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2,192,133

CASTING PRESS

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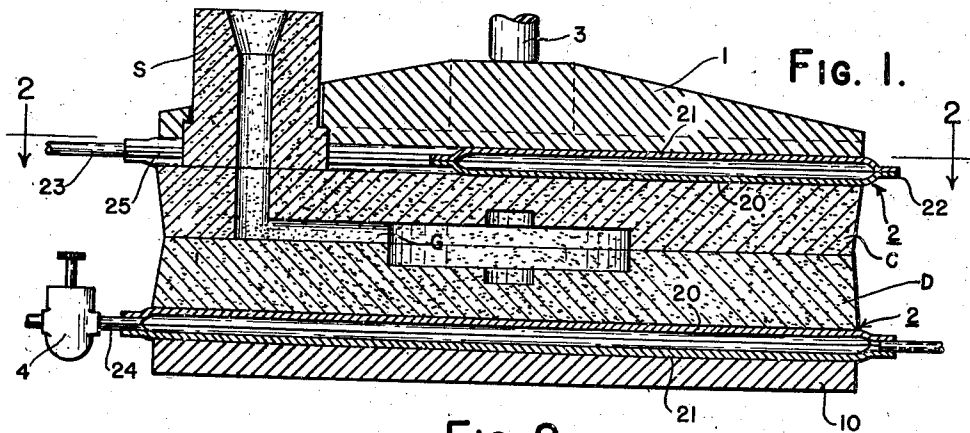


FIG. 1.

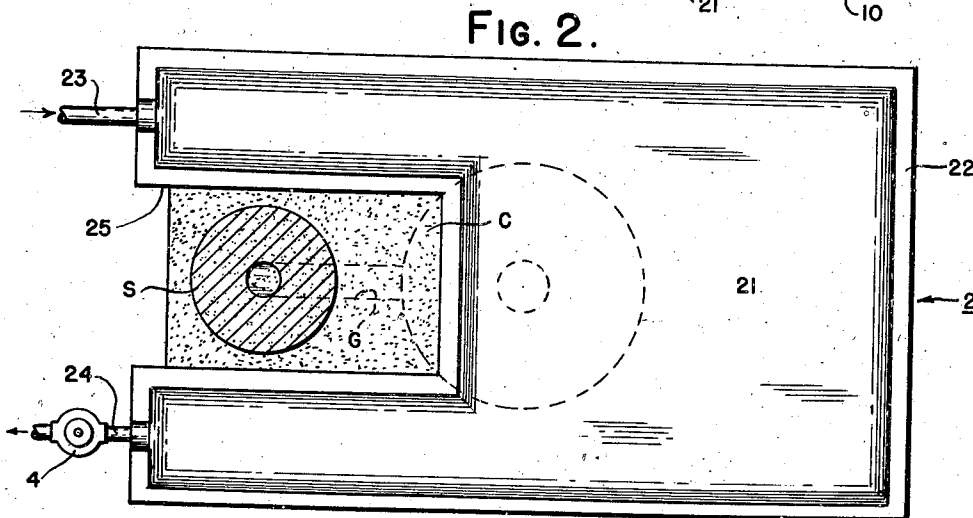


FIG. 2.

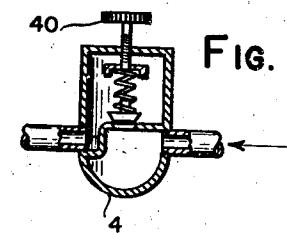


FIG. 4.

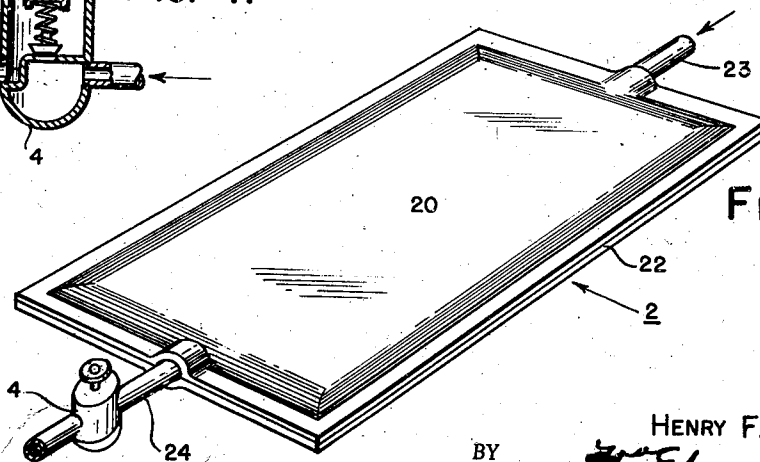


FIG. 3.

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2,192,133

CASTING PRESS

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7 Claims. (Cl. 22—90)

My invention relates to presses used to hold complemental mold sections together during the operation of pouring metal into the mold cavity, and more particularly to flexible members engageable with the backs of mold sections which have irregularities thereon.

Especially in the production of molds composed of plaster base material, the mold sections have slightly irregular backs when set. When such fluid molding material is allowed to set in a flask or mold form on one surface of which is mounted a pattern, in the region of contact of the material with the flask sides a slight meniscus will be formed, which will persist after the mold has set, causing a slightly raised rim on the back thereof. Other irregularities may also occur from variations in the amount of shrinkage which takes place in different portions of the mold owing to differences in thickness of the mold cavity wall. In drying a slight warpage may occur which also tends to create an irregular surface on the mold back.

Heretofore it has been conventional practice to press against the back of a mold section a rigid pressure plate which will not conform to irregularities on the engaged mold surface, and hence will produce an undesirable unequalized pressure on the fragile mold. I have devised a pressure transmitting member incorporating a flexible metal sheet which will contact a somewhat irregular surface in a yielding manner, so that its engagement will be substantially contiguous over the entire mold surface and the pressure will, therefore, be distributed over such surface in a substantially uniform manner.

It is therefore a principal objective of my invention to provide a mechanism to be used with a casting press for contingously engaging an irregular mold surface, to distribute the pressure uniformly over such surface.

A further object is to provide a mold engaging member which, while yieldable to conform to irregularities of the mold surface, will nevertheless be heat resistant and of durable construction.

It is also an object to provide such a member which may be employed with the conventional type of casting press, being adapted for insertion between a press plate and the back of the adjacent mold section.

Still another object is to provide controllable mechanism operable to vary the degree of flexing which may take place in the mold engaging member for a given pressure exerted thereon.

All these objects I obtain by a device of simple and compact structure.

Other objects of my invention will be understood from the following specific description of the representative structure illustrated in the drawing. The novel features of my device are defined particularly in the claims.

Fig. 1 is a longitudinal central section through a press and assembled mold, with my pressure members in place above and below the mold and between the press plates.

Fig. 2 is a sectional view taken along line 2—2 of Fig. 1.

Fig. 3 is a top perspective view of a lower pressure member.

Fig. 4 is a detail sectional view through a pressure control valve.

A representative mold including a cope section C and a drag section D is shown in Fig. 1 disposed between an upper press plate 1 and a lower press plate 10 of a conventional casting press. Plunger 3, carried by a piston reciprocable in a conventional fluid pressure cylinder (not shown) may be employed as the pressure creating mechanism. Between each of the press plates 1 and 10 and the adjacent mold section is disposed a pressure transmitting member, generally indicated as 2.

The surfaces of members 2 which engage the backs of mold sections C and D are thin metal sheets 20. These sheets are sufficiently flexible to engage contiguously the mold backs even though they have a considerable meniscus or other irregularities. In addition to the flexible mold engaging sheet, each pressure transmitting member 2 includes a second sheet 21, which may or may not be flexible, to be engaged by a press plate. A simple construction may comprise two complemental sheets of the same shape and size with offset edges which may be placed in abutment and secured together to form a seam 22, while the central portions of the sheet are held in spaced relation. Since sheet 21 seats flat against the plane surface of a press plate it may be of the same gauge as sheet 20, the flexibility here being neither of advantage or a disadvantage, and the equal thickness simplifying fabrication by allowing the seam 22 to be welded or brazed readily without overheating the edge of one member, as might occur with stock of different thicknesses.

In order to vary the flexibility of the mold engaging sheets, the fluid pressure in the hollow between the central portions of the two sheets may be altered. The operation may be accomplished by providing a pressure relief valve 4 of any conventional construction, a representative valve be-

ing illustrated in Fig. 4, located in the discharge conduit from this pressure member. The pressure at which this valve releases fluid from the hollow member may be adjusted according to the size of the mold and the pressure to be exerted thereon by the casting press by means of adjusting screw 40.

Instead of having both inlet and outlet conduits, a single connection only may be employed through which fluid may be withdrawn from the hollow of the pressure member to decrease the internal pressure or through which additional fluid can be supplied to the pressure member to increase its internal pressure, such conduit being positively closed when the pressure has been adjusted to that desired. Generally the greater the irregularity of the mold back, the greater should be the internal pressure. On the other hand the greater the pressure to be exerted on the mold, the greater should be the pressure within the pressure member so that the thin sheets thereof will not be subjected to excessive stress.

The pressure member 2 which is shown in Fig. 3 would ordinarily be employed between a lower press plate 10 and the back of the mold drag. Such a member cannot conveniently be employed between the upper press plate 1 and the back of the cope C because a sprue S is ordinarily provided into which the metal is poured to flow through the gate G into the casting cavity. While the same general type of pressure member may be used for the cope, a cutout 25 should be provided in it as shown in Fig. 2, through which the sprue S may project. Preferably this reentrant portion 25 extends back beyond the connection of the gate G with the mold cavity, so that the metal in the sprue and gate will not be cooled at an excessively rapid rate by fluid flowing through the hollow of the pressure member.

If desired the inlet conduit 23 may be connected with the right end of the upper pressure member but such connection would necessitate two outlet connections 24, one for each bifurcation formed by the cutout 25. A single outlet only need be used, however, if the inlet is connected to one bifurcation and the outlet to the other, as illustrated in Fig. 2. While I have shown the inlet for the lower pressure member connected to the end thereof remote from the sprue S and gate G, such disposition is unimportant in the maintenance of the desired pressure within the pressure member. In fact such connections may be located at any point along the edge, it being unnecessary that the inlet and outlet be connected to opposite sides. Such disposition of the connections is advantageous, however, for controlling the cooling of metal in the casting cavity according to the method disclosed in my companion application, Serial No. 222,599, filed Aug. 2, 1938, for Mold cooling methods and apparatus.

When my pressure members are employed between the plates of a press and a mold, and the pressure in such members has been adjusted according to the degree of irregularity of the mold back and the pressure to be exerted on the mold surfaces, an even pressure over such surfaces is obtained which will not set up unequal strains in a fragile mold such as one of the gypsum base type. The pressure between the parting surfaces of the mold sections will be substantially evenly distributed, thus forming a tight seal about the mold edges, preventing the metal breaking through the junction of the parting surfaces when it is poured into the mold cavity, and tending to

prevent the formation of undesired fins on the casting. The fluid used in the pressure members is preferably oil, although it may be water, or even compressed air or other compressed gas.

By the expression surface of a mold member used in the claims I mean any surface of the mold assembly engaged by my pressure member which is irregular, either by reason of its method of fabrication, from treatment it receives thereafter, or from its method of use. Thus, for example, a mold covering, having an irregular surface by conforming to an irregular surface of a cope or a drag, or itself having an irregular surface, engaged by the pressure member, is an element of the mold assembly and would be included within the term mold member.

I claim as my invention:

1. Apparatus for clamping together complementary mold members for the pouring operation, comprising pressure creating means, and an all-metal pressure member having one side engaged by said pressure creating means, and including on the other side thereof a thin, flexible metal sheet engageable directly with a surface of a mold member and deformable to conform substantially to the irregularities in such mold surface and to distribute substantially uniformly over such irregular mold surface the pressure exerted on said pressure member by said pressure creating means.

2. Apparatus for clamping together complementary mold members for the pouring operation, comprising pressure creating means, and a hollow, fluid-filled, pressure member having one side engaged by said pressure creating means, and including on the other side thereof a thin, flexible sheet forming one wall of the fluid-filled hollow of said member, engageable directly with a surface of a mold member, and deformable to conform substantially to the irregularities in such mold surface and to distribute substantially uniformly over such irregular mold surface the pressure exerted on said pressure member by said pressure creating means.

3. The combination of claim 2 and means connected to the hollow, fluid-filled, pressure member operable to remove fluid from such pressure member or to supply additional fluid thereto to vary the internal pressure thereof.

4. Apparatus for clamping together complementary mold members for the pouring operation, comprising pressure creating means, and a hollow, fluid-filled, pressure member formed of two parallel, thin, flexible metal sheets having their edges joined together, one sheet being engageable over substantially its entire area by said pressure creating means, and the other sheet being engageable directly with a surface of a mold member and deformable to conform substantially to the irregularities in such mold surface and to distribute substantially uniformly over such irregular mold surface the pressure exerted on said pressure member by said pressure creating means.

5. Apparatus for clamping complementary mold members against each other for the pouring operation, which apparatus comprises a hollow member, and means acting through said hollow member for forcing the mold members against each other to have the parting surfaces thereof held firmly in contact with each other around the mold cavity, said hollow member yielding unequally as necessary in different parts thereof to compensate for faults in the mold members.

6. Apparatus for clamping complementary mold

members against each other for the pouring operation, which apparatus comprises a member including a flexible sheet of metal, and means acting through said flexible sheet of metal for forcing the mold members against each other to

5 have the parting surfaces thereof held firmly in contact with each other around the mold cavity, said flexible sheet of metal yielding unequally as necessary in different parts thereof to compensate for faults in the mold members.

10 7. Apparatus for clamping together complementary mold members for the pouring operation, comprising pressure creating means, and a hollow, liquid-filled, sealed, pressure member

normally of uniform thickness and having parallel planar opposite walls, one of said walls including a thin, flexible sheet engageable directly with a surface of a mold member, and deformable under the stress exerted by said pressure creating means to conform substantially to the irregularities in such mold surface, and to distribute substantially uniformly over such irregular mold surface the pressure exerted on said pressure member by said pressure creating means,

10 said pressure member varying in thickness under such stress as required by deformation of said flexible sheet wall.

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