Aug. 23, 1949. L. H. MORIN 2,479,695

METHOD OF FORMING, TRIMMING, AND THEN STACKING OR STRINGING DIE CASTINGS

Filed Aug. 5, 1944

Fig. 1.

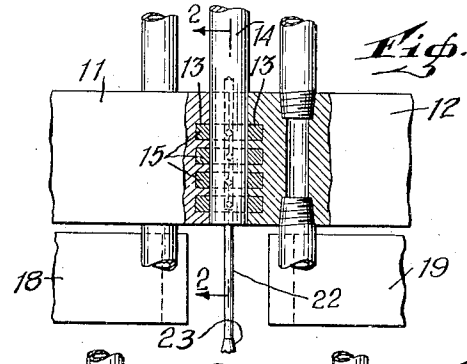


Fig. 2.

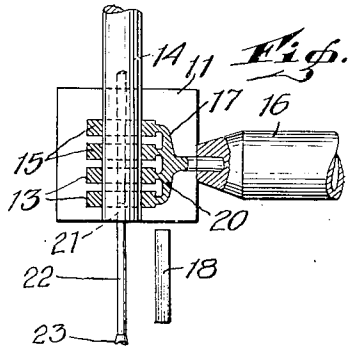


Fig. 3.

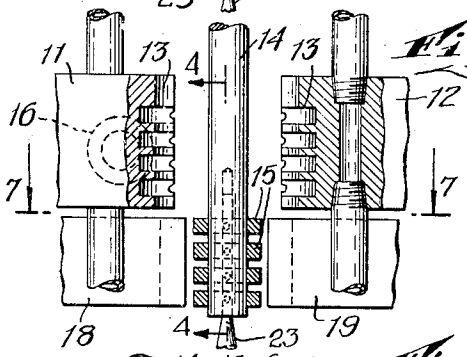


Fig. 4.

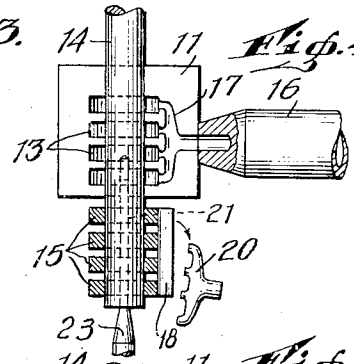


Fig. 5.

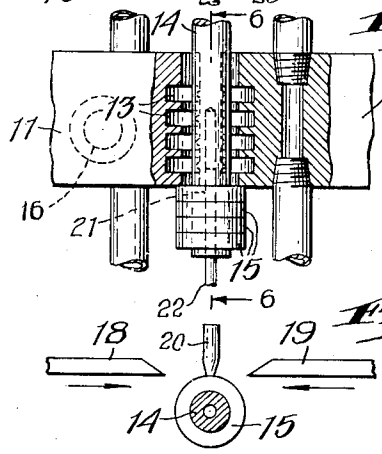


Fig. 6.

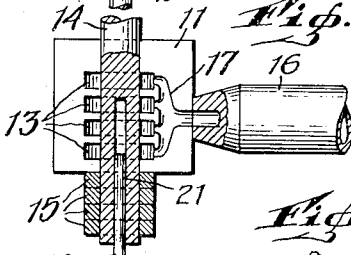


Fig. 7.

Fig. 8.

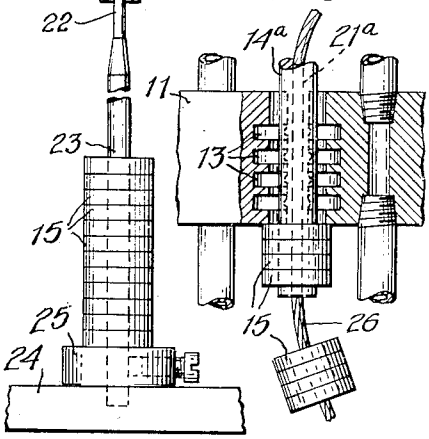


Fig. 9.

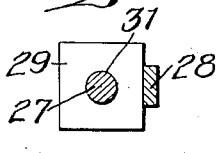
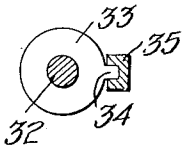


Fig. 10.



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METHOD OF FORMING, TRIMMING, AND THEN STACKING OR STRINGING DIE CASTINGS

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Application August 5, 1944, Serial No. 548,258

8 Claims. (Cl. 18—47.5)

1

This invention relates to the production of die castings either of ring formation, or having eyes or openings extending therethrough. More particularly, the invention comprises a method of forming one or more castings on a core, then trimming the castings while supported on the core, and then stripping the castings from the core and simultaneously passing them onto an elongated strand or pin like member for stacking or stringing the castings as they are removed from the machine. The novel features of the invention will be best understood from the following description when taken together with the accompanying drawings, 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 showing the step of first forming castings on a core.

Fig. 2 is a section on the line 2—2 of Fig. 1.

Fig. 3 is a view similar to Fig. 1, showing the castings supported in position for the trimming operation.

Fig. 4 is a section on the line 4—4 of Fig. 3.

Fig. 5 is a view similar to Figs. 1 and 2, showing the operation of stripping the castings from the core and stacking the same on a pin or rod.

Fig. 6 is a section on the line 6—6 of Fig. 5.

Fig. 7 is a section on the line 7—7 of Fig. 3.

Fig. 8 is a view similar to Fig. 5, showing the casting stripped onto an elongated strand in what might be termed a stringing operation.

Fig. 9 is a cross sectional view through a pair of mountings, showing one method of keying castings in longitudinal alinement; and

Fig. 10 is a view similar to Fig. 9, showing another form of procedure.

In the art of forming die castings as well as other products from metal or plastic materials, it has been the conventional practice to discharge the castings or products from the machine into a suitable box, tray or other receiver from which the castings or products are removed for the performance of any other operations thereon, or for uniting the castings or products with other members.

In illustrating one adaptation of my invention, I provide a method of forming and trimming castings and then removing the same from the casting machine in the stripping operation. Furthermore, in stripping the castings from a core, I automatically feed the castings onto a pin or rod on which the castings are stacked, or onto an elongated strand of string or wire on which

2

the castings may be said to be strung, utilizing the pin or rod strand as a magazine from which the castings may be fed into other machines or into members in connection with which the castings are to be assembled.

In further illustrating one adaptation and use of the invention, I have shown the production of plastic ring like members which are adapted for use or assemblage in nut like bodies to provide means for retaining the nuts against displacement from associated bolts. As such articles termed, "elastic stop nuts" are well known in the art, no specific showing or description need here be made. It will appear, however, that by arranging these washer or ring like plastic bodies on pins or strands in the manner more fully hereinafter set forth, said pins or strands will facilitate assemblage of the ring or washer like bodies in the nuts or other supports in machines employed for securing these bodies to the supports.

In other words, by producing and mounting die castings in the manner described, the use of conventional hopper feeds can be dispensed with, and a more simple and practical method is provided for supplying the individual castings to a machine in performing any successive operation on the casting or in assembling the casting with a support, as above stated.

Obviously, if a casting has a special contour on one side surface thereof, this side surface will always be properly positioned in the machine, as it will always be arranged in the direction of one end of the pin, strand or other mounting, and from the standpoint of delivery, can be discharged from either end of the mounting. In other instances, the casting may be formed with an angular bore, in which event the pin or other mounting may be of a contour conforming with the angular contour of the bore to maintain a predetermined position on said pin mounting. Still further, supplemental mounting members may be employed to maintain the plurality of castings on the mounting in predetermined longitudinal alinement in order to properly position the castings in the machine or any other member in making an assemblage, these latter adaptations being diagrammatically shown in Figs. 9 and 10.

In the accompanying drawings, I have diagrammatically illustrated successive steps in carrying out my improved method and in these figures, 11 and 12 represent a pair of relatively movable dies having on adjacent abutting surfaces thereof a plurality of spaced cavities or im-

pressions 13 to form at spaced intervals on a core 14, four similar and spaced castings 15.

The castings 15 are in the form of ring like or washer like bodies of plastic material, any suitable plastics being employed which can be die cast by injection molding processes. At 16 is shown, in Figs. 2, 4 and 6, a part of the injector nozzle for injecting the plastic materials through a gate aperture 17 into all of the cavities 13 in forming the four castings 15 simultaneously on the core 14. As seen in Figs. 3 and 5, the nozzle 16 moves to the left to seal the end of the nozzle against the die 11 while the dies are in open or partially open position. Arranged below the dies 11 and 12 are relatively movable knives 18 and 19 for trimming off the gate portion 20 from all of the castings in the manner clearly illustrated in Figs. 4 and 7, thus forming independent ring or washer like bodies or members of the castings 15.

The lower end portion of the core 14 has an elongated aperture 21 centrally thereof to receive the reduced end 22 of a mounting or stacking pin 23 which will be arranged on a suitable support 24, as indicated in Fig. 5 of the drawing, a large sleeve 25 being detachable with respect to one end of the pin 23 to support the castings or members 15 thereon. However, upon removal of the sleeve 25, the castings can be discharged from either end of the pin 23, as will be apparent.

In Fig. 8 of the drawing is shown a slight modification wherein the core 14—*a* has a bore or passage 21—*a* extending longitudinally therethrough and opening through both ends thereof. Movable longitudinally through this core is a strand 26, which may be in the form of a flexible string or wire, upon which the castings 15 removed from the core 14—*a* are adapted to be strung. In this connection, it will be apparent that the mounting strand 26 may be of indefinite length, whereas the stacking pin 23 will be of a length suitable to receive a predetermined number of the castings and new stacking pins may intermittently be brought into position to receive the castings after one pin has been fully stacked.

In Fig. 9 of the drawing, I have shown a cross section through a pair of stringing or stacking members 27 and 28, in diagrammatically illustrating another adaptation of the invention. Associated with these members is a casting 29 which has a square peripheral contour. This illustration is to indicate generally any irregular contour that may be provided in a casting, and also that the member 28 is adapted to engage one surface 30 of the castings to maintain the castings, arranged on the member 27, in a common longitudinal alinement, the castings 29 having a bore 31 to receive the member 27.

In Fig. 10 of the drawing is shown, diagrammatically, a further adaptation of the invention. In this figure, 32 represents a strand or rod member similar to the member 27. At 33 is shown the casting having a projection 34 on the periphery thereof. At 35 is shown a supplemental stacking or stringing member of channel cross sectional form to engage the projection 34, also for the purpose of maintaining all of the projections in a common alinement longitudinally of the pin or strand member 32, again for the purpose of proper feeding of these castings into or through another machine for any purpose or for assemblage with another article.

From the foregoing, it will be apparent that two or more stringing or stacking members may be collectively used for alining castings as they are ejected from a casting machine, or this result may be accomplished by a single member shaped to conform with either the irregular contour of the bore or periphery of said casting. In considering the question of shaping to conform with the contour of the bore of a casting in which the stringing or stacking member is arranged, it will be apparent that this member may conform to any contour of such bore for guiding any casting in its movement longitudinally with respect to said member. In this last respect, the member may move relatively to the casting in the stringing or stacking operation.

The method will be readily understood from a consideration of Figs. 1 to 7 inclusive and the following statement. Starting with the operation of forming the castings on the core 14, as illustrated in Figs. 1 and 2, the next step comprises opening the dies in the manner illustrated in Fig. 3 of the drawing and feeding the core 14 to bring the castings 15 below the dies 11 and 12 in position for the trimming operation, at which time, the knives 18 and 19 are moved toward each other to trim off the gates, as clearly illustrated in Figs. 4 and 7. The next operation comprises stripping the castings 15 from the core 14. This is accomplished with the dies 11 and 12 moved into a partially closed position, which takes place during the trimming operation above mentioned. This position of the dies is shown in Fig. 5 of the drawing, in which figure, the core 14 is shown in a partially raised position, indicating the beginning of the stripping operation, with the four castings still remaining on the core but ready to be stripped off onto the pin 23, as will clearly appear from a consideration of Fig. 6 of the drawing. The core 14 then returns to the position shown in Figs. 1 and 2, and the next series of castings are simultaneously formed on the core and the above operation is repeated.

The only difference between the structure shown in Figs. 1 to 7 and that illustrated in Fig. 8 is in the fact that the mounting 26 is in the form of an elongated flexible strand, such as a wire or cord, and in the stripping operation the castings are stripped onto the member 26 and by suitable means this member may be fed through the core so that a more or less indefinite length of strung castings can be provided in contrast to the teachings in Figs. 5 and 6, where the castings will be strung onto definite pin lengths.

From the foregoing, it will be apparent that the invention contemplates stringing or stacking castings or groups of castings on an elongated member. This stringing or stacking may be further characterized as bunching or grouping for convenience of collective handling and for the other purposes heretofore mentioned.

It will also be apparent that the members 23 and 26 may be flexible to the end of producing what is commonly referred to as flexible shafting or as cable, and in some instances, a flexible strand can be used. In such cases, these members may constitute the means for directly conveying the castings to a further treatment, shaping or assemblage station, suitable means being provided, in some instances, to feed the casting along said member or as with the construction shown in Fig. 8, the feed of the strand itself would constitute the feeding means of the castings. In some further instances and by suitable arrangement of machines, the castings may be fed by gravity to the next machine where the castings are to be delivered. From the above

standpoint, the members 22 and 26 may be said to comprise feed extensions from the cores of the casting machine.

It will be apparent from the foregoing that my novel method lends itself to the solution of a problem which has existed for many years, particularly in the manufacture of small articles or products of manufacture, or the separate pieces or members of finished assemblages of such parts or products, in providing a medium for stringing, stacking or grouping parts or products at the forming stations and maintaining these products in definite alinement and relationship with respect to each other for a collective group delivery to another station for further forming of the part or product, or for the assemblage of two or more parts or products in producing a finished article or assemblage. In some instances, even one assemblage may be further collectively grouped for delivery to another assembling, forming or treatment station. In known processes, these articles, products or parts thereof have been collected in bulk in boxes, trays or similar receivers and then fed into hoppers or similar feeding means for guidance into other forming or assembling stations, and quite often, difficulty has been experienced in proper alinement of the parts, products or articles at said other stations. With my method, this alinement and relationship is maintained.

The grouping or bunching may be in predetermined numbers of the parts or products, or more or less endless chains when long flexible strands are employed. It will thus be seen that a great saving in handling as well as in saving of complicated machine parts is brought about by my simple method of threading, stacking or otherwise grouping or assembling the products at the station where the products are formed.

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

1. The herein described method of forming die castings and automatically stringing the same on an elongated strand, which comprises first forming castings around a core member producing in the resulting castings alined apertures extending completely through each casting, then trimming the castings while supported on said core and when removed from the dies employed to form said castings, then stripping the castings from said core and feeding the same directly onto an elongated strand arranged axially with respect to said core, and feeding the strand axially of the core in successive operations of stringing the castings on said member.

2. The herein described method of forming groups of similar castings and then delivering said castings to an elongated receiver to be loosely supported thereon, which comprises first forming the group of castings on a core between relatively movable dies and united by a common gate, said core having said elongated receiver extending therefrom to a point beyond the boundaries of the dies, separating the dies, leaving the castings on said core, then feeding the core relatively to the dies to a trimming station, then trimming the gate from the castings to form on the core a group of independent castings, then stripping the castings from the core directly onto said elongated receiver, and arranging a multiplicity of the castings on said receiver by a successive series of casting operations.

3. The method of forming and bunching die castings, which comprises first forming a ring-

like die casting around a core arranged between relatively movable dies, then separating the dies and moving the core to feed the casting thereon to a trimming station, then trimming the casting, then stripping the casting from the core and simultaneously feeding the same directly onto a rod-like member positioned adjacent and in alinement with said core and loosely bunching a plurality of castings upon each other on said member in successive series of the aforesaid operations, and feeding said member relatively to the core in the bunching of the castings on said member.

4. The method of forming a plurality of ring-like die castings and then collecting them on an elongated member, which comprises first forming a group of similar castings on a core and in multiple cavities of relatively movable dies, separating the dies leaving the group of castings on said core, moving the core to bring the group of castings directly in one single movement of the core to a trimming station, then trimming the group of castings on said core, then stripping the group of castings from the core and simultaneously feeding the same directly onto an elongated member positioned in contiguous and axial alinement with the core, and utilizing said member to convey a multiplicity of castings collected thereon for transmission to another station.

5. The method of forming a plurality of ring-like die castings and then collecting them on an elongated member, which comprises first forming a group of similar castings on a core and in multiple cavities of relatively movable dies, separating the dies leaving the group of castings on said core, moving the core to bring the group of castings on said core, then stripping the group of castings from the core and simultaneously feeding the same directly onto an elongated member positioned in alinement with the core, employing with said elongated member a supplemental member extending parallel thereto to engage the outer surfaces of the castings in order to maintain a predetermined longitudinal alinement of the castings one with respect to the other on said first member, and utilizing both said members to convey a multiplicity of collected castings for transmission to another station.

6. The herein described method of forming die castings and stacking the same on a strand, which comprises first forming castings around a core between relatively movable dies, said core forming a passage extending completely through each casting and also axially enclosing said strand with respect to which the core is relatively movable, then separating the dies leaving the castings on said core, then moving the core to feed the castings to a trimming station, trimming the castings supported on the core at said trimming station, and then moving the core to a die casting position while restraining the castings to strip the latter from the core directly onto said strand.

7. The herein described method of forming die castings and stacking the same on a rod-like member, which comprises first forming castings around a core between relatively movable dies, said core forming a passage extending completely through each casting, then separating the dies leaving the castings on said core, then moving the core to feed the castings to a trimming station, trimming the castings supported on the core at said trimming station, positioning said member adjacent and in axial alinement with said core and the passages of said castings, then stripping

the castings from the core directly onto said member, and keying all of the castings on the member to maintain a predetermined alinement of the castings longitudinally with respect to said member.

8. The method of forming die castings and delivering said castings to a predetermined station, which comprises forming castings around a hollow core having a core extension extending through said core at a casting station including relatively movable dies, then separating the dies leaving the castings arranged on said core, then moving the core to strip the castings therefrom directly onto said core extension, utilizing said core extension as a means to guide and deliver castings to another station spaced with respect to said casting station, and moving said core and

core extension one relatively to the other in successive casting operations.

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