Oct. 25, 1932. J. V. TURNER 1,884,394

CASTING MACHINE

Filed June 16, 1931 2 Sheets-Sheet 1

Fig. 1

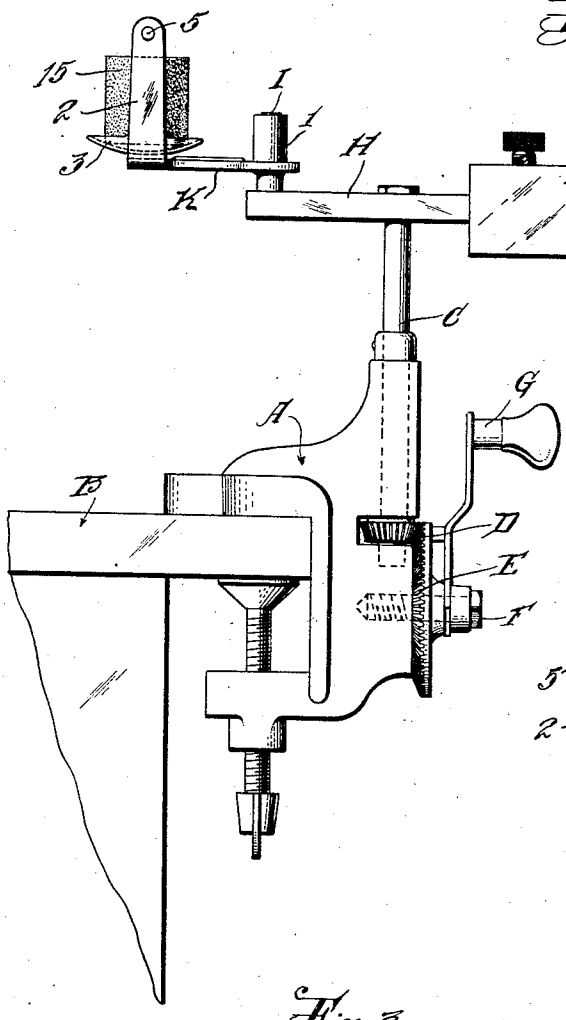

Fig. 2

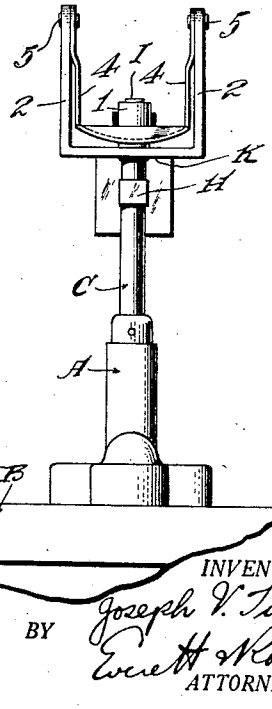

Fig. 3

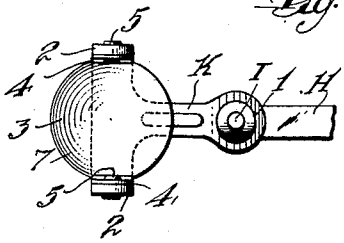

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Fig. 4

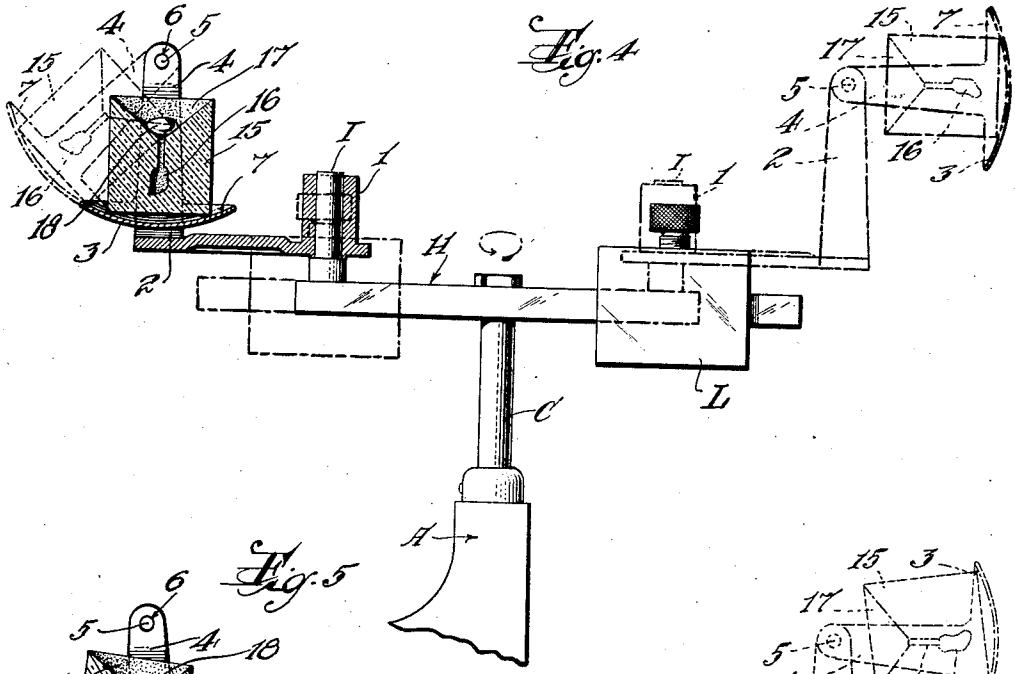


Fig. 5

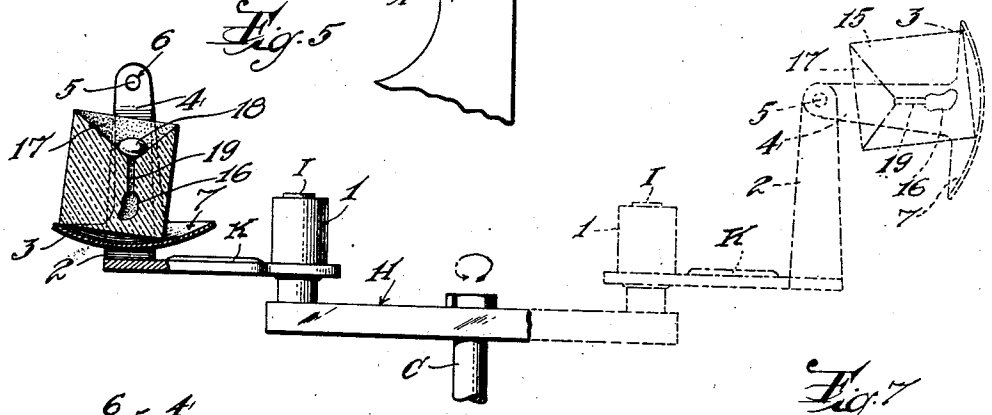


Fig. 6

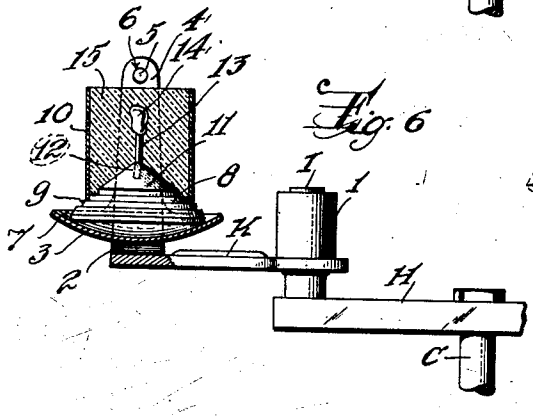
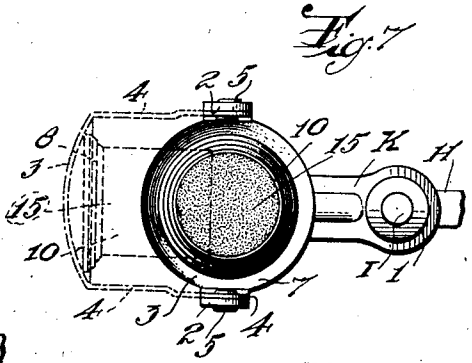


Fig. 7



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Patented Oct. 25, 1932 1,884,394

UNITED STATES PATENT OFFICE

JOSEPH V. TURNER, OF WILSON, NORTH CAROLINA

CASTING MACHINE

Application filed June 16, 1931. Serial No. 544,795.

This invention relates in general to centrifugal casting machines, and more particularly to a dental casting machine of the type described in my Patent No. 1,429,807, dated September 19, 1922, for use in casting dental inlay fillings and the like. The machine shown in my said patent includes a clamp or support for attachment to a table, bench or the like having a vertical shaft journaled therein and manually rotated by a crank and gearing. At the upper end of said vertical shaft is mounted a horizontal arm having at one end a stud shaft upon which is journaled about a vertical axis a bifurcated yoke on and between the arms of which a retaining ring for an investment flask is pivotally suspended about a horizontal axis at right angles to the axis of said stud shaft. An investment flask having a mold cavity is removably fitted in said retaining ring and has in its upper surface a conical depression at the bottom of which is a sprue or opening leading to the mold cavity. In casting with this machine, the metal of which the cast is to be formed is melted in the conical depression, after which the vertical shaft is rotated and the flask is swung outwardly by centrifugal action so that the molten metal is caused to flow into the mold cavity.

Such a casting machine is quite satisfactory except that a different size of retaining ring and different yokes are required for different sizes of flasks to be used, and some difficulty is encountered in changing the retaining rings and placing the flasks in and removing them therefrom. Furthermore, the keeping of a number of different sizes of retaining rings with the possibility of loss of one or more thereof, and the trouble entailed in selecting the right retaining ring for a given flask, in a large measure offset the advantages of the machine.

Another disadvantage of said machine is that it does not allow for compensation of inaccuracies or off-centering of the sprue or opening leading to the mold cavity, so that the metal may not be uniformly distributed in the mold cavity.

One object of my present invention is to provide in a casting machine of the general character described, novel and improved means for overcoming the above-mentioned objections to my prior machine, and more particularly to provide means whereby flasks or investment blocks of different sizes can be accommodated in the machine without any change in or adjustment of the parts of the machine.

I have discovered that it is not necessary to provide means such as the retaining ring shown in my said patent for holding the investment flask or block against lateral displacement from the support, and according to my present invention I utilize a pan or tray instead of the retaining ring upon and from which pan or tray the flasks or investments of different sizes can be easily and quickly set and removed without manipulation of any parts of the machine.

Another object is to provide in a casting machine of this character, a novel and improved support for the investment or flask, whereby the latter may be adjusted on the support to compensate for inaccuracies in location or off-centering of the sprue or opening in the investment leading to the mold cavity, so that uniform distribution of molten metal in the mold shall be ensured even with imperfectly formed investments.

My present invention has the further advantage over my patented machine in that crucible formers or sprue formers of different sizes having wax patterns thereon, may be positioned on the flask support with the flask on the sprue former, and the investment material then poured into the flask, after which and while the material is still plastic, the flask can be centrifugalized to solidify the investment material around the wax pattern.

Other objects of the invention are to provide a centrifugal casting machine of the character described which shall be simple in construction and operation, and embody a minimum number of simple and inexpensive parts; to provide such a machine which shall be reliable and durable; and to obtain other advantages and results as will be brought out by the following description.

Referring to the accompanying drawings,

in which corresponding and like parts are designated throughout the several views by the same reference characters,

Figure 1 is a side elevation of a casting machine embodying my invention;

Figure 2 is an end elevation thereof;

Figure 3 is a fragmentary top plan view of the pan and its supporting yoke;

Figure 4 is an enlarged fragmentary sectional elevation, showing the details of construction and the manner of operation;

Figure 5 is a similar view, showing the manner of using the invention with an investment having an off-centered sprue or opening leading to the mold cavity;

Figure 6 is a similar view, showing the manner of forming a crucible or investment, and

Figure 7 is a top plan view of the construction shown in Figure 6.

Inasmuch as my present invention is an improvement upon the construction shown in my aforesaid Patent No. 1,429,807, I shall describe only so much of the general details of construction and operation of the machine as may be necessary to a clear understanding of my present improvement. For a complete understanding of the construction and operation of the machine, reference may be had to my said patent.

Specifically describing the illustrated embodiment of my present invention, the machine includes a body or clamp A for attachment to a table or support B. In the body A is journaled a vertical shaft C which is driven through a beveled pinion D which meshes with a beveled gear E on a stud shaft F mounted in the body A. The gear E is rotated by a crank G.

At the upper end of the vertical shaft C is a horizontal arm H at one end of which is fixed a stud shaft I with its axis vertical and parallel to the shaft C.

Pivotally mounted on the stud shaft I is a yoke K having a sleeve 1 at one end to slip over the stud shaft and bifurcated at its other end with the arms 2 of the bifurcation disposed vertically in spaced, and parallel relation.

A pan or tray 3 has spaced and parallel arms 4 provided at their extremities with trunnions 5 fitted in the respective bearing openings 6 in the upper ends of the arms 2 of the yoke. The axes of the trunnions 5 are coincident, offset from the axis of the stud shaft I, and at right angles to the common plane of the axes of the stud shaft I and the shaft C. The pan or tray 3 is normally horizontal and preferably has no perimetral flange or side walls but is shown as concavo-convex, or has a concave upper surface 7, although the pan may be flat if desired; and the pan is of a diameter adequate to receive the largest size of flask and/or sprue form which it is desired to utilize in casting operations.

The end of the arm H opposite the stud shaft I has adjustably mounted thereon a counterweight L to balance the weight of the yoke, investment flask, etc.

In use of the machine, and assuming that it is desired first to form an investment, a sprue former 8 is set upon the tray 3, as shown in Figure 6. This sprue former has a plurality of annular ledges 9 to receive flask rings 10 of different sizes, and an approximately conical surface 11 is formed on the top of the sprue former in the center of which is formed an opening 12 to receive the end of a fusible pin 13 on which is mounted a wax pattern 14 from which it is desired to make a casting. A flask ring 10 of the desired size is set upon the sprue former, after which the investment material 15, such as plaster of Paris, is poured into the flask ring around the wax model 14. Thereupon, the investment material, while plastic, is centrifugalized by rotating the crank G which causes the stub shaft I to rotate in a circular path to set up a centrifugal action on the pan and investment that causes the pan to swing outwardly about the trunnions 6, as indicated by dot and dash lines in Figure 7. The investment material is thus forced tightly around the wax model.

After the investment material has hardened, the flask ring with the investment material therein is removed from the sprue former 8 and heated so as to melt the wax model 14 and pin 13 and form a mold cavity 16, as shown in Figure 4 of the drawings. The investment material may then be removed from the flask ring 10, although this is not necessary. When it is desired to form the casting, the flask ring with the investment therein, or the investment block after it has been removed from the flask ring, is set upon the pan 3 as shown in Figure 4 of the drawings. The metal to be cast is then placed in the conical depression 17 made by the sprue former, and the whole block and the metal are heated, as by a blow torch, so as to melt the metal into the form of a globule 18. The investment block thus serves also as a crucible. Then the crank G is again turned so as to cause the pan and investment block to swing outwardly about the trunnions 5, as indicated by dot and dash lines in Figure 4 of the drawings. The light dot and dash lines indicate the beginning of the movement, while the heavy dot and dash lines indicate the limit of the centrifugal action. As the result of this centrifugal action the globule of molten metal is caused to flow into the mold cavity 16, and this action simulates a pouring of the metal into the mold cavity rather than a blowing or throwing of the metal into the cavity which takes place in other known casting machines. A substantially perfect casting may thus be made, the metal being uniformly distributed throughout the

mold cavity. The casting can then be removed from the investment in the usual way.

In some instances the opening or sprue leading to the mold cavity is inaccurately located or off-center with respect to the investment, as indicated at 19 in Figure 5 of the drawings, and unless some means is provided to compensate for this inaccuracy, the molten metal will be unevenly distributed in the mold cavity. My present invention provides means for overcoming this difficulty by the adjustment of the investment block upon the tray 3. The block is set upon the tray 3 so as to locate the axis of the sprue 19 in the same vertical plane as the trunnions 5, as shown in Figure 5. The tray will swing about the trunnions 5 as the result in the change of the center of gravity, due to movement of the block. When the investment is subjected to centrifugal action, as indicated by dot and dash lines in Figure 5, the sprue is alined with the direction of the centrifugal force, instead of being at an angle to the direction of the centrifugal force, as would be the case with the machine shown in my Patent No. 1,429,807.

From the foregoing, it will be observed that the pan or tray 3 will accommodate a large number of different sizes of flasks or investments, or sprue forms, and no adjustment of the parts of the machine is necessary. In fact, no part of the machine need be touched in setting an investment or sprue former upon the tray, the action being exactly the same as would be the setting of the investment or sprue former on a table or other horizontal support. The necessity for a large number of different-sized parts, such as retaining rings shown in my above-mentioned patent, is therefore obviated with the incidental trouble and expense.

I am aware of Patent No. 1,124,099, dated January 5, 1915, and do not desire to be understood as attempting to claim a construction such as that shown by said patent. A pan such as constitutes my present invention could not be used in place of the holder shown in said patent, because a deep support with side walls is necessary in the patented construction to prevent lateral displacement of the investment flask from the holder during starting and stopping of the rotation of the horizontal arm. Furthermore, my pan has distinct advantages over the patented holder in the ease of applying and removing an investment flask or sprue former, and in adjusting such a flask or sprue former on the pan.

Obviously the details of construction of the invention may be modified and changed by those skilled in the art without departing from the spirit or scope of the invention, and therefore I do not desire to be understood as limiting myself except as required by the following claims when construed in the light of the prior art.

Having thus described the invention, what I claim is:

1. A centrifugal casting machine, comprising an arm mounted to rotate about a vertical axis, means for rotating said arm, a yoke, means to mount said yoke on said arm at one side of the axis of rotation of said arm to swing on a vertical axis, and a normally horizontal flangeless pan mounted on said yoke to swing on an axis which is offset from the axis of the yoke and lies in a plane perpendicular to said vertical axis of said yoke for holding an investment block without separate means for securing the block on the pan.

2. A centrifugal casting machine, comprising an arm mounted to rotate about a vertical axis, means for rotating said arm, a yoke, means to mount said yoke on said arm at one said of the axis of rotation of said arm to swing on a vertical axis, said yoke having upturned spaced and parallel arms at one side of said axis of swinging of the yoke, an approximately flat pan having oppositely disposed suspension arms, and means for mounting said pan normally horizontal between said arms of the yoke and pivotally connecting said suspension arms of the pan to said yoke arms on an axis which is offset from the axis of said yoke and lies in a plane perpendicular to the vertical axis of said yoke, said pan to hold an investment block without separate means for securing the block on the pan.

3. A centrifugal casting machine, comprising an arm mounted to rotate about a vertical axis, means for rotating said arm, a yoke, means to mount said yoke on said arm at one side of the axis of rotation of said arm to swing on a vertical axis, and a normally horizontal pan having a shallow concave upper side and mounted on said yoke to swing on an axis which is offset from the yoke axis and lies in a plane perpendicular to said vertical axis of the yoke, said pan to hold an investment block without separate means for securing the block on the pan.

4. A centrifugal casting machine, comprising an arm mounted to rotate about a vertical axis, means for rotating said arm, a yoke, means to mount said yoke on said arm at one side of the axis of rotation of said arm to swing on a vertical axis, said yoke having upturned parallel arms spaced in a common plane parallel with the axis of swinging of the yoke, a pan having a shallow concave side and oppositely disposed suspension arms, and means for mounting said pan between said arms of the yoke and pivotally connecting said suspension arms to said yoke arms on an axis which is offset from the yoke axis and lies in a plane perpendicular to said vertical axis of the yoke with the pan normally horizontal and said concave side facing upwardly, said pan to receive and hold investment

blocks of different sizes without separate means for securing said blocks on the pan and to permit adjustment of said blocks on the pan to compensate for off-center sprues in the blocks.

5. A centrifugal casting machine, comprising an arm rotatable about a vertical axis, means for rotating said arm, a pan having a shallow concave side to receive an investment block, a yoke for supporting said pan on said arm, means pivotally connecting said yoke to said arm at one side of said vertical axis of the arm, and means pivotally connecting said pan to said yoke on an axis offset from the yoke axis with the pan normally horizontal and said concave side facing upwardly, the axes of said pivotal connections between said pan and said yoke and between said arm and the yoke lying in planes perpendicular to each other and one thereof lying in a common plane with the axis of said rotatable arm, whereby said pan will receive and hold investment blocks of different sizes without separate means for securing the investment blocks on the pan and will permit adjustment of said blocks on said pan to compensate for off-center sprues in the blocks.

6. A centrifugal casting machine, comprising an arm rotatable about a vertical axis, means for rotating said arm, an approximately flat pan to receive an investment block, a yoke for supporting said pan on said arm, means pivotally connecting said yoke to said arm at one side of said vertical axis of the arm, and means pivotally connecting said pan to said yoke on an axis offset from the yoke axis with the pan normally horizontal, the axes of said pivotal connections between said pan and said yoke and between said arm and the yoke lying in planes perpendicular to each other and one thereof lying in a common plane with the axis of said rotatable arm, whereby said pan will receive and hold investment blocks of different sizes without separate means for securing the investment blocks on the pan.

JOSEPH V. TURNER.