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(54) **Die-casting apparatus for die-casting non ferrous alloys, in particular brass, with a low pressure process.**

(57) Die-casting apparatus has two pairs of die-carrier heads (1, 2) which can be turned through 180° about a central vertical axis (3) in such a way as to be able to face either a furnace (4) or an operator (5).

Each die-carrier head (1, 2) is controllable independently of the other in such a way as to be able to perform the operations of:

- graphiting of each die half;
- inclination of the die-carrier heads (1, 2) for the introduction of mould cores;
- rotation of the said heads (1, 2) for cleaning of the dies;
- closure of the dies with adjustable damping;
- rotation and coupling of the dies to the casting nozzle of the furnace;
- automatic ejection of castings directly onto a receptable provided with suitable conveyors.

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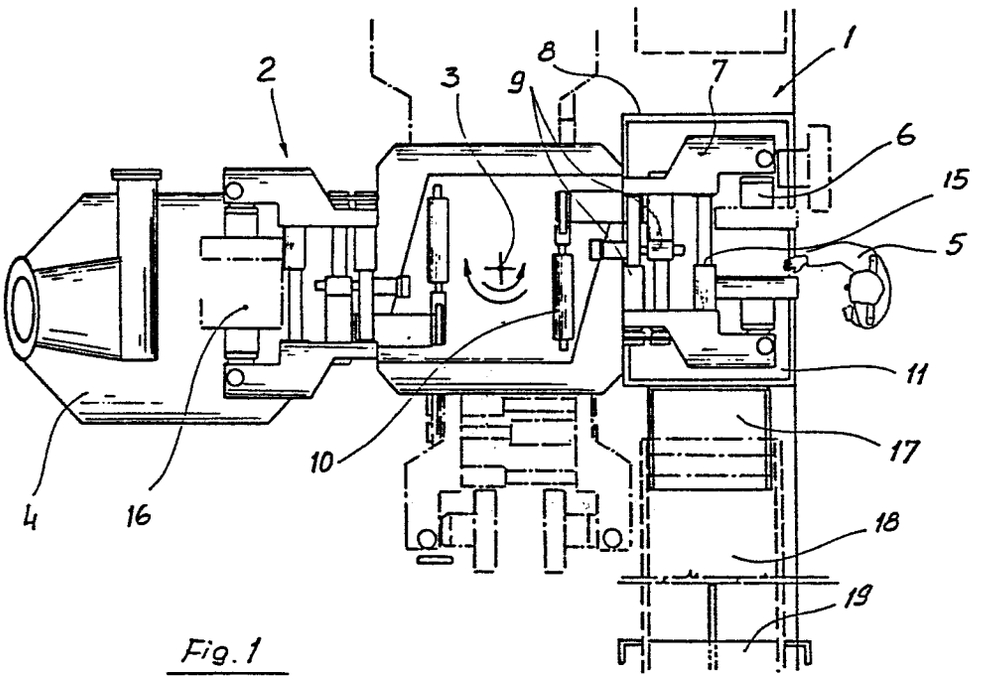

Fig. 1

Die-casting apparatus for die-casting non ferrous alloys, in particular brass, with a low pressure process

The present invention relates to a two-station die-casting apparatus having a single furnace, for the automatic die-casting of brass, with a low pressure process.

As is known, die-casting is a particular type of casting, in which the castings are formed in permanent metal moulds, sometimes called "shells" but more usually "dies".

It is likewise known that casting under pressure or "pressure die-casting", is a particular case of die-casting. With this system, which is advantageously used for low melting point alloys, even brass, molten metal is injected into the metal mould under a determined pressure. The sequences of operations in such a process comprise: closure of the mould (after the mould cores have been positioned therein, if mould cores are used); coupling of the mould to the nozzle and forced filling of the mould; solidification of the melt and separation of the mould from the nozzle; opening of the mould and removal of the casting; and finally, cleaning of the mould ready for the next cycle of operations.

In current machines for pressure die-casting there are provided various constructional arrangements for the purpose of allowing an adequate movement of the die-carrying heads, in such a way as to facilitate the necessary operations which have to be performed by the operators. In these conventional machines, however, there are only provided a single pair of counterposed die-carrying heads which are made to rotate about a central vertical axis in such a way as to dispose them, in sequence, in front of the operator, in correspondence with the casting chamber, and in front of the graphiting vessel.

Consequently, in such machines there are significant dead times between two successive operations by the operator on the mould and, therefore, between two subsequent castings. This means that a full exploitation of the capability of the furnace cannot be achieved, which increases operating costs of the machine and detrimentally affects the manufacturing costs of the finished castings.

The object of the present invention is to eliminate the previously discussed disadvantages and to provide apparatus for the automatic die-casting of brass, which allows a better and fuller exploitation of the operating capacity of a furnace to be obtained.

An advantage of apparatus according to the invention is that it allows the production of small, medium and large

pieces to be obtained with an automatic brass die-casting process.

Another advantage of the present invention is that it provides a system of automatic die-casting of brass which is made in such a way that it does not require the provision of a foundation to put it in operation.

According to the present invention apparatus for the automatic die-casting of brass, characterised by the fact that it includes two pairs of die-carrier heads which can be turned through 180° about a central vertical axis in such a way as to be positioned either in front of a furnace or in front of an operator, each die-carrier head being controllable independently of the other and being capable of turning movement about three mutually orthogonal axes.

One embodiment of the present invention will now be more particularly described, by way of example, with reference to the accompanying drawings, in which:

Figure 1 is a schematic plan view of the apparatus;

Figure 2 is a partial perspective view of the apparatus illustrated in Figure 1; and

Figure 3 is a perspective view, in an inclined position, of one of the pairs of die-carrier heads of the apparatus of Figures 1 and 2.

With reference now to the drawings, the apparatus shown includes two die-carrier heads 1 and 2, which are mounted on a common support capable of rotation through 180° about a central vertical axis 3, in such a way that the heads 1 and 2 can be carried either to a position in front of a furnace or to a position in front of an operator 5. In particular, each die-carrier 6 is mounted rotatably on a support structure 7 and each support structure 7 is slidably mounted on a bed 8. Two fluid pressure actuators 9 are provided for displacing the support structures 7 slidably on the bed 8 in a direction transverse the length of a line joining the two sets of die-carriers heads 1, 2 and passing through the common central vertical axis 3. Each bed 8, in turn, can be inclined by the action of an appropriate actuator 10.

A graphiting vessel 11 is arranged at the operator's position and is provided with an automatically controlled heating and cooling system.

Each bed is mounted by means of bracket elements 13 so as to be turnable about an axis 12 and can be turned about this axis by the action of a double acting fluid pressure actuator 14 (see Figure 3).

By means of these arrangements, in practice, each die-carrier head is controllable in an independent manner and is able to perform the following operations:

- graphiting, with independent times, for each mould half;

- inclination of the bed to allow mould cores to be fitted in position;

- rotation towards the operator to allow cleaning of the mould to take place;

- closure of the mould with adjustable braking, by means of suitable damper device 15 (see Figure 1);

- turning about the common central vertical axis 3 and coupling of a mould to the casting nozzle 16 of the furnace;

- automatic ejection of the castings, directly onto a receptacle 17 formed beneath the graphiting vessel; downstream of this receptacle there is placed a conveyor 18 able to discharge the castings into a suitable container 19.

The pressurisation system for the casting chamber is supplied from a compressed air network and is constituted, essentially, by:

- special filters for removal of dust, and for dehumidifying the air;

- pressure regulators for the pressurisation air;

- hydraulically servo-controlled flow rate regulators for the gradual increase of the pressure in the furnace;

- safety valve and safety pressure switch for avoiding excess pressures in the furnace.

It is suitable, by the way, to underline that the pressure, the velocity and the casting times can be regulated in a different manner for each of the two moulds.

From what has been explained above and from observation of the various Figures of the attached drawings, the great functionality and practicality in use which characterises the system for automatically die-casting brass constituting the subject of the present invention will be apparent.

Claims:

1. Apparatus for the automatic die-casting of brass, characterised by the fact that it includes two pairs of die-carrier heads (1, 2) which can be turned through 180° about a central vertical axis (3), to be positioned either in front of a furnace (4) or in front of an operator (5), each die-carrier head (1, 2) being controllable independently of the other and being capable of turning movement about three mutually orthogonal axes.

2. Die-casting apparatus according to Claim 1, characterised by the fact that each die-carrier (6) is mounted rotatably on a support structure (7) and each support structure (7) is mounted slidably on a bed (8) and is movable over this latter by means of respective double acting fluid pressure actuators (9); each bed being susceptible of inclination with respect to the horizontal by the action of a further actuator (10).

3. Die-casting apparatus according to Claim 1 or Claim 2, characterised by the fact that a graphiting vessel (11) is located at operator's position (5), the graphiting vessel (11) being provided with an automatically controlled heating and cooling system.

4. Die casting apparatus according to Claim 2 or Claim 3, characterised by the fact that the said bed (8)

is mounted by bracket elements (13) to a spindle (12) and is turnable about the axis of the spindle (12) by a double acting actuator (14).

5. Die-casting apparatus according to any preceding Claim, characterised by the fact that a damper device (15) is provided for damping the mould closing movements.

6. Die-casting apparatus according to any preceding Claim, characterised by the fact that castings produced by the apparatus are automatically ejected directly into a receptable (17) formed beneath the graphiting vessel (11) and by the fact that downstream of this receptacle (17) there is located a conveyor (18) acting to discharge the castings to a suitable container (19).

7. Die-casting apparatus according to any preceding Claim, characterised by the fact that the pressurisation apparatus for the casting chamber is supplied from a compressed air network comprising filters for removal of dust and for de-humidification of the air, a pressure regulator, a hydraulically servo-controlled flow rate regulator for the gradual increase of the pressure in the furnace; a safety valve and a safety pressure switch.

8. Die-casting apparatus according to any preceding Claim, characterised by the fact that the pressure, the velocity and the casting times can be controlled in a different manner for each of the two moulds.

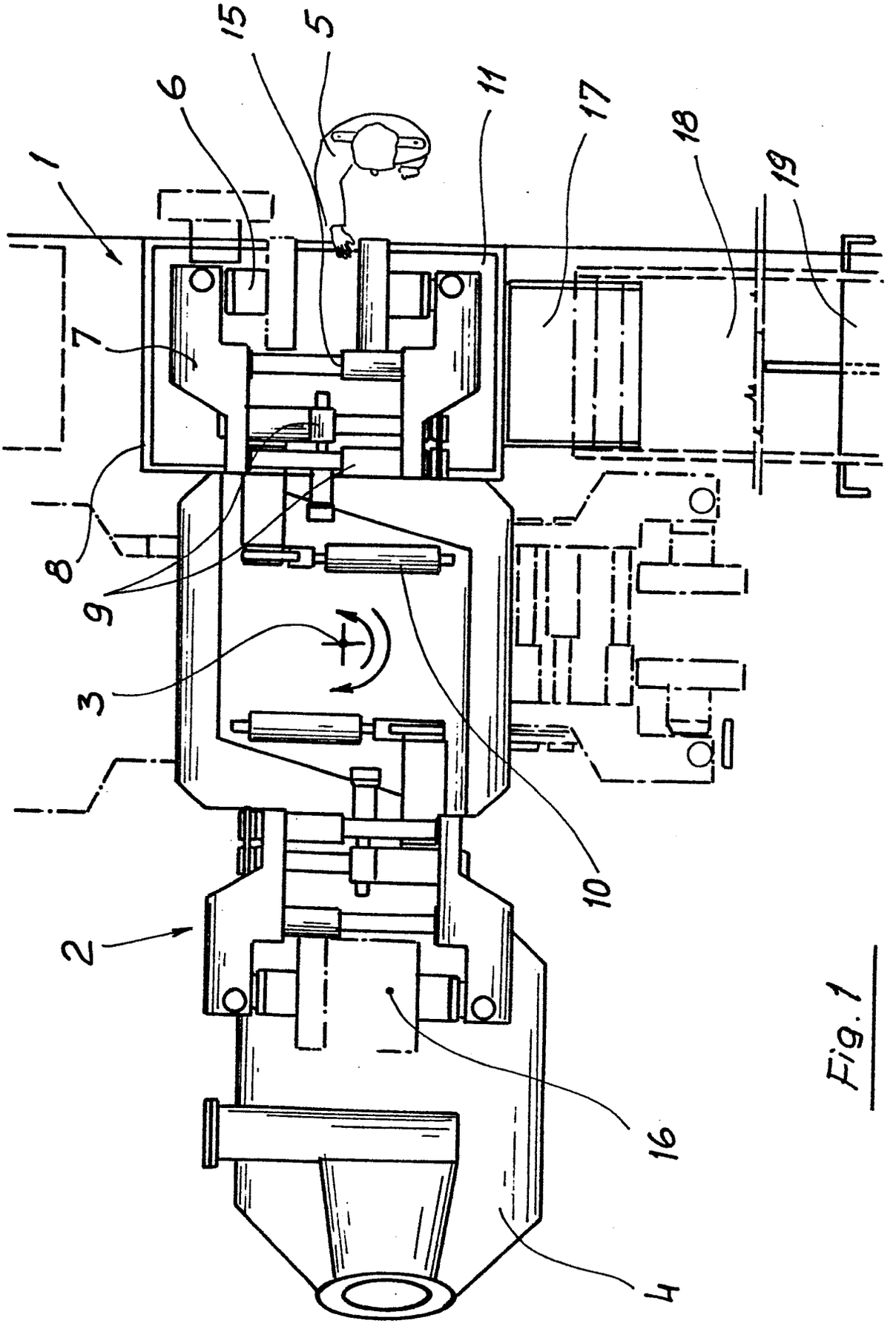

Fig. 1

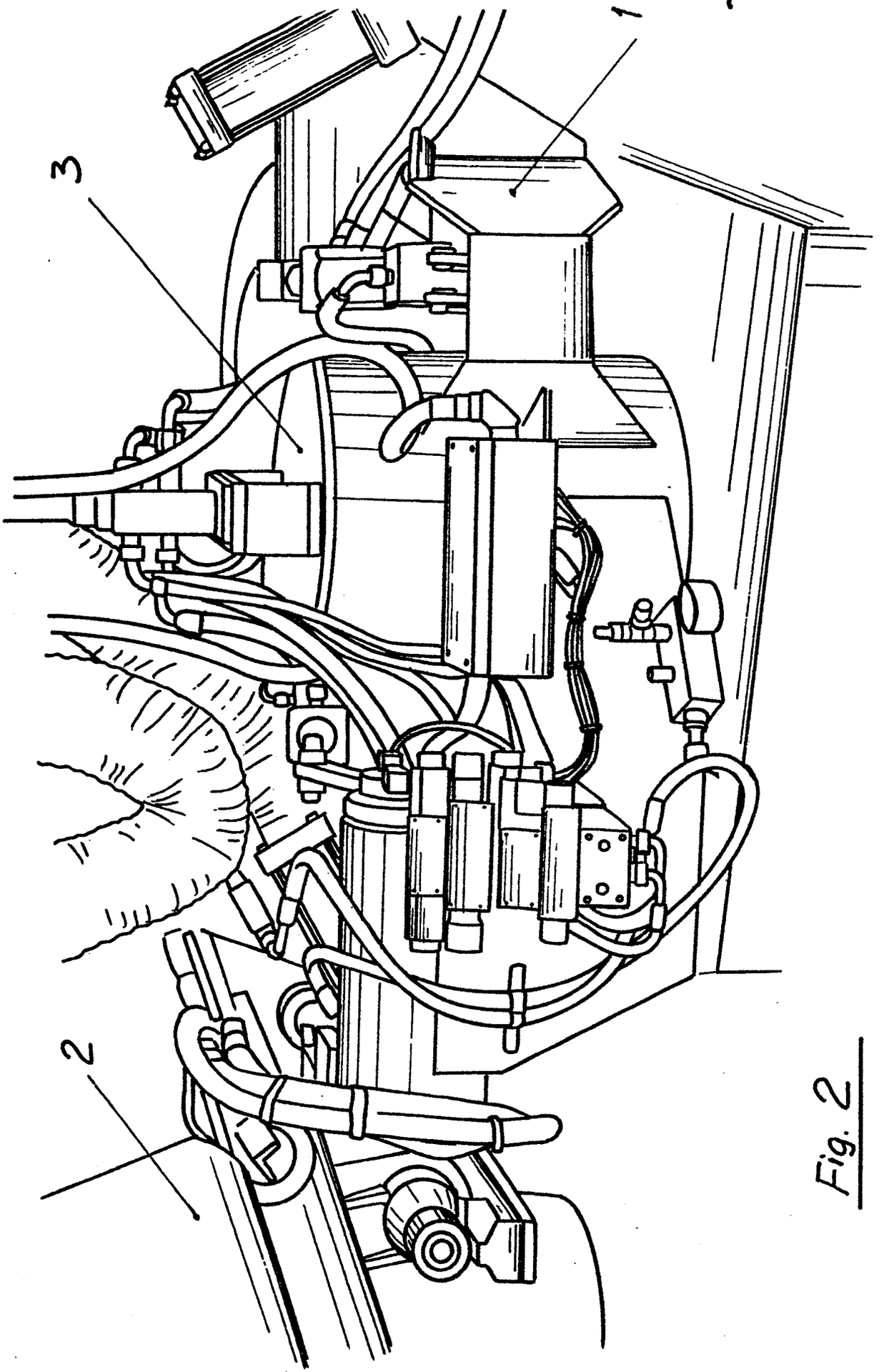

Fig. 2

Fig. 3