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(54) **A MOULD TABLE WITH A SYSTEM FOR PROVIDING CONSISTENT FLOW THROUGH MULTIPLE PERMEABLE PERIMETER WALLS IN CASTING MOULDS**

GIESTTISCH MIT EINEM SYSTEM ZUM GLEICHMÄSSIGEN ZUFÜHREN EINES FLUSSES DURCH
MULTIPLE DURCHLÄSSIGE WÄNDE IN DEN GIESSKOKILLEN

TABLE DE MOULAGE AVEC UN SYSTEME PERMETTANT D'ASSURER UN ECOULEMENT
UNIFORME A TRAVERS PLUSIEURS PAROIS PERIPHERIQUES PERMEABLES DE MOULES

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Description

Technical Field

[0001] This invention pertains to a system for providing consistent lubricant and/or gas flow through multiple permeable perimeter walls in a metal casting mold table.

Background Art

[0002] Metal ingots and billets are typically formed by a casting process, which utilizes a vertically oriented mold situated above a large casting pit beneath the floor level of the metal casting facility. The lower component of the vertical casting mold is a starting block mounted on starting block pedestals. When the casting process begins, the starting blocks are in their upward-most position and in the molds. As molten non-ferrous metal is poured into the mold and cooled, the starting block is slowly lowered at a pre-determined rate by a hydraulic cylinder or other device. As the starting block is lowered, solidified non-ferrous metal or aluminum emerges from the bottom of the mold and ingots or billets are formed.

[0003] While the invention applies to casting of metals in general, including without limitations aluminum, brass, lead, zinc, magnesium, copper, steel, etc., the examples given and preferred embodiment disclosed are for aluminum, and therefore the term aluminum will be used throughout for consistency even though the invention applies more generally to metals.

[0004] There are numerous mold and pour technologies that fit into these mold tables. Some are generally referred to as "hot top" technology, while others are more conventional casting technologies that use floats and downspouts, both of which are known to those of ordinary skill in the art. The hot top technology generally includes a refractory system and molten metal trough system located on top of the mold table, whereas the conventional pour technology involves suspending or supporting the source of molten metal above the mold table and the utilization of down spouts or tubes and floats to maintain the level of molten metal in the molds while also providing molten metal to the molds.

[0005] These different casting technologies have different advantages and disadvantages and produce various billet qualities, but no one of which is required to practice this invention.

[0006] The metal distribution system is also an important part of the casting system. In the two technology examples given, the hot top distribution trough sits atop the mold table while the conventional pouring trough is suspended above the mold table to distribute the molten metal to the molds.

[0007] Mold tables come in all sizes and configurations because there are numerous and differently sized and configured casting pits over which mold table are placed. The needs and requirements for a mold table to fit a particular application therefore depends on numerous fac-

tors, some of which include the dimensions of the casting pit, the location(s) of the sources of water and the practices of the entity operating the pit.

[0008] The upper side of the typical mold table operatively connects to, or interacts with, the metal distribution system. The typical mold table also operatively connects to the molds which it houses.

[0009] The use of a permeable or porous perimeter wall has proven to be an effective and efficient way to distribute lubricant and gas to the inside surface of a continuous casting mold, such as is described in U.S. Patent No. 4,598,763 to Wagstaff.

[0010] In the typical use of a permeable perimeter wall, lubricant and gas are delivered to the perimeter wall under pressure through grooves or delivery conduits around the perimeter wall, typically using one delivery conduit (if grooves are used for the delivery of lubricant) and one or two delivery conduits (grooves) for the delivery of gas. The preferred lubricants are synthetic oils, whereas the current preferred gas is air. The lubricant and gas then permeate through the perimeter wall and are delivered to the interior of the mold as part of the casting process.

[0011] The perimeter walls on existing mold tables each have delivery conduits to deliver the lubricant and/or gas, and the delivery conduits may be circumferential groove-shaped delivery conduits with the same depth and width, or they may be holes partially drilled through the perimeter walls, or any other delivery means for that matter. The typical perimeter wall has a separate lubricant delivery conduit and a gas conduit.

[0012] Graphite has proven to be the preferred permeable material for use as the perimeter wall material or media. However, graphite has proven to be expensive in consistently producing high quality individual products which have very similar permeability to other graphite perimeter walls.

[0013] One of the significant factors causing the high cost incurred in providing consistent permeability or lubricant/gas flow rates through the perimeter walls is the variability in the relevant properties of the perimeter wall material. The properties related to the lubricant and gas flow rates can vary significantly from batch to batch of graphite for instance, and even within the same batch and within a given perimeter wall. Variations in properties such as porosity, permeability and density, impact the rate of delivery of lubricant and or gas through the perimeter wall. Furthermore, the viscosity of a particular lubricant or gas as well as the pressure at which the lubricant or gas is supplied to the perimeter wall, are factors affecting the respective flow rates through the permeable perimeter walls.

[0014] Experience has taught that graphite from a particular supplier or source will tend to have more similar properties than graphite from two different sources or suppliers, however, there may still be unacceptable variations in the properties of the graphite from a single source and even from a single batch. This is the case even though a particular density is typically specified

when ordering.

[0015] In a typical application, one perimeter wall is used for each mold, and there are typically numerous molds on a single mold table, each mold having a perimeter wall. It is preferred to supply gas from one source line at one pressure and to supply lubricant from one source line at one pressure, to all perimeter walls in molds of a particular mold table.

[0016] The variations of most concern in the lubricant and/or gas flow rates through the graphite are therefore based on the variability in the properties of the graphite related to the respective flow rates, which becomes the critical factor in accomplishing the goal of the equal or predictable flow rates of lubricant and gas through the perimeter walls in each of the molds on the same mold table, or even in the same manufacturing facility.

[0017] Prior to this invention, achieving the same flow rate or delivery rate of lubricant and/or gas flow through multiple perimeter walls on the same mold table, was very time consuming and expensive, and resulted in significant waste. Each individual perimeter wall was extensively tested to determine its properties relevant to flow rate and an unnecessarily large percentage were rejected due to the flow rate variations.

[0018] With numerous molds on the same table simultaneously casting metal, it becomes critical to achieving a reliable process for producing high quality molded products (billet, ingot or special shapes) that the lubricant and/or gas delivered to the perimeter walls during casting is very closely the same from perimeter wall to perimeter wall in the same mold table.

[0019] In order to achieve consistent lubricant and/or gas flow rates through the perimeter walls in each of the molds in a given mold table, a high rate of rejection of graphite rings has been experienced. Typically, graphite perimeter walls with similar properties may be grouped together to achieve closely similar lubricant and/or gas flow rates. However, while grouping perimeter walls together may work for new construction, managing the selective replacement of perimeter walls in place in a facility can be very difficult.

[0020] From a practical and expense perspective, lubricant and/or gas are supplied at a constant pressure, and the perimeter walls are manufactured at a constant or fixed thickness and general size to fit within the molds. The inner and outer diameters of the perimeter walls, as well as their overall height also is generally fixed.

[0021] It is an objective of this invention to achieve a sufficiently consistent lubricant and/or gas flow rate through multiple perimeter walls on a mold table or in a casting facility, even though the perimeter walls generally have variations in their individual properties related to the flow rate of lubricant and/or gas through the perimeter wall body.

[0022] It is also an objective of this invention to reduce the significant expense of a high rejection rate for perimeter walls to achieve the sufficiently consistent lubricant and/or gas flow rate.

[0023] This invention accomplishes these objectives by providing a system for providing consistent lubricant and/or gas flow through multiple permeable perimeter walls. The system involves ascertaining one or more of the relevant properties, or the actual flow rate, of the perimeter walls, and then determining and creating the appropriate surface area of the delivery conduit which provides the lubricant and/or gas to the exterior of the perimeter wall, and/or the appropriate delivery distance.

[0024] The invention provides a mould table, as specified in claim 1 and a process of making a plurality of permeable perimeter walls around mould cavities of a mould table, as specified in claim 5.

[0025] The system provided by this invention has the significant advantage of allowing the use of multiple perimeter walls with different flow related properties, or with different lubricant and/or gas flow rates, to be used in the same mold table, while achieving consistent flow rates through each perimeter wall.

[0026] The system provided by this invention has the significant advantage of providing a significantly similar flow rate of lubricant or gas in a plurality of perimeter walls in molds on the same mold table.

[0027] In accomplishing these objectives, this invention provides a system which is simpler and less expensive than all prior systems.

Brief Description of the Drawings

[0028] Preferred embodiments of the invention are described below with reference to the accompanying drawings, which are briefly described below.

- Figure 1 is an elevation view of a typical casting pit, caisson and aluminum casting apparatus;
- Figure 2 is a cross sectional elevation view of a typical mold casting assembly, illustrating the perimeter wall in place;
- Figure 3 is a cross sectional view of a perimeter wall seated in a mold housing, illustrating the flow of lubricant or gas through its body;
- Figure 4 is a cross sectional view of a perimeter wall seated in a mold housing, illustrating the flow of lubricant or gas through its body, only wherein the delivery conduits are in the mold housing;
- Figure 5 is a perspective of one embodiment of a perimeter wall which is contemplated for use by this invention;
- Figure 6 is a top view of the perimeter wall illustrated in Figure 5;
- Figure 7 is an elevation view of the perimeter wall illustrated in Figure 5;
- Figure 8 is Section 8 - 8 from the perimeter wall illustrated in Figure 6;
- Figure 9 is a top view of an alternative embodiment of a perimeter wall contemplated by this invention, wherein lubricant and/or gas are

- delivered to the perimeter wall through holes drilled from the top of the perimeter wall;
- Figure 10 is a top view of an alternative embodiment in which lubricant and/or gas are delivered to the perimeter wall through holes drilled from the top of the perimeter wall, and wherein the holes through which lubricant and/or gas are delivered are not equally spaced;
- Figure 11 is a top view of an alternative embodiment in which lubricant and/or gas are delivered to the perimeter wall through holes drilled from the top of the perimeter wall, and wherein shape of the perimeter wall is not circular; and
- Figure 12 is a top partial view of a perimeter wall which illustrates the movement of the location of the delivery holes to affect the flow rates.

Best Modes for Carrying Out the Invention and Disclosure of Invention

[0029] While there are numerous ways to achieve and configure a vertical casting arrangement, Figure 1, illustrates one example. In Figure 1, the vertical casting of aluminum generally occurs beneath the elevation level of the factory floor in a casting pit. Directly beneath the casting pit floor 1a is a caisson 3, in which the hydraulic cylinder barrel 2 for the hydraulic cylinder is placed.

[0030] As shown in Figure 1, the components of the lower portion of a typical vertical aluminum casting apparatus, shown within a casting pit 1 and a caisson 3, are a hydraulic cylinder barrel 2, a ram 6, a mounting base housing 5, a platen 7 and a starting block base 8, all shown at elevations below the casting facility floor 4.

[0031] The mounting base housing 5 is mounted to the floor 1a of the casting pit 1, below which is the caisson 3. The caisson 3 is defined by its side walls 3b and its floor 3a.

[0032] A typical mold table assembly 10 is also shown in Figure 1, which can be tilted as shown by hydraulic cylinder 11 pushing mold table tilt arm 10a such that it pivots about point 12 and thereby raises and rotates the main casting frame assembly, as shown in Figure 1. There are also mold table carriages which allow the mold table assemblies to be moved to and from the casting position above the casting pit.

[0033] Figure 1 further shows the platen 7 and starting block base 8 partially descended into the casting pit 1 with billet 13 being partially formed. Billet 13 is on starting block 14, which is mounted on pedestal 15. While the term starting block is used for item 14, it should be noted that the terms bottom block and starting head are also used in the industry to refer to item 14, bottom block typically used when an ingot is being cast and starting head when a billet is being cast.

[0034] While the starting block base 8 in Figure 1 only

shows one starting block 14 and pedestal 15, there are typically several of each mounted on each starting block base, which simultaneously cast billets or ingots as the starting block is lowered during the casting process.

[0035] When hydraulic fluid is introduced into the hydraulic cylinder at sufficient pressure, the ram 6, and consequently the starting block base 8, are raised to the desired elevation start level for the casting process, which is when the starting blocks are within the mold table assembly 10.

[0036] The lowering of the starting block base 8 is accomplished by metering the hydraulic fluid from the cylinder at a pre-determined rate, thereby lowering the ram 6 and consequently the starting blocks at a pre-determined and controlled rate. The mold is controllably cooled during the process to assist in the solidification of the emerging ingots or billets, typically using water cooling means.

Claims

1. A mould table for the continuous casting of metal, the mould table comprising:

- a. a plurality of casting moulds attached to the mould table, each casting mould including a mould cavity;
- b. a respective permeable perimeter wall disposed around each mould cavity, each perimeter wall of said plurality of mould cavities being of a constant thickness but of different permeability to lubricant or gas passing through said wall of said thickness, and each including at least one delivery conduit disposed to receive a lubricant or a gas; and
- c. a source line for supplying a lubricant or gas at one pressure to said at least one delivery conduit of the permeable perimeter wall of each mould cavity;

wherein said at least one delivery conduit of a permeable perimeter wall of one of said plurality of mould cavities differs from said at least one delivery conduit of a permeable perimeter wall of another of said plurality of cavities in a manner affecting the flow rate of lubricant or gas through said permeable perimeter walls, said difference causing the same flow rates of said lubricant or gas through said perimeter walls from said source line supplying said lubricant or gas at said one pressure despite said differences of the permeability of said walls.

2. A mould table according to claim 1, wherein said at least one delivery conduit of each permeable perimeter wall has a surface area through which said lubricant or gas flows from said conduit to said mould cavity, and wherein said surface area of said at least

one delivery conduit of said permeable perimeter wall of said one of said plurality of mould cavities differs from said surface area of said at least one delivery conduit of said permeable perimeter wall of said another of said plurality of cavities, thereby forming said difference causing said same flow rates.

3. A mould table according to claim 2, wherein said at least one delivery conduit of each permeable perimeter wall is open at an outer surface of said wall, and wherein said mould table includes a plurality of mould housings surrounding the permeable perimeter walls, each mould housing including an aperture communicating with said open part of said at least one delivery conduit, such that each mould housing combines with at least one delivery conduit in the outer surface of the permeable perimeter wall to form a passageway for said lubricant or gas.

4. A mould table according to any one of claims 1 to 3, wherein said at least one delivery conduit of each permeable perimeter wall has a delivery distance from said cavity through which said lubricant or gas flows from said conduit to said mould cavity, and wherein said delivery distance of said at least one delivery conduit of said permeable perimeter wall of said one of said plurality of mould cavities differs from said delivery distance of said at least one delivery conduit of said permeable perimeter wall of said another of said plurality of cavities, thereby forming said difference causing said same flow rates.

5. A process of making a plurality of permeable perimeter walls to be disposed about metal mould cavities of a mould table, the process comprising:

providing at least two perimeter walls of the same thickness between an outer surface and an inner surface but of different permeability to a lubricant or gas passing through walls of said thickness;

ascertaining said permeability of each said perimeter wall or a property corresponding thereto; and

creating at least one delivery passage for a lubricant or gas in each of said at least two perimeter walls, while causing said at least one delivery passage of one of said walls to differ from said at least one delivery passage of another of said walls in a manner that affects the flow rate of lubricant or gas through said perimeter walls, said difference causing said flow rates of said lubricant or said gas through said perimeter walls be the same when said delivery passages are supplied with lubricant or gas from a source at one pressure.

6. A process according to claim 5, wherein said delivery

passages each have a surface area through which said lubricant or gas flows from said conduit through said permeable perimeter wall to said inner surface thereof, and wherein said surface area of at least one delivery passage of one of said walls is caused to differ from said surface area of said at least one delivery passage of said another of said perimeter walls, said differences causing said flow rates to be the same.

7. A process according to claim 5 or claim 6, wherein said at least one delivery conduit of each permeable perimeter wall is created at a delivery distance from said inner surface through which said lubricant or gas flows from said conduit through said wall, and wherein said delivery distance of said at least one delivery conduit of said one permeable perimeter wall differs from said delivery distance of said at least one delivery conduit of said another permeable perimeter wall, thereby forming said difference causing said flow rates to be the same.

Patentansprüche

1. Gießtisch zum kontinuierlichen Gießen von Metall, wobei der Gießtisch aufweist:

a. eine Mehrzahl von Gussformen, die am Gießtisch befestigt sind, wobei jede Gussform einen Formenhohlraum aufweist;

b. eine jeweils zugeordnete durchlässige, umlaufende Wandung, die um jede der Gussformen herum angeordnet ist, wobei jede umlaufende Wandung der Mehrzahl von Formenhöhlräumen eine konstante Dicke, jedoch eine unterschiedliche Durchlässigkeit bezüglich Schmiermittel oder Gas, welches durch die Wandung dieser Dicke strömt, aufweist und wobei jede der Wandungen mindestens einen Beschickungskanal aufweist, der zum Aufnehmen eines Schmiermittels oder Gases vorgesehen ist; und

c. eine Speiseleitung zum Speisen eines Schmiermittels oder Gases eines bestimmten Drucks an den mindestens einen Beschickungskanal der durchlässigen, umlaufenden Wandung eines jeden Formenhohlraums;

wobei der mindestens eine Beschickungskanal der durchlässigen, umlaufenden Wandung eines der Mehrzahl von Formenhöhlräumen sich vom mindestens einem Beschickungskanal der durchlässigen, umlaufenden Wandung eines anderen der Mehrzahl von Hohlräumen derart unterscheidet, dass die Durchflussrate von Schmiermittel oder Gas durch die durchlässigen, umlaufenden Wandungen beeinflusst wird, wobei der Unterschied dieselben Durch-

flussraten des Schmiermittels oder des Gases durch die umlaufenden Wandungen von der Speiseleitung, die das Schmiermittel oder Gas bei dem einen Druck speist, bewirkt, trotz der Unterschiede in der Durchlässigkeit der Wandungen.

2. Gießtisch nach Anspruch 1, wobei der mindestens eine Beschickungskanal einer jeden durchlässigen, umlaufenden Wandung eine Flächenausdehnung aufweist, durch die das Schmiermittel oder Gas von dem Kanal zum Formenhohlraum fließt, und wobei die Flächenausdehnung des mindestens einen Beschickungskanals der durchlässigen, umlaufenden Wandung des einen der Mehrzahl von Formenhohlräumen sich von der Flächenausdehnung von dem mindestens einen Beschickungskanal der durchlässigen, umlaufenden Wandung des anderen der Mehrzahl von Hohlräumen unterscheidet, so dass der dieselben Durchflussraten verursachende Unterschied gebildet ist.
3. Gießtisch nach Anspruch 2, wobei der mindestens eine Beschickungskanal einer jeden durchlässigen, umlaufenden Wandung an einer äußeren Oberfläche der Wandung offen ist, und wobei der Gießtisch eine Mehrzahl von Formgehäusen umfasst, welche die durchlässigen, umlaufenden Wandungen umgeben, wobei jedes Formgehäuse einen Durchlass zum offenen Teil des mindestens einen Beschickungskanals aufweist, so dass jedes der Formgehäuse derart mit mindestens einem Beschickungskanal in der äußeren Oberfläche der durchlässigen, umlaufenden Wandung zusammenwirkt, dass ein Weg für das Schmiermittel bzw. Gas gebildet ist.
4. Gießtisch nach einem der Ansprüche 1 bis 3, wobei der mindestens eine Beschickungskanal einer jeden durchlässigen, umlaufenden Wandung einen Beschickungsabstand von dem Hohlraum, durch den das Schmiermittel bzw. Gas von dem Kanal zu dem Formenhohlraum fließt, aufweist, und wobei der Beschickungsabstand des mindestens einen Beschickungskanals der durchlässigen, umlaufenden Wandung der einen der Mehrzahl von Formenhohlräumen sich von dem Beschickungsabstand des mindestens einen Beschickungskanals der durchlässigen, umlaufenden Wandung des anderen der Mehrzahl von Hohlräumen unterscheidet, so dass der dieselben Durchflussraten bewirkende Unterschied gebildet ist.
5. Verfahren zum Herstellen einer Mehrzahl von durchlässigen, umlaufenden Wandungen, die um metallene Formenhohlräume eines Gießtisches anzuordnen sind, wobei das Verfahren folgende Schritte aufweist:

Vorsehen von mindestens zwei umlaufenden

Wandungen derselben Dicke zwischen einer äußeren Oberfläche und einer inneren Oberfläche, jedoch mit unterschiedlicher Durchlässigkeit bezüglich Schmiermittel oder Gas, welches durch Wandungen dieser Dicke strömt;

Bestimmen der Durchlässigkeit einer jeden umlaufenden Wandung oder einer dementsprechenden Eigenschaft; und

Schaffen von wenigstens einem Beschickungskanal für ein Schmiermittel oder Gas in jeder der mindestens zwei umlaufenden Wandungen, während der mindestens eine Beschickungskanal von einer der Wandungen sich derart von dem mindestens einen Beschickungskanal einer anderen der Wandungen unterscheidet, dass die Durchflussrate von Schmiermittel oder Gas durch die umlaufenden Wandungen beeinflusst wird, wobei der Unterschied dieselben Durchflussraten des Schmiermittels oder des Gases durch die umlaufenden Wandungen bewirkt, wenn Schmiermittel bzw. Gas mit einem bestimmten Druck von einer Quelle zu den Beschickungskanälen gespeist wird.

6. Verfahren nach Anspruch 5, wobei die Beschickungskanäle jeweils eine Flächenausdehnung aufweisen, durch die das Schmiermittel bzw. Gas vom Kanal durch die durchlässige, umlaufende Wandung zu der inneren Oberfläche derselben fließt, und wobei die Flächenausdehnung des mindestens einen Beschickungskanals von einer der Wandungen unterschiedlich ausgelegt wird von der Flächenausdehnung des mindestens einen Beschickungskanals der anderen der umlaufenden Wandungen, wobei die Unterschiede bewirken, dass die Durchflussraten gleich sind.
7. Verfahren nach Anspruch 5 oder 6, wobei der mindestens eine Beschickungskanal einer jeden durchlässigen, umlaufenden Wandung in einem Beschickungsabstand von der inneren Oberfläche geschaffen wird, durch welche das Schmiermittel bzw. Gas von dem Kanal durch die Wandung fließt, und wobei der Beschickungsabstand des mindestens einen Beschickungskanals der mindestens einen durchlässigen, umlaufenden Wandung sich von dem Beschickungsabstand des mindestens einen Beschickungskanals der anderen durchlässigen, umlaufenden Wandung unterscheidet, so dass der Unterschied bewirkt wird, aufgrund dessen die Durchflussraten gleich sind.

Revendications

1. Table de moulage destinée à la coulée continue d'un métal, la table de moulage comprenant :

a) plusieurs moules de coulée fixés à la table de moulage, chaque moule de coulée ayant une cavité de moule,

b) une paroi périphérique perméable respective disposée autour de chaque cavité de moule, chaque paroi périphérique des cavités de moule ayant une épaisseur constante mais une perméabilité différente au lubrifiant ou au gaz traversant la paroi de cette épaisseur, chacune comprenant au moins un conduit de distribution disposé afin qu'il reçoive un lubrifiant ou un gaz, et

c) une conduite source destinée à transmettre un lubrifiant ou un gaz à une première pression au conduit de distribution au moins de la paroi périphérique perméable de chaque cavité de moule,

dans laquelle le conduit de distribution au moins d'une paroi périphérique perméable de l'une des cavités de moule diffère du conduit de distribution au moins d'une paroi périphérique perméable d'une autre des cavités d'une manière qui affecte le débit de lubrifiant ou de gaz dans les parois périphériques perméables, la différence provoquant l'obtention du même débit de lubrifiant ou de gaz dans les parois périphériques depuis la conduite source qui transmet le lubrifiant ou le gaz à ladite pression, malgré les différences de perméabilité des parois.

2. Table de moulage selon la revendication 1, dans laquelle le conduit de distribution au moins de chaque paroi périphérique perméable a une région de surface par laquelle le lubrifiant ou le gaz s'écoule du conduit vers la cavité de moule, et dans laquelle l'étendue de surface du conduit de distribution au moins de la paroi périphérique perméable de cette cavité parmi les cavités de moule diffère de l'étendue de surface du conduit de distribution au moins de la paroi périphérique perméable de l'autre des cavités, avec formation ainsi de la différence qui donne le même débit.

3. Table de moulage selon la revendication 2, dans laquelle le conduit de distribution au moins de chaque paroi périphérique perméable est ouvert à une surface externe de la paroi, et la table de moulage comprend plusieurs boîtiers de moule entourant les parois périphériques perméables, chaque boîtier de moule comprenant une ouverture qui communique avec la partie ouverte du conduit de distribution au moins, de sorte que chaque boîtier de moule se combine avec le conduit de distribution au moins à la surface externe de la paroi périphérique perméable pour former un passage destiné au lubrifiant ou au gaz.

4. Table de moulage selon l'une quelconque des re-

vendications 1 à 3, dans laquelle le conduit de distribution au moins de chaque paroi périphérique perméable a une distance de distribution depuis la cavité sur laquelle le lubrifiant ou le gaz s'écoule du conduit vers la cavité de moule, et dans laquelle la distance de distribution du conduit de distribution au moins de la paroi périphérique perméable de la première cavité des cavités de moule diffère de la distance de distribution du conduit de distribution au moins de la paroi périphérique perméable de l'autre des cavités, en formant ainsi la différence qui provoque l'obtention du même débit.

5. Procédé de fabrication de plusieurs parois périphériques perméables destinées à être disposées autour de cavités métalliques de moule d'une table de moulage, le procédé comprenant :

la disposition d'au moins deux parois périphériques de même épaisseur entre une surface externe et une surface interne, avec des perméabilités au lubrifiant ou au gaz traversant les parois de cette épaisseur qui diffèrent, la détermination de la perméabilité de chaque paroi périphérique ou d'une propriété qui lui correspond, et

la création d'au moins un passage de distribution de lubrifiant ou de gaz dans chacune des deux parois périphériques au moins, avec une différence entre un passage de distribution au moins de l'une des parois et un passage de distribution au moins de l'autre des parois d'une manière qui affecte le débit de lubrifiant ou de gaz à travers les parois périphériques, la différence donnant les débits de lubrifiant ou de gaz à travers les parois périphériques qui sont les mêmes lorsque les passages de distribution reçoivent du lubrifiant ou du gaz d'une source à une seule pression.

6. Procédé selon la revendication 5, dans lequel les passages de distribution ont chacun une étendue de surface par laquelle le lubrifiant ou le gaz circule du conduit à travers la paroi périphérique perméable vers sa surface interne, et dans lequel l'étendue de surface du passage de distribution au moins de l'une des parois présente une différence avec l'étendue de surface d'un passage de distribution au moins de l'autre des parois périphériques, la différence étant telle que les débits sont les mêmes.

7. Procédé selon la revendication 5 ou 6, dans lequel le conduit de distribution au moins de chaque paroi périphérique perméable est créé à une distance de distribution de la surface interne par laquelle le lubrifiant ou le gaz s'écoule du conduit à travers la paroi, et dans lequel la distance de distribution d'un conduit de distribution au moins de la première paroi

périphérique perméable diffère de la distance de distribution d'un conduit de distribution au moins de l'autre paroi périphérique perméable avec ainsi formation de la différence qui provoque la formation de débits identiques.

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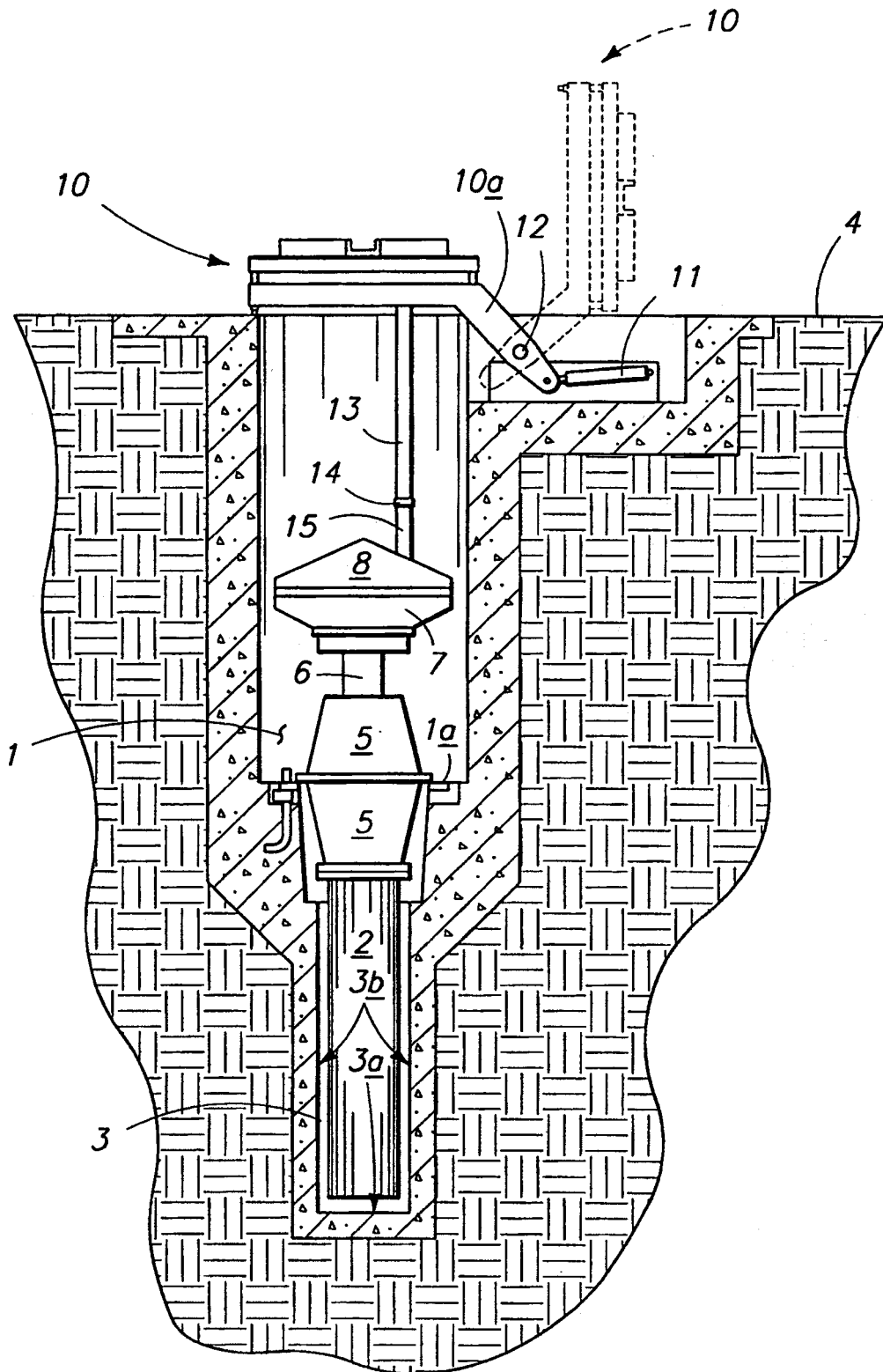
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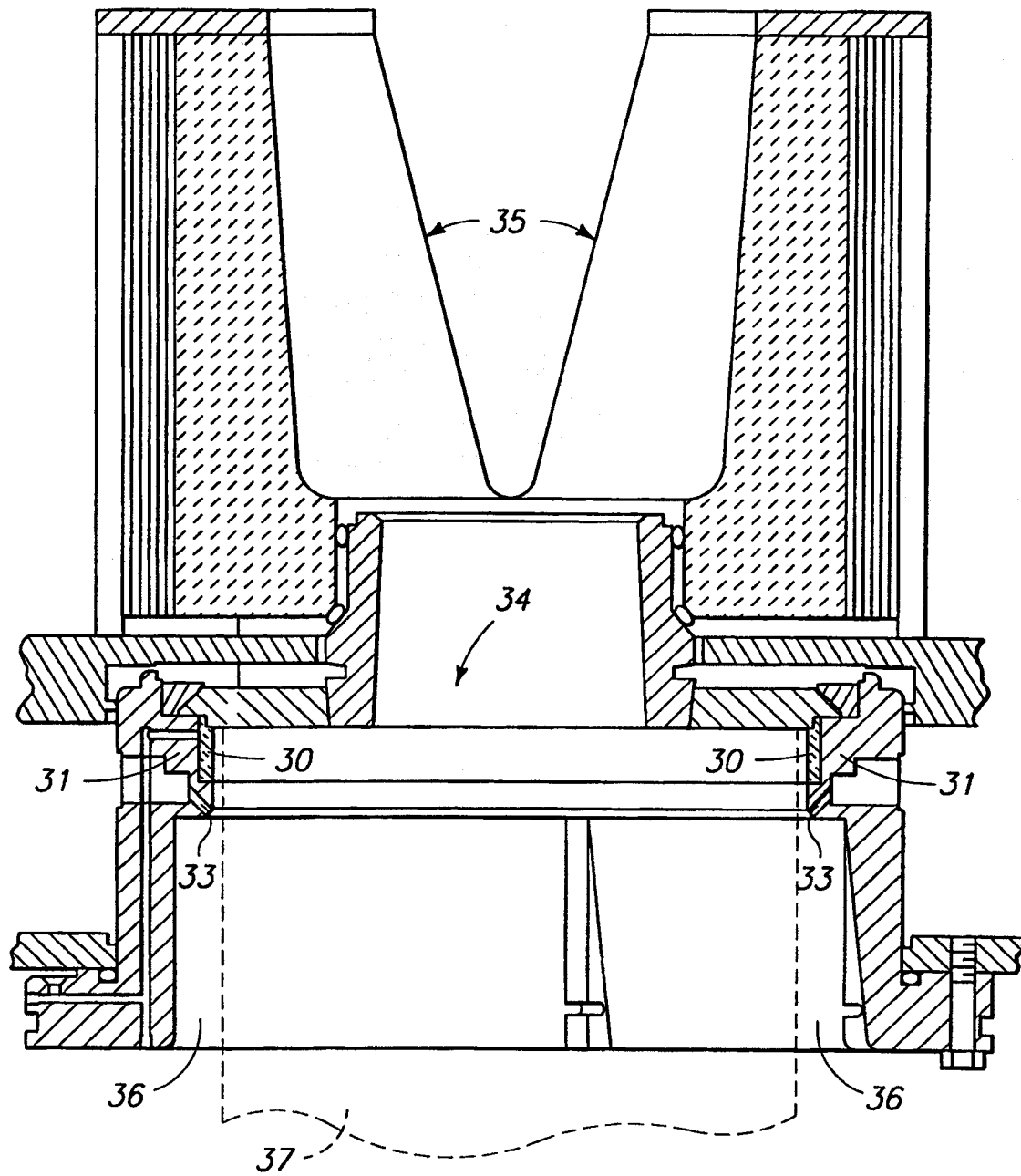
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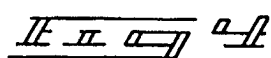
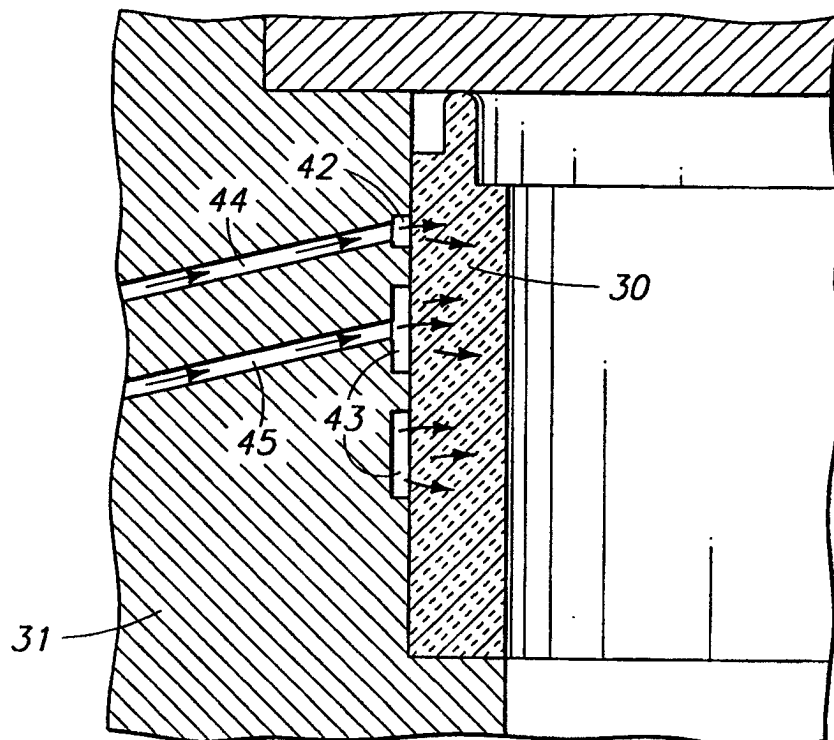
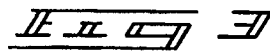
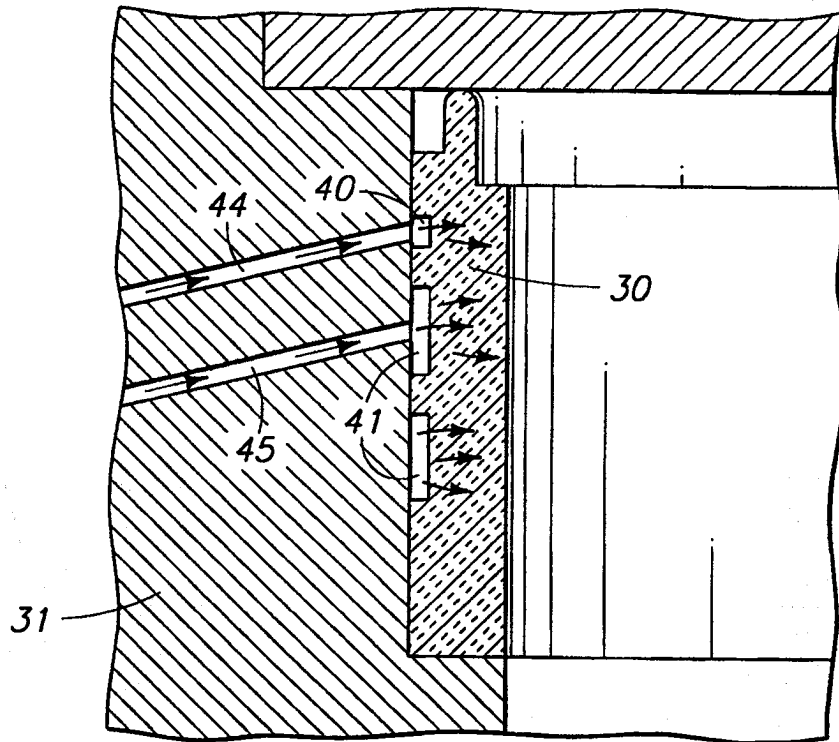
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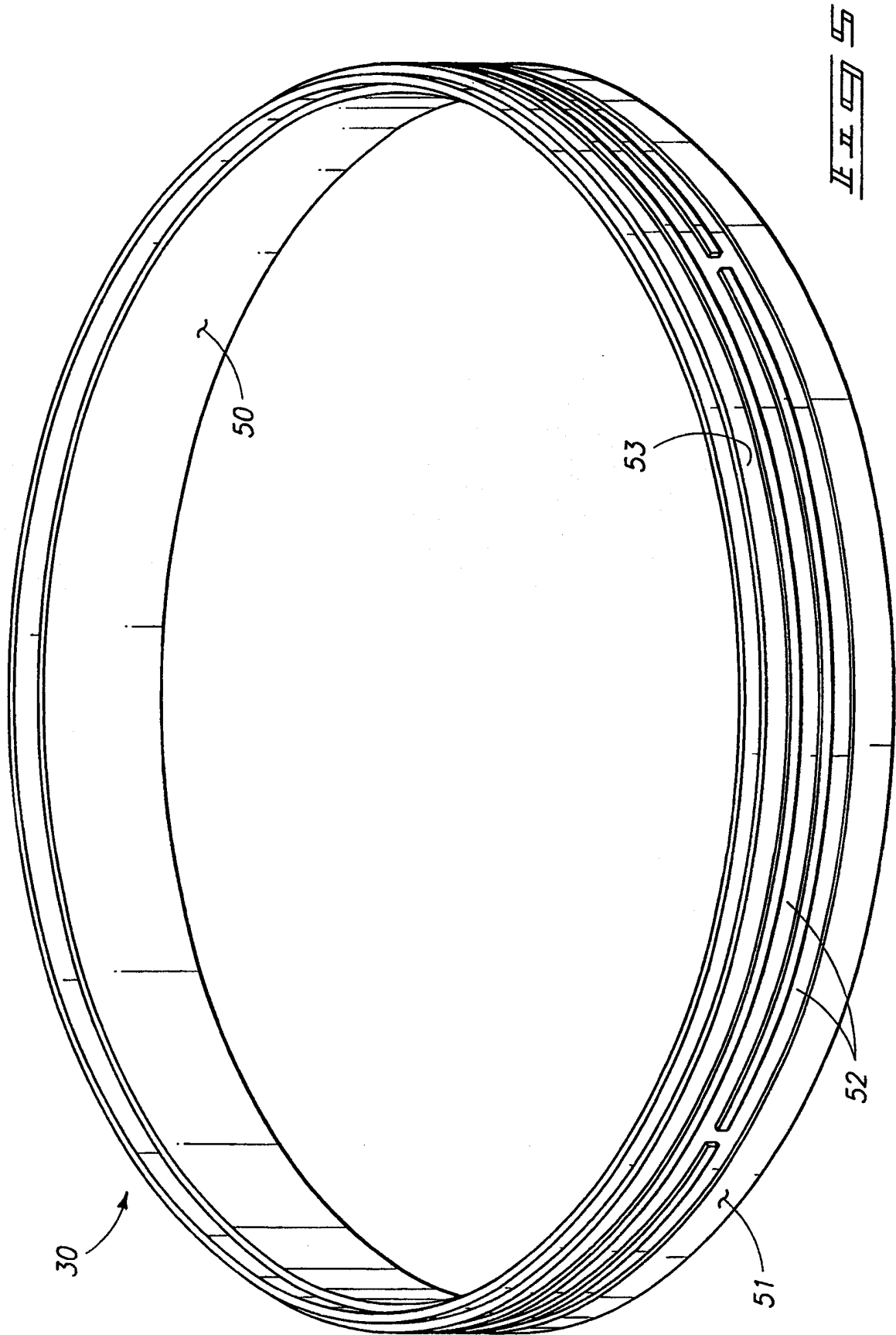
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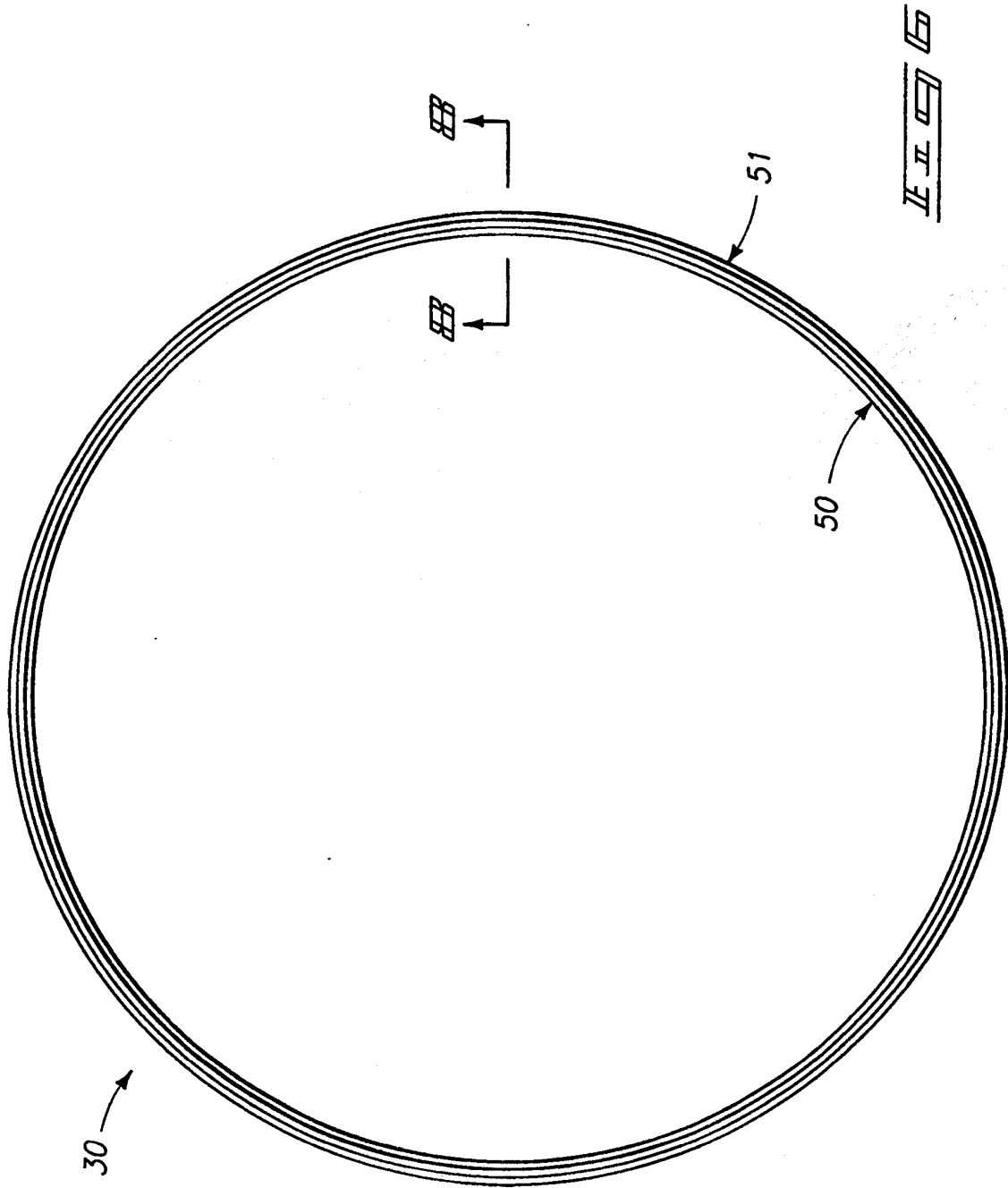


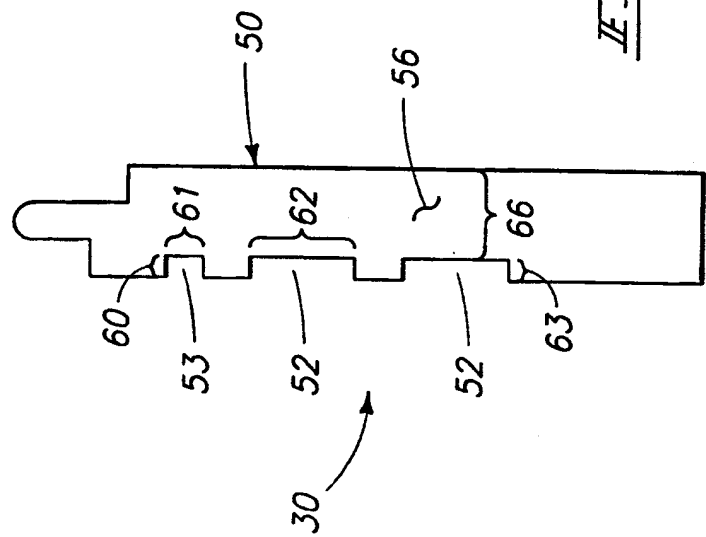
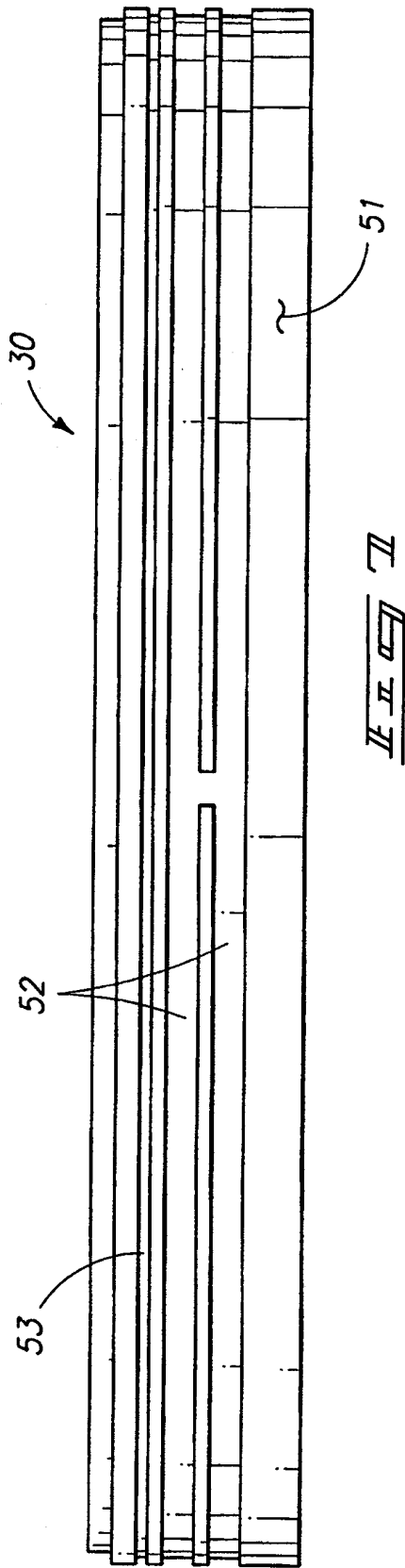


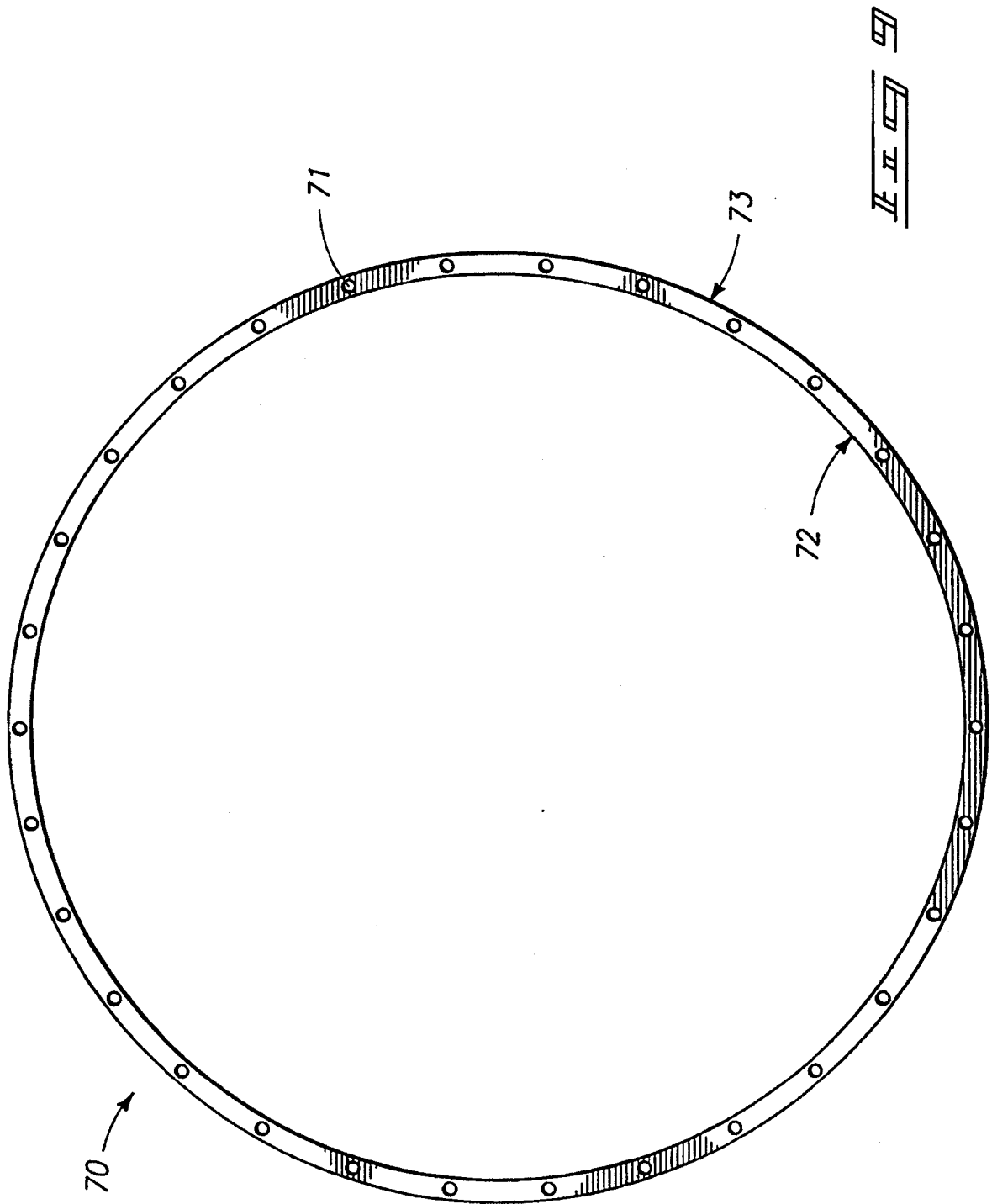
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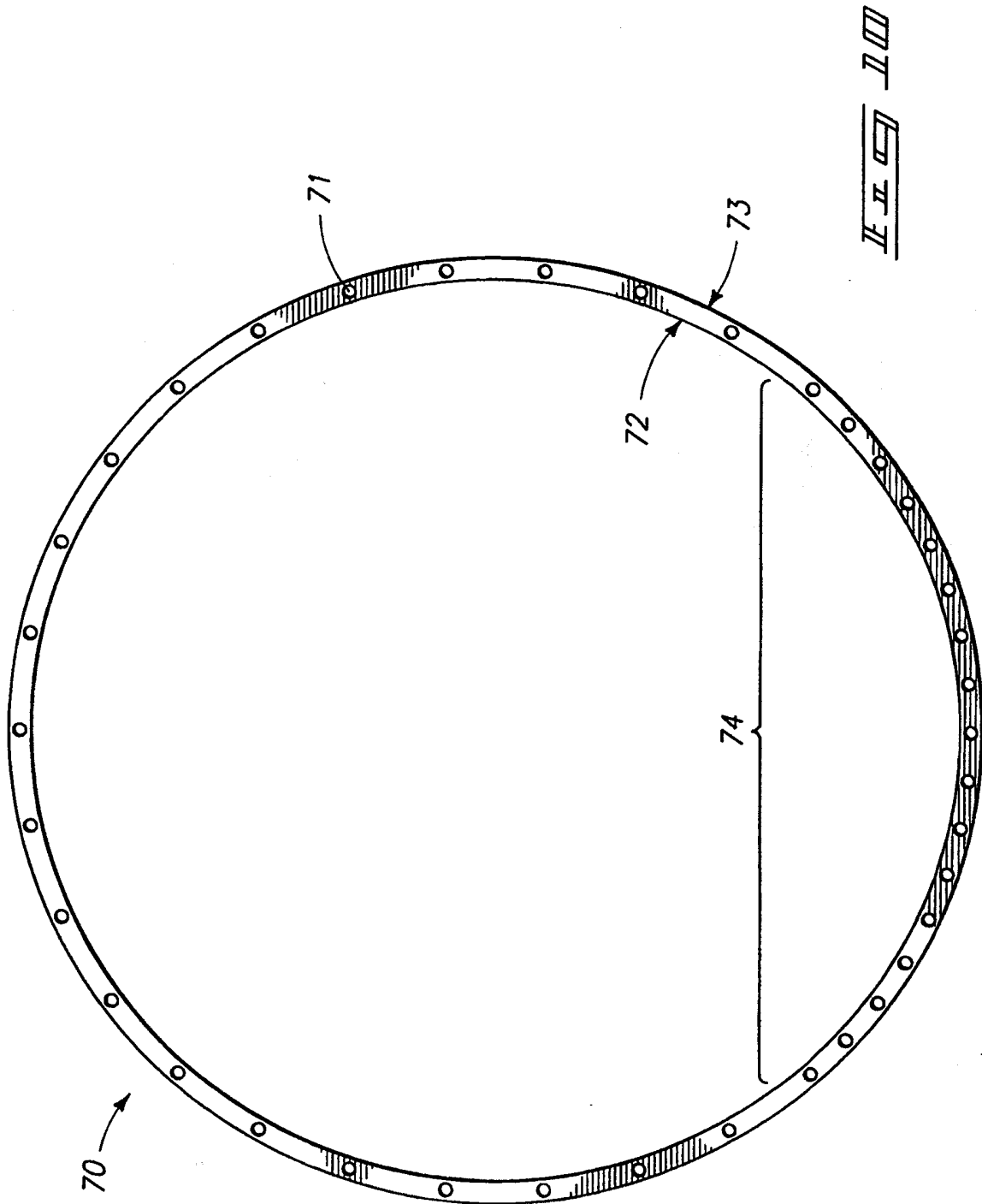


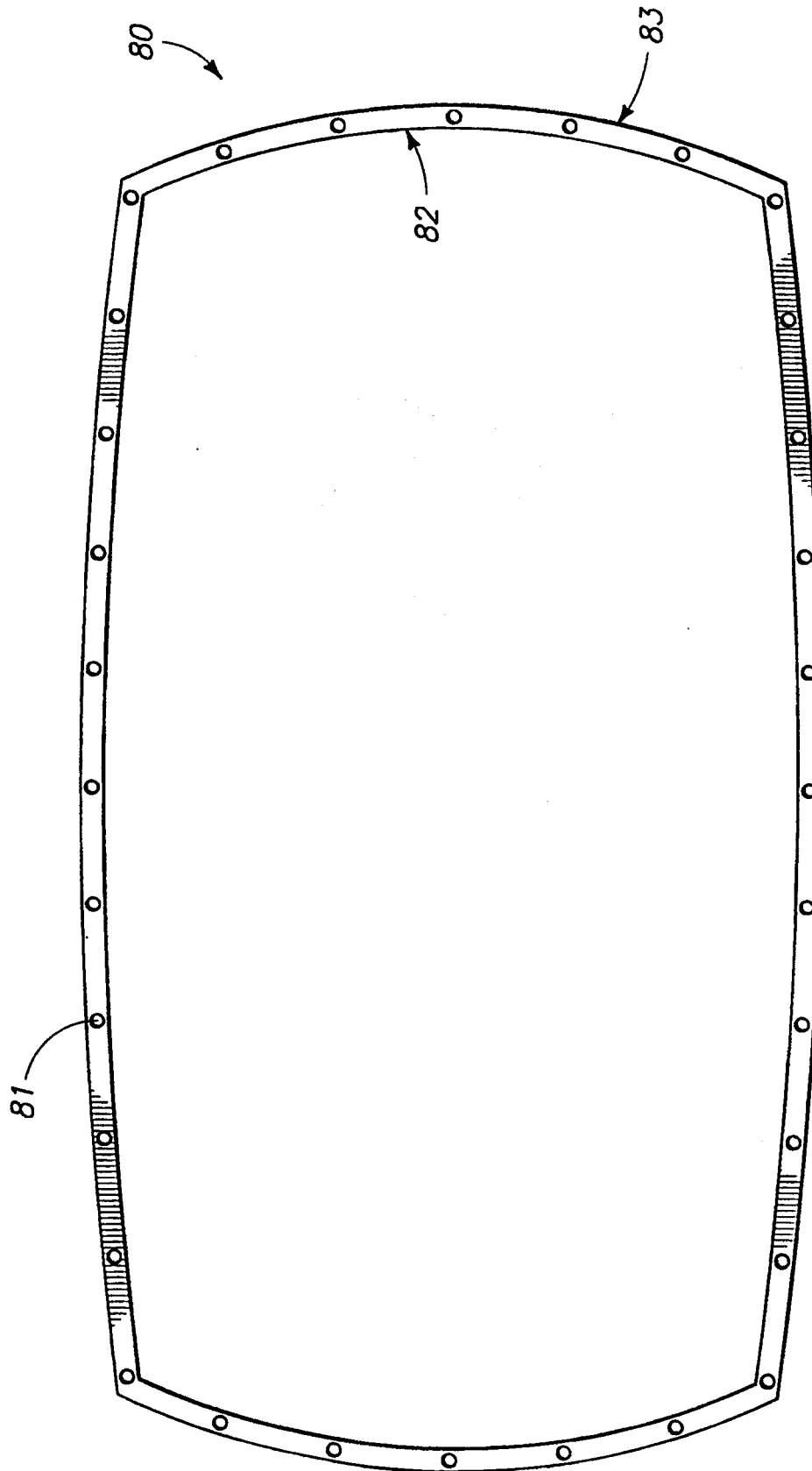












II II

