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(54) **Eljárás anyag öntésére, öntőforma anyag öntésére, valamint öntőforma alkalmazása egy öntvény öntésére**

Az európai szabadalom ellen, megadásának az Európai Szabadalmi Közlönyben való meghirdetésétől számított kilenc hónapon belül, felszólalást lehet benyújtani az Európai Szabadalmi Hivatalnál. (Európai Szabadalmi Egyezmény 99. cikk(1))

A fordítást a szabadalmas az 1995. évi XXXIII. törvény 84/H. §-a szerint nyújtotta be. A fordítás tartalmi helyességét a Szellemi Tulajdon Nemzeti Hivatala nem vizsgálta.

Description

[0001] The invention relates to a method of casting a material by bringing it into a free-flowing state through heating and introducing it into a casting mould in accordance
5 under the effect of gravity, and a casting mould or permanent mould for casting a material, as well as for the use of a casting mould for casting a cast part from molten metal.

[0002] When casting, especially through gravity casting, there are mainly four proven casting processes, namely bottom casting, side casting, top casting and tilt casting, and
10 although all have certain common advantages, overall they all have certain disadvantages.

[0003] For example, bottom casting yields laminar mould filling, but, during the solidification process, the coldest material is in the feeder or riser, i.e. the storage space from which the material is to be fed during solidification, which requires that the feeding
15 must be ensured by larger feeder dimensions.

[0004] In the case of side casting, while there is relatively hot material in the feeder, this results in more turbulent mould filling than is the case with bottom casting.

[0005] In the case of top casting, the hottest material is in the riser or feeder, so that although there is a good feeding at minimum feeder volume, the quality of the castings
20 degrades as a function of the filling level due to turbulence.

[0006] In the case of tilt casting, where the hottest material is also in the feeder, unwanted turbulence and flow lines occur on the casting surface. The direction of flow of the liquid material is determined by the contour of the casting and thus leads to overheating of areas in the casting mould and thus also in the cast part.

[0007] DE 43 04 622 A1 discloses a method for filling a mould through rising casting route wherein an inlet opening of the casting mould is connected via a pipe connection with a spout of a holding furnace containing molten metal, wherein the mould cavity of the mould is held below the molten metal level in the container during the entire filling, while the feeder of the casting mould lies below the mould cavity during the filling and is
25 brought up to a higher position after filling. The method should be less onerous in terms
30 of filling the mould and should offer improved casting quality compared with gravity

methods. In addition, DE 43 04 622 A1 discloses a container having a spout that has a housing which can be attached to an outlet of the container to implement the method.

[0008] DE 20 2004 020 881 U1 discloses a low-pressure casting method, wherein a molten metal is pressed directly out of the melting furnace by means of a pump through a riser pipe from below into the mould cavity.

[0009] WO 2004/039516 A discloses a casting method with disposable moulds. In this case, a molten metal is pressed through a riser pipe in the casting model by means of low pressure.

[0010] DE 21 64 755 A1 discloses a casting method with directional solidification and a device for carrying out the method. The mould is filled with eddy-free molten metal and at a flow rate above the speed of rotation of the storage space controllable inflow from the storage space via the pipe connection into the mould cavity in order to fill the latter with a uniform level increase. The filling of the casting mould takes place by continuous tilting of the same. Upon completion of the mould filling, a mostly falling directional solidification can then begin, initially serving as the feeder with respect to the gravity vector, and which then progresses to the mouth of the pipe connection. From this first solidification position, the cast objects in their moulds progress in continuous transition to a predominantly horizontal main direction of solidification, and finally into a predominantly vertically rising direction, wherein the solidification is completed in the moulds until the beginning of the pipe joint.

[0011] The object of the present invention is to avoid the disadvantages of the previously known casting processes and to provide methods for casting a material, with optimal laminar eddy-free mould filling, as well as optimum feeding of the hottest metal from a storage space thus allowing smaller storage or feeder volumes. In addition, overheating of contour-related material accumulations can be avoided, while circulatory, material, energy, transport and cutting operations can be saved. Furthermore, the production of large-scale and complicated castings may be simplified and cheapened. Another aspect of the object is the creation of appropriate moulds for the efficient and high-quality production of castings, as well as the use of a mould for casting a cast part from a molten metal.

[0012] This object is achieved by a method having the characteristics of claim 1, through a casting mould or permanent mould having the characteristics of claim 13, as well as by the use of a casting mould or permanent mould for casting a cast part of molten metal according to the characteristics of claim 15. Further developments and advantageous embodiments of the invention will emerge from the respective dependent claims.

[0013] According to the invention, the method for casting a material initially requires bringing the material into a flowable state by heating and introducing it into a mould under the effect of gravity, wherein the introduction of the material into the mould cavity from below is effected according to the principle of bottom casting, wherein the said material - seen in its flow direction - is first introduced into a sprue basin of a runner, then flows through the runner, and then through a storage space situated in front of the cavity and arranged below this, and from there into the cavity, wherein after introduction of the material into the casting mould, this is then pivoted together with sprue basin, runner and storage space so that the storage space assumes the function of a feeder or riser, and the solidification of the material takes place in accordance with the top casting principle. In other words, the material is first heated into a flowable state and then placed in a mould or in the mould cavity or the cavity according to the principle of bottom casting, wherein the solidification takes place according to the principle of top casting/tilt casting.

[0014] In this case, the introduction of the material is into the cavity of the casting mould from below according to bottom casting, wherein the molten metal is initially brought into a sprue basin lying at least partly higher than the cavity, and then via an inlet leading downwards, then via a curve - the inlet - upwards into a storage space lying below the cavity and through the outlet into the cavity and the solidification is then effected with the storage space upright according to the type of top casting, wherein, before solidification of the material, the inlet mould is pivoted so that the storage space assumes the feeder or riser function.

[0015] In order to prevent leakage of the molten metal from the sprue basin during pivoting, it may be advantageous if a gate lying in the runner in front of the cavity - seen

in the flow direction of the molten metal - is activated in good time before or during pivoting of the mould.

[0016] However, instead of a gate, a closure may also be provided on the sprue basin and activated prior to pivoting.

5 [0017] In this case, it is expedient when the pivoting of the mould takes place about an axis which runs at least approximately parallel to the parting line plane(s) of the mould.

[0018] It may furthermore be advantageous if the cavity and the runner and thus the parting line or separating gap plane(s) are provided or arranged at an angle to one another. Either the runner or the cavity may be arranged obliquely, but both the cavity
10 and the runner may also be arranged at an oblique angle to the horizontal, wherein the cavity and the runner may each form an obtuse angle. However, the cavity and/or the runner may also be at a shallow angle to the horizontal.

[0019] It may thus be particularly advantageous if the cavity and casting runner are arranged at such an angle to one another and are pivoted together through such an
15 angle and in such a direction that, upon the storage space reaching a position where it can assume the function of riser or feeder, the runner shall not have yet reached the horizontal, wherein it is particularly advantageous if the pivoting of the mould is carried out in one direction in such a way that the runner moves forward, so that the runner lies at least slightly upwards in the solidification position and leakage of the molten metal
20 from the storage space is not possible, because, as already mentioned, the latter assumes the functions of a riser or feeder.

[0020] The invention also relates to a corresponding mould or permanent mould for casting a material by bringing it into a free-flowing state by heating and introducing it into a casting mould under the effect of gravity, comprising a runner with a sprue basin, a
25 storage space connected to the runner, as well as a cavity provided with an inlet, wherein the sprue basin is provided above the cavity, wherein the runner extends from the side of the cavity, wherein, in order to introduce the material into the cavity of the casting mould from below according to the principle of bottom casting, the storage space below the inlet of the cavity and the inlet is arranged above the storage space, and
30 wherein the mould together with the sprue basin, runner, storage space, inlet and cavity

can be pivoted so that the storage space is effective as a feeder above the cavity for solidification of the material according to the principle of top casting.

[0021] A development of the invention relates to a mould or permanent mould, which has a storage space below the cavity, into which the casting runner opens, wherein the area opening into the storage space of the runner has a section - the inlet - which lies lower than the storage space.

[0022] The mould can be characterised further in that the cavity and the runner are not provided parallel to one another, but are at an angle to one another. The mould or permanent mould may be so configured that both, i.e. the cavity as well as the runner, are inclined to one another, wherein they can form an obtuse angle to one another. The angle may be so selected that upon pivoting of the mould into the position in which the storage space comes to lie above the cavity - the solidification position - and the storage space can act as a feeder or riser, and thus the runner is in a position to avoid leakage of the molten metal from the storage space in which at least a partial section of the latter protrudes at least slightly upwards from the horizontal. Advantageously, the mould, the cavity and the runner are so arranged with respect to one another and the mould is so pivoted that the runner moves forward.

[0023] The pivotable mould, in the case where the runner and the storage space and the cavity surrounding the mould halves are separated from one another by corresponding parting lines, is advantageously arranged so that there is a pivotal movement about an axis that is at least approximately parallel to the parting line plane.

[0024] This mould - with the storage space downwards - can be filled with molten metal according to the bottom casting principle, wherein the storage space is below the cavity and the solidification of the molten metal takes place in the pivoted mould, wherein the storage space effectively assumes the functions of a feeder or riser upwards.

[0025] To avoid the leakage of the molten metal during or after pivoting, it may also be advantageous if the mould has a closure on the sprue basin or a gate provided in the region of the runner, wherein the closure or the gate are operated before or in good time during pivoting.

[0026] The invention also relates to the use of a rotatable casting mould or permanent mould, comprising a mould cavity to form the casting, a feeder system for feeding the

mould cavity with molten metal as well as an inlet or sprue channel via which the feeder system can be filled with molten metal, wherein the feeder system is so arranged with respect to the mould cavity of the mould or permanent mould that, when the mould is rotated into a filling position, the filling of the mould cavity with the molten metal via the feeder system is effected against the effective direction of gravity, and wherein the inlet opening of the runner provided for filling the molten metal is arranged on a side surface of the mould at such a distance from its junction in the feeder system that the filling opening of the runner is arranged in the respective filling position of the casting mould above its junction with the feeder system, wherein the following steps are implemented to cast a cast part from molten metal:

a. Provision of the casting mould

b. Alignment of the casting mould in a filling position, in which the molten metal filled in the runner flows through the runner under the effect of gravity, wherein the main flow direction of the molten metal, i.e. the flow direction in which the molten metal has to flow regardless of the actual course of the runner in order to pass directly from the inlet opening to the junction of the runner in the feeder system, and so form an angle with the direction of the gravitational force,

c. Filling of the casting mould aligned in the filling position with the molten metal until the casting mould including the runner is completely filled with molten metal,

d. Turning of the casting mould to a solidification position in which the molten metal present in the feeder system is pressed onto the molten metal present in the mould cavity under the effect of gravity,

e. Holding of the casting mould in the solidification position until the molten metal present in the casting mould reaches a certain state of solidification,

f. Removal of the cast part.

[0027] It may be advantageous if a closure is provided in the area of the sprue basin. A gate can be provided advantageously in the inlet area. The axis of rotation of the mould may usefully be oriented horizontally.

[0028] Castings, which are produced according to the inventive method and/or by means of the casting moulds according to the invention are made, in a particularly useful and advantageous way, of light metal alloys, especially aluminium alloys.

[0029] The invention is explained in more detail with reference to Fig. 1-9,

5 [0030] Fig. 1 to 4 show a conventional casting process 20 according to the prior art, while Fig. 5 and 9 show the casting method according to the invention.

[0031] The Figures are as follows:

Fig. 1 schematically shows the casting process according to so-called bottom casting,

10 Fig. 2 shows the casting process according to side casting,

Fig. 3 shows the casting process according to top casting, and

Fig. 4 shows the casting process according to tilt casting.

[0032] In Fig. 1 to 4, the casting mould or permanent mould is designated respectively
15 by 1A, 1B, 1C and 1D, and the mould hollow space or the cavity by 1a -1d.

[0033] Fig. 1 to 4 respectively show a feeder or riser 2a to 2d, from which the so-called feeding can be carried out during solidification of the casting.

[0034] In the case of bottom casting, side casting and top casting, the casting moulds stand upright according to Fig. 1 to 3, while in Fig. 1 and 2, the melt is introduced
20 through the sprue basin 4a, 4b. In the case of top casting according to Fig. 3 and tilt casting according to Fig. 4, the riser 2c, 2d also serves as the sprue basin. In the case of tilt casting according to Fig. 4 - in the example shown here - the filling of the molten metal is first carried out in the horizontal state of the permanent mould 1D in the container 2d' while the permanent mould 1D is pivoted according to the arrow 3, wherein
25 the molten metal passes through the feeder 2d until the permanent mould stands upright and the solidification of the material is carried out in this position with the feeder 2d upwards.

[0035] In the case of the bottom and side casting according to Fig. 1 and 2, the material supply is effected via the runner 5a, 5b shown in grey, first in the sprue basin and from
30 there into the cavity 1a, 1b. In the case of bottom casting according to Fig. 1, the sprue

basin 4a joins the inlet 6, which merges into an intake 7, which is lower here than the cavity 1a and delivers the molten metal into the cavity 1e through the outlet 8.

[0036] It can be seen that laminar mould filling arises in the case of bottom casting according to Fig. 1. In the case of side casting according to Fig. 2, the mould filling takes place as a result of the elevation of the bath level in the outlet at the mould cavity and is thus less laminar than in the case of bottom casting.

[0037] The most turbulent mould filling occurs in the case of top casting according to Fig. 3, leading to greater presence of oxides, gas bubbles and foam in the molten metal.

[0038] Significant flow lines occur in the case of tilt casting according to Fig. 4. In addition, the direction of flow of the material is determined by the contour of the casting thus leading to the overheating of areas in the mould and defects arising in the casting.

[0039] In the case of the tilt casting process according to Fig. 4 and in the case of the top casting process according to Fig. 3, the hottest material is in the feeder leading to the best feeding, but, as already mentioned, the mould filling is turbulent instead of the desired laminar.

[0040] In the case of bottom casting according to Fig. 1, as already mentioned, laminar mould filling take place, while in the case of side casting according to Fig. 2, the laminar mould filling is already degraded, while both casting methods, i.e. bottom casting and side casting, have the disadvantage that the coldest material is in the feeder or riser meaning that optimal feeding can only take place through larger feeders during solidification.

[0041] In the present invention, which is described in detail by means of Fig. 5, 6 and 7, the advantages of bottom casting and top casting, i.e. the best laminar mould filling, are combined with the advantage of the hottest metal being located in the feeder during solidification.

[0042] The casting is carried out according to Fig. 5, in the casting mould indicated by 1E as shown practically in Fig. 1, i.e. according to the bottom casting process, wherein the molten metal passes into the cavity 1e through the runner 5c likewise shown in grey. The molten metal filled in the sprue basin 4e flows downwards through the inlet 6a, then through the area extending below a storage space 9, the intake 7a, through the storage space 9 and from there through the outlet 8a of the storage space 9 into the cavity 1e.

Prior to solidification of the material, for example in response to a certain temperature, the entire mould 1E is pivoted, as shown in Figure 6, by about 180° about axis I corresponding to the direction of rotation II. The storage space 9 is now upright so that this storage space 9 now acts as the feeder or riser until the material has solidified.

5 [0043] Fig. 7 shows a position of the mould or permanent mould 1E after it has been pivoted from the position of Fig. 5 by about 90°. The parting line 10 between the two mould halves 1E' and 1E'' can be seen here, while the pivoting axis I is parallel and runs through the plane formed by the parting line 10. In Fig. 7, one can also see the end surface of the cavity 1e facing the viewer and the end face of the storage space 9, the intake 7a and the sprue basin 4e.

[0044] In many cases, it is irrelevant in the position according to Fig. 6, whether the molten metal leaks from the sprue basin 4e, the inlet 6a or the intake 7a, because the molten metal present there is no longer needed for the following phases of the casting process.

15 [0045] It may be advantageous if the permanent mould 1E is quickly moved from the position that it occupies just before it is in the position shown in Fig. 7 to a position shortly thereafter, so that the molten metal can practically not leak from the cavity and the storage space. However, a closure 11 may be provided in the area of the sprue basin 4e or a gate 12 in the area of the inlet, which are operated just before or during pivoting, so that the runner is closed.

20 [0046] The pivoting can however also be pivoted about an axis, other than the axis shown here, that is level or horizontal or at least approximately parallel to the plane of the parting line 10, for example, at least approximately perpendicular to the axis III. It may thus be advantageous if the pivoting in the direction of the arrow III' takes place so that the runner or the sprue basin moves forward, so that the molten metal cannot leak out of this until it reaches a position when the storage space 9 is upright. However, the pivoting can also take place about other axes or curves than those illustrated, for example axes or curves other than the axes shown, wherein by using a closure or gate, the direction of rotation with respect to the leakage of the molten metal from the casting runner is less crucial.

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[0047] Fig. 8 and 9 show a cavity 20 and at least parts of the runners 21, i.e. the inlet 22, respectively arranged at an angle, i.e. at an obtuse angle to one another.

[0048] It can again be seen that the sprue basin 23 and the curved inlet 24 open into the storage space 25 and pass via an outlet 26 into the cavity. The cavity 20, the storage space 25 and the inlet 24 may be so arranged with respect to one another that the inlet 24 is lower than the storage space 25 and this in turn is lower than the cavity 20. In some cases, it may also be advantageous or sufficient if the inlet 24 is not placed below the storage space 25. Fig. 8 and 9 show the cavity and the inlet, as already mentioned, at an obtuse angle 26 to one another, wherein both are at a respective angle 27, 28 to a plane 29, which extends at least approximately perpendicular to the horizontal.

[0049] Following the introduction of the molten metal and in good time prior to the solidification thereof, the mould 30 is pivoted into the position shown in Fig. 9 about the axis 31, which is at least approximately parallel to the parting line 32 of the mould 30, i.e. expediently in a pivoting direction of the arrow 33, so that the runner 21 is moved forwards with the sprue basin 23 to a position in Fig. 9, wherein the cavity 20 is brought into such a position that the storage space 25 is now located above the cavity 20 and the storage space 25 can assume the functions of a riser or feeder.

[0050] The pivoting is effected as far as the inlet 22 does not quite reach the horizontal 34, and may thus have little or no leakage of molten metal.

[0051] It can be seen that the casting or moulding according to the invention enables the moulding to be effected according to the principle of bottom casting in order to offer optimal laminar mould filling compared to the other casting methods, and solidification on the principle of top casting, which in turn results in the best possible feeding.

[0052] The invention further relates to castings produced by the inventive method and/or moulds according to the invention. Although the inventive method is particularly suitable for the processing of light metal, especially light alloys such as aluminium alloys, the invention is not limited to use with light metal alloys, but can process other materials, including non-metallic materials in accordance with the invention.

List of reference numerals**[0053]**

	1A to 1D	Casting mould	33	Pivoting direction
	1a to 1e	Cavity	34	Horizontal
5	2a to 2d	Feeder/riser		
	2d'	Container		
	3	Arrow		
	4a-4d	Sprue basin		
	5a, 5b, 5c	Runner		
10	6	inlet		
	7,7a	Intake		
	8, 8a	Outlet		
	9	Storage space		
	I	Axis		
15	10	Parting line		
	1E	Permanent mould		
	1E', 1E''	Mould halves		
	11	Closure		
	12	Gate		
20	20	Hollow space		
	21	Runner		
	22	Inlet		
	23	Sprue basin		
	24	Inlet		
25	25	Storage space		
	26	Angle		
	27, 28	Angle		
	29	Horizontal plane		
	30	Mould		
30	31	Axis		
	32	Parting line		

**Eljárás anyag öntésére, öntőforma anyag öntésére
valamint öntőforma alkalmazása egy öntvény öntésére**

SZABADALMI IGÉNYPONTOK

1. Eljárás egy anyag öntésére ennek egy folyásképes állapotba való hozásával, melegítés és egy öntőformába, a nehézségi erő elve alapján történő bevitele útján, **azzal jellemezve, hogy** az anyag bevitele az öntőforma üregébe alulról, a fénköntési elv szerint történik, ahol az anyagot — ennek a folyásirányában nézve — először egy beömlőcsatorna beömlőcsészéjébe tápláljuk be, ezt követően ez keresztülfolyik a beömlőcsatornán, majd egy, az üreg előtti és ez alatt elhelyezkedő tárolótérben, és innen az üregbe ömlik, és, **hogy** az anyagnak az öntőformába való bevezetését követően ezt a beömlőcsészével, a beömlőcsatornával és a tárolótérrel együtt elforgatjuk, úgy, hogy a tárolótér felveszi a tápfej vagy a feltöltő szerepét, és az anyag megszilárdulása a felülről való öntés elvének megfelelően valósul meg.

2. Az 1. igénypont szerinti eljárás, **azzal jellemezve, hogy** a beömlőcsatornának van egy olyan a felülete, amely alacsonyabban helyezkedik el, mint a tárolótér, azon idő alatt, amíg az anyagot betápláljuk.

3. Az előző igénypontok egyike szerinti eljárás, **azzal jellemezve, hogy** a beömlőcsatornában és az üregben biztosítunk egy kaput, amelyet az elforgatás előtt aktiválunk.

4. Az előző igénypontok egyike szerinti eljárás, **azzal jellemezve, hogy** egy elzárást biztosítunk az öntőforma beömlőcsészéjén, amely elzárást az elforgatás előtt aktiváljuk.

5. Az előző igénypontok egyike szerinti eljárás, **azzal jellemezve, hogy** az öntőforma elforgatása egy olyan tengely körül valósul meg, amely párhuzamos ennek elválasztó-bemetszés síkjával vagy síkjaival.

6. Az előző igénypontok egyike szerinti eljárás, **azzal jellemezve, hogy** az üreg és a beömlőcsatorna egymáshoz képest egy szögben vannak elhelyezve.

7. Az előző igénypontok egyike szerinti eljárás, **azzal jellemezve, hogy** az üreg és a beömlőcsatorna közül mindkettő, a közöttük futó vízszintes síkhoz képest, egy szöget zár be.

8. Az előző igénypontok egyike szerinti eljárás, **azzal jellemezve, hogy** az üreg és a beömlőcsatorna, egymással való viszonylatban, tompaszöget zárnak be.

9. Az előző igénypontok egyike szerinti eljárás, **azzal jellemezve, hogy** az üreg és/vagy a beömlőcsatorna, egy vízszintes sikkal való viszonylatban, tompaszöget zárnak be.

10. Az előző igénypontok egyike szerinti eljárás, **azzal jellemezve, hogy** az üreget és a beömlőcsatornát, egymással való viszonylatban, olyan szögben bocsátjuk rendelkezésre és a forgási tengely körül olyan szögben és olyan irányban forgatjuk el, hogy, amikor a tárolótér elér egy olyan helyzetet, amelyben a felveheti egy tápfej vagy feltöltő szerepét, akkor a beömlőcsatorna még nem érte el a vízszintest.

11. Az előző igénypontok egyike szerinti eljárás, **azzal jellemezve, hogy** a forma elforgatását olyan irányban végezzük, hogy a beömlőcsatorna megelőzi.

12. Az előző igénypontok egyike szerinti eljárás, **azzal jellemezve, hogy** a folyóképes állapotba hozott anyag kifolyik a beömlőcsészéből a beömlőcsatornán, azaz egy, a beömlőcsészéhez kapcsolt beömlőnyíláson és egy ehhez kapcsolt bemeneti nyíláson keresztül, majd továbbfolyik a tárolótérbe, a bemenet pedig, legalább ennek egyes felületei, alacsonyabban helyezkednek el mint a tárolótér, és továbbá a tárolótér egy kimeneti nyílásán keresztül az öntőforma üregébe, a tárolótér pedig, legalább ennek egyes felületei, alacsonyabban helyezkednek el mint az üreg, és, **hogy** a belépőtartályt tartalmazó öntőformát, a beömlőnyílást, a bemeneti nyílást, a tároló teret, a kimeneti nyílást és az üreget, az anyag megszilárdulása előtt, elforgatjuk, úgy, hogy a tárolótér tápfejként vagy feltöltőként működjön.

13. Öntőforma vagy kokilla (1E) egy anyag öntésére, ennek egy folyásképes állapotba való hozásával, melegítés és egy öntőformába (1E), a nehézségi erő elve alapján történő bevitele útján, amely magában foglal egy beömlő-csészével (4e) ellátott beömlőcsatornát (5c), egy a beömlőcsatornához (5c) kapcsolt tárolóteret (9) és egy ehhez kapcsolt üreget (1e), amely egy beömlőnyílással (8a) van ellátva, a beömlőcsészét pedig az üreg (1e) felett biztosítjuk, a beömlőcsatorna (5c) az üreg (1e) oldalán fut, ahol az anyagnak az öntőforma (1E) üregébe (1e) való bejuttatása alulról, a fenékontési elv szerint történik, a tárolótér az üreg (1e) beömlőnyílása (8a) alatt helyezkedik el, és a beömlőnyílás (8a) a tárolótér (9) felett helyezkedik el, és ahol az öntőforma (1E) elforgatható a beömlőcsészével (4e), a beömlő-csatornával (5c), a tárolóterrel (9), a beömlőnyílással (8a) és az üreggel (1e) együtt, úgy, hogy a

tárolótér (9) egy, az üreg (1e) felett levő tápfejként működik, az anyagnak a felülről való öntés elvének megfelelően történő megszilárdítására.

14. A 13. igénypont szerinti öntőforma, **azzal jellemezve, hogy** az öntőforma (1E) forgási tengelye (III) vízszintes.

15. Egy forgatható csapágyas öntőforma vagy kokilla (1E, 30) alkalmazása, amely magában foglal egy öntött üreges teret (1a, 20), amely az öntőrészt képezi, egy betápláló rendszert (9) az öntött üreges térnek (1e, 20) olvadt fémmel való táplálására és egy beömlőnyílást vagy betápláló csatornát (6a, 22), amelyen keresztül a betápláló rendszer (10) megtölthető olvadt fémmel, a betápláló rendszer (9, 25) pedig, az öntőforma vagy a kokilla (1E, 30) öntött üreges terének (1e, 20) viszonylatában, úgy van elrendezve, hogy egy betáplálási helyzetbe fordított öntőforma esetén az öntött üreges térnek (1e, 20) az olvadt fémmel való megtöltése a betápláló rendszeren keresztül (9, 25), a gravitációs hatás irányával ellentétesen valósul meg, és ahol a betápláló csatornának (6a, 22) az olvadt fém beöntésére biztosított betöltő nyílása (4e, 23), az öntőformának (1E, 30) egy oldalsó felületén, távol ennek a betápláló rendszerbe (9, 25) való nyílásától helyezkedik el, úgy, hogy a betápláló csatorna (6a, 22) betöltő nyílása (4e, 23), az öntőforma megfelelő betáplálási helyzetében, ennek a betápláló rendszerrel (9, 25) való összefolyása felett legyen található, egy öntvénynek egy olvadt fémből való kiöntésére, amely magában foglalja a következő gyártási lépéseket:

- a) az öntőforma vagy kokilla (1E, 30) biztosítása,
- b) az öntőformának (1E, 30) egy olyan betáplálási helyzetbe való igazítása, amelyben a betáplálási csatornába (6a, 22) öntött olvadt fém, a gravitáció eredményeképpen, keresztülfollik a betáplálási csatornán (6a, 22), ahol az olvadt fém fő folyási iránya, azaz az a folyási irány, amelybe az olvadt fém folya, függetlenül a betápláló csatorna aktuális helyzetétől, azzal a céllal, hogy közvetlenül elérje a betápláló csatornával való összefolyást a betápláló rendszerben, egy szöveget zár be a gravitáció hatásának az irányával,
- c) az öntőformának (1E, 30) a megtöltése, amely maga a betáplálási helyzetbe van igazítva, az olvadt fémmel, amíg a betápláló csatornát (6a, 22) magában foglaló öntőforma (1E, 30) teljesen megtelik olvadt fémmel,
- d) az öntőformának (1E, 30) egy olyan megszilárdulási helyzetbe való fordítása, amelyben, a gravitáció hatásának köszönhetően, a betápláló rendszerben (9, 25)

jelenlevő olvadt anyag nyomást gyakorol az öntött üreges térben (1e, 20) jelenlevő olvadt anyagra,

e) az öntőformának (1E, 30) a megszilárdulási helyzetben való tartása addig, amíg az öntőformában (1E, 30) található olvadt fém egy meghatározott szilárdulási fokot el nem ért,

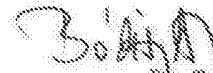
f) az öntvénynek az öntőformából való kivétele.

16. A 15. igénypont szerinti alkalmazás, **azzal jellemezve, hogy** egy elzárást biztosítunk a beömlőcsésze (4e) környékén.

17. A 15. igénypont szerinti alkalmazás, **azzal jellemezve, hogy** egy gátat (12) biztosítunk a beömlőnyílás környékén.

18. Az előző igénypontok egyike szerinti alkalmazás, **azzal jellemezve, hogy** az öntőforma (1E, 30) forgási tengelye (III, 31) vízszintes.

A meghatalmazott:



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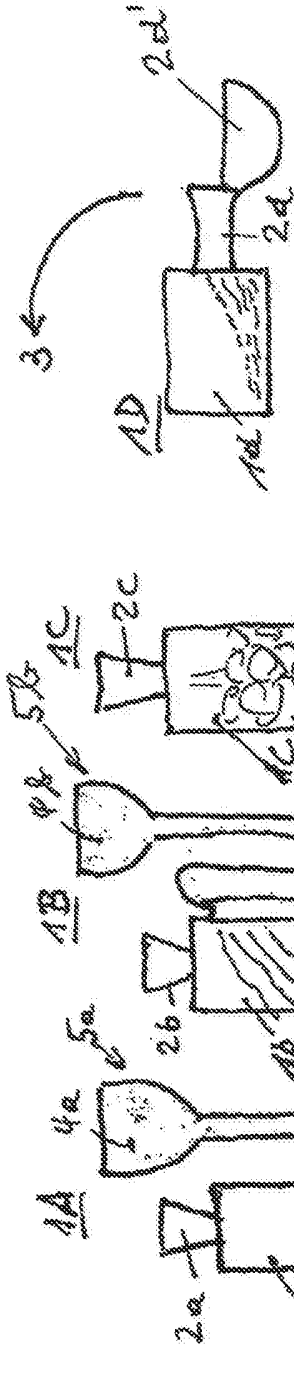


FIG. 4

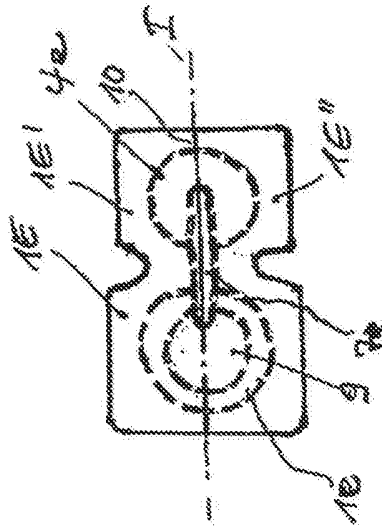


FIG. 3

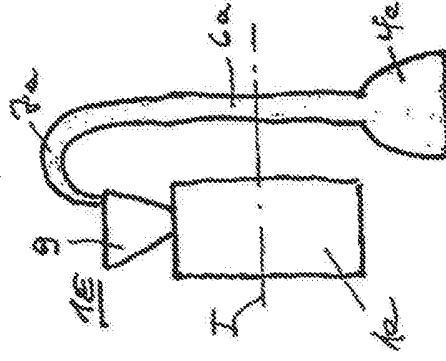


FIG. 7

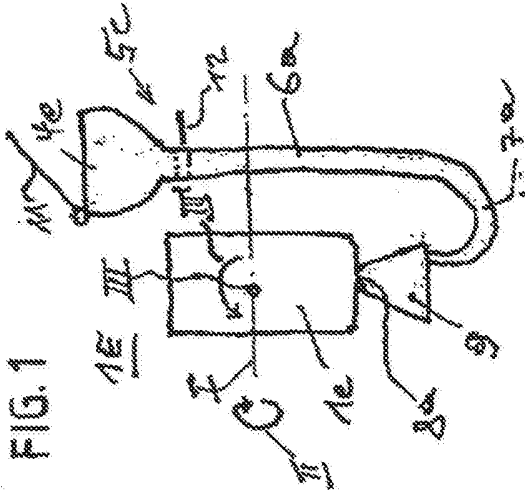


FIG. 6

FIG. 5

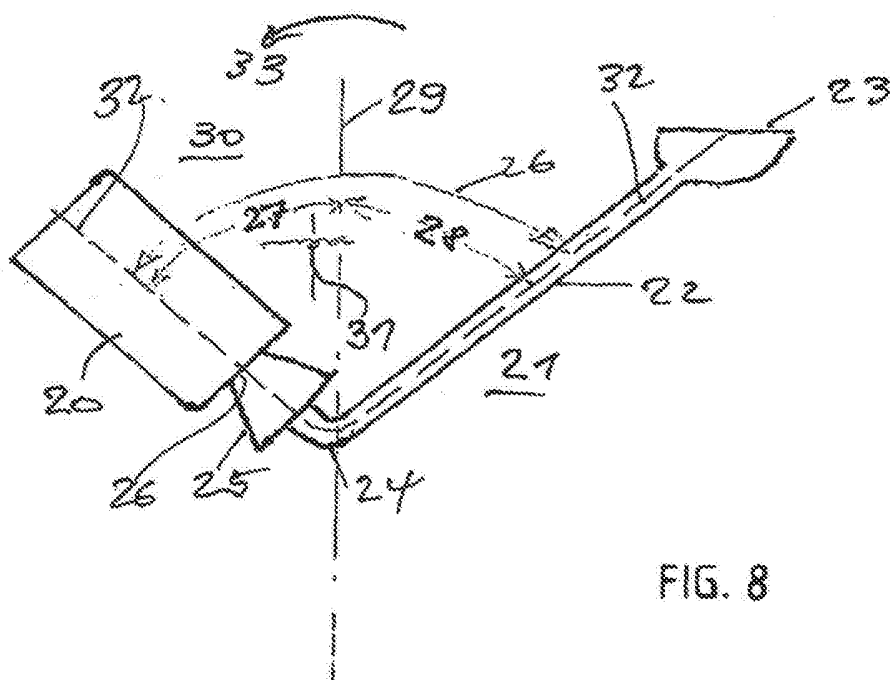


FIG. 8

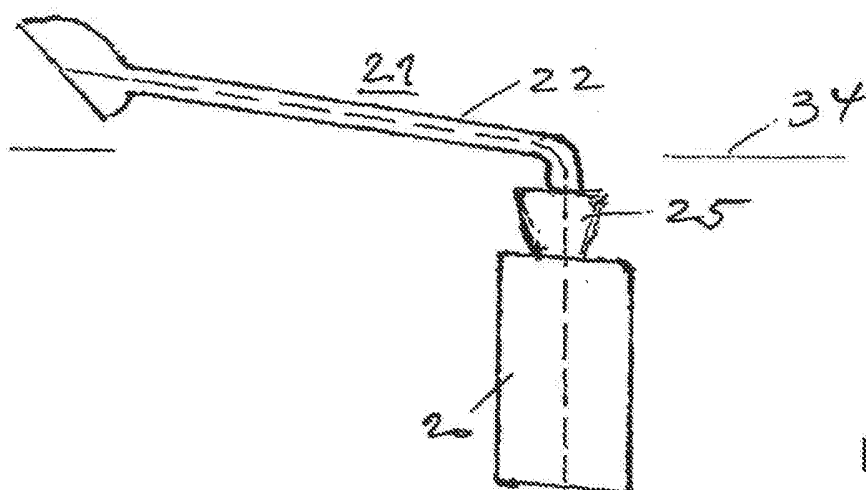


FIG. 9