United States Patent [19]

Lee

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[45] **July 17, 1973**

[54] **BULLET MOLD**

[76] Inventor: **Richard J. Lee**, R. R. 2, Hartford, Wis.

[22] Filed: **Aug. 3, 1971**

[21] Appl. No.: **168,569**

[52] **U.S. Cl.** **86/1**, 29/1.22, 164/264

[51] **Int. Cl.** **C06b 21/02**, F42b 33/10

[58] **Field of Search** 86/1, 10, 21, 24, 86/28, 33, 37, 40; 164/70, 137, 264, 342; 29/1.22

[56] **References Cited**

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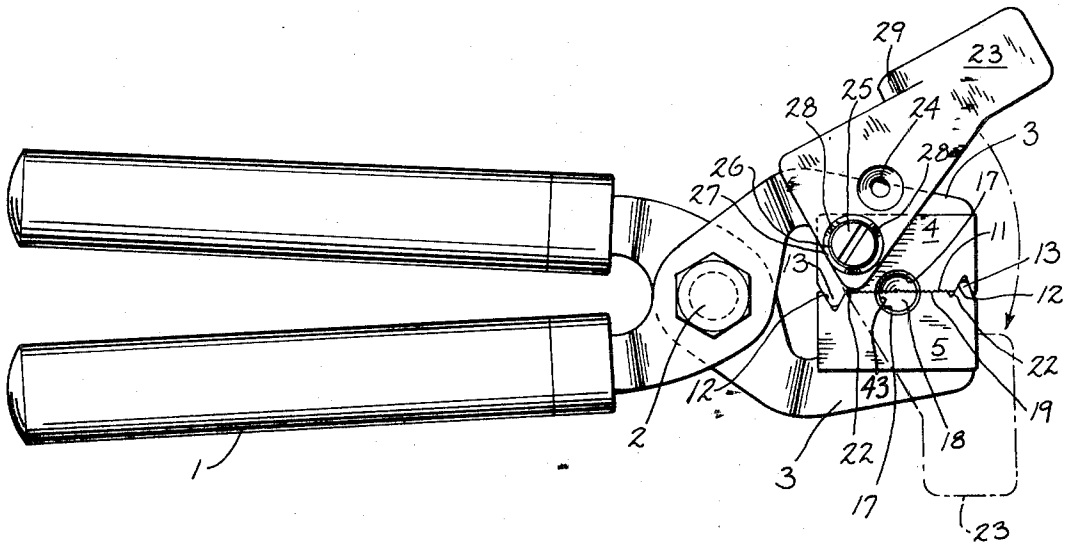
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Primary Examiner—Benjamin A. Borchelt
Assistant Examiner—Harold Tudor
Attorney—Andrus, Sceales, Starke & Sawall

[57] **ABSTRACT**

A bullet mold is provided with two block-like halves which are formed as part of an extruded aluminum bar, cut off, and then reversed to form a complimentary matching pair. Mating V-grooves and raised ribs disposed along the longitudinal edges of the inner mold block faces provide ease of transverse location. Pin and groove means provide longitudinal location. Longitudinal air vents are disposed proximate the mating V-grooves and ribs, and the planular mating faces are knurled to provide fine vent grooves leading from the mold cavity to the longitudinal vents. The sprue plate is held in position by a wave washer to eliminate undesirable torque. The mold cavity is formed by rotating the clamped halves in a screw machine spindle and using appropriate tools.

8 Claims, 14 Drawing Figures



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SHEET 1 OF 3

Fig. 1

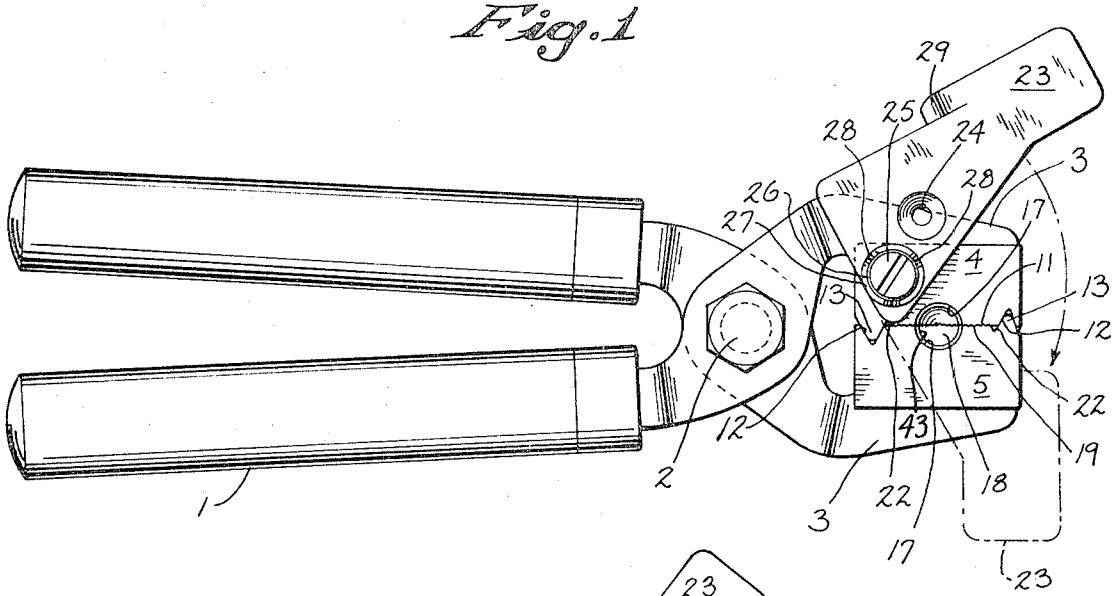


Fig. 2

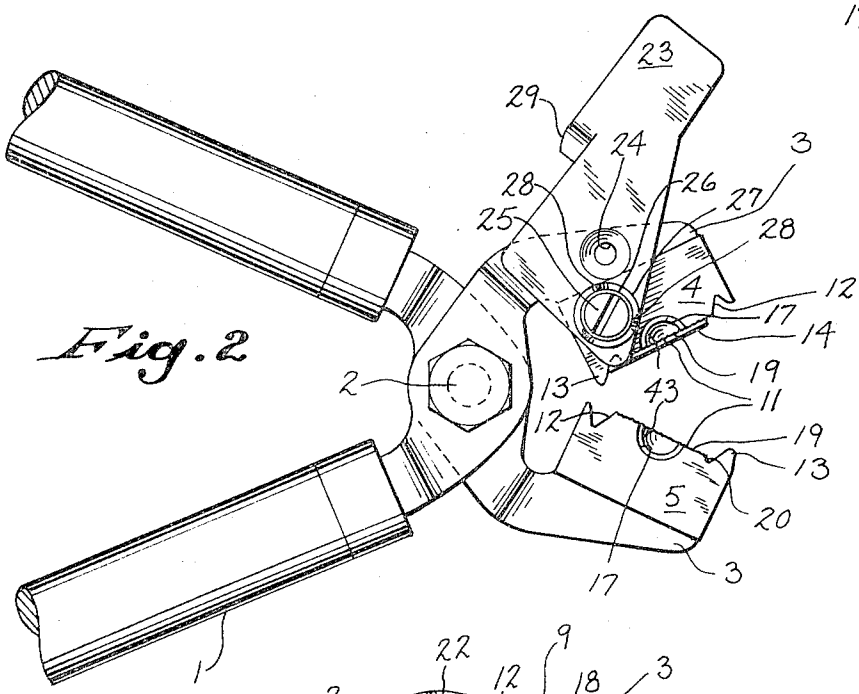
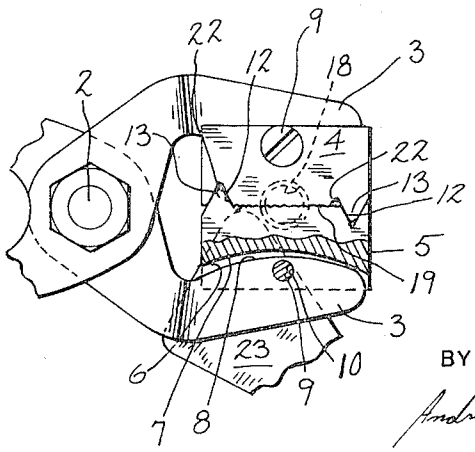


Fig. 3



INVENTOR
RICHARD J. LEE

BY
Andrus, Sceales, Starke & Sawall

ATTORNEYS

Fig. 4

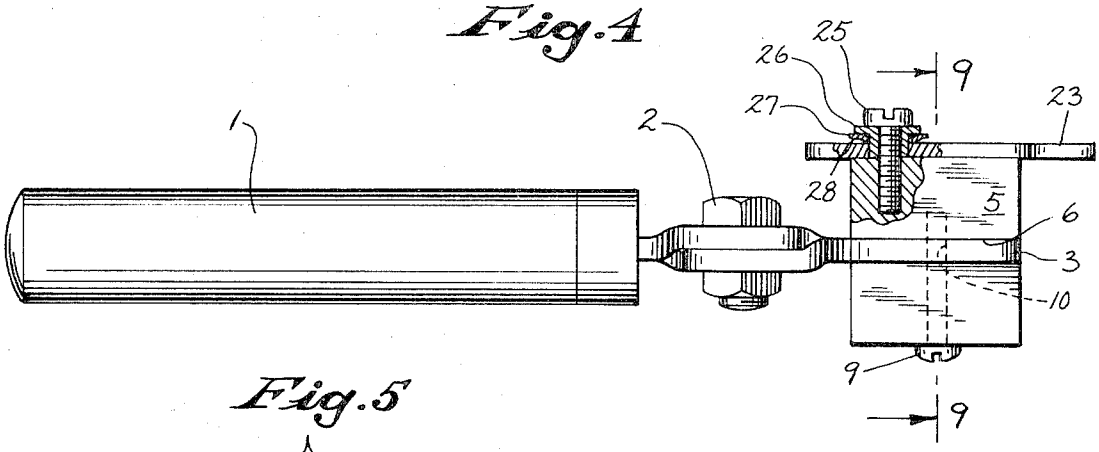


Fig. 5

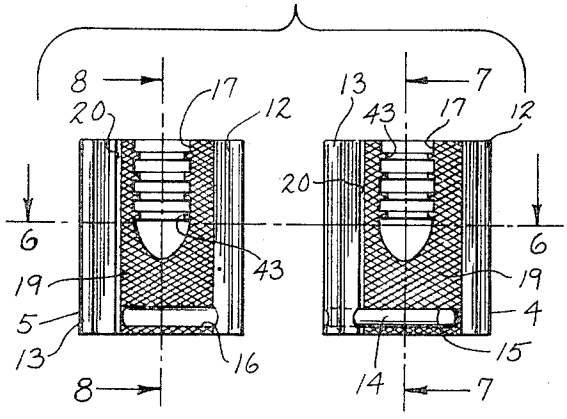


Fig. 6

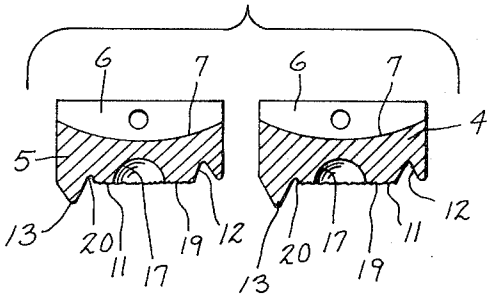


Fig. 7

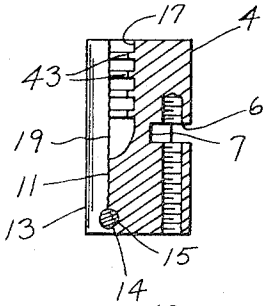


Fig. 8

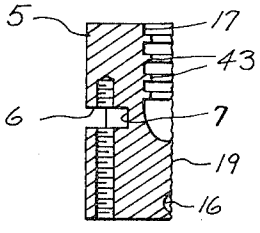
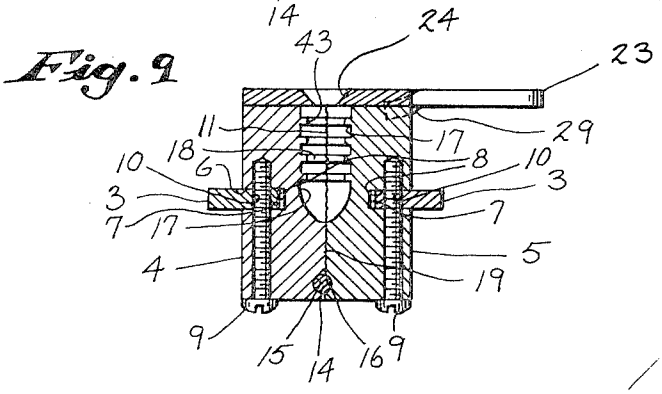


Fig. 9



INVENTOR
RICHARD J. LEE

BY
Andrus, Sceales, Starke & Sawall
ATTORNEY

Fig. 10

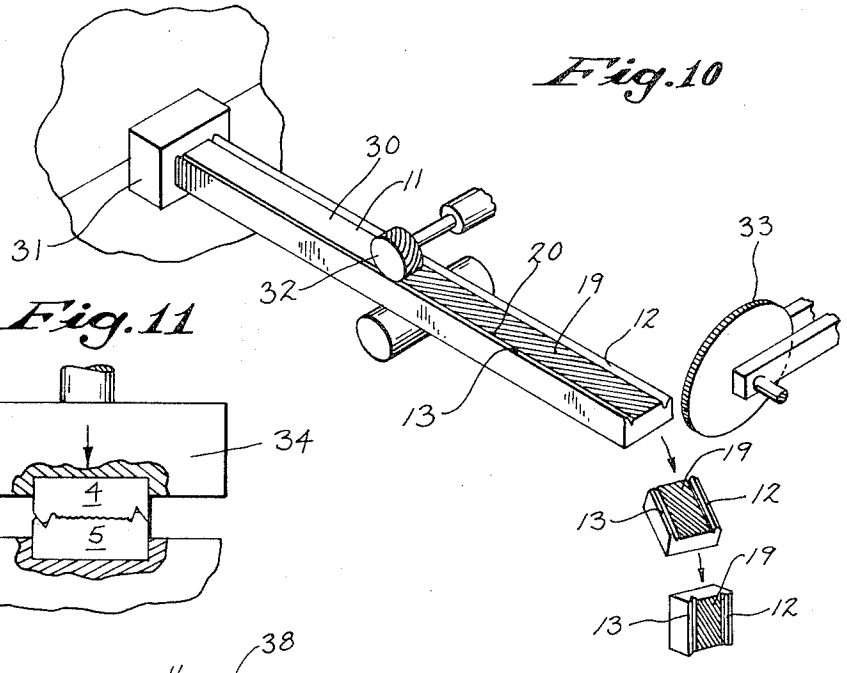


Fig. 11

Fig. 12

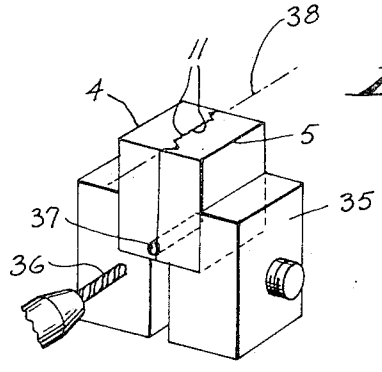


Fig. 13

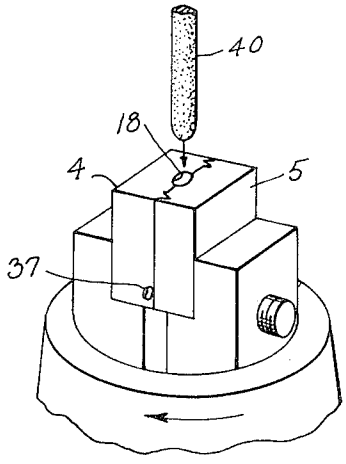
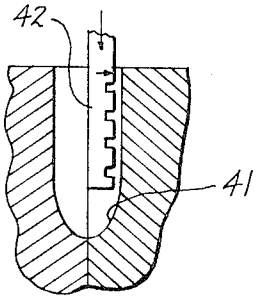


Fig. 14



INVENTOR
RICHARD J. LEE

BY
Andrus, Sceales, Starke & Sawall
ATTORNEYS

BULLET MOLD

BACKGROUND AND SUMMARY OF THE INVENTION

This invention relates to a bullet mold and contemplates improved manufacture and structure for hand operated bullet molds which are formed in two halves and held tightly together during molding.

More specifically a bullet mold is provided with two block-like halves which are formed as part of an extruded aluminum bar, cut off, and then reversed to form a complimentary matching pair. Mating V-grooves and raised ribs disposed along the longitudinal edges of the inner mold block faces provide ease of transverse location. Pin and groove means provide longitudinal location. Longitudinal air vents are disposed proximate the mating V-grooves and ribs, and the planular mating faces are knurled to provide fine vent grooves leading from the mold cavity to the longitudinal vents. The sprue plate is held in position by a wave washer to eliminate undesirable torque. The mold cavity is formed by rotating the clamped halves in a screw machine spindle and using appropriate tools.

BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawings illustrate the best mode presently contemplated by the inventor for carrying out the invention.

In the drawings:

FIG. 1 is a top plan view of a bullet mold constructed in accordancewith the invention, and with the mold blocks closed, and showing the positions of the sprue plate;

FIG. 2 is a view similar to FIG. 1 with the mold blocks open;

FIG. 3 is a bottom plan view of the bullet mold with the mold blocks closed;

FIG. 4 is a side elevation of the mold;

FIG. 5 is a plan view of the faces of the mold blocks placed in side by side relation;

FIG. 6 is a transverse section taken on line 6—6 of FIG. 5;

FIG. 7 is a longitudinal section taken on line 7—7 of FIG. 5 through the right hand block thereof;

FIG. 8 is a longitudinal section taken on line 8—8 of FIG. 5 through the left hand block thereof;

FIG. 9 is a longitudinal section taken on line 9—9 of FIG. 4 through the closed mold with the sprue plate in pouring position;

FIG. 10 is a schematic view showing the extruding, knurling and cut-off steps;

FIG. 11 is a schematic view showing compression of the pair of blocks;

FIG. 12 is a perspective schematic view showing clamping and drilling of the transverse hole;

FIG. 13 is a perspective schematic view showing finishing of the bullet cavity end; and

FIG. 14 is a sectional schematic view showing finishing of the bullet cavity walls.

DESCRIPTION OF THE PREFERRED EMBODIMENT

As shown in FIGS. 1–4 of the drawings, the hand bullet mold of the invention comprises a Scissor-like clamping handle 1 pivoted as at 2 and having a pair of clamp arms 3. Arms 3 are adapted to centrally hold a pair of facing mold blocks 4, 5 for relative pivoting

movement into and out of closed molding position. For this purpose, a transverse slot 6 having a curved concave base 7 is formed centrally in the outer wall of each block, with each slot fitting over the inner convexly curved edge 8 of the respective arm 3. A longitudinal screw 9 extends through each block 4, 5 and through an opening 10 in the respective arm 3 to loosely mount the block in place. The parts are arranged so that curved base 7 and edge 8 are spaced slightly apart, thus permitting slight transverse pivotal movement of each block, with a stop provided by engagement of either end of slot base 7 with arm edge 8.

Referring to FIGS. 5–9, each mold block 4, 5 is provided with a centrally disposed planular inner face 11, a V-groove 12 along one longitudinal edge, and a raised generally V-shaped rib 13 along the opposite longitudinal edge. The apex of rib 13 may be blunted for clearance purposes. When the unit is assembled, blocks 4 and 5 are reversed in orientation so that closing of the mold causes pivoting of the blocks on screws 9 and causes rib 13 of each block to enter complimentary groove 12 of the opposed block until faces 11 matingly engage. See FIGS. 1 and 3. Grooves 12 and ribs 13 thus serve to properly locate the blocks transversely.

In addition, means are provided to properly locate the blocks in a longitudinal direction. For this purpose, an elongated locator pin 14 is press-fit into a transverse groove 15 disposed along one end of face 11 of block 4, with pin 14 adapted to enter a complimentary facing transverse groove 16 disposed similarly in block 5. Grooves 15 and 16 are formed, as will be further described, so that groove 15 is about twice as deep as groove 16, thus allowing the press fit.

The face of each block is provided with a longitudinal semi-circular bullet mold cavity portion 17, with portions 17 forming a suitable complete cavity 18 when the mold is closed. Cavity 18 opens outwardly from the mold at the opposite end from pin 14 and is adapted to pouringly receive molten metal for the bullet. As cavity 18 is filled, provision must be made for the escape of air therefrom. For this purpose, faces 11 are provided with a grill-like plurality of fine closely spaced diagonally extending grooves 19. In addition, a shallow longitudinal venting groove 20 is disposed parallel to and proximate the base or root of each rib 13 adjacent face 11, thus forming with the opposite face 11 a pair of open-ended venting channels 22 when the mold is closed. Grooves 19 are in communication with cavity 18 and channels 22 so that air is vented therethrough to the outside during metal pouring.

As shown in FIGS. 2 and 4, structure of the device also includes a flat sprue plate 23 having an opening or sprue 24 therein and which is pivotally mounted to the end of block 4 which contains the opening for cavity 18. For this purpose, a screw 25 passes through a bushing 26 in plate 23, and through an annular uninterrupted wave washer 27 into block 4. Wave washer 27 is so named because it is provided with a series of undulations 28 which maintain tension between the screw-head bushing-head assembly and sprue plate 23 to hold the plate down without any torque applied to the plate. An edge of plate 23 includes a bent portion forming a stop 29, which engages the outer longitudinal wall of block 5 when sprue 24 is aligned above cavity 18. The torque-less construction prevents stop 29 from backing off from block 5 and thus maintains the openings in alignment.

It has been found preferable to manufacture the mold from relatively soft aluminum, so that it is more easily formable then conventional cast iron, which is more porous and tends to hold minute amounts of oil therein which is difficult to vent. Break-in is therefore usually not needed with aluminum.

Referring to FIGS. **10–14**, the bullet mold is made by extruding an aluminum bar **30** through any suitable well-known extrusion device **31**, so that a continuous face **11**, V-groove **12**, rib **13** and vent groove **20** are already formed on one bar side. After extrusion, bar **30** is passed across a rotating diagonal knurl **32** which forms diagonal venting grooves **19** in face **11**. A pair of blocks are then cut from bar **30**, as by a cutter **33**. The blocks are then reversed and placed face-to-face in a high compression press **34** to improve the fit thereof. In the process, the diagonal grooves **19** of each block leave an impression on the other block to form the grill-like appearance. The reversed blocks are subsequently clamped together in opposed relation, as by clamp **35**. A drill **36** is then utilized to bore transversely into the clamped assembly to provide an elongated bore **37** which is parallel to but slightly offset from the plane **38** of mating faces **11**. The offset is such that preferably two-thirds of the diameter of bore **37** is in block **4** and the remaining one-third is in block **5**. When the blocks are opened, bore **37** separates into grooves **15** and **16**, described previously. Bore **37** and the resultant groove **15** and pin **14** extend inwardly through rib **13** and groove **20** in block **4**, along face **11** and terminates proximate the inner edge of V-groove **12**. Groove **16** in block **5** extends from V-groove **12** to proximate groove **20**.

Subsequently, the clamped blocks **4, 5** are placed in a screw machine spindle **39** and rotated on the axis desired for the bullet cavity **18**. See FIGS. **12** and **13**. After rough drilling of the cavity by any suitable means, not shown, a finishing tool **40** forms the pointed bullet cavity end **41**. Then, a cutting blade type recessing tool **42** is moved axially into the cavity and is then moved radially outwardly to form the finished cavity walls, including suitable ridges **43**.

Various modes of carrying out the invention are contemplated as being within the scope of the following claims particularly pointing out and distinctly claiming the subject matter which is regarded as the invention.

I claim:

1. A bullet mold comprising:

a. a clamping device having a pair of facing relatively movable clamping members,

b. and a pair of complimentary opposed mold blocks loosely mounted to said clamping members and pivotable relative thereto and movable thereby into and out of closed mating position,

c. each of said mold blocks having a longitudinally extending bullet molding cavity portion which mates with the cavity portion of the other block when the mold is closed to form a complete molding cavity,

d. first cooperative locator means disposed on the inner facing portions of said pair of mold blocks for locating said pivotable blocks transversely when the mold is closed,

e. and second cooperative locator means disposed on the inner facing portions of said pair of mold blocks for locating said pivotable blocks longitudinally when the mold is closed.

2. The bullet mold of claim **1** wherein said first locator means comprises:

a. a groove disposed along one longitudinal edge of the inner face of each said mold block,

b. and a raised rib disposed along the other longitudinal edge of the inner face of each said mold block,

c. the rib on each block being disposed opposite the groove of the other block so that the respective ribs and grooves complimentingly mate when the mold is closed.

3. The bullet mold of claim **1** wherein said second locator means comprises:

a. a transverse groove extending across the inner face of each said mold block, with said grooves in facing positions,

b. and a locator pin disposed in one of said grooves and adapted to enter the other of said grooves when the mold is closed.

4. The bullet mold of claim **3** wherein:

a. the groove within which said pin is located is deeper than the other of said grooves,

b. and said pin is press-fit into its respective groove.

5. The bullet mold of claim **2** which includes: vent means for providing escape of air from said cavity as it is filled with molten metal.

6. The bullet mold of claim **5** wherein the inner facing portions of each said mold block are provided with matable generally planular faces, and wherein said air vent means comprises:

a. a plurality of closely spaced diagonally extending grooves disposed in said faces and communicating with said cavity,

b. and a longitudinal venting groove extending parallel to and proximate the root of each said raised rib and communicating with said diagonal extending grooves,

c. said venting grooves forming with the respective opposite block faces a pair of open-ended air venting channels when the mold is closed.

7. A bullet mold comprising:

a. a clamping device having a pair of facing relatively movable clamping members,

b. and a pair of complimentary opposed mold blocks loosely mounted to said clamping members and pivotable relative thereto and movable thereby into and out of closed mating position,

c. each of said mold blocks having a longitudinally extending bullet molding cavity portion which mates with the cavity portion of the other block when the mold is closed to form a complete molding cavity,

d. cooperative locator means disposed on the inner facing portions of said pair of pivotable mold blocks for locating said blocks transversely and longitudinally when the mold is closed,

e. a sprue plate disposed at the end of one of said blocks and having a sprue movable into alignment with said cavity,

f. and torque-less means for mounting said sprue plate on the said one of said blocks.

8. The mold of claim **7** wherein said torque-less means comprises:

a. a screw extending through said sprue plate into the end of the said one of said blocks,

b. and an annular uninterrupted undulating wave washer disposed between the head of said screw and said sprue plate.

* * * * *