Dec. 29, 1936. S. L. JEFFERIES 2,065,977

APPARATUS FOR VIBRATING INVESTING MATERIAL

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FIG. 1.

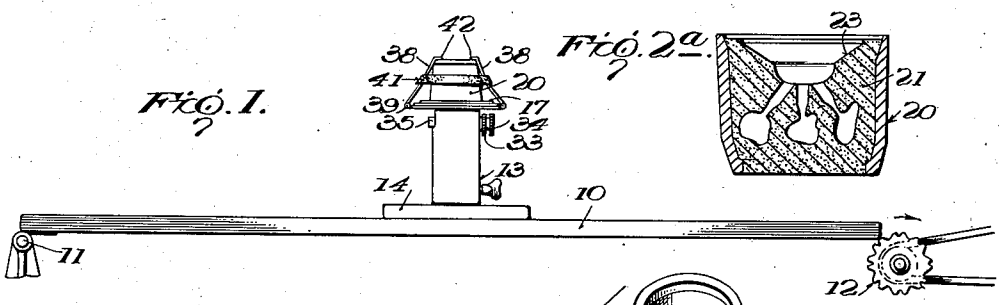


FIG. 2a.

FIG. 2.

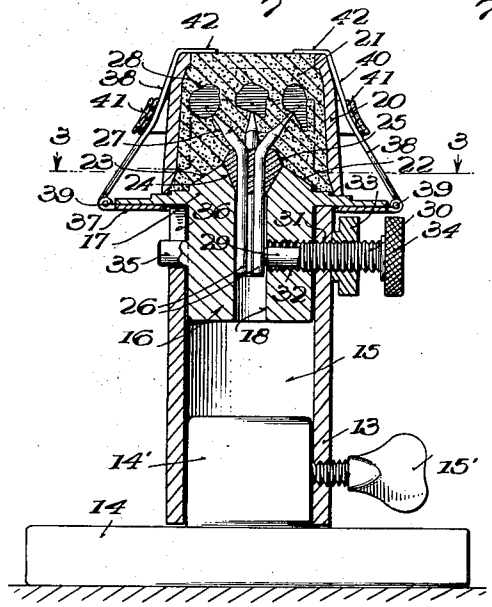


FIG. 4.

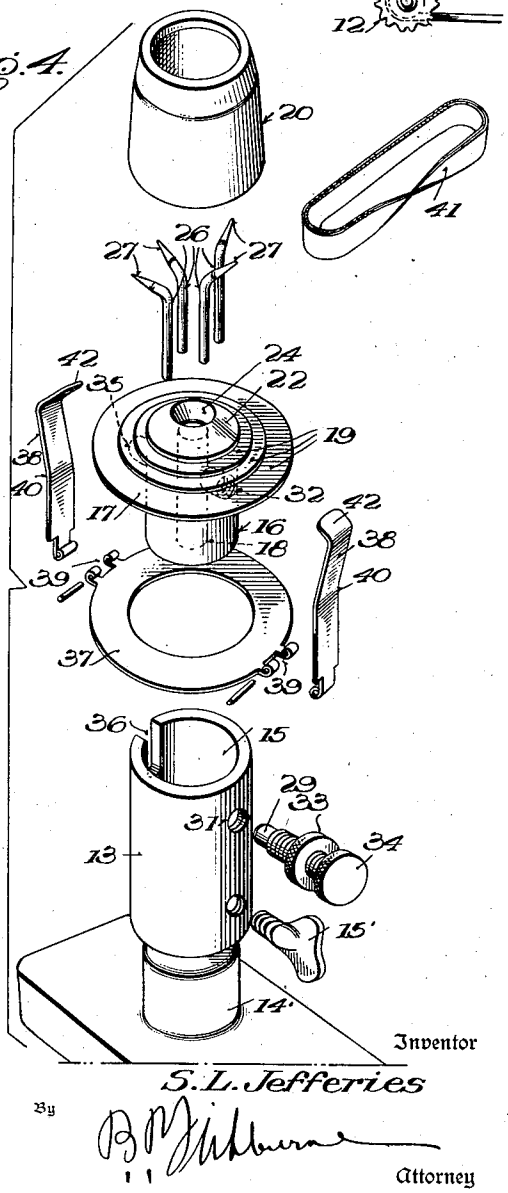
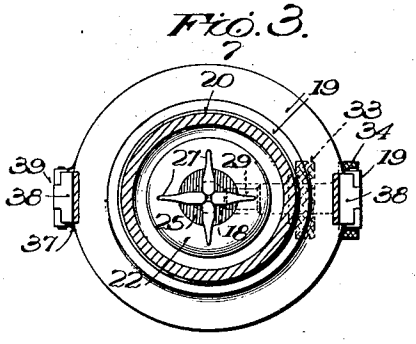


FIG. 3.



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Fig. 5.

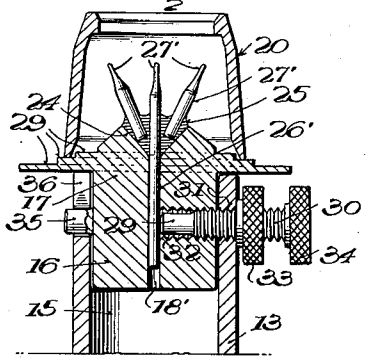


Fig. 6.

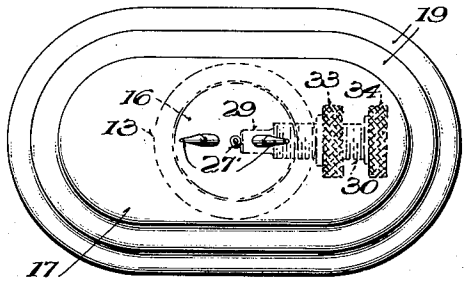


Fig. 7.

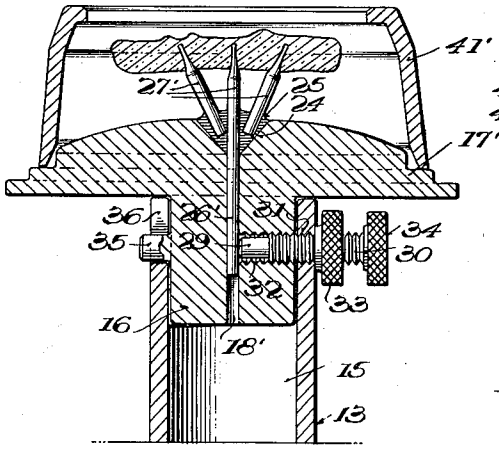


Fig. 8.

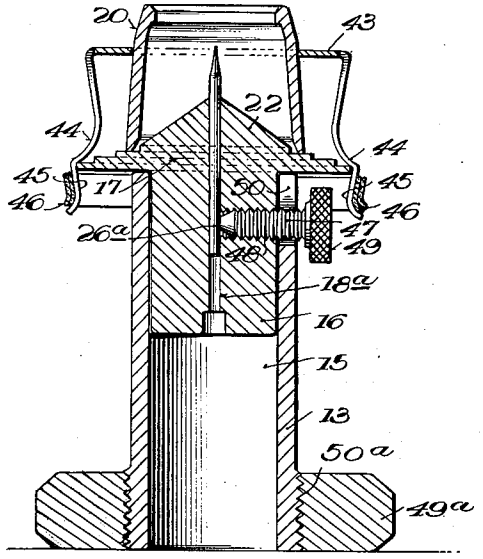
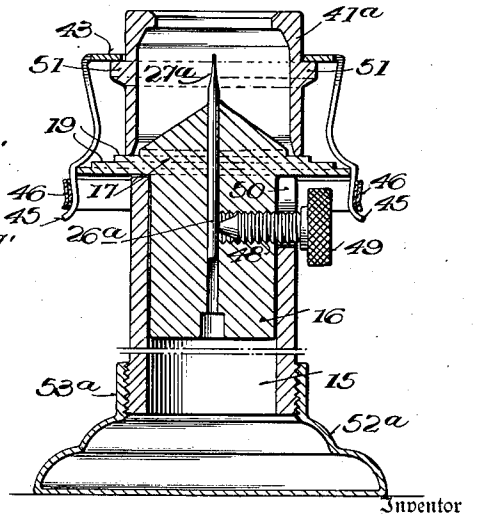


Fig. 9.



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UNITED STATES PATENT OFFICE

2,065,977

APPARATUS FOR VIBRATING INVESTING MATERIAL

Samuel L. Jefferies, Gaffney, S. C.

Application June 15, 1935, Serial No. 26,858

14 Claims. (Cl. 22—45)

My invention relates to apparatus for manipulating investing material, in the formation of moulds, used for casting small articles, such as are ordinarily employed in dental work.

An important object of the invention is to provide apparatus of the above mentioned character, which may be employed to subject the investing material to a vibrating or jarring action, while securely holding the assembled parts of such apparatus against displacement.

A further object of the invention is to provide simple and reliable means to releasably secure the flask to the cover, against displacement, and which may be quickly and conveniently adjusted.

A further object of the invention is to provide means for detachably mounting the cover upon a supporting element, which is arranged in an upright position in use, and may serve as a handle or pedestal.

A further object of the invention is to provide apparatus of the above mentioned character which will permit of the use of one or more sprues.

A further object of the invention is to provide apparatus of the above mentioned character which is compact, simple, and convenient to use.

Other objects and advantages of the invention will be apparent during the course of the following description.

In the accompanying drawings forming a part of this application and in which like numerals are employed to designate like parts throughout the same,

Figure 1 is a side elevation of apparatus embodying my invention, showing the same arranged upon a vibrating element,

Figure 2 is a central vertical longitudinal section through the apparatus,

Figure 2*a* is a central vertical section through the finished mould,

Figure 3 is a transverse section taken on line 3—3 of Figure 2,

Figure 4 is a perspective view of the several elements constituting the apparatus, showing the same separated, for the purpose of illustration,

Figure 5 is a central vertical longitudinal section, parts broken away, through a slightly modified form of apparatus embodying the invention,

Figure 6 is a plan view of a further modified form of apparatus embodying my invention,

Figure 7 is a central vertical longitudinal section through the same,

Figure 8 is a central vertical longitudinal section through a further modified form of apparatus embodying my invention, and,

Figure 9 is a similar view through a further modified form of apparatus embodying the invention.

In the drawings, wherein for the purpose of illustration are shown preferred embodiments of my invention, attention being called first to Figures 1 to 4, inclusive, the numeral 10 designates a vibrating element, which may be in the form of a flat board or plank, which may be pivotally supported at one end, as shown at 11, while its opposite end is supported by a toothed wheel 12, rotated in the direction of the arrow, by any suitable means. The rotation of the wheel 12 causes the element 10 to vibrate in a vertical plane. The vibrating element 10 need not be pivoted at 11, but may be held in one hand, in engagement with the wheel 12, and the device to be vibrated held in the other hand upon the element.

The apparatus for forming the mould from the investing material, comprises an elongated tubular supporting element 13, adapted to serve as a handle or pedestal, vertically arranged in use, and preferably formed cylindrical. This elongated tubular supporting element is provided at its lower end with an enlarged base 14, detachably secured thereto, and upon which the same rests, without liability of tipping over. This base 14 has a cylindrical coupling 14', for insertion in the lower end of the tubular pedestal 13, and is clamped therein by a set screw 15', as shown. This tubular supporting element 13 has its upper end receiving the cylindrical coupling 16 of a flask cover 17. The coupling 16 is tubular and has a preferably cylindrical bore 18, extending longitudinally and centrally thereof.

The cover 17 is provided with annular steps 19, and an annular flask or moulding cap 20 is mounted upon the cover 17, and snugly receives one of the annular steps 19 in its lower end. The flask 20 is preferably longitudinally tapered and increases in diameter downwardly. The flask 20 receives the investing material 21, which sets and produces the mould. The cover 17 is provided centrally thereof with an upwardly bulging portion 22, to form the crucible recess 23, in the finished mould. This upwardly bulging portion 22 has a recess 24, which is tapered, increases in diameter upwardly, and leads at its lower end into the bore 18 of the tubular coupling 16. This recess 24 is adapted to receive wax 25, or the like.

The numeral 26 designates sprues, the upper portions 27 of which are preferably angularly arranged and inclined outwardly. The end portions 27 of these sprues carry wax patterns or matrices 28, corresponding to the shape and size of the articles to be cast. Instead of the end por-

tions 27 carrying a number of separate patterns or matrices 28, they may carry one large pattern or matrix, when it is desired to have a plurality of sprue holes leading to a large pattern cavity. The patterns or matrices 28 may be formed in the usual manner, well known in dental work, and are secured to the sprues 26, in the usual manner. The sprues 26 are clamped within the bore 18 of the tubular coupling 16 by the inner reduced end portion 29 of a screw 30, having screw-threaded engagement within an opening 31, formed in the pedestal 13, and an opening 32 formed in the tubular coupling 16. A lock-nut 33 is preferably employed to lock the screw 30 against accidental turning movement and this screw also preferably has a milled head 34. It is thus seen that the screw 30 serves to rigidly attach the tubular coupling 16 to the pedestal 13 and also serves to rigidly clamp the sprues 26 to the tubular coupling, within the bore 18 thereof. A guide lug 35 is rigidly attached to the tubular coupling 16, preferably diametrically opposite to the screw 30 and is adapted for insertion within a longitudinal slot 36. The purpose of this guide lug is to cause the openings 31 and 32 to register, when tubular coupling 16 is inserted within the pedestal 13, thus enabling the screw 30 to be conveniently screwed into position.

Means are provided to hold the flask 20 upon the cover 17, against upward displacement, comprising a ring 37, adapted to be arranged beneath the cover 17, and above the screw 30. This ring carries arms 38, hinged at 39, and these arms preferably have depressed portions 40, between their ends, for receiving a retractile element 41, which may be in the form of an elastic band. The arms 38 preferably have their free ends bent inwardly to produce overhanging extensions 42, to engage over the top of the flask 20.

The patterns 28, when used for casting dental inlays, are formed in the usual manner, and attached to the ends of the sprues. The elements of the apparatus are assembled, as shown in Figure 2, and the pedestal is mounted upon the vibrating support or board 10. The investing material, in the plastic state, is preferably gradually poured into the flask 20, while the support 10 is vibrating. This causes the investing material to be vibrated or jarred and air bubbles and excess water will be separated out so that the investing material will become dense and produce a mould which is dense. This dense formation of the investing material causes the walls of the cavities of the finished mould to be free from pits or irregularities and to correspond accurately to the pattern or matrix. Instead of employing the supporting element as a pedestal and mounting the same upon the vibrating element, such supporting element may be used as a handle and may be struck blows of sufficient intensity, to vibrate or jar the investing material, to produce the desired results. During the vibrating action, the flask is securely held upon the cover, and the sprues held in the flask against displacement, and the patterns are properly held in position for producing the cavities in the investing material. The flask thus filled with the investing material may be separated from the pedestal and will remain upon the cover 17 until the investing material has set. It is preferred to subject the surfaces of the cover 17, which are to contact with the investing material and the wax 25, to a coating of oil, and when this has been done and the investing material has set, the mould may be readily separated from the cover, after the elastic band 41 has been removed and the arms 38 swung to the open position. This separation is effected in the usual manner, as by the insertion of a blade between the adjacent ends of the flask and cover, to start the separation, the screw 30 not now having clamping engagement with the sprues 26, which may be readily withdrawn from the bore 18. The flask 20 and the mould have heretofore been in the inverted position, but are now arranged top end up, so that the sprues may be conveniently removed. This may be done by gently heating each sprue to free it from the wax 25, after which each sprue may be separated from the pattern or matrix, and the wax 25 and patterns 28 are removed from the mould by heating, as is well known, whereby the mould will have the desired mould cavities, the crucible recess, and sprue holes leading from the crucible recess to the mould cavities. The bolten metal is held within the crucible recess and is forced into the cavities, through the sprue holes, by gas pressure, as is well known in the dental art.

In Figure 5, I have shown apparatus identical with that shown in Figure 2, except that the large bore 18 in the tubular coupling is dispensed with, and a small bore 18' substituted therefor, and this small bore is adapted to receive one straight sprue 26', clamped into position by the screw 30. A plurality of short sprues 27' are anchored within the wax 25 within the recess 24, and these short sprues have their inner ends arranged adjacent to or contacting with the long sprue 26'. These sprues carry wax patterns or matrices or a single wax pattern or matrix to produce the cavity or cavities in the mould. The holes formed by the several sprues, when removed, will establish communication between the crucible recess and the cavity or cavities of the mould. All other parts remain identical with those shown and described in connection with the first form of the invention, as shown in Figure 2.

In Figures 6 and 7, I have shown apparatus which is identical with that shown in Figure 5 except that the cover 17 is elongated or elliptical and the flask 41' has a corresponding elongated or elliptical shape. The plurality of sprues are adapted to carry a large pattern or matrix, for moulding a large cavity, in casting a relatively large object in dental work, such as a plate, bridge, or the like. All other parts remain identical with those shown and described in connection with the forms of invention shown in Figures 2 and 5.

In Figure 8, the apparatus shown is similar to that shown in Figure 2. The large bore 18, Figure 2, is dispensed with and a small bore 18*a* is employed for receiving a single sprue 26*a*. The recess 24 is dispensed with and the opening 18*a* passes through the upwardly bulging portion 22. This sprue carries one wax pattern or matrix. The flask 20 is tapered and increases in diameter downwardly, and this flask receives upon its upper portion a ring 43, carrying resilient depending arms 44, provided with curved extensions 45, to engage around or beneath the edge of the cover 17, and to be pressed inwardly by an elastic band 46 or the like. As stated, the single sprue 26*a* is arranged within the bore 18*a*, and this sprue is clamped into position by a screw 47, operating within a screw-threaded opening 48, formed in the tubular coupling 16, and having a milled head 49. This screw also extends through a slot 50, passing through the upper end of the pedestal 13, but having no screw-

threaded engagement therewith. The guide bolt **35** and slot **36** are eliminated in this form of the invention. The pedestal **13** is detachably secured to a base **49***a*, which has a screw-threaded opening **50***a*, to receive the lower screw-threaded end of the pedestal **13**, as shown. The device of Figure 8 is otherwise substantially identical with that shown in Figure 2.

In Figure 9, the flask **41***a* is shown as cylindrical instead of tapered, and this flask is provided with an annular flange or rib **51**, so that the ring **43** engages above the same. The numeral **52***a* designates a preferably hollow base, having an upper tubular screw-threaded portion **53***a*, which detachably receives the lower screw-threaded end of the pedestal **13**, as shown. This form of device is otherwise identical with that shown in Figure 8.

It is to be understood that the forms of my invention herewith shown and described are to be taken as preferred examples of the same, and that various changes in the shape, size, and arrangement of parts may be resorted to without departing from the spirit of my invention or the scope of the subjoined claims.

Having thus described my invention, I claim:

1. In apparatus for handling investing material to produce a mould, a cover having a projection for forming the crucible recess in the mould and also having an opening, a plurality of sprues having substantially parallel portions arranged within the opening, said sprues having laterally extending free end portions, the ends of which are spaced, a clamping screw for rigidly holding the substantially parallel portions of the sprues within the opening, a flask mounted upon the cover for enclosing the sprues and to receive the investing material, and means for holding the flask upon the cover against displacement.

2. In apparatus for handling investing material to produce a mould, a cover having a projection for forming the crucible recess in the mould, said cover having an opening and a recess in its projection, the opening leading into the recess, the recess being adapted to receive wax or the like, a plurality of sprues extending through the recess and projecting into the opening, said sprues having laterally projecting end portions providing spaced ends, means for clamping the sprues within the opening, a flask mounted upon the cover for inclosing the sprues, and means to attach the flask to the cover.

3. In apparatus for vibrating or jarring investing material to produce a mould, a cover having an opening and a recess leading into the opening, the recess being adapted to receive wax or the like, a supporting element attached to the cover and adapted to serve as a handle or pedestal, a plurality of short and long sprues, the short sprues having their inner ends imbedded in the wax or the like with the long sprue extending into the opening, means to clamp the long sprue within the opening, a flask to inclose the sprues and mounted upon the cover, and means to attach the flask to the cover.

4. In apparatus for vibrating or jarring investing material to produce a mould, a supporting element adapted to serve as a pedestal and to be stood on end and having its upper portion tubular, a cover having means to form a crucible recess in the mould and having an opening to receive a sprue, a coupling secured to the cover and adapted to be inserted in the upper tubular portion of the supporting element, a clamping screw carried by the coupling to engage the sprue, and a flask mounted upon the cover to surround the sprue.

5. In apparatus for vibrating or jarring investing material to produce a mould, a supporting element adapted to assume an upright position in use and having its upper portion tubular and provided with a longitudinal slot and a screw-threaded opening, a cover having means to provide a crucible recess in the mould and having an opening, a tubular coupling secured to one side of the cover and having its bore in communication with the opening of the cover, the tubular coupling being adapted for insertion within the upper tubular end of the supporting element, the tubuar coupling also having a screw-threaded opening adapted to register with the first named screw-threaded opening, a guide lug secured to the tubular coupling for insertion within the longitudinal slot to bring the screw-threaded openings into registration, a sprue for insertion within the bore of the tubular coupling, a screw for engagement within the screw-threaded openings and having a part to enter the bore of the tubular coupling to engage the sprue therein, and a flask mounted upon the cover to surround the sprue.

6. In apparatus for vibrating or jarring investing material to produce a mould, a supporting element adapted to assume an upright position in use and having its upper portion tubular and provided with a longitudinal slot, a cover having means to produce a crucible recess in the mould and to hold a sprue, a tubular coupling secured to the cover for insertion within the upper tubular end of the supporting element, a transverse screw carried by the coupling for holding the sprue in position and adapted for insertion within the slot, and a flask mounted upon the cover to inclose the sprue.

7. In apparatus for vibrating or jarring investing material to produce a mould, a supporting element adapted to assume an upright position in use, a cover mounted upon the upper end of the supporting element and having a part interlocking therewith, said cover extending radially beyond the supporting element and having means to produce a crucible recess in the mould and for holding a sprue, a flask mounted upon the cover, and a releasable device connecting the flask and cover including a ring and adjustable arms carried thereby.

8. In apparatus for vibrating or jarring investing material to produce a mould, a supporting element adapted to assume an upright position in use, a cover mounted upon the upper end of the supporting element and extending laterally beyond the same and having means to produce a crucible recess in the mould and for holding a sprue, a flask mounted upon the cover, and a releasable device connecting the flask and cover including a ring and laterally adjustable arms carried thereby, and yielding means to draw the arms inwardly.

9. In apparatus for vibrating or jarring investing material to produce a mould, a supporting element adapted to assume an upright position in use, a cover mounted upon the upper end of the supporting element and extending laterally beyond the same, said cover having means for producing a crucible recess in the mould and for holding a sprue, a flask mounted upon the cover, a ring arranged beneath and adjacent to the cover, and adjustable arms carried by the ring and engaging the flask.

10. In apparatus for vibrating or jarring investing material to produce a mould, a supporting element adapted to assume an upright position in use, a cover mounted upon the upper end of the supporting element and extending laterally beyond the same and having means for producing a crucible recess in the mould and for holding a sprue, a flask mounted upon the cover, a ring arranged beneath and adjacent to the cover, arms hinged to the ring and extending upwardly to engage the flask, and a resilient element engaging the arms to draw them inwardly.

11. In apparatus for vibrating or jarring investing material to produce a mould, a supporting element adapted to assume an upright position in use, a cover mounted upon the upper end of the supporting element and having means for producing a crucible recess in the mould and for holding a sprue, a flask mounted upon the cover, a ring engaging the flask, arms carried by the ring and engaging the cover, and yielding means to move the arm inwardly.

12. In apparatus for vibrating or jarring investing material to produce a mould, a supporting element adapted to assume an upright position in use, a cover mounted upon the upper end of the supporting element and having means for holding a sprue, a flask mounted upon the cover and provided upon its periphery with a rib, a ring surrounding the flask and engaging above the rib, arms carried by the ring and engaging the cover, and an elastic band applied to the arms to draw them inwardly.

13. In apparatus for vibrating or jarring investing material to produce a mould, a tubular supporting element adapted to serve as a pedestal, a cover having means to form a crucible recess in the mould and having an opening to receive a sprue, a coupling secured to the cover and adapted to be inserted in the upper end of the tubular supporting element, means to clamp the coupling in place within the tubular supporting element, a flask mounted upon the cover to surround the sprue, a base, a coupling secured to the base for insertion within the lower end of the tubular supporting element, and means to clamp the last named coupling in place within the tubular supporting element.

14. In apparatus for vibrating or jarring investing material to produce a mould, a tubular supporting element adapted to serve as a pedestal, a cover having means to form a crucible recess in the mould and having an opening to receive a sprue, a coupling secured to the cover and adapted for insertion in the upper end of the tubular supporting element, means to clamp the coupling in place within the tubular supporting element, and a base having a screw-threaded opening for receiving the lower screw-threaded end of the tubular supporting element.

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