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BAG TOP SEALING MACHINE

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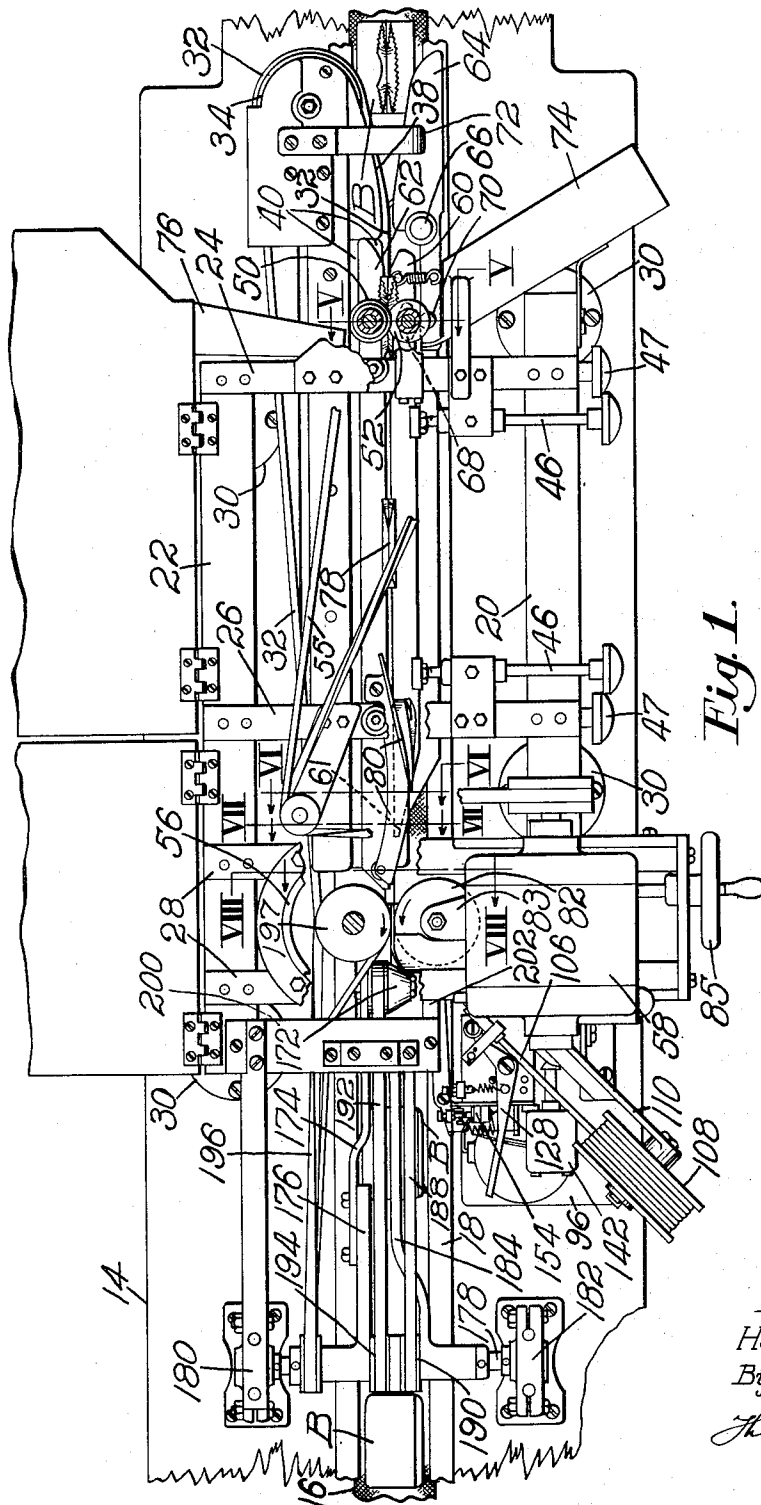


Fig. 1.

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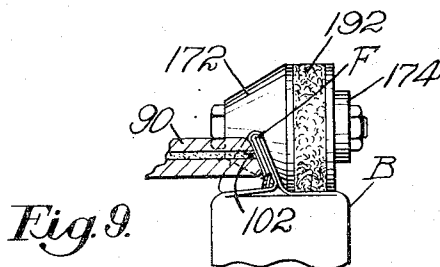
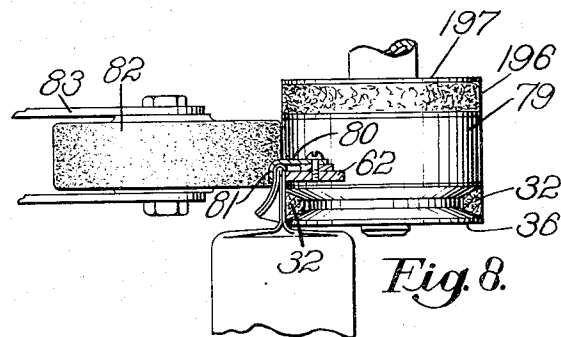
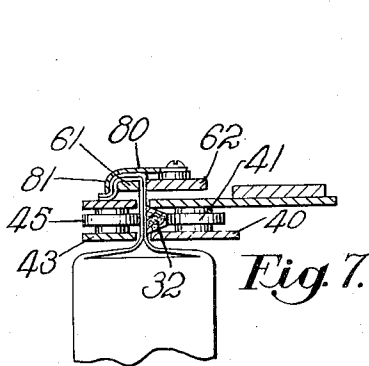
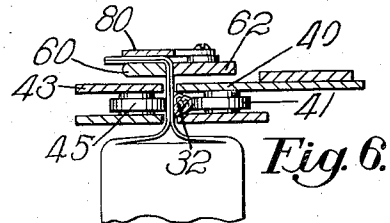
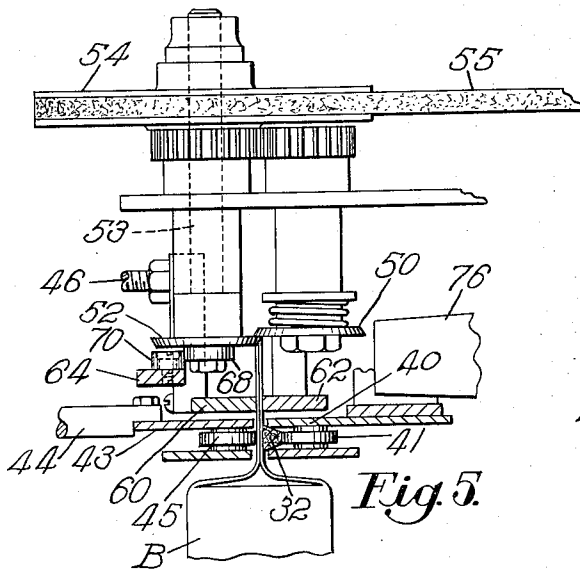
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## BAG TOP SEALING MACHINE

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8 Claims. (Cl. 53—143)

This invention relates to machines for sealing the tops of paper bags after they have been filled and is herein illustrated as embodied in a machine which crimps and trims and folds the top of a paper bag, forming a flap, and then applies adhesive to the flap and presses the latter against the body of the bag.

In handling paper bags which have been filled with granulated or pulverulent material, machines are provided for making a double fold in the top of the bag to form a flap which may be pressed tightly against the body of the bag and held thereby adhesive. Such machines commonly employ paste or glue for securing the flap but these materials do not set quickly and they do not always hold the flap securely. Some of these drawbacks may be avoided by employing a thermoplastic adhesive which will seal the flap quickly and securely and which will be inexpensive to use because only a small quantity is required.

Accordingly, an object of the invention is to provide an improved, trigger-controlled, power-actuated extruding mechanism adapted for bag-sealing machines and by means of which small quantities of coating material may be extruded directly upon the work.

To this end, a feature of the invention resides in an improved extruding mechanism wherein the quantity of material applied to the work upon the tripping of a work-contacting trigger may be easily and positively controlled.

As illustrated, cement in strip form is pushed through a heated nozzle and is fed forward by the engagement therewith of a lever-operated toothed disk, the lever being oscillated through an operator-controlled arc by means of a solenoid. The latter is energized through a switch which is closed automatically when a piece of work is carried past an operating point, as by a conveyor. Additional assurance of proper sticking is provided by a continuously acting presser herein illustrated as a driven belt carried, at one end, by a yieldably mounted arm.

These and other features of the invention will best be understood by a consideration of the following specification, taken in connection with the accompanying drawings in which

Fig. 1 is a plan view of the whole machine with protective covers lifted and certain parts broken away;

Fig. 2 is a plan view on a larger scale of the extruding mechanism;

Fig. 3 is a vertical section on the line III—III of Fig. 2;

Fig. 4 shows a filled bag to which adhesive has been applied but with the coated flap held upright to show the position of the adhesive;

Fig. 5 is an enlarged vertical section on the line V—V of Fig. 1 taken through the cutter disks;

Fig. 6 is an enlarged vertical section on the line VI—VI of Fig. 1 showing the beginning of the fold of the flap;

Fig. 7 is an enlarged vertical section on the line VII—VII of Fig. 1 showing a continuation of the fold;

Fig. 8 is an enlarged section on the line VIII—VIII of Fig. 1 showing the completion of the fold as the flap enters the feed rolls; and

Fig. 9 is a vertical section on the line IX—IX of Fig. 2 showing the flap held against the nozzle as it is turned down by a frusto conical roll, to be stuck to the body of the bag.

When a paper bag B has been filled with loose material and it is presented to this machine the sides 10 (Fig. 4) are pressed inwardly and the top edges trimmed at 12 to make them of uniform length. Further movement of the bag through the machine results in the formation of a flap

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F by folding the material over once, after which a streak of adhesive A is applied to the under side of the flap whereupon the flap F is brought into contact with the body of the bag as shown in Fig. 3 and held there long enough to allow the adhesive to set.

The machine is intended to be mounted upon a bench 14 which has on it a belt conveyor 16 driven by a motor, which is not shown, to move horizontally across the top of the bench to the left as shown in Figs. 1 and 2. This conveyor belt is guided between overhanging guard rails 18. Preferably, the belt slides over a strip of sheet metal on the bench, the surface of the sheet metal being smooth to minimize friction, and this strip is inclined gradually upward from the entrance of the machine at the right in Fig. 1 to a point midway of the length of the belt, thereby facilitating the entry of the bag top into a guideway, to be described, and gradually pushing the bag upwardly against the bottom of the guideway so as slightly to squeeze the contents of the bag heightwise and cause the top of the bag to be folded tightly against the body portion thereof.

The body of the machine is made up of angle iron side bars 20 and 22 which are connected by crossbars 24, 26 and 28. This framework is supported above the level of the bench by short posts having bases 30. The feeding movement of the bags is facilitated by an endless belt 32 carried at the right by a pulley 34 and at the left by a grooved driving pulley 36 (Fig. 8). The nearer run of this belt presses against one side of the bag top and is backed up by a curved plate 38 and by a longitudinally extending double member 40 which is hung from the cross bars 24, 26 and has a series of antifriction rolls 41. On the near side of the machine and directly opposing the active run of the belt 32 is a bar 43, constructed of two plates with rolls 45, which bar is supported by means of slide rods 44 (Fig. 5). These rods may be adjusted by hand-operated screws 47 connected to them.

At the right of the crossbar 24 there is a trimming mechanism for cutting off surplus material from the bag tops so that the necks thereof will be of uniform lengths and this comprises overlapping cutting disks 50 and 52 the latter of which is mounted on a driven shaft 53 carrying an overhead pulley 54 (Fig. 5) having a belt 55 connecting it to a reduction gear mechanism contained within a housing 56 (Fig. 1) which in turn is supplied with power from an electric motor 58. In order for the trimming mechanism to operate successfully it is found desirable to provide a guideway for the bag tops between plates 60 and 62 the right ends of which are cut back or tapered to form a throat.

Since it is desired to facilitate the entrance of the bag top to the space between these guide plates 60 and 62, a crimping mechanism is provided which includes an oscillatory crimping blade 64 pivoted at 66 and spring-held against a cam 68 on the shaft of the driven cutter 52. This cam engages a roller 70 on the crimping blade. An overhanging guard 72 at the right of the machine prevents the operator's fingers from entering the space between the crimping blade and the belt 32. Trimmings from the bag tops which are severed by the cutting disks 50 and 52 are carried off through a disposal chute 74 by air from a blower 76.

As the bags pass along with the assistance of the belt 32 and the conveyor 16 the trimmed tops 78 are turned over or folded by a folder 80 the bottom of which is provided with a down turned flange 81 (Figs. 7 and 8) which cooperates first with the tapered end 61 of the plate 60 and then with the other plate 62 to press the flap against itself. The upstanding turned-over flap F is carried between a roll 79 on the shaft of the driving belt pulley 36 and a roll 82 so as thereby to press the flap parts firmly together. The mount 83 for this idler roll 82 extends beneath the motor and is yieldable and also adjustable by a hand wheel 85 although it is not thought necessary to illustrate this well-known mechanism.

As the upstanding flap of the bag passes between the rolls 79 and 82 it runs along the edge of a nozzle plate 90 (Fig. 2) which is supported on a bracket 92 attached to a base plate 94. This base plate is mounted in turn upon a carrier plate 96 which is held down upon the

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bench by a superposed upright 98 attached to the cross-bar 28 which forms the motor support.

The nozzle plate 90 is a thin plate with a tapered end portion and is provided with a passage 100 terminating in an outlet opening 102 in the upwardly sloping end surface (Fig. 9) of the plate so that any cement extruded through this opening is delivered to the underside of the flap F and, depending upon the amount extruded and the speed of movement of the bag, it is spread over a greater or lesser portion of the flap. In this nozzle plate there is an electrical heating unit 104 (Fig. 2) supplied from any suitable source and designed to raise the temperature of the plate to a point such that cement in the form of a strip or rod 106, drawn off from a supply reel 108 (Fig. 1) which is carried on a bracket 110, is melted as it is pushed through the passage 100.

This rod of cement 106 is guided to the passage 100 by a tubular member 112 supported from the base plate 94 by an arm 114 and it is important that heat shall not be transferred to this guide 112 to such an extent that the rod becomes softened at that locality and sticks in the guide. Accordingly, an air gap 120 is provided between the guide 112 and a tubular extension 116 of the passageway 100, and the said extension 116 is provided with heat radiating fins 118 in order to keep it as cool as possible. It will be understood that the unmelted portion of the rod as it moves forward into the tubular extension 116 serves to push the melted portion out of the outlet opening 102.

In order that a predetermined quantity of cement may be extruded at each operation, a feeding device is provided comprising an idle backing roll 122 and a ratchet roll 124 which are positioned beside cutaway portions 126 of the guide tube 112 and grip the opposite sides of the cement rod 106 directly. The backing roll 122 is mounted on a lever 128 which is pivoted on the base plate 94 and is held against the rod by a spring 130 the tension of which may be adjusted by a screw 132. On the lever 128 is a finger piece 134 so that the backing roll may be moved aside when it is necessary to insert a new supply of the rod cement 106.

The ratchet roll 124 rotates about a pivot screw 136 which also serves as the fulcrum of a feed lever 138, and the roll is caused to move angularly with the lever in one direction by a spring-pressed pawl 140 which is mounted on the top of the lever. The oscillation of this lever to feed the rod is effected by a solenoid 142 having a core which is provided with a semicircular head 144 which, by its contact with the core guide 146, limits the stroke of the core and hence the extent of the oscillation of the lever in a clockwise direction, inasmuch as the semicircular head 144 is connected to the lever by an adjustable connecting rod 148. Movement of the feed lever 138 in a counterclockwise direction under the pull of a spring 150 is limited by an eccentrically pivoted stop disk 152 which may be held fixed in adjusted position by a clamp screw to determine just how much cement is to be pushed out at each operation of the solenoid.

Energization of the solenoid, as a bag B comes into position to be coated, is controlled by a sensitive switch 154 having an operating plunger 156. This plunger is aligned with an adjustable screw 158 carried by one end of a trigger lever 160 which is pivoted at 162 on one of the guide bars 18 for the conveyor belt 16. The trigger lever 160 is provided with an extension 164 having a hump 166 which is positioned to contact the side of the body of a filled bag B. The exact position of this hump 166 with respect to the nozzle may be determined by a slot and screw connection 168 between the extension and the lever 160. A stop screw 170 threaded through a depending lug on the trigger lever 160 contacts with the base 94 to limit the movement of the hump 166 toward the bags. Current for the solenoid may be derived from any suitable source.

Inasmuch as the flap F is held in vertical position between the rolls 79 and 82, it is found desirable, as it approaches the nozzle, to turn the flap over to a position where it will contact with the nozzle adjacent to the outlet opening 102. Accordingly, a frusto conical presser roll 172 is rotatably supported on a stud carried by an extension 174 (Fig. 1) of an arm 176 which swings on a shaft 178 carried in bearings 180 and 182 supported on the bench. The connection between this extension 174 and the arm 176 provides for an adjustment of the

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position of the frusto conical roll 172 with respect to the nozzle 90. Another arm 184 also pivoted on the shaft 178 supports a grooved pulley 186 (Figs. 2 and 3) which acts as a flap-pressing roll aiding its belt 188. Stretched between this pulley and a corresponding pulley 190 is a belt 188 running parallel to a similar belt 192 which is received in a groove in the frusto conical roll 172 and a pulley 194 secured to the shaft 178. This latter shaft is driven by means of a belt 196 passing around a pulley 197 on the speed reduction unit 56. The lower run of the belt 188 rests upon the down turned, already coated flap F and holds it there long enough for the cement to set. The lower run of the belt 192 bears upon the other half of the top of the filled bag (Fig. 3) and helps to hold it in upright position on the conveying belt 16.

To this end spring pressure is applied (Fig. 3) to hold down the free ends of the arms 174 and 184. A plate 200 is attached to the frame 22 and to one of the crossbars 28 by means of a strut 202. The plate 200 carries a block 204 recessed to receive springs one of which is shown at 206 in Fig. 3. These springs act upon plungers 208, 210 attached at their lower ends to plates 212 and 214 which are secured to the arms 184 and 174 respectively. Abutment screws 216 and 218 are threaded in the block to control the tension of the springs, such as that shown at 206. Inasmuch as these belts are driven they assist in the feeding movement of the bags and press the flaps F firmly into contact with them.

Supposing then, that heat has been supplied to the unit 104 in the nozzle plate 90 and that the various motors are in operation, a filled bag on the belt 16 with its open top projecting upwardly is carried between the oscillatory crimper blade 64 (Fig. 1) and the run of the belt 32 where it passes over the plates 38. It then enters the guideway between the tapered ends of plates 60 and 62 on the bars 40 and 44, is trimmed by the disks 50 and 52 (Fig. 5) and carried along until it reaches the folder 80 (Fig. 6). The upper portion of the flap is turned over on itself (Figs. 7 and 8) and is firmly pressed together in passing between the rolls 79 and 82.

As soon as the bag contacts the trigger hump 166 (Fig. 2) the sensitive switch energizes the solenoid and causes oscillation of the feed arm 138. This pushes forward a portion of the cement rod 106 and causes the melted portion thereof to be extruded upon the underside of the flap which is then being bent over the sloping end of the nozzle plate 90 (Fig. 9) by the frusto conical roll 172. Almost immediately the coated flap is pressed down against the body of the bag by the belt 188 (Figs. 2 and 3) which, in cooperation with the belt 192, carries the bag along in upright position for a period sufficient to insure the setting of the adhesive, thus supplying a compact package in which the bag top is folded twice and secured to the top of the bag. It will be understood that there is no waste of adhesive because it is delivered directly to the bag flap in the form of a streak A as shown in Fig. 4, and because of the fact that the quantity extruded at each passage of a bag may readily be controlled by setting the stop 152 which limits the back movement of the feed lever 138. For this reason the mechanism is very economical of cement, it having been found by actual use that an ounce of cement is sufficient to seal something over a thousand bags.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:

1. In a sealing machine, a continuously moving carrier for workpieces, a heated nozzle supported on the machine adjacent to said carrier, intermittently operable extruding means for forcing a solid, thermoplastic coating material through a portion of the length of said nozzle to extrude a molten portion of the same material against a moving work piece, means for positively operating said extruding means, and means responsive to the passage of individual workpieces on the carrier for actuating the operating means.

2. In a sealing machine, an extruding mechanism for adhesive in rod form, said mechanism comprising a nozzle, means mounted for movement and engaging the rod of adhesive to feed it forward to the nozzle, a lever arranged to move said means intermittently, a fixed stop at one side of said lever, an eccentrically mounted member at the other side of said lever acting as an adjustable stop to determine the extent of movement of the lever and

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hence the extent of feeding movement of the rod, and means for holding said eccentric stop in a predetermined position.

3. In a machine for sealing workpieces having flaps, a carrier for said workpieces, a flap turning roll, a nozzle positioned just ahead of said roll to deposit adhesive between a flap and the body of a workpiece to which it is attached, intermittently operated means for pushing a quantity of adhesive through the nozzle, a flap pressing roll near said flap turning roll, and an endless belt rotating said pressing roll and traveling with the workpieces positioned to hold the flap against the body of the workpiece as the adhesive sets.

4. In a machine for sealing workpieces having flaps, a carrier for said workpieces, a heated nozzle positioned to deposit thermoplastic adhesive between a flap and the body of a workpiece to which it is attached, intermittently operated means for pushing a solid strip to extrude a quantity of adhesive melted from the forward end of said strip through the nozzle, and a yieldably depressed belt continuously engaging the flap as it leaves the nozzle to hold it against the body of the workpiece as the adhesive sets.

5. In a machine for sealing workpieces having flaps, a movable conveyor for said workpieces, means above said conveyor for depositing adhesive between a flap and the body of a workpiece to which it is attached, a driven shaft above said conveyor, an arm swingable on said shaft carrying a flap turning roll, and a belt connecting said shaft and said roll.

6. In a machine for sealing workpieces having flaps, a movable conveyor for said workpieces, means above said conveyor for depositing adhesive between a flap and the body of a workpiece to which it is attached, a driven shaft above said conveyor, an arm swingable on said shaft carrying a flap turning roll, a belt connecting said shaft and said roll, another arm swingable on said shaft, a flap

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pressing roll on said arm, a belt connecting said shaft and said flap pressing roll with the under-run of the belt lying on the flap of a workpiece, and means for yieldably depressing said arms.

7. In a machine for sealing workpieces having flaps, a movable carrier for the workpieces, a nozzle comprising a thin plate adapted to lie beneath a flap and having an outlet opening, lever operated means for positively extruding costing material through the nozzle, an adjustable stop for variably determining a stroke of said lever, electrical means for actuating said lever in one direction, and a switch operated by the positioning of a workpiece at the nozzle for effecting a single stroke of said lever to push adhesive from the nozzle.

8. In a machine for sealing the flaps of filled bags, a nozzle having an outlet and adapted to be interposed between a flap and its bag, means for heating said nozzle, a roll for turning the flap toward the nozzle, a hollow member attached to said nozzle forming a passage for a rod of adhesive, intermittently operable feeding means for said rod comprising a rod-engaging feed roll, a lever having a ratchet connection to said feed roll, a solenoid for moving the lever in one direction to push the rod forward and thereby to extrude adhesive from the nozzle, a switch controlling said solenoid, and means responsive to the presence of a bag presented to the nozzle for closing the switch and thereby actuating the lever to push adhesive from the nozzle.

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