Sept. 2, 1947. H. T. HALLOWELL, JR 2,426,969

DEPOSITING DEVICE FOR PLASTIC MATERIALS

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FIG. 1.

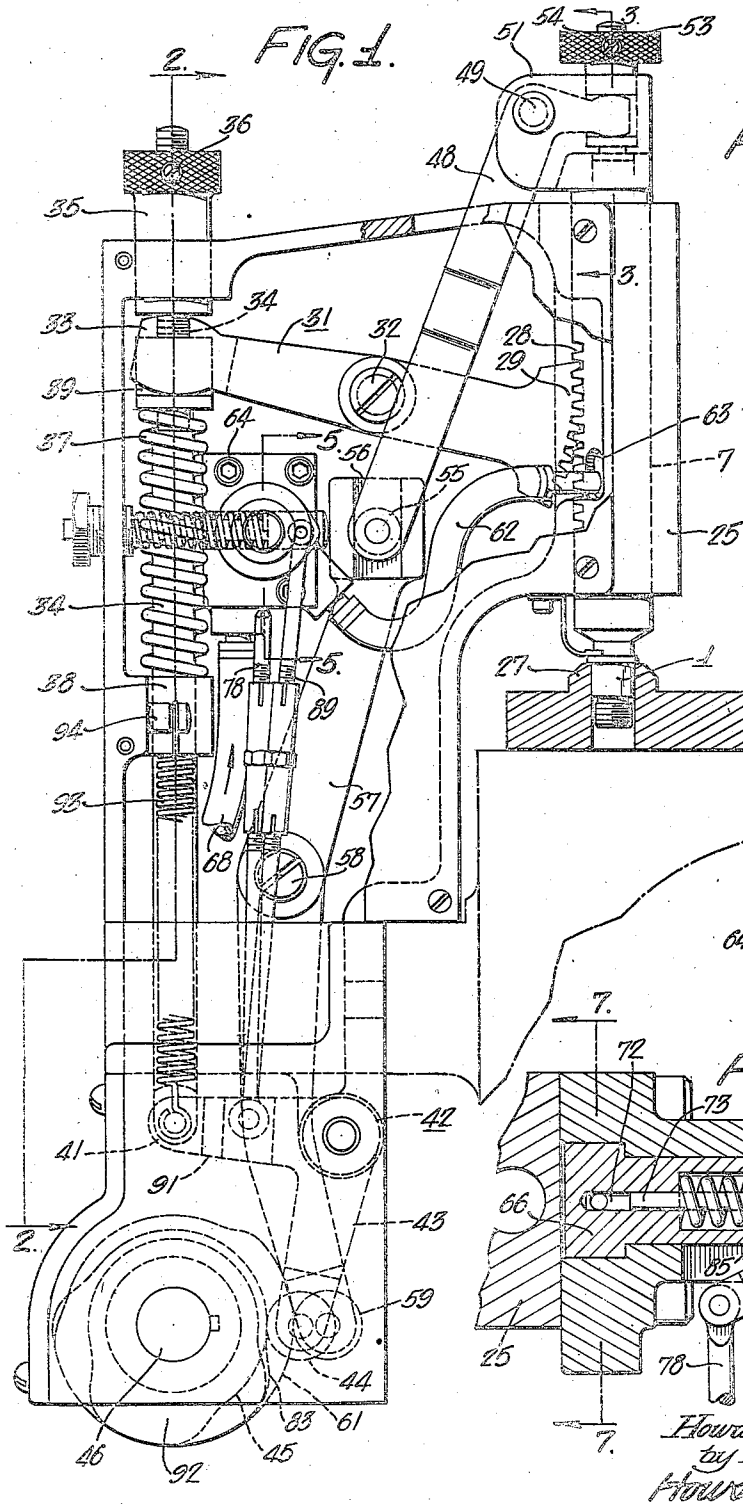


FIG. 3.

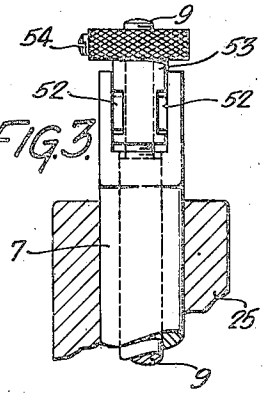


FIG. 6.

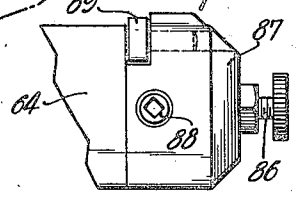


FIG. 5.

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FIG. 2.

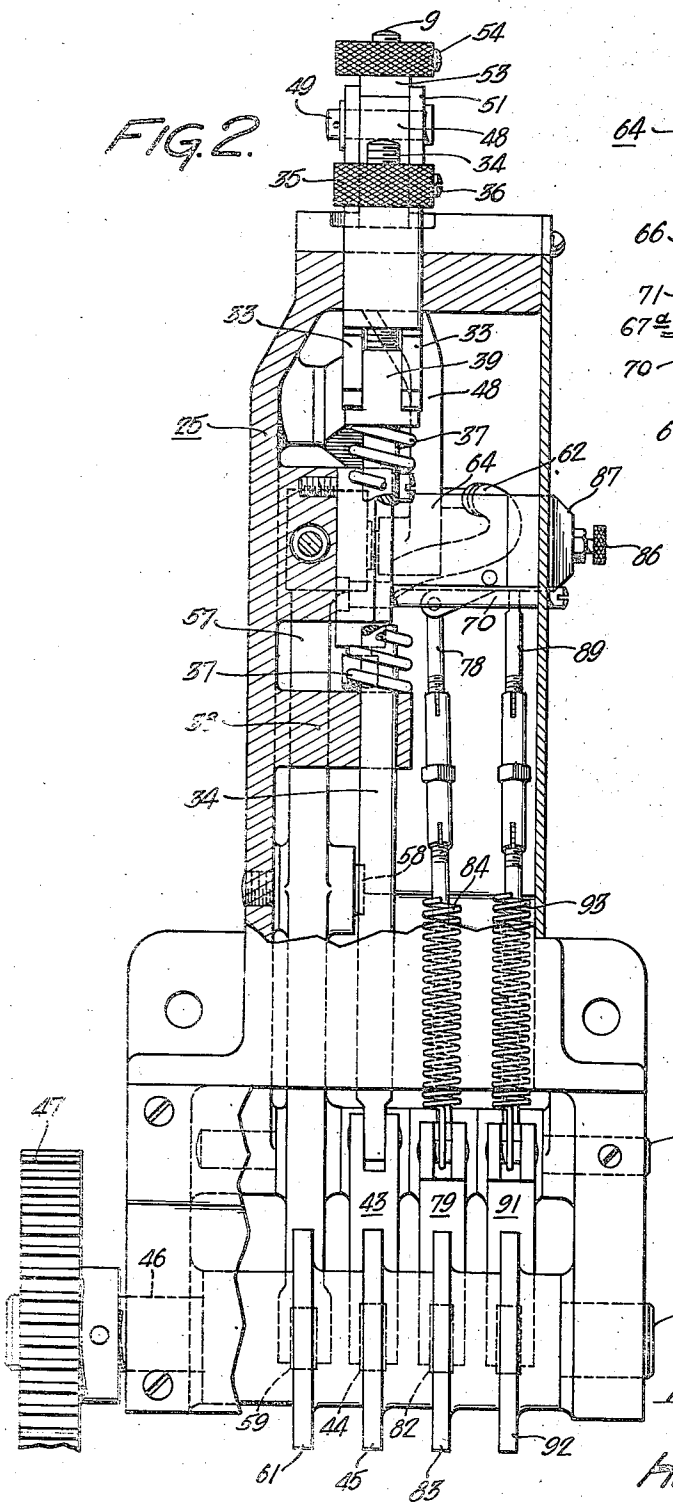
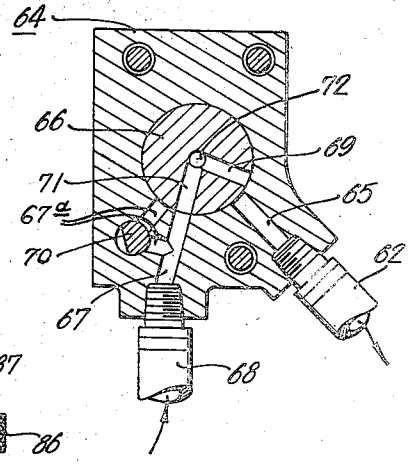


FIG. 7.



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FIG. 8.

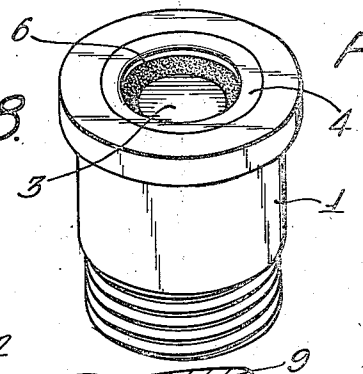


FIG. 4.

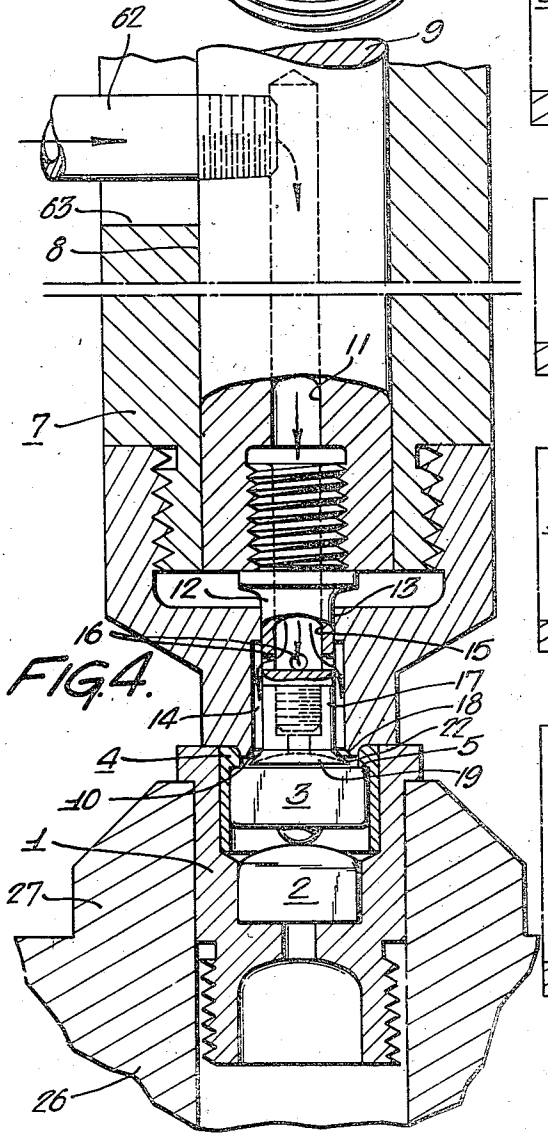


FIG. 10.

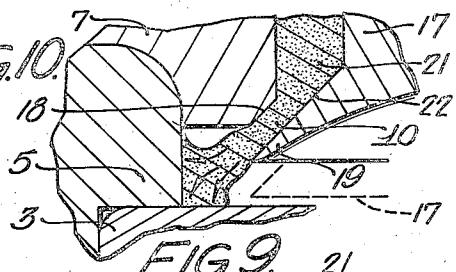


FIG. 9.

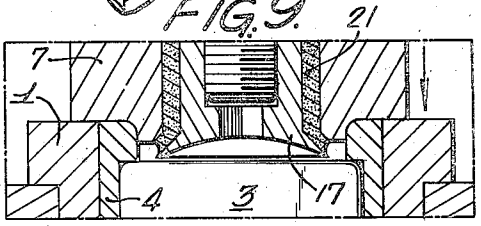


FIG. 11.

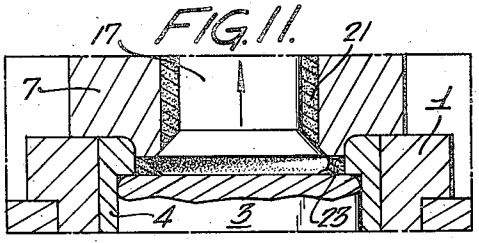


FIG. 12.

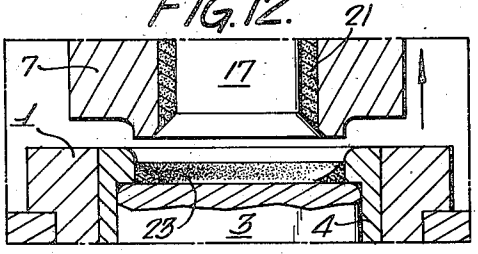
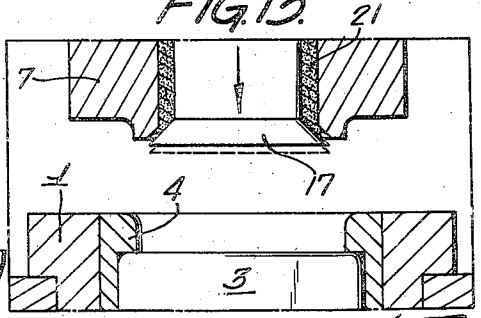


FIG. 13.



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UNITED STATES PATENT OFFICE

2,426,969

DEPOSITING DEVICE FOR PLASTIC MATERIALS

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Application December 1, 1943, Serial No. 512,513

16 Claims. (Cl. 91—18)

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This invention has for its primary object the provision of a machine for depositing wax on the end of a primer head so as to seal the latter against moisture. The machine, while adapted primarily to the function of depositing wax on primer heads, may be found useful in principle for depositing at desired points measured quantities of plastic materials in general.

In the attached drawings,

Fig. 1 is a side elevational view of a depositing machine made in accordance with my invention;

Fig. 2 is a section on the line 2—2, Fig. 1;

Fig. 3 is a section on the line 3—3, Fig. 1;

Fig. 4 is a fragmentary vertical sectional view illustrating details of the depositing elements;

Fig. 5 is a section on the line 5—5, Fig. 1;

Fig. 6 is a fragmentary top plan view on a portion of the device shown in Fig. 5;

Fig. 7 is a section on the line 7—7, Fig. 5;

Fig. 8 is a view in perspective of a primer head onto which the wax has been deposited by the machine forming the subject of my invention, and,

Figs. 9 to 13 inclusive are fragmentary sectional views illustrating the mode of operation of the depositing device.

With reference to the drawings, the primer head illustrated in Fig. 8 consists of a threaded casing 1 within which, as shown in Fig. 4, is mounted a percussion element 2, a firing pin 3, and a cap 4, the latter functioning to retain the firing pin in position. To this end, the upper end of the cap 4 is flanged inwardly, as indicated at 5, so as to overlie the edges of the pin 3. The primary function of the machine forming the subject of my invention is to deposit wax in the form of an annulus 6, see Fig. 8, around the inner edge of the flange 5 so as to seal the joint between this flange and the firing pin surface and to thereby exclude moisture from the interior of the casing 1.

The depositing device, per se, which is best illustrated in Figs. 4 and 9 to 13 inclusive, consists of a casing 7 which is mounted for vertical reciprocation, as hereinafter described, and which has in the interior thereof a cylindrical bore 8 for reception of a plunger 9, this plunger being adapted for reciprocation in and with respect to the said casing. The plunger 9 is provided with a longitudinal passage 11 which terminates in a threaded countersunk recess and in assembly this recess receives the correspondingly threaded end of a hollow nozzle element 12. The element 12 extends downwardly through a cylindrical bore 13 into a recess 14 extending upwardly from a port 10 in the lower end of the casing 7, the recess 14 being

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of somewhat greater diameter than the diameter of the element 12 so that a space is left between the inner wall surface of the recess 14 and the outer surface of the said element. The interior channel 15 of the element 12, which communicates with the channel 11 of the plunger 9, communicates also with the recess 14 through ports 16 in the wall of the element. Below the ports 16 the element 12 has an extension 17 the lower end of which projects through the port 10 and is shaped to constitute a closure for said port. The wall of the port 10 is beveled outwardly as indicated at 18 and the closure end 19 of the extension 17 is correspondingly beveled, these beveled surfaces being adapted to meet when the plunger is retracted to thereby effect a positive cut-off of the port 10. When the plunger 9 and its extension 12 are occupying the positions shown in Fig. 4, the port 10 is open, but when the plunger 9 is elevated or retracted the port 10 is progressively closed, and it will be noted also that as the plunger is retracted, the bevel 22 is caused to enter the recess 14 with a consequent reduction in the interior size of the recess, such reduction continuing until the beveled surfaces meet to positively close the port.

In effect, the channels 11 and 15 and the recess 14 constitute together a container for the wax or other plastic material. The plunger 9 with its extension 12 and terminal portion 19 constitute in effect a retractable closure for the open lower end or discharge port 10 of the container and this closure member has in effect an entrant portion which moves into the container as the member advances toward the operative port-closing position. If under these conditions the container is full of the wax, the said entrant portion will have the effect of extruding a small part of the contents of the container from the port 10 so that when the end 19 of the closure member makes contact with the lip of the port as described above, the extruded portion is positively cut off from the main body of the wax in the container.

In practice, provision is made for bringing the housing 7 into engagement with the end of the priming head 1 after the manner illustrated in Fig. 4, so that the wax extruded and cut off as described will be deposited at the inner surface of the flange 5 and over the joint between this flange and the element 3 of the primer head. This action is best illustrated in Figs. 9 and 10. In Fig. 9, the elements are illustrated in positions which they assume immediately before the extruding operation and it will be noted that the wax indicated by the reference numeral 21 com-

pletely fills the recess 14 around the extension 17 and extends downwardly between the beveled surface 18 and the opposite beveled surface of the head element 19. As the plunger 9 is elevated in the housing 7 and the aforesaid beveled surfaces approach each other the wax 21 is extruded, as illustrated in Fig. 10, this extrusion resulting from the entrant portion 22 of the head 19 which enters and thereby reduces the capacity of the container. The extrusion of the wax continues until the aforesaid beveled surfaces contact each other at which moment the extruded portion of the wax is cut off from the main portion which remains in the container. This is shown in Fig. 11 and it will be noted by reference to Figs. 10 and 11 that in the extrusion operation wax is directed by the beveled surfaces into the angular corner between the flange 5 and the top surface of the firing pin 3, the deposited wax being in the form of a continuous annulus which seals the joint between these elements. Subsequently the casing 7 is retracted, as shown in Fig. 12, with the closure member still in the positive port closing position thereby leaving the deposited annulus of wax, designated in Fig. 12 by the reference numeral 23, in the desired sealing position. As the retractive movement of the casing 7 continues the plunger 9 is moved with respect to the casing so as again to open the port 10, and while in this position the mechanism hereinafter described functions to replenish the material previously extruded from the container so that in the next operation the device may function as described above to deposit the wax on a succeeding primer head.

Referring now to Fig. 1, the casing 7 is mounted for vertical reciprocation in a suitable fixed frame 25, the casing being supported in the frame in a position overlying the peripheral edge of a rotary dial or work table 26, this dial having in its peripheral portion a concentric series of sockets 27 for reception of the primer heads 1. By movement of the dial, the primer heads may thus be brought successively into position under the depositing device and in vertical alignment with the casing 7 and the associated depositing elements previously described.

The required vertical reciprocatory movement of the casing 7 is effected in the present instance through the medium of a rack 28, and a segmental gear 29 which meshes with the rack and which is formed at one end of a lever 31 pivoted at 32 to the frame 25. The other end of the lever 31 is bifurcated and the bifurcations 33—33, see Figs. 1 and 2, lying at opposite sides of a threaded stem 34, engage the under surface of a collar 35 which is threaded on the stem 34 as illustrated and which is secured in adjusted position to the stem by means of a set screw 36. The bifurcated end of the lever 31 is held against the under side of the sleeve 35 by means of a spring 37 which embraces the rod 34 and which seats upon a boss 38 on the frame which boss functions also as a guide for the rod 34, and the upper end of the spring supports a flanged sleeve 39 which is slidably fitted on the rod 34 and which engages the under side of the bifurcations of the said lever. The spring thereby functions through the lever to support the rod 34 in a relatively elevated position. The lower end of the rod is secured to one arm 41 of a bell-crank lever 42 pivotally supported in the fixed frame, and the other arm 43 of this lever carries a roller 44 which engages a cam 45 on a cam shaft 46 journaled in the lower part of the frame. As shown in Fig. 2, this shaft is provided

with a gear 47 by means of which it may be connected to a suitable source of power. It will be noted that the spring 37 functions to hold the roller 44 in operative engagement with the associated cam. The cam 45 functions to periodically vertically reciprocate the housing 7.

The vertical reciprocation of the member 9 in and with respect to the casing 7 is effected through the medium of a lever 48 which is pivoted at 49 on a bracket 51 at the upper end of the casing 7. The upper end of the lever 48 is bifurcated as indicated at 52 in Fig. 3 and these bifurcations engage in recesses at opposite sides of a sleeve 53 which is threaded on the upper end of the member 9, as shown in Figs. 1 and 3. The set screw 54 locks the sleeve 53 in adjusted position on the member. The other end of the lever 48 extends downwardly and has at its lower end a roller or block 55 which fits into a vertical slot 56 at the upper end of a second lever 57. This latter lever is pivoted at 58 to the frame and the lower end thereof carries a roller 59 which engages a cam 61 on the cam shaft 46. The cam 61 functions to oscillate the lever 57 which in turn oscillates the lever 48, the oscillations of this lever being converted into vertical reciprocations of the member 9.

Referring to Fig. 4, it is to be noted that the upper end of the channel 11 of the member 9 communicates with a duct 62, the terminal end of this duct being threaded into the member 9 and extending inwardly through a slot 63 in the casing 7. The duct 62, which is flexible, extends to a pump and valve housing 64 secured in the frame 25 as illustrated. The duct 62 communicates with a port 65 which is controlled by a rotary valve 66, and this valve also controls a second port 67 to which is connected a duct 68. The valve 66 has two ports 69 and 71 which are arranged for communication respectively with the ports 65 and 67, and as shown in Fig. 7 the arrangement of the ports 69 and 71 is such that when one of these ports communicates with its associated port 65 or 67, the other of the ports 69 and 71 is closed. Thus in Fig. 7 ports 71 and 67 are in communication with each other, whereas the ports 69 and 65 are disconnected and sealed by the valve 66, or the valve housing as the case may be.

Both of the ports 69 and 71 connect with a common central axially extending port 72 which, as shown in Fig. 5, constitutes a cylinder for a plunger 73. This plunger is secured to a crosshead 74 slidably mounted in a suitable bore 75 in the interior of the valve 66. Reciprocation of the crosshead is effected through the medium of the bellcrank lever 76 which is pivoted at 77 to the housing 64, one arm of this lever extending through the wall of the recess of the bore 75 into operative engagement with the crosshead 74, and the other end being connected through a rod 78 to a lever 79, this lever being mounted on a pivot pin 81 in the frame and being operatively connected through a roller 82 with a cam 83 on the shaft 46. A spring 84 at the upper end of the lever 79 has its other end connected to the frame 25 and exerts resilient pressure tending to maintain the lever into operative engagement with the cam. The cam operates to oscillate the lever and through the rod 78 and the lever 76 to reciprocate the plunger 73. A spring 85 in the bottom of the bore 75 exerts resilient pressure on the inner end of the crosshead 74 tending to force the crosshead with its plunger 73 outwardly and into en-

gagement with an adjustable stop 86 in the outer end of the valve housing.

Oscillation of the valve 66 and selective connection of the port 65 and 67 with the cylinder 72 is effected through the medium of a valve cap 87 which in effect forms a continuation of the housing 64 as illustrated in Figs. 5 and 6 and which is secured to the outer end of the valve 66 by means of a set screw 88. A rod 89 has its upper end attached to the cap 87 as illustrated in Fig. 6, and this rod extends downwardly and connects at its lower end with a bellcrank lever 91, this lever being pivotally supported on the pin 81 and being operatively associated with a cam 92 on the cam shaft 46. A spring 93 attached to the upper end of the lever 91 and connected at the other end to a pin 94 on the frame 25 exerts resilient pressure tending to maintain the lever 91 in operative engagement with the cam 92. The cam operates to oscillate the lever 91 and to thereby longitudinally reciprocate the rod 89, and this reciprocation of the rod 89 effects in turn an oscillation of the valve cap 87 and therethrough of the valve 66. In one position of oscillation the port 67 is connected with the port 71 as shown in Fig. 7, and in another position of oscillation the port 65 is connected with the port 69. When the ports 67 and 71 are in communication with each other the plunger 73 is timed for its retraction stroke whereby wax or other plastic material, to a source of which the duct 68 is connected, is drawn through the duct and through the ports into the cylinder 72. When the port 65 is connected with the port 69 the plunger 73 is advanced with the result that the wax previously drawn into the cylinder 72 is ejected through the port 65 and duct 62 to the channel 11 of the member 9 as previously described. The pump is constituted so that the quantity of wax injected at each stroke corresponds to that ejected or extruded in each stroke of the plunger 9, and the elements are timed so that each extrusion is followed by a replenishing stroke of the pump. Exact synchronization of the several moving elements is obtained through the use of the common cam shaft 46.

In regard to the operation of the device, the cycle of movements of the casing 7 and plunger 9 has been set forth on pages 4 and 5 supra. The elements of the pump and the distributing valve 66 are operated in timed relation to the movements of the casing 7 and plunger 9 through the medium of the associated cams on the shaft 46. Thus during the period when the said casing 7 and plunger 9 are passing through the stages illustrated in Figures 9 to 12 inclusive, the pump plunger 73 and valve 66 will be actuated to draw a charge of wax from the source into the cylinder 72; and when the casing 7 has moved to the position shown in Figure 13 and the plunger 9 is in a depressed position as indicated in broken lines, the pump plunger 73 and valve 66 will be actuated to force the said charge into the duct 62 so as to replenish the wax discharged by the previous retractive movement of the plunger 9 as in Figure 11. It will be understood that the wax is of a viscous consistency which precludes escape from the casing by gravity flow when the plunger 9 is depressed.

For cleaning and priming purposes, means has been provided for directly connecting the ports 65 and 67, as shown in Figure 7. A by-pass 67a is provided from the port 67 so that when the valve 66 is in a position in which the port 69 registers with the port 65, the port 71 will register with the inner end of the by-pass. The by-pass channel is normally closed by a valve 70 which may be adjusted from the outside of the housing (see Figure 2) to open the by-pass when required. With the by-pass open, the entire system may be either charged with or cleared of wax by suitable pressure means applied by way of the port 67.

I claim:

1. In a device for depositing plastic materials, a constant-volume container for said material having a discharge port, a member constituting a retractable closure for said port, said member having an entrant portion movable into the container as the member advances toward the operative position with respect to the port so as to extrude material from the container, and means for advancing and retracting the closure member.

2. In a device for depositing plastic materials, a constant-volume container for said material having a discharge port, a member constituting a retractable closure for said port, said member having an entrant portion movable into the container as the member advances toward the operative position with respect to the port so as to extrude material from the container, and being engageable with the lip of the port when in the said operative position so as to effect a positive cut-off of the said extruded material, and means for advancing and retracting the said member.

3. In a device for depositing plastic materials, a container for said material having a discharge port, a member constituting a closure for said port and means for advancing and retracting the member to open and close the port respectively, said member having an entrant portion movable into the container as the member moves toward the port closing position so as to extrude material from the container, and being engageable with the lip of the port when in the said port closing position so as to effect a positive cut-off of the said extruded material, and means synchronized with the movements of the member and operative when the member is in retracted position for charging the container with measured quantities of said material.

4. In a device for depositing plastic materials, a constant-volume container for said material having an opening, a member constituting a retractable closure for said opening, said member in retracted position defining the inner peripheral edge of a narrow endless port the outer peripheral edge of which is defined by the wall of said opening, said member in the operative position seating on said wall and having an entrant portion movable into the container as the member advances toward said operative position so as to extrude material from the container in an endless band through said port, and means for advancing and retracting the closure member.

5. In a device for depositing plastic materials, a constant-volume container for said material having a circular opening, a member constituting a retractable closure for said opening and having a circular portion which when the member is retracted defines the inner peripheral edge of an annular port the outer peripheral edge of which is defined by the wall of said opening, said member in the operative position seating on said wall and having an entrant portion movable into the container as the member advances toward said operative position so as to extrude material from the container in an annular band through said port, and means for advancing and retracting the closure member.

6. In a device for depositing plastic materials, a casing of constant volume having a port, and a

plunger mounted for reciprocation in the casing and projecting loosely through the port so as to provide a passage for discharge of said plastic material from inside the casing, said plunger having a terminal portion adapted when the plunger is moved inwardly of the casing to enter and to subsequently seat against the wall of said port so as to close the latter, said terminal portion being thereby operative to extrude said material in predetermined quantity from the casing.

7. In a device for depositing plastic materials, a casing of constant volume having a port, a plunger mounted for reciprocation in the casing and projecting loosely through the port so as to provide a passage for discharge of said plastic material from inside the casing, said plunger having a terminal portion adapted when the plunger is moved inwardly of the casing to enter and to subsequently seat against the wall of said port so as to close the latter, said terminal portion being thereby operative to extrude said material in predetermined quantity from the casing.

8. In a device for depositing plastic materials, a constant-volume container for said material having a circular opening, a member constituting a retractable closure for said opening and having a circular portion which when the member is retracted defines the inner peripheral edge of an annular port the outer peripheral edge of which is defined by the wall of said opening, said wall being outwardly beveled and forming a seat for a corresponding bevel on the end of said member, and the beveled surface of said member projecting into said port when the member is in the seated position so as to effect an extrusion of said material from the port when the member is moved toward the seating position, and means for advancing and retracting the closure member.

9. In a device for depositing plastic materials, a casing having a port, a plunger mounted for reciprocation in the housing and projecting loosely through the port so as to provide a passage for discharge of said plastic material from inside the casing, said plunger having a terminal portion adapted when the plunger is moved inwardly of the casing to enter and to subsequently seat against the wall of said port so as to close the latter, said terminal portion being thereby operative to extrude said material from the casing, means for reciprocating said plunger in the casing, and means synchronized with the reciprocatory movement of the plunger for maintaining a constant supply of material in the casing.

10. In a device for depositing plastic materials, a reciprocatory casing having a port, a plunger mounted in the casing for reciprocation in the casing and projecting loosely through the port so as to provide a passage for discharge of said plastic material from inside the casing, said plunger having a terminal portion adapted when the plunger is moved inwardly of the casing to enter and to subsequently seat against the wall of said port so as to close the latter, said terminal portion being thereby operative to extrude said material from the casing, means for reciprocating the casing and for synchronously reciprocating the plunger in and with respect to the casing, and means for replenishing the supply of material in the casing after each extrusion operation.

11. In a device for depositing plastic materials, a casing having a port, a plunger mounted for reciprocation in the casing and projecting loosely through the port so as to provide a passage for discharge of said plastic material from inside the casing, said plunger having a longitudinally extending bore communicating at one end with the interior of the casing and said plunger having a terminal portion adapted when the plunger is moved inwardly of the casing to enter and to subsequently seat against the wall of said port so as to close the latter, said terminal portion being thereby operative to extrude said material from the casing, means for reciprocating the plunger, a duct attached to said plunger in communication with the said bore and movable with the plunger, and means connected to said duct operating in synchronism with the movements of the plunger for replenishing the material extruded from the casing.

12. In a device for depositing plastic materials, a container for said material having a discharge port, a member constituting a retractable closure for said port, said member having an entrant portion movable into the container as the member advances toward the operative position with respect to the port so as to extrude a predetermined quantity of the material from the container, means for advancing and retracting the closure member, and means operating in synchronism with the movements of said member for injecting into the container measured quantities of said material while the closure is in said operative position.

13. In a device for depositing wax in the end of a priming head, a casing having a port and shaped around said port to fit the said end of the priming head, a plunger mounted for reciprocation in the casing and projecting loosely through the port so as to provide a passage for discharge of the said plastic material from inside the casing, said plunger having a terminal portion adapted when the plunger is moved inwardly of the casing to enter and to subsequently seat against the wall of said port so as to close the latter, said terminal portion being thereby operative to extrude said material from the casing upon the end surface of said priming head, and means for advancing and retracting the said plunger so as to periodically open and close the port.

14. In a device for depositing plastic materials, a frame, a casing mounted for reciprocation in said frame and having a discharge port, a plunger mounted for reciprocation in and with respect to the casing and projecting loosely through the port so as to provide a passage for discharge of said plastic material from inside the casing, said plunger having a terminal portion adapted when the plunger is moved inwardly of the casing to enter and to subsequently seat against the wall of said port so as to close the latter, said terminal portion being thereby operative to extrude said material from the casing, means for individually and synchronously reciprocating the casing and the plunger, and means for maintaining a constant supply of the material in the casing.

15. In a device for depositing plastic materials, a frame, a casing mounted for reciprocation in said frame and having a discharge port, a plunger mounted for reciprocation in and with respect to the casing and projecting loosely through the port so as to provide a passage for discharge of said plastic material from inside the casing, said plunger having a terminal portion adapted when the plunger is moved inwardly of the casing to enter and to subsequently seat against the wall of said port so as to close the latter, said terminal portion being thereby operative to extrude said material from the casing, means for individually and synchronously reciprocating the casing and the plunger, and means for maintaining a con-

stant supply of the material in the casing, said reciprocating means comprising a cam shaft, a pair of cams on said shaft, and means for operatively connecting the cams respectively with the casing and the plunger.

16. In a device for depositing plastic materials, a frame, a casing mounted for reciprocation in the frame and constituting a container for said material, said casing having a port, a plunger mounted for reciprocation in and with respect to the casing and projecting loosely through said port, said plunger having a terminal portion adapted when the plunger is moved inwardly of the casing to seat against the wall of said port and to close the latter, a cam shaft, and independent means for operatively connecting the cam shaft to the casing and to the said plunger, the said connecting means for the plunger comprising a lever pivotally attached to the casing and movable with the latter, and a second lever slidably connected with an arm of the first named lever and operatively connected to the cam shaft.

HOWARD THOMAS HALLOWELL, JR.

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