July 27, 1948. L. H. MORIN 2,446,056

APPARATUS FOR FORMING GROUPS OF DIE CASTINGS

Filed March 29, 1944

Fig. 1.

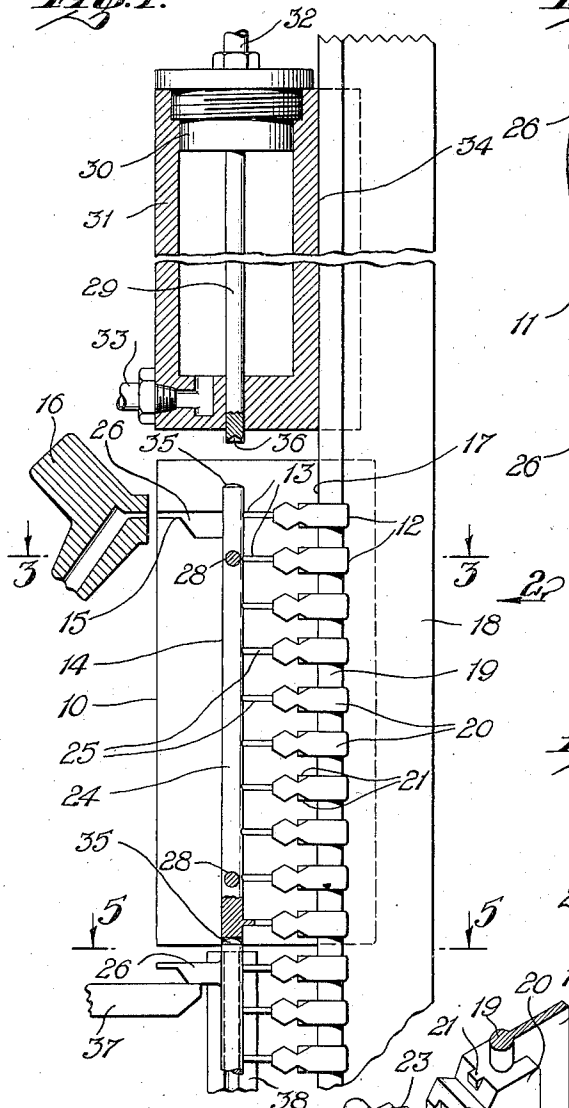


Fig. 2.

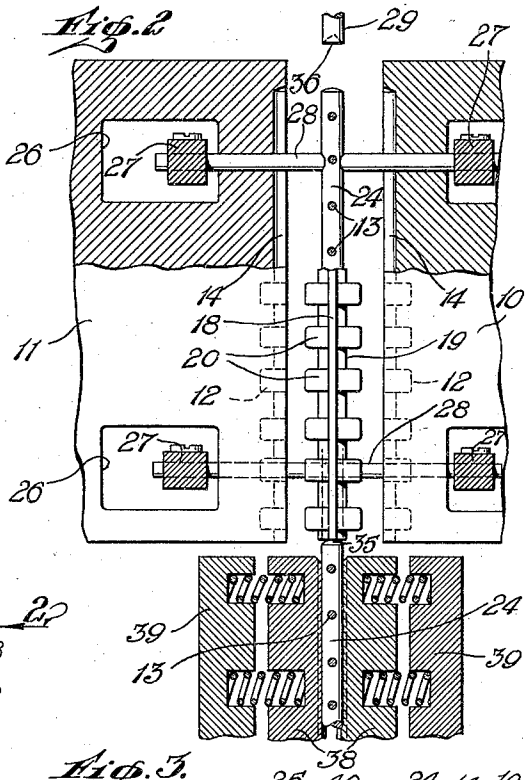


Fig. 3.

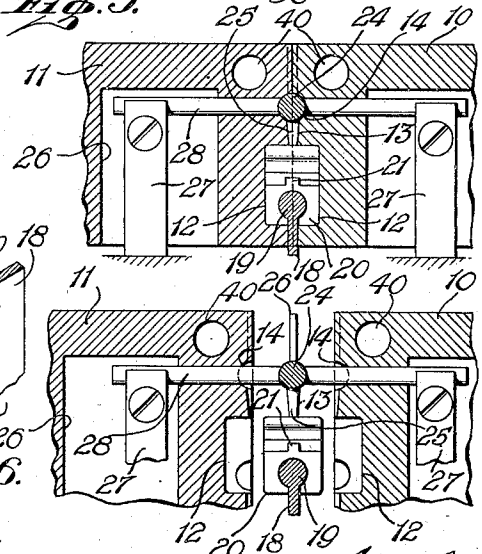
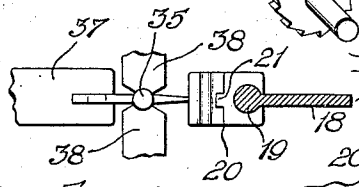


Fig. 6.

Fig. 4.

Fig. 5.



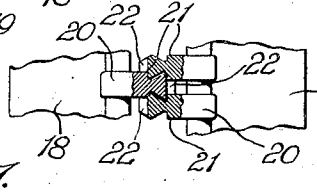


Fig. 7.

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APPARATUS FOR FORMING GROUPS OF DIE CASTINGS

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11 Claims. (Cl. 18—42)

1

This invention relates to separable fasteners employing stringers having links or scoops spaced longitudinally of one edge of the stringers. More particularly, the invention relates to an apparatus for forming a cast unit comprising a series or multiplicity of scoops on the stringer tape together with an integral gate rod, and in utilizing the gate rod as a means for supporting the cast unit and moving the cast unit relatively to the dies employed. 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 sectional view diagrammatically illustrating the apparatus employed in forming successive cast units comprising groups of scoops on a stringer tape.

Fig. 2 is a view looking in the direction of the arrow 2, Fig. 1, illustrating the dies in open position and with part of the construction in section.

Fig. 3 is a partial section on the line 3—3 of Fig. 1.

Fig. 4 is a view similar to Fig. 3, showing the dies in open position, as in Fig. 2.

Fig. 5 is a partial section on the line 5—5 of Fig. 1.

Fig. 6 is a perspective view diagrammatically illustrating the forming operation; and

Fig. 7 is a detail view of a few coupled links of two stringers.

In the construction of stringers of separable fasteners, it has been customary, in forming die cast scoops on the stringers, to cast the scoops one at a time in forming the undercut socket or female coupling portions thereof. It has also been customary in more recent developments of this art, to cast a plurality of scoops simultaneously upon a core element employed for forming the undercut socket or female portion of the scoop. In the last method of procedure, some difficulty would be experienced in removing the core element, particularly when a large number of castings are simultaneously formed on the element.

It is the purpose of my present invention to simultaneously cast a plurality or relatively large

2

number of scoops on the stringer tape without forming the undercut socket or female coupling portions in the scoops, and then to shape the scoops to form these undercut socket or female coupling portions. In producing relatively short stringer lengths, the entire stringer length may be cast in a single operation. However, as most fasteners are relatively long, in such instances, it will be desirable to form cast units, each comprising groups of scoops, and automatically spacing the groups one with respect to the other to provide proper spacing of all the scoops on the stringer edge. In this procedure, I preferably form in each group of castings a bar-like gate portion used as a means for spacing individual scoops, and as a means for feeding and spacing successive groups of scoop castings.

To illustrate one adaptation of my invention, I have diagrammatically illustrated in the drawing two relatively movable dies 10 and 11, on the adjacent impression surfaces of which are formed vertically spaced scoop cavities 12, into which open gate passages 13 communicating with a large cylindrical gate passage 14 with which an admission gate passage 15 communicates, the latter opening through the outer surface of the dies to register with a discharge nozzle 16. Also formed in the impression surfaces of the dies are recesses 17 for receiving a mounting member or tape 18, the beaded edge 19 of which extends through all of the cavities 12. The cavities 12 each define the contour of the resulting links or scoops 20.

At this time, it is to be pointed out that the particular contour or structure of the scoops may be varied to suit any specific requirements, and the structure of the scoop disclosed simply illustrates one adaptation of my invention.

Each scoop has upon opposed surfaces, projecting ribs or elements 21, which are adapted to enter recesses 22 in scoops of a companion stringer, as clearly illustrated in Fig. 7 of the drawing. However, in casting the scoops 20, the recesses or female portions 22 are not formed in the casting, as will readily appear from a consideration of Figs. 3 and 4 of the drawing. These castings are afterwards shaped or formed, for example, by a milling cutter diagrammatically illustrated at 23 in Fig. 6 of the drawing, to mill the slots or recesses 22 in all of the scoops of

each stringer length. Where a series of stringer lengths are formed on a long tape the operation will be a continuous one. It will be understood that the gate portions comprising the rod 24, including the pin portions 25 leading to each casting and the outwardly projecting gate part 26 which also forms the stop controlling spacing, can be trimmed from the castings in a trimming operation prior to the milling operation, and in some instances, the milling cutter 23 may be used to remove all of the gate portions in the milling operation.

It will be apparent that the castings, or each unit comprising the group of castings may be formed by pressure injection of any suitable material into the dies from a suitable nozzle, as at 16. Different types of injection cylinders and nozzles are used in different types of castings. In other words, metal castings or plastic castings may be formed in this manner.

Arranged in recessed portions 26 of the dies 10 and 11, are stationary supports 27 for guide pins 28, note Figs. 3 and 4. These pins open through adjacent surfaces of the dies into the passage 14, so that when the dies are opened, as seen in Figs. 2 and 4, the rod portion 24 of the gate remains supported in a centralized position between the dies before moving the same out of alinement with the dies preparatory for the next casting operation.

Arranged above the dies and in alinement with the parting line of the dies directly above the rod 24 is a transfer plunger 29, the piston end 30 of which is operable in an air cylinder 31 into which air under pressure is injected through pipes or tubes 32 and 33. The cylinder 31 also includes a tape guide portion 34 which supports and guides the tape in its movement along the parting line of dies 10 and 11.

The upper portion of the recess 14 is made conical in form to produce on the upper end of the rod a conical end 35. This conical end is adapted to seat in a conical recess 36, provided in the lower outer end of the plunger 29. It will thus be seen that when the dies 10 and 11 are moved into open position, as seen in Fig. 2, the plunger 29 is moved downwardly to engage the upper end of the rod 24, and as the plunger continues downwardly, the rod 24 is stripped from the guides 28, and the casting is moved into a position below the lower surface of the die, the limit of this movement being checked by a stop 37 engaging the portion 26 of the gate.

In the above operation, air would be admitted to the cylinder through the tube 32. Upon completion of this operation, air is then admitted through the tube 33, and the plunger 29 is moved to raised position, the dies are again closed, and the next casting formed. It will be noted, that the dies close upon the upper conical end of the rod 24, thus the second rod 24 is formed around the first rod which maintains a constant spacing of each group of castings. In shifting the second group of castings to the cleared position from the dies, the stop 37 is, of course, retracted to release the first group of castings and then returned to stop position in order to engage the gate portion 26 of the next successive group of castings. The above operations are continued until the desired length of stringer has been formed, after which a feed of the tape will be made to provide a wide spacing on the tape between the stringer lengths, and then the cycle of operation is repeated.

In feeding each unit or group of castings downwardly, the rod portion 24 is fed through guide and hold-back members 38, resiliently supported on stationary members 39. The members 38 will serve to retain the lowered unit or group of castings in position preparatory to feeding the next group of castings downwardly to the stop position, at which time, the second group of castings will be firmly and yieldably supported in the members 38. The pins 28 in addition to maintaining the centralized position of the cast unit also operate as strippers to strip the castings from the impression surfaces of the die. The number of pins 28 employed may be varied in proportion to the number of links or scoops which are simultaneously formed between the dies.

It will, of course, be apparent that in the machine employed for automatically caring for the successive groups of castings, means will be provided for timing and synchronizing the operation of the dies, the plunger 29 and stop 37, as well as the pressure injection of the casting material into the die cavities when the dies are in closed position. The dies will be water cooled by suitable passages, such as diagrammatically illustrated at 40. The arrangement of these passages will be made to suit the characters of the dies employed.

In an apparatus as herein described, it may be said that the plurality or group of castings formed in each unit or in each casting operation are complete products, and that these products are then shaped or formed to complete the contour of the desired resulting product, for example, by milling the grooves in the outer coupling portions of the scoops. The completion of each scoop also includes the removal of the gate portions.

The formation of the gate rods or similar means as part of a cast unit of the class described, provides on the unit, means which supports several castings of the unit as well as means adapted to be engaged by the ejector and supporting pins 28. The gate rod also provides on the cast unit the means adapted to be engaged by the transfer plunger 29 to strip the unit from the pins 28 and then feed the unit into its position out of the path of adjacent impression surfaces of the dies, with the exception of one end of the rod, which remains between the dies to engage one end of the gate rod of the next successive unit formed between said dies.

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

1. A die casting machine comprising a pair of dies having a plurality of independent cavities spaced along the parting line of the dies in a straight row, adjacent surfaces of the dies having an elongated impression spaced from said cavities and arranged substantially parallel to said row of cavities for forming a gate rod, the dies having an admission gate passage communicating with said impression, passages extending from the impression to each of the die cavities whereby in the pressure injection of casting material into the dies a plurality of castings are formed in the die cavities all united by the gate rod, means for ejecting the casting and gate rod from the dies coincidently with the operation of separating the dies and for supporting the complete casting in predetermined position between the open dies, and reciprocating means for engaging the end of said gate rod to

strip the unit casting from last named means and to feed the same beyond adjacent surfaces of said dies.

2. A die casting machine comprising a pair of dies having a plurality of independent cavities spaced along the parting line of the dies, adjacent surfaces of the dies having an elongated impression spaced from said cavities for forming a gate rod, the dies having an admission gate passage communicating with said impression, passages extending from the impression to each of the die cavaties whereby in the pressure injection of casting material into the dies a plurality of castings are formed in the die cavities all united by the gate rod, means for ejecting the casting and gate rod from the dies in the operation of separating the dies and for supporting the complete casting in predetermined position between the open dies, means engaging the gate rod for stripping the unit casting from the last named means and for feeding the same beyond adjacent surfaces of said dies, and a pair of yieldable grippers adjacent but spaced from said dies for receiving and supporting the cast unit moved out of the path of movement of said dies.

3. A die casting machine comprising a pair of dies having a plurality of independent cavities spaced along the parting line of the dies, adjacent surfaces of the dies having an elongated impression spaced from said cavities for forming a gate rod, the dies having an admission gate passage communicating with said impression, passages extending from the impression to each of the die cavities whereby in the pressure injection of casting material into the dies a plurality of castings are formed in the die cavities all united by the gate rod, means for ejecting the casting and gate rod from the dies in the operation of separating the dies and for supporting the complete casting in predetermined position between the open dies, means engaging the gate rod for stripping the unit casting from the last named means and for feeding the same beyond adjacent surfaces of said dies, a pair of yieldable grippers adjacent but spaced from said dies for receiving and supporting the cast unit moved out of the path of movement of said dies, and said last named means in combination with a pre-cast unit forming a backing and support for the next successive cast unit in the operation of feeding the same into said last named means.

4. In a die casting machine, means comprising a pair of relatively movable dies for forming a die cast unit including a rod like gate portion, means for supporting the rod like gate portion of a previously formed unit in a position to engage one end of the first mentioned gate rod, thereby to space said units relatively to each other, stationary means for ejecting the first mentioned unit from the dies in the separation thereof and for positioning said unit between the separated dies, and means movable toward and from the other end of said first mentioned gate rod for stripping the unit from said stationary means and for feeding the unit out of the path of movement of said dies.

5. In a die casting machine, means comprising a pair of relatively movable dies for forming a die cast unit including a rod like gate portion, stationary means for ejecting the unit from the dies in the separation thereof and for positioning the unit between the separated dies, means movable toward and from one end of said

gate rod for stripping the unit from said second named means and for feeding the unit out of the path of movement of said dies, and means for checking the last named movement of the unit to position one cast unit definitely with respect to the next successive cast unit formed between said dies.

6. In a die casting machine, means comprising a pair of relatively movable dies for forming a die cast unit including a rod like gate portion, stationary means for ejecting the unit from the dies in the separation thereof and for positioning the unit between the separated dies, means movable toward and from one end of said gate rod for stripping the unit from said second named means and for feeding the unit out of the path of movement of said dies, and said last named means comprising a plunger rod and an air cylinder for actuating said rod in movement thereof into different positions in successive casting operations of the machine.

7. In a die casting machine, means comprising a pair of relatively movable dies for forming a die cast unit including a rod like gate portion, stationary means for ejecting the unit from the dies in the separation thereof and for positioning the unit between the separated dies, means movable toward and from one end of said gate rod for stripping the unit from said second named means and for feeding the unit out of the path of movement of said dies, and yieldable jaws for engaging said unit and between which each unit is fed by said stripping and feeding means.

8. In a machine for simultaneously forming a plurality of independent die castings united in a gate portion, means comprising relatively movable dies forming an elongated gate rod as part of said gate portion and castings in defining a cast unit, said gate rod being spaced with respect to said castings in said unit, means cooperating with the gate rod for feeding said cast unit out of alinement with the dies when in open position, stationary means engaging said gate rod for ejecting the unit therefrom in movement of the dies into open position, and for supporting said unit preparatory to engagement of the second named means therewith.

9. In a machine for simultaneously forming a plurality of independent die castings united in a gate portion, means comprising relatively movable dies forming an elongated gate rod as part of said gate portion and castings in defining a cast unit, said gate rod being spaced with respect to said castings in said unit, means cooperating with the gate rod for feeding said cast unit out of alinement with the dies when in open position, stationary means engaging said gate rod for ejecting the unit therefrom in movement of the dies into open position, and for supporting said unit preparatory to engagement of the second named means therewith, and said stationary means comprising a pair of pins engaging opposed surfaces of the gate rod of said unit.

10. In a die casting machine, a pair of dies for forming successive cast units each including a gate portion of predetermined contour, a pair of yieldable grippers arranged adjacent said dies, means for feeding successive cast units between said grippers, and said grippers supporting each unit in predetermined position with respect to said dies and the next successive unit formed thereby.

11. In a die casting machine, a pair of dies for forming successive cast units each including a gate portion of predetermined contour, a pair of

yieldable grippers spaced from said dies, means for feeding successive cast units between said grippers, said grippers supporting each unit in predetermined position with respect to said dies and the next successive unit formed thereby, and means for checking movement of each cast unit into position between said grippers.

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