on the axis of cylinder 19; the tube 9 is eccentric in relation to the latter, and the top of said tube is movable in the base plate of the mold into which it extends to a slight degree, said plate being suitably recessed at 24. Said plate is mounted on the table by means of studs 20, and is adjustable in height by the screws 22 in order to provide an easy friction joint of perfect character between the plate and the tube 9, at 24.

For casting a piece, this screw adjustment is first made, then the mold is covered by the bell 3 whose height is made somewhat greater than the height of the latter. A certain degree of vacuum is produced in the bell and the crucible, and by its action the sheet metal piece 5 will yield, causing the block 7 to press the mold 1 upon the table 2; said packing member 8 which is made of a plastic substance will tend to bear upon the table according to the degree of the vacuum, thus affording a perfectly tight joint. All that is now required is to cause the metal to rise in tube 9 and

mold 1, and to this end one admits atmospheric pressure into the crucible, and if necessary, a gas can be compressed therein.

As the metal rises it drives out the rarefied air, but by reason of the slow motion it will in no wise form an emulsion with the air, as usually happens, and it comes into exact contact with the walls of the mold by the effect of the vacuum prevailing in the bell. When the mold has been filled, the lever 21 is used to pivot the tube 9 on the axis of its conical part thereby cutting off the column of metal whose lower portion now returns to the crucible as soon as the gas in the latter is allowed to expand and air is admitted under the bell, the latter being raised, and the piece then is removed from the mold.

(b) In the first modified form of construction corresponding to Fig. 2, like parts are used such as mold 1, table 2 and bell 3; the latter is also provided with the aperture 4 which in this case is covered by a flexible sheet metal piece 5 forming a diaphragm and suitably shaped so as to constitute a vertical hollow cylinder 12 adapted to surround the feed receptacle 13 which is so placed on the mold that the outlet 14 of the former coincides with the inlet of the passage 15 of the latter. The angle pieces 16 secured to cylinder 12 at the top of the same provide for the tight closing of the bell by co-operating with the edges of the receptacle 13. A plug with shank 17 serves to close the outlet 14 at the beginning of the operation, the same being opened at the proper time; said device may be replaced by a suitable punching point which serves to puncture at a given moment a disc made of thin metal formed by the pressing process and fitting on the edges of the outlet 14, said disc being faced with an insulating substance should it be formed of the same metal as the piece to be cast. A pipe 18 passes through the table and opens into the bell 3, whereby the suction can be effected in the same.

To proceed with the moulding of a metal piece, the mold 1 is placed on the table 2, and the receptacle 13 is so disposed that the openings 14 and 15 will coincide, then the bell 3 is placed upon the whole; the cylinder 12 surrounding said receptacle whose edges fit upon the angle pieces 16 which are properly adjusted for the purpose. A vacuum is then made in the pipe 18; if the receptacle has not been put in place with the requisite amount of melted metal, it is now filled; the plug is removed or the disc perforated in order to run the melted metal into the mold.

This latter form of apparatus can be used by first filling the mold, and producing the vacuum only afterwards.

Modifications in detail may be made with-

out departing from the principle of the invention, for example instead of producing the vacuum by direct suction of the air contained in the bell by the pipe 18, the latter
5 can be extended so as to form a perforated ring 23 disposed below the edges of the sheet metal diaphragm, as shown in Fig. 3.

I claim:

10 1. An apparatus for filling molds under reduced pressure including a work table on which the mold is adapted to rest, a bell having its lower edge resting on said table and adapted to enclose the mold, said bell being provided with an opening, a flexible
15 diaphragm covering said opening and adapted to bear on said mold for forcing the same toward the work table, a supply conduit for furnishing the material to be moulded, to the mold, and means for withdrawing air from said bell in order to cause
20 the diaphragm to bear on the mold.

2. A moulding apparatus including a work table, a mold arranged on said work table and provided with an inlet, a bell resting
25 on the work table and enclosing said mold, means for withdrawing air from said bell, a conical seat provided on said table, a supply pipe having a conical extension adapted to engage said seat, the axis of said supply
30 pipe being eccentrically arranged relatively

to the axis of the conical extension, the outlet of said supply pipe being adapted to register with the mold inlet when the supply pipe is in a certain position, and means for rotating said supply pipe about the axis of
35 the conical extension, in order to cause the outlet of the supply pipe to be moved out of register with the inlet of said mold.

3. A moulding apparatus including a work table having a conical seat arranged
40 therein, a mold resting on said table above the conical seat, a detachable bell enclosing said mold and having packing at its lower edge adapted to form a hermetical seal with said table, means for creating a
45 vacuum within said bell, an inlet for said mold, a supply pipe arranged beneath the table and having a conical extension adapted to engage the conical seat, a movable diaphragm forming part of said bell and
50 adapted to be influenced by the vacuum created in the bell to cause the mold to be forced toward the table and toward the outlet of the supply pipe, and a crucible arranged below the table and communicating
55 with the inlet of said supply pipe for furnishing the material to the mold.

In witness whereof I affix my signature.

LÉON MONTUPET.