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METHOD AND APPARATUS FOR CLEANING FOUNDRY CORES

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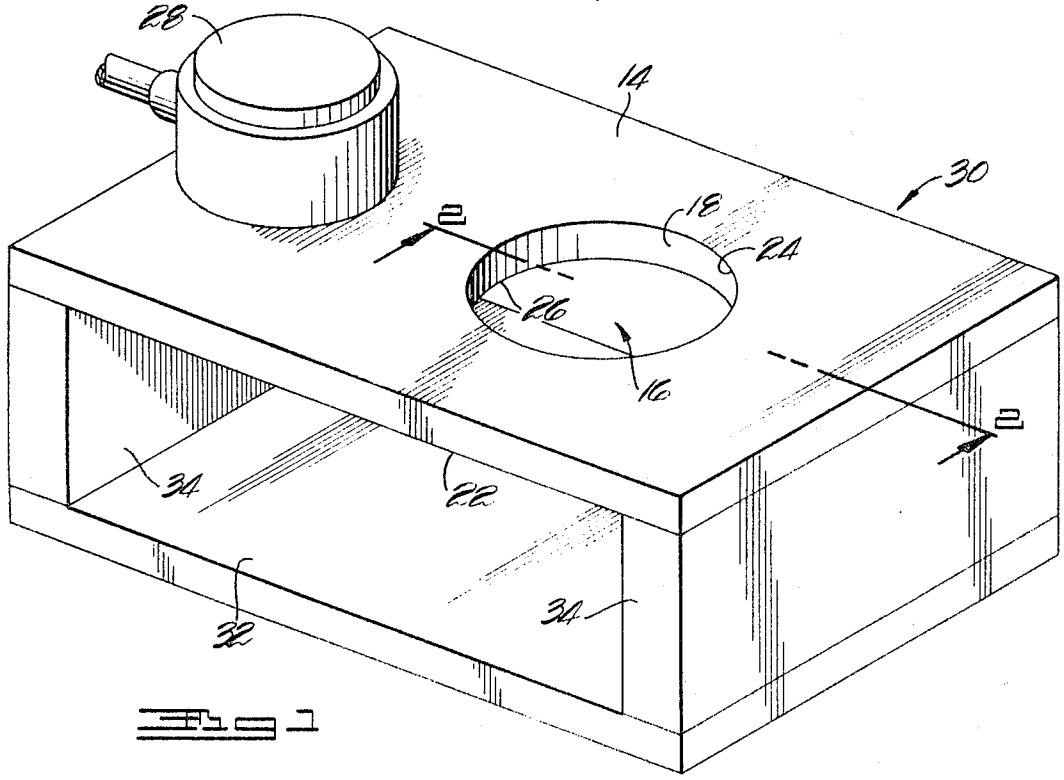


Fig 1

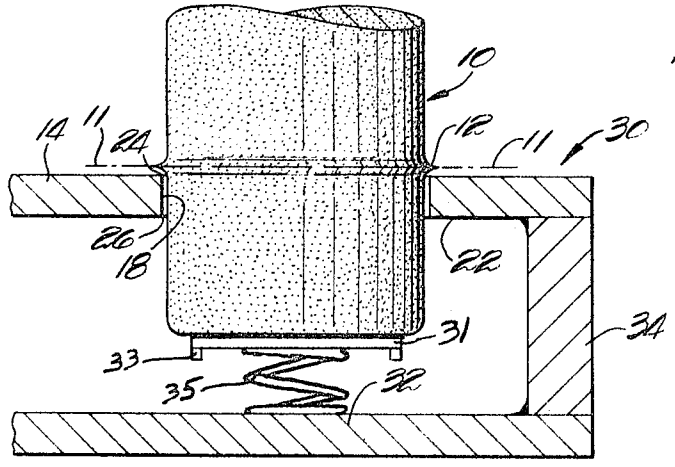


Fig 2

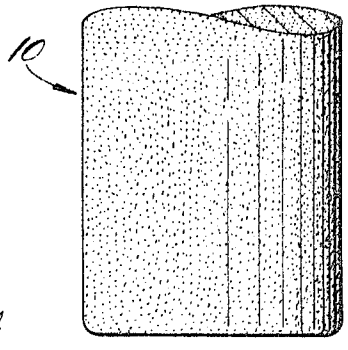


Fig 3

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METHOD AND APPARATUS FOR CLEANING FOUNDRY CORES

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U.S. Cl. 125—1 6 Claims

ABSTRACT OF THE DISCLOSURE

Apparatus for removing parting line flash from refractory particle foundry cores by the insertion of the core through an aperture in a vibrating template. The aperture being configured to match the parting line peripheral configuration of the core.

BACKGROUND OF THE INVENTION

Field of invention

This invention relates to the method and apparatus for cleaning refractory particle foundry cores. More particularly, this invention relates to a novel and highly effective method and apparatus for removing parting line flash from refractory particle foundry cores without damage to the core by touching the parting line flash against a vibrating template.

Description of the prior art

As is known, refractory particle foundry cores used to create internal voids in castings are themselves cast in molds having separable mold portions. Depending on the method of making the core, either; a refractory particle and binder slurry is poured into a core mold and cured, or a refractory particle and dry binder mixture is blown into a mold and cured. Curing of the slurry or mixture may be accomplished in any of several ways, thermal or chemical in nature.

A problem common to most, if not all, multiple part molds particularly sand casting molds is that of maintaining a perfectly matched parting line between the separable portions of the mold. When a material is poured or blown into a multiple part mold the tendency is for the material to be forced into the mold imperfections at the parting line. When the mold parts are separated the solid casting is left with an imperfect surface configuration at the parting line. The imperfect surface configuration generally has the form of a thin sheet extending outwardly from the cast object. This thin sheet of cast material is known as parting line flash.

Removal of parting line flash is a problem regardless of the type of material cast and generally must be removed before the casting may be used.

Removal of parting line flash from cast metals is accomplished by grinding, from cast polymers by grinding or by thermal means. However, neither of these methods of removing parting line flash is suitable for removal of flash from a refractory particle core because of the lack of sufficient tensile strength in the core and the high resistance to heat of the core. In the past, parting line flash has generally been removed from refractory particle cores by scraping, filing or brushing. Such methods of removal are, however, time consuming and expensive. Also, it is difficult to scrape or brush the flash from a core without doing damage to the core body.

It is therefore, a primary object of this invention to provide a faster more economical and less damaging method of cleaning refractory particle foundry cores.

Another object of this invention is to provide a novel

apparatus for removing flash from a refractory particle foundry core.

SUMMARY

The invention of the present case is a method and apparatus for cleaning refractory particle foundry cores. The apparatus has a relatively thick template having an aperture therethrough. The configuration of the aperture conforms to the configuration of the core to be cleaned. The template is substantially thicker than the thickness of the flash to be removed. Also, the walls of the aperture intersect the planar surfaces of the template to present a non-tapered entry and exit for the core.

Attached to the template is a vibration generating mechanism for causing the template to be vibrated at relatively high frequency low amplitude oscillations at a relatively high energy level.

The template is supported for oscillation on a relatively high spring rate support member.

In operation, the vibration generating mechanism imparts a continuing oscillation to the template and as the core is inserted into the template aperture the flash surrounding the core contacts the edge of the template formed by the intersection of the wall of the aperture and the planar surface of the template. Contact with the vibrating template causes the flash to crumble due to the relatively high tensile stresses imparted to the flash. In view of the small amplitude of the vibrations the stresses are localized to the parts of the flash contacting the template and no undue crumbling of the body of the core results. Also, the thickness of the template prevents the transfer of undue stresses to the core and thereby further prevents damage to the core.

The method of cleaning refractory particle foundry cores also forming a part of the invention of the present case comprises vibrating a template member, inserting a mating refractory particle foundry core into an aperture in the template, and removing the finished core from the aperture.

BRIEF DESCRIPTION OF THE DRAWING

FIGURE 1 is a three-dimensional view of the core cleaning apparatus.

FIGURE 2 is a fragmentary sectional view taken along the section line 2—2 of FIGURE 1 and showing the core in position in the template prior to the removal of the flash.

DESCRIPTION OF THE PREFERRED EMBODIMENT

In the drawing there is shown a molded refractory particle foundry core **10**. The core **10** is shown in FIGURE 2 "as cast" and has a parting line flash **12** at least partly surrounding the periphery of the core. This parting line flash results from imperfect mating of the core mold halves during casting of the core.

As is known, it is generally required that the flash **12** be removed before the core **10** may be satisfactorily used to "core" a casting. The core cleaning or flash removal apparatus of the present invention is shown generally at **30**.

The core cleaning apparatus **30** comprises a relatively thick template member **14** having an aperture **16** therethrough. The aperture **16** has a peripheral configuration identical to the peripheral configuration of the core **10** at the parting line plane **11**.

The wall **18** of the aperture **16** is substantially perpendicular to and intersects planar surfaces **20** and **22** to define sharp non-tapered edges **24** and **26**.

Attached to the template **14** is a vibration generating mechanism **28** capable of generating relatively high frequency low amplitude oscillations in the template **14**.

As is shown in the drawing, the vibration generating mechanism is driven by a source of energy such as compressed air.

The template **14** is mounted on a relatively high spring rate support member to permit proper oscillation with the template. In the drawing the template **14** is shown mounted on a non-oscillating base member **32** and separated therefrom by relatively rigid support member **34** such as walls, which are suitably secured to the base **32** and template **14** such as by welding or other well known means.

The core **10** is manually inserted into the template aperture **16** beyond the parting line flash **12** and removed. The relatively large thickness of the template **14** as compared to the thickness of the flash **12** serves to assist in guiding the core **10** into the aperture **16** and prevents inadvertent gouging or other destruction of the body of the core.

Mounted on the base member **32** and aligned with the aperture **16** is a core support and guide assembly having a guide plate **31**, stops **33** and a free standing spring **35**. As the core **10** is inserted into the aperture **16**, the core **10** contacts the guide plate **31**. The guide plate **31** is attached to the spring **35** which in turn is attached to the base member **32**. Further insertion of the core **10** into the aperture **16** is resisted by the spring **35** thereby offering a resistance to the operator and affords better control over the insertion of the core. The guide plate **31** is provided with stops **33** which limit the displacement of the spring **35**.

When the flash **12** contacts the vibrating template **14** the flash is crumbled and allows the parting line plane **11** to pass into the aperture **16** where the flash **12** is completely removed and the parting line is blended into the surface of the core body, as shown in FIGURE 3.

As was indicated above, the template **14** is at least several times as thick as the flash to be removed from the core. Template thickness is a benefit in more perfectly removing flash while preventing inadvertent damage to the core body and providing better blending of the parting line into the core body.

In practicing the method of this invention which may be said to begin at the point where the cast refractory particle cores are removed from the molds, the cores are transported by appropriate means to the core cleaning apparatus **30**. With the vibration generating mechanism **28** operating to oscillate the template **14** an operator manually lifts the cores **10**, aligns the core with aperture **16** in the template **14** and inserts the core into the aperture such that the parting line plane **11** passes the upper planar surface **20** of the template **14**. The parting line flash **12** is thereby removed and the operator then removes the finished core to FIGURE 3 from the aperture **16**.

It can be seen that this method of cleaning cores is economical and efficient with a minimum of core handling and damage.

The passing of the core **10** into the aperture past parting line plane **11** removes the flash and causes the surface of the core at the parting line plane **11** to blend with the remainder of the core surface. That is, after parting line flash removal, the core surface is continuous and there is no remaining evidence of the parting line flash.

From the foregoing description, taken together with the drawing it will be readily apparent that this invention provides a novel method and apparatus for removing mold parting line flash from refractory particle foundry cores and thereby rendering the cores useful in the "coring" of castings.

Having thus described by invention, I now claim:

1. Apparatus for removing flash from a molded refractory particle foundry core comprising:
- a base member;
- a support member attached to the base member;
- a template plate mounted on the support member having an aperture therethrough with a peripheral configuration conforming to the core for receiving the core therein; and
- a vibration generating mechanism attached to the template for producing a continuing oscillation therein.

2. The core cleaning apparatus of claim **1** wherein the template further comprises:
- a plate member having substantially parallel planar surfaces and having an aperture therethrough, the wall forming the aperture being substantially perpendicular to the planar surfaces.

3. The core cleaning apparatus of claim **2** wherein the template is further characterized by:
- the plate member having a thickness greater than the thickness of the flash to be removed.

4. The core cleaning apparatus of claim **3** wherein the support member comprises:
- resilient means having a spring rate for supporting oscillation of the template.

5. The core cleaning apparatus of claim **4** further comprising:
- a spring mounted on the base;
- a movable guide plate attached to the spring and aligned with the aperture in the template; whereby, the core, when inserted through the aperture, will contact the guide plate and the guide plate will offer beneficial resistance to further insertion of the core.

6. A method of removing parting line flash from refractory particle foundry cores comprising the steps of:
- vibrating a template having an aperture therethrough conforming to the peripheral configuration of the core,
- inserting the particle foundry core into said aperture in the template a depth to contact said flash with the periphery of said aperture; and
- removing the core from the template.

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HAROLD D. WHITEHEAD, Primary Examiner

U.S. Cl. X.R.

83—914; 125—26; 225—3, 93