MOLD FOR WAX PATTERNS FOR CASTING FINGER RINGS

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FIG. 1

FIG. 2

FIG. 3

FIG. 4

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12 Claims

ABSTRACT OF THE DISCLOSURE

A wax pattern mold for the investment casting process for producing wax patterns for finger rings including means for substituting and adjusting cores therein for forming different ornamental designs on said pattern.

This invention relates in general to the casting of precision metal articles by the investment casting process, commonly known as the lost wax method, and more particularly to a mold for making precise wax patterns for casting finger rings which include complex ornamentation and/or rings having cavities therein for the mounting of gems.

Reference is had to applicant's issued patent, No. 3,302,257.

Prior molds for making investment casting patterns for finger rings required complex and expensive assembly of precision elements and a relatively high degree of skill in assembling the elements in order to produce a precise symmetrical wax pattern for a plaster mold, from which the wax pattern is removed by melting through the application of heat and the casting of metal into the mold by well known gravity or centrifugal means.

The present invention comprehends a simplified split mold of simplified construction including adjustable features for assuring the forming of precise symmetrical wax patterns including means for sealing together and locking each half of the mold together, which construction is a principal object of the invention.

Another object of the invention is the provision of a split mold for finger ring patterns in which bezel elements having different ornamentation thereon may be adjustably substituted for casting ring patterns having different designs surrounding the upper portion thereof.

A further object of the invention is the provision of a mold in which the upper end cores for the wax pattern may be substituted for producing patterns of rings having different cavities for mounting different gems or cores for setting or other rings bearing different ornamentation or characters on an integral upper surface of a ring.

Another object of the invention is the provision of a screw means in the lower half of the mold for adjustably aligning and securing each of the substitution cores in the mold and a second screw in the upper half of said mold for providing auxiliary security to the substitution cores and for temporarily securing the two halves of the mold together prior to final clamping by well known means for the injection of the wax therein.

Another object of the invention is the provision of a metered vent in one of said screws for providing an outlet for the air trapped in the mold cavity during the injection of the wax into the mold.

These and other objects and advantages in two embodiments of the invention are described and shown in the following specification and drawings, in which:

FIG. 1 is a perspective view in reduced scale of a split mold for a wax pattern for casting a finger ring.
FIG. 2 is an exploded view of the mold shown in FIG. 1, in normal scale.
FIG. 3 is an enlarged cross sectional view taken through section line 3--3, FIG. 1.
FIG. 4 is a perspective view of a wax pattern for a finger ring, as molded in the mold shown in FIG. 1.
FIG. 5 is a perspective exploded view of a mold for a pattern for an alternate form of finger ring.
FIG. 6 is an enlarged fragmentary cross sectional view of the mold shown in FIG. 5, when assembled.
FIG. 7 is a perspective view of a wax pattern for a finger ring, as molded in the mold shown in FIG. 6.

The mold shown in FIG. 1 is cylindrical in shape for convenience only and is centrally split normal to the axis thereof forming an upper half 1 and a lower half 2 and has a radial injection orifice 3 central in the plane at the junction of the upper and lower halves, as shown. Each half 1 and 2 of the mold have radial set screws 4 and 5 threaded therein, respectively, for the purposes to be hereinafter described.

Referring to FIG. 2, the upper half 1 is provided with a concentric groove 6, and the lower half 2 is provided with a mating concentric tongue 7 for positioning and sealing halves 1 and 2 together, as shown in FIG. 1.

Each half of the radial injection orifice 3 in halves 1 and 2 provides one half of a cylindrical passage 8--8 terminating in conical surfaces 9--9 in the outer end thereof for engaging an injection nozzle, not shown, and forming sprue 8s integral with the pattern, as shown in FIG. 4.

The upper and lower halves of the mold contain mating cavities 10--10, forming a cylindrical surface for snugly receiving a cylindrical core 11, having an axis a, for forming the inner band surfaces 11s of the pattern. The opposite outer surfaces of the pattern are formed by the surfaces of the engraved cavities 12 and 13 in each cylindrical cavity 10, respectively, with like or unlike ornamentation on opposite sides thereof.

A rectangular cavity 14 is formed adjacent each cylindrical cavity 10 with a wall 15 having a central arculate shape therein for completing the shape or design of the cavities 12 and 13 on opposite sides of the upper portion of the pattern.

A core 16 symmetrical about axis b is provided with a cylindrical inner surface 17 on one side thereof for mating engagement with a central portion of core 11, better shown in FIG. 3. The core has an opening therethrough normal to the axis a of the cylindrical surface thereof for receiving an auxiliary core, to be hereinafter described.

A bezel plate 18 having a central aperture therethrough may be provided with an oblique ornamental engraving 19 about the periphery of the opening for forming a desired ornamental surface 19s, such as shown on the pattern in FIG. 4, for surrounding a gemstone mounted in an aperture 20 in the top of the ring. The aperture 20 in plate 18 is formed by a core 21 of substantially elliptical shape and has a uniform step 22 thereon and is centrally secured in a plate 23 by a screw 24, better shown in FIG. 3. Depressions 25 in each half of the mold, shown in FIG. 2, provide clearance for the head of screw 24 when the mold is closed.

Referring to FIG. 3, all the elements for forming a particular wax pattern for a ring are positioned in working relation centrally positioned with respect to the planar
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3. junction of mold halves 1 and 2. It is to be noted that the core 11 is positioned in mating cavities 10—10 with the ornamental surfaces 12 and 13 forming the outer sides and the back portion of the pattern and the axis (b) of core 16 is positioned normal to axis (a) of core 11 and coincident with said junction for forming the inner cavity in the pattern beneath the gemstone mounting.

The bezel plate 18 and plate 22 are positioned in adjacent contact with each other and the small diameter portion of the mating engagement with the core (b) of this assembly is adjustably positioned against the inner wall of cavity 14 by screw 5.

It is apparent that the plate 23 must be accurately aligned with the center of the core 11 and axis (b) to maintain symmetrical and uniform thickness of opposite sides of the pattern. It is also apparent that the plates 18 and 22 may be accurately positioned in the lower half 1 of the mold and in exact central relation with respect to core 11 and locked in this position by the tightening of screw 5 in lower half 2 before the upper half 1 of the mold is positioned, as shown in FIG. 1. The plates 18 and 23 are further secured by tightening screw 4, which tightening also serves to hold the two halves 1 and 1 of the mold together in proper register by virtue of the automatic alignment of the inner walls of cavity 14 in each half of the mold, which also aligns the two halves of the injection passage 8.

Screw 4, shown in FIG. 3, has a coaxial metering bore 26 therein opening into a transverse bore 27 for providing an air escape passage from the cavity in the mold during the molding operation.

The aforesaid description provides for the precise molding of a wax pattern of a typical finger ring, illustrated in FIG. 4, from which a metal casting may be molded for swage mounting a gemstone in the open end thereof against shoulder 22s formed by the peripheral step 22, shown in FIG. 2.

The mold shown in FIGS. 5 and 6 will produce a pattern for a typical finger ring, shown in FIG. 7, having an upper surface which may include a predetermined extended character or ornamental or depressed characters or ornamentation, or the top surface may be made plain for the engraving of a monogram or design. This mold is essentially the same as that previously described, having upper and lower members 28 and 29, respectively, and a transverse mating core 30 for forming the inner surface of the pattern adapted to be retained in like cavities 31 in each half of the mold, which cavities include the ornamental depressions for forming the surfaces corresponding to the outer sides and band portion of the pattern. A core 33 has a cylindrical inner surface adapted to mate with core 30 for forming the inner surface of the upper portion of the pattern. The core 33 is retained on the main core 30 by a screw 40 in a shoulder bore 41 for engagement in threaded hole 42. The screw 40 and the hole 42 are positioned at one side of center in order that the screw may be removed after the band portion of the ring pattern is cast around the center portion of core 30. A key 44, inserted in one end of core 30, is adapted for sliding relation in groove 45 in member 29 in order that the central axis of core 33 is retained in colinear position with respect to the junction of members 28 and 30.

Referring to FIG. 5, the rectangular cavity 34 is adjacent to and separated from cavity 31 by waxy 35, which wall has a central opening for casting the upper portion of the pattern substantially the same in principle as shown in FIG. 2.

A benefit 36 has a central opening therein forming oblique negative ornamentation 37, with the cast positive mode in FIG. 7.

A plate 38 is adapted to have a planar side for molding a planar engraving surface or for forming either a depressed design 39 or a projecting design, illustrated in dotted lines. The plate is positioned against plate 36, as shown in FIG. 6, with the inner surface of the latter against the inner wall of cavity 34.

FIG. 6 illustrates the assembly of elements of the mold ready for the injection of wax for forming the corresponding pattern, as previously described, with the plates 36 and 38 carefully adjusted for alignment with the center of core 30 in member 29 and retained by means of screw 5 prior to engaging mold member 28 and locking the halves together with screw 4.

Both halves of the mold described are made of relatively soft metal, such as type metal, zinc alloy or aluminum alloy and cast by well known die cast or hodging means, in which the cavity and the ornamentation are in negative mode. The molds and all of the cores and bezel may also be made of like metals.

It is to be noted that the decorative surface portions of the ring cavity may be ornamented by routing or engraving methods, which methods apply particularly to the ornamentation around the inner periphery of the bezel.

Since the mold is not subject to temperatures greatly in excess of 150 degrees F., the mold and its cores may be alternately made from certain plastic material, such as one of the acrylics or a harder material, such as Delrin.

In operation, the two halves of the mold are clamped together and a wax injection nozzle urged into the conical surface of the cylindrical passage 8 and melted wax forced into the molding cavity under predetermined pressure, by well known means. One of many well known waxes may be used, such as paraffin or beeswax base waxes commonly used for this purpose, which waxes are ordinarily colored by Venetian red to improve the visual inspection of the pattern. Ordinarily there is sufficient space within cavities 14 and 34 to accommodate the compression of air displaced from the molding cavity, which will gradually dissipate through the seams during the time the wax within the mold is hardening.

When the mold includes intricate precision designs, the sharpness of the pattern is improved by subjecting the entire mold to a vacuum during the injection of the melted wax, wherein the entrapped air will be withdrawn through the bore in screw 4, thus insuring a sharply defined detail to the pattern.

Following the injection of the wax into the mold and the solidification of same, the clamp, not shown, holding the two mold members together is released and then the screws 4 and 5 are loosened and the mold members carefully parted. The main core and the bezel plate 36 and its back-up plate will remain as one assembly in one mold member and are carefully removed therefrom as a whole. Then the back-up plate and the bezel are withdrawn and the main core slidally removed in an axial direction through the band portion of the pattern. Then the inner core 16 is readily removed from the pattern shown in FIG. 4 which is now ready for molding in plaster.

In the case of the alternate mold shown in FIGS. 5 and 6, the main core 30 and the molded pattern are removed from the members 28 and 29, and the plates 36 and 38 are withdrawn as previously described. Then the screw 40 in the main core adjacent the band portion of the pattern and core 30 are sequentially removed from the pattern. Then the core 33 is removed from the inner top side of the ring, forming a pattern as shown in FIG. 7, ready for use in a plaster mold.

When the patterns shown in FIGS. 4 and 7 are used to form corresponding negative shapes in plaster molds the sprues 5f form the passages for draining the melted pattern wax from the molds and for conducting the casting metal into the molds to form the final castings, the casting of which may be accomplished by well known gravity, centrifugal or vacuum methods.

It is understood that certain modifications in construction, utilizing the features above described, are intended to come within the scope of the appended claims.
Having described my invention, I claim:
1. A mold for making wax patterns for the investment casting of finger rings comprising a first and a second body member in superposed relation with each said member having a planar side in mating contact forming a co-planar parting junction,
a cylindrical main core of predetermined diameter and length for forming the inside transverse surface of said patterns,
a semi-cylindrical cavity in mating relation in each said planar side of each said member forming a cylin-
drical surface for removably retaining said core with the principal axis thereof coincident with said junc-
tion,
a second cavity of predetermined size in mating rela-
tion in each side of each said member positioned adjacent each said semi-cylindrical cavity forming a wall normal to said junction a predetermined dis-
tance from and parallel said main core for adjust-
ably retaining a bezel mold for molding a bezel sur-
rounding the upper end of said pattern and an upper end core for molding the upper end portion of said pattern,
a recess in and around the central portion of each said semi-cylindrical cavity and through said wall for
forming the outer surface of the bands and the op-
posite outer side portions of said patterns,
a passageway in said first and second body members
central of said junction entering said recess for con-
ducting said wax into said mold,
a removable hollow inner core symmetrical about a
central axis thereof with one end contiguous with
and removably secured to one side of the central
portion of said main core with the said central axis
thereof normal to the axis of said main core and co-
incident with said junction and the opposite end of
terminating in a planar rim normal to said junc-
tion,
a bezel plate loosely positioned in said second cavity
with an aperture having a size and shape substanc-
tially equal to said rim of said inner core,
said plate including an oblique ornamental surface
around the inner periphery thereof for forming the
convergent upper end portion of said pattern when
positioned against the wall and said aperture ad-
justed into coaxial relation with said inner core,
a gem-stone core coaxial with and projecting through
said bezel aperture with the inner end portion there-
of engaged with the inner periphery of said rim with
a rear end of said gem-stone core terminating in a
flange loosely positioned in said second cavity with
the inner surface against the outer surface of said
bezel plate,
a first screw means threaded through said first body
member and into said second cavity for engaging the
outer surface of said flange for adjustably positioning
said bezel plate and said gem-stone core in coaxial
alignment with said axis of said inner core and lock-
ing same into engagement with said wall,
a second screw means threaded through said second
body member into said cavity for engaging the outer
surface of said flange for holding the adjustment of
same and securing said first and second body mem-
ber together in mating relation.
2. In a mold for making wax patterns for the invest-
ment casting of finger rings a first and second mold mem-
er in superposed relation with each said member having
a planar side in mating contact forming a co-planar part-
ing junction,
a first cavity means in mating relation in each said
mold member for forming the body of said ring pat-
tern including a band portion and opposite side por-
tions of said pattern,
a second cavity of predetermined size in mating rela-
tion in each side of said mold member positioned
adjacent the outer end of said first cavity means, an
annular bezel plate having negative ornamentation
for molding a positive bezel surrounding the end of
said wax pattern,
a gem-stone core means with the axis thereof posi-
tioned centrally through said bezel plate and into
said cavity means for molding a gem retaining cavity
in the end of said pattern when said bezel plate and
said gem-stone core are adjustably positioned central
and extending into the outer end of said first cavity
means,
screw means in said first body member for securing
said bezel plate and said gem-stone core means in
said adjusted position in said cavity when tightened.
3. The construction recited in claim 2 including a
marginal tongue around said planar side of one said mem-
ber integral therewith and a mating groove in and around
the said planar side of the other said member for sealing
engagement with said tongue when said planar sides are
positioned in mating contact to said junction.
4. The construction recited in claim 2 wherein each
said mold member is cylindrical in shape and of like
diameter,
a circular marginal tongue around the said planar side
of one said member integral therewith and a mating
circular groove in and around said planar side of the
other said member for sealing engagement with said
tongue when said planar sides are positioned in
mating contact at said junction.
5. The construction recited in claim 2 including inte-
gral negative ornamentation formed in each of said
sides of said pattern.
6. The construction recited in claim 2 including a bore
means in said screw means for permitting the escape of
air therethrough from each said cavity when said mold
is subjected to a partial vacuum.
7. In a mold for making wax patterns for the invest-
ment casting of finger rings a first and second mold mem-
er in superposed relation with each said member having
a planar side in mating contact forming a co-planar part-
ing junction,
a first cavity means in mating relation in each said
mold member for forming the body of said ring pat-
tern including a bank portion and side portion ter-
minating in a rim at the outer end thereof,
a second cavity of predetermined size in mating rela-
tion in each side of said member positioned adjacent the
outer end of said cavity means an annular bezel plate
having negative ornamentation for molding a positive
bezel surrounding the end of said pattern,
an end core means positioned adjacent said bezel plate
having an outer end thereof substantially parallel
said bezel plate and loosely positioned in said cavity
means for molding a planar surface on the outer
end of said pattern substantially normal thereto
when said bezel plate and said end core are adjust-
ably positioned adjacent to the outer end of said
first cavity means,
screw means in said first body member for securing
said bezel plate and said end core means in said
adjusted position in said cavity when tightened.
8. The construction recited in claim 7 including inte-
gral negative ornamentation formed in each of said sides
of said pattern.
9. The construction recited in claim 7 including a bore
means in said screw means for permitting the escape of
air from each said cavity when said mold is sub-
jected to a partial vacuum.
10. The construction recited in claim 7 including pre-
determined integral ornamentation on said planar surface
of said end core means for molding corresponding orna-
mentation on the said planar surface on the outer end
of said pattern.
11. In a mold for making wax patterns for the invest-
ment casting of finger rings wherein said mold comprises
a first and second adjoining cavity, said first cavity having wall members adapted to form the band of said ring, said second cavity adapted to form the signet portion of said ring, the improvement wherein a first plate member is releasably secured in said second cavity to form the uppermost surface of the ring, said first plate member having a design engraved on the side of said plate facing said first cavity, a second plate member releasably secured in said second cavity adjacent to said first plate and positioned between said first plate and said first cavity, said second plate member having an aperture with a design at its periphery to form the bezel portion of said ring.

12. In a mold for making wax patterns for the investment casting of finger rings wherein said mold comprises a first and second adjoining cavity, said first cavity having wall members adapted to form the band of said ring, said second cavity adapted to form the signet portion of said ring, the improvement wherein a first plate member is secured in said second cavity, said plate having a core projecting toward said first cavity and having a step on its periphery, to form a recess for mounting a gemstone in said ring, and a second plate member secured in said second cavity having an aperture within which said core is centrally positioned, said aperture having a design on its periphery to form the bezel portion of said ring.

References Cited

UNITED STATES PATENTS

695,507 3/1902 Strang 249—57
1,000,470 8/1911 Widmann 249—57
3,302,257 2/1967 Kaplan 249—57 X
984,659 2/1911 Greco 249—57

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