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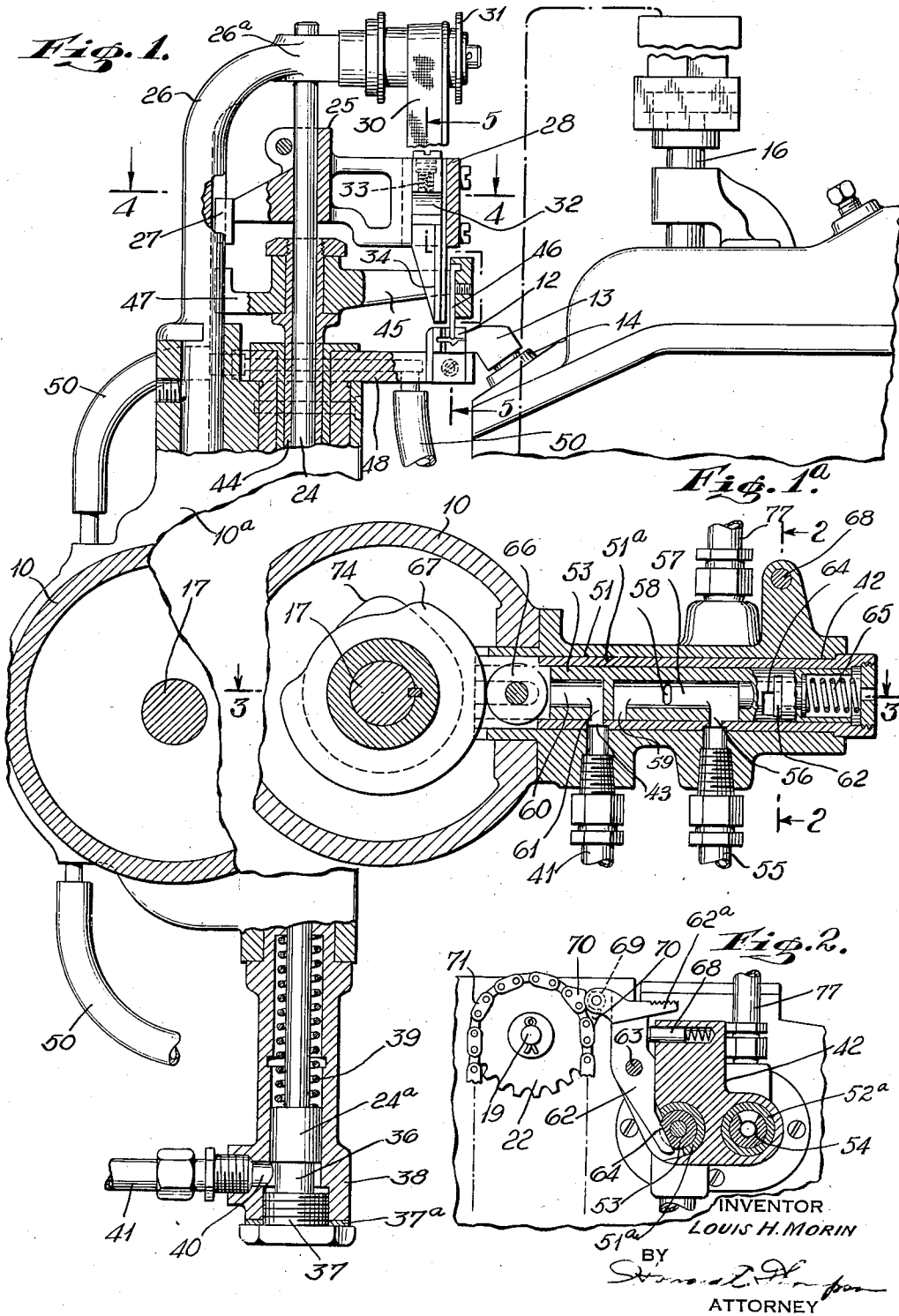
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TAPE FEEDING MECHANISM

Filed April 18, 1939

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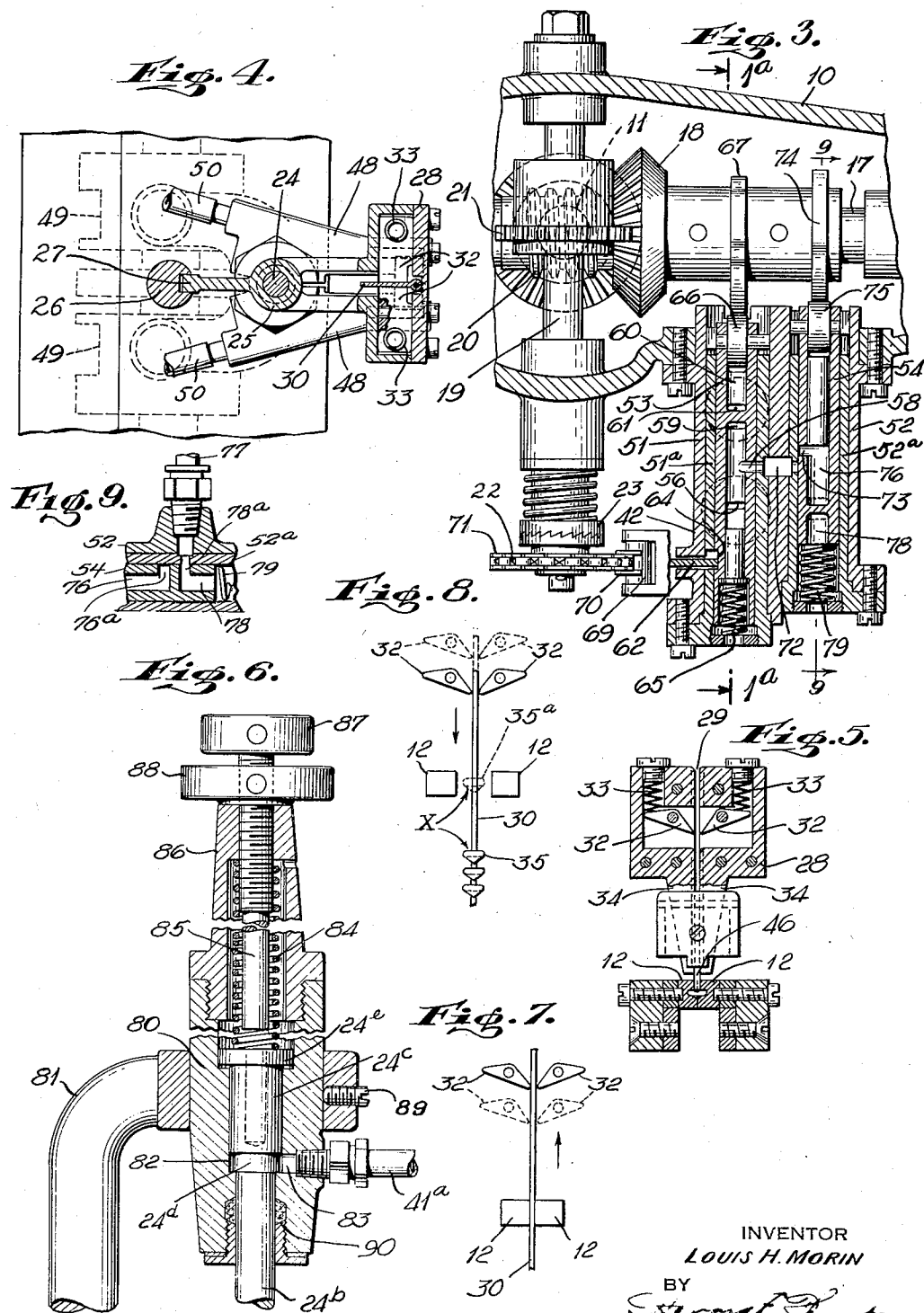
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TAPE FEEDING MECHANISM

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12 Claims. (Cl. 22—70)

This invention relates to tape feeding mechanism wherein the said mechanism is actuated through the medium of compressed air so that a quick and yet positive feed may be provided of a tape or other strand, especially in the wide spacing of the tape or strand in a machine. More particularly, the invention relates to a machine of the character described wherein devices or elements are mounted or attached to a tape or strand at spaced intervals longitudinally thereof and wherein at predetermined controlled intervals an air valve will be actuated to intermittently feed a tape or strand one or more times in widely spacing the elements arranged or mounted thereon. The novel features of the invention will be best understood from the following description and annexed drawings, in which certain embodiments of the invention are disclosed and in which the separate parts of the mechanism are designated by suitable reference characters in each of the views, and in which:

Fig. 1 is a vertical broken section through a part of a die casting machine illustrating one method of carrying my invention into effect.

Fig. 1A is a sectional view substantially on the line 1A—1A of Fig. 3, showing the valve mechanism associated with the structure as shown in Fig. 1.

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

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

Fig. 4 is a section on the line 4—4 of Fig. 1.

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

Fig. 6 is a sectional detail view showing a modified form of construction which may be employed.

Fig. 7 is a diagrammatic view illustrating one step in the method of feeding the tape for the wide spacing thereof, and

Fig. 8 is a view similar to Fig. 7 showing another step in the operation of feeding the tape.

Fig. 9 is a fragmentary sectional view on the line 9—9 of Fig. 3.

The present invention constitutes a continuation in part of the structure shown and described in my prior application Ser. No. 189,309 filed Feb. 8, 1938, in which prior application the fundamental principles of the tape feeding mechanism herein described and particularly as illustrated in Figs. 1 to 5 inclusive were described. In the present application one further adaptation of this invention is illustrated, which adaptation is basically the same as that shown in the other figures.

In the production of such articles of manufacture as stringers for separable fasteners, it has been the practice to arrange a group of links or elements on one edge of the tape and then to widely space the tape between one group of elements and the next adjacent group in forming what is commonly termed, stringer lengths. These lengths vary in the production of fasteners of different lengths adapting them to various types and kinds of articles of manufacture, garments and the like. In all structures of this type and kind, it has been difficult to provide an accurate wide spacing of the groups of links so that in coupling two long tapes together, an accurate length of tape between groups of links would be provided on both stringers. Variances of these lengths has brought about difficulty in the handling of the joined long workpieces from the standpoint of plating or for other purposes.

It is one of the features of my invention to provide an accurate spacing between the groups of links on a stringer of the class described so that no variance would be provided between coupled stringers which would bring about the buckling and other objectionable features. As a matter of fact, it is the purpose of my invention to not only accurately control the wide spacing of the groups of links on a long tape, but also in definitely controlling the number of links applied in each group in the spacing thereof one with respect to the other so as to gage and control the various stringer lengths, not by the number of inches but by the number of links employed; thus providing a more positive and definite means of merchandising articles of this type and kind by the sale of stringer lengths by the number of links employed in each stringer rather than by the inch length of a complete stringer from one end link to the opposed end link.

In the accompanying drawings, and for the purpose of illustrating one method of carrying my invention into effect, I have shown parts of the die casting machine shown and described in the application hereinbefore referred to, as is necessary to illustrate, to one skilled in the art, the operation of the tape feed mechanism. In the drawings 10 represents the frame-work of a swinging arm or frame mounted to swing about an axis 11 indicated by dotted lines in Fig. 3 of the drawings so as to move a pair of dies 12 toward and from the discharge nozzle 13 of a gooseneck 14 supported in a melting pot 15 in a fixed position in the machine. The molten metal is discharged from the nozzle 13 into the dies or the impression formed therein by the air

operation of a plunger 16 as taught in the prior application.

Extending centrally and longitudinally through the casing 10 is a cam shaft 17 which is driven from the drive shaft axis 11 through a beveled gear 18, note Fig. 3. Mounted transversely in the arm 10 is a shaft 19 driven through a worm 20 on the cam shaft and a worm gear 21 on the shaft 19. The shaft 19 protrudes through the casing 10 and carries at the outer end thereof a sprocket 22 having a clutch engagement with the shaft 19 as seen at 23.

Arranged in an enlargement 10a of the casing is a vertically movable rod 24, to the upper end of which is adjustably secured a bracket 25 keyed, as seen at 27, to a hook-shaped rod 26 protruding from the top of the casing, so that the bracket 25 is free to move longitudinally of the rod 26. Supported upon the face of the bracket is a tape feeding device or gripper block 28 slotted as clearly seen at 29 in Fig. 5 of the drawings to receive the tape 30 guided into the device 28 from a roller 31. Within the device 28 are pivotally supported grippers 32 which are arranged at each side of the tape to engage opposed surfaces thereof. These grippers are tensionally supported in engagement with the tape through springs 33 as clearly seen in Fig. 5 of the drawings. The device 28 includes downwardly directed extensions 34 to guide the tape for proper alignment with the dies 12 so that the tape will be properly positioned within the impression of the dies in receiving the cast links 35 to be formed on the beaded edge of the tape.

The rod 24 is in the form of a plunger and has at its lower end an enlarged piston portion 24a which normally seats against a stop 36 formed on a plug or screw 37 mounted in a tubular extension 38 on the frame part 10a. The piston 24a is normally urged in the direction of the stop 36 by a coil spring 39. Opening into the extension 38 below the piston 24a is an admission port 40 into which air under pressure may be introduced through a pipe or tube 41 which communicates with a control valve 42 as seen by the port 43 in said valve. Around the rod 24 is a sleeve 44 to the upper end of which is attached another bracket 45 for supporting a core pin 46 and for moving said core pin together with the casting thereon in spacing the links on the tape in accordance with the teachings in said prior application. Means for actuating the core pin forms no direct part of the present invention, it being apparent that any cam or other device can be employed to reciprocate the sleeve 44 at the proper time intervals in actuating the core 46. It will be understood that the bracket 45 is keyed to and movable longitudinally of the rod 26 as seen at 47.

At 48 are shown the die supporting and operating members which are mounted to reciprocate around the rod 24 or sleeve 44, note Fig. 4. The members 48 are in the form of a pair of shears or tongs which are operated to open and close the dies 12 at proper time intervals through cams 49 indicated by dotted lines in Fig. 4 of the drawings, again as more specifically taught in the application referred to. The tubes 50 partially shown in Figs. 1 and 4 of the drawings are simply means for circulating cooling water through the die supporting members as well as through the frame to provide desirable cooling effects in a machine of the type and kind herein illustrated which operates at very high speeds; that is to say in producing die castings at the rate of five

hundred or more individual castings per minute.

The valve device or mechanism 42 is secured to the casing 10 and is thus movable therewith. This valve as will be seen in Fig. 3 of the drawings comprises two cylinders 51 and 52, and in the present construction, liners 51a and 52a are arranged therein. However, to simplify the present description, in referring to the cylinders it will be understood that reference is being made to the cylinders including the liners. In each cylinder is arranged a reciprocating plunger valve 53 and 54. At 55 is shown a supply pipe for compressed air from a suitable source which opens into a port 56 in the cylinder to admit air into the chamber 57 of the valve 53. The chamber 57 has a by-pass outlet 58 at one side thereof and an exhaust passage 59 at the bottom thereof normally sealed as seen in Fig. 1A of the drawings; that is to say, normally out of registration with the passage 43.

The exhaust passage 60 of the valve 53 is normally in communication with the passage 43 through the port 61 as seen in said figure. This supporting of the valve 53 is attained by a pawl or catch 62 pivotally supported on the valve device as seen at 63 and normally supported in a recess 64 formed in the valve 53 so as to retain the valve against movement and against the action of a spring 65 in the normal casting operation of the machine. By supporting the valve in this manner, a roller 66 carried at the inner end of the valve is maintained against mechanical engagement with a cam 67 on the shaft 17, or in other words is not susceptible to the action of said cam. It will be understood that a spring pressed pin 68 serves to normally support the pawl 62 in operative position.

The upper end of the pawl carries a roller 69 which is adapted to cooperate with trip devices 70 on a control chain 71 mounted on and movable with the sprocket 22 so that when the trips 70 engage the roller 69, the pawl 62 may be moved into inoperative position and release the valve 53 so as to maintain the roller 66 in operative engagement with the cam 67. In the cycle of revolution of the machine the port 59 will be moved into registering position with the passage 43 and the compressed air in the chamber 57 will pass through the pipe 41 into the port 40 and raise the piston 24a and rod 24 to move the tape feeding mechanism upwardly. That is to say, to move the grippers 32 from the dotted line position shown in Fig. 7 to the full line position shown in said figure while the dies 12 are maintained in firm engagement with the tape 30. Thus the grippers will slide over the tape in this operation.

Immediately upon completing this operation, the valve 53 will be returned by the cam 67 to the position shown in Fig. 1A and the air in the pipe 41 will be exhausted through the exhaust 60. The spring 39 will then move the rod 24 and the piston 24a downwardly, in which operation the grippers will move from the position shown in dotted lines in Fig. 8 to the position shown in full lines in said figure, moving the tape 30 with said grippers, while the dies are in open position. Thus the tape will be fed in this one cycle of operation a distance controlled and gaged by the movement of the grippers 33 as above described. This movement is gaged in one direction by the striking of the bracket 25 upon the top extension 26a of the arm 26 and is gaged in the other direction by the stop 36. The latter adjustment may be provided by changing shims

37a or by substituting new stops having shorter or longer stop pin portions 36, or by means such as later described in connection with Fig. 6 of the drawings. The above operation may be repeated as many times as desired to provide the required spacing of the tape, and while in the accompanying drawings this is shown as being accomplished by two trips of the pawl 62, any number of these trips may be employed.

After the successive tripping and wide spaced feeding of the tape 30, the pawl 62 will again be dropped into its operative position and then the valve 53 will be held against movement until the next series or group of castings 35a is formed.

The casing of the valve device 42 has a by-pass 72 with which the port 58 normally registers when the valve 53 is in the position shown in Fig. 1A. The valve 54 has a passage 73 adapted to be moved into registering position with the cam shaft 17, engaging a roller 75 on the inner end of the valve 54 so as to permit passage of air under pressure through a chamber 76 and port 76a in the valve 54 to a pipe or tube 77 leading to a cylinder for actuation of the plunger 16. When the valve 54 is moved into the position where the port 73 does not register with the by-pass 72, the port 78a of the exhaust passage 78 at the outer end of the valve 54 will register with the pipe 77 and the air in said pipe will be exhausted. This will clearly be apparent from a consideration of Figs. 3 and 9 of the drawings. The valve 54 is shown in each of these figures as arranged in the inoperative position with respect to the actuation of the plunger 16. A spring 79 is employed to normally support the valve 54 or the roller 75 thereof in engagement with the cam 74.

It will be understood that the valve 54 is in constant operation, but when the valve 53 is released and moved forwardly to bring the port 59 into registering position with the passage 43, the port 58 is out of registering position with the by-pass 72, and thus no air can be admitted into the valve 54. While the dies 12 will complete their normal functioning to open and close, no heated metal will be discharged from the nozzle 13 in that the plunger 16 remains idle during these cycles of operation. In other words, it may be said that in the wide feeding or spacing of the tape 30, the machine performs all of its normal functions with the exception of the idleness of the plunger 16 and the further exception that the normally idle valve 53 actuates to perform its function in controlling the air operation of the tape feed device 28. From the foregoing it will be understood that the grippers 32 at all times have a slight tensional engagement with the tape so that the tape is supported in proper position at all times. This also provides accuracy in the feeding of the tape through the medium of the core pin 46 in accurately spacing the tape for the reception of adjacent links 35 in a group of links on the tape.

In Fig. 8 of the drawings I have indicated at 35 the last cast link of one group and at 35a the first cast link of the next adjacent group of links to be formed on a stringer tape. The section of the tape identified by the arrows x represents the wide spacing section of the tape produced by the tape feeding mechanism herein referred to.

By controlling the length of the chain 71 with respect to the trips 70 which may be employed thereon, a definite number of links 35 may be

formed in each group of castings on the tape. For example, if a hundred link chain 71 were employed, then a hundred cast links would be formed in each group, and for each different stringer length, a definite length of chain would be provided, the chain being marked to identify the number of link castings formed. Where exceptionally long stringer lengths are required, it may be desirable to use a different ratio of drive of the sprocket 22 so as to operate at a ratio of two to one or three to one as the case may be, thereby permitting the use of shorter chains, but would otherwise accomplish the same result. A finger piece 62a is provided on the pawl for the manual tripping of the pawl at any time, especially in the testing of the machine.

In Fig. 6 of the drawings I have shown a slight modification of the construction shown in Fig. 1, which simply consists in modifying the structural arrangement and mode of operation of the rod 24. In other words, the tubular extension 38 would not be employed and the rod would simply have a bearing in the lower end of the casing 10a, and on the upper end of the rod 24b is an enlarged piston portion 24c movable vertically in a tubular body 80 supported in an extension rod or bracket 81 similar to the rod 26 and extending above the bracket 25 sufficiently to compensate for the movement of the rod 24b. The piston 24c has a reduced portion 24d where it joins the rod 24b to provide an annular air passage 82 at the base of the piston 24a into which compressed air is introduced through a port 83 with which is coupled a pipe 41a similar to the pipe 41. That is to say, the pipe 41a is coupled with the valve 42 and communicates with the chamber 43 thereof. In other words, the structure of Fig. 6 simply amounts to actuating the rod from the upper end thereof rather than from the lower end as is taught in Fig. 1 of the drawings. When air is admitted into the chamber 82 the piston 24c moves upwardly against the action of a spring 84 until the upper head end 24e of the piston strikes the lower end of an adjustable stop rod 85 held in different positions of adjustment in a plug 86 secured to the tube 80 by means of an operating head 87 and a lock screw 88. The downward movement of the piston 24c and rod 24b will be adjusted to suit the other structure of the machine by a slight adjustment of the tube 80 in the support 81 through the medium of a set screw 89 or any other suitable means. A packing gland 90 is provided in the tube 80 to seal the rod 24b against the leakage of compressed air as will be apparent. Aside from the different location of the operating mechanism and the other structural differences defined, the structure shown in Fig. 6 will actuate in the same manner as the structure shown in Fig. 1.

It will of course be apparent that the feeding mechanism herein defined is applicable for use in connection with machines of various types and kinds wherein a tape, strand or the like is fed into and through the machine and especially where it is desirable to intermittently feed a tape or strand for the wide spacing thereof. It will be understood that the tape feeding mechanism will be modified to suit the particular type and kind of workpiece engaged thereby. In dealing with the invention from the standpoint of the production of separable fastener stringers, it will be apparent that the invention is applicable to machines of this type and kind regardless of the manner of forming the links and of apply-

ing the links to a stringer tape. From this standpoint, in some instances, the entire valve 54 and associated parts may be dispensed with unless the latter is used in some manner for the operation of other parts of a machine which will in no way conflict with the actuation of the tape feeding device or mechanism.

It will also be apparent that the present casting machine is intended primarily for the casting of metallic links, but here again it will be understood that the invention is applicable to the formation of stringer tapes regardless of the type and kind of cast links arranged thereon.

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

1. In a die casting machine of the character described employing a mounting strand upon which a successive series of castings are formed and arranged in groups on said strand by widely spacing predetermined castings on said strand, means including a block having spring actuated grippers for engaging and feeding said strand, a compressed air operated plunger rod in connection with which said block is mounted, a compressed air valve for supplying air to said plunger rod, means for normally supporting said valve in inoperative position, and means for intermittently releasing the last named means whereby said valve may be operated to supply air to said plunger rod for actuating said block in the wide space feeding of said strand.

2. In a die casting machine for forming separable fastener stringers, means for guiding a tape into the machine, means including dies cooperating with the tape for intermittently forming successive series of die cast links on one edge portion of the tape in forming stringers of a separable fastener, means for feeding the tape and cast links thereon for spacing successive links on the tape in a stringer length, a pair of grippers engaging the tape for tensionally supporting the tape in its several positions, and means for moving the grippers longitudinally of the tape when held between said dies and for moving the tape with the grippers when the dies are opened in the wide spacing of links on the tape in forming stringers of predetermined length.

3. In a die casting machine for forming a successive series of castings in spaced groups on a mounting member, means involving dies for intermittently feeding said mounting member to provide wide spacing of the mounting member between the groups of castings, said means comprising grippers movable with the mounting member when the dies are open and movable relatively to the mounting member when said member is firmly supported between said dies, said grippers tensionally engaging the mounting member at all times, and said grippers being arranged adjacent the dies in a position between the dies and the source of supply of said mounting member.

4. A pneumatically actuated intermittent workpiece feed of the class described comprising means for supporting and guiding an elongated workpiece through a machine, a pair of grippers for engaging a workpiece and for moving the same in one direction through the machine in one directional movement of said grippers, means supporting the workpiece in the other opposed directional movement of the grippers with respect to said workpiece, pneumatically actuated means for moving the grippers in one direction,

other means for moving the grippers in the opposed direction, and an automatically actuated valve for controlling the pneumatic operation of said grippers.

5. A pneumatically actuated intermittent workpiece feed of the class described comprising means for supporting and guiding an elongated workpiece through a machine, a pair of grippers for engaging a workpiece and for moving the same in one direction through the machine in one directional movement of said grippers, means supporting the workpiece in the other opposed directional movement of the grippers with respect to said workpiece, pneumatically actuated means for moving the grippers in one direction, other means for moving the grippers in the opposed direction, an automatically actuated valve for controlling the pneumatic operation of said grippers, means supporting said valve in inoperative position during predetermined cycles of operation of the machine to render said workpiece feeding means idle, and automatically actuated means for releasing said holding means for a predetermined number of cycles of operation of said machine in providing a corresponding number of intermittent feeding operations of said workpiece.

6. A pneumatically actuated intermittent workpiece feed of the class described comprising means for supporting and guiding an elongated workpiece through a machine, a pair of grippers for engaging a workpiece and for moving the same in one direction through the machine in one directional movement of said grippers, means supporting the workpiece in the other opposed directional movement of the grippers with respect to said workpiece, pneumatically actuated means for moving the grippers in one direction, other means for moving the grippers in the opposed direction, an automatically actuated valve for controlling the pneumatic operation of said grippers, means supporting said valve in inoperative position during predetermined cycles of operation of the machine to render said workpiece feeding means idle, automatically actuated means for releasing said holding means for a predetermined number of cycles of operation of said machine in providing a corresponding number of intermittent feeding operations of said workpiece, said grippers maintaining constant tensional engagement with the workpiece, and other means for feeding the workpiece in successive operations of the machine independent of said first named feed.

7. In combination with a workpiece feed mechanism involving grippers engaging opposed surfaces of the workpiece and having pneumatically operated means for moving said mechanism in one direction into operative position and resilient means for operatively moving the mechanism in the opposite direction in the feed of the workpiece, of means controlling the operation of said mechanism comprising a chain, an air valve, a catch device normally supporting the air valve in inoperative position, and a series of trips on said chain engaging and releasing said catch device to actuate said feed mechanism in a series of successive operations depending upon the number of trips employed on said chain.

8. In a machine for applying groups of links to an elongated tape and for widely spacing the respective groups of links on the tape, a tape feeding mechanism comprising a pair of grippers, means maintaining the grippers in constant tensional engagement with opposed surfaces of the

tape, means moving the grippers longitudinally of the tape, means for holding the tape against movement in said movement of the grippers, and means upon the completion of the formation of the last link in a group of links for actuating said spacing mechanism to provide predetermined spacing between said last link of one group and the first link of the next adjacent group.

9. In a machine for applying groups of links to an elongated tape and for widely spacing the respective groups of links on the tape, a tape feeding mechanism comprising a pair of grippers, means maintaining the grippers in constant tensional engagement with opposed surfaces of the tape, means moving the grippers longitudinally of the tape, means for holding the tape against movement in said movement of the grippers, means upon the completion of the formation of the last link in a group of links for actuating said spacing mechanism to provide predetermined spacing between said last link of one group and the first link of the next adjacent group, and means controlling the number of links cast in each group in determining the length of each link group on said tape.

10. In a machine of the class described, a tape feeding mechanism for feeding the tape through the machine in the wide spacing of said tape, said mechanism comprising a block, channeled to receive the tape, a pair of pivoted grippers supported in said block, tensional means cooperating with the grippers for tensionally supporting the same upon the side surfaces of a tape passed through said block to maintain the tape against accidental shifting with respect to the block, means for actuating said block to move the grippers relatively to the tape, other means for

moving the block in opposite direction in the operation of feeding said tape, and means for keying and alining said block in its movement in the machine.

11. In a die casting machine employing relatively movable dies movable toward and from a mounting tape in forming a successive series of castings at longitudinally spaced intervals on the tape, a tape feeding means for feeding the tape for wide spacing of groups of the castings on the tape, said feeding means comprising grippers arranged in close proximity to the dies and in constant tensional engagement with the tape, means moving the dies in firm engagement with the tape periodically in the wide spacing of the tape, and means simultaneously moving the grippers lengthwise of the tape held in the dies in determining the length of said wide spacing of the tape.

12. In a die casting machine employing relatively movable dies movable toward and from a mounting tape in forming a successive series of castings at longitudinally spaced intervals on the tape, a tape feeding means for feeding the tape for wide spacing of groups of the castings on the tape, said feeding means comprising grippers arranged in close proximity to the dies and in constant tensional engagement with the tape, means moving the dies in firm engagement with the tape periodically in the wide spacing of the tape, means simultaneously moving the grippers lengthwise of the tape held in the dies in determining the length of said wide spacing of the tape, and means for moving the tape relatively to the grippers and said dies in spacing the tape for forming successive castings in each group of castings.

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