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(54) Process using reduced blowing pressure and device for blowing complex cores

(57) It consists in establishing, between the sand cartridge (3) and the core box (8), a plurality of blowing nozzles (15), in varying numbers and arrangements as a function of the design characteristics of each core (9) to be obtained, in order to achieve easier access for the sand to the different areas of the core box and improved consolidation of the sand, with lower working pressure.

In addition, provision has also been made for the housing (9) for the core, between the two half core boxes (8-8'), to communicate with the lower general collector (10) for draining the residual moulding air, not only by means of the orifices or ducts (20) formed in the lower half-box (8'), but also by means of ducts (21), counterposed to the former ones, which open out into a single (22) or multiple (22') auxiliary collector in direct communication with the general collector (10) by means of orifices or ducts (23) which pass through the actual core box (8-8').

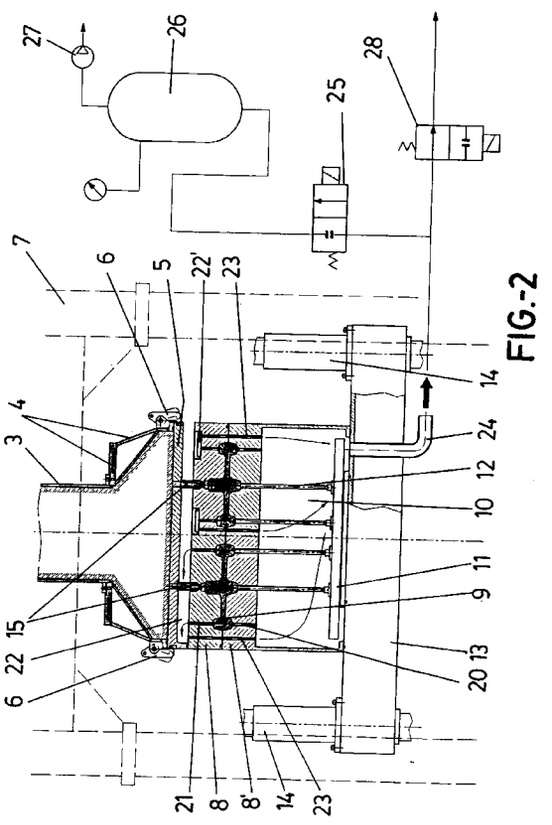

FIG.-2

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Description

SUBJECT OF THE INVENTION

The present invention relates to a process for blowing sand cores which is especially suitable for obtaining complex cores, i.e. cores with complicated configurations which make access of the sand to hidden areas of the cores difficult, this being a process which also makes it possible to carry out the blowing operation at a reduced pressure.

The invention also relates to the core-blowing device for implementing said process.

BACKGROUND OF THE INVENTION

In a conventional core moulding machine, the core box is positioned over the so-called work table, normally equipped with hydraulic means for its upward and downward movement, while the sand cartridge is positioned on the core box, said cartridge incorporating the metered amount of sand and binder additives required for filling one or more core boxes. Next, on the sand cartridge there is a blowing head with its corresponding shooting valve, which generates the pressurized air necessary for, accessing the cartridge, entraining the sand from the latter towards the inside of the core box once the three basic elements of the moulding machine (core box, sand cartridge and moulding head) have been hermetically coupled together.

More specifically, the discharge of sand towards the core box takes place through a gate valve strategically located in the core box and which is maintained closed up to the critical moment at which discharge takes place.

Obviously, when obtaining complex cores which, owing to their very configuration, make passage of the sand towards specific areas of the core difficult, it is necessary to raise the air pressure, i.e. the moulding pressure, in the reservoir considerably so that the sand reaches all the areas of the core box in a uniform manner and with the required degree of consolidation.

This increase in the working pressure gives rise to wide-ranging and varied problems: on the one hand, there is a direct influence in economic terms since the greater the pressure the greater the consumption of energy by the machine and, consequently, the greater the costs of production, whilst, on the other hand, this greater pressure involves a greater abrasive effect of the sand entrained by the air during the blowing phase, with the corresponding negative effect this has on the life of the machine and its tools. Concomitantly, this greater air pressure leads to more rapid soiling of the tools, especially in the core box, which involves more frequent cleaning which, in turn, involves frequent shutdowns of the machines during production as well as an increase in maintenance costs.

DESCRIPTION OF THE INVENTION

The process of the invention fully satisfactorily solves the problems set forth above, ensuring optimum conditions of distribution and consolidation of the sand within the core box, regardless of the complexity of the latter, and at a reduced blowing pressure, this low blowing pressure being precisely what leads to the solving of conventional problems.

To this end and more specifically, the process advocated is based on the replacement of the classical single-point system of access of the sand to the core box by a multi-point system so that, as a function of the formal characteristics of the core to be obtained, a plurality of sand inlets is established in the core box, in varying number and suitably distributed in accordance with the specific requirements of each case.

Provision has also been made for the residual air to emerge from the core box not only towards the general lower collector but also towards an upper collector which may be a single or multiple collector and which will be suitably in communication with the first one, preferably through the actual core box.

To this end and more specifically, in the upper half core box, the one which is next to the sand cartridge, there is a plurality of suitably distributed blowing nozzles which establish communication between the sand cartridge and the housing for the core defined within the core box, each one of these blowing nozzles having a pneumatically actuated elastomeric valve which is synchronized with the general moulding valve.

On the other side of strategically distributed points of the housing of the core box, residual air outlet pipes or ducts are directed both towards the lower general collector and towards the upper face of the core box, or to a chamber defined between said box and the blowing plate, or to individual chambers defined within the actual core box and which, in any case, communicate with the lower general collector by means of ducts which pass through the core box. This enables the residual air to be expelled with greater ease, leading, in turn, to a greater reduction in the required blowing pressure.

DESCRIPTION OF THE DRAWINGS

To supplement the description being given and in order to assist better comprehension of the characteristics of the invention, the present specification is accompanied, as an integral part thereof, by a set of drawings which, in an illustrative and non-limiting manner, show the following:

Figure 1 - shows a view in lateral elevation and in cross-section of a machine for blowing cores constructed in accordance with the process and device which is the subject of the present invention.

Figure 2 - shows an enlarged detail of the previous figure, at the level of the area of the machine upon which the invention concentrates, said detail being supple-

mented, diagrammatically, by the means for applying a vacuum and neutralizing gases whose two halves, left half and right half, show two alternative solutions for the auxiliary or complementary, single or multiple collector for evacuating residual air.

Figures 3 and 4 - show, finally, an enlarged detail in elevation and in section of one of the multiple blowing nozzles through which the sand accesses the core box from the cartridge, with its corresponding elastomeric valve, which, in Figure 3, appears closed and, in Figure 4, appears open.

PREFERRED EMBODIMENT OF THE INVENTION

Viewing these figures and, more specifically, Figure 1, it is possible to see how a machine for blowing cores equipped with the blowing device advocated is structured, as is conventional, from a reservoir (1) supplying pressurized air through a shooring valve (2) intended to act on a sand cartridge (3) incorporated in a head (4) to which the blowing plate (5) is fastened with the aid of clamps (6) or by any other conventional means, this assembly being mounted on a frame (7) and arranged vertically in a core box (8) structured on the basis of two half-boxes (8-8'), an upper half-box and another lower half-box, between which is defined the housing (9) in which, in each case, the core in question has to be configured, the lower half-box (8') having a skirt defining a lower general collector (10) in which there is a plate (11) for expelling the cores (9), this being a plate to which a plurality of expulsion rods (12) are secured and which penetrate inside the lower half-box (8') through orifices made operationally therein in order to push the core (9), after shaping thereof and once the two half core boxes (8-8') have been released from each other, this assembly resting on a work table (13) mounted telescopically on vertical guides (14) upon which it is hydraulically or pneumatically movable in order to achieve coupling and uncoupling of the aforesaid elements.

Therefore, on the basis of this basic and conventional structure, the invention consists basically of the fact that, between the blowing plate (5) and the core box (8) there is a plurality of blowing nozzles (15), in varying number and suitably distributed according to the specific requirements deriving from the complexity which is also specific to each core (9), each of these blowing nozzles (15) being provided with an elastomeric valve embodied as a tube (16) suitably fastened via its ends to the nozzle (15) and covered on the outside by a rigid sleeve (17) equipped with a radial entry (18) through which a suitable air pressure accesses the chamber (19) defined between the elastomeric tube (16) and the rigid sleeve (17), giving rise to constriction of the first component, shown in Figure 3 and corresponding to the closed-valve situation, whereas, when the pressure supplied to said chamber (19) disappears, simultaneously giving rise to opening of the shooting valve (2) or main valve, the elastomeric tube (16) recovers, changing to the position shown in Figure 4 in which the valve is fully open, allowing the free passage of the sand from the cartridge (3) to the core box (8).

Concomitantly, provision has been made for the housing (9) for shaping the cores to have, in addition to residual air outlet ducts (20) towards the lower general collector (10), orifices or ducts (21), counterposed to the former ones, specifically made in the upper half core box (8), which facilitate the evacuation of the residual air towards an auxiliary collector (22) formed between the core box (8) and the blowing plate (5), as shown in the left-hand half of Figures 1 and 2, or, alternatively, towards several draining collectors (22'), one for each outlet duct (21), formed actually inside the core box, as shown by the practical embodiment in the right-hand half of the said Figures 1 and 2, this auxiliary collector (22) or these auxiliary collectors (22') being, in any case, in direct communication with the general collector (10) through ducts (23) which pass through the core box (8-8').

Moreover, and as is conventional, the said lower general collector (10) will be provided with an outlet (24) coupled by means of a valve (25) to a vacuum tank (26) with its corresponding vacuum pump (27) and by means of another valve (28) to the gas neutralizer.

Claims

1. Process for blowing complex cores with reduced blowing pressure which, being applicable to machines for blowing cores of the type in which a reservoir, through a shooting valve, supplies pressurized air to a sand cartridge which, in turn, and through a blowing plate, discharges over a core box, coupled to a vacuum source, is characterized in that the communication between the sand cartridge (3) and the core box (8) is achieved by means of a plurality of blowing nozzles (15) which are suitably distributed in order to achieve optimum distribution of the sand inside the housing (9) for the core, as a function of the design characteristics of the latter.

2. Process according to Claim 1, characterized in that closure takes place at each of the blowing nozzles (15) and can be put into practice at the time of blowing.

3. Process according to the preceding claims, characterized in that opening of the closures existing at the blowing nozzles takes place in synchronization with the opening of the shooting valve, with the suitable time delay as a function of the characteristics of the installation.

4. Process according to the preceding claims, characterized in that the residual moulding air is drained

both via the lower face and via the upper face of the core box (8).

5. Device for implementing the process of Claims 1 to 4, characterized in that each blowing nozzle (15) is formed between the blowing plate (5) and the core box (8) and has an elastomeric valve embodied as a tube (16) fastened via its ends to the actual nozzle (15) and surrounded by a rigid sleeve (17) provided with a radial entry (18), located halfway up, for accessing the chamber (19) defined between the elastomeric tube (16) and the rigid sleeve (17) so that a pressure supplied to the chamber (19) constricts the elastomeric tube (16), whereas the removal of said pressure permits the elastic recovery of the tube and the consequent opening of the valve.

6. Device according to the preceding claims, characterized in that, from the housing (9) for shaping the core, in addition to the orifices (20) for direct access to the lower general collector (10) of residual moulding air, there is another series of ducts (21) which are directed towards an auxiliary collector (22-22'), counterposed to the former one, and in communication with it by means of another series of ducts (23) which establish communication between both collectors.

7. Device according to the preceding claims, characterized in that the drainage collector for residual moulding air is a single collector and is embodied as a chamber (22) defined between the core box (8) and the blowing plate (5).

8. Device according to Claims 1 to 6, characterized in that the drainage collector for residual moulding air is a multiple collector, being embodied as a plurality of small chambers (22), formed in the upper half core box (8), independent communication being established between each of these chambers (22) and the lower general collector (10).

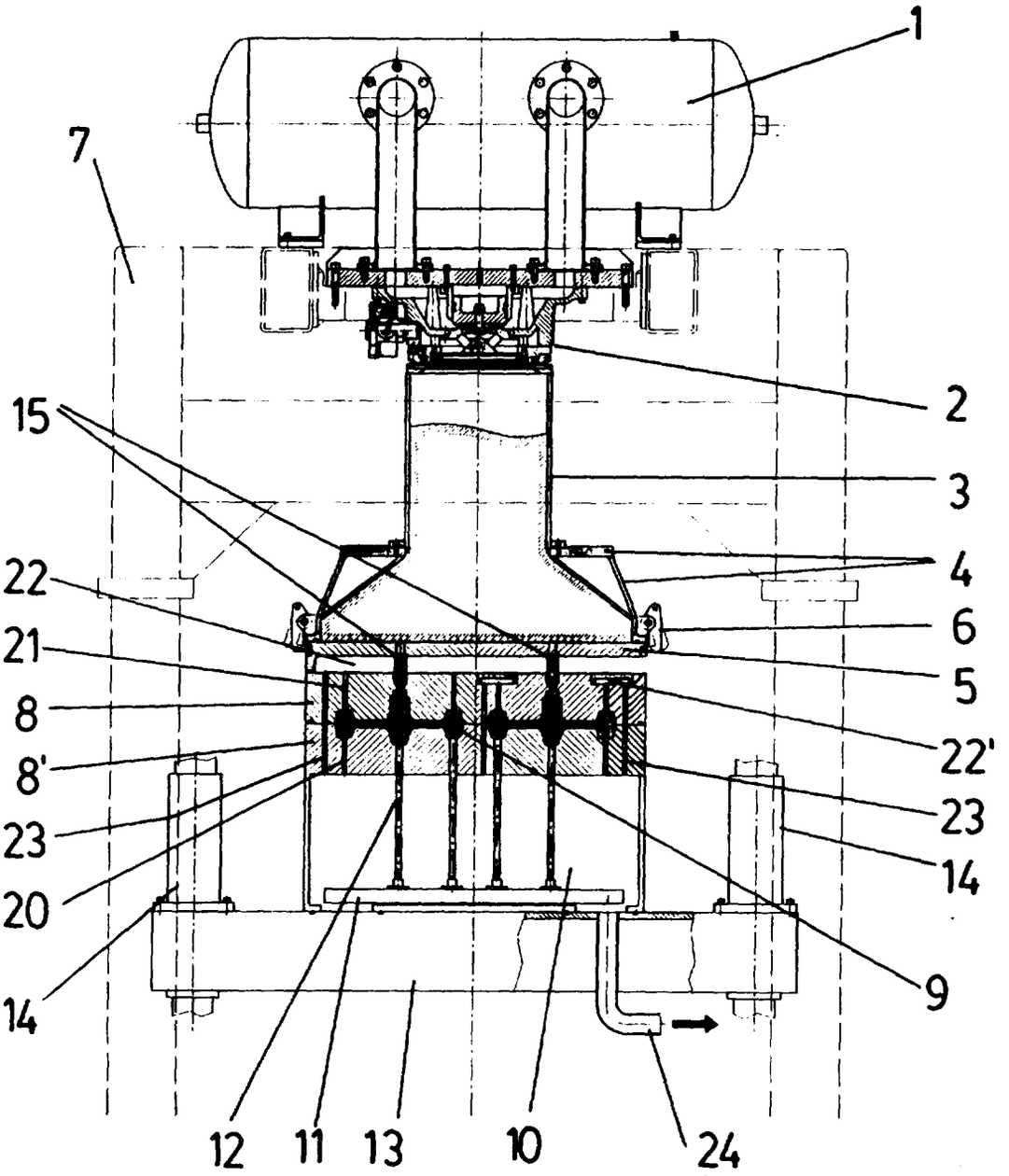

FIG.-1

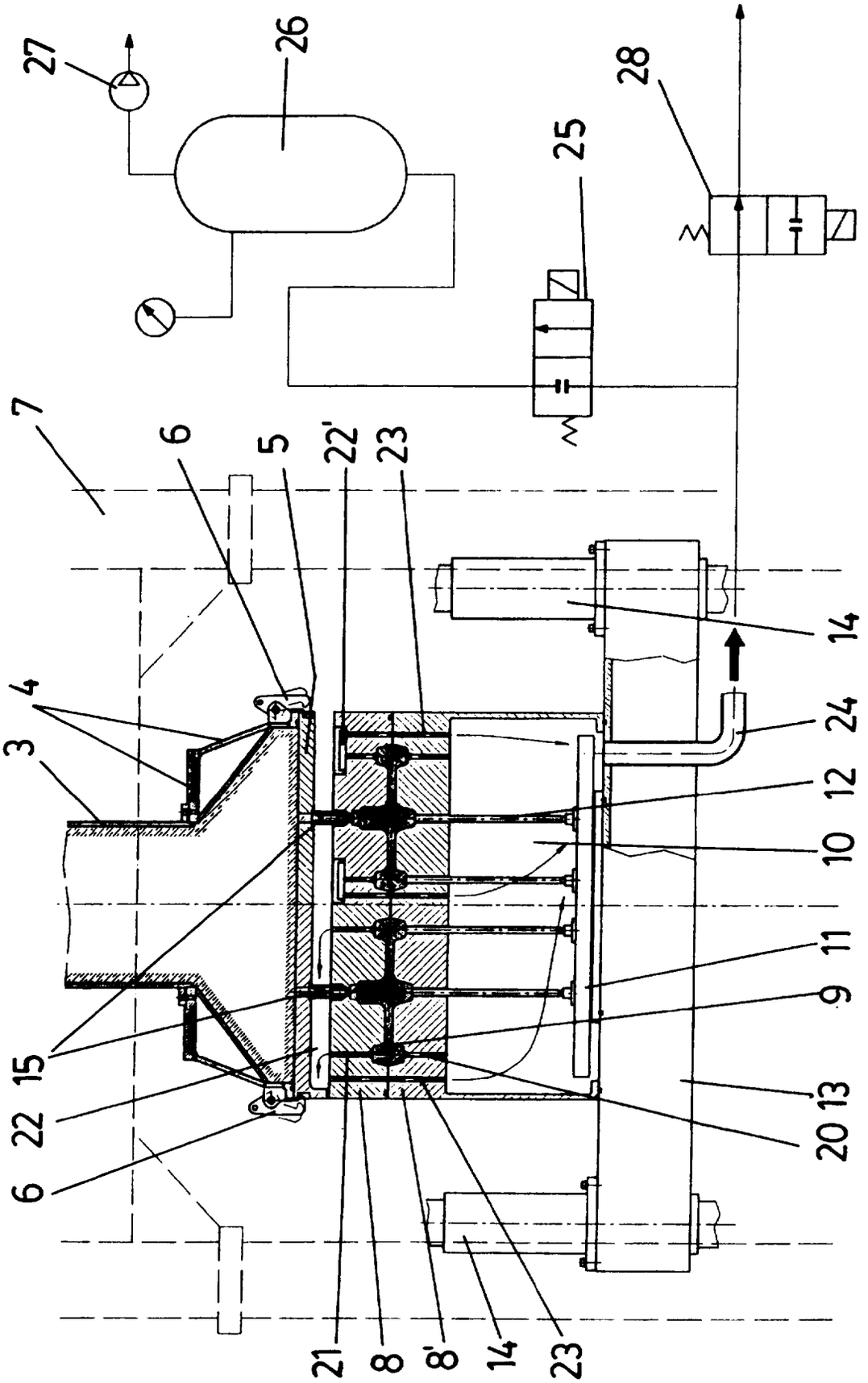

FIG.-2

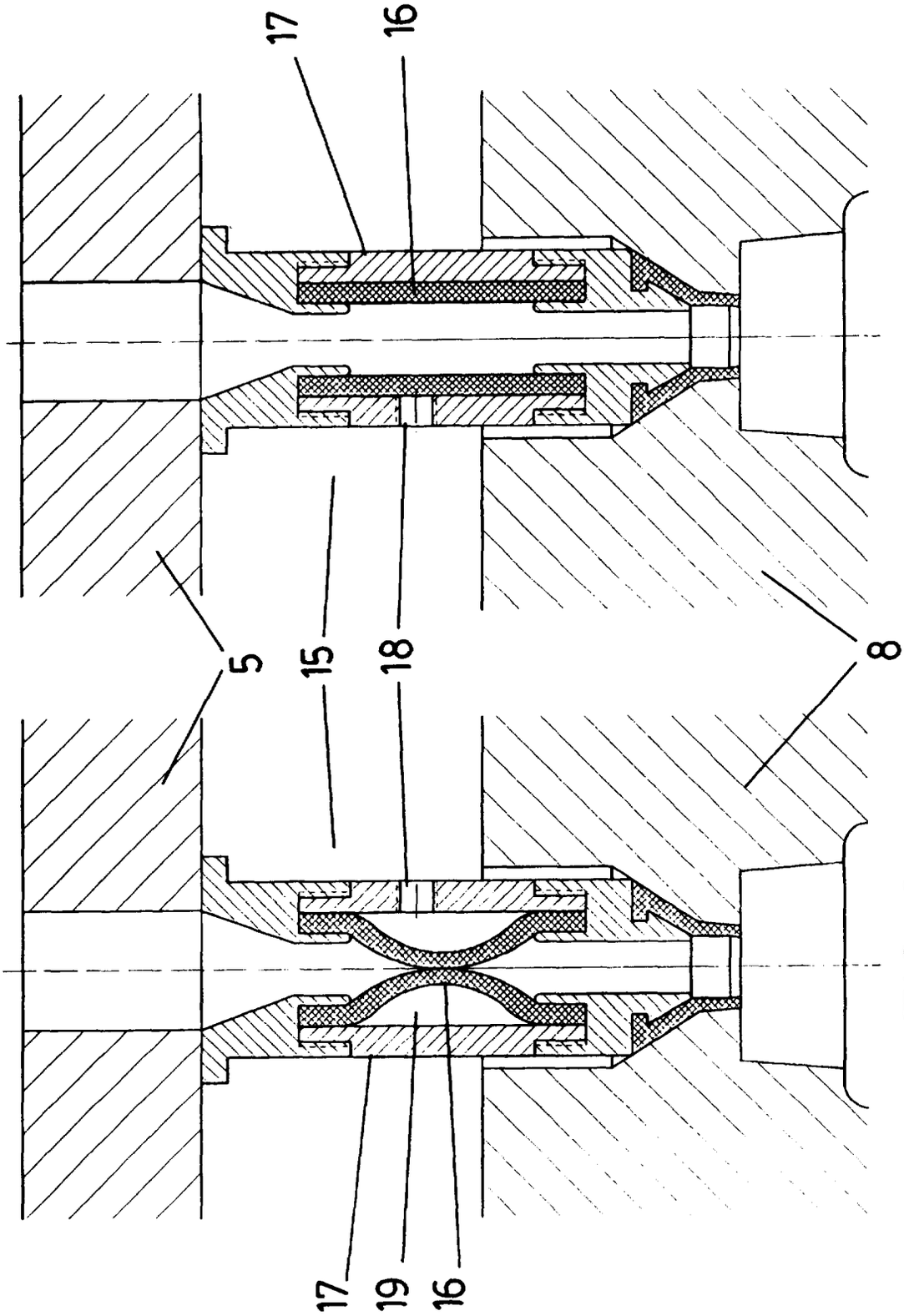

FIG.-4

FIG.-3

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EUROPEAN SEARCH REPORT

Application Number
EP 95 50 0146

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X	EP-A-0 561 729 (ERANA AGUSTIN ARANA) 22 September 1993 * column 1, line 44 - line 52 *	1,3,4	B22C15/24
Y	* figure *	6-8	
X	SU-A-625 837 (SPEC CAST METHODS) 7 August 1978	5	
Y	* abstract *	6-8	
X	DE-C-713 157 (AKTIENGESELLSCHAFT DER EISEN- U. STAHLWERKE) 9 November 1941	5	
Y	* page 3, line 23 - line 50 *	6-8	
Y	US-A-2 876 508 (RAYMOND S. AMALA) * claims; figures *	6-8	

TECHNICAL FIELDS SEARCHED (Int.Cl.6)

B22C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	15 February 1996	WOUDENBERG, S

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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