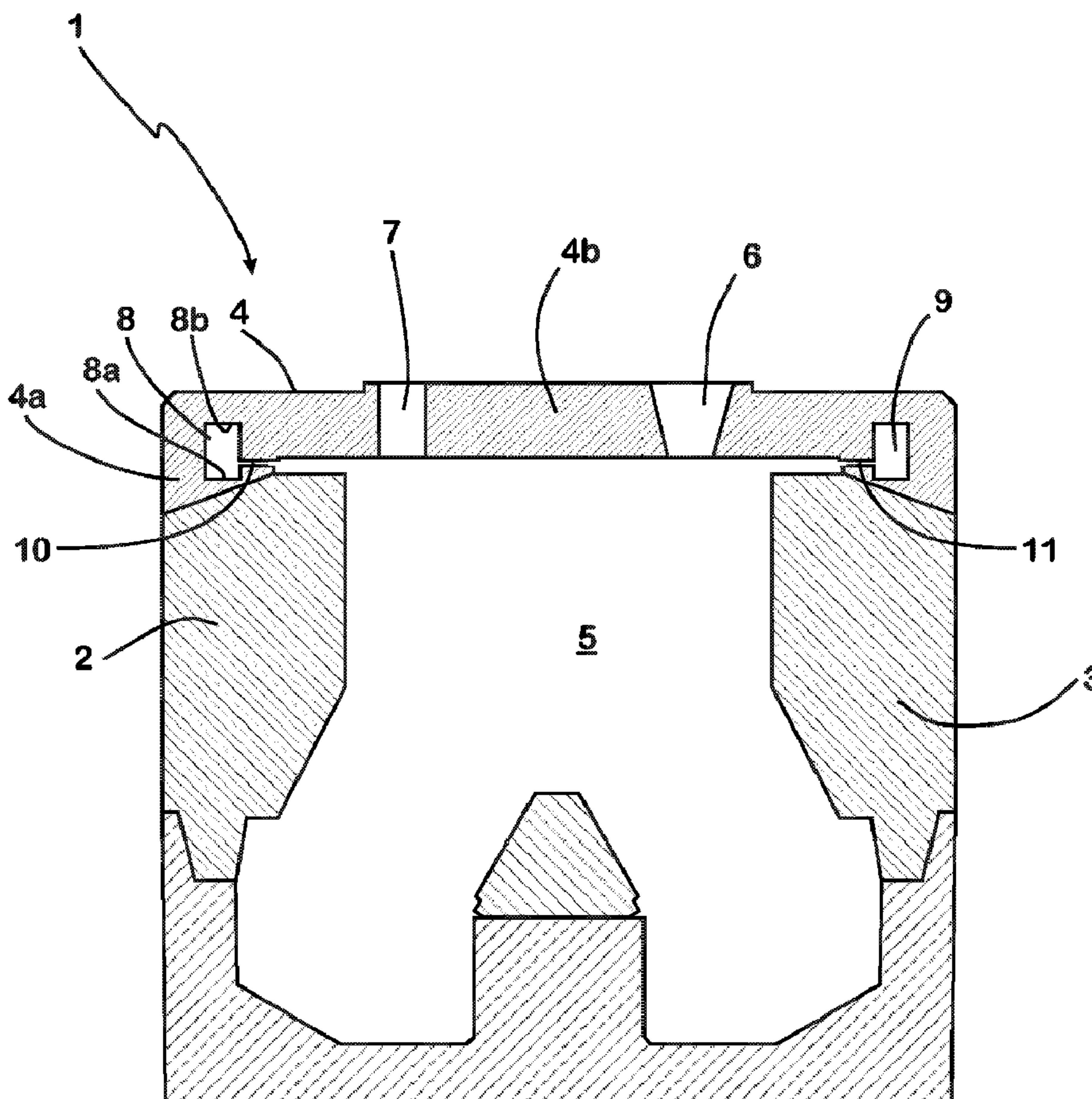




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(54) Titre : MOULE, DISPOSITIF ET PROCEDE POUR MOULER DES MATIERES FONDUES METALLIQUES
 (54) Title: CASTING MOULD, PROCESS AND DEVICE FOR CASTING METAL MELTS



(57) **Abrégé/Abstract:**

A casting mould is disclosed for manufacturing a casting from a metal melt (S) in a hollow moulding cavity (5) for reproducing a casting, and through an inlet for pouring a metal melt (M) into the hollow moulding cavity (5), as well as a device and a process for

(57) **Abrégé(suite)/Abstract(continued):**

casting such metal melts. The disclosed casting mould also makes it possible to achieve a further optimised casting result, even in the hard operation conditions found in casting practice. Moreover, the use of the claimed device and process minimises the risk of jamming because of a pressure build-up during casting. This is achieved in that the casting mould comprises at least one compensation chamber (8, 9) linked to the moulding cavity (5) by a channel (10, 11) and having at least one section (8a, 9a) located above the maximum filling level (Fmax) of the casting mould (1) during the solidification of the metal melt (S).

Abstract

The present invention relates to a casting mould for manufacturing a cast part from a metal melt (S) comprising a mould cavity (5) for reproducing a cast part and comprising an inlet for pouring metal melt (M) into the mould cavity (5) and also to a device and a process for casting metal melts of this type. The casting mould according to the invention provides further optimised casting results even under hard practical operating conditions. In addition, the use or application of the device according to the invention and the process minimises the risk of jamming during casting. This is achieved in that the casting mould has at least one compensation chamber (8, 9) which is linked to the mould cavity (5) via a channel (10, 11) and comprises at least one portion (8a, 9a) which is arranged above the maximum filling level (F_{\max}) of the casting mould (1) during solidification of the metal melt (S).

Fig. 1 is intended for the abstract.

Casting mould, device and process for casting metal melt

The present invention relates to a casting mould for manufacturing a cast part from a metal melt which is, for example, a light metal melt, especially an aluminium melt. In addition, the invention relates to a device and a process for casting metal melts of this type to form a cast part using a casting mould of this type.

One possibility for producing cast parts using casting moulds of the above-mentioned type is what is known as 'contact casting'. In this casting process, the casting moulds, each of which is to be filled with melt, are gradually moved below a melt container containing the metal melt. Formed in the base of the melt container is an outlet which merges with a supply channel, to the free end of which the inlet in each casting mould is docked. The outflow of melt out of the melt container is in this case conventionally regulated via a stopper which can be moved from a completely lowered position, in which it seals the outlet, into a raised position, in which the outlet is released and melt is able to flow into the casting mould via the supply channel.

Another casting process which has enjoyed practical success is what is known as 'low-pressure casting'. In this process, the melt is conveyed counter to gravity from a melt container docked to the bottom of the casting mould into the mould cavity in the casting mould via an inlet arranged on the bottom of the casting mould. For this purpose, there is a pressure applied to the melt contained in the melt container, which forces the melt to flow into the mould cavity in the casting mould via a riser pipe which acts in this case as the supply channel.

Regardless of the manner in which the mould is filled, there is the problem that what is known as 'jamming' occurs once the mould has been completely filled. This jamming is manifested in a sudden rise in static pressure acting on the walls of the casting mould. It is a result of the kinetic energy with which the melt flows into the casting mould suddenly being converted, once the mould has been completely filled, into static energy and, at the same time, the amount of melt which has accumulated in each supply channel exerts a pressure on the melt which is already present in the casting mould. This pressure surge not only presses the melt into the gaps which are inevitably present between the individual moulded parts of the casting mould; the casting mould walls surrounding the mould cavity are also penetrated to a greater extent. This has proven especially problematic in the case of casting moulds which are made of a porous moulding material and are destroyed for demoulding the cast part once the melt has solidified. In the case of 'expendable' casting moulds of this type, in particular, jamming causes the cast parts obtained to have a rough surface and necessitates increased effort for releasing the cast parts, once they have solidified, from the moulding material of the casting mould.

To minimise the extent to which the metal melt penetrates a casting mould made of sandy moulding material, the filling level in the mould cavity in the casting mould is, in the case of a device known from DE 196 23 720 A1 for contact casting, monitored while the melt is being poured out and, on reaching a provided filling height, the filling process is terminated prematurely to the extent that the superfluous amount of melt which still burdens the melt once the mould has been completely filled is minimised and the risk of jamming is thus reduced. For this purpose, the casting moulds used in the known device have in their lid an inspection opening which

leads rectilinearly into the mould cavity and through which a laser beam is directed onto the surface of the melt introduced into the casting mould. The beam reflected by the melt is intercepted by a sensor which forwards its measurement signal to a control and evaluation means which, based on the laser beam transmitted and received, determines the respective filling level of the casting mould and, on reaching a critical filling height, issues a control signal to seal the outlet in the melt container. The critical filling height is in this case adjusted in such a way as to avoid any undesirable jamming even if any melt continues to flow in the supply channel.

In practice, it has been found that, under the rough conditions provided in practical casting operation, monitoring the height of the filling level and prematurely terminating the flow of melt on the model of the procedure described in DE 196 23 720 A1 still do not rule out the undesirable penetration of the inner walls of the casting mould with the requisite degree of certainty.

The object of the present invention was therefore to provide a casting mould in which further optimised casting results are ensured even under hard practical operating conditions. In addition, there are to be disclosed a device and a process, the use or application of which minimises the risk of jamming during casting.

With regard to a casting mould for manufacturing a cast part by casting a metal melt, which mould has a mould cavity for reproducing a cast part and an inlet for pouring metal melt into the mould cavity, this object has, in accordance with the invention, been achieved in that a casting mould of this type was provided with at least one compensation cavity which is

linked to the mould cavity via a channel and comprises at least one portion which is arranged above the maximum filling level of the casting mould during solidification of the metal melt.

With regard to a device for casting metal melt to form a cast part in a casting mould configured in accordance with any one of the preceding claims and is equipped with a melt container, comprising an outlet, for the metal melt, with a supply channel connected to the outlet, with a means for docking the casting mould to the melt container in such a way that the inlet in the casting mould is connected to the supply channel when docked, with a measuring means for detecting the amount of melt introduced into the casting mould, with a regulating means for regulating the flow of melt from the melt container into the casting mould and with a control and evaluation means which evaluates the amount of melt detected by the measuring means and issues a control signal for sealing the outlet in the container once a specific filling level in the casting mould has been reached, the above-mentioned object has, in accordance with the invention, been achieved in that the control and evaluation means issues the control signal once the amount of melt poured into the casting mould has reached a limit value at which the amount of metal melt which is then still present in the supply channel is sufficient to fill the mould cavity completely and at most a portion of the compensation cavity.

With regard to a process for casting metal melt to form a cast part in a casting mould, wherein the metal melt is guided in a regulated manner from a container into the casting mould via a supply channel and the inflow of metal melt into the supply channel is interrupted once a specific amount of metal melt has been introduced into the mould cavity, the above-mentioned

object was finally achieved by the invention in that use is made of a casting mould configured in accordance with the invention and the inflow of melt into the supply channel is interrupted once the metal melt in the mould cavity has reached a filling level at which the amount of metal melt which is still present in the supply channel is sufficient to fill the mould cavity completely and at most a portion of the compensation cavity.

To avoid as far as possible penetration of a casting mould as a result of jamming, the invention proposes the formation in the casting mould of a compensation cavity which is designed to absorb, as a buffer, the amount of excess melt which is no longer required for complete filling of the casting mould and, as a result of this process, inevitably remains, even after the melt container has been sealed, in the supply channel via which the melt flows into the casting mould. The metallostatic pressure, which would otherwise prevail, of the amount of melt present in the supply channel is thus prevented from acting on the melt present in the casting mould.

At the same time, in the event of pressure peaks in the casting mould, the compensation cavity acts as a damper by which, for example, jamming, which is especially critical in the prior art with regard to the surface quality and subsequent processability of the cast part obtained, is effectively buffered. The melt infiltrating the mould cavity in the casting mould is able to escape into the compensation cavity, thus preventing, in particular, the sudden rise in pressure which occurs in conventional casting moulds, once the mould has been completely filled, as a result of the conversion of the kinetic energy, inherent to the melt during filling, into static energy.

In terms of the process and device, the embodiment according to the invention of a casting mould allows the inflow of melt into the supply channel to be interrupted as soon as the casting mould is filled, the tolerance range within which this interruption is carried out being widened by the buffering effect of the compensation cavity. It is thus ensured, even under crude practical operating conditions, that the flow of melt is in each case terminated in good time in such a way as reliably to rule out, with incorporation of the effect of the compensation cavity, the production of pressure peaks in the casting mould.

The linking of the compensation cavity via a channel firstly serves, in this case, the purpose of allowing the casting compound remaining in the region of the compensation cavity to be easily separated from the cast part after solidification. The channel is therefore preferably formed in such a way that the webs remaining in the region of the channels after solidification are thin and easily separable. The surface area of the passage of the melt to the chambers is in this case preferably selected so as to be as large as possible in that the linking of the channel is as broad as possible at a given low linking height.

A particular advantage of the embodiment according to the invention of a casting mould is that the compensation chamber is formed in the casting mould itself, so the casting mould as a whole remains closed. This allows the casting mould easily to be turned in order, for example, to cause purposefully oriented solidification of the cast part.

The amount of melt which remains unused in the compensation chambers is negligible compared to the overall volume of melt required for the cast part. A suitably sophisticated

configuration of each connecting channel between the mould cavity and compensation chamber allows the casting material which collects in the chamber easily to be broken off from the finished cast part. It has been found to be especially beneficial for the practical application of the invention that casting moulds configured in accordance with the invention may easily be inserted into existing casting devices and that these existing casting devices may easily be retrofitted to devices according to the invention or be operated in the manner according to the invention.

The cast parts obtained using the invention have a much smoother surface than those manufactured in the known manner. Especially in the field of sophisticated moulded elements of the cast part, such as, for example, the oil channels of engine units, the levels of surface roughness are much lower, as is accordingly the flow resistance as liquids flow through. The cast parts obtained in accordance with the invention are especially simple to clean, as little moulding material clings to them after demoulding. The effort required for cleaning the finished cast part is therefore greatly reduced. Finally, the reduced penetration of pressure of the inner surfaces by the melt lowers the requirements placed on the quality of the moulding material used for manufacturing the casting mould. More economical coarse-grain moulding materials may thus be used without detracting from the surface quality.

The invention therefore provides a casting mould, a casting device and a casting process which provide, even under hard practical operating conditions, casting results which not only ensure optimised surfaces but also allow simplified removal from the casting mould once the cast part has solidified.

The options for use of casting moulds according to the invention may be extended in that the cross section of the channel is delimited in such a way as to be sealed, as soon as the mould has been filled with metal melt which has already solidified. This can be achieved in that the cross-sectional course of the channel is adapted to the heat dissipated via the casting mould in the region of the channel in such a way that the solidification of the melt contained in the channel is completed very rapidly. It is thus very easy to prevent cast metal from flowing out of the compensation chamber into the mould cavity and back once the mould has been filled. This has been found to be especially beneficial for casting processes of the type in which the casting mould, once filled with melt, is rotated about a longitudinal or transverse axis to bring about purposefully oriented solidification of the cast part.

In principle, the advantages of the invention may be utilised in all casting moulds and casting processes, regardless of the material from which the casting mould is made. However, the good demouldability makes the invention especially suitable for expendable casting moulds which are usually made of a moulding sand and a moulding material comprising a binder.

An especially uniform effect of the configuration according to the invention of a casting mould may be achieved in that there are provided a plurality of compensation chambers which are connected to mould cavity regions which are, in each case, critical with regard to the effect of pressure peaks. However, it is also conceivable to provide a larger chamber which is connected to the mould cavity via a suitably configured connecting channel or via a plurality of channels leading into the critical regions.

The casting mould may, in principle, be provided for all known casting processes. Examples include contact casting or else rising casting. The casting mould according to the invention may be provided for the manufacture of cast parts for the automotive industry, especially of engine components such as, for example, cylinder blocks.

A constructionally simple embodiment of a casting mould according to the invention is obtained if the compensation chamber is linked to a portion of the mould cavity that is located on top while the metal melt is being poured in. In the case of casting moulds composed of a plurality of moulded parts, the compensation chamber may for this purpose be incorporated, for example, into the casting mould lid which is arranged on top during filling.

The amount of melt guided into the casting mould can, in principle, be detected by a weight measurement or other known processes. The amount of melt may in this case be detected, in a particularly reliable manner adapted to the actual conditions, in that the measuring means monitors the filling level in the casting mould and the evaluation means issues the control signal once the metal melt in the mould cavity has reached a filling height at which the volume of metal melt which is still present in the supply channel is sufficient to fill the mould cavity completely and at most a portion of the compensation cavity. In order, for this purpose, to be able to utilise the possibility, known from DE 196 23 720 A1, of an especially precise and practical measurement of the filling level of a casting mould, the casting mould is advantageously provided with an inspection opening leading to the mould cavity for inspecting the filling level of the metal melt in the mould cavity. The compensation chamber and the inspection opening are in this case preferably oriented in such a way

that the inspection opening to the mould cavity and the compensation cavity intersect a common horizontal plane. The filling level of the chambers may thus be gauged, in each case, via the inspection opening.

If the casting mould has an inspection opening of the type described hereinbefore, the measuring means of the device according to the invention may comprise, in a manner known from DE 196 23 720 A1, a laser, which directs a laser beam through the inspection opening onto the surface of the melt introduced into the casting mould, and a sensor which detects the laser beam reflected by the surface of the melt.

The risk of the occurrence of a pressure surge may be further reduced in that the filling speed is reduced toward the end of the mould-filling process by reducing the flow through the outlet in the melt container. For this purpose, in the case of a device according to the invention, the regulating means may, in a manner known per se, comprise a stopper for sealing the outlet in the container and an adjustment means for raising the stopper out of and lowering it into its sealed position, the adjustment movement of the stopper preferably being regulated by the regulating means stopper, especially when the approaches the outlet.

The invention will be described hereinafter in greater detail with reference to drawings which illustrate an embodiment and in which:

Fig. 1 is a schematic cross section of a casting mould for casting a cast part of an internal-combustion engine;

Fig. 2 is a schematic cross section of a device for casting an Al/Si melt in a first operating position; and

Fig. 3 shows the device according to Fig. 2 in a second operating position.

The casting mould 1 is composed, as a core packet, from a plurality of lateral moulded parts 2, 3, a base part and a lid moulded part 4 which is arranged at the top, in the casting mould filling position shown in the figures, and covers the top of the mould cavity 5 surrounded by the moulded parts 2, 3, 4. The moulded parts 2, 3, 4 are made from a moulding material mixed from a moulding sand and a binder and are destroyed on demoulding of the cast part G formed in the mould cavity. The cast part G may, for example, be a cylinder block for an internal-combustion engine.

Incorporated into the cover moulded part 4 of the casting mould 1 are an inlet 6, which runs toward the mould cavity 5 in the manner of a funnel and merges therewith, and a cylindrical inspection opening 7 which also leads rectilinearly from the top of the cover moulded part 4 into the mould cavity 5.

The cover moulded part 4 comprises a peripheral edge portion 4a which is thicker toward the bottom of the cover moulded part 4 than the inner portion 4b, surrounded by the edge portion 4a, of the cover moulded part 4. The edge portion 4a of the cover moulded part 4 rests on the lateral parts 2, 3, whereas the bottom of its inner portion 4b defines the top of the cast part and thus the height at which the casting mould 1 is completely filled with melt.

Incorporated into the edge portion 4a of the cover moulded part 4 are a large number of small-volume compensation chambers 8, 9 which are arranged in rows along the lateral

parts 2, 3. One row of compensation chambers 8 are in this case associated with one lateral part 2, whereas the other row of compensation chambers 9 are positioned above the other lateral part 3 of the casting mould 1. Within their rows, the compensation chambers 8 or 9 are set apart from one another in such a way that each compensation chamber 8, 9 is associated with a region which is especially critical with regard to the effect of pressure peaks. Alternatively, the compensation chambers 8, 9 may also be arranged in their rows at uniform intervals so as to ensure a distribution of their effect that is as uniform as possible over the length of the casting mould.

The compensation chambers 8, 9 take up little space compared to the mould cavity 5. The total volume of all of the compensation chambers 8, 9 is thus approximately 2 % to 3 % of the volume of the mould cavity 5.

The base 8a of the compensation chambers 8, 9 is arranged, in each case, below the maximum filling level F_{\max} of the casting mould 1 defined by the bottom of the inner portion 4b of the cover moulded part 4, whereas the roof 8b of the compensation chambers 8, 9 is positioned, in the direction of the top of the cover moulded part 4, in each case well above the bottom of the inner portion 4b. The upper portion 8c, 9c of the compensation chambers 8, 9 is thus located in each case above the maximum filling level F_{\max} of the casting mould 1.

The portion 8d, arranged below the maximum filling level F_{\max} of the casting mould 1, of the compensation chambers 8, 9 is connected to the mould cavity 5 in the casting mould 1 in each case via a horizontally extending channel 10, 11 incorporated into the lid core 4. The opening, associated with the mould cavity 5, of the channels 10, 11 is in each case arranged on

the inside, facing the mould cavity 5, of the edge portion. The channels 10, 11 have a low height and width which is designed in such a way that the opening cross section of the channels 10, 11 is sufficiently large to allow melt to enter the compensation chambers 8, 9 unimpeded but at the same time sufficiently small for the volume of melt contained in the channels 8, 9 to solidify, as a result of the dissipation of heat into the volume of the cover moulded part 4 that surrounds the channels 10, 11, as soon as the mould cavity 5 has been filled.

For casting of the cast part G, the casting mould 1 is positioned by a conveying and lifting device 12 below the opening of a supply channel 13 in such a way that the inlet 6 in the casting mould 1 is docked tightly at the opening of the supply channel 13. In this position, the inspection opening 7 in the casting mould 1 is arranged below a laser 14 which directs its laser beam through the inspection opening 7 into the mould cavity 5 in the casting mould 1.

The supply channel 13 is configured in a connector 15 which is configured on the bottom of a melt container 16 and connected to the outlet 17 in the melt container 16, which outlet may be sealed and opened using a stopper 18. For this purpose, the stopper 18 can be raised by an adjustment means 19 from a closed position, in which its thickened end seals the outlet 17, into an open position, in which it releases the outlet 17, thus allowing the Al/Si melt S contained in the melt container 16 to flow into the supply channel 13. In the same way, the stopper 18 may be lowered by the adjustment means 19 to seal the outlet 17. Both the raising process and the lowering process are carried out in this case in a regulated manner in that the adjustment means 19 is able to stop the stopper 18 in

any position in order to regulate the volume flow of melt S passing through the outlet 17.

The adjustment means 19 receives the control signals for raising and lowering the stopper 18 from a regulating and control means 20. The regulating and control means 20 is coupled to a measuring and evaluation means 21 with which there are associated, in turn, the laser 14 and a sensor 22 which detects the laser beam L reflected at the surface of the melt S passing into the mould cavity 5.

During filling of the casting mould 1 with melt S (stopper 18 raised to the maximum degree), the measuring and evaluation means 21 continuously calculates, from the laser beam L issued by the laser 14 and detected by the sensor 22, the filling level F in the mould cavity 5 and delivers the corresponding measured results to the regulating and control means 20. If the filling level F reaches a filling height F_{krit1} , the regulating and control means 20 issues to the adjustment means 19 a first control signal in response to which the adjustment means lowers the stopper 18 into a position in which, although the outlet 17 in the melt container 12 is still open, the flow of melt S is nevertheless slowed down. The filling height F_{krit1} is sufficiently remote from the maximum filling level F_{max} of the casting mould 1 that the filling of the casting mould is slowed down toward the end of the filling process.

As soon as the filling level F has thus reached a second critical filling height F_{krit2} , the regulating and control means 20 issues to the adjustment means 19 a second control signal in response to which the adjustment means presses the stopper 18 fully into the outlet 17, thus preventing any further melt S from entering the supply channel 13. The position of the filling height F_{krit2} is in this case designed in such a way

that the amount of melt S_2 still present in the supply channel 13 is sufficient to fill with melt S the mould cavity 5 completely and the compensation cavities 8, 9 at most in their lower region 8b, 9b. Depending on the configuration of the casting mould 1, the filling height F_{krit2} may correspond to the maximum filling level F_{max} .

Alternatively, the regulating and control means may issue merely one control signal to the adjustment means 19, i.e. when the critical filling height is reached, so the stopper 18 is completely closed. If the times required for filling the mould are substantially constant, the stopper may be partially lowered in advance in a time-controlled manner, thus also slowing down the filling of the casting mould toward the end of the filling process.

On account of its low volume, the amount of melt which passes into the channels 10, 11 when the casting mould 1 is filled with melt S solidifies almost immediately after the end of the filling process, thus sealing the connection between the compensation chambers 8, 9 and the mould cavity 5 in the casting mould 1. The casting mould 1 may then easily be forwarded for subsequent processing by being rotated, for example, through 180° about its longitudinal axis in order to allow the cast part G purposefully to solidify with solidification oriented counter to the direction of introduction.

Reference numerals

- 1 Casting mould
- 2, 3 Lateral moulded parts
- 4 Cover moulded part
- 5 Mould cavity
- G Cast part
- 6 Inlet
- 7 Inspection opening
- 4a Edge portion of the cover moulded part 4
- 4b Inner portion of the cover core 4
- 8, 9 Compensation chambers
- 8a Base of the compensation chambers 8, 9
- 8b Roof of the compensation chambers 8, 9
- 8c, 9c Upper portions of the compensation chambers 8, 9
- 8d Lower portion of the compensation chambers 8, 9
- 10, 11 Channels
- 12 Conveying and lifting device
- 13 Supply channel
- 14 Laser
- 15 Connector
- 16 Melt container
- 17 Outlet in the melt container 16
- 18 Stopper
- 19 Adjustment means
- 20 Regulating and control means
- 21 Measuring and evaluation means
- 22 Sensor
- F_{\max} Maximum filling level of the casting mould 1
- F Filling level in the casting mould 1
- F_{krit1} First critical filling height
- F_{krit2} Second critical filling height
- L Laser beam
- S Al/Si melt

17

S_z Amount of melt still present in the supply channel 13
after the outlet 17 has been closed

Claims

1. Casting mould for manufacturing a cast part from a metal melt (S) comprising a mould cavity (5) for reproducing a cast part and comprising an inlet for pouring metal melt (M) into the mould cavity (5), characterised in that it has at least one compensation cavity (8, 9) which is linked to the mould cavity (5) via a channel (10, 11) and comprises at least one portion (8c, 9c) which is arranged above the maximum filling level (F_{\max}) of the casting mould (1) during solidification of the metal melt (S).
2. Casting mould according to claim 1, characterised in that the cross section of the channel (10, 11) is delimited in such a way as to be sealed, immediately after completion of the mould filling process, with metal melt (S) which has already solidified.
3. Casting mould according to any one of the preceding claims, characterised in that it is made of a moulding sand and a moulding material comprising a binder.
4. Casting mould according to any one of the preceding claims, characterised in that the compensation cavity (8, 9) is linked to a portion of the mould cavity (5) that is located on top while the metal melt (S) is being poured in.
5. Casting mould according to any one of the preceding claims, characterised in that it has an inspection opening (7) to the mould cavity (5) for inspecting the filling level (F) of the metal melt (S) in the mould cavity (5).
6. Casting mould according to claim 5, characterised in that the inspection opening (7) to the mould cavity (5) and the compensation cavity (8, 9) intersect a common horizontal plane.
7. Casting mould according to any one of the preceding claims, characterised in that it is composed of a plurality of moulded parts (2, 3, 4).
8. Casting mould according to claim 7, characterised in that the compensation cavity (8, 9) is incorporated into a lid moulded part (4).

9. Casting mould according to any one of the preceding claims, characterised in that more than one compensation cavity (8, 9) is provided.
10. Device for casting metal melt (S) to form a cast part (G) in a casting mould (1) configured in accordance with any one of the preceding claims,
– comprising a melt container (16), comprising an outlet (17), for the metal melt (S),
– comprising a supply channel (13) connected to the outlet (17),
– comprising a means (12) for docking the casting mould (1) to the melt container (16) in such a way that the inlet (6) in the casting mould (1) is connected to the supply channel (13) when docked,
– comprising a measuring means (21) for detecting the amount of melt introduced into the casting mould (1),
– comprising a regulating means (20) for regulating the flow of melt from the melt container (16) into the casting mould (1) and
– comprising a control means (20) which evaluates the amount of melt detected by the measuring means (21) and issues a control signal for sealing the outlet (17) in the melt container (16) once a specific filling level in the casting mould (1) has been reached, characterised in that the control means (20) is configured to issue a control signal once the amount of melt poured into the casting mould (1) has reached a limit value (F_{krit2}) at which the amount of metal melt (S_z) which is then still present in the supply channel (13) is sufficient to fill the mould cavity (1) completely and at most a portion of the compensation cavity (8, 9).
11. Device according to claim 10, characterised in that the measuring means (21) monitors the filling level in the casting mould (1) and the control means (20) issues the control signal once the metal melt in the mould cavity (5) has reached a filling height (F_{krit2}) at which the volume of metal melt (S_z) which is then still present in the supply channel (13) is sufficient to fill the mould cavity (5) completely and at most a portion of the compensation cavity (8, 9).
12. Device according to claim 11, characterised in that the casting mould (1) is configured in accordance with any one of claims 5 to 9 and the measuring means (21) comprises a laser (14), which directs a laser beam (L) through the inspection opening (7) onto the surface of the melt (S) introduced into the casting mould (1), and a sensor (22) which detects the laser beam (L) reflected by the surface of the melt (S).

13. Device according to any one of claims 10 to 12, characterised in that the regulating means (20) comprises a stopper (18) for sealing the outlet (17) in the melt container (16) and an adjustment means (19) for raising the stopper (19) out of and lowering it into its sealed position.

14. Device according to claim 13, characterised in that the regulating means (20) regulates the adjustment movement of the stopper (18).

15. Process for casting metal melt (S) to form a cast part (G) in a casting mould (1), wherein the metal melt is guided in a regulated manner from a melt container (16) into the casting mould (1) via a supply channel (13) and the inflow of metal melt (S) into the supply channel (13) is interrupted once a specific amount of metal melt has been introduced into the mould cavity (1), characterised in that the casting mould (1) used is a casting mould (1) configured in accordance with any one of claims 1 to 9 and the inflow of melt (S) into the supply channel (13) is interrupted once the metal melt (S) in the mould cavity (5) has reached a filling level (F_{krit2}) at which the amount of metal melt (S_z) which is still present in the supply channel (13) is sufficient to fill the mould cavity (5) completely and at most a portion of the compensation cavity (8, 9).

16. Process according to claim 15, characterised in that the filling level (F) in the casting mould (1) is monitored and the inflow of metal melt (S) into the supply channel (13) is interrupted once the filling level (F) has reached a height (F_{krit2}) at which the volume of metal melt (S_z) which is then still present in the supply channel (13) is sufficient to fill the mould cavity (5) completely and at most a portion of the compensation cavity (8, 9).

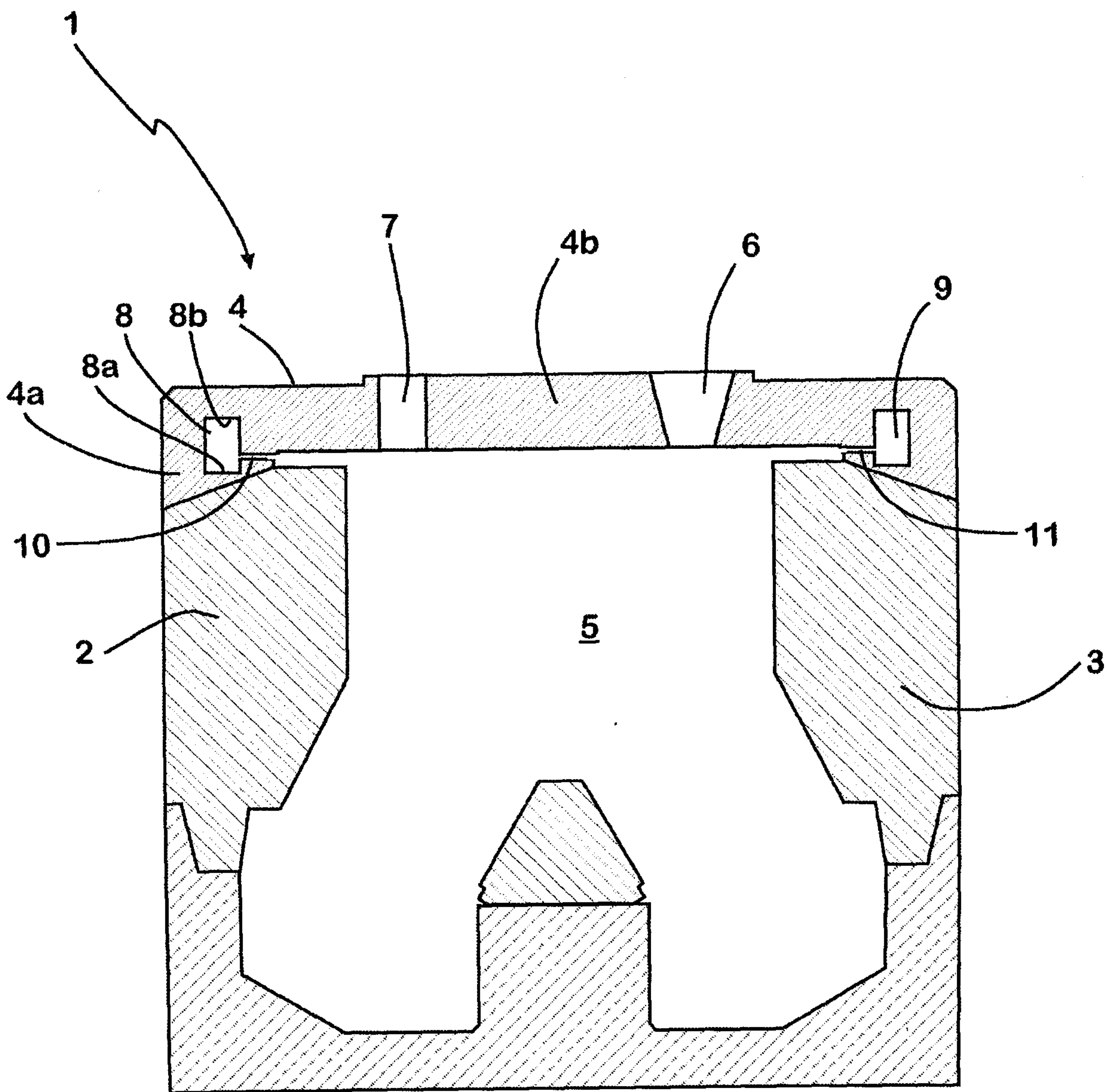


Fig. 1

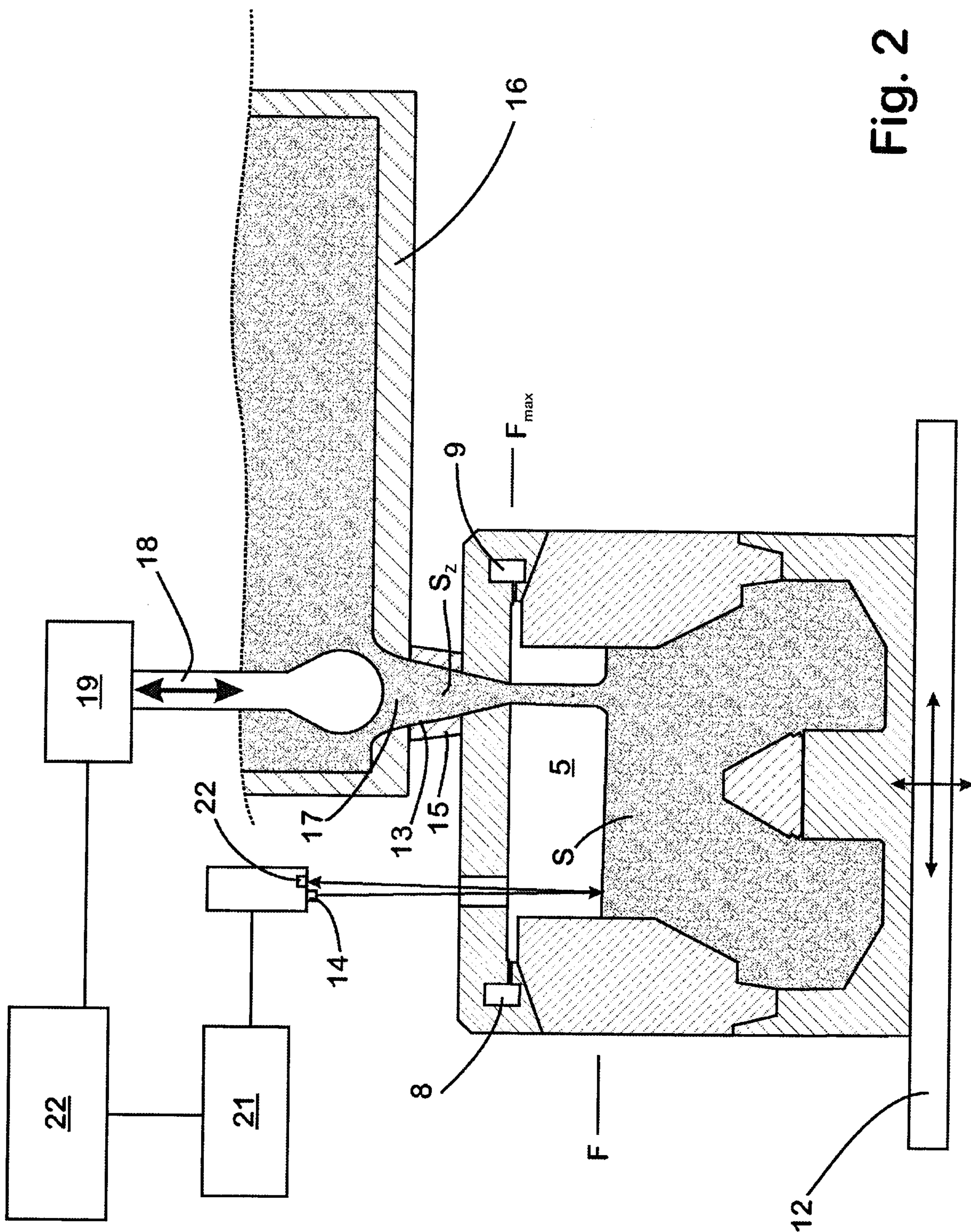


Fig. 2

