

April 25, 1967

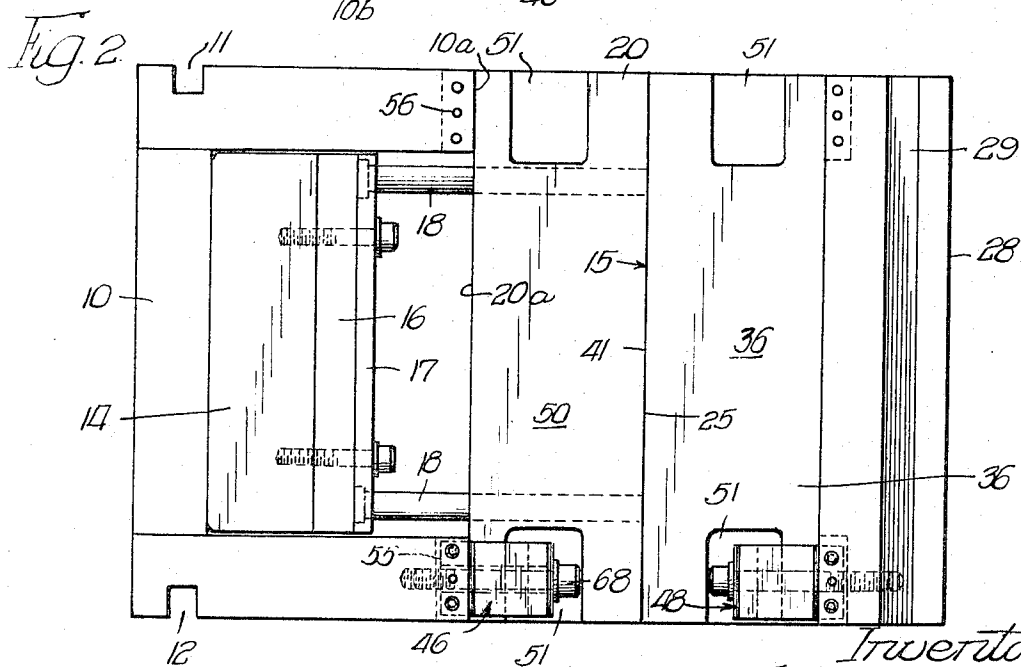
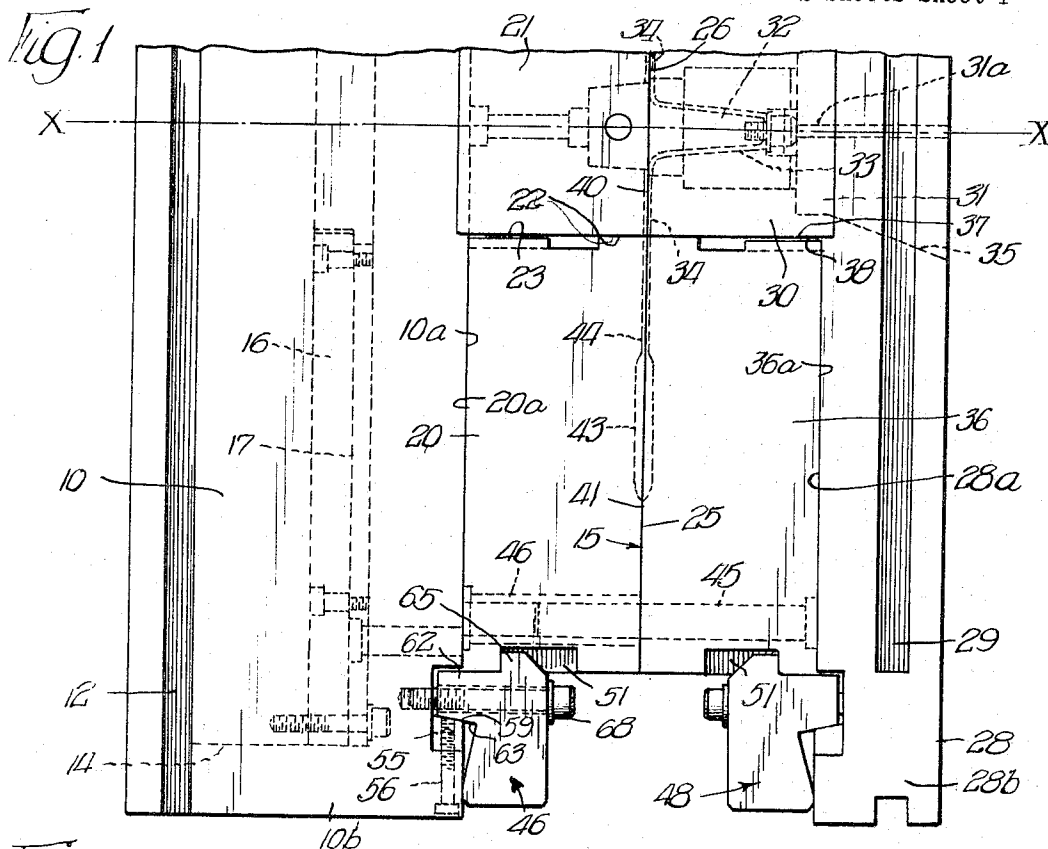
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3,315,318

CLAMP FOR UNIT DIE MECHANISM

Filed March 25, 1965

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3,315,318

CLAMP FOR UNIT DIE MECHANISM

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Filed Mar. 25, 1965, Ser. No. 442,586

2 Claims. (Cl. 18—43)

The present invention relates to a machine for injection die casting or molding, and more particularly to new and improved clamping means for securing or mounting the cavity plates of such machines.

It is a primary object of the present invention to provide new and improved clamping means for securing the cavity plate of a unit die mechanism.

Another object of the present invention is the provision of clamping means of the type described which are uniquely adapted to prevent movement of the cavity plate outwardly or laterally of the mechanism as well as preventing movement of the cavity plate in a direction perpendicular to the parting plane of the mechanism.

Still another object of the present invention is the provision of clamping means of the type described which include means for wedging the cavity plate inwardly of the unit die mechanism.

These and other objects and advantages of the invention will become apparent from the following specification disclosing preferred embodiments which are illustrated in the accompanying drawings wherein:

FIG. 1 is a fragmentary top plan view of a unit die mechanism for injection die casting or molding;

FIG. 2 is an end elevation of the mechanism illustrated in FIG. 1;

FIG. 3 is a fragmentary, enlarged top plan view primarily showing one of the clamp blocks and associated structure of the FIG. 1 mechanism; and

FIG. 4 is a view similar to FIG. 3 and showing a modification of the invention.

Now referring to FIGS. 1 and 2, the unit die mechanism illustrated, which in itself forms no part of the present invention, will be seen to include an ejector housing 10 which is of recumbent U-shaped configuration. Ejector housing 10 has upper and lower transversely extending notches 11 and 12, respectively, adapting the ejector housing for being secured to the reciprocal platen of a die cast machine. A master ejector plate 14, which may be of recumbent H-shape, is suitably mounted within the ejector housing for movement relative to the latter in either direction along an axis extending perpendicular to the vertical parting plane of the mechanism which is designated by numeral 15. It will be understood that the master ejector plate 14 is suitably mounted within the ejector housing as by means of racks and pinions so that the ejector plate moves relative to the ejector housing during movement of the latter all in a manner well known in the art.

A secondary ejector plate 16 is secured to master ejector plate 14, and a retainer plate 17 is in turn secured to the secondary ejector plate. Retainer plate 17 secures a plurality of ejector pins 18 for movement with the ejector plate. The ejector pins extend through suitable bores in a cavity plate 20 for ejecting the casting formed therein in a manner known in the art. Cavity plate 20 has a planar surface 20a thereof in contact with surfaces 10a of the ejector housing, all of which surfaces are parallel with parting plane 15.

An upright center block 21 is suitably secured to ejector housing 10. Upright center block 21 includes a face 22 in abutting engagement with face 23 of cavity plate 20; face 23 defines the inner end of the cavity plate 20. Faces 22 and 23 include complementary interfitting projections and recesses for interfitting or securing the inner end of cavity plate 20 with the upright center block 21.

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It will be understood that this interfitting relationship prevents movement of cavity plate 20 relative to block 21 in any direction in a plane perpendicular to the parting plane; however, this interfitting engagement does not prevent movement of the cavity plate away from the upright center block or outwardly of the mechanism. Cavity plate 20 and upright center block 21 include respective, coplanar faces 25 and 26 which define the parting plane or parting line of the mechanism.

The die mechanism illustrated further includes a stationary anchor plate 28. Anchor plate 28 is provided with a plurality of grooves 29 adapting the anchor plate for being secured to the stationary platen of a die cast machine. Suitably secured to anchor plate 28 is an upright center block 30, which upright center block is adapted to receive a conventional sprue bushing 31 and sprue spreader 32 defining the annular diverging passageways 33 for delivering molten die cast material to conventional gates or passageways 34. The anchor plate includes a frusto-conical bore 35 adapted to receive a die cast nozzle for admitting molten material to central opening 31a of sprue bushing 31. Anchor plate 28 also includes a face 28a extending in parallel relation with parting plane 15. A stationary cavity plate 36 has one surface 36a thereof in abutting relation with surface 28a of the anchor plate. Cavity plate 36 has an inner end defined by a face 37; this face abuts and interfits with a face 38 of upright center block 30. The inner end of cavity plate 36 is interfitted with upright center block 30 in the same manner as cavity plate 20 is interfitted with upright center block 21.

Upright center block 30 and cavity plate 36 include respective coplanar faces 40 and 41 which are adapted for coextensive contact with respective faces 26 and 25 of upright center block 21 and cavity plate 20. By way of example, cavity plates 20 and 36 have confronting cavities as illustrated for defining a cavity 43 communicating with a passageway 44, which passageway in turn communicates with gate 34.

In FIG. 1, the numeral 45 represents one of a number of conventional leader pins 45 which is adapted to be received within an associated bushing 46 in cavity plate 20. It is believed that the above description of the unit die mechanism will be sufficient for purposes of understanding the present invention since, as mentioned above, the unit die mechanism of itself forms no part of the present invention. The unit die mechanism may be of the type shown in Halward Patent 2,956,321, assigned to the assignee of the present invention. It should be pointed out that the mechanism shown in FIGS. 1 and 2 is of the double type and therefore symmetrical about axis x—x of FIG. 1.

The present invention has to do with means for securing cavity plates 20 and 36 in place. This construction primarily includes a pair of clamp blocks 46 and a pair of clamp block 48. It will be understood that two clamp blocks 46 are provided for securing cavity plate 20 and that two clamp blocks 48 are provided for securing cavity plate 36. One clamp block 46 and the structure associated therewith, which are typical of the other clamp blocks and associated structure, will now be described in detail.

Referring especially to FIG. 3, cavity plate 20 includes a face 50, which face defines the outer end of the cavity plate and extends in perpendicular relation with parting plane 15. Cavity plate 20 includes a pair of identical upper and lower recesses 51 (FIG. 2) which open into face 50 of the plate. As noted in FIG. 3, recess 51 includes a ledge surface 52, which surface faces parting plane 15 in parallel relation with the latter.

Ejector housing 10 includes a projection 10b extending outwardly of the die mechanism beyond the outer end of cavity plate 20. Preferably, this extension 10b has the

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same cross-section as the ejector housing, which cross-section is illustrated in FIG. 2. Extension 10b includes a pair of identical, aligned recesses 54. As noted in FIG. 3, recess 54 includes a base wall 54a and parallel, opposed side walls 54b and 54c. It will be noted that wall 54b, which is parallel with face 50 of cavity plate 20, is offset from the latter a short distance inwardly of the die casting mechanism. A key 55 is received within recess 54 in abutting relation with wall 54c and with the adjacent portion of wall 54a. The key is secured in the recess by a plurality of fasteners 56 which extend through bores 57 in extension 10b and threadingly engage threaded bores 58 in key 55. Key 55 includes a wall 59 contained in a vertical plane which is inclined outwardly of the mechanism in a direction extending toward the parting plane thereof.

Clamp block 46 includes a planar surface 61 which makes a tight abutting engagement with the portion of face 50 adjacent the ledge 52. Clamp block 46 also includes an extension 62 defining an inclined surface 63, which surface abuts wall 59 in tight or snug engagement with the latter. Clamp 46 is further defined by a planar surface 64 adapted to abut a portion of the surface of extension 10b which faces parting plane 15 in parallel relation thereto. Clamp block 46 includes an integral protruding portion 65 defining a planar ledge 66 adapted for substantial coextensive contact with ledge 52. The clamp block also includes a bore 67 which extends in perpendicular relation with the parting plane when the clamp is in place as indicated in FIGS. 1 and 3.

Clamp block 46 is secured in its clamping position by means of a fastener 68 having a threaded end threadingly engaged in a threaded blind bore 69 formed in extension 10b of the ejector housing. Tightening of fastener 68 draws clamp block 46 toward the ejector housing thereby acting to clamp cavity plate 20 against the ejector housing by reason of the abutting engagement between ledge surface 52 of the cavity plate and ledge surface 66 of the clamp block. It will be apparent that the clamp block also serves to force the cavity block inwardly of the mechanism by reason of the engagement between face 50 and surface 61 and the engagement between inclined wall 59 and inclined surface 63. The sliding engagement of inclined wall 59 and inclined surface 63 performs a wedging action for wedging the cavity plate inwardly upon tightening of fastener 68.

It will be noted that the bottom surface of extension 62 of the clamp block remains in spaced relation with bottom wall 54a of the recess so as not to interfere with the wedging action of the clamp block. It will also be noted that wall 54b is in spaced relation with extension 62 and accordingly does not interfere with the action of the clamp block in urging the cavity plate inwardly. The action of clamp block 46 in urging cavity plate 20 inwardly of the die casting mechanism brings about a tight engagement between face 23 of the cavity plate and face 22 of the upright center block 21. The tight engagement between the last two mentioned faces tends to prevent spattering of the molten material at the juncture of cavity plate 20 and upright center block 21 around the registering ends of passageways 34, 44, which spattering could cause injury to operating personnel.

Although only one clamp 46 and associated structure have been described in detail, it will be understood that two of such clamps (each clamp and the associated structure being identical) are provided for securing cavity plate 20 in the manner described. Also, it will be understood that clamp blocks 48 and their associated structure are identical but opposite hand with the clamp blocks 46 and associated structure. Even though anchor plate 28 has a different cross-section than ejector housing 10 as indicated in FIG. 2, the anchor plate is provided with an extension 28b, which extension includes the recess 54. It will be understood that clamp blocks 48, in addition to securing cavity plate 36 to anchor plate 28, also act to

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urge cavity plates 36 inwardly of the mechanism thereby to provide a tight engagement between the interfitted faces of cavity plate 36 and upright center block 30. This tight engagement between cavity plate 36 and upright center block 30 tends to prevent spattering of molten material at the juncture of these two blocks.

FIG. 4 illustrates a modification of the invention. The FIG. 4 modification is the same as the form of the invention just described with the exception that the modified form does not provide a wedging action. The parts of the modified form illustrated in FIG. 4 that are identical to the form of the invention illustrated in FIGS. 1-3 are designated by the prime form of numeral.

A key 72 is received within recess 54' in abutting engagement with wall 54c' and the adjacent portion of wall 54a'. Key 72 is secured within the recess by fastening means (not shown), which fastening means may be identical with those illustrated and described in connection with the form of the invention of FIGS. 1-3. Key 72 includes a wall 73, which wall is contained in a vertical plane extending perpendicular with parting plane 15.

Extension 62' of clamp block 46' includes a planar surface 74 which is adapted for tight or snug abutting engagement with wall 73 of key 72. Face 50', surface 61', surface 74 and wall 73 are machined to very close tolerances so that a snug and tight engagement is formed between clamp block 46, cavity plate 20' and key 72. It will be apparent that the engagement between these just mentioned machined surfaces acts to hold cavity plate 20' in tight contact with the adjacent upright center block thereby to prevent spattering during an ejection shot as mentioned above. In other words, although the clamp block and associated key of the modification illustrated in FIG. 4 do not include complementary inclined surfaces for providing a wedging action, the modified clamp block still acts to secure the cavity plate to the ejector housing and to hold the cavity plate in snug engagement with the adjacent upright center block.

As noted in FIG. 4, clamp block 46 has a through opening defined by first bore 76 communicating with a coaxial, reduced-in-diameter, threaded bore 77. A fastener 78 is threadingly engaged with bore 77. Fastener 78 provides a means for removing clamp block 46', which block tends to stick in place by reason of the tight engagement between surfaces 61', 74 with respective surfaces 50', 73. After removal of fastener 68', fastener 78 is rotated for bringing the end thereof into engagement with key 72 whereupon continued rotation of fastener 78 causes clamp block 46' to be forced away from the ejector housing.

While the invention has been shown in but only two forms, it is not to be so limited. On the contrary, it will be apparent to those skilled in the art that the invention is susceptible of various forms and modifications without departing from the spirit and scope of the appended claims. In this respect, it will be understood that the invention is equally applicable to die casting machines which part at a horizontal plane and to die casting machines of the single type.

I claim:

1. In a unit die mechanism for injection molding and casting, which mechanism is of the type including, a member having a surface in parallel relation with the parting plane defined by the mechanism, a cavity plate having inner and outer ends defined by respective parallel faces and having a surface extending between said faces at a right angle thereto, which surface is in contact with the first mentioned surface, a block secured to said member and having a face in interfitted engagement with the face defining the inner end of said cavity plate, the improvement which comprises, said member being provided with an extension projecting outwardly of said mechanism beyond the outer end of said cavity plate, said extension including means defining a wall extending generally perpendicular to said parting plane and facing inwardly of

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said mechanism, said cavity plate having a ledge adjacent the face thereof defining its outer end, said ledge extending generally parallel with said parting plane and facing the same, a clamp block secured to said projection by fastening means which act in a direction generally perpendicular to the parting plane, which clamp block has generally oppositely facing surfaces in tight abutting engagement, respectively, with said wall and a portion of the face defining the outer end of said cavity plate, said clamp block having a portion thereof defining a ledge in abutting relation with the ledge of said cavity plate, whereby said clamp block serves both to secure said cavity plate against said member and to prevent outward movement of the cavity plate.

2. The improvement according to claim 1 wherein said wall is inclined outwardly of said mechanism in a direction toward the parting plane thereof and wherein the face of said clamp block in abutting engagement with said wall is correspondingly inclined, whereby actuation of

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said fastening means causes said clamp block to be wedged against said cavity plate.

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