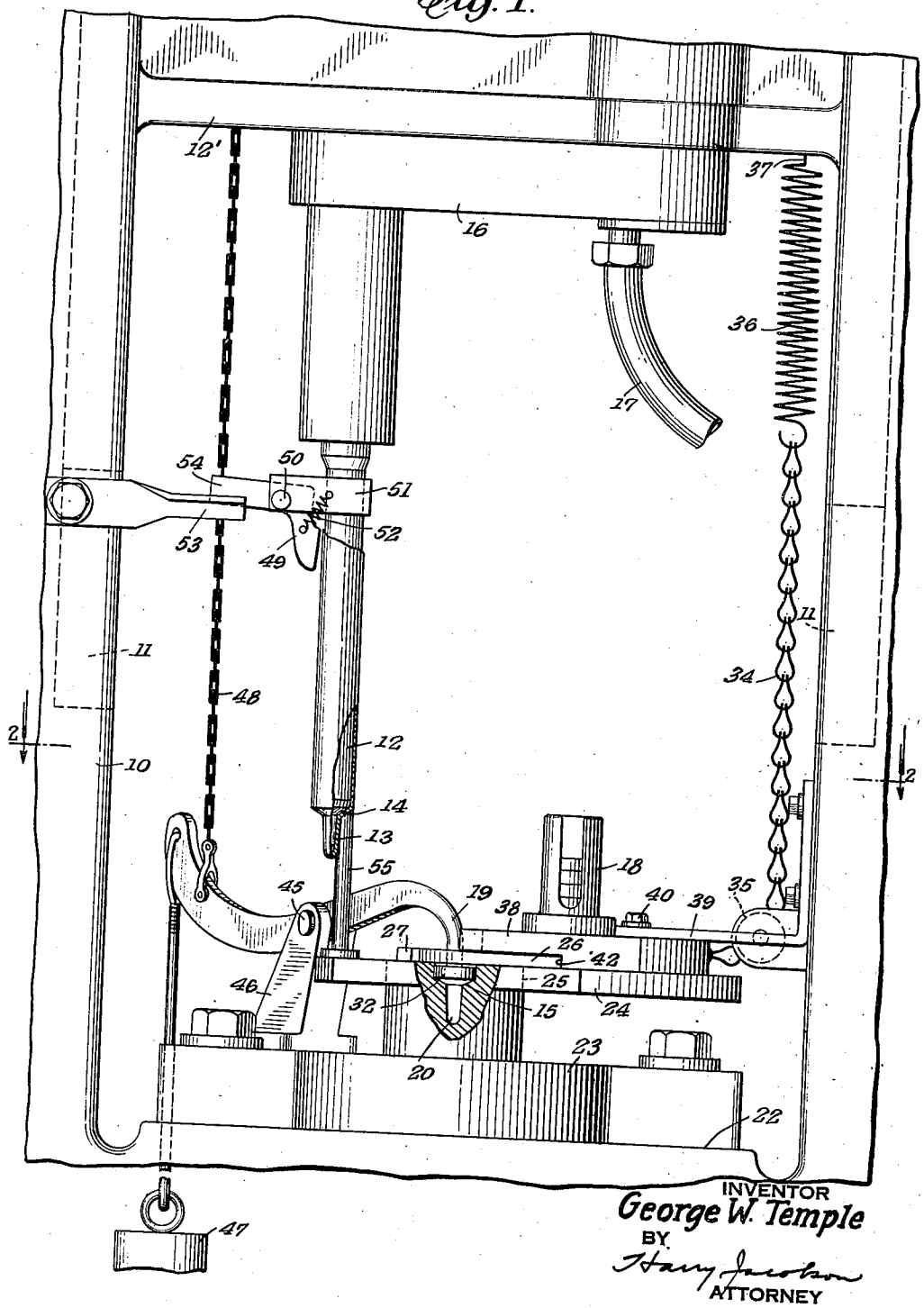
Sept. 8, 1942. G. W. TEMPLE 2,295,138

SLUG FEEDING MECHANISM FOR EXTRUDING PRESSES

Filed Oct. 17, 1939 3 Sheets-Sheet 1

Fig. 1.



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SLUG FEEDING MECHANISM FOR EXTRUDING PRESSES

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Fig. 2.

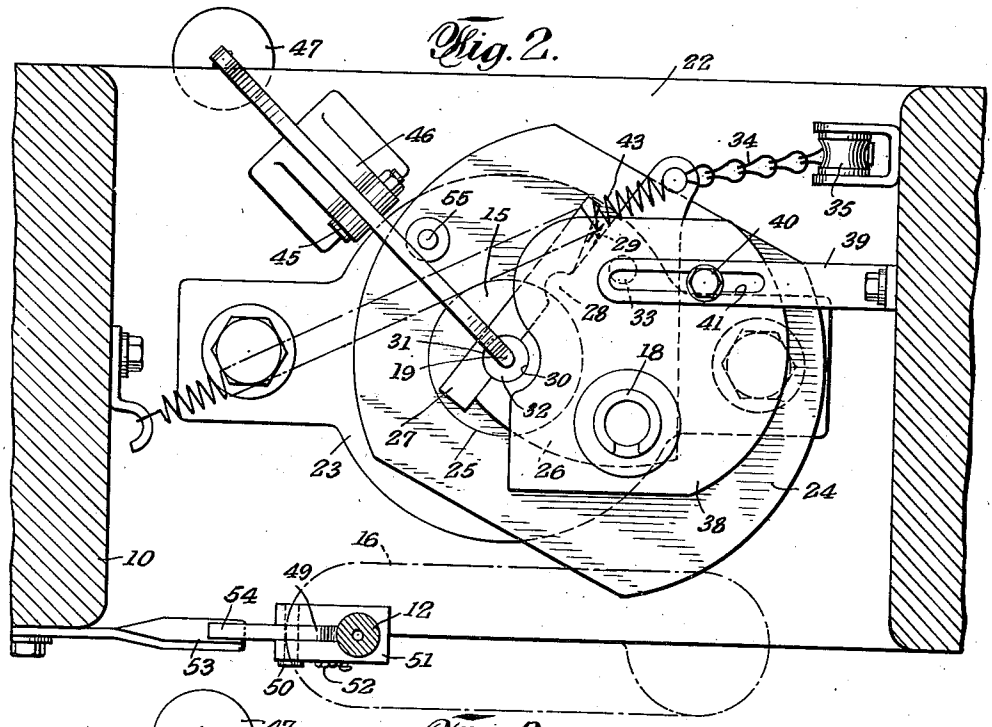
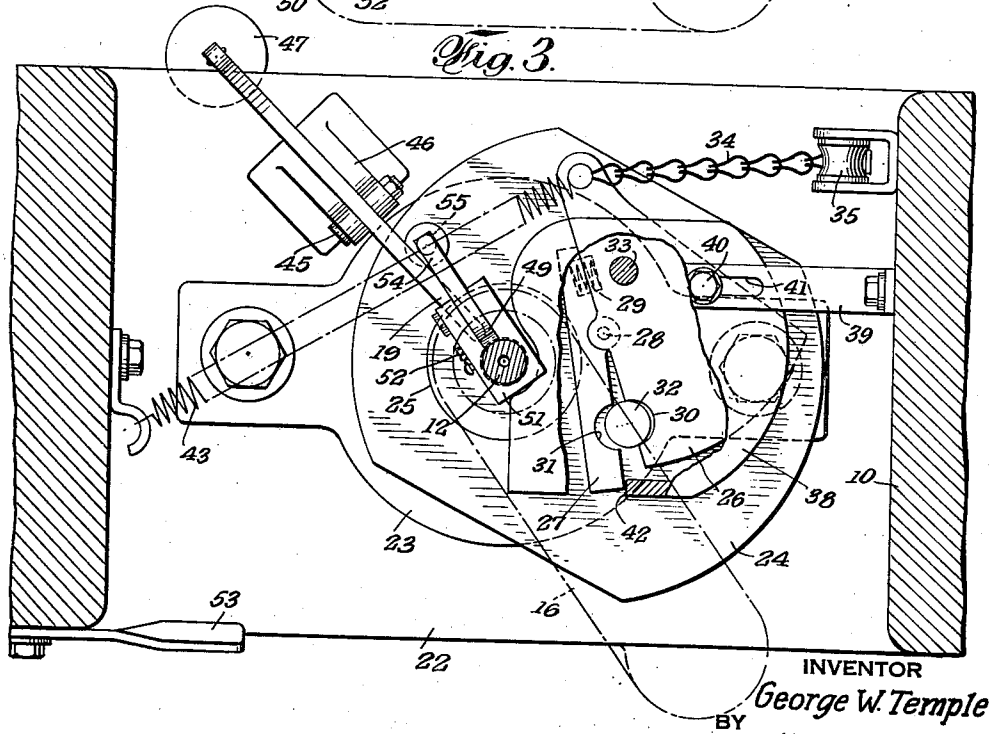


Fig. 3.



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Fig. 4.

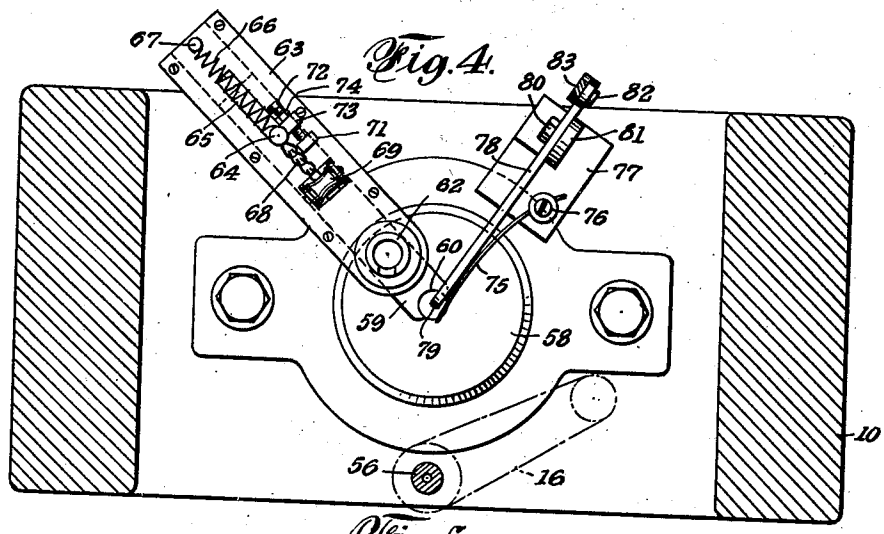


Fig. 5.

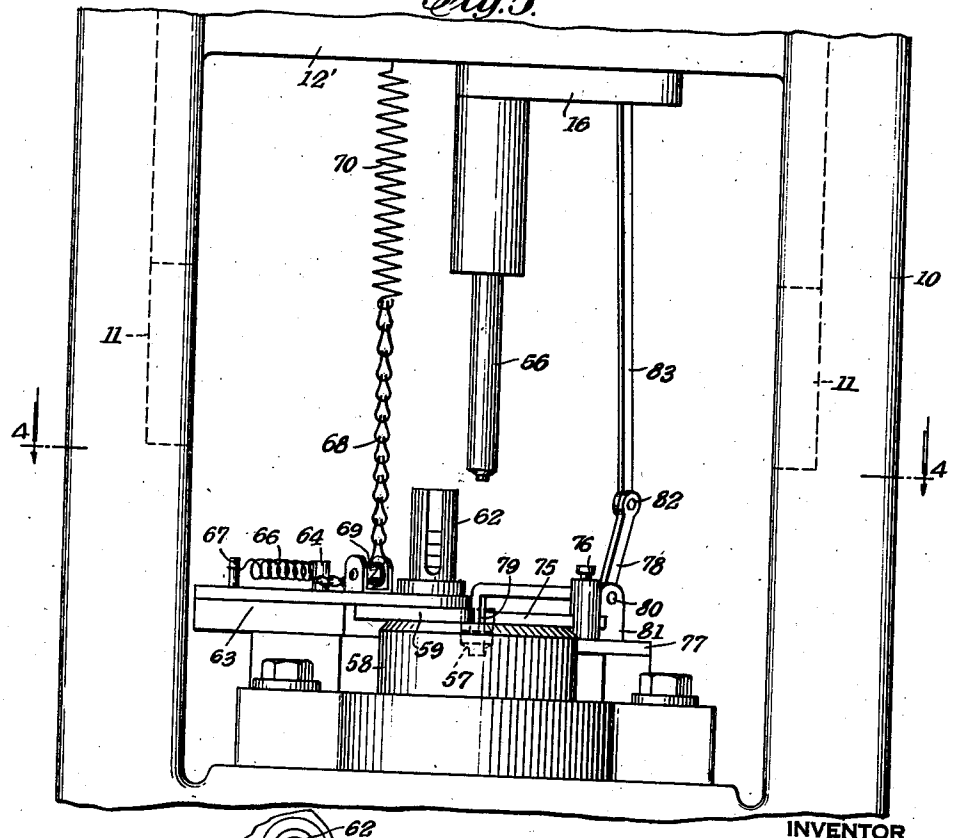
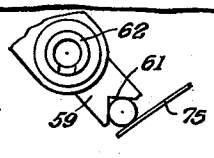


Fig. 6.



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UNITED STATES PATENT OFFICE

2,295,138

SLUG FEEDING MECHANISM FOR EXTRUDING PRESSES

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Application October 17, 1939, Serial No. 299,801

12 Claims. (Cl. 207—1)

This invention relates to machines or presses for extruding discs or slugs of comparatively soft metal into collapsible tubes, the present application being a continuation-in-part of my copending allowed application for Slug-feeding mechanism for tube extruding presses, Serial No. 114,757, filed December 8, 1936, which has resulted in Patent No. 2,180,313, dated November 14, 1939.

In the manufacture of collapsible tubes, difficulty has heretofore been experienced in controlling the movement of the slugs into the female die so that the slugs are inserted into said die in the proper position for the extrusion thereof by and on to the male die or plunger.

My invention therefore contemplates the provision of mechanism for suitably gripping and delivering the slug advanced from a suitable hopper to the female die in its proper position while adequately controlling the slug during its movement.

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

Fig. 1 is a front elevation of my improved machine showing one form of the slug-feeding means.

Fig. 2 is a combined top plan view and horizontal section taken on the line 2—2 of Fig. 1.

Fig. 3 is a similar view showing the positions assumed by the parts during the extruding operation.

Fig. 4 is a view similar to Fig. 2 of a modified form of the slug-feeding means and controlling means.

Fig. 5 is a front elevation of the same.

Fig. 6 is a fragmentary top plan view of the leading end of the feed slide showing a modified form of the notch therein.

In the practical embodiment of my invention which I have shown by way of example, and referring particularly to Figs. 1, 2 and 3 showing means designed particularly for the extrusion of long neck or nozzle tubes, the various instrumentalities are mounted on the frame 10, which is provided with suitable guide grooves as 11 receiving corresponding members of the cross head 12'. The mechanism for reciprocating the cross head, being of any of the usual types employed for that purpose, need not be described nor illustrated. Carried by the reciprocating cross head is the plunger 12, terminating in a suitable elongated pin 13 and in a preferably tapered shoulder 14 adapted to enter the female die 15. The plunger or male die 12 is shown as supported by the oscillatory arm 16 for oscillatory movement from its extruding position, in which it enters the female die (Fig. 3), to the discharge position thereof (Fig. 2), in which the tube is stripped therefrom. It will be understood, however, that the plunger may be mounted in any of the other ways well known in the art. The usual air line 17 communicating with the interior of the plunger serves to supply compressed air to blow the tube off the plunger at the tube-discharge station in the customary manner.

A slug or disc is fed to the female die 15 by mechanism which removes the lowermost slug from the pile of such slugs in the hopper tube 18, while firmly gripping the slug during its transfer. When the slug is advanced to a position directly above the female die, a suitable finger 19 pushes the slug out of the slug gripping jaws and into the die in the exact position in which the slug should rest for the proper extrusion thereof into a tube by the plunger. It being noted that the metal of the slug must flow downwardly into the comparatively small but long nozzle-forming cavity 20 of the female die, as well as upwardly around the plunger during the extruding pressure thereon by the plunger during the formation of the tube, the desirability of accurately positioning the slug to be extruded will be obvious. It being also noted that the tube nozzle is hollow and comparatively soft and thin and hence is not adapted to withstand the blow of the usual knock-out pin customarily used to aid in withdrawing the extruded tube from the female die, the desirability of the provision of means for insuring the withdrawing movement of the plunger and tube as a unit from the female die will be understood.

With the above in mind, the description may now proceed.

Secured to the horizontal surface 22 of the frame 10 is a member as 23 for supporting the female die 15, the finger 19, the hopper 18 and various other parts later to be described. The plate 24 is provided with an opening 25 through which the female die passes and serves to support on its upper surface the slug gripping members or jaws 26 and 27. The main gripping jaw 26 is pivoted to the jaw 27 as at 28, the compression spring 29 serving to urge the front parts of the adjacent inner edges of said jaws toward each other. A preferably semi-circular recess as 30 is made in the inner edge of the jaw 26 and a corresponding recess 31 is made in the adjacent inner edge of the jaw 27, said recesses being of

the proper size to receive and grip a slug as 32 therebetween.

The jaw 26 is pivotally mounted, preferably on the plate 24, as by means of the pivot 33. At the rear end of the jaw 26 is secured the chain 34, which passes about the guide pulley 35 and is connected at its upper end to the lower end of the tension spring 36, the upper end 37 of which is secured to the cross head 12'. A second spring 43 is secured at one end to the jaw 26 and at its other end to a stationary part of the machine such as the frame 10, and serves to pull the jaws in a direction opposite to the direction of the pull of the spring 36. A cover or retaining plate 38, covering the jaws 26 and 27, is suitably supported as by means of the bracket 39 secured to the frame 10. The cover plate 38 is adjustable as by means of the bolt 40 passing through the slot 41 of the bracket 39 and into the plate 24.

In the slug-receiving positions of the slug advancing jaws 26 and 27, the jaw 27 is in engagement with a suitable stop 42 of the cover plate 38, whereby the jaws are opened, said jaw 27 being slightly separated from its co-operating jaw 26 against the tension of the spring 29. The recesses 30 and 31 are thereby separated sufficiently to permit a slug from the hopper 18 to drop into said recesses and on to the plate 24. When the cross head 12' rises and consequent tension is put upon the spring 36, the chain 34 is pulled, thereby swinging the jaws 26 and 27 about the pivot 33 and away from the hopper in a clockwise direction, as viewed in Fig. 3. When the jaw 27 is withdrawn from the stop 42, the spring 29 becomes operative to swing said jaw 27 about its pivot 28 and thereby to hold the slug 32 firmly in the recesses 30 and 31. The parts are so proportioned and so designed that movement of the jaws 26 and 27 is halted when the slug becomes arranged over the cavity of the die 15, though it will be understood that, if desired, a suitable stop may be arranged to stop the jaws at the desired point.

Means are provided as has been hereinbefore indicated for pushing the slug 32 downwardly into its exact required position in the female die 15. Said means comprises the oscillatory finger 19, pivotally mounted as at 45 on the bracket 46, and suitably shaped at its free end to engage the slug and at the proper time to push said slug downwardly out of the grip of the jaws and against the bottom of the larger part of the cavity of the female die, said finger passing through the recesses of the jaws and straightening the slug in the die. At its rear end, the finger 19 is provided with the chain 48 which is secured at its upper end to the cross head 12'.

It will be seen that on the upward movement of the cross head, the finger 19 is operated to lower the front end thereof and to push the slug 32 out from between the slug-gripping jaws 26 and 27 and into the female die. On the downward movement of the cross head, the weight 47 connected to the rear end of the finger 19, serves to raise the front end of said finger out of the way of the plunger or male die preparatory to the repetition of the operation. As the cross head moves down, tension on the spring 36 is released, and the spring 43 becomes operative to move the jaws into the slug receiving position thereof with the recesses 30 and 31 underneath the hopper, the stop 42 opening the jaws for a slug from the hopper to drop into said recesses. The jaw 26 is of sufficient width to retain the remaining slugs in the hopper and to prevent them from dropping onto the plate 24.

The means for insuring the retention of the extruded tube on the plunger when the plunger is withdrawn from the female die will now be described. Said means comprises the retaining lever 49 pivoted, as by means of the bolt 50, to a suitable collar 51 secured to the upper end of the plunger 12. A spring as 52 serves to urge the lower end of said lever toward the plunger. A suitable stationary cam 53 is secured to the frame 10 in the proper position to engage the end 54 of the lever and to oscillate said lever into the position shown in Fig. 1 to release the tube on the plunger when the plunger has been swung by the arm 16 into the discharge position thereof shown in Fig. 2. Normally, however, said spring 52 serves to pull the lever into contact with the extruded tube on the plunger and to hold said tube to the plunger.

When, however, the plunger is in the extruding position shown in Fig. 3, and is lowered into the cavity of the female die, on the last downward movement of the cross head 12', the extension 54 of the lever 49 strikes the stationary rod 55, which is supported on the plate 24. The final part of the downward movement of the cross head 12', after the end 54 of the lever has been stopped by the rod 55, causes said lever to swing about its pivot 50 against the action of the spring 52 and thereby to withdraw the lever slightly from the plunger but enough to permit the metal of the slug extruded from the die to flow about the plunger past said lever. As soon as the upward movement of the cross head 12' begins, should the frictional engagement of the tube with the walls of the die cavity be so great that the tube does not begin to leave the die, the lever end 54 is disengaged from the rod 55 permitting the spring 52 to close said lever upon the tube and thereby to hold the tube firmly upon the plunger, so that the further upward movement of the cross head pulls the tube and plunger out of the die as a unit, and without injury to the tube.

The lever 49 continues to hold the tube on to the plunger until the arm 16 is swung to carry the plunger into its discharge position, at which time the lever end 54 is swung by the cam 53 out of engagement with the tube so that the compressed air delivered by the air line 17 becomes operative to blow the tube off the plunger.

It will be understood that the movements of the parts are properly timed to deliver a slug to the female die during the upward movement of the cross head 12' and while the plunger is being carried to the discharge position thereof, the slug delivering means being moved out of the way of the plunger as the plunger is oscillated back to its extruding position.

It will further be seen that I have provided simple and efficient mechanism for accurately controlling the position of the delivery of the slug to the female die and for insuring the removal of the tube from the die with the plunger without the necessity for the use of a knock-out pin.

In that form of the invention shown in Figs. 4, 5 and 6, the means for holding the tube on to the plunger has been omitted for purposes of clarity, though it will be understood that such means may be used in connection with the modified form of slug-feeding means there shown, if desired, just as efficiently as with the type shown in the remaining figures. This form of the in-

vention may be used with either nozzle tubes or with tubes of the usual shape having a short neck, and has been illustrated in connection with the latter form of tubes. The male die or plunger 56 (Fig. 5) is not provided with the long nozzle or neck 21 but with a neck of the usual shape, the cavity 57 in the female die 58 being correspondingly shaped.

In this form of the invention, the feed plate 59 is supported for straight line reciprocation instead of oscillation and is provided, as shown in Fig. 4, with an arcuate slug-receiving recess 60 or, as shown in Fig. 6, with a V-shaped recess as 61 in its leading end edge. Said plate 59 is mounted for sliding movement in a groove of the fixed support 63. At the front end of said support is arranged the slug hopper 62, open at its bottom so that the plate 59 may slide therepast and remove the lowermost slug from the pile in the hopper.

The groove of the support 63 is provided with a cover plate secured to the upper face of the support and serving to hold the plate 59 against rising in the groove. In the cover plate is provided a slot 65 through which passes the pin 64 upstanding from the feed plate. A suitable tension spring 66 is secured at one end to the pin 64 and at its other end to a second pin 67 upstanding from the top or cover plate of the support. Said spring normally urges the feed plate 59 toward its rearmost or retracted position and when free to do so moves the feed plate out of the way of the male die 56. To move said feed plate forwardly or in a direction to advance a slug from the hopper, the chain 68 is secured at one end to the pin 64 and passes around the pulley 69 suitably mounted on the upper face of the support 63 and serving to change the direction of the chain. The other end of the chain 68 is secured to the lower end of the spring 70, the upper end of which spring is secured to the cross head 12'. It will thus be seen that on the upward movement of the cross head, the spring 70 is tensioned thereby pulling on the chain 68 which in turn pulls on the pin 64 and therethrough on the feed plate 59 to move the feed plate forwardly into the position shown in Fig. 4. When the cross head 12' moves downwardly, the spring 70 is released, as is the chain 68, whereby the spring 66 becomes operative to retract the feed plate so that its leading end edge is behind the hopper ready to repeat the operation.

In the case where the V-shaped notch 61 is provided in the feed plate, the slug is supported at two points and is, consequently, adequately positioned by the feed plate. Means are provided, however, to halt said plate when it has advanced the slug directly over the cavity 57. Said means comprises the stop 71 upstanding from the cover plate of the support, which stop engages the end of the adjustable stop screw 72. Said stop screw is threaded through the lug 73 projecting from the pin 64 and is adjustably held in place by a suitable lock nut as 74, whereby the exact predetermined extreme forward position of the feed plate can be accurately controlled.

To maintain the slug which has been removed from the hopper in the notch 60 or 61, as the case may be, and to maintain full control of the slug during the advancing movement of the feed plate, the flat spring 75 is provided. Said spring is secured at one end as 76 to the fixed support 77 and tends to assume a position just in front of the hopper 62 when unstressed, that is, before the feed plate has advanced a slug from the hopper and forwarded the slug against the spring. When, however, the feed plate has been advanced sufficiently to remove a slug from the bottom of the pile of said slugs in the hopper, the removed slug engages the spring and on the continued advancing movement of the feed plate, bends said spring. The spring urges the slug into the recess or notch in the end of the feed plate and maintains the slug in that position until the slug has been advanced to a point directly over the female die.

Means are provided for removing the slug from the grip of the spring 75 and feed plate and from the notch 60 or 61 at the proper time to insert said slug in an accurate horizontal position into the female die cavity. As shown, said means consists of the bell-crank lever 78 provided with the terminal slug-removing finger 79 and pivoted as at 80 to the fixed bracket 81. The upper end 82 of said lever is connected as by the link 83 to the cross head 12'.

Downward movement of the cross head, which moves the plunger or male die 56 downwardly toward the female die, operates the link 83 to rotate the bell-crank lever 78 about its pivot and to raise the finger 79 out of the way of the plunger. After the tube has been extruded on to the male die or plunger and the upward movement of the cross head is begun, the link 83 is raised, the lever 78 is rotated in a counter-clockwise direction as viewed in Fig. 5, and the slug which has been advanced by the feed plate is pressed firmly and in its proper horizontal position into the die cavity 57.

It will be understood that the parts are so proportioned and timed that the slug removed from the hopper by the feed plate is arranged over the die cavity on the upstroke of the cross head and just before the finger 79 engages the slug to push it out of the grip of the feed plate and spring 75 and into the die. In other words, the finger 79 becomes operative during the final part of the upstroke of the cross head, and is removed from the die on the beginning of the downstroke of the cross head. The feed plate 59 is also retracted after the finger 79 is removed, that is, after the cross head has moved downwardly to some extent. During the final part of the movement of the cross head, the feed plate 59, the slug-control spring 75 and the finger 79 are all out of the way of the plunger 56 which then operates in the usual manner.

It will be seen that I have provided simple and efficient means for controlling the slug during its advance from the hopper into the female die and for inserting the slug in its proper position in the die.

While I have shown and described certain specific embodiments of my invention, I do not wish to be understood as limiting myself thereto, but intend to claim the 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 collapsible tube extruding press, tube-extruding means including a female die having a slug-receiving cavity therein and a vertically reciprocating member, means for delivering a slug into the die in position for the extrusion thereof by said extruding means comprising a pair of cooperating slug-gripping and controlling members, one of said members being normally urged toward the other to grip a slug therebetween and being movable therewith as a unit

in the plane of the faces of said other member and in opposite directions alternately, the other of said members having a slug-receiving recess in the leading edge thereof, means for moving said members to carry the slug gripped thereby toward and over the die, an oscillatory finger having an end portion thereof arranged for movement through the recess and thereby adapted to engage the slug and move the slug down out of the grip of said members and into the die, and means for oscillating said finger including an operative connection between the finger and said vertically reciprocating member.

2. In a machine of the character described, a reciprocating cross head, means for feeding a slug toward a die cavity while retaining control of the slug, said means including a notched plate for receiving part of the slug and a yieldable member for engaging another part of the slug projecting from the plate and for urging the slug into the notch of the plate, said member and plate gripping the slug forcibly between them, and means operated by the cross head for forcibly removing the slug from the plate and out of the grip of the member and plate and for inserting said slug in a horizontal position into the die including a bell-crank-lever having an end thereof operable through the notch of the plate and into the die.

3. In a machine of the character described, a vertically reciprocating cross head, slug feeding means for advancing a slug into the cavity of a female die, said means including a notched slug-feeding plate, a chain connecting said plate to the cross head to move the plate in a slug-feeding direction during upward movement of the cross head, a spring to move the plate in the other direction when the cross head is lowered, means including a spring for urging the slug into and retaining the slug in the notch of the plate during the slug-feeding movement of the plate, and a lever operatively connected to the cross head to remove forcibly the slug from the plate and to lower the slug into the cavity of the female die.

4. In a collapsible tube extruding press, a vertically movable cross head, slug feeding means including a notched plate, and yieldable means for maintaining a slug in the notch of the plate, a spring connected to and urging the plate in one direction on the downward movement of the cross head, a chain connected to the cross head and the plate for moving the plate in the other direction, and means actuated by the cross head for forcibly removing the slug from the notch of the plate, said means including a lever having an end movable through the notch.

5. In a collapsible tube extruding press, tube extruding means including a female die having a slug-receiving cavity therein, and means for delivering a slug into the die in position for the extrusion thereof by said extruding means comprising a pair of slug gripping members, one of said members being pivoted to and carried by the other, said members having complementary opposed slug-receiving recesses in the adjacent edges thereof, a spring urging said one pivoted member toward said other member and thereby urging the walls of said recesses in the direction to close said walls upon a slug inserted into said recesses, means for oscillating said members as a unit to carry a slug toward the die, and an oscillatory finger having an end portion thereof adapted to engage the slug and move the slug vertically out of the grip of said gripping members and into the die.

6. In a machine of the character described, a pair of closable jaws pivoted together in edge-adjacent relation and each having a recess in the inner edge thereof, a spring urging the jaws toward each other to grip a slug therebetween, means for oscillating said jaws while closed to carry the walls of the recesses to a predetermined station, means including a member reciprocable through the recesses forcibly to remove and advance a slug gripped by the closed jaws, and stop means at another station arranged in the path of one of the jaws to open said jaws for the reception of a slug in the recesses.

7. In a machine of the character described, a slug hopper, a pair of recessed jaws pivoted together to close upon and to grip a slug and adapted to receive the lowermost slug in the hopper in the recesses thereof, means for oscillating said jaws as a unit, means including an oscillatory member movable through the recesses in a direction perpendicular to the path of movement of the jaws for forcibly removing a slug from the grip of said jaws at a predetermined point in the oscillatory movement of the jaws and while the jaws are closed on the slug, and a stop in the path of one of the jaws to open the jaws when the recesses of the jaws are arranged underneath the hopper.

8. In a machine of the character described, means for extruding a slug into a collapsible tube including a reciprocatory plunger and a cooperating female die, a slug hopper, a pair of closable jaws having recesses therein for the reception of a slug from the hopper, means for oscillating the closed jaws to carry the recesses from a point underneath the hopper to a point above said die, an oscillatory lever terminating in a finger movable into and out of the recesses and into and out of the die to advance the slug forcibly from out of the grip of the closed jaws into the die and to straighten the slug in said die, a cross head carrying said plunger and an operative connection between the cross head and said lever.

9. In a collapsible tube extruding press, a slug-feeding plate having a slug-receiving notch in its leading edge, a spring urging the plate in one direction, a chain operated by the press to move the plate in the other direction, and a flat spring fixed at one end and having its other end arranged in front of the leading edge of the plate and in the path of movement of said plate, said other end being forced in one direction by the plate and following the plate in the movement of the plate in the other direction, said other end of the spring engaging the slug advanced by the plate and holding the slug in the notch.

10. In a collapsible tube extruding press, a reciprocating slug-feeding plate having a slug-receiving notch in its leading edge, a spring biased toward the plate and fixed at one end and having its free end arranged in front of the notch and in the path of said plate, said free end engaging the slug fed by the plate and holding the slug in the notch during the advance of the slug and being forced in one direction by the plate and following the plate in the movement of the plate in the other direction, and means movable in a direction at right angles to the plane of the advance of the slug for removing the slug from the grip of the plate and the spring while the slug is pressed therebetween.

11. In a slug-feeding mechanism for depositing a slug in a die of a collapsible tube extruding press, a die having a slug-receiving cavity there-

in, a slug hopper, means for removing a slug from the hopper and for gripping and advancing the slug to a position above the die, said means including a pair of members spring-pressed toward each other, and a lever pivoted at a point in spaced relation to the cavity and having a free end thereon moving into engagement with the top of the slug to remove the slug from between said pair of spring-pressed members while said members are closed upon the slug, said lever entering the cavity and moving the slug vertically down into the die and into a horizontal position therein.

12. In a collapsible tube extruding press, a die having a cavity enlarged at its upper part and reduced in diameter on its lower part, slug-feeding means to advance a slug toward the die and directly above the upper part of the cavity, said means including a notched plate and a yieldable member cooperating with the plate to maintain the slug in the notch of the plate, a lever terminating in a finger, and means to move said finger into engagement with the slug and through the notch sufficiently to enter said upper cavity part and forcibly to remove the slug from said feeding means in a direction at right angles to the plane of the feeding movement of the slug while the slug is gripped by said means thereby to insert the slug in said upper cavity part and above the lower cavity part.

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