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(54) Title: COOKING VESSEL FOR INDUCTION RANGES AND MANUFACTURING METHOD THEREOF

(57) Abstract: Disclosed herein is a cooking vessel for induction ranges and a manufacturing method thereof, in which a locking member produced through die casting injection to have a predetermined shape is assembled with a conductive plate produced through pressing, the assembly is put into molds for manufacturing the cooking vessel, and a die casting injection process is performed in the molds using molten aluminum Al, thus ensuring the flatness of the conductive plate, and allowing the conductive plate to be firmly integrated with the lower portion of a vessel body of the cooking vessel, thus preventing the conductive plate from being separated from the cooking vessel even if it is used for a lengthy period of time. The manufacturing method includes the steps of pressing a conductive plate made of a conductive material, assembling an aluminum locking member produced through die casting injection with an upper surface of the pressed conductive plate, die casting a vessel body integrally having the assembly on a lower portion thereof, and removing the vessel body from the molds.
Description

COOKING VESSEL FOR INDUCTION RANGES AND MANUFACTURING METHOD THEREOF

Technical Field

[1] The present invention relates generally to a cooking vessel for induction ranges and a manufacturing method thereof and, more particularly, to a cooking vessel for induction ranges and a manufacturing method thereof, in which a locking member produced through die casting injection to have a predetermined shape is assembled with a conductive plate produced through pressing, the assembly is put into molds for manufacturing the cooking vessel, and a die casting injection process is performed in the molds using molten aluminum Al, thus ensuring the flatness of the conductive plate, and allowing the conductive plate to be firmly integrated with the lower portion of a vessel body of the cooking vessel, thus preventing the conductive plate from being separated from the cooking vessel even if it is used for a lengthy period of time.

[2] Background Art

[3] Generally, induction ranges are appliances which generate a magnetic field and lead to an eddy current effect on the bottom surface of a cooking vessel so that the cooking vessel itself rapidly generates heat, thus heating and cooking food in the cooking vessel. The induction range does not produce flames, hazardous gas, etc., so that there is no risk of a fire. Further, the induction range does not produce carbon monoxide CO, which is inevitably produced in the case of using gas as a heat source. Since the induction range does not consume oxygen, a pleasant environment is maintained. For these reasons, the induction range has been widely used in the catering industry, such as restaurants.

[4] Further, even if a person’s hand touches a top plate of the induction range while the cooking vessel is heated, there is no risk of a burn. The induction range does not produce flames, so that there is no risk of fires or explosions. The induction range is advantageous in that a person is not injured even if his or her body touches the top plate of the induction range when electricity is supplied to the induction range.

[5] The induction range, having the above-mentioned characteristics, uses a cooking vessel which is usually made of metal. The cooking vessel includes a vessel body and a conductive plate. The vessel body is made of a relatively light non-conductive metal material, such as aluminum or stainless steel, so as to reduce the weight of the cooking vessel. The conductive plate is mounted on the bottom surface of the vessel body, and is made of a conductive metal material, such as iron or alloy containing iron.
As shown in FIG. 1, a conventional cooking vessel 1 for induction ranges, includes a conductive plate 5 through which a plurality of holes 7 each having the shape of a circle, ellipse, or the like is punched. When a vessel body 3 is formed, the conductive plate 5 is placed at a position corresponding to the bottom of the vessel body 3. In such a state, a non-conductive metal material for forming the vessel body is continuously injected along a passage defined by the holes 7, so that the conductive plate 5 is integrally attached to the vessel body 3.

Disclosure of Invention

Technical Problem

However, the conductive plate 5 has a single structure produced through pressing, so that it may be deformed or distorted after it has been formed. Thus, when the conductive plate 5 is placed on the bottom of the vessel body 3, the entire upper surface of the conductive plate 5 may not be in close contact with the lower surface of the vessel body 3. In this case, when the conductive plate 5 is mounted to the lower surface of the vessel body 3 using the non-conductive metal material for forming the vessel body, the conductive plate 5 may partially come off the vessel body 3. Thus, the conventional cooking vessel is problematic in that it is difficult to ensure flatness.

The conventional cooking vessel has another problem in that the conductive plate 5 is not provided with an additional holding structure for increasing the coupling force of the conductive plate 5 with the molten aluminum alloy, so that the connective force of attaching the conductive plate 5 to the vessel body 3 is weak.

Technical Solution

Accordingly, the present invention has been made keeping in mind the above problems occurring in the prior art, and an object of the present invention is to provide a cooking vessel for induction ranges and manufacturing method thereof, in which a conductive plate is firmly and integrally mounted to the lower portion of a vessel body through die casting, thus ensuring the flatness of the conductive plate, and preventing the conductive plate from being separated from the cooking vessel even if it is used for a lengthy period of time.

Advantageous Effects

The present invention provides a cooking vessel for induction ranges which ensures the flatness of the conductive plate, and the assembly of the conductive plate with the locking member is put into molds for manufacturing the cooking vessel and goes through a die casting process using molten aluminum Al, thus allowing the conductive plate to be firmly integrated with the lower portion of a vessel body, therefore
preventing the conductive plate from being separated from the vessel body even if it has been used for a lengthy period of time.

[13] **Brief Description of the Drawings**

[14] FIG. 1 is a perspective view showing one example of a conventional cooking vessel for induction ranges;

[15] FIG. 2 is a perspective view showing a cooking vessel for induction ranges, according to the present invention;

[16] FIG. 3 is a plan view showing an embodiment of a conductive plate of the cooking vessel for induction ranges of FIG. 2;

[17] FIG. 4 is a perspective view of the conductive plate of FIG. 3;

[18] FIG. 5 is a plan view showing an embodiment of a locking member to be assembled with the conductive plate of FIG. 4;

[19] FIG. 6 is an exploded perspective view showing the assembly of the conductive plate with the locking member, according to the present invention;

[20] FIG. 7 is a perspective view showing the assembled state of the conductive plate and the locking member, according to the present invention;

[21] FIG. 8 is a sectional view of a lower mold;

[22] FIG. 9 is a view illustrating sections of upper and lower molds, and illustrating the state where the assembly of the conductive plate with the locking member shown in FIG. 7 is mounted in the molds; and

[23] FIGS. 10 and 11 are sectional views of a finished product.

[24] **Best Mode for Carrying Out the Invention**

[25] A method of manufacturing a cooking vessel for induction ranges, comprising the steps of pressing a conductive plate made of a conductive material, such as iron or an alloy containing iron, a circular first through hole being formed in a center of the conductive plate, and a plurality of second through holes being formed around the first through hole; assembling an aluminum locking member, produced through die casting injection, with an upper surface of the pressed conductive plate, thus ensuring flatness of the conductive plate; die casting a vessel body integrally having the assembly on a lower portion thereof by positioning the assembly of the conductive plate with the locking member in upper and lower molds having the same shape as the cooking vessel, and thereafter, injecting non-conductive metal, such as aluminum or stainless steel, into the molds; and removing the vessel body from the molds.

[26] **Mode for the Invention**
FIG. 2 is a perspective view showing a cooking vessel for induction ranges, according to the present invention, FIG. 3 is a plan view showing an embodiment of a conductive plate of the cooking vessel for induction ranges of FIG. 2, and FIG. 4 is a perspective view of the conductive plate of FIG. 3.

Further, FIG. 5 is a plan view showing an embodiment of a locking member to be assembled with the conductive plate of FIG. 4, FIG. 6 is an exploded perspective view showing the assembly of the conductive plate with the locking member, according to the present invention, and FIG. 7 is a perspective view showing the assembled state of the conductive plate and the locking member, according to the present invention. As shown in FIG. 2, a cooking vessel 10 for induction ranges, according to the present invention, includes a vessel body 12 and a conductive plate 14. The vessel body 12 is provided with a food holding part to hold food therein. The conductive plate 14 is integrally mounted to the lower portion of the vessel body 12.

The vessel body 12 is made of a non-conductive metal, such as aluminum Al or stainless steel. The vessel body 12 incorporates the food holding part which holds a predetermined amount of food to be cooked. A handle (not shown) is detachably mounted to a predetermined portion on the outer circumference of the vessel body 12.

The conductive plate 14 is manufactured through pressing using a conductive metal, such as iron Fe or an alloy material containing iron. As shown in FIGS. 3, 4, 6, and 7, a first through hole 14a having a circular shape is formed in the center of the conductive plate 14. A plurality of second through holes 14b is formed around the first through hole 14a in circumferential and radial directions of the conductive plate 14.

As shown in FIGS. 3, 4, 6, and 7, a plurality of projections 14c is provided along the outer circumference of the conductive plate 14, the inner circumference of the first through hole 14a, and the circumferences of the second through holes 14b. In this case, each projection 14c has an inverted trapezoidal shape or a T-shaped cross-section.

While the conductive plate 14 is put into molds and a die casting process is performed using molten aluminum (Al), the projections 14c function as hooks. Thus, during the die casting process, the conductive plate 14 is firmly coupled to the aluminum due to the projections 14c. Thereby, the separation of the conductive plate 14 from aluminum (Al) can be prevented.

As shown in FIG. 3, the conductive plate 14 may be constructed so that the first through hole 14a of the conductive plate 14 communicates with one end of each second through hole 14b which is bored vertically, or the second through holes 14b partially communicate with each other.

Further, the conductive plate 14 having a circular shape may be made by coupling plate members 14d, each having an inverted trapezoidal shape, to each other. The plate
members 14d are separated from each other by U-shaped spaces 14e.

[36] As shown in FIGS. 5 to 7, a die cast aluminum locking member 16 is mounted to the upper surface of the conductive plate 14. In this case, a first through hole 16a having a circular shape is formed in the center of the locking member 16, and a plurality of bridges 16b, each having a predetermined pattern, is integrally provided around the first through hole 16a.

[37] As shown in FIGS. 6 and 7, the inside and outside edges of each bridge 16b and the outer circumference of the locking member 16 are positioned to be supported by the projections 14c of the conductive plate 14. Some of the projections 14c protrude through holes 16c which are formed along the outer circumference of the first through hole 16a and the circumference of the inner surface of the locking member 16 at regular intervals. The locking member 16, which is attached to the upper surface of the conductive plate 14, ensures the flatness of the conductive plate 14. Further, the locking member 16 is melted during a die casting process which will be described later, and is fused to be integrated with aluminum, so that it is firmly coupled to the conductive plate 14.

[38] Further, conical protrusions 16d are provided on the inner circumference of the locking member 16 and the upper surfaces of the bridges 16b at regular intervals. While the conductive plate is attached to the lower surface of the vessel body 12 and a die casting process is implemented, the conical protrusions 16d allow the locking member 16 to be easily melted and attached to the vessel body 12. Referring to FIG. 7, it is preferable that the height of each protrusion 16d extending from the lower surface of the conductive plate 14 be about 5.5mm.

[39] FIG. 8 is a sectional view of a lower mold 22. A circular protruding part 20 is provided on the center of the mold 22, so that the circular first through hole 14a of FIGS. 6 and 7 is fitted over the circular protruding part 20.

[40] FIG. 9 is a view illustrating the sections of upper and lower molds, and illustrating the state where the assembly of the conductive plate 14 with the locking member 16, shown in FIG. 7, is mounted in the molds. The assembled conductive plate 14 and locking member 16 are placed to be precisely inserted between the lower surface of the upper mold 24 and the upper surface of the lower mold 22. In this case, the circular first through hole 14a is fitted over the circular protruding part 20 provided on the upper surface of the lower mold 22, the locking member 16 is located on the conductive plate 14, and the upper mold 24 is positioned above the locking member 16. The conical protrusions 16d protruding from the locking member 16 are precisely inserted into a gap 26 defined between the upper and lower molds 24 and 22. More preferably, the sum of the height of the conductive plate 14 and the height of the locking member 16 is equal to or slightly larger than the height of the gap 16. The
conical protrusions 16d provided on a surface of the locking member 16 serve as spacers, thus allowing the bottom surface of the conductive plate 14 to be in close contact with the upper surface of the lower mold 22. Thus, when one desires to change the thickness of the vessel bottom, the height of the conical protrusions 16d provided on a surface of the locking member 16 is adjusted. The locking member 16, made of the same metal (e.g. aluminum) as the vessel, is melted while a die casting process is executed using molten metal, so that it is integrated with a base metal.

FIGS. 10 and 11 are sectional views of a finished product. Referring to the drawings, the bottom surface of the conductive plate 14 is exposed to the outside, and the locking member 16 made of the same metal (e.g. aluminum) as the vessel, is melted while the die casting process is executed using molten metal, so that it is integrated with the base metal.

The method of manufacturing the cooking vessel for induction ranges, according to the present invention, will be described below.

First, the conductive plate 14 is produced through a pressing process using a conductive metal, such as iron or an alloy containing iron. The pressing process primarily blanks the conductive metal, and pierces a plurality of through holes on the inner surface of the blanked product. The projections are bent along the circumferences of the pierced through holes.

Subsequently, the locking member 16, which is produced through die casting injection, is mounted on the upper surface of the pressed conductive plate 14 such that the inside and outside portions of the bridges 16b and the outer circumferences of the locking member 16 are positioned to be supported by the projections 14c of the conductive plate 14. The locking member 16 is used to prevent the conductive plate 14 from being distorted due to stress generated in the pressing process, when the conductive plate 14 contacts the molten aluminum. The locking member 16 functions to ensure flatness without deformation or distortion due to the forming process.

Thereafter, the assembly of the conductive plate 14 with the locking member 16 is positioned in upper and lower molds having the same shape as the cooking vessel. Non-conductive metal, such as aluminum Al or stainless steel, is injected into the molds, so that the vessel body 12 integrally having the assembly at a lower portion thereof is produced through die casting injection. Afterwards, the vessel body 12 is removed from the molds. Thereby, the cooking vessel 10 for induction ranges is obtained.

Although the preferred embodiment of the present invention has been disclosed for illustrative purposes, those skilled in the art will appreciate that various modifications, additions and substitutions are possible, without departing from the scope and spirit of the invention as disclosed in the accompanying claims.
[47] **Industrial Applicability**

[48] As described above, the present invention provides a cooking vessel for induction ranges, in which a locking member produced through die casting injection is mounted on the upper surface of a conductive plate produced through pressing, thus ensuring the flatness of the conductive plate, and the assembly of the conductive plate with the locking member is put into molds for manufacturing the cooking vessel and goes through a die casting process using molten aluminum Al, thus allowing the conductive plate to be firmly integrated with the lower portion of a vessel body, therefore preventing the conductive plate from being separated from the vessel body even if it has been used for a lengthy period of time.

[49]
Claims

[1] A method of manufacturing a cooking vessel for induction ranges, comprising the steps of:
pressing a conductive plate made of a conductive material, such as iron or an alloy containing iron, a circular first through hole being formed in a center of the conductive plate, and a plurality of second through holes being formed around the first through hole;
assembling an aluminum locking member, produced through die casting injection, with an upper surface of the pressed conductive plate, thus ensuring flatness of the conductive plate;
die casting a vessel body integrally having the assembly on a lower portion thereof by positioning the assembly of the conductive plate with the locking member in upper and lower molds having the same shape as the cooking vessel, and thereafter, injecting non-conductive metal, such as aluminum or stainless steel, into the molds; and
removing the vessel body from the molds.

[2] The method as set forth in claim 1, wherein the step of pressing the conductive plate comprises:
a first step of blanking the conductive metal;
a second step of piercing a plurality of through holes on an inner surface of the blanked product; and
a third step of bending projections formed along the pierced through holes.

[3] The method as set forth in claim 1, wherein each of the projections provided on the conductive plate has a shape of an inverted trapezoid so as to prevent the conductive plate from being separated from the aluminum.

[4] The method as set forth in any one of claims 1 to 3, wherein the first through hole and one end of each of the second through holes, formed in the conductive plate, communicate with each other.

[5] The method as set forth in any one of claims 1 to 3, wherein the second through holes formed in the conductive plate partially communicate with each other.

[6] The method as set forth in any one of claims 1 to 3, wherein a circular first through hole is formed in a center of the locking member, and a plurality of bridges, each having a predetermined pattern, is integrally provided around the first through hole of the locking member.

[7] The method as set forth in claim 6, wherein a plurality of conical protrusions is formed on an inner circumference of the locking member and upper surfaces of the bridges at regular intervals.
[8] A cooking vessel for induction ranges, manufactured any one of claims 1 to 8.
INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER

A47J 36/02(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPCS A47J 27/00, A47J 36/02, B21D 51/22, B22D 19/00

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Korean Patents and applications for inventions since 1975
Korean Utility and applications for Utility models since 1975, Japanese Utility models and applications for Utility models since 1975

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
eKIPASS(KIPO internal), PAJ, NDSL "coo*, "vessel**", "induction"

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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<th>Relevant to claim No.</th>
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<td>KR2001-0010381A(Namsun Co. Ltd.) Feb. 05, 2001 See page 3, line 21-page 4, line 1</td>
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<td>KR2002-0018300A(JUNGWOO INDUSTRY Co.) Mar. 08, 2002 See claims 1, 2 &amp; fig. 1-4</td>
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<td>JP10-314020A(RITERA Co. Ltd.) Dec. 02, 1998 See the abstract &amp; claim 1</td>
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Further documents are listed in the continuation of Box C. See patent family annex.

Date of the actual completion of the international search
12 OCTOBER 2006 (12.10.2006)

Date of mailing of the international search report
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