June 16, 1959 J. J. BRAND 2,890,505

PERMANENT MOLD WITH INSERT LOCATING MEANS

Filed Oct. 18, 1956 2 Sheets-Sheet 1

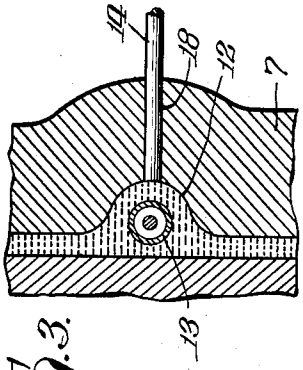


Fig. 3.

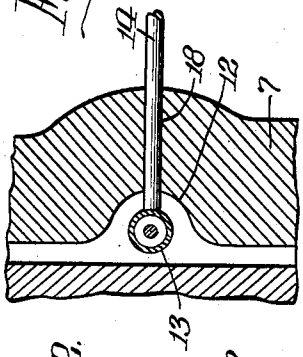


Fig. 2.

Fig. 1.

INVENTOR.
Joseph J. Brand,
BY
Andrew F. Winters
Atty.

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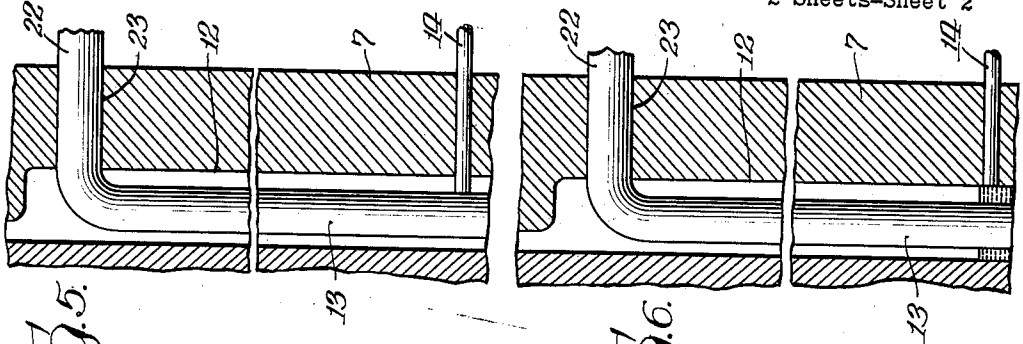


Fig. 5.

Fig. 6.

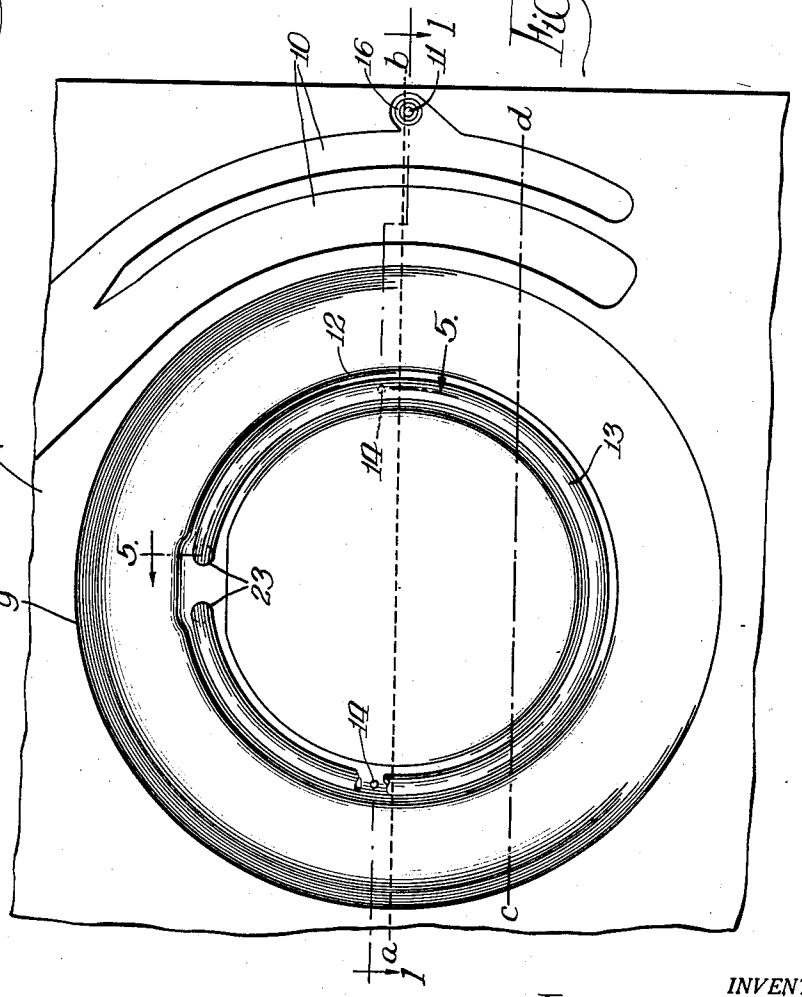


Fig. 4.

INVENTOR.
Joseph J. Brand,
BY
Andrew F. Pinterosa
Atty.

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PERMANENT MOLD WITH INSERT LOCATING MEANS

Joseph J. Brand, Northlake, Ill., assignor, by mesne assignments, to R and R Metal Products, Inc., Chicago, Ill., a corporation of Delaware

Application October 18, 1956, Serial No. 616,827

14 Claims. (Cl. 22—151)

This invention relates to permanent mold dies especially designed for use in casting aluminum cooking utensils and the like that have electrical heating elements molded in place in the wall thereof.

The "Calrods," as the heating element inserts are called, presented a problem to locate the same properly in the mold and keep the same centrally located in a recess during casting. At first, these Calrods were equipped with three locating pins welded thereto radially with respect to the rods, but that was objectionable because the ends of these pins were visible where they extended through the wall of the casting, and there was the further objection that leakage could occur around these pins, in some instances at as little as four pounds per square inch hydrostatic pressure. Furthermore, there was always the danger of a short circuit being caused by any one or more of these pins. Although it was possible to eliminate two of the three welded locating pins to avoid some of the objections mentioned above, the third pin remained a problem and a special operation had to be done on each completed casting to effect a tight seal, so that that was still more or less of a makeshift construction and was not considered to be a good solution to the problem. It is, therefore, the principal object of my invention to eliminate the third welded pin also by providing retractable locating pins slidably mounted in the mold using metal rod material of a kind that will stand up under high temperature, two such pins being provided at about a mid-level and being movable from a projecting position for Calrod location purposes to a retracted position flush with the wall of the cavity automatically when a contact point that projects into another portion of the die cavity at a slightly lower level is reached by the molten metal in casting to ground the contact point and operate a relay which in turn operates a solenoid controlled air valve or other means operatively connected with the locating pins to retract the same. The contact point, like the locating pins, is made of a metal rod material that will stand up under high temperature, and it is normally electrically insulated from the die block. I have found that this works quite satisfactorily as the partially solidified metal in the lower portion of the die cavity holds the Calrod securely enough by the time the molten metal reaches the level of the contact point, so that the movement of the locating pins to retracted position is feasible, and the metal fills in over the ends of the locating pins, instead of around them.

The invention is illustrated in the accompanying drawings, in which—

Fig. 1 is a horizontal section on line 1—1 of Fig. 4 through a pair of permanent mold dies for use in making aluminum fry pans with a Calrod in the bottom, the one die block being shown equipped with locating pins that are connected with operating mechanism controlled by an electrical contact point in accordance with my invention;

Figs. 2 and 3 are enlarged sectional details showing the operative and retracted positions of one of the locating pins, respectively;

Fig. 4 is a face view of the recessed die block showing the Calrod positioned therein and illustrating the slightly lower level relationship of the contact point with respect to the two locating pins, and

Figs. 5 and 6 are sections on line 5—5 of Fig. 4 related to Figs. 2 and 3, respectively, showing the Calrod locating position of the pin in Fig. 5 and the retracted position thereof in Fig. 6.

The same reference numerals are applied to corresponding parts throughout these views.

Referring to the drawings, the reference numerals 7 and 8 designate the two mating dies of a permanent mold defining therebetween the die cavity 9 and its lateral extension 10 where the contact point 11 provided in accordance with my invention, at approximately a mid level, is located, the reference numeral 12 indicating the recessed portion in the die block 7 in which the Calrod 13 is disposed and has to be held as closely as possible in a central position by means of the two locating pins 14. The contact point 11 is mounted in insulators 15 in a metal tube 16 having a tight press fit in a hole 17 in block 7. The contact point 11 is made of an alloy metal rod that will stand up well under high temperatures for a long time. The same is true of the locating pins 14 which are slidable with a close working fit in holes 18 provided therefor in block 7, in radial relationship to the circular section of the Calrod 13 and half-round cross-section of recess 12. These pins 14 are adapted to have endwise movement only to the small extent indicated in Figs. 2 and 3, which show the pin 14 in Calrod locating position and retracted position respectively, the pin in the latter position having its inner end substantially flush with the recess 12. The Calrod 13 is shown in Fig. 4 as of substantially circular form and disposed centrally in the substantially circular boss 19 cast integral with the bottom 20 of an aluminum circular fry pan casting 21. However, it will be understood that the present invention is not limited to this or any other specific shape or kind of cooking utensil, and the invention may be applied to any castings requiring the casting in place therein of heating elements or other similar inserts. The end portions 22 of the Calrod 13 are bent at right angles to the plane of the circularly bent portion thereof and are parallel to one another and have a close working fit in parallel holes 23 provided therefor in block 7 at the upper end of the recess 12. After each casting operation, when the dies 7 and 8 are separated, these end portions 22 slip out of the holes 23 at the same time that the sprue-like extension 24 of the casting 21 is stripped off the end of the contact 11 and out of the die cavity extension 10, leaving the die cavity 9 and its extension 10, and contact point 11, as well as locating pins 14, clean and ready for the next casting operation.

The two Calrod locating pins 14 are shown as having threadedly adjustable connections 25 with posts 26 slidably connected, as at 27, with the opposite ends of a cross-head 28 that is pivotally connected at its mid point, as at 29, with a rod 30 connected to a piston 31 reciprocable in a cylinder 32. Of course, any suitable or preferred means may be provided for transmitting a predetermined amount of retracting movement to pins 14 and the means herein shown is only one such means. One end of the cylinder 32 is connected by means of a pipe 33 with one side of an electric solenoid operated air valve 34 whose other side is connected by means of a pipe 35 with a source of compressed air. The valve 34 is normally closed and opens only when the solenoid is

actuated, thus allowing air to enter the cylinder **32** and force the piston **31** to the rear against the resistance of a spring **36** into engagement with an adjustable screw abutment **37**, whereby to insure pulling the pins **14** back only an exactly predetermined distance with their inner ends flush with the Calrod cavity **12**. The solenoid valve **34** is shown as electrically connected with a relay **38**, to one side of which line conductors **39** are connected and to the other side of which a conductor **40** is connected, the latter extending to and connected with the contact point **11**, while another conductor **41** connected thereto is grounded.

In operation, the circuit is completed when the molten metal poured into the mold reaches the level of the horizontal dotted line *a—b* in Fig. 4, slightly below the level of the two Calrod locating pins **14**, so that these pins are certain of being retracted before the molten metal reaches their level, the metal filling in over the inner ends of these pins instead of around them, as appears in Figs. 3 and 6. In Fig. 1, the pins **14** are shown still extended, as if the molten metal indicated at **20**, **21** and **24** had not yet reached the level of contact point **11**. I have found that by the time the molten metal reaches a level approximately where the dot and dash line *c—d* is shown in Fig. 4, the partial solidification of the metal is enough to hold the Calrod against shifting from its central position in the recess **12**. It is obvious, therefore, that by the time the molten metal reaches the level *a—b*, when the locating pins **14** are retracted, there is no danger whatsoever of the Calrod shifting, and accordingly the Calrods **13** are always centrally disposed in the bosses **19** on castings **21**. When the castings are removed from the mold, the sprue-like extensions **24** are trimmed off and there is nothing left to do but what is customary with any other aluminum castings made in permanent molds. The special operation that had to be done on each casting where a single pin for locating purposes was still provided welded onto the Calrod and had to be attended to in order to make a tight seal around it is eliminated when the castings are made as herein described and the present product is not only cheaper but far better.

It is believed the foregoing description conveys a good understanding of the objects and advantages of my invention. The appended claims have been drawn to cover all legitimate modifications and adaptations.

I claim:

1. In combination, a pair of companion separable dies substantially vertically disposed and defining a die cavity therebetween in a substantially vertical plane, an insert engaging and locating element slidably mounted in a guide provided therefor in one of said dies for movement transversely of the die cavity and at a predetermined elevation above the bottom thereof, an electrical contact exposed in the die cavity at another elevation below that of the aforesaid locating element, said contact being mounted in electrically insulated relation to said dies and adapted to be grounded by engagement with the molten metal in the die cavity in a casting operation, and mechanism operable in response to the grounding of said contact and operatively connected with said locating element to move the latter to a retracted position relative to an insert in the die cavity.

2. In combination, a pair of companion separable dies substantially vertically disposed and defining a die cavity therebetween in a substantially vertical plane, an insert engaging and locating element slidably mounted in a guide provided therefor in one of said dies for movement transversely of the die cavity and at a predetermined elevation above the bottom thereof, said die cavity having an extension for the casting therein of a sprue-like extension on a casting poured in the die cavity, an electrical contact exposed in the die cavity extension at another elevation below that of the aforesaid locating element, said contact being mounted in electrically insulated relation

to said dies and adapted to be grounded by engagement with the molten metal in the die cavity extension in a casting operation, and mechanism operable in response to the grounding of said contact and operatively connected with said locating element to move the latter to a retracted position relative to an insert in the die cavity.

3. In combination, a pair of companion separable dies substantially vertically disposed and defining a die cavity therebetween in a substantially vertical plane, insert engaging and locating elements slidably mounted in guides provided therefor in one of said dies for movement transversely of the die cavity and at a predetermined elevation above the bottom thereof, an electrical contact exposed in the die cavity at another elevation below that of the aforesaid locating elements, said contact being mounted in electrically insulated relation to said dies and adapted to be grounded by engagement with the molten metal in the die cavity in a casting operation, and mechanism operable in response to the grounding of said contact and operatively connetced with said locating elements to move the latter to a retracted position relative to an insert in the die cavity.

4. In combination, a pair of companion separable dies substantially vertically disposed and defining a die cavity therebetween in a substantially vertical plane, insert engaging and locating elements slidably mounted in guides provided therefor in one of said dies for movement transversely of the die cavity and at a predetermined elevation above the bottom thereof, said die cavity having an extension for the casting therein of a sprue-like extension on a casting poured in the die cavity, an electrical contact exposed in the die cavity extension at another elevation below that of the aforesaid locating elements, said contact being mounted in electrically insulated relation to said dies and adapted to be grounded by engagement with the molten metal in the die cavity extension in a casting operation, and mechanism operable in response to the grounding of said contact and operatively connected with said locating elements to move the latter to a retracted position relative to an insert in the die cavity.

5. In combination, a pair of companion separable dies substantially vertically disposed and defining a die cavity therebetween in a substantially vertical plane, a pair of insert engaging and locating rods disposed in spaced parallel relationship in substantially the same horizontal plane and slidably mounted in guides provided therefor in one of said dies for movement transversely with respect to the die cavity and at a predetermined elevation above the bottom thereof, a cross-head operatively connected at its opposite ends with the outer protruding end portions of said rods, an electrical contact exposed in the die cavity at another elevation below that of the aforesaid rods, said contact being mounted in electrically insulated relation to said dies and adapted to be grounded by engagement with the molten metal in the die cavity in a casting operation, and mechanism operable in response to the grounding of said contact and operatively connected with the middle of said cross-head to move the latter outwardly with respect to said dies and shift the rods to a retracted position relative to an insert in the die cavity.

6. A structure as set forth in claim 5, wherein said die cavity has an extension for the casting therein of a sprue-like extension on a casting poured in the die cavity, said electrical contact being exposed in the die cavity extension.

7. A structure as set forth in claim 5, wherein said mechanism comprises a cylinder, a piston reciprocable therein and operatively connected by means of a piston rod with said cross-head, spring means in said cylinder holding said piston normally in one extreme position, an abutment limiting movement of the piston to an opposite extreme position, a source of pressure fluid, and valve means operable in response to the grounding of said contact for admitting pressure fluid to said cylinder

to move said piston against the resistance of said spring means.

8. A structure as set forth in claim 5, wherein said mechanism comprises a cylinder, a piston reciprocable therein and operatively connected by means of a piston rod with said cross-head, spring means in said cylinder holding said piston normally in one extreme position, an abutment limiting movement of the piston to an opposite extreme position, a source of pressure fluid, and valve means operable in response to the grounding of said contact for admitting pressure fluid to said cylinder to move said piston against the resistance of said spring means, said piston abutment being threadedly adjustable with respect to said cylinder.

9. A structure as set forth in claim 5, including adjustable length connections between said rods and said cross-head.

10. A structure as set forth in claim 5, including threadedly adjustable length connections between said rods and said cross-head.

11. In combination, a pair of companion separable dies substantially vertically disposed and defining a die cavity therebetween in a substantially vertical plane, said die cavity including an elongated depression provided in one of said dies which depression is of substantially semi-circular form in cross-section, an insert disposed in said die cavity substantially centrally with respect to said depression, an insert engaging and locating pin slidably mounted in a guide provided therefor in the last mentioned die substantially radially with respect to said depression for movement transversely of the die cavity and at a predetermined elevation above the bottom thereof, an electrical contact exposed in the die cavity at another elevation below that of the aforesaid pin, said contact being mounted in electrically insulated relation to said dies and adapted to be grounded by engagement with the molten metal in the die cavity in a casting operation, and mechanism operable in response to the grounding of said contact and operatively connected with said pin to move the same to a retracted position.

12. A structure as set forth in claim 11, wherein said die cavity has an extension for the casting therein of a sprue-like extension on a casting poured in the die cavity, said contact being exposed in said die cavity extension.

13. In combination, a pair of companion separable dies substantially vertically disposed and defining a die cavity therebetween in a substantially vertical plane, said die cavity including an elongated depression provided in one of said dies which depression is of substantially semi-circular form in cross-section, a tubular metal casing resistance element of circular cross-section disposed in said die cavity substantially centrally with respect to said depression, a resistance element engaging and locating pin slidably mounted in a guide provided therefor in the last mentioned die substantially radially with respect to said depression for movement transversely of the die cavity and at a predetermined elevation above the bottom thereof, an electrical contact exposed in the die cavity at another elevation below that of the aforesaid pin, said contact being mounted in electrically insulated relation to said dies and adapted to be grounded by engagement with the molten metal in the die cavity in a casting operation, and mechanism operable in response to the grounding of said contact and operatively connected with said pin to move the same to a retracted position.

14. A structure as set forth in claim 13, wherein said die cavity has an extension for the casting therein of a sprue-like extension on a casting poured in the die cavity, said contact being exposed in said die cavity extension.

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