Dec. 1, 1959 L. H. MORIN 2,914,805

APPARATUS FOR PRODUCING SUPERIMPOSED CASTINGS BETWEEN THREE RELATIVELY MOVABLE DIES

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Fig. 1.

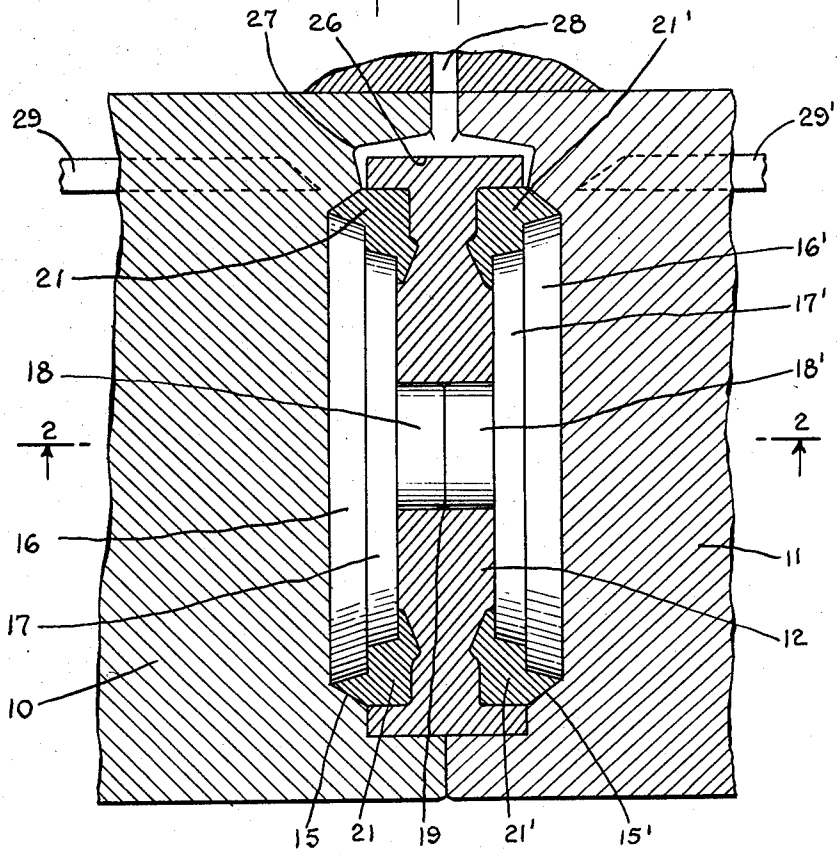


Fig. 4.

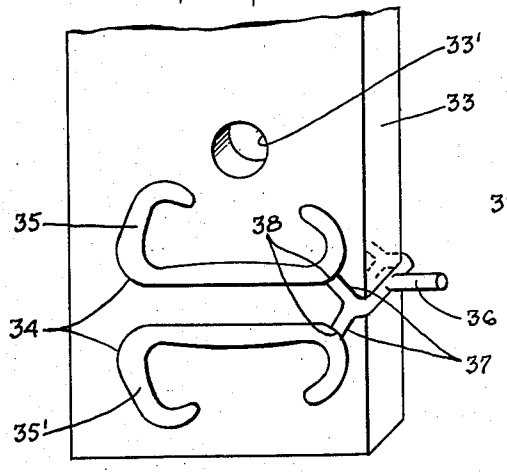
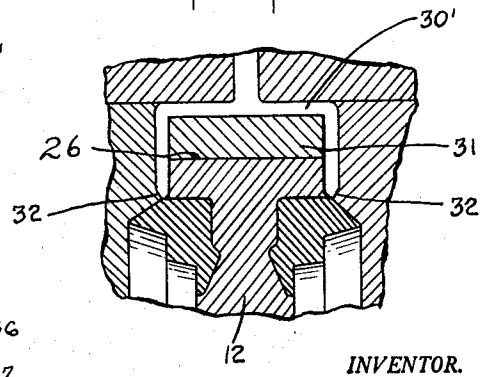


Fig. 3.



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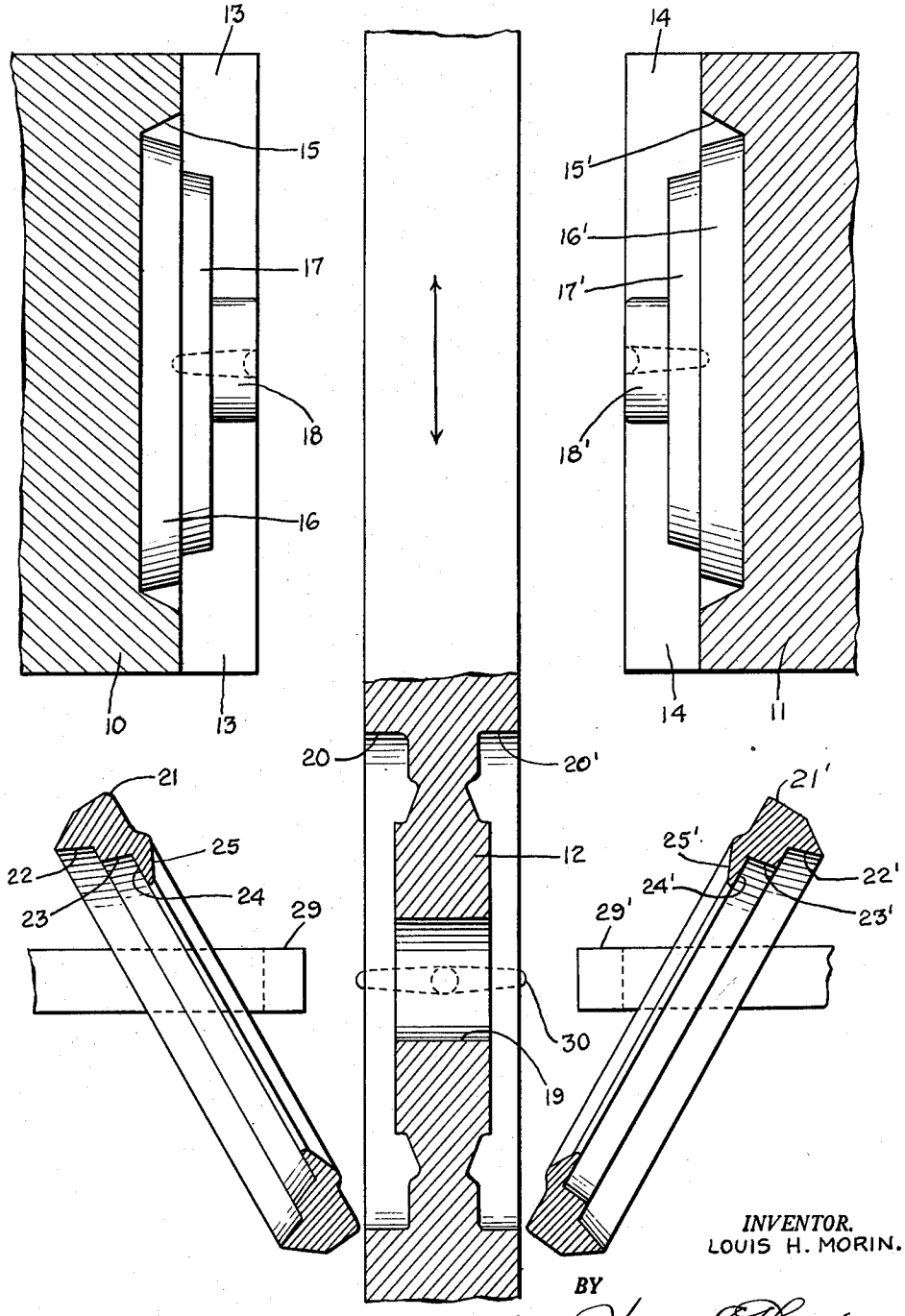
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Fig. 2.



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2,914,805

APPARATUS FOR PRODUCING SUPERIMPOSED CASTINGS BETWEEN THREE RELATIVELY MOVABLE DIES

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Application April 25, 1955, Serial No. 503,467

1 Claim. (Cl. 18—42)

This invention relates to the production of multiple or superimposed cast or moulded products in such manner as to adapt a relatively small capacity machine to a higher production speed, while maintaining the standard of the hydrostatic pressure required in operation of the small machine, thereby economically producing the resulting products by virtue of the increased production capacity of the machine.

More particularly, the invention deals with a machine of the character described, wherein a pair of opposed relatively movable dies are employed in conjunction with an intermediate die movable across the path of movement of such pair of dies, in the operation of forming the cast or moulded products and removal of the same from the machine, and particularly, wherein the gating for cavities disposed upon opposed surfaces of the intermediate die is across an outer surface of said intermediate die.

The novel features of the invention will be best understood from the following description, when taken together with the accompanying drawing, in which certain embodiments of the invention are disclosed and, in which, the separate parts are designated by suitable reference characters in each of the views and, in which:

Fig. 1 is a diagrammatic sectional view through three dies, illustrating formation of cast products on opposed surfaces of one of said dies.

Fig. 2 is a diagrammatic sectional view, showing all of the dies in relative position to each other and indicating the method of releasing the cast products from opposed surfaces of an intermediate die, the section of Fig. 2 being substantially on the line 2—2 of Fig. 1.

Fig. 3 is a detail sectional view, similar to Fig. 1, showing only a part of the construction and showing a modification; and

Fig. 4 is a diagrammatic perspective detail view of a modified form of independent die for producing other types of cast products.

In the formation of cast and moulded products, the use of what are generally referred to as multiple impression dies or moulds is quite common in the art. It is also known to employ a series of alined dies or moulds with impressions or cavities formed between adjacent surfaces thereof. With the multiple impression dies, particularly in the formation of relatively large diameter and, yet, small material volume members, such for example as rings, dies having large surface areas and requiring extremely high hydrostatic pressures are required, in order to produce such products.

I have conceived a simple, economical and practical method to increase the production capacity of a small capacity or area casting machine by employing a different die structure than heretofore used. This new die structure includes an intermediate die having alined or superimposed cavities which are completed by complementary cavities in a pair of alined relatively movable dies. The sprue or gate to the cavities is arranged on opposed surfaces of the intermediate die and extends across an outer surface thereof. With this construction, a single

injection shot of the molten material will fill both cavities simultaneously, thus forming a cast object on each side of the intermediate die with substantially the same hydrostatic pressure as required to make a single cast object.

From the foregoing, it will be apparent that, with this novel die structure, twice as many products can be produced in the small machine and, by utilizing the same or substantially the same hydrostatic pressures, thus eliminating the necessity of constructing the much larger and more expensive machine to perform the desired result.

In Figs. 1 and 2, I have diagrammatically illustrated one adaptation of my invention and, in these figures, **10** and **11** represent a pair of opposed relatively movable dies which, for purposes of the present description, will be characterized as "core dies." At **12** I have shown an intermediate die arranged between and enveloped by the dies **10** and **11**, except where the intermediate die **12** extends through openings **13** and **14** in opposed surfaces of the dies **10** and **11**, as clearly noted in Fig. 2 of the drawing.

The dies **10** and **11** have annular cavities **15**, **15'**, substantially V-shaped in cross-sectional form, the cavities being partially formed by enlarged diameter disc-like core portions **16**, **16'**, outwardly of which are reduced disc-like core portions **17**, **17'**. Centrally of the portions **17**, **17'** are projecting core pin portions **18**, **18'**, the latter extending into a central aperture **19** in the intermediate die **12**, thus alining the die **12** upon the dies **10** and **11**. The intermediate die **12** has, on its outer surfaces, annular impressions or cavities **20**, **20'**. These impressions or cavities, in conjunction with the cavities **15**, **15'**, result in the formation of two similar ring-like products **21**, **21'** of the cross-sectional contour shown, it being apparent that the inner bevelled surfaces **22**, **22'** and **23**, **23'** are formed by the discs **16**, **16'**, **17**, **17'** respectively. It will also be seen that the inner surface **24**, **24'** of an inwardly extending annular flange **25**, **25'** of the rings is formed by part of the inner surface of the core discs **17**, **17'**, as clearly apparent from a consideration of Fig. 1 of the drawing.

Formed between adjacent surfaces of the dies **10** and **11** and the outer surface **26** of the intermediate core is a gate or sprue passage **27**, which opens into both cavities **15**, **15'** and out through the surfaces of the dies **10** and **11** to register with a nozzle passage **28** from a suitable source of pressure supply of the casting or moulding material employed. As these methods of pressure injection of the materials employed are all well known in the art, no detailed description or showing thereof is deemed to be necessary.

From the foregoing, it will be apparent that I employ what might be termed a gating which straddles an outer surface of the intermediate die. It will be noted, from a consideration of Fig. 2 of the drawing, that, when the intermediate die **12** is moved into spaced relationship to the dies **10** and **11**, a pair of trimming tools or knives **29**, **29'** are actuated to trim the gates **30** from the two cast or moulded products, freeing said products for discharge into suitable receptacles, not shown, in the manner diagrammatically illustrated in said figure.

After the trimming operation, the intermediate die **12** is returned to the position shown in Fig. 1, whereupon, the dies **10** and **11** are brought into engagement with each other and the die **12** and the next injection charge is performed in filling the die cavities in forming another pair of products **21**, **21'**.

In Fig. 3 of the drawing, I have diagrammatically shown a slight modification, wherein an auxiliary gate removal strip **31** is employed on the side surface **26** of the die **12**, which simply means that the gate **30'** will have a larger yoke than the gate **30** and, here instead of

utilizing the trimming knives, such as the knives **29**, **29'**, the strip **31** can be moved outwardly with respect to the surface **26** in stripping or severing the gate **30'** from the two cast or moulded products. It will be noted that the gate **30'** has weakened portions, as at **32**, to facilitate this operation.

In Fig. 4 of the drawing, I have shown a slight modification, simply to illustrate one of the many other uses and adaptations of my method and die structure and, in this figure, **33** represents, in perspective, an intermediate die, generally similar to the die **12**, and having an alinement aperture **33'** therein to receive core pins, similar to the pins **18**, **18'** to aline the die **33** with its companion dies, in order to provide proper registration of pairs of die cavities **34** on opposed surfaces of the die **33**. With this construction, it will be apparent that two independently cast or moulded products **35**, **35'** will be formed simultaneously at each side surface of the die **33** and the gate or sprue **36** is modified only to the extent of having branch extensions **37** to the cavities **34**. With this construction, it will be apparent that, in the severing or trimming operation, the gate or sprue **36** will be trimmed off along the lines **38**. The cavities on one side only of the die **33** are shown, but it will be apparent that the opposed side of the die will have another pair of cavities which can be of the same contour as the cavities **34**, or of different contour. In the construction shown, the products **35**, **35'** are identical and in the form of double hook members, similar to what are known as traveler rings. It will be understood, however, that two different types of products, that is to say, products of different contours could be made at each side of the die **33**.

Having fully described my invention, what I claim as new and desire to secure by Letters Patent is:

In a machine for simultaneously forming independent superimposed injection moulded products, an intermediate die, a pair of dies movable toward and from opposed surfaces of said intermediate die, means for alining the movable dies with said intermediate die, said intermediate die and movable dies having impressions on adjacent surfaces thereof collectively forming cavities of predetermined products to be formed, a sprue passage forming a gate extending across an edge surface of the intermediate die into the cavities on opposed surfaces of said intermediate die, whereby, in injecting heated material through said sprue, products will be simultaneously formed in cavities on opposed surfaces of said intermediate die, said intermediate die being movable across the path of movement of said movable dies, when the latter are in open position, in movement of the moulded products to a trimming station, and means for trimming the products to remove the gate therefrom and free the products from opposed surfaces of said intermediate die.

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