Nov. 30, 1954 L. H. MORIN 2,695,419

APPARATUS FOR CONTROLLING TAPE SPACING BETWEEN SEPARABLE FASTENER STRINGER LENGTHS

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Fig. 4.

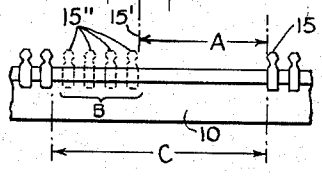


Fig. 1.

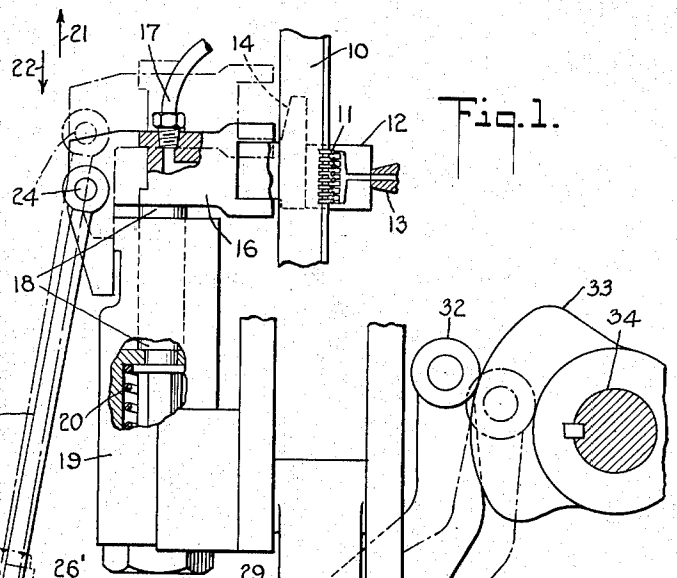
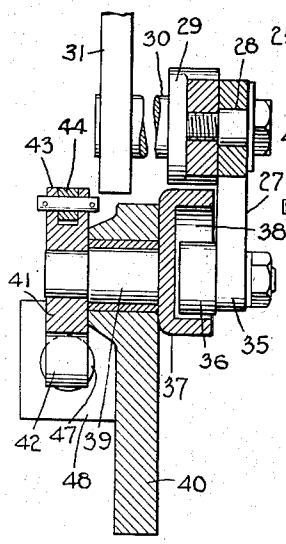


Fig. 2.



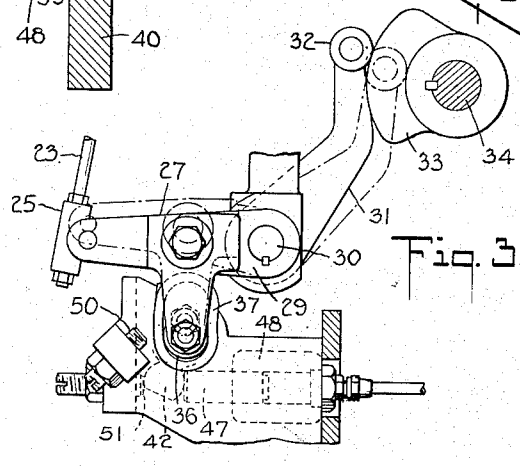


Fig. 3.

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APPARATUS FOR CONTROLLING TAPE SPACING BETWEEN SEPARABLE FASTENER STRINGER LENGTHS

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11 Claims. (Cl. 18—1)

This invention relates to machines for producing separable fastener stringers, wherein a predetermined number of scoops are attached in groups defining stringer lengths at spaced intervals along an elongated mounting tape and, particularly, to an apparatus for controlling and regulating the length of the tape. More particularly, the invention deals with a method and apparatus, wherein automatic means is provided to control the number of scoops applied to the tape in forming the groups or stringer lengths of scoops, particularly when scoops are applied to the tape in predetermined increments, such, for example, as 1" with a predetermined number of scoops in each inch increment, and wherein the movement or spacing of the tape is regulated to correspond with the number of scoops applied to the tape.

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 side and sectional view of a part of a die casting machine, showing the arrangement of my improved apparatus therein and indicating the method of its use.

Fig. 2 is a partial section on the line 2—2 of Fig. 1 on an enlarged scale.

Fig. 3 is a view similar to Fig. 1, showing only parts of the construction on a reduced scale, with parts in a different position; and

Fig. 4 is a detailed view of a portion of a stringer tape diagrammatically illustrating the control of predetermined spacings between stringer lengths of scoops on an elongated tape according to my method.

My present invention deals with die casting machines of the type utilizing increment spacing control in application of the scoops to a stringer tape, so as to definitely regulate the number of scoops applied to a stringer in defining stringer length, as taught in my Patent No. 2,447,355 which issued August 17, 1948. This patent has taught the formation of a group of scoops, employing a specific increment length for the group, and it further taught the formation of an additional group or number of scoops of less than the said specfiic increment length. Let it be assumed, for illustrative purposes, that the specific increment length is 1". Now, depending upon the size of the scoops, this 1" may include any number of individual scoops. According to this patent, if a customer required an 8½" length to define the scoop stringer length, it was necessary to first apply 8" or 8 increments of scoops to the tape and, then, through the teachings in the patent to add a sufficient number of scoops to make up the ½" length; but this left, within the environment of the die, a ½" of tape, which in accordance with conventional 1" spacing of the tape to respective increments, would result in 1½" spacing between groups of stringers, where a 1" spacing might be all that is necessary for the required distance between the respective groups of stringers.

The cumulative amount of tape that is lost or wasted by the improper spacing between the groups of stringers becomes quite large over even short periods of time in the operation of die casting machines of the type involved here and is an important item from an economic viewpoint. The present invention provides a solution to this problem and, in fact, provides an arrangement whereby stringers

of any length desired may be cast with the exact amount of tape necessary or required between the stringer lengths.

In addition, the present invention makes it possible to obtain readily any tape spacing desired between the stringers. Such tape spacing may be the standard increment spacing of the machine, a fractional part thereof, or a distance greater than the standard increment spacing.

To accomplish this result, a machine, which normally produced the desired length of stringers, can be easily converted to produce such stringers that are spaced apart by the necessary or required distance on the tape by minor additions to the machine and through actuation of a suitable control valve.

In addition to the patent heretofore mentioned, reference is also here made to my prior Patent Number 2,224,979 of December 17, 1940, which illustrates the air control valve mechanism for actuating air cylinders, to fully understand operation of an air valve mechanism employed in the apparatus disclosed and, further, reference is made to my Patent Number 2,497,010, which issued February 7, 1950, in which apparatus is disclosed for the automatic feeding of tape to provide for the increments of scoop attachments to the tape, part of which apparatus is illustrated diagrammatically in the accompanying drawing.

In the drawing, I have indicated at 10 part of a stringer tape, upon which increments of scoops, as at 11, are adapted to be cast by a die 12, into which casting material is injected through a nozzle, partially shown at 13. At 14 is shown the automatically actuated tape grippers for intermittently feeding the tape the necessary distance to receive the successive increment groups 11 in forming predetermined stringer lengths on the tape 10 and the required spacing of the tape between the adjacent stringer lengths.

In Fig. 4 of the drawing, I have diagrammatically shown part of the tape 10 with the normal tape spacing between two stringer lengths as 15, 15', this length being designated by the dimension A and, for purposes of illustration, will be 1" and equal to one standard or normal casting increment of the scoops 11. The control of this spacing will be dealt with more specifically later.

The grippers 14 are timely actuated by air introduced into the housing 16, in which the grippers are supported, through the pipe 17, as is taught in my Patent Number 2,497,010, heretofore mentioned. The housing 16 has a depending rod 18 which extends into a cylinder or casing 19, in which a spring 20 is arranged and operates upon the rod 18 to move the grippers 14 upwardly or, in other words, in the direction of the arrow 21. In this upward movement, the grippers 14 pass freely over the tape, the tape being fed in the opposite direction by the grippers, in other words, in the direction of the arrow 22. This feed stroke of the tape 10 by the grippers 14 is governed by my improved control attachment.

The attachment comprises a link or rod 23 pivoted to the housing 16, as at 24, and the lower end of the rod is adjustably coupled, as seen at 25, with one end 26 of a bell crank 27. The bell crank 27 has a jointed connection, as seen at 28, to the end of a lever 29, mounted on a rod 30. Also secured to the rod 30 is a lever 31, carrying, at its free end, a roller 32, which is constantly held in engagement with a cam 33 on a cam shaft 34 by the spring 20.

The other end 35 of the bell crank 27 carries a roller 36, note Fig. 2, which operates in an arcuate cam segment 37 or the cam slot or groove 38 thereof. The segment 37 has a pin extension 39 pivotally mounted in the frame 40 which constitutes part of the machine. Secured to the pin 39 is a member 41 having a rounded arm extension 42 and a forked extension 43. Pivoted to the forked extension 43 is a rod 44, on which is mounted a spring 45, the tension of which is adjusted by the means seen at 46. The spring 45 maintains the rounded arm extension 42 in constant engagement with a piston or plunger 47. The piston or plunger 47 is arranged in an air cylinder 48 secured to the frame 40, as indicated in Fig. 1 of the drawing. Air from a suitable valve control, as illustrated in Patent Number 2,224,979 is admitted into the cylinder 48 through an admission pipe or tube 49. At this time, it may be

said that the control of this actuation of the piston or plunger 47 is dependent upon the increment control of tape spacing, as later described. At 50 is shown an adjustable stop screw which maintains the segment 37 in the normal position which is shown in Fig. 1 of the drawing, being held in this position by the spring 45.

At 51 is shown an adjustable stop screw which controls and regulates swinging movement of extension 42, and thus of the segment 37, when actuated by the air operated piston or plunger 47 and, in Fig. 3 of the drawing, I have diagrammatically shown one operation of the segment 37 in this manner. It will be understood that, by adjusting the screw 51, the movement of the arm 42 is controlled to govern the degree of swinging movement of the segment 37.

As heretofore stated, the segment 37, as shown in Fig. 1, is in its normal position, in which position, the curvature of the cam groove or slot 38 is formed on a radius common to the pivot 30 so that, in normal operation of the machine and in providing the normal 1" increment spacing, as at A, Fig. 4, the roller 36 on the end 35 of the bell crank 27 will swing freely in the cam groove or slot 38, thus facilitating the full stroke movement of the grippers 14, which movement is governed by the cam 33 or, in other words, the movement attributed by this cam through the leverage and linkage shown. This is further indicated by the full and dotted line showing of the pivot 24 in Fig. 1 of the drawing. It is also indicated by the movement of the pivot ends of the end portions 26 of the bell crank, as seen at 26' in said figure.

Now turning to Fig. 3 of the drawing, it will be readily seen that, by actuating the piston or plunger 47 to move the segment 37 into the position shown in Fig. 3, the same operation contributed to the lever 31 by the cam 33 will actuate the ball crank 27 through an arc materially less than the movement contributed to the bell crank in Fig. 1. Thus, the movement of the rod 23 is correspondingly limited, reducing the tape feed stroke of the grippers 14, so that the tape will be fed a distance that will provide for the necessary or required spacing between the stringer lengths. If necessary, this feed stroke may be repeated to obtain the desired tape spacing between the adjacent stringer lengths.

It will be well to consider Fig. 4 of the drawing at this point, in which I have shown at 15" four scoops in dotted lines arranged in a bracketed section B which represents scoops omitted at the end of the final increment of a stringer. Advancing the tape thereafter by the standard distance for one increment, as represented at A, would result in a tape spacing between the ends of the adjacent stringers of the distance represented at C, which would be greater than the standard distance A by the bracketed portion B, represented by four scoops. Let us say, for example, that four scoops represent half of the total number of scoops in an increment. Then, if these dotted line scoops had been omitted from the last casting operation in forming the desired stringer length, one-half of the tape defined by the increment is left blank with scoops unattached thereto; thus, to make up the desired A length in the next operation of simply moving the tape without attaching scoops thereto, it would only be necessary to move the tape half the normal distance to make up a spacing which would be equal to the normal spacing A.

This is accomplished, in accordance with the present invention, by applying air to the piston 47 at the proper time so as to swing the cam segment 37 to a position where the downward movement of the end 26 of the bell crank lever 27 under the influence of the cam 33 is reduced to one-half of its normal stroke and consequently, the tape 10 is fed only one-half the normal distance at this time. This, of course, reduces the tape spacing between the stringers to the standard or normal spacing A. In a similar manner, practically any tape spacing desired can be obtained between adjacent stringers and, if necessary, more than one spacing movement of the feed grippers 14 can be provided for in the timing of the machine so as to obtain a tape spacing greater than the full stroke of the grippers if desired.

It will also be understood that, in many instances, different fractional elimination of scoops are automatically cared for in producing specific stringer lengths or stringer lengths having a predetermined number of

scoops therein. However, by adjustment of the screw 51, the distance the tape is fed for each increment can be controlled to compensate for these variances. It will also be understood that, after a setting has been made in the machine, the machine will continue to operate with this desired tape spacing until the required number of stringer lengths to fulfill a special order has been produced, after which the screw 51 may again be adjusted to return the apparatus to the normal or standard spacing, as illustrated in Fig. 1, or to any other desired adjusted position, to fit some other specific or odd stringer length measurement.

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

1. In apparatus for producing separable fastener stringers, means for intermittently feeding a tape to enable consecutive groups of scoops to be attached to the tape to form stringer lengths and for feeding the tape to space one stringer length from an adjacent stringer length thereon, said means comprising a pair of grippers movable with and relatively to the tape, cam actuated links and levers controlling movement of said grippers in one direction, spring means for moving the grippers in the opposite direction, means controlling movement of one of said levers, said control means normally being positioned to permit a full feed stroke of the grippers in feeding the tape for the attachment of scoops thereto, and means for moving said control means to a position for reducing the feed stroke of said grippers in feeding the tape between said stringer lengths to less than the full stroke thereof.

2. In apparatus for producing separable fastener stringers, means for intermittently feeding a tape to enable consecutive groups of scoops to be attached to the tape to form stringer lengths and for feeding the tape to space one stringer length from an adjacent stringer length thereon, said means comprising a pair of grippers movable with and relatively to the tape, cam actuated links and levers controlling movement of said grippers in one direction, spring means for moving the grippers in the opposite direction, an arcuate segment guiding movement of one of said levers, tensional means maintaining said segment in a position providing a full stroke movement of the links and levers in feeding the tape for attachment of scoops thereto, and automatically actuated means for positioning said segment in a position for reducing the stroke movement of the lever guided by the segment and thus in turn for reducing the corresponding stroke movement of the grippers to less than the full stroke thereof in feeding the tape between adjacent stringer lengths.

3. In apparatus for producing separable fastener stringers, means for intermittently feeding a tape to enable consecutive groups of scoops to be attached to the tape to form stringer lengths and for feeding the tape to space one stringer length from an adjacent stringer length thereon, said means comprising a pair of grippers movable with and relatively to the tape, cam actuated links and levers controlling movement of said grippers in one direction, spring means for moving the grippers in the opposite direction, an arcuate segment guiding movement of one of said levers, tensional means maintaining said segment in a position providing a full stroke movement of the links and levers in feeding the tape for attachment of scoops thereto, automatically actuated means for positioning said segment in a position for reducing the stroke movement of the lever guided by the segment and thus in turn for reducing the corresponding stroke movement of the grippers to less than the full stroke thereof in feeding the tape between adjacent stringer lengths, and manually adjustable means cooperating with said segment for additionally controlling the movement contributed to said guided lever.

4. In an apparatus for forming separable fastener stringers employing grippers normally feeding a stringer tape successive increment distances in producing stringer lengths of scoops thereon with a tape spacing between said stringer lengths, the combination therewith of a cam actuated lever, a bell crank actuated by said lever, a connecting rod coupling one end of the bell crank with said grippers, a pivotally supported arcuate segment, another arm of the bell crank operatively engaging said segment, and means including a coil spring normally maintaining the segment in an arc concentric

to the axis of said lever, thereby permitting full stroke motion of the bell crank in actuating the grippers through said rod coupling upon the cam actuation of said lever.

5. In an apparatus for forming separable fastener stringers employing grippers normally feeding a stringer tape successive increment distances in producing stringer lengths of scoops thereon with a tape spacing between said stringer lengths, the combination therewith of a cam actuated lever, a bell crank actuated by said lever, a connecting rod coupling one end of the bell crank with said grippers, a pivotally supported arcuate segment, another arm of the bell crank operatively engaging said segment, means including a coil spring normally maintaining the segment in an arc concentric to the axis of said lever, thereby permitting full stroke motion of the bell crank in actuating the grippers through said rod coupling upon the cam actuation of said lever, and means for intermittently moving said segment into an eccentric position with respect to the axis of said lever, thereby reducing the stroke motion of said bell crank, said rod coupling, and said grippers.

6. In an apparatus for forming separable fastener stringers employing grippers normally feeding a stringer tape successive increment distances in producing stringer lengths of scoops thereon with a tape spacing between said stringer lengths, the combination therewith of a cam actuated lever, a bell crank actuated by said lever, a connecting rod coupling one end of the bell crank with said grippers, a pivotally supported arcuate segment, another arm of the bell crank operatively engaging said segment, means including a coil spring normally maintaining the segment in an arc concentric to the axis of said lever, thereby permitting full stroke motion of the bell crank in actuating the grippers through said rod coupling upon the cam actuation of said lever, means for intermittently moving said segment into an eccentric position with respect to the axis of said lever, thereby reducing the stroke motion of said bell crank, said rod coupling, and said grippers, and manually adjustable means regulating the amount of eccentric movement of said segment by said last named means.

7. In apparatus for producing separable fastener stringers comprising a pair of grippers for intermittently gripping and moving a tape to a casting station wherein scoops are cast on the tape in groups to form a stringer length and wherein the grippers move the tape a fixed distance in order to space one stringer length from a succeeding stringer length, the combination therewith of a pair of pivotally connected movable levers for actuating the grippers through successive tape feeding strokes, movable means operable on one of said levers for varying the movement of the same and thus varying the movement of the grippers and tape, and means for moving said movable means into operative position during the spacing of a stringer length from a succeeding length, whereby the spacing between said lengths may be varied.

8. In apparatus for producing separable fastener stringers comprising a pair of grippers for intermittently gripping and moving a tape through a pair of relatively movable dies wherein scoops are cast on the tape in groups to form a stringer length and wherein the grippers move the tape a fixed distance past the dies in order to space one stringer length from a succeeding stringer length, spring biassed means for moving the grippers relatively to the tape to the original position of said grippers preparatory to feeding another section of tape to the dies, the combination therewith of a rod for moving the grippers in successive strokes to feed the tape to the dies, a cam-actuated lever for actuating said rod, a second lever pivoted to the first lever and engaging said rod, a cam track for engaging the second lever and guiding the same, said track having a normal position wherein the movement of said levers and rod enables said grippers to make a full feed stroke, said track being movable to another position wherein the movement of the second lever is changed and thus the movement of the rod and grippers is changed to other than a full feed stroke, means for moving said track to said latter position, and said last mentioned means being active during the spacing of a stringer length from a succeeding length, whereby the spacing between said lengths may be varied.

9. In a machine for producing stringer lengths having means for intermittently feeding a tape to control tape spacing between said stringer lengths, said tape feed means having a normal stroke motion, the combination therewith of a pair of pivotally connected levers for actuating the tape feed means through said normal stroke motion, intermittently moving cam means engaging one of said levers for varying the movement of the lever, means for holding said cam means in a normal position favoring (1) normal movement of said one lever and (2) normal stroke motion of the tape feed means, and means for moving said cam means to another position to vary the movement of said one lever, and, in turn, to vary the normal stroke of said tape feed means.

10. In apparatus for producing castings on a mounting member comprising a pair of grippers for intermittently gripping and moving said member through a pair of relatively movable dies wherein said castings are formed on the member, spring biassed means for moving the grippers relatively to the member to the original position of said grippers preparatory to feeding another portion of the member to the dies, the combination therewith of a rod for moving the grippers in successive strokes to feed the member to the dies, a lever for actuating said rod against the action of said spring biassed means, means for actuating said lever, a second lever pivoted to the first lever and engaging said rod, a cam track engaging the second lever and guiding the same, said track having a normal position wherein the movement of said levers and rod enables said grippers to make a full feed stroke, said track being movable to a position wherein it serves to limit the movement of the second lever and thus to limit the movement of the rod and grippers to less than a full feed stroke, and means for moving said track from said normal position to said limiting position, whereby movement of the grippers and the mounting member is limited.

11. In apparatus for producing castings on a mounting member comprising a pair of grippers for intermittently gripping and moving said members in successive strokes, a pair of relatively movable dies through which said member is moved and wherein said castings are formed on the member, said grippers being active to move the member in order to periodically space the castings thereon, spring biassed means for moving the grippers relatively to the member to the original position of said grippers preparatory to feeding another portion of the member to the dies, and means for moving the grippers against the action of said spring biassed means, the combination therewith of means periodically engageable with said gripper moving means for actuating the latter, movable means operable on said engageable means for varying the feeding movement of the grippers, means for holding said movable means in one position, and means for changing the position of said movable means.

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