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D. MARINSKY ET AL

2,234,185

TWO-TONE DIE CASTING AND METHOD OF FORMING THE SAME

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*Fig. 1*

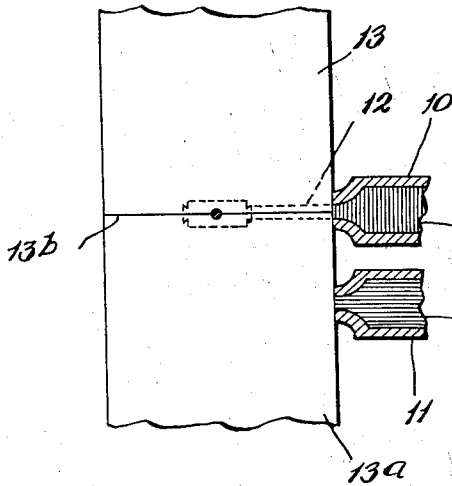


*Fig. 3.*

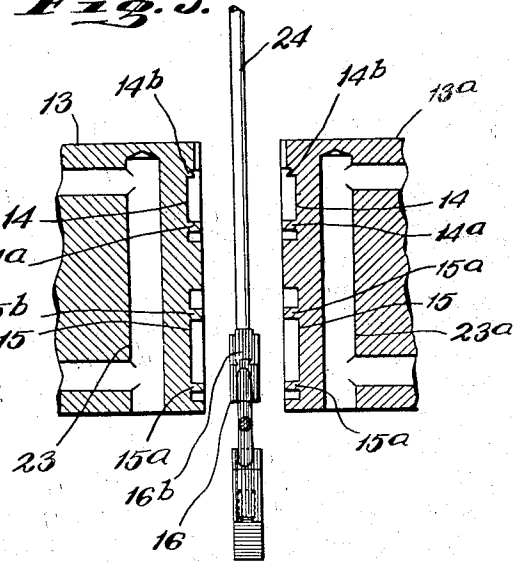


*Fig. 2.*

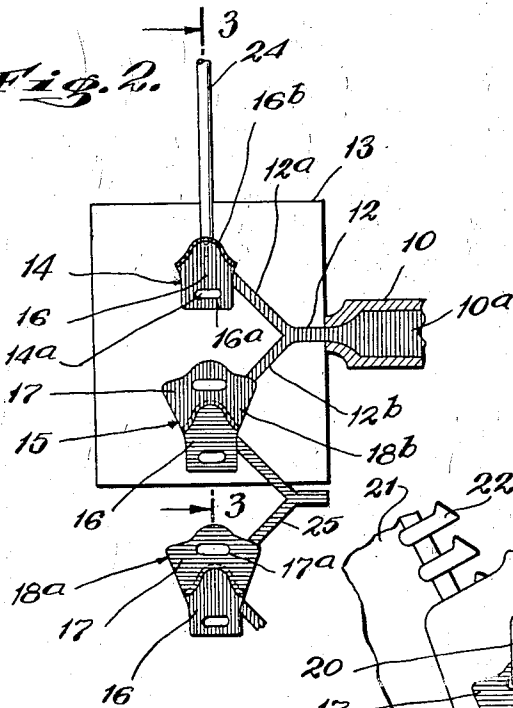


*Fig. 4.*

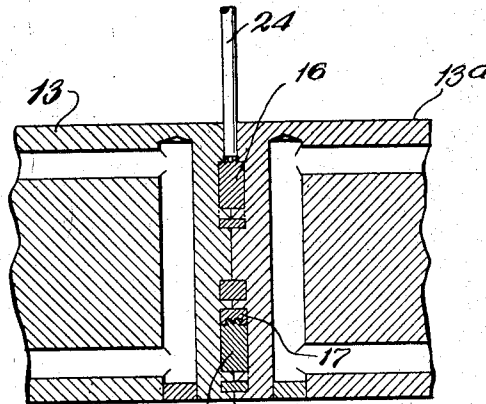
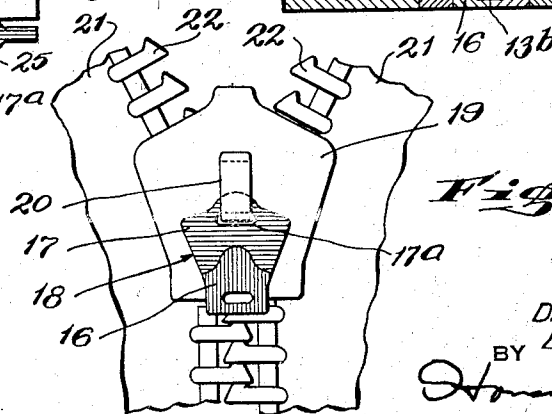


*Fig. 5.*



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## UNITED STATES PATENT OFFICE

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## TWO-TONE DIE CASTING AND METHOD OF FORMING THE SAME

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Application May 25, 1937, Serial No. 144,627

8 Claims. (Cl. 18—59)

This invention relates to the die casting of various kinds and classes of devices and particularly in forming such devices in two distinct casting operations to form what may be termed, two-tone or two-color castings so as to produce on the resulting device, predetermined designs, patterns, or contours in two distinct shades, tones, or colors, and the object of the invention is to provide a device of the class described wherein the separate or individually cast portions of a complete device have interengaging means to securely anchor and retain said portions against relative separation; a still further object being to provide a method of forming two-toned or two-colored devices which consists in providing a die, the separate parts of which are provided with two distinct mold chambers or impressions, each in direct communication with a single admission orifice, and in intermittently moving two distinct discharge nozzles into registering alignment with the admission orifice of the die in a successive series of casting operations to form die cast members, each consisting of both of the casting materials employed to produce the two-tone or two-color effects in the resulting devices; a further object being to provide a die for carrying out the method herein contemplated, adjacent surfaces of the separate parts of the die having independent mold cavities or impressions, one of which is of a contour defining a portion of the resulting device to be formed, and the other of which has a part adapted to receive the casting made in the first impression, and including additional impression or cavity areas forming the second part of the complete device, and still further in the provision of a method wherein each cavity or impression of the die parts is charged simultaneously with the material discharged from a nozzle so that alternate cast devices will have a different arrangement of the casting materials thereon, and with these and other objects in view, the invention consists in a device of the class and for the purpose specified, which is simple in construction, efficient in use, and which is constructed as hereinafter described and claimed.

The invention is fully disclosed in the following specification, of which the accompanying drawing forms a part, in which the separate parts of my improvement are designated by suitable reference characters in each of the views, and in which:

Fig. 1 is a diagrammatic view illustrating the arrangement of parts of discharge nozzles of a

die casting machine, adjacent one surface of the dies employed for forming castings of the kind under consideration.

Fig. 2 is a face view of one of the die parts employed, diagrammatically illustrating the method of injecting casting material into the impressions of the die parts and showing the formation of a number of castings.

Fig. 3 is a section on the line 3—3 of Fig. 2 showing the die parts separated.

Fig. 4 is a view similar to Fig. 3 but showing the die parts in closed position with the castings arranged therein, and

Fig. 5 is a face view of a part of a separable fastener indicating the use of the device formed by the method disclosed in Figs. 1 to 4 inclusive.

The invention herein described is designed for die casting various kinds and classes of devices by the use of two casting materials having different characteristics so as to produce on the resulting device, what may be termed a two-tone or two-color effect in any desired ornamental arrangement to add to the attractiveness or to enhance the appearance of the device. While any kind or class of die casting materials may be employed which may be suitable for the intended purposes, it is preferred that the devices be cast from thermoplastic material in accordance with methods disclosed in our prior applications, 131,606, 131,607, and 131,608, filed March 18, 1937.

In the accompanying drawing, parts of two nozzles 10 and 11 are indicated in Fig. 1 of the drawing, and these nozzles may constitute parts of discharge mechanisms such as diagrammatically illustrated in the applications above referred to, and through which suitable casting material 10a and 11a are discharged under pressure through an admission opening or orifice 12 on the parting line of two die parts 13, 13a and through diverging channels 12a, 12b which open into and communicate with independent impressions or mold cavities 14 and 15, formed between adjacent surfaces of the die parts, and on the parting line 13b of said die parts.

For purposes of illustration, it will be assumed that the nozzle 10 contains a red cellulose acetate or other thermoplastic material suitable for die casting as at 10a, whereas at 11a a blue material of the same group and class is disposed in the nozzle 11. It will of course be understood that any combinations of colors may be used, or different shades in a single color, for example two tones of blue or two tones of red, etc. It will also be understood that one or both of the

nozzles may contain a combination of colors to produce what may be termed a mottled or marble effect. For example, one nozzle may have a material which will produce a pearl finish, and the other a plain color or a combination of colors in accordance with the teachings in the prior applications herein referred to.

The mold cavity or impression 14 is designed to form one part or section 16 of the resulting device, whereas the cavity or impression 15 is of such contour as to receive the cast device 16 and to form an additional part or section 17 in conjunction with the section or part 16. The cavity or impression 14 in the construction shown, has an inwardly projecting lug 14a which forms in the resulting casting, an aperture 16a, through which lugs or projections 15a in the impression 15 are adapted to pass in arranging part 16 in the impression 15, and other lugs or projections 15a, 15b, are formed in the impression 15 to provide in the resulting cast part 17, an aperture 17a. One wall of the impression 14, the upper wall in the construction shown, is provided with inwardly projecting V-shaped portions 14b, which form a V-shaped tongue 16b at the upper edge of the casting 16, which tongue forms means for positively keying the part 17 to the part 16, as will be apparent. This keying of the parts is not absolutely essential, and other means may be provided to accomplish this result when the result is desired. Under ordinary circumstances, sufficient adherence will be provided between the two cast parts to secure them together, but should these parts be composed of die cast metals or other materials which would not adhere, a suitable means of keying or interlocking the parts will be desirable.

In the accompanying drawing, the resulting device 18 made from the two parts 16 and 17, is in the form of a pull or finger piece such as commonly employed on the slider 19 of what is known as separable fasteners, the pull 18 being attached to a loop or ring 20 on the slider which passes through the aperture 17a. In the accompanying drawing the dimensions of the pull have been exaggerated, especially in Figs. 3 and 4 of the drawing, in order to clearly illustrate the method. At this time it will be understood that the illustration in the accompanying drawing is simply to show one method of carrying the invention into effect.

In Fig. 5 of the drawing, 21 represents parts of the tapes or stringers of a separable fastener, having the coupling links or clips 22 thereon, which are coupled and uncoupled by the slider 19 as in other devices of this kind.

In Figs. 3 and 4 of the drawing, water circulating passages 23, 23a are shown in the die parts 13, 13a for the circulation of water there-through to cool the dies, as in other die casting dies of this type. At 24 is shown a core pin which enters the upper end portion of the impression or cavity 14 so that the casting 16 is formed thereon. This core pin will serve to move the casting 16 downwardly between the die parts when separated, as shown in Fig. 3, to position the part 16 in proper alignment with respect to the impression or cavity 15. When the dies are in a partially closed position, the pin 24 is raised to the position shown in Figs. 2 and 4, for the next casting operation.

The method of operation will be readily understood from the foregoing description taken in connection with the accompanying drawing and the following statement. Assuming that the dies

are in closed position and the nozzle 10 registering with the aperture 12 as in Figs. 1 and 2 of the drawing, the casting material 10a is forced into both of the impressions 14, 15 through the diverging channels 12a, 12b, and a red cast part 16 and part 17 will be formed. At this time it will be apparent that in the first shot or charge, when a part 16 has not been pre-formed, the entire cavity 15 will be filled with the one material or color of material, and the member so formed will be an unused blank which may be melted or, if desired, which may be used in its single color form. After the first casting operation, the die parts are separated and the castings move into the position shown in Fig. 3, the pin 24 removed from the castings and returned to its normal position after which the dies are closed and the part 16 will be arranged within the cavity 15 or the lower portion thereof. During the last cycle of operation, the nozzle 11 will be moved into registering position with the aperture 12, and the material 11a will then be injected into the mold cavities. Assuming this material to be blue, a blue casting 16 will be formed in the impression 14, and a blue upper end or part 17 will be formed upon the top of the previously formed red part 16, the result of which is indicated in the casting shown at 18a in Fig. 2 of the drawing, whereas the casting 18b represented in the lower part of the dies in Fig. 2 of the drawing has a red top part 17 and a blue lower part 16. In other words, alternate castings in the successive series of operations will be in the two different colors or combinations of colors employed in any particular run of the machine. From time to time, different kinds or combinations of colors may be used in, or discharged from the nozzles 10, 11, to satisfy the demands therefor. It will be understood that the gate portions 25 which join the castings, one with the other as they leave the dies, may be broken or sheared off in what may be termed a trimming or finishing operation. These gate portions may be remelted as will be apparent.

It will be seen upon a consideration of Fig. 1 of the drawing, that the discharge ends of the nozzles are maintained in constant engagement with the surface of the die parts 13 and 13a, and in the operation of separating the die parts, the nozzles will be so moved as to maintain this engagement. These nozzles will be heated to maintain the casting materials in proper casting condition, all as taught in the applications herein referred to.

It will be understood that in making other kinds and classes of devices, the arrangement of the admission openings or channels 12a, 12b, will be modified to suit the particular devices being formed, and the different arrangement and contour of cavities provided in and between adjacent surfaces of the die parts. It will also be apparent that any kind or class of engravings may be provided on the separate parts of the resulting casting. In some instances the material of one cast part may extend into the other cast part to provide attractive designs or ornamental effects, the accomplishment of which simply depends upon the formation of the mold cavities or impressions in the die parts. In this respect it will be apparent that one side surface of the resulting device may differ in its ornamental characteristics from the opposed side surface thereof.

Having fully described our invention, what we

claim as new and desire to secure by Letters Patent, is:

1. The herein described method of forming two-tone die cast thermoplastic members of the class described, which consists in first forming one part of a unitary casting by pressure injecting thermoplastic material from one cylinder into one cavity of a die to form a cast part therein, then moving said part into another larger cavity in said die, then pressure injecting a contrasting thermoplastic material from another cylinder simultaneously into both of said cavities to form a resulting two-tone unitary casting in the larger cavity, and to form in the first cavity the first part of the next successive casting to be formed.

2. The herein described method of forming a unitary die cast body, which consists in pressure injecting thermoplastic material into one mold cavity to form a first part of said unitary body, then moving the first cast part into another mold cavity formed to receive the first part and to define the contour of a second part to be formed, then pressure injecting thermoplastic material into the second cavity to form the second thermoplastic part of said unitary body directly upon the first formed part disposed in the second mentioned cavity, and simultaneously injecting material into the first mentioned cavity to form the first part of the next successive casting to be formed.

3. The herein described method of forming a unitary die cast body, which consists in pressure injecting thermoplastic material into one mold cavity to form a first part of said unitary body, then moving the first cast part into another mold cavity formed to receive the first part and to define the contour of a second part to be formed, then pressure injecting thermoplastic material into the second cavity to form the second thermoplastic part of said unitary body directly upon the first formed part disposed in the second mentioned cavity, simultaneously injecting material into the first mentioned cavity to form the first part of the next successive casting to be formed, forming the first casting upon a core pin, utilizing said core pin to feed the first casting into the second mentioned cavity, intermittently moving independent discharge cylinders into registering position with the cavities of said dies in forming successive castings, and employing different colored thermoplastic materials in said cylinders to provide cast parts of different colors in each unitary body.

4. The herein described method of forming a unitary die cast body, which consists in pressure injecting thermoplastic material into one mold cavity to form a first part of said unitary body, then moving the first cast part into another mold cavity formed to receive the first part and to define the contour of a second part to be formed, then pressure injecting thermoplastic material into the second cavity to form the second thermoplastic part of said unitary body directly upon the first formed part disposed in the second men-

tioned cavity, simultaneously injecting material into the first mentioned cavity to form the first part of the next successive casting to be formed, forming the first casting upon a core pin, and utilizing said core pin to feed the first casting into the second mentioned cavity.

5. The herein described method of forming a successive series of two-tone thermoplastic die cast members, which consists in first pressure injecting thermoplastic material simultaneously into spaced mold cavities of a die, said cavities differing in size to form one part of the resulting member in the smallest cavity and another part of the member united with a first part in a larger cavity, moving the member from the smallest cavity into the larger cavity and simultaneously discharging the united castings from said larger cavity, and intermittently moving independent cylinders into registering position with the die to alternate the color of thermoplastic material injected into the cavities.

6. The herein described method of forming a unitary die cast body, which consists in pressure injecting thermoplastic material into one mold cavity to form a first part of said unitary body including projecting interlocking elements on one surface thereof, then moving the first part into another mold cavity formed to receive the first part and to define the contour of a second part to be formed while at the same time exposing the interlocking elements in the last mentioned cavity, then pressure injecting thermoplastic material into the second cavity to form the second thermoplastic part of said unitary body directly upon the first formed part disposed in the second mentioned cavity and around the interlocking elements thereof, and simultaneously injecting material into the first mentioned cavity to form the first part of the next successive casting to be formed.

7. A unitary die cast body of predetermined contour, said body comprising two parts, adjacent surfaces of said parts being united by interlocking elements, said elements being so shaped as to prevent relative movement of the parts longitudinally and transversely, thereby permanently uniting said parts against separation in any direction, and adjacent surfaces of the parts abutting and forming a line of distinct subdivision between the parts.

8. A unitary die cast body of predetermined contour, said body comprising two parts, adjacent surfaces of said parts being united by interlocking elements, said elements being so shaped as to prevent relative movement of the parts longitudinally and transversely, thereby permanently uniting said parts against separation in any direction, adjacent surfaces of the parts abutting and forming a line of distinct subdivision between the parts, said parts being composed of thermoplastic material, and one of said parts being of a color contrasting to the color of the other part.

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