

Jan. 7, 1941.

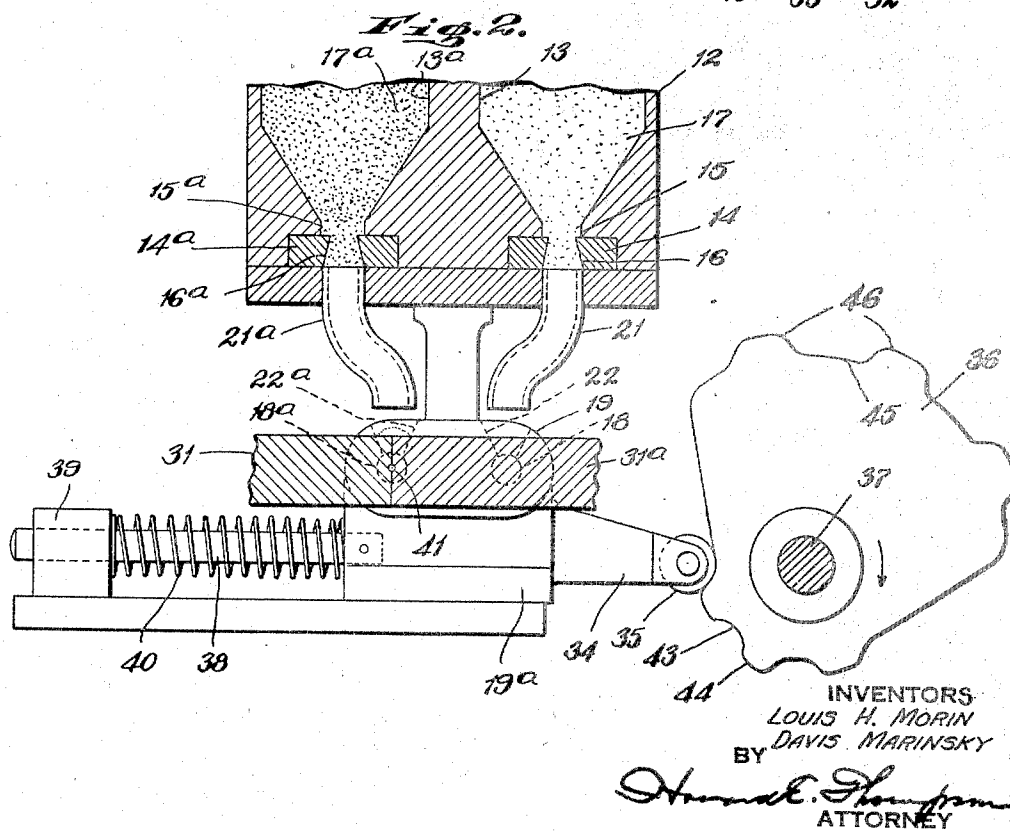
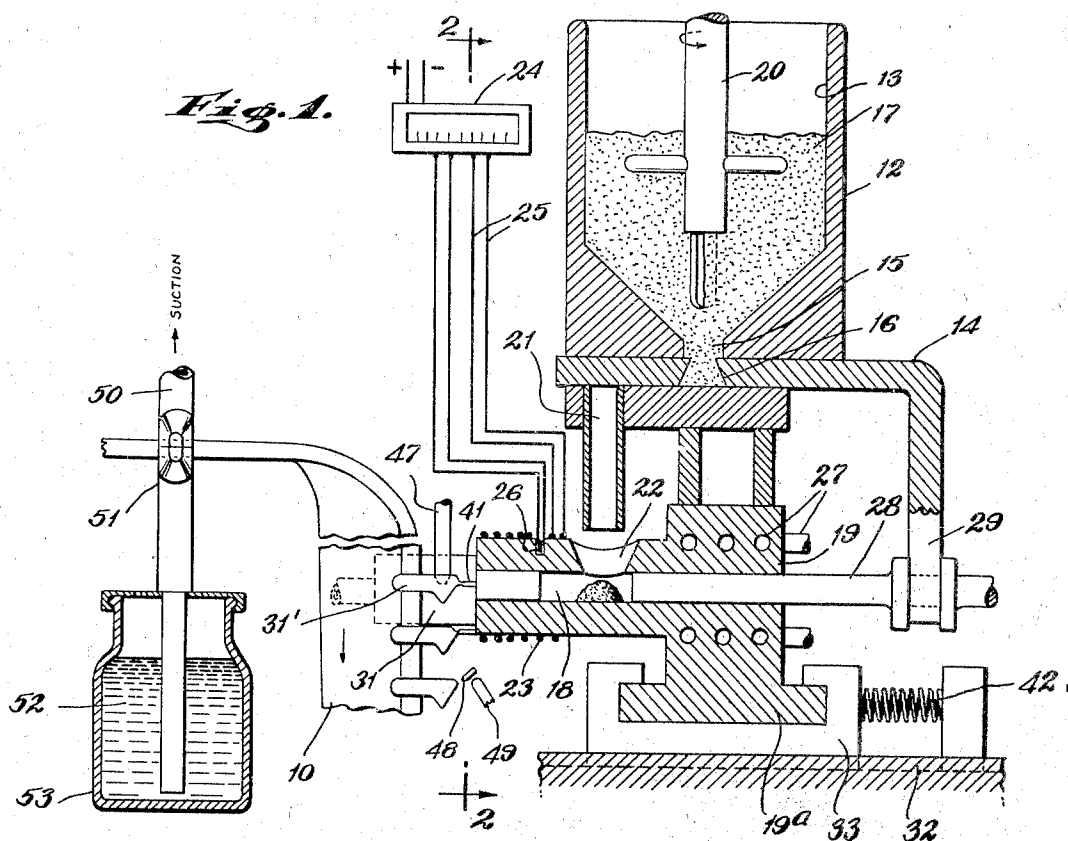
L. H. MORIN ET AL

2,227,461

METHOD OF INTERMITTENTLY CASTING VARIABLY COLORED THERMOPLASTICS

Filed March 18, 1937

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

*Fig. 3.*

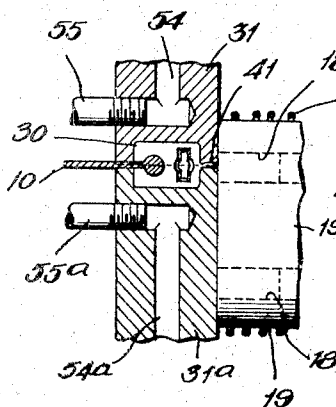


*Fig. 4.*

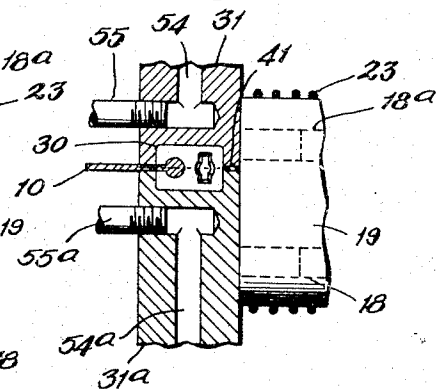


*Fig. 5.*

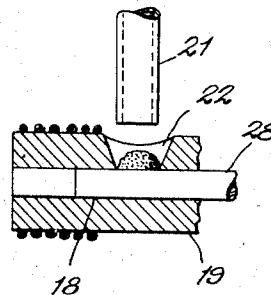


*Fig. 6.*

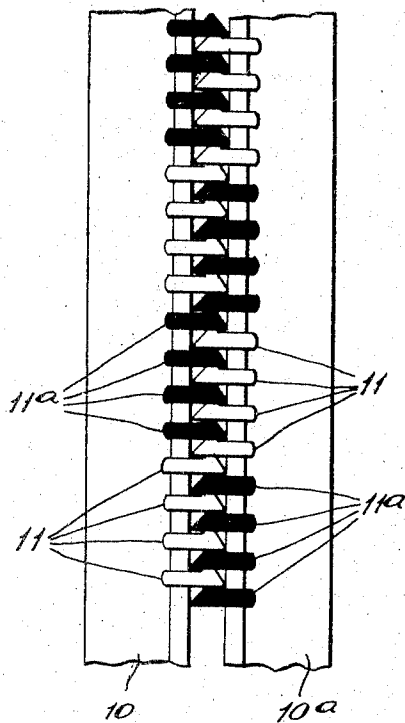


*Fig. 7.*

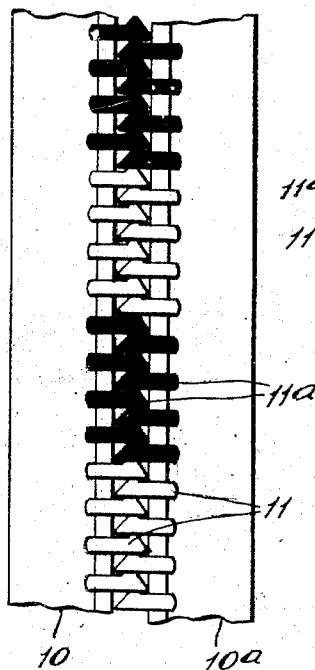
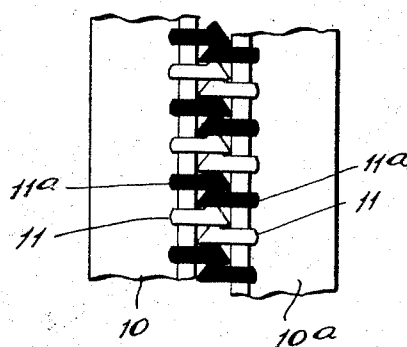


*Fig. 8.*



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## UNITED STATES PATENT OFFICE

2,227,461

METHOD OF INTERMITTENTLY CASTING  
VARIABLY COLORED THERMOPLASTICS

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Application March 18, 1937, Serial No. 131,608

8 Claims. (Cl. 18—59)

This invention relates to the molding or die casting of thermoplastics, such for example, in the casting of the links or scoops of separable fastener stringers; and the object of the invention is to provide a method which consists in intermittently and periodically casting upon a single workpiece or supporting member, such for example, as the tape or stringer of a separable fastener, a series of differently colored or contrastingly colored cellulose acetate elements in any desired grouping or arrangement to produce a predetermined design on the resulting article or a pair of articles coupled together; a further object being to provide a method of intermittently and periodically casting two or more different types and kinds of die casting materials which consists in providing independent units for the supply of the respective materials for delivering, heating and injecting the same into a single mold or die by moving the respective units into position to register with the admission orifice or gate of the die; and with these and other objects in view, the invention consists in a method of casting thermoplastic materials which is more fully hereinafter described and claimed.

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

Fig. 1 is a diagrammatic sectional view illustrating one use of our improved method.

Fig. 2 is a diagrammatic sectional view substantially on the line 2—2 of Fig. 1.

Fig. 3 is a diagrammatic sectional view substantially on the line 3—3 of Fig. 2.

Fig. 4 is a view similar to Fig. 3 showing parts in a different position.

Fig. 5 is a view similar to Fig. 1 showing only a part of the construction and with parts in a different position.

Fig. 6 is a detail view of two fastener stringers made according to our invention and shown in coupled relationship.

Fig. 7 is a view similar to Fig. 6 showing the stringers coupled together in a different manner; and,

Fig. 8 is a view similar to Fig. 6 and showing one of a number of other forms of construction which may be employed.

To illustrate one method of carrying the invention into effect, the accompanying drawings diagrammatically illustrate methods of die cast-

ing the links or scoops of separable fasteners onto the mounting tapes or stringers employed. In Figs. 6, 7 and 8 of the drawings, certain forms and arrangements of links are shown to produce different designs or effects upon the complete finished fastener. For example, in Fig. 6 of the drawings, we have shown at 10, 10a the tapes of two similarly formed stringers of a separable fastener. To one edge of each tape is attached a series or group of links 11 of one color, such as white, and at 11a, black links. Four of the links of each color are arranged in each group so as to produce an effect similar to that shown in Fig. 7. Other staggered or irregular arrangements may be made of the two similar stringers by simply shifting one stringer longitudinally of the other, and this can be controlled in the manufacture of the stringer tapes.

In Fig. 8 of the drawings, one of the many other types and forms of stringer tapes is shown. In this construction, white and black links 11, 11a are alternately cast on the edge of the stringer tapes 10, 10a to produce the result illustrated. In this connection, it will be understood that any desired form and arrangement or grouping of links of contrasting colors or other characteristics may be made, and an odd arrangement such as one white and two black or six white and four black, etc. can be provided. The various patterns or designs are controlled by the machine operation through suitable cams, jacquards or other means. While the invention herein described is shown as applicable to the manufacture of separable fastener stringers, this is only illustrative of one of many uses to which the invention may be applied. To give one other specific example, it will be apparent that a plurality of die cast beads, knobs or other elements of different colors may be arranged longitudinally of a string or strand in forming what is known as pull chains.

In Fig. 1 of the drawings, we have diagrammatically illustrated a section through one unit of the mechanism for carrying the method into effect and forming the links of a separable fastener stringer. In this figure, 12 represents a hopper casing having independent hopper compartments 13, 13a with slides 14, 14a movable across the discharge opening 15, 15a of said compartments. The slides have apertures 16, 16a for measuring predetermined quantities of a suitable thermoplastic material 17, 17a for delivery into independent cylinders 18, 18a of a cylinder block 19 as will be seen upon a consideration of Figs. 1 and 2 of the drawings.

The casting or molding material 17, 17a may

be in the form of particles, granular or powdered, of thermoplastic material, such for example as cellulose acetate. In some instances, and as seen in Fig. 1 of the drawings, an agitator 20 may be disposed in each hopper to stir the material 17 to insure a feed thereof through the discharge opening 15. In some instances, a biscuit, capsule or the like of the required volume may be fed into and through the machine, either from a hopper or by removal from a rod in the manner taught in a companion application filed March 18, 1937, Serial No. 131,606.

Arranged below the casing 12 and in alignment with the apertures 16, 16a and in position to register with the apertures 16, 16a of the slides 14, 14a are curved discharge or feed tubes 21, 21a, the lower ends of which preferably extend toward each other to provide a closer arrangement of the cylinders 18, 18a and to dispose the lower ends of the tubes 21, 21a above and in registering alignment with apertures 22, 22a in the block 19 and registering with the cylinders 18, 18a. The forward or discharge end of each cylinder is heated by an electric heating coil 23, only one of which is shown in Fig. 1 of the accompanying drawings. This coil is in circuit with a pyrometer 24 through wires 25. At 26 is shown suitable pyrod means also in circuit with the pyrometer for registering temperature at the discharge end of the nozzle in order that the thermoplastic material may be heated to the desired degree to insure the formation of proper castings. At the rear portion of the block 19 is shown means 27 whereby water or another cooling agent may be passed through the block to cool the rear ends of the cylinders.

In each cylinder 18, 18a is arranged a piston or plunger 28, to the outer end of which is coupled the forked end 29 of the slides 14, 14a. These pistons are operated by suitable means and at the proper time intervals in the cycle of operation for discharging or ejecting the material from the cylinders into the impression or mold cavity 30 of the separate die parts 31, 31a. These pistons are actuated through resilient means to compensate for varying conditions as later described.

Arranged on a bed plate or table 32 of the machine is a guide or slideway 33 in which the lower flanged end 19a of the block 19 is slidably movable. The block 19 has a fork-shaped extension 34 at one side carrying an anti-friction roller 35 which operates upon a cam 36 arranged on a shaft 37. Coupled with the other side of the block 19 is a rod 38 which slides through a bearing 39. A spring 40 is arranged on the rod between the bearing 39 and the block 19 and serves to support the roller 35 in constant engagement with the surface of the cam 36.

The cam 36 controls the shifting movement of the block 19 and the hopper casing 12 thereon as well as the other associated parts to bring the respective cylinders 18, 18a into registering alignment with the gate or admission opening 41 on the parting line of the dies, or, in other words, in position to permit the ejection of the casting material into the impression 30 of the dies as well as to intermittently move the respective cylinders to one side of the aperture 41 during each cycle of the machine or casting operation to prevent discharge of the material therefrom. A spring or springs 42 is employed to support the cylinders in firm engagement with the die parts in the injecting operation, and suitable means will be provided to simply relieve the pressure in the sliding movement of the cylinders with re-

spect to the dies to reduce frictional engagement, but not sufficient to cause a leak or discharge of the heated casting material.

The cam 36 is provided with one surface 43 maintaining the cylinder 18a in registering position with the die in making four successive injections of the material 17a to form the four black links 11a. The bumps or raised cam surfaces 44 serve to move the cylinder 18a from the position shown in Fig. 3 to that shown in Fig. 4. At 45, we have shown the cam surface which supports the cylinder 18 in registering position with the die orifice 41. This surface has spaced projections 46 which accomplish the same result described in connection with the cylinder 18a and shown in Figs. 3 and 4 of the drawings. The cam surface 45 will be such as to care for four discharges of the material to produce the four white cast links 11 as shown in Figs. 6 and 7 of the drawings. Suitable means will be provided to time the rotation of the cam 36 or the shaft 37 thereof to provide eight distinct charges or piston operations in each cycle or revolution of the cam 36. At this time, it will be apparent that when varied arrangements of castings are employed, different types of cams, Jacquards or other controlling means will be provided.

It is also within the scope of the present invention to provide two distinct sets of dies opening and closing at the same time and being charged by two cylinders so as to form, for example, a black casting on one mounting member between one set of dies and a white casting on another mounting member between the other set of dies and the cylinders shifted to register with the opposed mounting members and dies to cast a series of the opposed colors on said different mounting members.

It is understood at this time that it is within the spirit of the invention to provide rotary movement as well as sliding movement to the supply hoppers and the cylinders. While the invention as shown and described is illustrative of casting two different colors, a plurality of colors may be cast, in accordance with the fundamental and basic teachings of the invention which reside not in any particular mechanism employed but in a method of casting alternate and individual elements or groups of elements on a mounting member in different colors or shades. It is also within the scope of this invention to not only cast solid colors in each link or element but to utilize the teachings of a companion application in casting each link or element in two colors or shades in a definite relationship or in an irregular or mottled condition.

After making each casting, the link or element is stripped from a core pin 47 and the tape 10 is moved to bring the next section thereof in position between the dies to receive the next link to be cast. As the links and the tape are fed downwardly, the gate 48 may be knocked or trimmed off from the end of the link by a suitable means 49.

Considering Fig. 1 of the drawings, it will appear that the tape 10 may be treated with a suitable cement or solvent just prior to the application of the links thereon by passing the tape between a suction pipe or tube 50 and a feed tube 51, both being in registering alignment so that a cement or solvent 52 in a suitable container 53 may be applied to the tape. In the feed of the casting material 17, 17a, such for example, as cellulose acetate, in the respective

cylinders 18, 18a, a constant supply or replenishment of the supply is maintained through the feed slides 14, 14a as is taught in the companion applications above referred to. The relative arrangement of the pistons and apertures in the slide are such as to prevent an excessive charge of the cylinder.

The dies 31, 31a are cooled by the circulation of water or another cooling agent through passages 54, 54a, arranged adjacent the impression or mold cavity 30 and having discharge tubes 55, 55a as illustrated in Fig. 3 of the drawings.

While it has been stated through the specification that two differently colored thermoplastics may be used in forming the successive series of die castings, it is within the scope of this invention to cast two different types of materials suitable for die casting operations which would vary not only as to color but as to structure. For example, it is possible to make a combined plastic and metallic casting, it being understood that separate heating units will be provided for the separate materials in order to control the melting point or to bring the different materials to the desired temperature suitable for performing the casting operation. This combination would find its usefulness in making, for example, a pull chain on which would be arranged a combination of plastic and metallic beads or other members in spaced relation thereon, the spacing being controlled by the means provided for moving the respective casting cylinders into registering position with the impression of the die. By cooling the inner ends of the cylinders 18, 18a, the pistons operating therein will be kept cool, thus preventing clogging or congestion of the cylinders.

Instead of utilizing uniform colors in each of the hoppers as at 17, 17a, each hopper may contain materials of variegated colors and a greater amount of one color to provide a base or ground color for the resulting castings to be formed. For example, if a white base color is desired, blue and red particles may also be included to produce on the resulting casting a white base or ground color with red and blue blotches appearing thereon, whereas the black base may include white, yellow, red or any other contrasting color. In using the multiple colors, it would also be desirable in some instances to use relatively large particles of the supplemental or mottling colors and finer particles of the ground color to produce a more definite contrast in the resulting casting. However, in some cases, there will be some blending of the colors in the resulting casting. One set of castings arranged on a single mounting member may be of solid unitary color and the other set of variegated colors.

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

1. The herein described method of casting successive series of different colored thermoplastic members which consists in providing relatively movable die parts with a mold chamber between adjacent surfaces thereof, feeding one colored thermoplastic material into one cylinder and feeding another colored thermoplastic material into an independent cylinder, heating the materials at the discharge ends of the cylinders to plastic form, intermittently moving the respective cylinders separately into registering alignment with the mold chamber of the dies, pressure discharging the heated material from the

cylinders when registering with the chamber of the die parts, and controlling the movement of the cylinders into registering or casting position with respect to the die parts to govern the number of successive castings produced by the material in one cylinder with respect to the castings produced by the material of the other cylinder.

2. The herein described method of forming independent thermoplastic die castings, which consists in providing relatively movable die parts with an impression formed between adjacent surfaces thereof with an admission passage opening into the impression on the parting line of the die parts, feeding thermoplastic material into independent cylinders arranged in juxtaposition to each other, heating the material in said cylinders at the discharge ends thereof, intermittently moving the respective cylinders into registering position with the admission passage to said impression, and selectively discharging the material from said cylinders when the respective cylinders are in registering position with said admission passage to produce die castings intermittently formed from the materials in the respective cylinders.

3. The herein described method of forming independent thermoplastic die castings along a mounting member, which consists in providing relatively movable die parts with an impression formed between adjacent surfaces thereof with an admission passage opening into the impression on the parting line of the die parts, feeding thermoplastic material into independent cylinders arranged in juxtaposition to each other, heating the material in said cylinders at the discharge ends thereof, intermittently moving the respective cylinders into registering position with the admission passage to said impression, selectively discharging the material from said cylinders when the respective cylinders are in registering position with said admission passage to produce die castings intermittently formed from the materials in the respective cylinders, and controlling the movement of the respective cylinders into registering position with said admission passage to produce a predetermined series of successive castings from the respective materials employed.

4. The method of forming thermoplastic castings on a mounting member, which consists in intermittently moving relatively movable dies toward and from spaced sections or areas of the mounting member to register with the mold cavity of the dies, and intermittently pressure injecting different colored thermoplastic materials from independent sources of supply into the mold cavity of the dies when intermittently engaging spaced sections of the mounting member to form differently colored castings on said spaced sections of a short length of said mounting member.

5. The method of forming thermoplastic castings on a mounting member, which consists in intermittently moving relatively movable dies toward and from spaced sections or areas of the mounting member to register with the mold cavity of the dies, intermittently pressure injecting different colored thermoplastic materials from independent sources of supply into the mold cavity of the dies when intermittently engaging spaced sections of the mounting member to form differently colored castings on said spaced sections of a short length of said mounting member, and selectively controlling the injection of the different colored materials into the mold cavity to regulate the grouping and arrangement of

thermoplastic castings on the mounting member.

6. The herein described method of casting successive series of thermoplastic members, which  
5 comprises pressure injecting heated thermoplastic material, first from one source of supply to a mold cavity defining the member to be formed, then pressure injecting heated thermoplastic material from another source of supply into the  
10 same mold cavity after removal of the cast member formed from the first source of supply, and controlling the succession of members cast from the respective supplies of heated thermoplastic material in the successive series of castings  
15 formed.

7. The herein described method of forming multi-colored die cast elements on a mounting member which comprises casting a variable and controlled number of elements on said member  
20 within dies surrounding said member from a source of supply of one color, then casting a variable and controlled number of elements on said member within said dies from another source of supply of a different color and successively re-

peating the above mentioned steps in a continuous uninterrupted series of casting operations to provide predetermined groups of different colored elements in predetermined arrangement on said member.

8. The herein described method of casting successive series of thermoplastic members, which comprises pressure injecting heated thermoplastic material, first from one source of supply to a mold cavity defining the member to be formed,  
10 then pressure injecting heated thermoplastic material from another source of supply into the same mold cavity after removal of the cast member formed from the first source of supply, controlling the succession of members cast from the  
15 respective supplies of heated thermoplastic material in the successive series of castings formed, sealing one source of supply against the discharge of material therefrom while the other source of supply is in injecting position, and sealing both  
20 sources of supply intermediate successive series of castings.

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