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[54] **ADJUSTABLE CRUCIBLE FORMER FOR DENTAL MOLDING FLASK**
9 Claims, 2 Drawing Figs.

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[50] **Field of Search** 164/34, 35, 374, 376; 249/54; 32/17, 70

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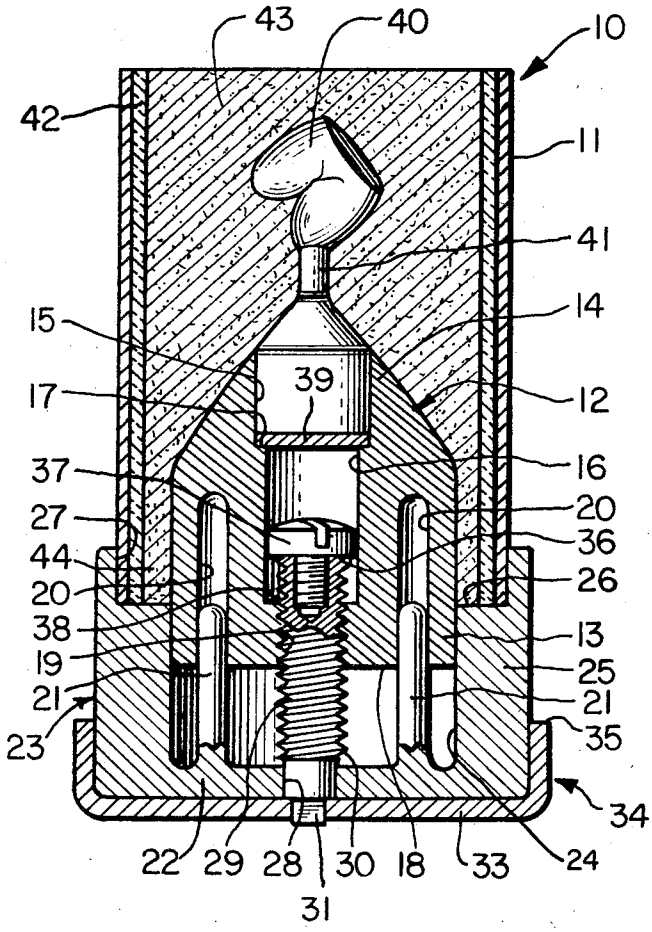
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ABSTRACT: Molding or casting apparatus for producing dental inlays, crowns, and the like wherein the crucible former utilized in conjunction with the molding flask is manually adjustable so as to permit varying of its position and the position of the wax pattern within the molding flask.



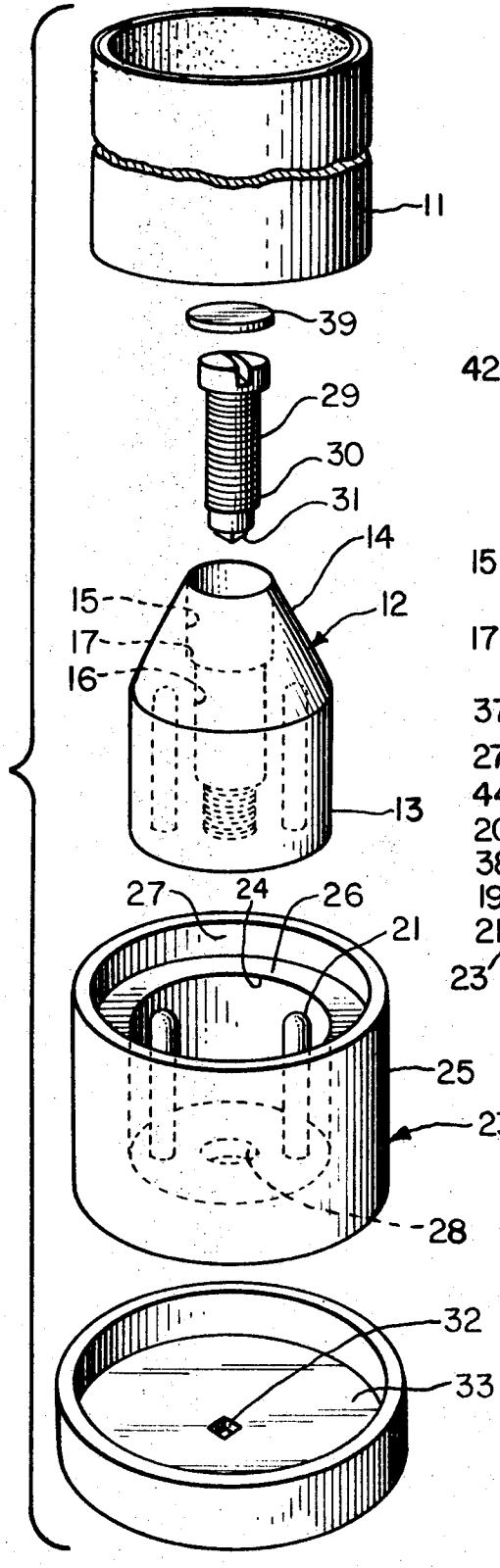
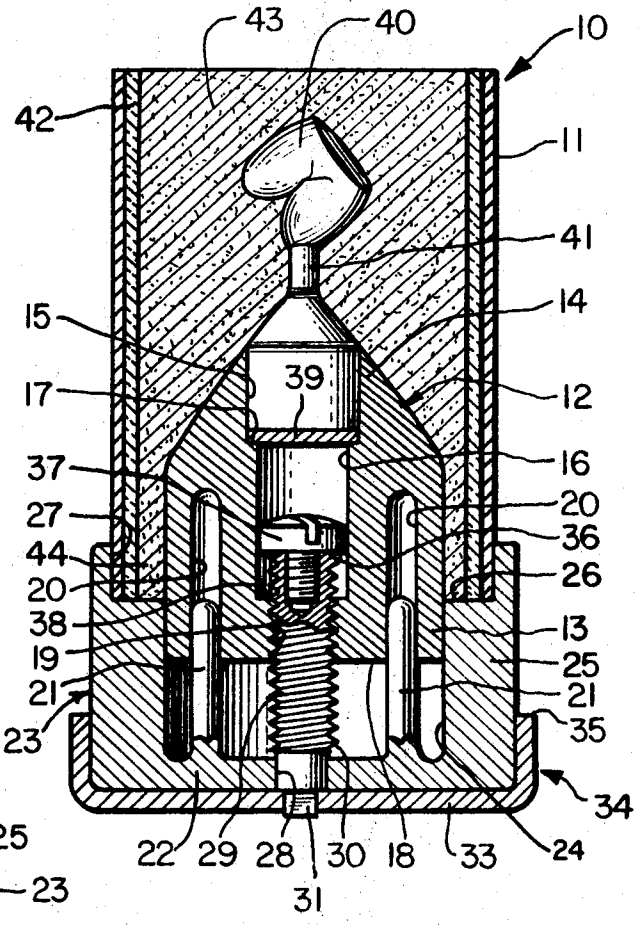


FIG. 2

FIG. 1



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ADJUSTABLE CRUCIBLE FORMER FOR DENTAL MOLDING FLASK

This invention relates to apparatus for making dental inlays, crowns or the like out of gold or other material, and, more particularly, to a novel casting or molding flask construction embodying means for adjusting the position of the crucible former and wax pattern carried thereby within the molding flask body.

The present invention is primarily concerned with the provision of apparatus utilized by dentists and dental technicians in producing inlays, crowns, bridges, partial dentures and the like out of gold or other similar materials. Briefly, the casting process generally in widespread use involves the placement of a wax pattern having the same marginal dimensions of the dental inlay, crown or the like to be cast within a flask body. In its assembled condition, the flask body is usually in the form of an open ended cylinder and one end thereof is closed by a generally frustoconically shaped crucible former. The wax pattern is supported on the central apex of the crucible former by means of a wax sprue. The flask body is thereafter filled with liquid investment material which is allowed to set or harden. Once the investment material is sufficiently hardened, the crucible former is removed and the flask is subjected to sufficient heat to cause burning out of the wax pattern and wax sprue leaving a mold cavity and a sprue in the hardened investment material. Molten metal such as gold or the like, is then poured through the sprue into the mold cavity to obtain the desired casting.

It is well known in the dental casting field that the length of the sprue is somewhat critical and has an effect on the efficiency of the casting operation as well as on the dimensional accuracy of the resulting dental casting. Ideally, a sprue length of approximately one-fourth inches is desirable. However, it is equally important in the dental casting operation that the wax pattern by positioned within one-fourth inches from the open end of the flask body whereby the gases formed during the burning out step of the wax pattern and sprue as well as the gasses formed during the pouring operation of the molten metal are allowed to readily escape. Except in those rare cases where the wax pattern was of a particular size with reference to the size of the flask body and the crucible former, it was virtually impossible, heretofore, to ever achieve both ideal objectives in a single casting operation. Compromises had to be made and thereby the efficiency of the operation and the dimensional accuracy of the metal casting were sacrificed. Either the sprue length had to be made longer than the ideal length of one-fourth inches in order to position the wax pattern within one-fourth inches of the flask body end opposite the crucible former or the ideal spacing of the wax pattern from the flask body open end was sacrificed so that a sprue length of one-fourth inches could be used. Furthermore, lengthening of the sprue beyond one-fourth inches involves the exercise of a high degree of skill on the part of the dental technician and is tedious and requires delicate hand work which is time-consuming. It is, therefore, a primary object of the present invention to substantially obviate the various shortcomings noted above of prior apparatuses for the production of dental inlays and like articles by providing a molding flask wherein the crucible former is manually adjustable along the longitudinal axis of the flask.

A further object of the invention is to provide a molding or casting flask embodying a manually adjustable crucible former whereby a dental inlay and the like of a great many sizes and shapes can be readily accommodated.

A more specific object is the provision of an open ended casing flask for use by dental technicians wherein the crucible former closing one end of the flask is quickly and easily adjustable within the flask along the longitudinal axis thereof to thereby position the wax pattern within a preselected, ideal distance from one end of the flask and to accomplish such ideal spacing of the wax pattern with a wax sprue of no longer than one-fourth inches.

The foregoing and other important objects and desirable features inherent in and encompassed by the invention, together with its many purposes and uses thereof, will become readily apparent from a reading of the ensuing description in conjunction with the annexed drawings, in which,

FIG. 1 is a vertical sectional view of molding or casting apparatus for producing dental inlays, crowns and the like embodying the invention; and

FIG. 2 is an exploded, perspective view of the components and parts of the casting apparatus.

Referring to the drawings in detail, wherein like reference characters represent like elements throughout the various views, the apparatus embodying the invention is designated generally by reference character **10**. The molding or casting apparatus **10** includes a generally cylindrical open ended casting flask **11** which is also referred to as a ring in the dental technician art.

The crucible former, designated generally by reference character **12**, has a generally cylindrical body **13** which has a diameter slightly less than the internal diameter of the flask **11**, the significance of differences in diameter will become readily apparent hereinafter. The crucible former **12** is also provided with a generally frustoconically shaped tip portion **14** which is integrally formed with the body **13**. As best shown in FIG. **1**, the crucible former **12** is inwardly formed with a central, longitudinal bore **15** extending from the apex of the tip portion **14**. A second bore **16**, of smaller diameter than the bore **15**, is in alignment with and has one end opening into the bore **15**. An annular shoulder **17** is thus formed at the juncture of the bores **15** and **16**, the purpose of which will be explained hereinafter. Extending from the face **18** of the crucible former body **13** opposite the tip portion **14** and opening into the second bore **16** is an internally threaded recess **19**. The crucible former **12** is also provided with a pair of elongated recesses **20** disposed on respective diametrically opposite sides of the longitudinal axis of the crucible former.

As best shown in FIG. **1**, the elongated recesses **20** extend from the face **18** and each recess **20** slidingly receives a respective one of a pair of spaced and parallel guide pins **21**. The guide pins **21** are integrally formed or otherwise rigidly fixed to the base **22** of the generally cup-shaped housing member **23**. The fit between each guide pin **21** and the recess **20** associated therewith permits the housing member **23** and the crucible former **12** to move readily with respect to each other along the longitudinal axis of the casting flask **11** but restrained from rotating with respect to each other. It will also be noted that the crucible former body **13** slidingly engages the inner cylindrical surface **24** of the housing member cylindrical wall **25** extending from the base **22**. The free edge portion of the cylindrical wall **25** is recessed to provide an annular shoulder **26** and a ringlike surface **27**. When the housing member **23** and the casting flask **11** are assembled together, one end of the casting flask **11** is disposed within the recess opening of the housing member **23** with the flask end portion firmly but removably seated upon and in sliding engagement with the annular shoulder **26** and ringlike surface **27**, respectively, as shown in FIG. **1**.

The base **22** of the housing member **23** is provided with a central aperture **28** therethrough, the defining surface of which serves as a bearing for rotatably supporting a screw assembly **29**. The screw assembly **29** is provided with external screw threads **30** which are adapted to engage the internal screw threads of the crucible former recess **19**. The lowermost end **31** of the screw assembly **29** as viewed in FIG. **1**, projects from the housing member **23** and has a shape which is preferably nonround.

The projecting end **31** of the screw assembly **29** is press fit into a central nonround aperture **32** formed through the disclike portion **33** of a cap **34**. It is to be understood that any suitable means may be employed for rigidly connecting the cap **34** and screw assembly **29** together for cojoint rotation together and with respect to the housing member **23** and the crucible former **12**. The cap **34** is provided with an annular peripheral flange **35** integrally formed with the disclike portion **33**, which may be readily and conveniently grasped in

order to effect rotation thereof with respect to the housing member **23**. From the foregoing, it will also be appreciated that relative longitudinal movement between the housing member **23** and the screw assembly **29** and cap **34** is substantially prevented. By rotating the cap **34** with respect to the housing member **23**, the crucible former **12** is movable along its longitudinal axis with respect to the housing member **23** between two limit positions. One positional limit is established when the base **18** of the crucible former **12** abuts the base **22** of the housing member **23** and the other positional limit is established when the peripheral edge **36** of disc **37** suitably attached to the innermost end of screw assembly engages the annular shoulder **38** formed at the juncture of the bore **16** and the threaded recess **19**.

When it is desired to use the apparatus **10**, a circular disc **39** is first placed within the bore **15** and caused to seat upon the annular shoulder **17**. The disc **39** serves as a closure means for preventing the entrance of wax or other material into the bore **16**. The bore **15** is then filled with wax and formed to blend with the outer contour of the crucible former tip portion **14**. A wax sprue **41** having the ideal length of approximately one-quarter of an inch is formed by the technician and such sprue **41** extends from the wax mass contained in the bore **15**. The wax pattern **40** is thus attached to and supported by the wax sprue **41**. One end of the casting flask **11**, lined with a conventional asbestos linen sleeve **42**, is inserted over the assembled wax pattern **40** and caused to frictionally engage the ringlike surface **27** snugly and to bear against the shoulder **26**. Thus, a sealed joint is provided between the housing member **23** and one end of the casting flask **11** and the housing member **23** and crucible former **12**, in effect, close one end of the casting flask **11** when the components are assembled together in the aforesaid manner. In most instances, the wax pattern **40** will not be positioned within one-quarter of an inch of the open end of the casting flask **11** as desired. Hence, in order to rectify the matter by properly positioning the wax pattern **40** so that it will be disposed approximately one-quarter of an inch from the open end of the assembled casting flask **11**, the cap **34** is merely turned in the proper direction with respect to the housing member **23** to effect raising or lowering of the crucible former **12** and, hence, the wax pattern relative to the casting flask **11** until the ideal spacing of the wax pattern **40** from the open end of the casting flask **11** is achieved, Once the wax pattern **40** has been properly positioned, the casting flask **11** is filled with liquid investment matter, indicated by reference character **43**, which is allowed to harden or set in a conventional manner. After the investment matter has hardened sufficiently to resist any change in size or shape of the was pattern **40** when handled, the crucible former **12** together with the cap **34** and housing member **23** are stripped from the casting flask **11** prior to transport to conventional casting apparatus (not shown) which forms no part of the present invention for the usual drying out, burning out and casting operations.

It will be appreciated, that stripping of the crucible former **12** is readily accomplished merely by turning the cap **34** slightly in the proper direction to cause the surface area of the crucible former **12** in contact with and somewhat adhesively bonded to the hardened investment material to break away therefrom. Once the adhesive connection or bond between the crucible former **12** and the invention material is broken the crucible former **12**, housing member **23** and cap **34** may be readily and bodily moved from the casting flask **11**. It will also be noted that inasmuch as the outer diameter of the crucible former body **13** is smaller than the inner diameter of the casting flask **11**, as pointed out hereinbefore, the investment material **43** disposed between the crucible former body **13** and the inner surface section of the casting flask **11** radially aligned therewith forms, when hardened or set, a smooth entrance lip **44** for facilitating guidance of the molten metal to the mold cavity during the casting operation. It will be noted that, desirably, such entrance lip **44** also extends from the terminal edge of the casting flask **11** so that no portion thereof is exposed directly to the molten casting metal.

I claim:

1. Apparatus for the production of dental inlays and the like comprising: casting flask for receiving investment material, said flask being open ended and generally cylindrical in shape; a crucible former disposed within said flask, said crucible former being capable of supporting a wax pattern and a wax sprue on one end thereof, said crucible former having a body cylindrical in shape and having a generally frustoconical tip portion, said crucible former body having a diameter slightly less than the internal diameter of said flask whereby said crucible former substantially closes one end of said flask; and manually operable adjustable means for selectively positioning said crucible former along the longitudinal axis of said flask.

2. Apparatus as set forth in claim **1**, including a housing member; means for detachable connecting said housing member to one end of said flask whereby the longitudinal axis of said flask and housing member are substantially in alignment, said housing member being effective to close one end of said flask when connected thereto; and means for operatively connecting said crucible former to said housing member including said manually operable adjustable means for selectively positioning said crucible former along the longitudinal axis of said flask.

3. Apparatus as set forth in claim **2**, wherein said housing member is generally cup-shaped in form so as to provide a generally circular base and a cylindrical wall extending from said base; and said means for detachably connecting said housing member to one end of said flask includes an annular shoulder and a ringlike wall surface extending normally from said shoulder, said shoulder and ringlike surface being formed on the free end of said housing member cylindrical wall, one end of said flask being seated upon said shoulder and being frictionally engaged by said ringlike wall surface when said housing member is connected to said one end of said flask.

4. Apparatus as set forth in claim **3**, wherein said means for operatively connecting said crucible former to said housing member includes means operatively interconnecting said housing member and crucible former whereby said crucible former and said housing member are constrained from rotating with respect to each other and are capable of moving with respect to each other along the longitudinal axis of said crucible former.

5. Apparatus as set forth in claim **4**, wherein said means operatively interconnecting said housing member and said crucible former includes an elongated guide pin, fixed to and projecting from one of said housing member and crucible former, said guide pin being slidable within a recess formed in the other one of said housing member and crucible former, the longitudinal axis of said recess being spaced from and substantially parallel to the longitudinal axis of said crucible former.

6. Apparatus as set forth in claim **5**, wherein said manually operable adjustable means for selectively positioning said crucible former along the longitudinal axis of said flask includes a cap mounted on the exterior of said housing member, said cap being rotated with respect to said housing member to effect movement of said crucible former with respect to and along the longitudinal axis of said flask.

7. Apparatus as set forth in claim **6**, wherein said manually operable adjustable means for selectively positioning said crucible former along the longitudinal axis of said flask further includes a screw assembly provided with external screw threads and one end rigidly connected to said cap so as to be rotatable therewith and a recess formed in said crucible former having internal screw threads operatively engageable with said external screw threads, said crucible former being movable along the longitudinal axis of said flask between a first position wherein said housing member is closely adjacent to said crucible former and a second position wherein said housing member is longitudinally spaced from said crucible former upon rotation of said cap in opposite direction.

8. Apparatus as set forth in claim **7**, wherein the longitudinal axis of said screw assembly coincides with the longitudinal axis of said flask, and wherein said crucible former includes a frustoconically shaped tip portion and a generally

cylindrically shaped body. The diameter of said body being smaller than the internal diameter of said flask whereby an annular space is provided between said crucible former body and said flask when said flask and housing member are connected together; and wherein stop means are provided for limiting longitudinal movement of said crucible former with respect to said housing member in two directions to establish said first and second positions of said crucible former.

9. Apparatus as set forth in claim 8, wherein said crucible former is provided with a first central bore extending longitudinally from said tip portion, and a second central bore of smaller diameter than and opening into said first central bore, the juncture of said first and second bores being defined by an annular shoulder, said first central bore being adapted to receive wax material therein for supporting a wax sprue and a wax pattern and said second central bore being adapted to receive one end of said screw assembly therein; and a removable disc capable of being seated upon said annular shoulder defining the juncture of said first and second bores, said disc effectively separating said first and second bores and preventing wax material from entering said second bore from said first bore.