Nov. 2, 1965 D. E. ARNT 3,214,803

CORE BOX VENT

Filed Jan. 3, 1963

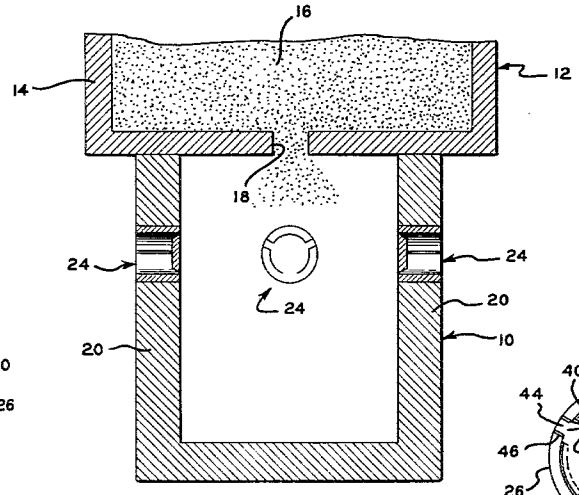


FIG. 1

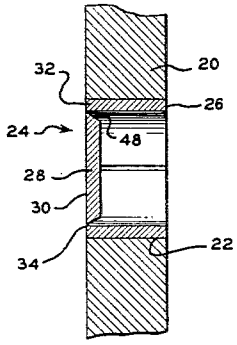


FIG. 2

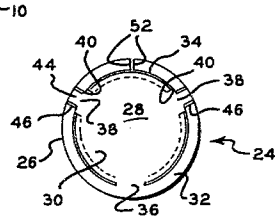


FIG. 3

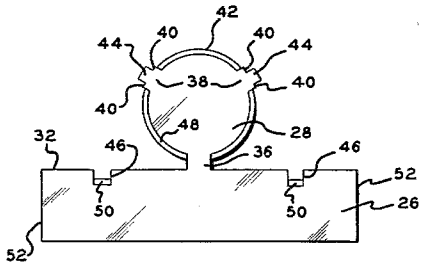


FIG. 4

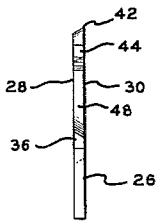


FIG. 5

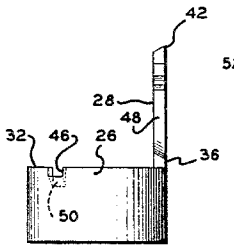


FIG. 6

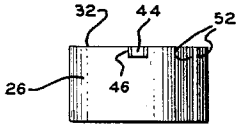


FIG. 7

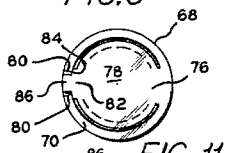


FIG. 11

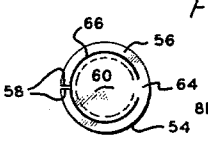


FIG. 9

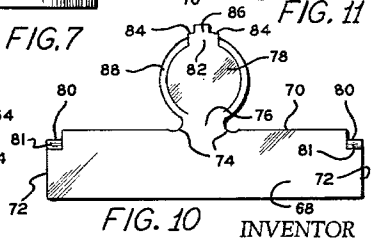


FIG. 10

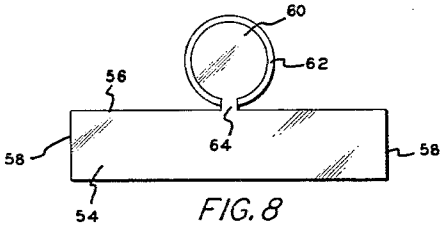


FIG. 8

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CORE BOX VENT

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9 Claims. (Cl. 22—13)

The invention pertains to the foundry and molding arts and particularly relates to a core box vent construction such as used in the formation of mold cores.

It is common practice to mold cores by blowing a mixture of the core material, usually moist sand and a binding agent, into the interior of a core box or core mold. To insure that the core material completely fills the core box and to prevent the formation of voids due to entrapped air, it is common practice to provide the core box with a plurality of vents. Such vents permit the escape of the air within the core box during injection of the core material, yet prevent the escape of the core material itself.

One of the basic problems attendant with core box vents lies in their tendency to clog due to the accumulation of the core material in the vent openings of the core box vent and thereby affect the efficiency of the vent. Also, as it is very difficult to prevent the escape of the smaller particles and dust of the core material through the vent, the core box vent is subjected to severe abrasive conditions and wears rather rapidly, necessitating frequent replacement.

It is an object of the invention to provide a core box vent of economical manufacture which may be manufactured by stamping and forming apparatus and processes at a low cost.

Another object of the invention is to provide a core box vent of sheet metal construction which is self-cleaning and resists abrasive wear.

A further object of the invention is to provide a core box vent forming a substantially annular vent opening wherein the dimensions of the vent opening are consistently maintained during manufacture of the vent, and during the use thereof.

These and other objects of the invention arising from the details and relationships of the components of embodiments thereof will be apparent from the following description and accompanying drawings wherein:

FIG. 1 is an elevational, sectional, schematic view of a core box associated with the filling apparatus during the process of the filling of the core box,

FIG. 2 is an enlarged elevational, sectional, detail view of a core box vent, in accord with the invention, as located within the wall of the core box,

FIG. 3 is an enlarged elevational, front view of a core box vent in accord with the invention,

FIG. 4 is a view of a core box vent blank, in accord with the invention, prior to the shaping thereof by bending,

FIG. 5 is an end elevational view of the blank of FIG. 4 as taken from the right side thereof,

FIG. 6 is an elevational view of the core box vent during forming wherein the body portion has been formed, and prior to bending the head into position,

FIG. 7 is an elevational view of the fully formed core box vent after bending the head into place,

FIGS. 8 and 10 are views of other embodiments of core box vent blanks prior to the forming thereof, and

FIGS. 9 and 11 are front views of the core box vents formed from the blanks of FIGS. 8 and 10, respectively.

FIG. 1 illustrates, in a schematic manner, a typical relationship between a core box **10** and core box filling apparatus **12** during the filling of the core box to form the desired core. The core box filling apparatus **12** includes a receptable **14** in which the core material **16** is received. The core material usually consists of moist sand, or the like, and a binding agent. An orifice **18** is formed in the bottom of the receptacle **14**, and compressed air is introduced into the receptacle to force the core material through the orifice **18** into a core box **10** located therebelow. The core box **10** includes side walls **20** wherein the side and end walls thereof define the desired configuration of the core. Openings **22** are defined in the core box side walls of a cylindrical configuration for closely receiving the core box vents **24**.

The relationship of the core box vent **24** to the core box side walls **20** will be readily appreciated from FIG. 2. The core box vent includes an annular body portion **26** of a cylindrical configuration which is closely received wthin the cylindrical box openings **22**. The axial length of the body portion **26** usually will be substantially equal to the thickness of the side walls **20**. The end of the body portion **26** disposed adjacent the interior of the core box is substantially enclosed by a head **28** having an outer surface **30** substantially aligned with the edge **32** of the body portion and the inner surface of the side walls **20**. Thus, it will be appreciated that the core box vent **24** does not interfere with the configuration of the core box or affect the shape of the core to be formed thereby.

The front appearance of a core box vent **14**, in accord with the invention, will be appreciated from FIG. 3. The front appearance is that from the interior of the core box. As previously mentioned, the head **28** substantially encloses the end of the body portion **26** adjacent the interior of the core box, and this head is of a circular configuration having a diameter slightly less than the inner diameter of the body portion. In that the head diameter is less than the inner diameter of the body member, and as the head is received within the axial dimensions of the body member, a substantially annular vent opening **34** will be defined between the periphery of the head and the inner surface of the body portion **26**.

The annular configuration of the vent opening **34** is interrupted at three locations. One of these locations is due to the hinge portion **36** which affixes the head **28** to the body portion **26**. The other two locations of interruption of the vent opening are due to the locating projections or tongues **38** defined upon the head and radially extending from the periphery thereof.

The projections **38** include an enlarged portion defining shoulders **40** on each side of the projection. The shoulders **40** radially extend beyond the outer peripheral edge **42** of the head a distance equal to the desired radial dimension of the vent opening **34**. The projections **38** also include a portion **44** of lesser circumferential dimension than the projection portion defining shoulders **40**. The portion **44** is adapted to be received within a recess **46** defined in the body portion **26** which intersects the edge **32** thereof.

With reference to FIGS. 3 and 7, it will be appreciated that in the assembled relation the shoulders **40** engage the inner surface of the body portion adjacent the associated recess **46**, and that the projection portions **44** will be received within the recesses **46**. Thus, the hinge portion **36** and the shoulders **40** will insure that the radial dimension of the vent opening **34** throughout its circumference will be uniformly maintained, and uniform vent flow characteristics may be maintained with little or no loss of core material during filling of the core box.

It will be appreciated from FIG. 2 through 6 that the peripheral surface **48** of the head **28** is conical and converges away from the interior of the core box. In a similar manner the recesses **46** are provided with a tapered surface **50**. The tapered surfaces **50** of the recesses also converge away from the interior of the core box.

An advantage of employing the conical surface **48** and the tapered surfaces **50** lies in the improved self-cleaning characteristics such constructions provide. The core material **16** is forced into the core box **10** under relatively high air pressure, and the escape of the air through the core box vent openings **34** will cause the head **28** to slightly vibrate relative to the body portion **26**. Such vibration is due to the fact that the hinge portion **36** constitutes a resilient mounting of the head relative to the body portion, and as the projections **38** are not rigidly affixed within the recesses **46**, but are merely located therein, such vibration may occur in the axial direction of the body portion without adversely affecting the dimensional characteristics of the vent opening. The vibration of the head **28**, though of slight magnitude, tends to permit very small core material particles and dust which have lodged within the vent opening **34** to work their way therethrough, and the conical surfaces **48** and **50** provide clearance for such a self-cleaning action. Also, the use of the conical surfaces provides an efficient flow path for the escaping air.

As previously mentioned, the core box vent in accord with the invention may be produced from sheet metal by a stamping operation. FIG. 4 illustrates the form of the stamped blank from which the vent is constructed. The surfaces **48** and **50** may be formed by a second operation after the blank has been stamped from the sheet stock, or may be formed by a stamping operation if the necessary die structure for forming these surfaces by stamping is available. As will be appreciated from FIG. 4, the body portion **26** will be of a substantially rectangular configuration being defined at the ends by edges **52** and including a linear edge which constitutes the inner edge **32** in which the recesses **46** are formed. The circular head **28** is integrally attached to the body portion by the neck or hinge portion **36** which extends perpendicularly from the edge **32**.

In the formation of the core box vent from the blank of FIG. 4, the body portion **26** is formed into an annular, cylindrical configuration wherein the ends **52** will be in an opposed and substantially abutting relationship, as shown in FIG. 3. Thereupon, the head **28** is bent from the position of FIG. 6 to that of FIG. 7 wherein the head is located within the end of the body portion adjacent the edge **32** by bending the hingle portion **36** adjacent the edge **32**. These two bending operations complete the formation of the core box vent **10** from the planar blank form of FIG. 4. It will be appreciated that the above-described core box vent and the method of construction thereof provides a very economical vent for fulfilling the purposes and objects of the invention. If desired, the core box vent, in accord with the invention, may be hardened by conventional heat-treating processes to resist the abrasive action of the core material.

FIGS. 8 and 9 are directed to another embodiment of the invention of a simplified construction. In the embodiment of FIG. 8 the core box vent blank includes the body portion **54** having a linear, longitudinal edge **56** and end edges **58**. The head **60** is of a circular configuration having a peripheral conical surface **62** defined thereon, and is attached to the body portion by the hinge portion **64**. The core box embodiment of FIGS. 8 and 9 is formed in the same manner as the previously described embodiment except that as no radially extending tongues or projections are defined upon the periphery of the head, the only association between the head **60** and the body portion **54** will occur at the hinge portion **64**. Thus, the vent opening **66**, FIG. 9, will be interrupted only at the hinge portion **64**. In that the hinge portion **64** will resiliently support the head relative to the body portion, the self-cleaning action, previously described, will also be present in this embodiment. However, in that tongues and projections are not employed with this embodiment, the maintenance of the uniform radial dimension of the vent opening will be more difficult and no means, other than the hinge portion itself, are provided for preventing the axial forces applied upon the head during filling, from possibly deforming the head into the body portion. It will be appreciated that in the embodiment of FIGS. 1 through 7 that the engagement of the projection portions **44** with the edge of surfaces **50** nearest the edge **32** will prevent the head **28** from being deformed or bent into the body portion **26** due to air pressure within the core box during filling, and this structural feature is not included in the simplified embodiment of FIGS. 8 and 9. However, the embodiment of FIGS. 8 and 9 can be employed in installations wherein lower core box filling pressures are employed and the maintenance of accurate vent opening dimensions is not critical.

The embodiment of FIGS. 10 and 11 employs a combination of the features of the previously described embodiments. This embodiment of the invention employs a body portion **68** having a longitudinal edge **70** and end edges **72**. The edge **70** is slightly recessed at **74** adjacent the hinge portion **76**, and the head **78** depends from the hinge portion.

The end edges **72** are notched at **80** which are provided with tapered surfaces **81** which function in the manner of the surfaces **50**, as will be later apparent.

A single projection **82** is defined on head **78** diametrically related to hinge portion **76**, and is formed with shoulders **84** and a reduced portion **86** in a manner similar to the projections **38**. Upon the body portion **68** being formed in an annular configuration wherein the end edges **72** are in substantial abutting relationship, the notches **80** will define a recess for receiving the projection reduced portion **86**. Thus, the notches **80** will provide a recess for supporting the projection **82**, in the manner of the projections **38** and recess **46**, and accurately relate the head **78** to the body portion **68**, and prevent the head from being deformed into the body portion by air pressure. The head is provided with a conical surface **88** which aids in the self-cleaning action of the vent during the slight vibration of the head, and the surfaces **81** also function to maintain the vent free of sand and core material.

The recessed edge at **74** aids in providing a uniform appearance of the hinge portion after the bending thereof, and it will be noted from FIG. 11 that, as the edges of the notches **80** substantially engage the radial sides of the reduced portion **86**, lateral deflection of the head **78** relative to the body portion will be prevented.

If the configuration of the core box is such that no planar surfaces are present, the vent heads of the various embodiments may be formed into a concave or convex configuration to conform to the core without departing from the spirit of the invention.

It will be appreciated that various modifications to the invention may be apparent to those skilled in the art without departing from the spirit and scope thereof, and it is intended that the invention be defined only by the scope of the following claims.

I claim:

1. A core box vent formed from an integral blank of sheet material comprising, in combination,

(a) an annular body portion having an edge transversely disposed to the axis of said body portion and defining an end thereof, said edge adapted to be located adjacent a mold cavity,

(b) a head resiliently connected to said body portion at said edge thereof, said head having a general peripheral configuration similar to the annular configuration of said body portion and disposed adjacent said body portion edge,

(c) said head dimensions being so related to said body portion whereby a vent opening is defined between the periphery of said head and said body portion, and

(d) said body portion including an open end oppositely disposed relative to said edge.

2. In a core box vent as in claim **1** wherein

(a) said head is located within said body portion, said head having an outer surface defined thereon and the outermost portion of said surface substantially axially aligning with said edge.

3. In a core box vent as in claim 2, wherein

(a) the periphery of said head is relieved in an inwardly direction with respect to said body portion whereby the width of said vent opening increases in the axial direction within the axial length of said head in the direction of air flow through said vent.

4. A core box vent constructed from an integral stamping of sheet material comprising, in combination,

(a) a body portion having a longitudinal edge formed into an annular configuration wherein said edge constitutes an end of the annular body member form,

(b) a deformable hinge portion extending from said longitudinal edge,

(c) a head having a peripheral configuration similar to the annular configuration of said body portion,

(d) said deformable hinge portion interconnecting a peripheral portion of said head to said body portion longitudinal edge,

(e) said hinge portion being bent to extend in a radial direction with respect to said annular body portion configuration wherein the periphery of said head portion is disposed adjacent the end of said body portion defined by said longitudinal edge,

(f) the transverse dimension of said head being less than the transverse dimension of said annular body portion wherein a substantially annular vent opening is defined between the periphery of said head and body portion, and

(g) said body portion including an open end oppositely disposed relative to said edge.

5. As an article of manufacture, an integral stamped blank of sheet material adapted to be formed into a core box vent,

(a) a body portion having a longitudintal edge,

(b) a neck portion of deformable character transversely extending from said longitudinal edge, and

(c) a generally circular head member attached to and depending from said hinge portion, said head member having a peripheral circumference slightly less than the length of said longitudinal edge.

6. A core box vent comprising, in combination,

(a) an annular body portion having an end edge defined thereon,

(b) a head having a general peripheral configuration similar to the internal configuration of said body portion,

(c) a resilient element connecting a peripheral portion of said head to said end edge,

(d) said head being substantially coaxially received within said body portion and being of lesser transverse dimension than the internal transverse dimension of said body member whereby the periphery of said head and said body portion define an annular vent opening, and

(e) cooperating locating means defined upon said head and body portion locating said head relative to said body portion.

7. In a core box vent as in claim 9, wherein

(a) said locating means include a radially extending projection defined upon said head, and

(b) a recess defined in said end edge receiving said projection.

8. In a core box vent as in claim 7, wherein

(a) a shoulder is defined on said head radially spaced a greater distance from the axis of said body portion and head than the head periphery,

(b) said shoulder engaging the inner surface of said body portion to maintain said head coaxial with said body portion and maintain a predetermined vent opening dimension.

9. The method of forming a core box vent from a planar stamped blank of sheet material comprising the steps of

(a) stamping a blank from sheet material having a body portion having an edge and a head portion connected to said edge by a hinge portion,

(b) forming said body portion into an annular configuration by bending wherein said edge constitutes an end of the annular configuration transversely disposed to the axial longitudinal length thereof, and

(c) bending said hinge portion substantially perpendicular to the axis of said annular body portion wherein said head portion is received within said body portion adjacent the edge thereof.

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