

May 16, 1933.

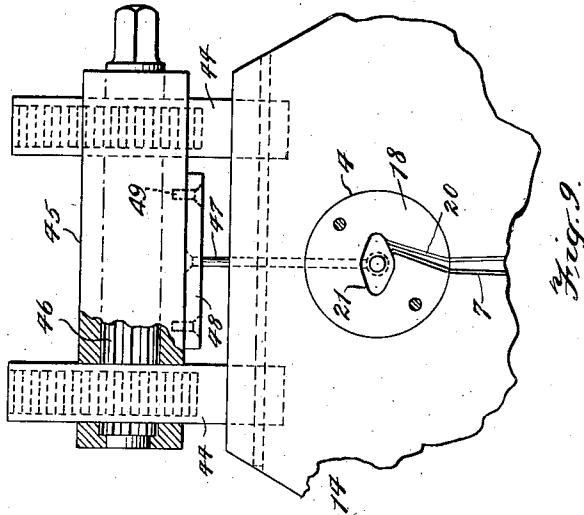
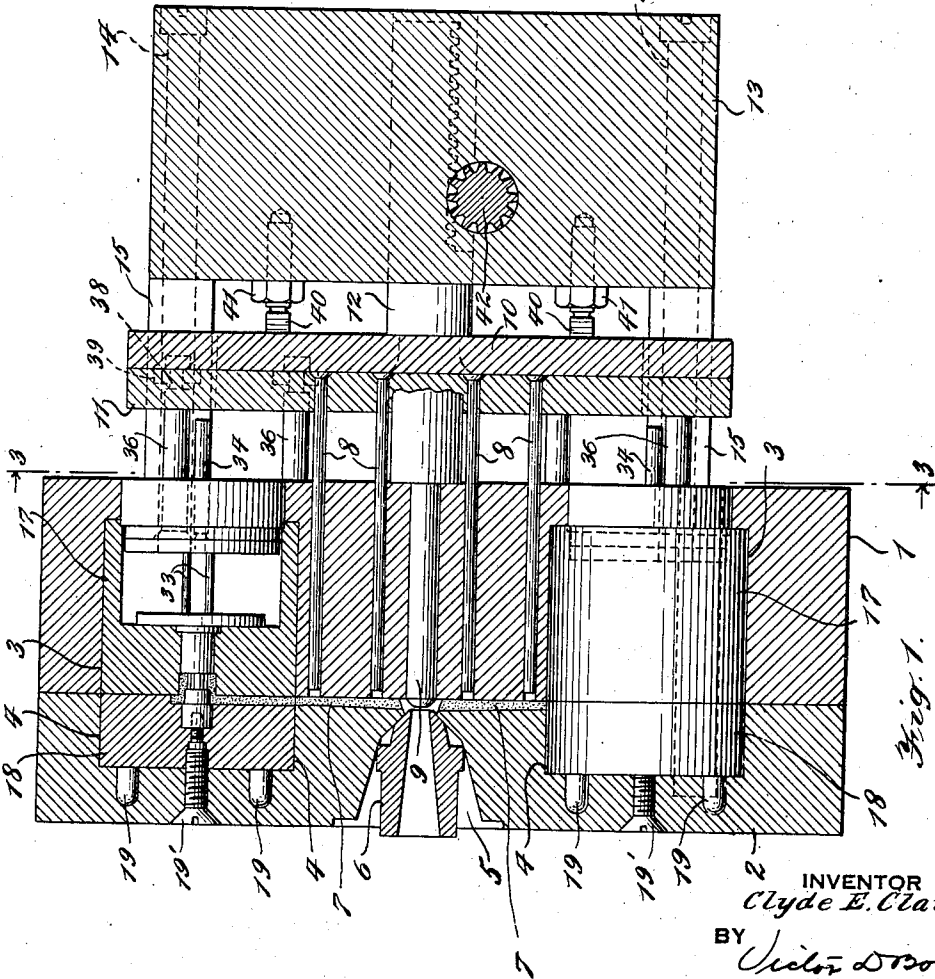
C. E. CLAUS

1,909,253

CASTING DIE

Filed Nov. 20, 1930

3 Sheets-Sheet 1



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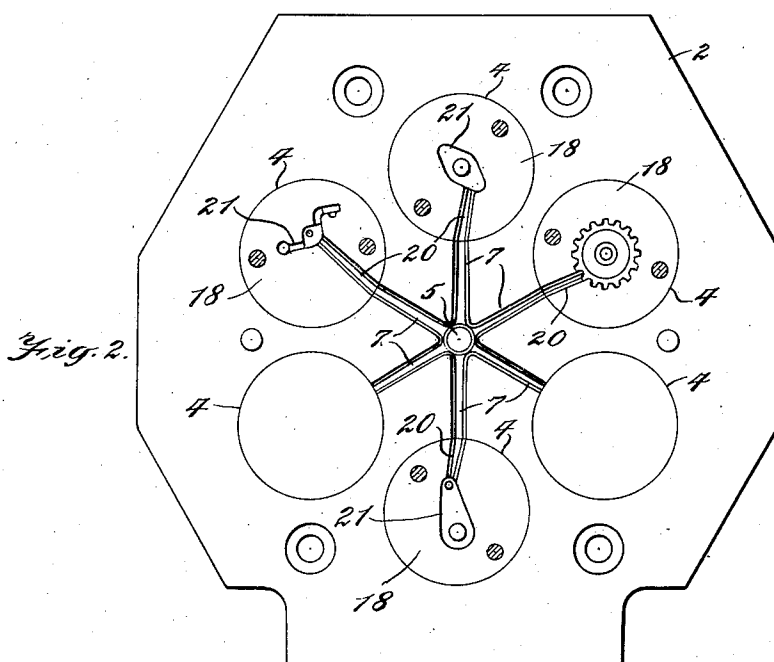
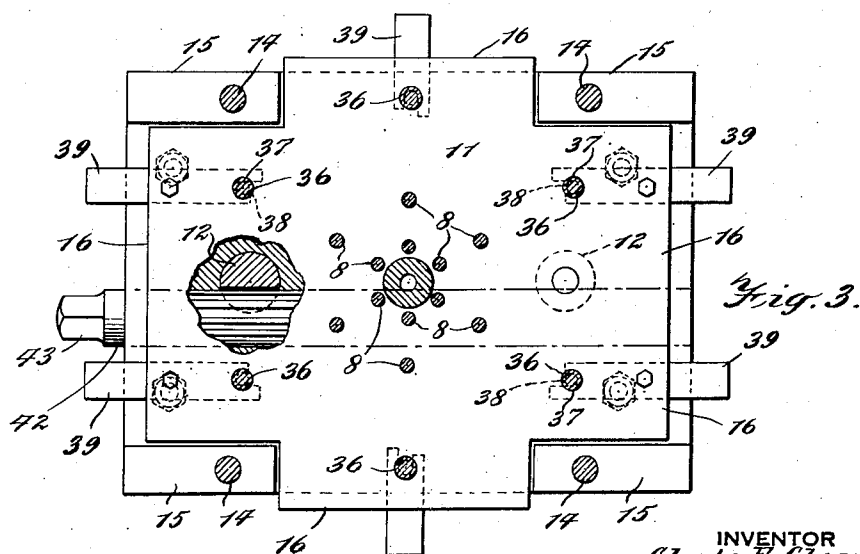
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3 Sheets-Sheet 3

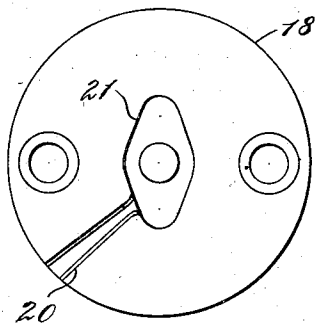


Fig. 5.

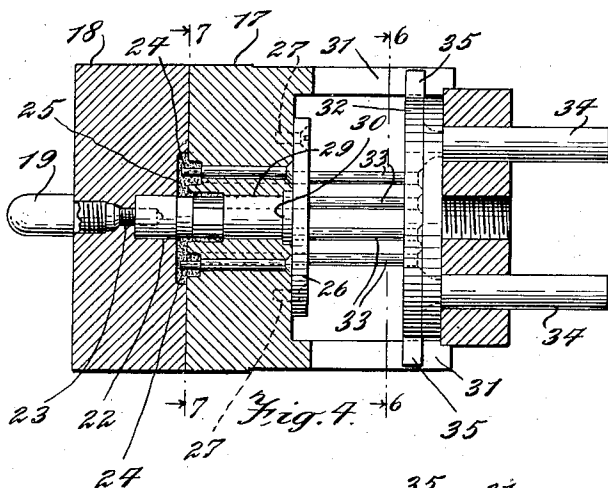


Fig. 4.

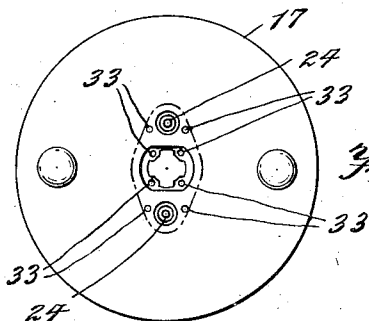


Fig. 7.

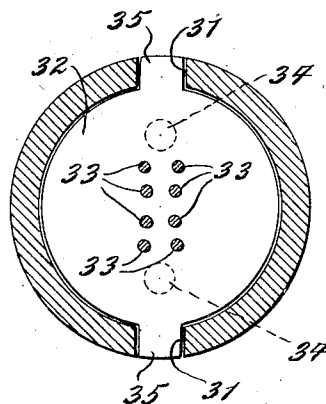


Fig. 6.

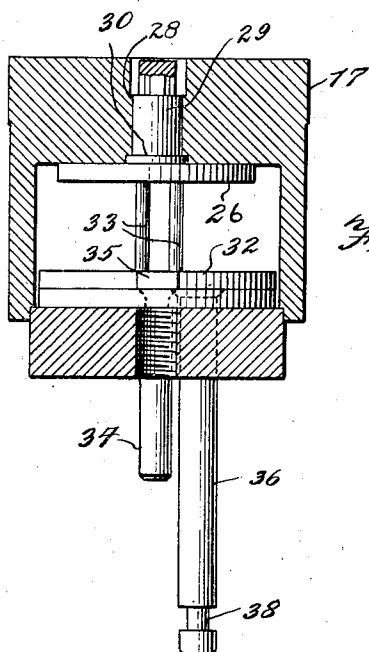


Fig. 8.

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CLYDE E. CLAUS, OF BROOKLYN, NEW YORK, ASSIGNOR TO DOEHLER DIE-CASTING CO.,
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CASTING-DIE

Application filed November 20, 1930. Serial No. 496,854.

In the art of die-casting, the casting-die constitutes a material factor in the cost of producing castings. The production of metal casting-dies requires such a high order of skill that the dies are very expensive. Heretofore, it has been necessary to make a complete new die for each kind of casting required. After the required number of castings has been made with a die, the die is stored until more of the same kind of castings are required. While the dies remain in storage, the die-casting manufacturer receives no return on the investment represented by the dies. It is therefore evident that a reduction in the cost of dies would constitute a material factor in reducing the cost of die-casting, and it is to a casting-die which materially reduces the requisite investment in dies that my invention relates.

In accordance with my invention, I provide a multiple die which comprises a plurality of replaceable units to which the charge of metal is simultaneously delivered. Each of these replaceable units constitutes a separate mold. With this construction, when a different shape of casting is desired, one of the units of the die is replaced by a unit having a mold cavity suitable for the casting required. The several units may differ each from the others in respect to the shape of the mold cavity so that castings of several different shapes are produced each time the die is charged with molten metal.

My improved die comprises a common supporting mechanism for the several units which is gated to distribute the metal to the units from a single gate opening and which contains suitable means for removably holding each unit. Specifically the supporting mechanism includes a two part member which is in effect a large die with a plurality of cavities but with the unit molds disposed in the cavities and gated in communication with the gate of the supporting member. Each unit mold has individual ejector mechanism which is operatively coupled with the ejector mechanism of the supporting mechanism operative to eject the metal from the gate as the die opens.

Advantages of the die of my invention will

be apparent from the following particular description of the embodiments shown in the drawings in which:

Fig. 1 is a sectional elevation of a casting-die constructed in accordance with my invention;

Fig. 2 is a plan of the cover member;

Fig. 3 is a transverse section taken on the line 3—3 of Fig. 1;

Fig. 4 is a sectional elevation of one of the units;

Fig. 5 is a plan of a unit half mold;

Fig. 6 is a transverse section taken on the line 6—6 of Fig. 4;

Fig. 7 is a transverse section taken on the line 7—7 of Fig. 4;

Fig. 8 is a sectional elevation of the unit shown in Fig. 4 at right angles to the section shown in Fig. 4, the unit cover die being removed; and

Fig. 9 is a fragmentary plan of the body member of the supporting mechanism.

The multiple die shown in the drawings comprises a supporting mechanism which includes a body part 1, a cover part 2, and ejection mechanism for ejecting the castings from the die. The body and cover parts of the supporting mechanism have a plurality of cavities, shown as six in number, formed therein, a portion 3 of each of the cavities being formed in the body part, and a portion 4 being formed in the cover part. The cavities, in the die shown, are arranged equidistant from the transverse centers of the body and cover part of the supporting mechanism which are gated to distribute molten metal from a gate opening 5 in the center of the cover part to which the metal is delivered by a nozzle 6. In the die illustrated, the gates 7 are formed in the cover part and radiate to the several cavities.

Extending through the body part transverse to the gates in the cover part, there are a plurality of ejector pins 8, shown as two for each gate, for ejecting the cast metal from the gates after the cover die has been removed, and through the center of the body part there is a sprue-cutter 9 for cutting the sprue. The ends of the ejector pins are so-

cured in an ejector plate so that the pins are operated by the ejector plate.

The ejector plate consists of two plates 10 and 11 secured together. The ejector pins 5 extending through the body part extend through only the plate 11, the conical head of the ejector pins being countersunk in the inner surface of the plate and firmly secured between the two plates. The ejector plate is 10 operated by two racks 12 which extend into an ejector box 13 which is secured to the body part 1. The ejector box is secured by fillister head screws 14 which extend through projections 15 formed on the ejector box and 15 abut against the surface of the body part. The projections formed on the ejector box also serve as guides for the ejector plate which is provided with projections 16 extending between the projections 15 of the 20 ejector box.

In each of the cavities formed in the body and cover parts there is a replaceable unit mold. Each unit mold comprises two separable halves, a half mold 17 which fits into 25 the portion of the cavity in the body part, and a half mold 18 which fits within the corresponding portion of the cavity in the cover part. The half molds 18 are properly located in the cover part by dowel pins 19, 30 and are secured in place by machine screws 19'. Each of the unit molds constitutes a separate and distinct mold and they may all have similarly shaped mold impression or 35 each may have a differently shaped mold impression as shown in Fig. 2. Each unit mold has, however, a gate 20 extending between the edge of the mold impression 21 and the edge of the unit mold. These gates are adapted to be aligned with the radial gates 40 in the cover part of the supporting mechanism. In the unit molds shown in Figs. 1 and 4 to 8, a core 22 is secured to the unit half mold 18 by a machine screw 23 and extends into the mold impression in the unit mold 45 when the die is closed. Core pins 24 are also provided for the holes in the ends of the flange of the casting 25 shown in the unit mold. These core pins extend through the half mold 17, the heads of the core pins being countersunk in the surface of the half 50 mold and secured in place by a plate 26 which is secured to the surface of the half mold 17 by screws 27. The opening 28 in back of the casting in the unit mold is closed by a plug 29 which has a shoulder 30 that limits the 55 inward movement of the plug. The plug is held in place by the plate 26.

The end of the half mold 17, opposite to the cover die, is hollow and has diametrically 60 opposed slots 31 and constitutes a frame or an ejector box. Each of the unit molds is provided with an ejector plate 32 similar to that described in connection with the supporting mechanism and with a plurality of 65 ejector pins 33 which extend through the half

mold 17 and are secured at their ends in the ejector plate. Guide pins 34 extending from the ejector plate oppositely to the ejector pins are provided for guiding the ejector plate. The ejector plate is also provided with projections 35 which extend into the slots 31 of 70 the unit mold ejector box and act as guides.

The ejector plates of the several units are operated by the ejector plate of the supporting mechanism and for this purpose 75 there is provided an ejector rod 36 for each unit mold which is secured at one end in the ejector plate of the unit mold and extends into an opening 37 in the ejector plate of the supporting mechanism. The ejector rod 80 of a unit mold, at the end which enters the ejector plate of the supporting mechanism, is provided with a reduced portion 38 that constitutes a keyway. A key 39 which is slidably mounted in a groove between the 85 plates 10 and 11 of the supporting mechanism ejector plate engages the reduced portion of the ejector rod of the unit mold and secures the ejector rod to the ejector plate 90 of the supporting mechanism.

When the die is closed and in position to receive molten metal the ends of the ejector pins extending into the die should be level with the surface of the mold impression therein. In order to insure that the pins 95 are properly located, adjustable set screws 40 are provided on the ejector box of the supporting mechanism. These set screws limit the movement of the ejector plate in a 100 direction to withdraw the ejector pins and may be adjusted to properly locate the ends of the ejector pins and secured in place by lock nuts 41. Within the ejector box, there is a transverse pinion shaft 42 which is journaled therein. The pinion shaft engages the 105 racks 12 which are secured to the ejector plate of the supporting mechanism, the end of the racks extending through one of the plates 10 and being firmly secured between the plates. One end 43 of the pinion shaft 110 extends beyond the ejector box and is squared to receive a handle having a complementary socket, and by means of which the ejector plate may be operated manually.

On one of the sides of the body part 1 of 115 the supporting mechanism as shown in Fig. 9, there is mounted a pair of racks 44 which extend laterally therefrom, one end of the racks extending into openings in the side 120 of the die and being rigidly secured therein. Extending between these racks there is a carriage 45 which rides upon the racks. The carriage carries a transverse pinion shaft 46 which engages the teeth of the racks 125 and by means of which the carriage may be moved along the racks. Between the two racks there is a hole extending through the body part to the adjacent cavity in the body part. This hole is adapted to receive a lateral 130 core pin 47 which is secured to the car-

riage by means of a plate 48, the head of the core pin being countersunk in the inner surface of the plate 48 and the plate being secured to the side of the carriage by screws

49. This lateral core pin is adapted to be used when the casting to be made is to have a transverse hole. In such a case the unit mold will have a radial hole which will be adapted to be aligned with the hole for the core pin in the body part of the supporting mechanism. When the casting is to be removed from the die, the carriage is actuated through the pinion shaft 46 to remove the core pin from the casting which may then be ejected from the die by the ejector pins. It is obvious, of course, that there may be a lateral core pin for each of the cavities in the die, if desired.

From the above description of the embodiment of my invention shown in the drawings, it will be apparent that for each differently shaped casting manufactured a replaceable unit only will be necessary and the casting-die may be used continuously, irrespective of the shape of castings being manufactured. It will also be apparent that several differently shaped castings may be cast at the same time and any one of these several castings may be changed at will while the other castings manufactured remain the same.

It is obvious that various changes may be made in the details of the embodiment described above by those skilled in the art without departure from the principle and spirit of my invention as defined in the appended claims.

I claim:

1. For a casting-die provided with a cavity for a removable mold unit and including ejector mechanism, a replaceable mold unit designed for the cavity in the casting-die, and an ejector mechanism for the mold unit adapted to be operated in unison with the first mentioned ejector mechanism.

2. For a casting-die including a cover part and a body part having aligned cavities therein for a removable mold unit and an ejector plate, a replaceable mold unit comprising two separable half molds, ejector pins for ejecting a casting from the mold impression, an ejector plate for operating the ejector pins, and means for removably securing the ejector plate of the unit mold to the first mentioned ejector plate.

3. A casting-die comprising a supporting member having a plurality of cavities and being gated to distribute metal to the several cavities, ejector mechanism for ejecting a casting from the supporting member, a replaceable mold unit having a mold impression in each of the cavities in the supporting member, ejector mechanism for each of the mold units for ejecting a casting from the mold impression, and means for operating

the ejecting mechanism of the mold units in unison with the ejector mechanism of the supporting member.

4. A casting-die comprising a supporting member having a plurality of cavities and being gated to distribute metal to the several cavities, ejector mechanism for the supporting member for ejecting a casting from the supporting member, a replaceable mold unit having a mold impression in each of the cavities in the supporting member, ejector mechanism for each of the mold units for ejecting a casting from the mold impression, and means for connecting the ejector mechanism of the unit molds to the ejector mechanism of the supporting member to be operated thereby.

5. A casting-die comprising a supporting mechanism having a plurality of cavities and being gated to distribute metal to the several cavities, ejector pins for ejecting a casting from said supporting member, an ejector plate for operating the ejector pins, a replaceable mold unit in each of the cavities in the supporting member, each mold unit having a mold impression therein, and ejector pins for ejecting a casting from the mold impression, and means for connecting the ejector pins of each of the mold units to the ejector plate of the supporting mechanism to be operated thereby.

6. A casting-die comprising a two part supporting member having a plurality of cavities therein and including a body part and a cover part, each part having a portion of each cavity therein, ejector pins for ejecting a casting from the supporting member, an ejector plate for operating the ejector pins to which the ejector pins are secured, a replaceable mold unit for each of the cavities in the supporting member, each replaceable mold unit including a half mold in the portion of the cavity in the body part of the supporting member, a half mold in the portion of the cavity in the cover part of the supporting member, ejector pins for ejecting a casting from the mold unit, and an ejector plate for operating the ejector pins to which the ejector pins are secured, and means for connecting the ejector plate of the mold unit to the ejector plate of the supporting member to be operated thereby.

7. A casting-die comprising a supporting member having a plurality of cavities therein, an opening for the molten metal and a plurality of gates extending from the opening to the cavities, ejector pins extending through the supporting member along the gates for ejecting cast metal from the supporting member, an ejector plate for operating the ejector pins to which the ejector pins are secured, a replaceable mold unit in each of the cavities in the die having a mold impression therein and a gate adapted to be aligned with the gate in the die leading from

the opening to the cavity in the supporting member and including ejector pins for ejecting the casting from the mold impression, and an ejector plate to which the ejector pins are secured for operating the ejector pins, means for connecting the ejector plates of the mold units to the ejector plate of the supporting member, and an ejector box having means for operating the ejector plate of the supporting member.

8. A casting-die comprising a two part supporting member having a plurality of cavities therein and including a body part and a cover part, each part having a portion of each cavity therein, the cover part having an opening therethrough for the molten metal, the complete supporting member having gates extending from the opening in the cover die to the several cavities, ejector pins extending through the supporting member along the gates therein for ejecting a casting from the member, an ejector plate to which the ejector pins are secured for actuating the ejector pins, a replaceable mold unit for each of the cavities in the supporting member, each replaceable mold unit including a half mold in the portion of the cavity in the body part of the supporting member, a half mold in the portion of the cavity in the cover part of the supporting member, each mold unit having a mold impression therein and a gate extending from the mold cavity to the edge of the mold unit and adapted to communicate with the gate extending from the opening for molten metal in the cover part of the supporting member to the receptacle, ejector pins for ejecting a casting from the mold unit, an ejector plate for actuating the ejector pins, and means for connecting the ejector plate of the mold unit to the ejector plate of the supporting member, and an ejector box secured to the supporting member and having means for actuating the ejector plate of the supporting member.

9. For a casting-die including a body part and a cover part and having a cavity formed partly in each part thereof for a removable mold unit and being gated to distribute metal to the cavity, a replaceable mold unit designed for the cavity in the casting-die, the mold unit comprising a body portion and a cover portion each having a portion of the mold impression of the unit therein and the mold unit being gated to receive metal distributed to the cavity in the casting-die.

10. For a casting-die including a body part and a cover part and having a cavity formed partly in each part thereof for a removable mold unit and being gated to distribute metal to the cavity, a replaceable mold unit designed for the cavity in the casting-die, the mold unit comprising a body portion and a cover portion each having a portion of the mold impression of the unit therein and the mold unit being gated to receive metal dis-

tributed to the cavity in the casting-die, and ejector mechanism for the unit mold mounted in the body portion thereof.

11. A casting-die comprising a supporting member including a cover part and a body part each having a plurality of aligned cavities therein and one of the parts being gated to distribute metal to the several cavities, and a replaceable mold unit in each of the cavities in the supporting member and each including a cover part received in the cavity of the cover part of the supporting member and a body part received in the cavity in the body part of the supporting member and each part of the mold unit having a portion of the mold impression therein and one of the parts being gated to receive metal distributed to the cavity in the supporting member.

12. For a casting-die including a body part and a cover part and having a cavity formed partly in each part thereof for a removable mold unit and being gated to distribute metal to the cavity, a replaceable mold unit designed for the cavity in the casting-die, the mold unit comprising a body portion and a cover portion each having a portion of the mold impression of the unit therein and the mold unit being gated to receive metal distributed to the cavity in the casting, an ejector plate slidably mounted in the unit, ejector pins extending therefrom and adapted to extend into the mold impression, and connecting means secured to the ejector plate and adapted to be secured to the ejector actuating mechanism of a casting-die.

13. In a casting machine, in combination, a pair of relatively movable die supports, a plurality of individually replaceable unit molds, each comprising complementary members removably carried respectively by said supports, means for relatively moving the supports to open and close the molds, and means for simultaneously ejecting the castings from all of the unit molds, comprising ejecting mechanism forming a part of each unit, and a single operating means common to all of said mechanisms, each unit ejecting mechanism being composed of separable parts so that the part peculiar to a particular die member may be removed with said member when a substitution is made, and the other part may remain in the machine for coaction with the substitute die member.

In witness whereof, I hereunto subscribe my signature.

CLYDE E. CLAUS.