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Remarks:
Amended claims in accordance with Rule 137(2) EPC.

(54) Cold chamber die-casting machine with device for anchoring the die sleeve

(57) A cold chamber die-casting machine for light alloys includes a sleeve (1) that fits into the base of a mold (2) and into the fixed platen (3) of a press, the position of the sleeve (1) being defined by a peripheral centering collar (4) that fits into a corresponding seat formed in the fixed platen (3) and/or in the base of the mold (2), as well as locking means suitable to make the sleeve (1) integral with the fixed platen (3) of the press, such as a ring (9) secured on the sleeve (1) by means of a thread, key or the like and arranged so as to abut against the external side (5) of the fixed platen (3). In this way, the injection and maintenance force is directly transmitted to the fixed platen (3) of the press and not to the mold (2), so as to prevent the risk of fall of the mold (2), to prevent the rotation of the sleeve (1) and to have the possibility of using the force of the press itself in case of difficult removal of the sleeve (1) from the mold (2).

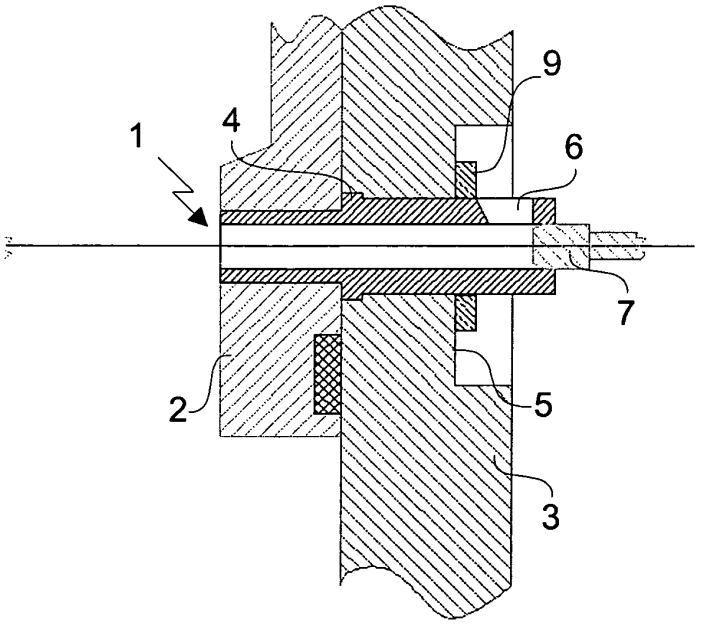

Fig.2

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Description

[0001] The present invention relates to cold chamber die-casting machines for light alloys, and in particular to a device for anchoring the die sleeve on the fixed platen of the press.

[0002] It is known that a sleeve for die-casting machine consists of a hollow cylinder open at the ends and provided with a peripheral collar, for centering the sleeve in the fixed platen of the press and/or in the mold base, as well as with a lateral opening at the rear end to pour therein the molten metal to be injected in the mold by means of an injection piston that reciprocates within the sleeve. The sleeve is simply introduced into its seat and then locked therein by the mold itself that is anchored on the fixed platen of the press.

[0003] The sleeves that are presently in use can essentially be of two types: a composite sleeve that is made up of two or more parts with a male/female coupling, a first part being coupled with the mold and a second part with the press, or an integral sleeve that is made up of a single piece simultaneously coupled with the mold and the press.

[0004] With these known sleeves the force exerted by the piston to inject the metal and to maintain the pressure during the cooling phase is transmitted to the mold, and therefore to its devices for anchoring it on the fixed platen of the press, through the above-mentioned centering collar or through possible reduction rings. This force is transmitted to the mold through the sleeve, at least in part, mainly for two reasons: a) when opening the mold, in every machine cycle, during the feedhead accompanying step due to the friction between the feedhead and the sleeve; and b) in case of jamming of the injection piston within the sleeve.

[0005] In the first case, being a cyclical and periodical stress, it can cause the loosening of the mechanical anchoring system that possibly results in the fall of the mold, or at any rate requires a periodical interruption of the operating cycle just to check the status of the anchoring system. In case of magnetic anchoring, since the center of gravity of the anchoring force usually does not coincide with the point of application of the injection force, there is generated a removal torque with possible fall of the mold.

[0006] In the second case the whole injection force is transferred to the mold and from there to the anchoring system thereof, but the latter is usually not sized to withstand all the force generated by the injection system, also because it is typically an impulsive type of force. This results in the break of the anchoring devices, the fall of the mold and the deformation and/or break of portions of the fixed platen of the press (e.g. T-shaped grooves, threads).

[0007] It should also be considered that the sleeve has to be periodically replaced due to wear, but jammings between mold and sleeve caused by deformation and/or expansion of the latter may come up in this operation. This implies the need to remove the mold/sleeve assembly from the press, in order to remove the sleeve from the mold by other methods and devices.

[0008] The above-mentioned forces may also cause a rotation of the sleeve with respect to the mold and/or the press and this causes a loss of reference for the metal charging device. As a consequence, said device might pour into the sleeve an amount of molten metal lower than the designed amount, since the metal entrance opening has moved.

[0009] The sleeve rotation is a problem that is particularly felt in the case of sleeves where the metal outflow inside the mold occurs through a radial opening in addition to the axial one. In fact, the possible misalignment between the sleeve outlet and the mold inlet may cause turbulences in the molten metal and therefore a poorer quality of the cast.

[0010] Therefore the object of the present invention is to provide a cold chamber die-casting machine which overcomes said drawbacks. This object is achieved by means of a machine provided with sleeve locking means for anchoring it on the fixed platen of the press. Other advantageous features of the present machine are disclosed in the dependent claims.

[0011] The main advantage of this machine is that the injection and maintenance force is directly transmitted to the fixed platen of the press and not to the mold. In this way, the risk of mold fall is prevented and the deformations of the fixed platen of the press are minimized.

[0012] A second significant advantage of the machine according to the present invention stems from the fact that the locking means also prevent the sleeve rotation, thus assuring the charging of the correct amount of molten metal and the absence of turbulence at the mold inlet which result in an improved quality of the cast.

[0013] A further advantage of said machine is the possibility of using the force of the press itself in case of difficult removal of the sleeve from the mold. In other words, since the locking means make the sleeve integral with the fixed platen of the press it is possible to disengage the mold from said fixed platen while keeping it anchored only on the mobile platen and then open the press so as to always easily remove the sleeve from the mold.

[0014] Still another advantage of the present machine is its reliability and structural simplicity, given that the locking means can preferably be integrated within the sleeve in a simple and economical way without requiring substantial modifications of the press.

[0015] These and other advantages and characteristics of the cold chamber die-casting machine according to the present invention will be clear to those skilled in the art from the following detailed description of two embodiments thereof with reference to the annexed drawings, wherein:

Fig.1 shows a diagrammatic longitudinal sectional view of the two types of prior art sleeves;

Fig.2 shows a diagrammatic longitudinal sectional view of a first embodiment including an integral sleeve; and

Fig.3 shows a diagrammatic longitudinal sectional view of a second embodiment including a composite sleeve.

[0016] With reference to fig.1, there is seen that a conventional sleeve 1 for die-casting machines may be of the integral or composite type, namely made up of a first part 1', that fits in the base of mold 2, and a second part 1" that fits in the fixed platen 3 of the press. In both cases there is provided a peripheral centering collar 4 that fits into a suitable seat formed in the internal side of the fixed platen 3 and/or in the base of mold 2 and is covered by the latter. Moreover, close to the external side 5 of platen 3 there is formed a lateral opening 6 for pouring the molten metal, which is injected in the mold by an injection piston 7 reciprocating within the sleeve. The molten metal flows out at the opposite end through an opening 8 that may be axial, like in fig.1, or radial or both.

[0017] This figure clearly shows what explained in the introduction of the present specification, namely how the push of piston 7 and/or the pull exerted by the feedhead, when the latter is pulled out through opening 8 upon aperture of the mold, are transmitted to mold 2, and therefore to its anchoring system, through the centering collar 4.

[0018] Referring now to figures 2 and 3, there is seen that the novel aspect of the die-casting machine according to the present invention is the provision of locking means of sleeve 1 for anchoring it on the fixed platen 3 of the press. More specifically, in the first embodiment illustrated in fig.2 said locking means consist of a ring 9 that abuts on the external side 5 of the fixed platen 3 and is made integral with sleeve 1 through suitable known means, such as a thread, key or the like.

[0019] In the second embodiment illustrated in fig.3 the locking means are integrated within the sleeve itself, since it is divided into two parts with a rear part 10, where the opening 6 for the molten metal is formed, having an increased diameter and sufficient length to abut on the external side 5 in the same way as the above-mentioned ring 9.

[0020] Therefore it is clear that any force acting on sleeve 1 in the direction of mold 2 is not transmitted to the latter through the centering collar 4 but on the contrary to the fixed platen 3, through ring 9 or the rear part 10.

[0021] It should be noted that several other more complicated systems may be devised to provide the locking means that make sleeve 1 integral with the fixed platen 3. For example, magnetic or hydraulic devices similar to those used for anchoring mold 2, or mechanical devices different from those illustrated above, such as a bayonet coupling or an external conical profile of the rear part of a composite sleeve that is introduced from the external side 5.

[0022] However, the two illustrated embodiments have the advantage of not requiring any modification of the die-casting machine beyond sleeve 1, whereby they are particularly preferable as upgrades of existing plants.

[0023] It is therefore clear that the above-described and illustrated embodiments of the die-casting machine according to the invention are just examples susceptible of various modifications. In particular, the exact shape and arrangement of the locking means can be freely changed according to specific manufacturing needs, for example by achieving the restraint between sleeve 1 and fixed platen 3 more downstream from opening 6 for the molten metal or even upstream therefrom.

Claims

1. Cold chamber die-casting machine for light alloys, including a sleeve (1; 1'; 1") that fits into the base of a mold (2) and into the fixed platen (3) of a press, the position of said sleeve (1; 1'; 1") being defined by a peripheral centering collar (4) that fits into a corresponding seat formed in the internal side of the fixed platen (3) and/or in the base of the mold (2), **characterized in that** it further includes locking means suitable to make the sleeve (1; 1'; 1") integral with said fixed platen (3) of the press.

2. Die-casting machine according to claim 1, **characterized in that** said locking means consist of mechanical devices integral with the sleeve (1; 1'; 1") and sized and arranged so as to abut against the external side (5) of the fixed platen (3).

3. Die-casting machine according to claim 2, **characterized in that** said locking means consist of a ring (9) secured on the sleeve (1; 1'; 1") by means of a thread, key or the like.

4. Die-casting machine according to claim 2, **characterized in that** said locking means consist of a rear part (10) of the sleeve (1; 1'; 1"), in which part there is formed an opening (6) for the molten metal.

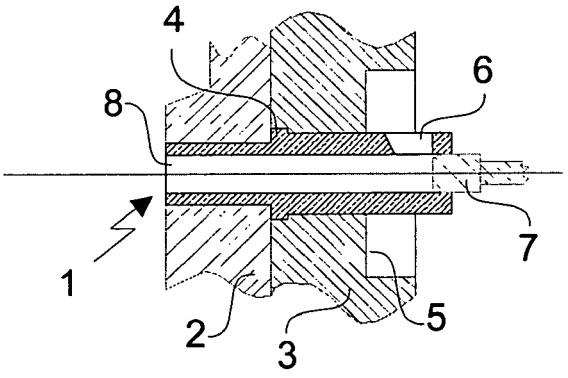
Amended claims in accordance with Rule 137(2) EPC.

1. Cold chamber die-casting machine for light alloys, including a sleeve (1; 1'; 1") that fits into the base of a mold (2) and into the fixed platen (3) of a press, the position of said sleeve (1; 1'; 1") being defined by a peripheral centering collar (4) that fits into a corresponding seat formed in the internal side of the fixed platen (3) and/or in the base of the mold (2), **characterized in that** it further includes locking means suitable to anchor the sleeve (1; 1'; 1") on said fixed platen (3) of the press even in the absence of the mold (2).

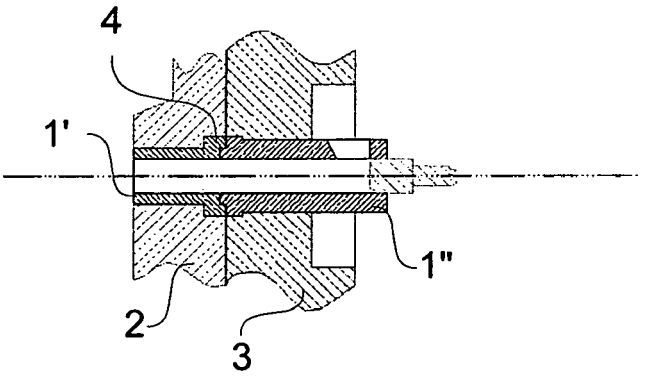
2. Die-casting machine according to claim 1, **characterized in that** said locking means consist of mechanical devices fixedly attached to the sleeve (1; 1'; 1") and sized and arranged so as to abut against the external side (5) of the fixed platen (3).

3. Die-casting machine according to claim 2, **characterized in that** said locking means consist of a ring (9) secured on the sleeve (1; 1'; 1") by means of a thread, key or the like.

4. Die-casting machine according to claim 2, **characterized in that** said locking means consist of a rear part (10) of the sleeve (1; 1'; 1"), in which part there is formed an opening (6) for the molten metal.



PRIOR ART



PRIOR ART

Fig.1

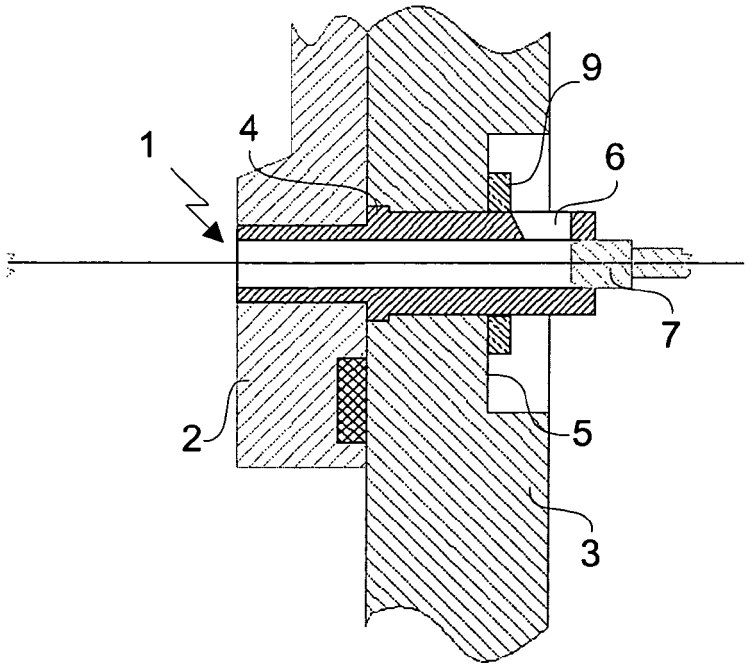


Fig.2

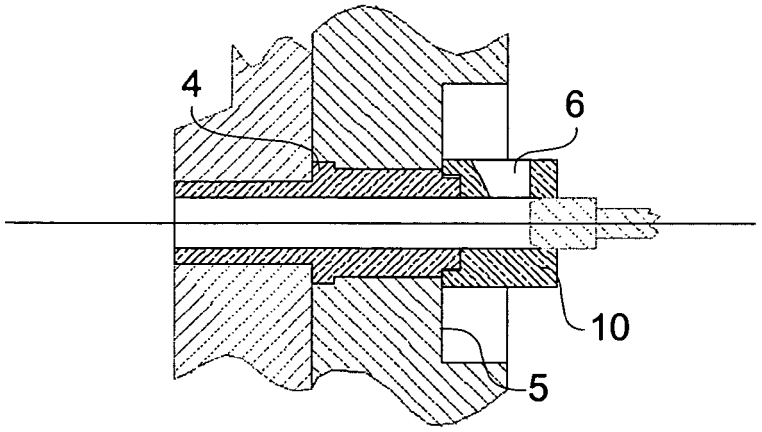


Fig.3

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EUROPEAN SEARCH REPORT

Application Number
EP 06 42 5706

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	JP 2000 351054 A (TOSHIBA MACHINE CO LTD) 19 December 2000 (2000-12-19) * abstract * -----	1	INV. B22D17/08 B22D17/20
X	JP 2003 225750 A (TOYOTA IND CORP) 12 August 2003 (2003-08-12) * abstract * -----	1	
X	JP 07 051830 A (TOSHIBA MACHINE CO LTD) 28 February 1995 (1995-02-28) * abstract * -----	1	
A	JP 09 225615 A (TOPY IND) 2 September 1997 (1997-09-02) * abstract * * figures 1-6 * -----	1-4	

TECHNICAL FIELDS SEARCHED (IPC)

B22D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	13 March 2007	Baumgartner, Robin

CATEGORY OF CITED DOCUMENTS

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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 06 42 5706

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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13-03-2007

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
JP 2000351054 A	19-12-2000	NONE	
JP 2003225750 A	12-08-2003	NONE	
JP 7051830 A	28-02-1995	NONE	
JP 9225615 A	02-09-1997	NONE	

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