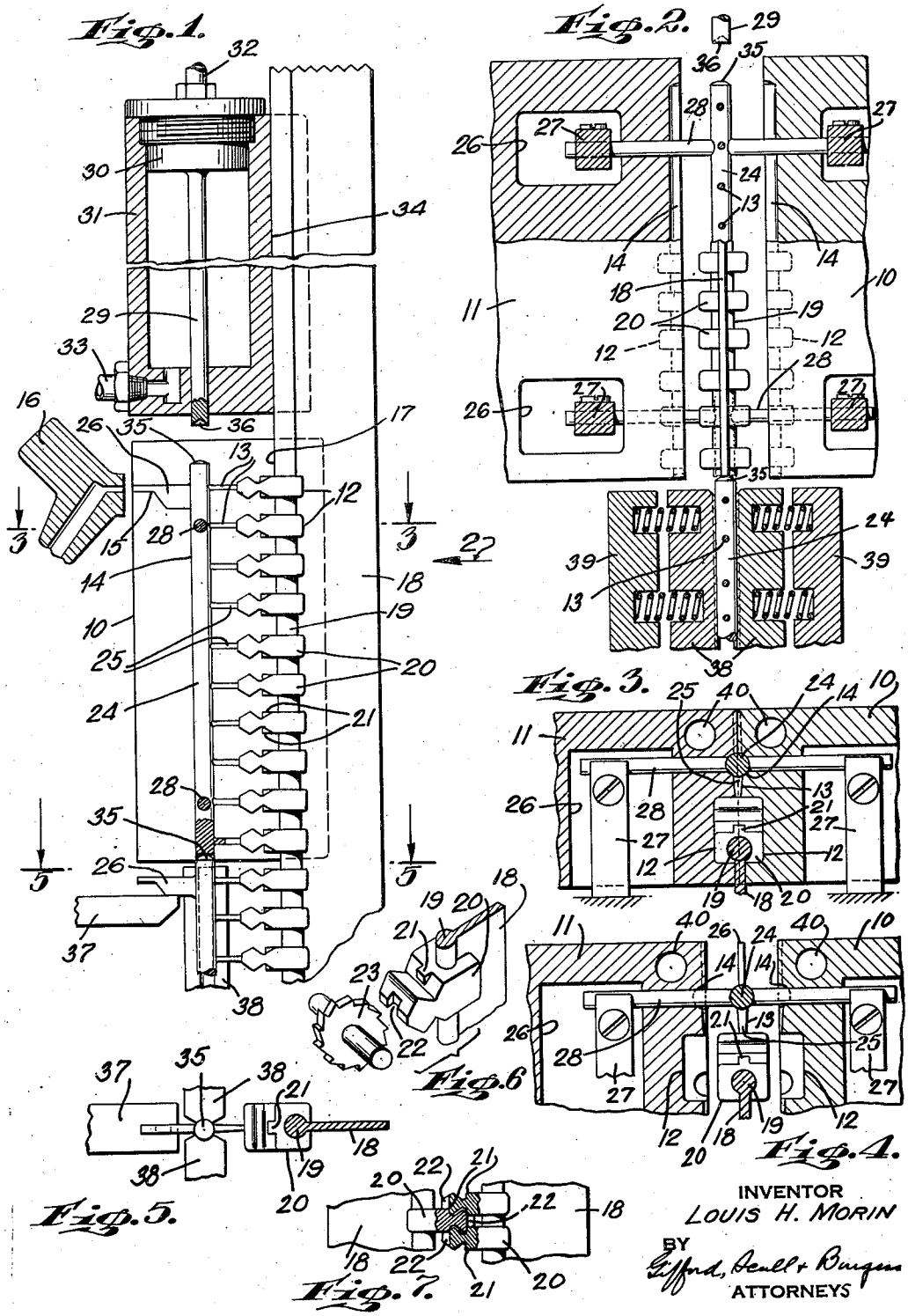
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METHOD OF FORMING SEPARABLE FASTENER SCOOPS

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METHOD OF FORMING SEPARABLE FASTENER SCOOPS

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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 the method of first casting a series or multiplicity of scoops on the stringer tape, and then in removing the gate portion and milling, or otherwise shaping the scoops to form recesses, apertures, or grooves therein to produce, on the resulting scoops, the socket or female portions, receiving coupling elements of scoops of a companion stringer in coupling the stringers together. 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 showing the method of casting successive groups of scoops on a tape edge.

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 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

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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 cast groups of scoops and automatically space 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 specification requirements and the structure of the scoop disclosed simply illustrates one adaptation of my invention. Each scoop has upon opposed surfaces projecting ribs or element 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 castings, as will readily appear from the consideration of Figs. 3 and 4 of the drawing, but 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 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 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 the 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 24 a conical end 35, and 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 surfaces 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 completing 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 group of castings downwardly, the rod portion 24 is fed through guide and holdback members 38, resiliently supported on stationary members 39. The members 38 will serve to retain the lowered 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 the 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 group 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 the method herein described, it may be said that the plurality or group of castings formed in each casting operation are incomplete 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.

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

1. The method of casting scoop blanks, which comprises forming a unit casting in relatively movable dies provided with a plurality of scoop cavities arranged at spaced intervals and a common gate for feeding material into said cavities, whereby a casting comprising a plurality of spaced scoops united by a common gate element is formed, separating the dies to strip the unit casting from the dies, supporting the unit casting by said gate element centrally between the open dies, and then pushing the unit from between said dies by a force acting directly on said gate element.

2. The method of casting scoop blanks, which comprises forming a unit casting in relatively movable dies provided with a plurality of scoop cavities arranged at spaced intervals and a common gate for feeding material into said cavities, whereby a casting comprising a plurality of spaced scoops united by a common gate element is formed, separating the dies to strip the unit casting from the dies, supporting the unit casting by said gate element centrally between the open dies, then pushing the unit from between said dies by a force acting directly on said gate element, stopping the unit casting removed from between the dies to dispose one end of the gate element in registering position with one end of the gate forming cavity of the dies, and then closing the dies and forming the next successive unit casting with the end of the gate element of the second cast unit abutting said end of the first cast unit.

3. The method of casting scoop blanks, which comprises forming a unit casting on a mounting member arranged between relatively movable dies provided with a plurality of scoop cavities arranged at spaced intervals on the mounting member and a common gate for feeding material into said cavities, whereby a casting comprising a plurality of scoops spaced on the mounting member and united by a common gate element is formed, separating the dies to strip the unit casting from the dies, supporting the unit casting by said gate element centrally between the open dies, then pushing the unit from between said dies by a force acting directly on

said gate element, and checking said movement of the cast unit to space the mounting member for reception of the next successive cast unit.

4. The method of casting scoop blanks, which comprises forming a unit casting on a mounting member arranged between relatively movable dies provided with a plurality of scoop cavities arranged at spaced intervals on the mounting member and a common gate for feeding material into said cavities, whereby a casting comprising a plurality of scoops spaced on the mounting member and united by a common gate element is formed, separating the dies to strip the unit casting from the dies, supporting the unit casting by said gate element centrally between the open dies, then pushing the unit from between said dies by a force acting directly on said gate element, checking said movement of the cast unit to space the mounting member for reception of the next successive cast unit, and forming the gate elements of successive cast units one directly upon the other.

5. The method of casting scoop blanks, which comprises forming a unit casting in relatively movable dies provided with a plurality of scoop cavities arranged at spaced intervals and a common gate for feeding material into said cavities, whereby a casting comprising a plurality of spaced scoops united by a common gate element is

formed, separating the dies to strip the unit casting from the dies, supporting the unit casting by said gate element centrally between the open dies, then feeding the unit from between said dies by a force acting directly on said gate element to a stop position, and supporting said unit in said stop position in casting the next successive unit between said dies.

6. The method of casting scoop blanks, which comprises forming a unit casting in relatively movable dies provided with a plurality of scoop cavities arranged at spaced intervals and a common gate for feeding material into said cavities, whereby a casting comprising a plurality of spaced scoops united by a common gate element is formed, separating the dies to strip the unit casting from the dies, supporting the unit casting by said gate element centrally between the open dies, then feeding the unit from between said dies by a force acting directly on said gate element to a stop position, supporting said unit in said stop position in casting the next successive unit between said dies, and maintaining one end portion of the gate element of the supported cast unit between the dies in forming the gate element of the successive cast unit directly upon the gate element of said supported unit.

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