May 12, 1964 E. E. GEBER 3,132,389

METHOD OF CASTING A REVOLVER FRAME

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Fig. 1

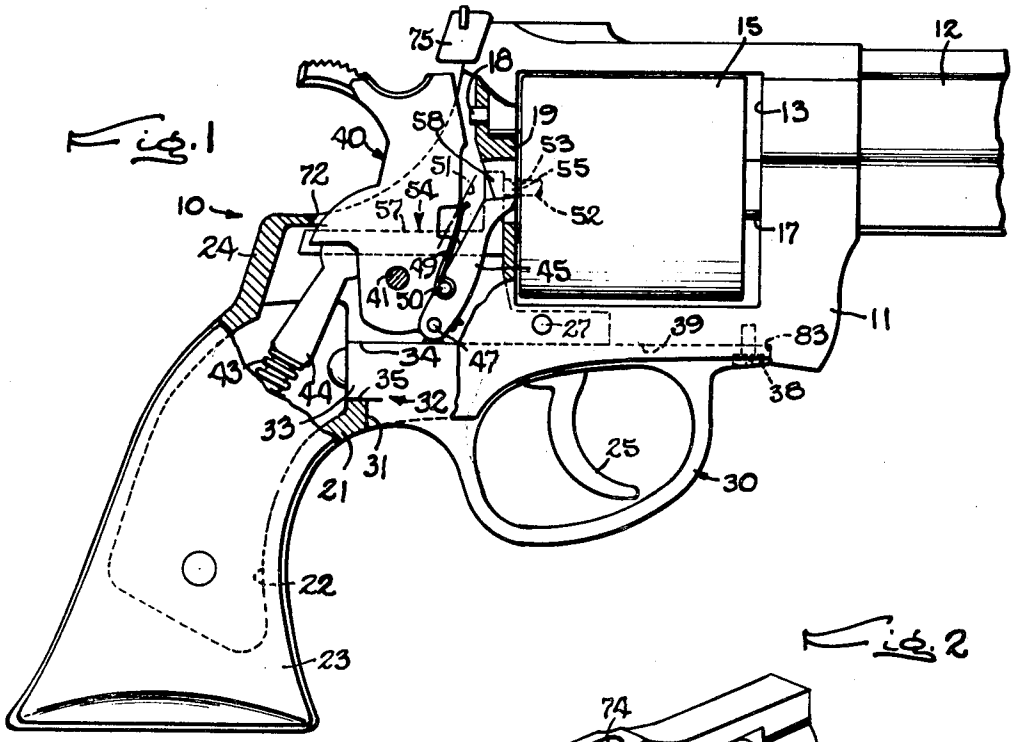


Fig. 2

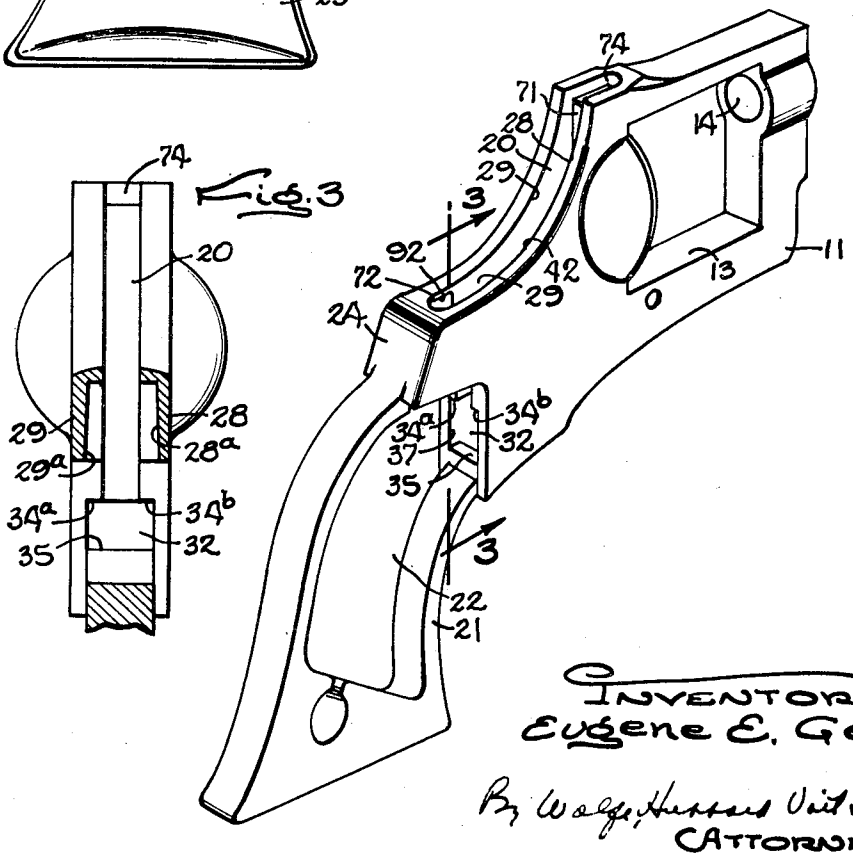


Fig. 3

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Fig. 4

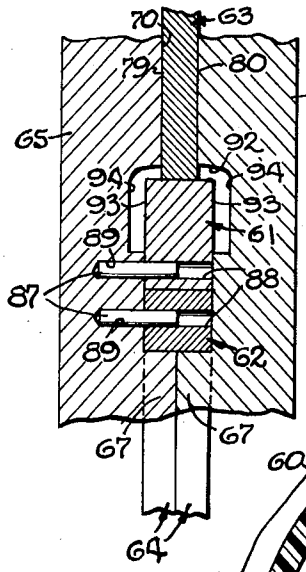
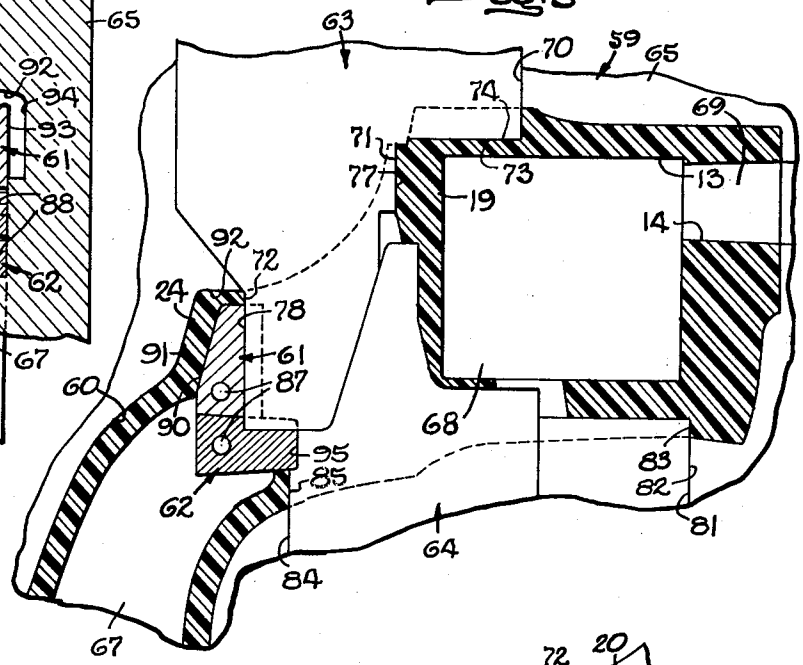


Fig. 5



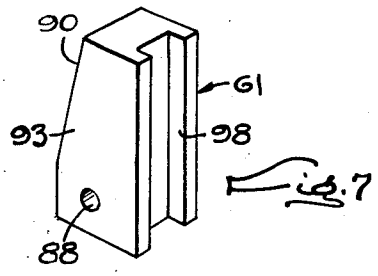


Fig. 7

Fig. 8

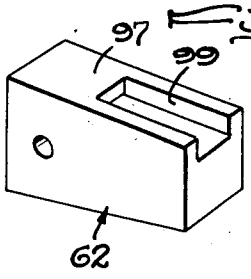
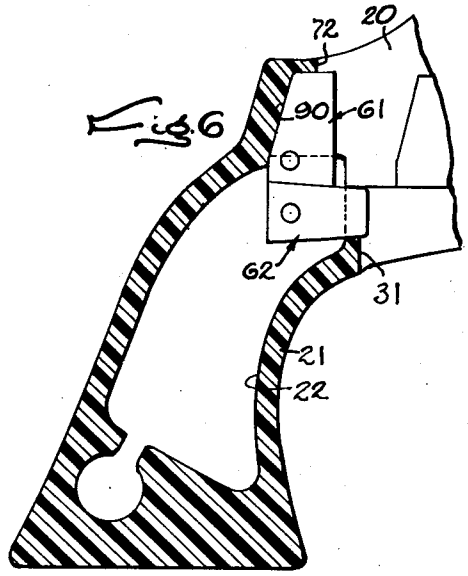


Fig. 6



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3,132,389

METHOD OF CASTING A REVOLVER FRAME

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3 Claims. (Cl. 22—200)

This invention relates to a method of casting a revolver frame with a chamber therein for housing the firing mechanism of the revolver. More particularly, it relates to a method of casting such a frame with hammer and trigger guard slots opening into the chamber through the upper and lower ends, respectively, and with a forwardly opening trigger guard seat adjacent the rear end of the trigger guard slot and a portion of the chamber extending rearwardly from the hammer slot under the upper end wall of the chamber, this wall being a part of the so-called horn of the revolver.

The general object of the present invention is to provide a novel method of casting a frame of the above character in one piece and eliminating a significant amount of machining as compared to the prior commercial practice.

A more specific object is to position and support insert cores in the mold cavity in a novel manner such that the hard-to-reach surfaces within the chamber are cast to close tolerances thereby eliminating the need for machining of these surfaces and for provision of a removable side plate on the frame for access to the interior of the chamber.

Another object is to facilitate the removal of the insert cores from the chamber of the cast frame.

Other objects and advantages of the invention will become apparent from the following detailed description taken in connection with the accompanying drawings, in which

FIGURE 1 is a fragmentary side elevation of a revolver having a frame formed in accordance with the present invention with parts broken away and shown in section.

FIG. 2 is a perspective view of the frame.

FIG. 3 is a fragmentary sectional view taken along the line 3—3 of FIG. 2.

FIG. 4 is a fragmentary sectional view taken in a vertical transverse plane through the mold and corresponding to the line 3—3 of FIG. 2.

FIG. 5 is a fragmentary sectional view taken in a vertical plane through the mold and extending longitudinally of the frame in the mold along a medial plane of the cavity and the frame chamber.

FIG. 6 is a fragmentary sectional view of a portion of the frame shown in the mold in FIG. 5, the frame having been removed from the mold with the insert cores in place.

FIG. 7 is a perspective view of the upper insert core.

FIG. 8 is a perspective view of the lower insert core.

Shown in the drawings for purposes of illustration is a revolver 10 having a frame 11 formed in accordance with the present invention. Such revolvers include a barrel 12 fast on the forward end of the frame and having a bore opening into a cylinder chamber 13 in the frame through a bore 14 (FIG. 2) in the frame. Within the chamber 13, a cylinder 15 formed with a plurality of angularly spaced cartridge chambers is rotatably mounted on a spindle 17 to be indexed step by step about the spindle thereby to aline successive cartridge chambers with the bore 14 and with a firing pin 18 (FIG. 1) guided for back and forth sliding in a frame wall 19 forming the rear end of the cylinder chamber.

Behind the wall 19 is another, substantially enclosed chamber 20 for housing the operating mechanism of the revolver. The rear portion of the frame constitutes a skeletal hand-grip portion 21 including an aperture 22 opening laterally to each side of the frame and covered

by the usual stocks 23 to form a hollow hand grip opening upwardly and forwardly into the portion of the chamber 20 directly below the horn 24.

The operating mechanism of the revolver includes a trigger 25 pivoted on a pin 27 spanning the side walls 28 and 29 of the chamber 20 below the cylinder. The lower end portion of the trigger hangs below the frame and the upper end portion (not shown) extends upwardly and rearwardly into the chamber 20. A trigger guard 30 is removably mounted in an elongated slot 31 formed in the underside of the frame and extends downwardly and rearwardly under the trigger. The slot corresponds in length and width to the length and width of the upper portion of the trigger guard and opens upwardly into the chamber 20. To hold the trigger guard in place, a seat 32 (FIG. 2) is formed in the frame at the rear end of the slot 31 to receive a rearwardly projecting lug 33 on the guard, the seat and the lug being of corresponding cross-sectional shape, rectangular in this instance, so that the rear end of the guard is held securely in place. As shown most clearly in FIG. 2, the seat 32 is defined by spaced horizontal top and bottom walls 34 and 35 and spaced vertical side walls 37. With the lug inserted in the seat, the forward end of the guard is held against the underside of the frame by a screw 38 threaded into a downwardly facing shoulder 39 closing the inner end of the forward portion of the slot 31.

Also mounted in the chamber 20 is a hammer 40 which is pivoted on a pin 41 spanning the chamber walls 28 and 29 with the upper portion of the hammer projecting out of the chamber through an elongated slot 42 in the top wall of the frame. This slot is slightly wider than the hammer and is long enough to accommodate the full range of hammer movement.

The lower end portion of the hammer extends downwardly toward the trigger and is operatively connected thereto in the usual manner so that retraction of the trigger first cocks and then releases the hammer. The latter is swung forwardly by a main spring 43 housed in the grip and acting through a strut 44 to rotate the hammer clockwise (FIG. 1) about the pin 41.

As the hammer is cocked, a cylinder hand 45 fulcrumed at 47 on the lower end of the hammer is swung upwardly and projected forwardly through a slot 48 (FIG. 1) in the wall 19 to engage a ratchet (not shown) formed on the rear end of the cylinder 15 thereby to index the cylinder one step in a manner that is well known to those skilled in the art. A spring 49 pivoted at 50 on the hand 45 rides along an inclined ledge 51 on the inside of one of the frame walls, herein the wall 28, to urge the hand forwardly through the slot 48 and into engagement with the ratchet.

The spindle 17 is supported in the usual manner to swing the cylinder out of the chamber 13 and to one side of the frame for access to the cartridge chambers, and the cylinder is latched in place in the chamber by a center pin 52 guided in the spindle for endwise back and forth sliding into and out of a hole 53 through the frame wall 19, the center pin being spring-pressed rearwardly into a latched position. To release the cylinder, a bolt or slide 54 is guided within the chamber 20 to slide forwardly and carry a pin 55 into the hole 53 to press the center pin out of the hole. Herein, the slide 54 includes a bar 57 slidable along the inside of the frame wall 29 with a second bar 58 projecting upwardly along the wall 19 and carrying the pin 55. As the slide is slid forwardly, the forward end of the pin enters the hole and becomes substantially flush with the front of the well 19, and as the slide is slid rearwardly, the rear end of the bar 57 slides under the horn 24 and the pin 55 is withdrawn from the hole 53.

It will be seen that the inner side 29a of the chamber wall 29 below the horn guides the bar 57 to maintain

alinement of the pin 55 with the hole 53 and, similarly, the surfaces 34, 35 and 37 of the trigger guard seat 32 securely support and position the rear end of the trigger guard 30 on the frame. Because these surfaces serve important purposes and are not alined with any of the openings into the chamber, the prior commercial practice has been to provide a side plate constituting one of the chamber side walls 28, 29 and to mount the plate for removal from the frame for access to the inside of the chamber by suitable tools for machining these surfaces with sufficiently close tolerances. It will be apparent that the cost of machining of the side plate and of these internal surfaces of the chamber constitutes a significant portion of the overall cost of the revolver.

Accordingly, the present invention contemplates a novel and relatively simple and inexpensive method of casting the frame 11 in one piece with these internal surfaces cast to relatively close tolerances thereby to eliminate the side plate and the machining of the inside of the chamber 20. For these purposes, first step of the method is to form a mold 59 having a cavity 60 conforming to the external shape of the frame. Insert cores 61 and 62 are positioned in the mold cavity to occupy the portions thereof corresponding to the area below the horn 24 and to the seat 32, and wafer-like draw cores 63 and 64 are inserted into the cavity from the ends thereof corresponding to the upper and lower frame ends and along rectilinear paths in a medial plane through the cavity, the inner end portions of these cores occupying the parts of the cavity corresponding to the slots 42 and 31 and forming parts of the chamber 20 alined with the respective slots along the respective paths. The draw cores 63 and 64 fit together within the cavity to form a continuous composite core and the insert cores 61 and 62 are supported in the cavity in abutment with the adjacent side of the composite core to project laterally of the draw cores and of their paths into the areas not alined with the slots 42, 31 along the respective paths.

This being done, the frame 11 is cast in the cavity around the cores, the draw cores are pulled reversely along their paths and from the mold, and the frame is removed from the mold. Then, the insert cores are dislodged from the frame and may be removed from the chamber 20 through one of the openings into the chamber.

In the present instance, the cores and the mold are composed of suitable metal and the mold comprises two laterally separable dies 65 (FIGS. 4 and 5) each formed with a recess constituting one half of the cavity 60, the dies having suitable cores 67 emplaced therein to extend laterally into the space corresponding to the hand grip aperture 22. A similar laterally extending core 68 forms the cylinder chamber 15, and a core 69 of circular cross-section is supported in contact with the forward end of the cylinder core 68 to form the bore 14.

The draw core 63 is inserted into the cavity 60 from the upper end thereof as viewed in FIGS. 4 and 5 through a guide slot 70 formed by two alined grooves in the adjacent sides of the dies 65 and centered on a medial plane of the cavity and, therefore, of the chamber 20. The thickness of this core corresponds to the thickness of the hammer slot 42 and the upper portion of the chamber 20, and the side edges of the inner end of the core are spaced apart to define the ends 71 and 72 of the slot and the upper portion of the wall 19. In order that the core may be withdrawn from the casting along a rectilinear path, the thickness of the core preferably tapers inwardly and there are no increases in width of the core inwardly from the slot 42, each inner part of the core being alined with the slot along the path of withdrawal.

On the forward side, a shoulder 73 shapes an external groove 74 for mounting the rear sight 75 of the revolver, and an inwardly extending edge 77 defines the front end 71 of the slot 42 and the rear side of the wall 19. On the other side, the rear edge 78 defines the rear end 72 of the slot. The laterally facing sides 79 and 80 (FIG. 4) of the core, of course, shape the spaced side walls of the upper portion of the chamber.

The lower draw core core 64 is inserted into the cavity 60 through a similar guide slot 81 (FIG. 5) between the dies 65 below the cavity as viewed in FIG. 5 and also is centered on the medial plane of the cavity and the chamber. Because of the greater width desirable for the trigger guard slot 31, this core is thicker than the upper core 63 and cooperates with the latter to define an upwardly and forwardly inclined, downwardly facing ledge on each side wall where the two cores fit together. One of these walls constitutes the guide ledge 51 along which the cylinder hand spring slides.

Again, the core 64 preferably is of inwardly tapering thickness and each inner part thereof is alined with the trigger guard slot 31 along a rectilinear path of withdrawal of the core. The front core edge 82 shapes the front end 83 of the slot and the rear edge 84 shapes the rear end 85 of the slot.

Each of the insert cores 61, 62 is a small block of approximately the same thickness as the lower draw core 64 and corresponds in shape to the portion of the chamber to be formed. In this instance, one end of each core projects into a portion of the cavity corresponding to the grip aperture 22 (see FIGS. 4 through 6) and is secured in that portion to a die 65 for initial support before the dies are closed and the draw cores are inserted. Pine 87 extend into alined holes 88 and 89 in the cores and the die respectively to secure the cores in place. Thus, the insert cores form part of the grip aperture 22.

The insert core 61 projects upwardly toward the upper end of the cavity with an inclined side 90 spaced from the adjacent cavity wall 91 and terminating short of the upper end 92 to form the horn 24. The sides 93 of the core 61 similarly are spaced from the side walls 94 of the cavity to define the inner surfaces 28^a and 29^a (FIG. 3) of the chamber side walls 28 and 29 just below the horn 24. To form the seat 32, the lower insert core 62 is positioned against the lower end of the core 61 and extends forwardly beyond both the insert core 61 and the grip aperture cores 67 along the underside of the inner end of the draw core 63 and into a notch 95 in the rear side of the lower draw core 64. Thus, the four side walls of the core 62 define the corresponding walls of the seat 32. Because the upper core 63 is narrower and abuts against the upper side 97 of the insert core 67, the upper wall 34 is divided into two sections 34^a and 34^b (FIG. 2).

To insure secure positioning of all the cores and tight contact between the draw cores and the insert cores, a groove 98 is formed in the forward side of the upper insert core 61 to receive the adjacent edge 78 of the core 63, both the groove 98 and the edge 78 paralleling the path of the draw core to permit separation of these two cores from each other after the frame is cast. The lower end of the upper core also fits into a groove 99 in the upper side 97 of the lower insert core thus interlocking the insert cores with the draw core. A similar groove (not shown) may be formed in the upper edge of the lower draw core so that the two draw cores are locked together.

While the order of insertion of the cores is not critical, the two insert cores preferably are positioned in the cavity 60 before the draw cores are inserted, the dies 65 then being closed and the draw cores being slid in along the guide slots 70 and 81 and interlocked with the insert cores. With the cores in place in the cavity and the dies closed with the usual sprue, gate and vents (not shown) provided, the frame 11 is cast in the cavity in the usual manner. Then, the draw cores are pulled from the cavity and the frame is removed with the cores 61 and 62 embedded in the chamber 20 as shown in FIG. 6. To facilitate removal of these cores, the upper core 61 tapers upwardly and the lower core 62 tapers forwardly. Thus, the core 62 is dislodged by tapping it rearwardly

into the grip aperture 22 and the core 61 is tapped downwardly into the aperture. Accordingly, the frame is cast in one piece with the hard-to-reach internal surfaces shaped exactly as desired in the final product.

While the metal frame may be cast directly in the dies, it is preferred to cast a plastic pattern in the dies to correspond exactly to the shape of the frame, and then to use the pattern to form an investment for use in casting the metal frame after the plastic is burned or melted out. For this purpose, the plastic pattern is molded in the die by following the above steps, and then is coated with a suitable investment material which forms a shell around the pattern. When the investment is baked, for example at 2000 degrees F., the shell is cured and the plastic is burned out to leave a cavity therein corresponding exactly to the shape of the pattern. The metal frame is cast in the shell which is broken away after the metal hardens. By using investment casting methds, the life of the die is greatly prolonged.

I claim as my invention:

1. The method of casting a one-piece revolver frame having a chamber therein defined by spaced side walls and narrow upper and lower ends walls having hammer and trigger guard slots respectively therein opening into said chamber and disposed in a medial plane through said chamber, said chamber including a portion extending rearwardly from said hammer slot under said upper wall and opening into a grip aperture in said frame, and a trigger guard seat opening forwardly from one end of said trigger guard slot, said method comprising the steps of forming a mold cavity in two laterally separable dies to correspond to the external shape of said frame and providing a laterally extending core therein forming part of said aperture, inserting a first draw core into said mold along a first rectilinear path in said plane and leading into the end of said cavity corresponding to the upper end of said frame, supporting the core with its inner end portion projecting into said cavity and spaced from the side walls of the cavity to define said hammer slot and the portion of said chamber alined with the hammer slot along said path, inserting a second draw core into said mold along a second rectilinear path in said plane and leading into the end of said cavity corresponding to the lower end of said frame, supporting said second draw core with its inner end projecting into said cavity and spaced from the side walls of the cavity to define said trigger guard slot and the portion of said chamber alined therewith along said path, said draw cores fitting together within said cavity to form a continuous composite core extending through the cavity, supporting a third upwardly tapered core on one of said dies prior to closing the latter in position to abut against one side of said composite core and extend rearwardly and downwardly therefrom below said upper wall and into the space corresponding to the rest of said aperture, supporting a forwardly tapered fourth core on said one die prior to closing the dies in position to abut against said composite core and occupy the space corresponding to said seat and extend into the space corresponding to said aperture, securing said third and fourth cores to said one die, casting said frame of molten material in said cavity around said cores, pulling said draw cores from said mold reversely along said paths, removing the cast frame from the mold and dislodging said third and fourth cores from the chamber and into said aperture for removal from the frame.

2. The method of casting a one-piece revolver frame having a chamber therein defined by spaced side walls and upper and lower end walls, said method including the steps of, forming a mold cavity in two laterally separable dies to correspond to the external shape of said frame, inserting a first draw core of thickness corresponding to the width of said chamber adjacent said upper wall into said cavity from the end thereof corresponding to said upper wall and along a rectilinear path in a medial plane through said cavity, supporting said first draw core with its inner end portion spaced from the side walls of the cavity thereby to define a hammer slot and an upper portion of said chamber alined with said hammer slot along said path, inserting a second draw core of thickness corresponding to the width of said chamber adjacent said lower wall into said cavity from the end thereof corresponding to said lower wall and along a second rectilinear path in a medial plane through said cavity, supporting said second draw core with its inner end portion spaced from said cavity side walls to define a trigger guard slot and a lower portion of said chamber alined with said trigger slot along said second path, fitting the inner ends of said draw cores together within said cavity to form a continuous composite core extending through the cavity, supporting an insert core in said cavity prior to closing said dies in spaced relation with said cavity side walls and upper end and in position to abut against one side of said composite core to define a portion of said chamber extending laterally of said first path and beneath said upper frame wall, supporting a second insert core in said cavity prior to closing said dies in spaced relation with said cavity side walls and the end thereof corresponding to the lower frame end and in position to abut against said first insert core and one side of said composite core to define a portion of said chamber extending laterally of said second path and above said lower wall, interlocking the adjacent edges of said cores, casting said frame of molten material in said cavity and around said cores, pulling said draw cores reversely along said paths from said mold, removing the cast frame from said mold, and dislodging said insert cores from said frame and removing the same from the chamber.

3. The method of casting a one-piece revolver frame having a chamber therein defined by spaced side walls and narrow upper and lower end walls having hammer and trigger slots therein opening respectively into the top and bottom of said chamber, said chamber including a portion extending rearwardly from one of said slots along the inside of adjacent end wall, said method including the steps of, forming a mold cavity in two laterally separable dies to correspond to the external shape of said frame, positioning a first wafer-like draw core in said mold for withdrawal along a rectilinear path in the plane of said hammer slot and supporting the core with its inner end portion projecting into the cavity and spaced from the side walls of the cavity to define the hammer slot and the portion of the chamber adjacent and alined with the hammer slot along said path, positioning a second wafer-like draw core in said mold for withdrawal along a rectilinear path in the plane of said trigger slot for withdrawal along a rectilinear path in the plane of the trigger slot and supporting said second core with its inner end portion projecting into the cavity and spaced from the side walls thereof to define said trigger slot and the portion of said chamber alined therewith, said draw cores fitting together within said cavity to form a continuous composite core extending through the cavity, inserting a third core in said cavity prior to closing said dies and supporting said third core in spaced relation with said cavity side walls and said end walls with said third core abutting against and projecting laterally from said composite core to define a portion of said chamber not alined with one of said slots, casting said frame of molten material in said cavity and around said cores, pulling said draw cores along said paths from said mold, removing the cast frame from said mold, and dislodging said third core from said frame laterally of said paths and removing the core from said frame.

References Cited in the file of this patent

UNITED STATES PATENTS

2,905,990	Whipple	Sept. 29, 1959
2,948,031	Webb	Aug. 9, 1960