

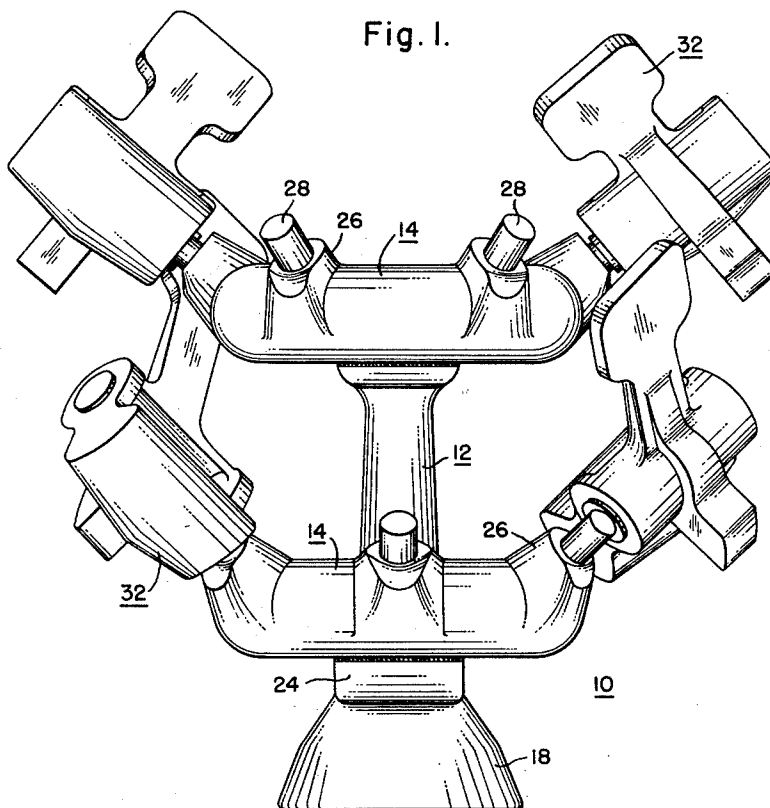
Jan. 19, 1954

J. A. FARRELL
PATTERN ASSEMBLY

2,666,239

Filed June 29, 1950

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

Fig. 2.

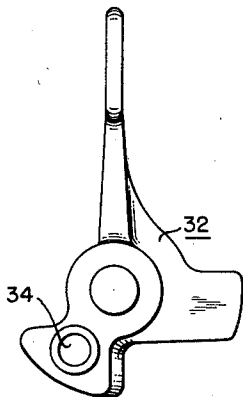


Fig. 4.

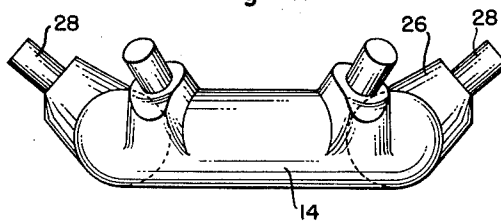


Fig. 3.

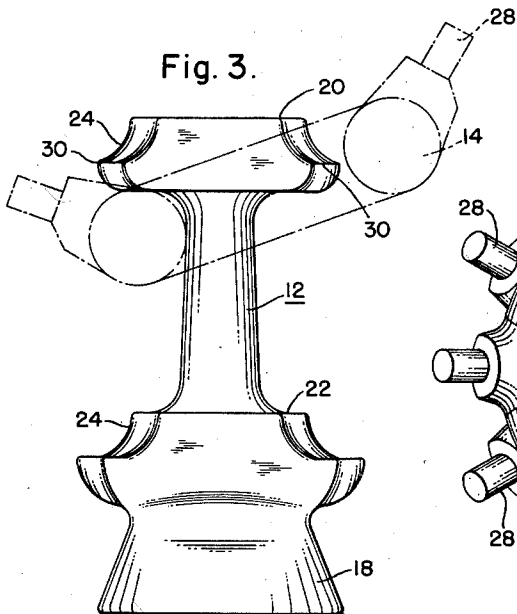
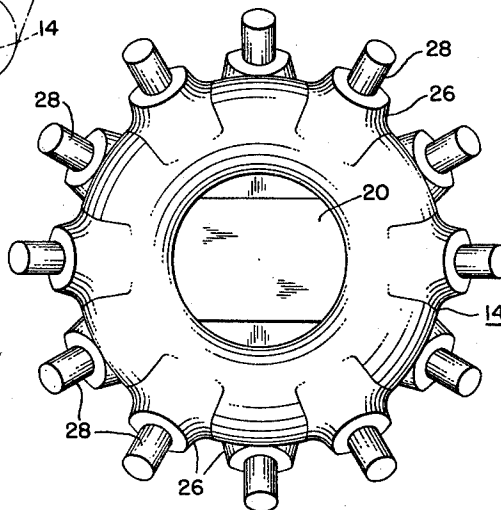


Fig. 5.



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PATTERN ASSEMBLY

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Application June 29, 1950, Serial No. 171,160

3 Claims. (Cl. 22-162)

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This invention relates to pattern assemblies and in particular to pattern assemblies of wax for the making of investment castings.

In the making of cast articles by the investment casting process, patterns identical to the article to be produced are formed of a suitable wax composition and disposed in a flask. Investment material is then introduced into the flask to fill the space about the wax pattern. When the investment material is solidified and dried, the wax pattern is melted and run out of the flask to leave a cavity in the solidified investment material corresponding to the article to be produced. Metal is thereafter cast into the resulting mold cavity.

In commercial practice, it is desirable to assemble as many of the patterns as possible and to so invest them in the flask so that a plurality of molding cavities will be produced in each flask. Heretofore the number of cavities which it has been possible to produce per flask has been seriously limited by reason of the pattern assembly, for each cavity must be properly gated and fed, thereby limiting the location of the gate and establishing the amount of riser material required. Further, each of the patterns must be at such an angle that air will not be entrapped in under-cuts or the like during the investing of the patterns with the investment material. In addition, the space is critical in that enough clearance must be maintained between patterns to provide an adequate wall of investment material between the resulting mold cavities and between the patterns and the investment flask.

An object of this invention is to provide a wax pattern assembly for the making of investment castings having a plurality of spaced patterns disposed about a plurality of feeder rings carried in spaced relation along a central feeder stem.

Another object of this invention is to provide a central feeder stem with spaced supports for holding interchangeable feeder rings adapted to receive a plurality of patterns thereon in a predetermined manner for producing a pattern assembly for the making of an investment mold.

A further object of this invention is to provide, in a wax pattern assembly having a central feeder stem with supporting shoulders spaced therealong, for utilizing interchangeable feeder rings of a size to seat on any one of the supporting shoulders, or to slip over the upper supporting shoulders when tilted relative thereto to thereby seat the ring on the lower supporting shoulders.

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A more specific object of this invention is to provide, in a wax pattern assembly having a central feeder stem with supporting shoulder means spaced therealong for utilizing interchangeable feeder rings of a size to seat on any one of the shoulder supporting means or to slip over the upper shoulder means when tilted relative thereto, the rings having a plurality of spaced angularly projecting pins carried thereon and being disposed when the rings are seated on the shoulder means with the pins of one of the rings intermediate the pins of the other ring to facilitate mounting of the patterns thereon in non-interfering relation.

Other objects of this invention will become apparent from the following description when taken in conjunction with the accompanying drawings in which:

Fig. 1 is a view in elevation of a pattern assembly embodying the teachings of this invention.

Fig. 2 is a plan view of a typical pattern utilized in making investment castings.

Fig. 3 is a view in elevation of a stem member utilized in making the pattern assembly of this invention.

Fig. 4 is a side elevational view of a feeder ring which cooperates with the stem member of Fig. 3 in producing the pattern assembly of Fig. 1, and

Fig. 5 is a top plan view of part of the pattern assembly illustrating the manner in which the rings seat on the stem of Fig. 3, and the relative positioning of the pins of the different rings.

Referring to the drawings, and in particular to Fig. 1, there is illustrated a pattern assembly 10 embodying the teachings of this invention. The pattern assembly 10 comprises a central stem member 12, a pair of interchangeable feeder ring members 14 and a plurality of patterns 32 assembled as to be described hereinafter. The components of the pattern assembly 10 are formed of a suitable formulation, reference being had to the wax composition disclosed and claimed in Patent No. 2,467,796, issued April 19, 1949, to Willis as being a particularly good wax formulation. The components of the pattern assembly 10 may be formed in any suitable manner, for example, by means of the apparatus and method disclosed in Patent No. 2,434,557, issued January 13, 1948, to Fox et al.

Referring to Fig. 3, the stem member 12 is more clearly illustrated as comprising an enlarged base portion 18 and upper and lower supporting members 20 and 22, respectively, all

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formed integrally during the formation of the stem member 12. Each of the upper and lower support members 20 and 22, respectively, is preferably formed with shoulders on opposite sides of the stem member 12, the shoulders having a reentrant curve shape or concave surface 24 for cooperating with the ring members 14, as will be explained more fully hereinafter.

Referring to Fig. 4, one of the ring members 14 is illustrated as being of a substantially dough-nut shape having an inner diameter of a predetermined size for cooperating with the supporting members 20 and 22 of the stem member 12. Each of the ring members 14 is provided with a plurality of protuberances 26 spaced about the periphery thereof, each protuberance 26 carrying a pin 28 extending outwardly therefrom. As illustrated, each of the ring members preferably carries six of the protuberances 26 and pins 28, the pins 28 preferably extending angularly outwardly from a plane through the ring member 14. In commercial practice, it has been found that where the pins 28 extend at an angle of substantially 40° with respect to a plane through the ring member 14, that a good pattern assembly will result with a resulting minimum over-all diameter of the assembly.

The upper and lower supporting members 20 and 22, respectively, are formed of a size to cooperate with the ring members 14, as stated hereinbefore. Thus, the upper edges of the opposite shoulders forming each of the upper and lower support members 20 and 22 are spaced apart a distance substantially equal to the inner diameter of one of the ring members 14, whereas the lower edges of the opposite shoulders of the upper and lower support members 20 and 22 are spaced apart a distance sufficient to engage at least a portion of the lower side of one of the ring members 14 when the ring member 14 is seated thereon, as to be described hereinafter.

In practice, the lower edges of the shoulders of the lower support member 22 extend outwardly in opposite directions a greater distance than the lower edges of the upper support member 20 so as to provide a good seat with one of the ring members 14, and to cooperate therewith to aid in forming a large feeder section in the cavity which will result after the wax pattern is melted out of the investment material.

As clearly illustrated in Fig. 3, while the lower edges 30 of the opposite shoulders of the upper support member 20 are spaced apart a distance sufficient to support one of the ring members 14 when the ring member is in seating engagement with the reentrant curved portions 24 of the upper support member 20, nevertheless, the lower edges 30 of the opposite shoulders of the upper support member 20 are spaced apart a distance limited by the size of the ring 14. Thus, the distance between the lower edges 30 of the upper support member 20 is determined by the distance from a point on one side of the stem member 12 adjacent the upper support member to the lower edge 30 of the opposite shoulder member of the upper support member 20 so that such distance is slightly less than the diameter of the central opening of the ring member 14. By determining the distance or location of the lower edges 30 of the supporting shoulders of the upper support member 20 in this manner, it is possible to tilt a ring member 14 to slip it over one of the shoulders of the upper support member 20 to a position where an edge of the ring member 14 engages the stem member 12 and thereafter moves

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the ring member 14 as illustrated in dotted outline in Fig. 3 to a horizontal position where it may be seated on the opposite shoulders of the lower support member 22. When thus seated, the ring member 14 is secured in assembled relation with respect to the lower support member 22 by applying a hot spatula to the underside of the ring member 14 where it will seat against the supporting shoulders of the lower support member 22 so that when seated thereon the composition of the ring member 14 and of the reentrant curved shoulders of the lower support member 22 become consolidated.

After one of the ring members 14 is positioned on the lower support member 22 in the manner just described, a second ring member 14 is seated on the opposite shoulders of the upper support member 20 and secured thereto in the same manner. In positioning the ring member 14 on the upper support member 20, care is taken to position and secure the ring member 14 to the upper support member 20 so that the pins 28 of the upper ring member 14 will be intermediately positioned with respect to the pins 28 of the lower ring member 14.

The reentrant curved shape of the opposite shoulders forming the upper and lower support members 20 and 22 cooperates with the inner lower curved surface of the ring members 14 to give a good support of the ring members when assembled in the manner described, it being noted that the reentrant curved shape of the supporting shoulders is complementary to the curved shape of the ring members 14.

With the ring members 14 mounted as described on the stem member 12, the patterns, for example the pattern 32 of Fig. 2, may be mounted on the pins 28 in non-interfering relation. The pattern 32 is illustrative of a latching mechanism for switchgear apparatus, and when formed in accordance with the teaching of the Fox et al. patent identified hereinbefore, is preferably formed with an opening 34 in the thick section thereof, the opening 34 being of a size to give a tight fit with any one of the pins 28 of one of the ring members 14. In forming the opening 34 in the thick section of the pattern, the opening extends substantially throughout the pattern 32 in order to reduce the volume of wax utilized in forming the pattern 32 and to prevent detrimental shrinkage in such large sections. Regardless of the pattern 32 utilized, it is preferable that the opening 34 be so located that the patterns may be assembled on the pins 28 in non-interfering relation with respect to one another as illustrated in Fig. 1 of the drawing. The patterns are preferably secured to the pins 28 in a manner similar to the mounting of the ring members 14 on the upper and lower support members, that is, a hot spatula or some other medium for effecting a surface melting or softening of the ends of the pins 28 is applied to the pins 28 so that the composition of the pins 28 will bond with the sides of the opening 34 of the pattern.

In assembling the patterns, it is seen that by reason of the angularly projecting pins 28 that the patterns extend outwardly from the ring members 14 at an angle thereto and that since the pins 28 are disposed in spaced relation about the ring members 14, it is a relatively simple matter to twist or turn the pattern 32 as it is mounted on one of the cooperating pins 28 that adequate clearance will be maintained between the assembled components forming the pattern assembly 10. Thus, a part of each of the spaced patterns

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32 positioned on the lower ring member 14 can extend upwardly between the spaced patterns 32 assembled on the upper ring member 14 and still maintain clearance therebetween. Further, because of the angular mounting of the patterns with respect to the rings 14, any air in the investment material admitted to the flask will readily escape from around the patterns as the flask is filled.

When the pattern assembly 10 is assembled and completed in the manner described hereinbefore, it can be invested in a suitable investment material in a flask (not shown) after which the wax of the pattern assembly 10 is melted out in a conventional manner to leave a mold cavity corresponding in all details to the pattern assembly 10. As will be evident, because of the enlarged base portion 18 of the pattern assembly, the resulting mold cavity will have a large gate and metal can be readily cast in the resulting mold cavity. Since the ring members 14 are of substantial size compared to the pin members 28, a cavity will result which will have large feeder sections for feeding the molten metal to the pattern cavity which it is desired to reproduce in exact detail. Further, by making the lower support member 22 of the stem member 12 large relative to the upper support member 20, it is seen that the resulting cavity formed when the assembled lower support member and the lower ring member are melted will be a substantially larger feeder cavity than the feeder cavity resulting by melting the assembled upper support member 20 and the upper ring member 14 from the investment material so that adequate metal will be supplied to all of the pattern cavities regardless of their location.

The pattern assembly of this invention makes it possible to produce as many as 12 castings at one time. It is, of course, evident that additional supporting members may be added to the stem member 12, depending upon the size and shape of the article to be produced and the available size of the flask for producing the molds. In all cases the resulting pattern assembly 10 is rugged and can be readily handled and located or positioned in the flask without danger of disturbing the positioning of the patterns 32 on the assembly. By utilizing the stem member 12 described, it is seen that the assembly is clearly simplified since interchangeable ring members 14 can be utilized for effecting the mounting of the patterns 32 relative one to the other and still obtain adequate feeder and riser cavities.

I claim as my invention:

1. In a pattern assembly of wax for the making of investment castings, the combination comprising, a stem member having an enlarged base portion, a pair of interchangeable ring members each having a plurality of protuberances spaced about the periphery thereof, each protuberance carrying a pin member extending outwardly therefrom and inclined upwardly at an angle with respect to a plane through the associated ring member, the pin members being disposed for mounting patterns thereon and the interchangeable ring members being of substantial size compared to the associated pin members, an upper support member and a lower support member disposed about the stem member in spaced relation lengthwise thereof for receiving the ring members, the lower support member being relatively large as compared to the upper support member, the lower support member comprising a shoulder having a concave surface for supporting one of the inter-

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changeable ring members and the upper support member comprising a shoulder having a concave surface for supporting the other of the interchangeable ring members, said one of the interchangeable ring members having a central opening therein of a size to facilitate slipping of the said one of the interchangeable ring members over the upper support member when tilted at an angle thereto to seat the said one of the interchangeable ring members on the lower support member with the stem member centrally thereof, the central opening of the said other of the interchangeable ring members facilitating the seating of the said other of the interchangeable ring members on the upper support member, the ring members being secured to their support members by the application of heat to effect a bond therebetween.

2. In a pattern assembly of wax for the making of investment castings, the combination comprising, a stem member having an enlarged base portion, a pair of substantially identical ring members each having a plurality of protuberances spaced about the periphery thereof, each protuberance carrying a pin member extending outwardly therefrom and inclined upwardly at an angle with respect to a plane through the associated ring member, the pin members being disposed for mounting patterns thereon and the substantially identical ring members being of substantial size compared to the associated pin members, an upper support member and a lower support member disposed about the stem member in spaced relation lengthwise thereof for receiving the ring members, the lower support member being relatively large as compared to the upper support member, the lower support member comprising a shoulder having a concave surface for supporting one of the ring members and the upper support member comprising a shoulder having a concave surface for supporting the other of the ring members, said one of the ring members having a central opening therein of a size to facilitate slipping the said one of the ring members over the upper support member when tilted at an angle thereto to seat the said one of the ring members on the lower support member with the stem member centrally thereof, said other of the ring members being disposed on the upper support member, the ring members being so disposed on the support members that the pin members of the said one of the ring members are disposed relative to the pin members of the said other of the ring members to be positioned intermediate thereof to facilitate mounting of the patterns thereon in assembled relation, the ring members being secured in their assembled relation on their cooperating support members by the application of heat to effect a bond therebetween.

3. In a pattern assembly of wax for the making of investment castings, the combination comprising, a plurality of identical patterns having an opening therein of a predetermined size, a stem member having an enlarged base portion, a pair of substantially identical ring members each having a plurality of protuberances spaced about the periphery thereof, each protuberance carrying a pin member extending outwardly therefrom and inclined upwardly at an angle with respect to a plane through the associated ring member, the pin members being of a size for fitting into the opening of predetermined size of the patterns to facilitate mounting of the patterns thereon and the substantially identical ring members being of substantial size compared to the associated pin

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members, an upper support member and a lower support member disposed about the stem member in spaced relation lengthwise thereof for receiving the ring members, the lower support member being relatively large as compared to the upper support member, the lower support member comprising a shoulder having a concave surface for supporting one of the ring members and the upper support member comprising a shoulder having a concave surface for supporting the other of the ring members, said one of the ring members having a central opening therein of a size to facilitate slipping the said one of the ring members over the upper support member when tilted at an angle thereto to seat the said one of the ring members on the lower support member, the said other of the ring members being disposed on the upper support member, the ring members being so disposed on the support members that the pin members of the said one of the ring members are

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disposed relative to the pin members of the said other of the ring members to be positioned intermediate thereof to facilitate mounting of the patterns thereon in non-interfering assembled relation.

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