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EXTRUDING MACHINE

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2 Sheets-Sheet 1

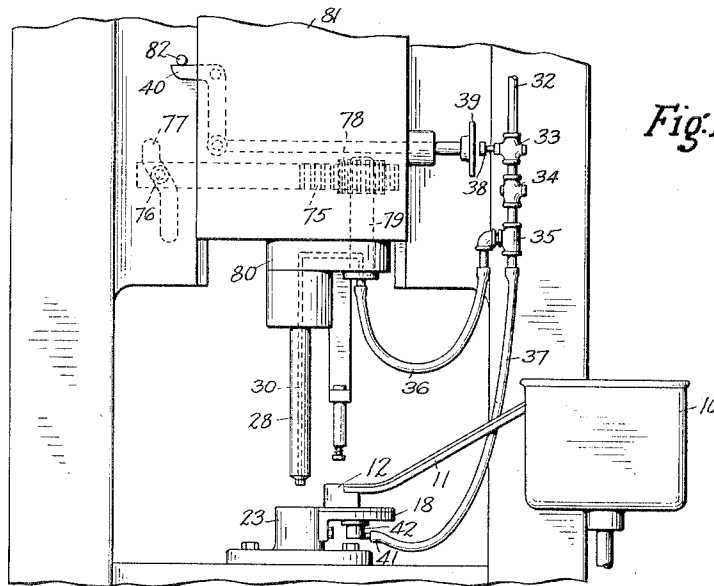


Fig. 1

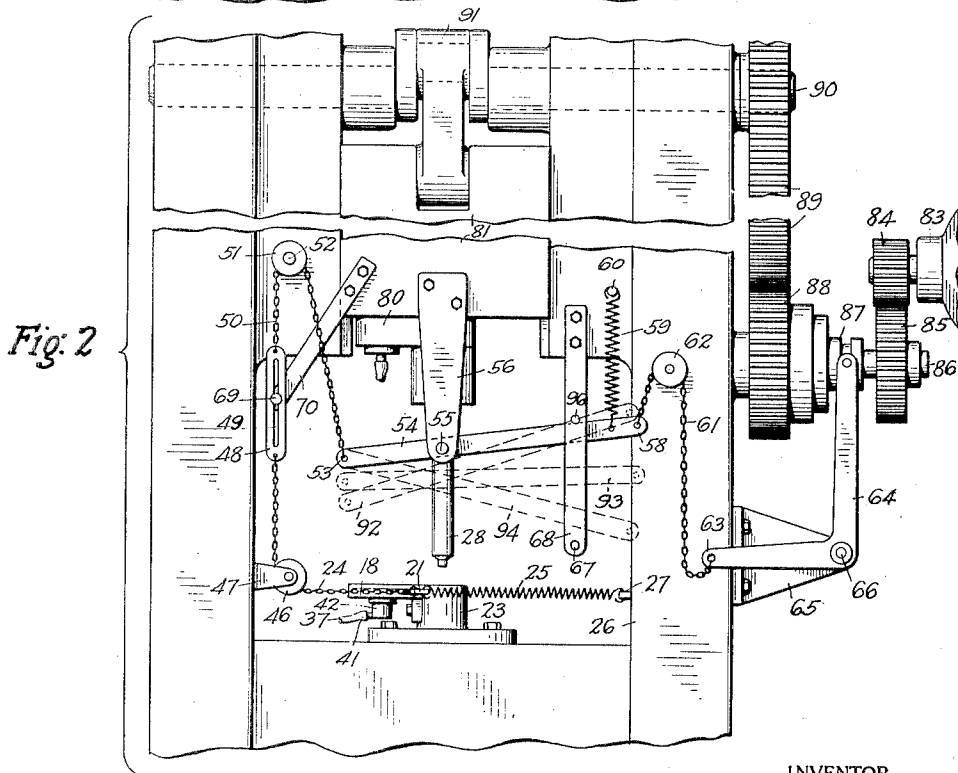


Fig. 2

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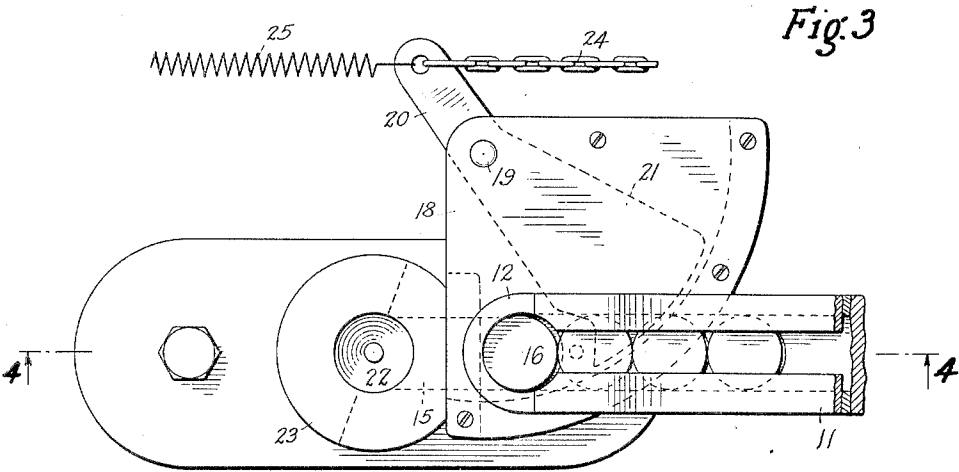
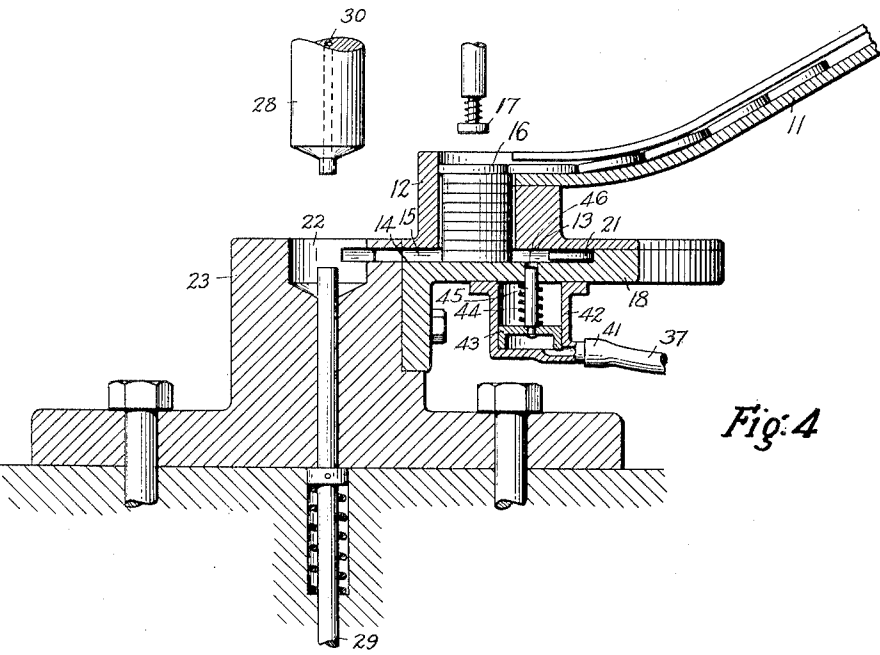
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2 Sheets-Sheet 2



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EXTRUDING MACHINE

Application filed January 31, 1929. Serial No. 336,368.

This invention relates to extruding machines and particularly, to that type in which a slug of soft metal is extruded into the form of a collapsible tube, and the collapsible tube thus extruded is then discharged from the machine as by means of a blast of air.

In such machines, the blast sometimes fails to discharge the extruded tube from the plunger on which the tube is formed and temporarily retained. In such cases, the succeeding slug is extruded over the tube retained by the plunger. If this happens several times, a number of defective tubes are formed, and the plunger and the cooperating die therefor is likely to become jammed or broken, due to the obstructing metal of the tubes.

My invention contemplates the provision of means for preventing these occurrences, so that should the machine fail to discharge the extruded tubes, the operation of the slug feeding means and of the extruding means is halted. My invention further contemplates the provision of a yieldable connection to the slug feeding means, so that the feeding mechanism cannot be injured in case the machine becomes jammed by defective tubes.

The various objects of my invention will be clear from the description which follows and from the drawings, in which,

Fig. 1 is a front elevation of a portion of an extruding machine to which my invention has been applied.

Fig. 2 is a rear elevation of the same, showing particularly, the means for stopping the machine in the event of an undischarged tube being retained by the plunger.

Fig. 3 is a top plan view of part of the slug feeding mechanism, and

Fig. 4 is a vertical section of the same, taken on the line 4—4 of Fig. 3.

In that practical embodiment of my invention which I have illustrated by way of example, slugs of the proper shape are deposited in the hopper 10, and are discharged therefrom in an aligned row to the chute 11.

Said chute terminates in a cylinder 12, into which the slugs are fed and piled vertically. The bottom 13 of the cylinder is spaced above the slideway 14 a distance slightly greater

than the thickness of a slug to form the groove 15, along which the slug is fed into the extruding position. For insuring the proper arrangement of the pile 16 of slugs, a spring plunger as 17 is suitably reciprocated into contact with the top of the pile and thereby forces the uppermost slug down on the pile, preventing the slug from being retained above the pile by the friction due to the weight of the succeeding slugs pressing thereagainst.

Operating in the groove 15 and formed preferably in the shape of a lever, pivoted to the support 18 as at 19, and provided with an extension 20, is the feed member 21. Said member is designed to engage the lowermost slug of the pile resting in the groove 15, and to forward said slug along the groove 15 into the aperture 22 of the female die 23.

As illustrated, the member 21 is operated in one direction by means of a suitable chain 24 which, when tensioned, swings the member 21 toward the extruding position, said member being operated in the opposite direction by means of a spring as 25, secured at one end to the arm 20 and at the other end, to the frame 26 of the machine as at 27. It will be understood, however, that other yielding suitable mechanism may be used for operating said member and that I do not intend to limit myself to the specific structure shown for that apparatus except as I have limited the appended claims.

The chain 24 is tensioned on the reciprocation of the extruding plunger 28, as will be more fully described hereinafter, and provides a flexible, yielding connection to the feed member 21. I have found that such a connection is highly desirable to avoid injury to the feed mechanism such as may occur when the dies are jammed with one or more defectively extruded tubes. In such a case, there being no positive operation of the feed member 21, but a yieldable operation thereof, additional slugs are not fed to increase the danger of jamming the machine.

The male die or plunger 28 is intended to enter the recess 22 of the female die and in so doing, depresses the spring-pressed supporting rod 29 on which the slug rests in the extruding position and squeezes the slug to its

proper shape in a manner well known in the art. The teat on the lower end of the plunger or die 28, as is well known, is of the proper shape to form the conical neck of the tube, said neck being later perforated and threaded to receive a cap. The body or cylindrical surface of the plunger or die 28 is smooth, so that when the slug is squeezed between the lower end of the die and the walls of the recess 22, the soft metal of the slug, under the pressure of the lowermost part of the die, almost instantaneously squirts upwardly out of the recess 22 and about and into close contact with the outside surface of the body of the plunger or die 28 to form a thin, soft metal, collapsible tube of much greater length than its diameter, and formed with a conical end and a neck.

The tube thus extruded, which I have sometimes termed the extruded slug, is of substantially the same size and shape as the plunger or die 28, which as is well known, determines the shape of the tube extruded by the process just mentioned from the disc-like slugs. The process of extruding thin slugs of soft metal by pressure in a comparatively shallow die so that the slug flows upwardly about a forming plunger is well known and needs no further description. An air passage as 30 is provided in the plunger 28 through which passage a blast of air is delivered through the plunger, to expel or discharge the extruded tube after the extruding operation has been completed. This blast of air is delivered only after the plunger 28 has been withdrawn from the female die and moved into discharging position which may be forwardly or rearwardly of the female die. The movement of the plunger 28 into discharging position may be accomplished by any well known mechanism, such as by means of the rack 75 (Fig. 1) reciprocated by the pin 76 operating in the slot 77 of the machine frame, said rack engaging a suitable pinion 78 on the shaft 79 to which the plunger frame 80 is secured for swinging movement.

Air is supplied to the plunger and to other mechanism, as will be shortly described, through the air inlet pipe 32 communicating with a suitable source of air supply not necessary to be shown. A suitable valve 33 and a check valve 34 is arranged along the inlet pipe 32 from which the T 35 discharges air through the flexible plunger branch pipe 33 and the flexible feed-stop branch pipe 37. The tubes 36 and 37 are preferably flexible so as to yield under movement of the various parts of the machine to which they are connected. As will be seen from Fig. 1, the tube or pipe 36 connects the plunger passage 30 with the air inlet passage 32. It will be understood that the valve 33 is normally closed so that no air passes through either of the tubes 36 or 37, except at the moment that the plunger 28 has been raised and swung into discharging position.

After the plunger 28 has been given its reciprocatory movement to extrude a slug into a tube, so that the extruded tube is retained by and carried by said plunger out of the die 23, the head 38 of the valve is pushed inwardly by the button 39 to open communication between the inlet pipe 32 and the tube 36, thereby admitting air to the passage 30 and blowing the extruded tube off the plunger 28. The button 39 may be supported by the reciprocating plunger cross-head 81, and may be given its reciprocatory movement in any suitable manner, as by means of the lever 40, suitably rotated by the pin 82 on the machine frame when the cross-head 81 rises to bring the plunger into discharging position.

The end 41 of the tube 37 is connected to a hollow cylinder as 42 (Fig. 4) secured to the under face of the support 18 and carrying a spring pressed piston as 43 normally held in its lowermost position by the compression spring 44. Projecting from the upper face of the piston 43 is a rod 45, passing through the aperture 46 of the support 18 and adapted to enter the groove 15, and thereby to be interposed in the path of the slug feed member 21. The spring 44 is made of sufficient strength to normally resist upward movement of the piston 43 when the lowermost end of the passage 30 is open or unobstructed or when the tube on the plunger 28 is not so firmly retained on said plunger as to fail to be discharged by the blast of air going through the passage 30. If, however, the tube is so firmly forced on to the plunger 28 that the blast of air does not remove said tube, then said blast having no other outlet, passes through the tube 37 and lifts the piston 43 against the action of the spring 44 and thereby interposes the rod 45 into the path of the member 21 so that said member cannot be moved to feed a succeeding slug from the bottom of the pile into extruding position.

Air continues to pass through the tube 37 and continues to maintain the piston 43 in its uppermost position until the lower end of the passage 30 is cleared as by removing the tube which obstructs said passage from the plunger 28, manually or otherwise as may be found convenient.

Means are further provided for preventing any further operation of the other parts of the machine should the extruded tube fail to be discharged from the plunger 28 by the blast of air. Said means, as illustrated, is combined with the yieldable mechanism for operating the arm 20 of the feed member 21. Referring to Fig. 2, the chain 24 passes from the feed member about the pulley 46, said pulley being suitably supported by the frame of the machine through the bracket 47. The upper end of said chain is secured to an elongated link 48 having a slot 49 therein. To the upper end of the link 48 is secured a second chain 50 which is passed about the

pulley 51, pivoted to the frame of the machine as at 52, the other end of the chain 50 being secured as at 53 to the lever 54. Said lever is pivoted as at 55 to the bracket 56 secured to the cross-head 81 and vertically reciprocated thereby. The right end 58 of the lever 54 is normally pulled upwardly by the spring 59 secured at one end to said lever and at the other end as 60, to the frame of the machine. A chain as 61 passing about the pulley 62 connects the end 58 of the lever 54 to the end 63 of the clutch operating lever 64 pivoted to the bracket 65 as at 66.

For limiting the movement of the lever 54, stops as 96 and 67, one above and the other below said lever, are secured to a member 68 fastened to the frame of the machine. For limiting and controlling the movement of the link 48, a stop-pin as 69 is inserted into the slot 49 thereof and is carried by the supporting member 70 secured to the cross-head 81.

For supplying power to the machine, the electric motor shown diagrammatically at 83 rotates the pinion 84 meshing with the gear 85 on the clutch shaft 86.

A one-revolution clutch 87 of any well known type may be operated by a suitable foot treadle of well known design, and hence not shown, and is also operated by the lever 64 to cut off power to the machine when a tube is not properly discharged from the plunger 28. Loose on the clutch shaft is the gear 88 meshing with the main gear 89 which in turn drives the main shaft 90, carrying the crank 91 or other suitable mechanism for operating the cross-head 81. As shown, the crank is connected to the cross-head, and serves to give said cross-head a complete reciprocatory stroke on each operation of the clutch, in a well known manner, the various gears being properly proportioned for that purpose.

The operation of my improved machine will now be described:

Power having been supplied to the motor 83, and the clutch 87 having been thrown into operation, as by means of a suitable treadle, the cross-head 81 is given a downward stroke from the position shown in Figs. 1 and 2. As the cross-head moves down, it carries the lever 54 down with it, but the spring 59 prevents any considerable movement of the lever end 58. The left end 53 of the lever, however, is carried down into the position shown at 92 (Fig. 2), thereby tensioning the chain 50, and pulling up the link 48 until the stop-pin 69, which also travels down with the cross-head, reaches the bottom of the slot 49. When this occurs, further upward movement of the link 48 is prevented by said stop-pin. Continued movement of the cross-head forces the link 48 down, thereby loosening the chain 24 and allowing the spring 25 to withdraw the feed member 21 from the female die 23 and out

of the way of the descending plunger, said feed member having previously fed a slug into extruding position in a manner soon to be described. As the link 48 moves down, the chain 50 is slightly tensioned to bring the end 53 of the lever 54 up slightly and the other end 58 down against the action of the spring 59 into the position indicated in dotted lines at 93, the chain 61 being at this time pulled somewhat, but not enough to take up the slack therein and not enough to throw the clutch lever 64.

In the extruding position of the plunger 28, the lever 54 is therefore substantially in the position indicated in dotted lines at 93 of Fig. 2. The slug having been extruded by the various dies into a collapsible tube in a manner well known in the art, the cross head 81 begins its upward movement. This movement carries the arm 70 and the stop pin 69 upwardly and thereby frees the link. The spring 59, however, moves the end 58 of the lever 54 upwardly from the position indicated at 93 and thereby lowers the end 53, pulling on the chains 50 and 24, raising the link 48 and thereby operating the feed member 21 to feed a slug into extruding position, the various parts moving into the position shown in full lines in Fig. 2.

During the upward movement, the lever 40 strikes the pin 82 and is rotated thereby about its pivot, forcing the button 39 against the valve head 38 and opening the valve 33 to admit air through the inlet pipe 32 and the tube 36 through the plunger passage 30, the plunger frame 80 being at this time swung about its shaft 79 through the pin 76 operating in the slot 77 to force the rack 75 to rotate the pinion 78. The extruded tube on the plunger is thereby discharged by the blast of air. Should, however, the blast fail to discharge the tube from the plunger, the blast continues along the branch pipe 37 and lifts the piston 43, thereby projecting the rod 45 into the path of the feed member 21 and maintains said rod in its lifted position to prevent further feeding of slugs until the obstructed air passage 30 is clear.

On the descent of the cross head 81, it being now assumed that the feed member 21 is held back by the rod 45, the end 20 of said feed member is in its extreme position toward the left as indicated in Fig. 3, or toward the right as indicated in Fig. 2, whereby the chains 24 and 50 are tensioned and are unable to be further tensioned by the movement of the cross head.

The end 53 of the lever is held stationary by the chain 50 on the beginning of the descending movement of the plunger but the remainder of the lever is carried downwardly into the dotted line position 94 of Fig. 2. This causes the end 58 of said lever to be carried down to a substantial extent, thereby pulling on the chain 61 to a sufficient extent

to throw the clutch into inoperative position. Power being thus cut off by the clutch, the machine is halted and the slug previously fed into the female die is not extruded. No further operation of the machine can take place until the undischarged tube has been removed from the plunger 28 whereby the air passage 30 is clear, the piston 43 released and the feed member 21 freed for further operation. The clutch can then again be operated by the foot treadle in the usual manner.

It will be seen that I have provided simple and efficient yieldable mechanism, well adapted to carry out the purposes for which this invention is intended. It will further be seen that various changes in the preferred embodiment of the invention which has been described for purposes of illustration only, may be made, and I therefore do not wish to limit myself to the specific details shown and described but intend to claim my invention as broadly as may be permitted by the state of the prior art and the scope of the appended claims.

I claim:

1. In a machine of the character described, means for automatically feeding disc-like metallic slugs to the machine including a feed lever, means for extruding a slug, including cooperating dies and means for relatively reciprocating the dies to squeeze the slug therebetween and to form the slug into a tube discharged by one of the dies, means for discharging the extruded slug from the die, and means for preventing further feeding of slugs on the failure of said discharging means to function comprising an air operated plunger interposed in the path of the feed lever.

2. In a machine of the character described, means for extruding a soft metal slug to form a thin, metallic collapsible tube, means for discharging the extruded tube, and means for preventing the extrusion of succeeding slugs when the tube is not discharged including means for feeding the lowermost slug of a pile of such slugs into extruding position and a spring-pressed member adapted to be interposed between the slug feeding means and the pile for preventing feeding of the slugs by the feeding means.

3. In a machine of the character described, slug feeding means, slug extruding means including a reciprocating squeezing die about which the slug is squeezed, having an air passage therein, means for delivering a blast of air through said passage for discharging an extruded slug carried by said extruding means, and means for preventing operation of the machine when the extruded slug is not discharged, including an air blast responsive member interposed in the path of the feeding means.

4. In a machine of the character described,

means for extruding slugs fed to the machine, means for delivering a blast of air to said extruding means for discharging an extruded slug, and means controlled by said blast for halting the machine when the extruded slug is not discharged.

5. In a machine for extruding metallic slugs into the form of collapsible metallic tubes, and for discharging the tubes, a clutch controlling the operation of the machine, a reciprocating die on which the extruded slug becomes fixed, and means for operating said clutch to render the machine inoperative when an extruded tube is not removed from the die, including a piston responsive to a fluid blast, and a spring urging said piston into inoperative position.

6. In a machine of the character described, a member for advancing a slug into extruding position, means for operating said member, a reciprocating die having an air passage therethrough for extending the slug to close the passage means for discharging the extruded slug, including means operatively connected to the die for delivering a blast of air through the passage and against the extruded slug, and means for preventing the operation of said member when the extruded slug is not discharged by the discharging means including an air responsive plunger actuated by the air blast diverted from the passage.

7. In a machine of the character described, a reciprocating extruding die, a female die cooperating therewith, spring-pulled means for feeding slugs singly in succession from the bottom of a pile of such slugs into said female die, and a yieldable connection between the reciprocating die and the feeding means for actuating said means including a lever pivoted adjacent said die, a spring for one end of said lever, a feeding lever, and a chain connecting said levers.

8. In a machine of the character described, reciprocating extruding means for forming soft metal slugs into tubes, an oscillatory member for feeding a single slug at a time from the bottom of a pile of slugs toward the extruding means, and a yieldable connection between the member and said means for actuating the member.

9. In a machine of the character described, extruding means for forming soft metal slugs into tubes, feeding means for the slugs, and yieldable operating means for the feeding means actuated by the extruding means.

10. In a machine of the character described, extruding means for forming slugs into tubes, feeding means for the slugs, yieldable operating means for the feeding means actuated by the extruding means, and means actuated by the extruding means for halting operation of said extruding means and of said feeding means when the extruded tube is not discharged from the extruding means.

11. In a machine for extruding slugs into

collapsible tubes, reciprocatory extruding means, means for discharging the extruded tubes from said means, and means operatively connected to the extruding means for rendering the extruding means inoperative on the failure of the discharging means to discharge an extruded tube including a spring-pressed member responsive to a blast of fluid.

12. In a machine for extruding slugs into collapsible tubes, reciprocatory extruding means, means for discharging the extruded tubes from said means, and means operatively connected to the extruding means for rendering the extruding means inoperative on the failure of the discharging means to discharge an extruded tube, comprising a clutch controlling the operation of the machine, a lever carried by the extruding means and reciprocated bodily thereby, and means for operatively connecting the lever with the clutch.

13. In a machine for extruding slugs into collapsible tubes, extruding means, a member for feeding one slug at a time toward said means, means for discharging an extruded tube from the extruding means, and a member operated by the discharging means arranged to be interposed in the path of the feeding means when an extruded tube is not discharged from the extruding means.

14. In a machine for extruding slugs into collapsible tubes, extruding means having an air passage therethrough, means for delivering air through said passage for discharging the extruded tube retained by said means at the completion of the extruding operation, a member operated by said extruding means for feeding slugs in succession toward the extruding means, and an air-operated member adapted to be interposed in the path of the feeding member for preventing further feeding of slugs when an extruded tube on the extruding means is not discharged therefrom.

15. In a machine for extruding slugs into collapsible tubes, extruding means having an air passage therein and adapted temporarily to retain an extruded tube thereon, means for delivering a blast of air through said passage for discharging the extruded tube from the extruding means, a slug feeding member yieldably connected to the extruding means and operated thereby, a member adapted to be interposed in the path of the feeding member, means for delivering air to the latter member for so interposing said member in the path of the feeding member when said passage is obstructed by an undischarged tube, means for operating said extruding means including a clutch, and means operatively connecting the clutch, the extruding means, and the feeding member for rendering the clutch inoperative to actuate the extruding means when said passage is obstructed by an undischarged tube.

16. In a machine for extruding slugs into

collapsible tubes, extruding means having a passage therein adapted to have air forced therethrough for discharging an extruded tube extruded thereon, a slug feeding member, means for stopping the operation of said member when said passage is obstructed by an undischarged tube, means for reciprocating the extruding means, and means operatively connecting the said reciprocating means, the feeding member and the extruding means for rendering said reciprocating means inoperative when the passage is obstructed by an undischarged tube.

17. In a machine for extruding slugs into collapsible tubes, reciprocatory extruding means, having an air passage therein adapted to have air forced therethrough for discharging a tube on the extruding means, a member for feeding slugs towards the extruding means, means for operating said member comprising a lever carried by said extruding means and a yieldable connection between the lever and the member, and air-operated means for holding said member when said passage is obstructed by an undischarged tube.

18. In a machine for extruding slugs into collapsible tubes, reciprocatory extruding means, a lever, operatively connected to the extruding means, and means for oscillating said lever to feed slugs toward the extruding means comprising a member carried by said extruding means and reciprocated thereby, and a flexible connection between said member and the lever.

19. In a machine for extruding slugs into collapsible tubes, reciprocatory extruding means, a slug feeding member, means for rendering said member inoperative on the retention of an extruding tube by said means, means for reciprocating said means including a clutch, a lever carried by said extruding means, a yieldable connection from one end of said lever to said member, and a second yieldable connection from the other end of the lever to said clutch for rendering the clutch inoperative to cause reciprocation of said extruding means when the feeding member is rendered inoperative.

20. In a machine for extruding slugs into collapsible tubes, extruding means, means for discharging a tube extruded on said means, means for reciprocating the extruding means including a clutch, a lever carried by the extruding means, a yieldable connection between the lever and the clutch, and means for operating the lever when said discharging means fails to function, to render the reciprocatory means inoperative.

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