Oct. 2, 1945. W. STELZER 2,385,951

SEALING MACHINE

Filed March 24, 1942 2 Sheets-Sheet 1

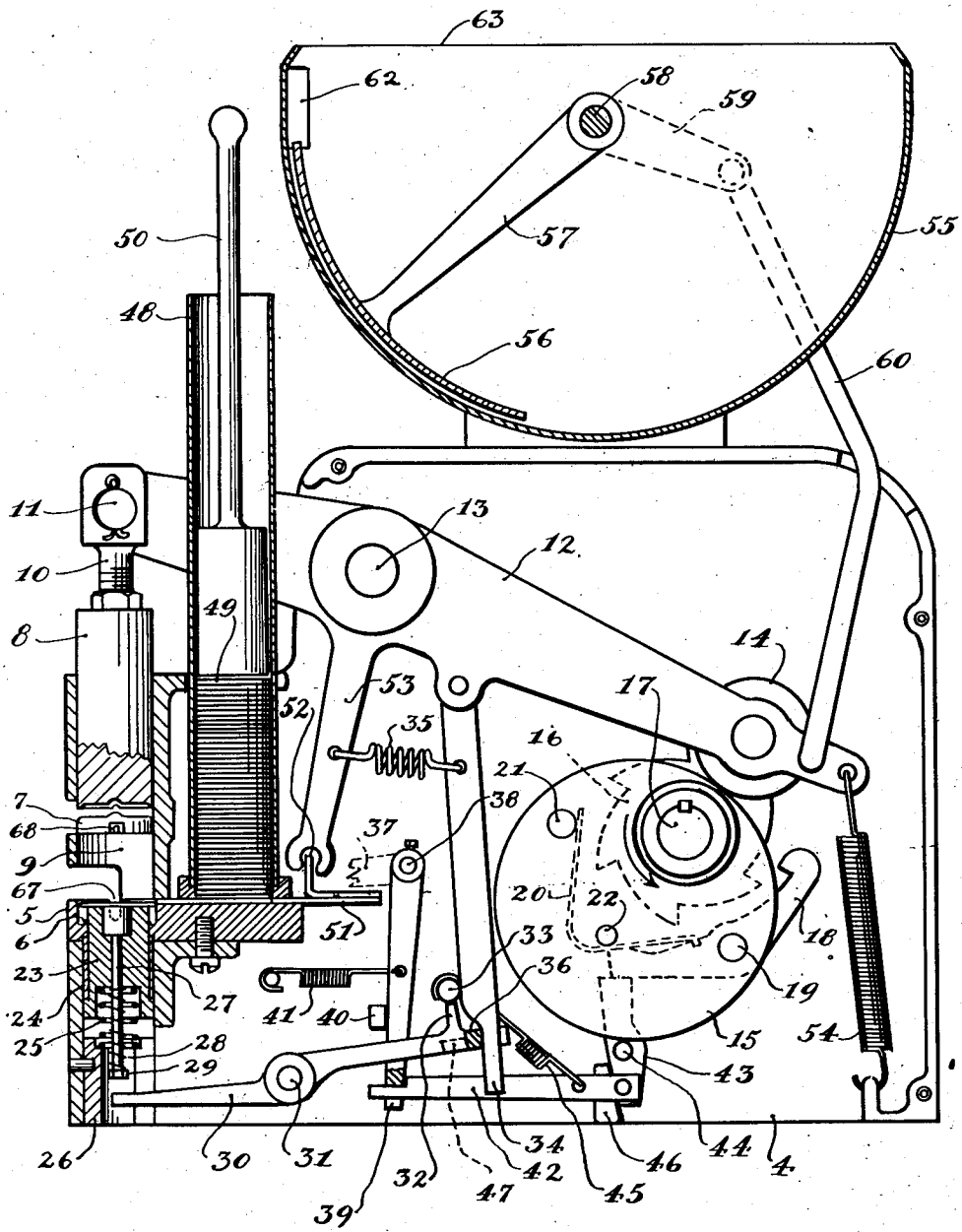


Fig. 1

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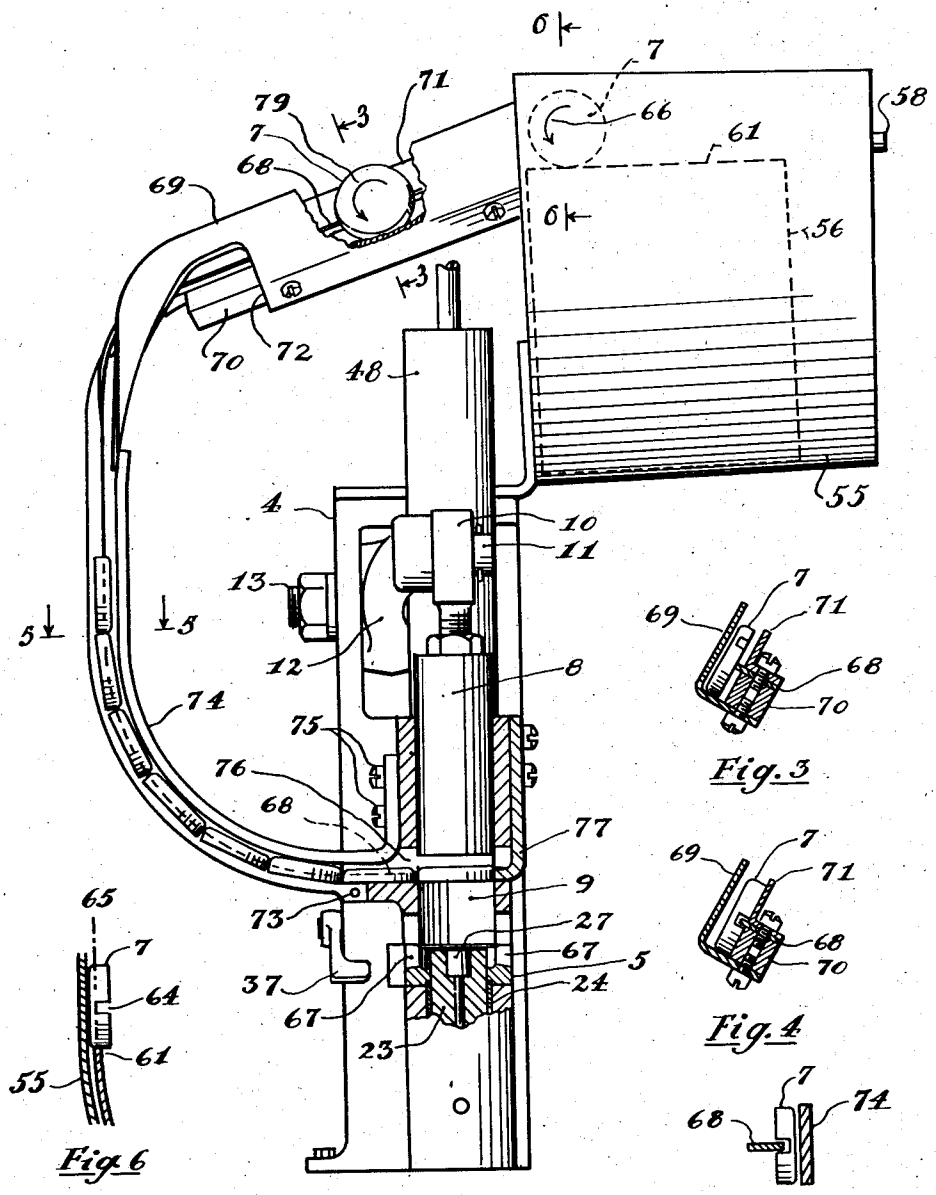


Fig. 2

Fig. 3

Fig. 4

Fig. 5

Fig. 6

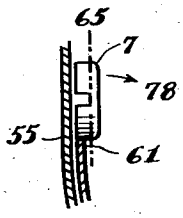


Fig. 7

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2,385,951

SEALING MACHINE

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Application March 24, 1942, Serial No. 435,959

6 Claims. (Cl. 81—9.1)

This invention relates to sealing machines and more particularly to a machine for affixing two part seals to strings or the like where said two part seals consisting of a cup and a disc are directed and applied to the string by a feeding mechanism for attaching said seals in a speedy manner.

The invention pertains particularly to a seal consisting of a cup shaped member or capsule and a disc member where the string is placed between the cup shaped member and the disc member and the rim of said cup shaped member is then crimped over to lock and seal the string.

The object of the invention is to provide a simplified and improved feeding mechanism for the cup shaped member and to improve the means for crimping the cup shaped member.

A further object is to improve the clutch mechanism as well as the control means for actuating the crimping mechanism by means of a source of power. The invention also aims at certain safety and interlocking means to improve the dependability and safety of the mechanism.

Other advantages and features of the invention will appear by examination of the drawings wherein:

Fig. 1 is a side view (partly in section) of the sealing machine with the side cover removed.

Fig. 2, a front elevation thereof showing the front end partly in section.

Fig. 3, a section on line 3—3 of Fig. 2 showing a cross section through the track or railway which guides the sealing cups to the crimping mechanism, showing a cup which is not yet lined up with the track.

Fig. 4, a cross section similar to Fig. 3 but showing a cup in proper position on the track.

Fig. 5, a section on line 5—5 of Fig. 2.

Fig. 6, a cross sectional view taken on line 6—6 of Fig. 2 of the hopper mechanism to illustrate the principle of assorting and selecting the cups to be fed to the crimping mechanism.

Fig. 7, a sectional view similar to Fig. 6 but illustrating the principle of rejecting a cup which is not in the proper position to enter the track.

Describing the invention now more in detail and referring in particular to Fig. 1, there is shown a housing or frame 4 to which all the component parts are connected, or housed therein.

The crimping mechanism consists of a die 5 having an annular curling groove by means of which the rim of the cup shaped member or capsule 7 is curled over.

8 designates a punch whose lower extremity conforms with the back of said cup 7, and is adapted to slide or reciprocate in a bore 9 of housing 4.

The upper end of punch 8 has attached thereto, a rod end 10 pivotally connected at 11 to an actuating lever 12 rotatable about a stud 13 rigidly secured to housing 4. The other extremity of lever 12 has a roller, preferably of the anti-friction type, 14 in rolling engagement with an eccentric 15, revolvable about a clutch gear 16 keyed to a drive shaft 17 which may be driven at a low speed by any suitable means, preferably a standard speed reduction unit which is not shown in order not to encumber the drawing as any type of speed reduction unit may be used. The eccentric 15 has a pawl 18 pivoted at 19 and urged to engage clutch gear 16 by a leaf spring 20 held in position by a pin 21 and stop pin 22.

The die 5 also has an ejector pin or yieldable member 23 adapted to slide therein as well as in sleeve 24 which serves as a pilot for die 5 and guide for ejector pin 23. Ejector pin 23 is urged into its upper position by a spring 25 seated in a recess in stop 26 which determines the lower position of the ejector pin when depressed during the sealing operation. Within said ejector pin 23 is a slidable pin or ejector pin 27 having a head at the top to be flush with the top surface of the ejector pin 23 when urged to its retracted position by retracting spring 28 retained by a nut 29, for the free movement of which stop 26 has a hole and slot on one side which also accommodates lever 30 which is pivoted to the housing 4 at 31 and serves to actuate said pin 27 to eject or raise the completed seal at a moment when a new disc is placed on ejector pin 23. Lever 30 at its other extremity has an extension 32 abutting against stop 33 extending from housing 4. Lever 30 is actuated by link 34 pivotally connected to lever 12 and urged into contact with stop 33 by a spring 35. The lower extremity of said link 34 is adapted to pass through a slot in lever 30, where the latter is shown in section to provide a better illustration. The surface of link 34 in contact with stop 33 is of a cam shape so that when the link is in its upward position its lower extremity abuts against the upper surface of lever 30 at 36, but is pushed into the slot at a point during its descension.

To control the operation of the machine by the operator, i. e., to engage the clutch I provide a trip lever 37 pivoted at 38 and rigidly connected with lever 39 to form a bell crank urged against stop 40 by a spring 41. The lower extremity of lever 39 has a slot to guide link 42

abutting against said lever 39 and pivotally connected to a trip lever 43 rotatably mounted on a pin 44 extending from housing 4. The trip lever 43 is urged into the position shown by a spring 45 pulling it against a stop 46 which is a part of housing 4.

In order that the sealing mechanism can operate only one complete sealing cycle after it has been released by the operator I provide a lug 47 extending from lever 30 to throw link 42 out of engagement with lever 39 during the operation when lever 30 is actuated to eject the finished seal.

To feed the discs to the die in proper order I provide a magazine consisting of a tube 48 wherein the discs 49 are placed and held down in contact with the die or feeding mechanism by a convenient plunger 50, which is suitable for easily loading said discs into the easily removable tube 48. The discs may be furnished in a paper container which may be inserted into tubing 48 and then forced out of the container by means of plunger 50. To push the discs 49 from said magazine 48 onto ejector pin 23 I provide a feeder blade 51 having a lug 52 attached thereto to be engaged by an arm 53 extending from lever 12. The power for the feeding operation is provided by a return spring 54 which also serves to keep roller 14 in engagement with eccentric 15.

The means for feeding the cup shaped members in proper order to the crimping mechanism consists of a hopper 55 which is secured to the top portion of housing 4 and which is of a semicircular shape to accommodate a blade 56 attached to a lever 57 securely mounted on a shaft 58 rotatable in hopper housing 55 and operated by a lever arm 59 whose outer end is connected to a connecting rod 60 which transmits an oscillatory movement from lever 12 to lever 57. The hopper housing 55 is open at the top and receives a supply of sealing cups which it feeds in proper order to the crimping mechanism. Blade 56 is positioned at an angle whereby upper edge 61 declines towards opening 62 in the side wall 63 of the hopper housing 55. This inclination serves to urge a sealing cup positioned on this upper edge to roll towards exit 62 as illustrated in Fig. 2. The sealing cups are constructed with two diametrically opposed slots 64 to accommodate the string or wire to which the seal is attached. To properly position the cups in the die it is necessary to provide some means for directing and positioning the cups and for rejecting cups which are not in the right position. In the embodiment of this invention I employ a principle utilizing the eccentricity of the center of gravity to select the cups. Referring to Fig. 2 showing a cup 7 raised in the desired position on upper edge 61 of blade 56, the center of gravity denoted by line 65 is inside of the point of support so that the cup leans against the wall of hopper housing 55 and is permitted to roll towards opening 62 in a direction of rotation indicated by arrow 66. If a cup is positioned on edge 61 facing in the wrong direction as shown in Fig. 7 the center of gravity is outside of the point of support whereby the cup loses its balance and falls to the bottom of hopper housing 55.

The string which extends from the article or package to be sealed is placed transversely across die 5 to fit into slots 67. Therefore, the cups have to be fed into the die with their slots in a fixed relation thereto. To accomplish this it is necessary to line up the cups on a track 68 onto which said slots fit to prevent the cups from turning. As the position of the slots when the cup is passing through opening 62 is haphazard I provide a slope on which the cup rolls until the slots register with track or rail 68 and the cup slides downward without turning. The slope consists of a guide 69 on which the cup rolls, a spacer 70 interposed between said track and said guide, and a guide member 71 (shown in section in Figs. 3 and 4). The guiding surfaces are inclined obliquely in a lateral direction so that the cup has a tendency to lean against guide 71 and spacer 70 to urge the slots 64 of cup 7 to engage track 68. This is illustrated in Figs. 3 and 4. Guide 69 is spaced sufficiently from track 68 to allow passage of the cup even though the slots are not engaged with the track. I have found that the obliquity of the guide in a transverse direction should be approximately 30 degrees in order to provide engagement of the cup with the track and to provide a sufficient rolling action before engagement. However, this angle varies with the height of the rim and the diameter of the cup. In order that no cup can pass to the curling mechanism that is not lined up with the track I provide an opening 72 which permits a cup not engaged in the track to fall out, for which purpose an auxiliary container may be provided but which is not shown on the drawing. The lower extremity of guide 69 is twisted to conform with track 68 to prevent cups moving down from falling out. The track 68 which is clamped between guide 71 and spacer 70 is made of one continuous piece and secured to housing 4 at 73. Guide 74 serves to retain the cups in position and is secured to housing 4 by means of screws 75. It is preferable that track 68 extends as far as possible to the bore 9 to properly guide the cups.

When the plunger is in the top or "off" position as shown in Fig. 2, the lower-most cup is forced into bore 9 by the weight of the column of cups. As it is difficult to provide an opening 76 only on one side of the housing, in this preferred embodiment I extend this opening through the housing to simplify the machine, therefore, it is necessary to provide a stop 77 which is preferably magnetized to hold the cup in position. To keep the cup in bore 9 from falling down when the punch 8 descends it is preferable to magnetize the latter when ferrous cups are used.

Having just described the construction of the novel mechanism I will now illustrate the operation of same. Assuming the machine is in the "off" position as shown in Figs. 1 and 2, with cups placed in hopper 55, and the magazine 48 provided with discs 49, the operator places a string or the like extending from the package or article to be sealed through slots 67 and onto disc 49; then he depresses lever 37 manually which turns stop lever 43 in a counterclockwise direction through the intermediary of link 42 whereby pawl 18 is released from its forced position and urged into engagement with clutch gear 16 by spring 20. As drive shaft 17 and clutch gear 16 slowly revolve in a counterclockwise direction as seen in Fig. 1, the clutch gear 16 picks up pawl 18 and with it the eccentric 15 so that these elements revolve as one entire unit in a counterclockwise direction forcing roller 14 upwardly and pressing punch or plunger 8 downward. The latter picks up cup 7 and forces it downward through bore 9 onto disc 49 which is adapted to fit inside of said disc or capsule 7. While plunger 8 further depresses the capsule towards the die, the string held by the operator in slot 67 enters the slots 64 of cup 7, and as soon as the edge of

the rim of the cup comes in contact with the annular groove 6 of the crimping die 5 the rim is being curled over and inwardly, sealing the disc and the string.

During the final downward movement of punch or plunger 8, the ejector pin 23 is depressed until it comes in contact with stop 26 which serves to build up the resistance at the end of the stroke and to maintain the proper shape of the cup or seal. At this stage of the cycle link 34 is in its upper position and therefore above abutment 36 of lever 30. Arm 53 of lever 12 is at the extremity of its stroke towards the right so that the blade 51 is pulling away from the column of discs 49 so that the latter are permitted to fall down a distance equal to the thickness of one disc.

During the downward stroke of plunger 8, connecting rod 60 is pushed upwardly to rotate lever 57 in a counterclockwise direction as seen in Fig. 1. Thereby the cups in hopper housing 55 are agitated and some of the cups fall in front of the pickup edge 61.

As drive shaft 17 and with it eccentric 15 revolve continuously, spring 54 urges the retractile movement of lever 12 towards its original position as shown in Fig. 1. Immediately upon the downward movement of roller 14 and link 34, the latter, pressing against abutment 36, actuates lever 30 to engage pin 27 to force it upwardly in order to lift up the finished seal. At the same time while this finished seal is lifted up a new disc 49 is pushed onto ejector pin 23 and under the finished seal. Before the new disc 49 comes in contact with lift pin 27, link 34 due to the cam action on pin 33 is pushed out of engagement with lever 30 whereby the lift pin 27 by virtue of its spring 28 returns to its original position as shown in Fig. 1. However, before this releasing operation takes place the actuation of lever 30 by means of link 34 causes link 42 to disengage from trip lever 37 due to the projection 47 extending from lever 30 which forces link 42 downwardly. As soon as link 42 is disengaged from lever 37 spring 45 returns the stop lever 43 to return to its original or "off" positon as shown in Fig. 1. During the upward movement of punch 8 the operator removes the finished seal from the machine.

In the hopper the feed lever 57 is returned towards the original position as shown in Fig. 1 by means of the connecting rod 60. The cups or capsules which have been lying in front of the pickup edge 61 are pushed upwardly along the surface until they are in a position similar to that shown in Fig. 6 or 7. It is possible that a plurality of cups are in front of the pickup edge 61, but the excess is urged to fall downward due to the peculiar shape of the upper edge of hopper housing 55. As blade 56 reaches the upper position, cups that are in a position similar to that shown in Fig. 6 roll towards exit 62 to enter the track or railway. Cups which are in a position similar to that shown in Fig. 7 lose their balance due to the eccentricity of the center of gravity and fall down as indicated by arrow 78. After passing through exit 62 the cup 7 rolls downward on guide 69 in a direction indicated by arrow 79. As soon as slots 64 register with track 68 the cup falls against guide 71 and spacer 70 and slides downward without revolving until it joins the column of cups held in line by the guided track.

As soon as plunger 8 nears its upper position it uncovers opening 76 leading to bore 9 and permits the lower-most cup on the track to enter bore 9, urged by the head, or weight, of the column of cups. At the same time the eccentric 15 and clutch gear 16 reach a position as indicated in Fig. 1 and the rearward extremity of pawl 18 comes in contact with stop lever 43 to be thrown out of engagement with clutch gear 16. The arrangement of a leaf spring between stop pin 22 and pawl 18 affords a smoother stopping action and eliminates any noise which otherwise accompanies such an operation. As the pawl is thrown out of engagement the eccentric is automatically stopped in a fixed position as shown in Fig. 1 though the drive shaft 17 continues to revolve. The mechanism is now in its "off" position as shown on the drawings and is ready for the next sealing cycle.

It may be observed that even though the operator would not release his grip on the trip lever 37, the mechanism is disengaged from the drive shaft after the cycle is completed due to the action of the arm 47 and link 42 which has been described hereinbefore.

The present invention is particularly adapted for use in conjunction with seals disclosed and described in my co-pending application Serial No. 430,057 filed February 9, 1942, pertaining to a cup or capsule of cylindrical shape having diametrically opposed slots, and disc adapted to fit into said cup. However, it is apparent that the method of selecting and rejecting the cups in the hopper mechanism can be applied to other types of capsules or sealing cups with, or without slots. I wish to make it understood that by the term string I wish to designate any type of medium such as a cord, thread, wire, or the like of any material and I am using the term "string" only for the purpose of simplicity, and as an example.

It is apparent that the invention can be carried out in ways different from that shown, without departing from the principle of the invention. Therefore, I do not wish to be limited to the embodiment shown either in the construction or in the scope of the invention, except by the terms of the appended claims.

I claim:

1. An automatic machine for affixing the cup and disc of a seal to a string placed in said machine, said cup having diametrically opposed slots in its rim to accommodate said string, comprising a crimping die and a cooperating punch adapted to crimp the rim of said cup over said disc, means for reciprocating said punch, means for feeding said disc to a position on said crimping die, a hopper adapted to contain a supply of cups, a feed member arranged in said hopper having an inclined pick-up edge to raise cups to a position from where they may roll towards said affixing die, means for operating said feed member, an inclined railway leading from said hopper to said affixing die to direct cups raised by said pick-up edge into said affixing die, said hopper being positioned at a higher level than said affixing die, said railway comprising rails to guide said cups, and having an inclined portion which is also inclined laterally to urge said cups rolling downwardly into a laterally oblique position to fall into engagement with one of said rails when said slots are lined up therewith during the rolling motion, whereby said cups slide to said affixing die by force of their own weight in the desired position.

2. An automatic sealing machine for affixing the cup and disc of a seal to a string or the like, said cup having diametrically opposed slots to accommodate said string, and said disc fitting inside of said cup, comprising a frame, a stationary die having an annular groove for crimping

the rim of said cup over said disc with said string interposed, a yielding member co-axial with and slidable in said die to press said disc firmly against said cup while the rim of said cup is crimped over, an ejector pin slidably arranged in the center of said yielding member to lift up the finished seal when secured to said string to facilitate the feeding of another disc to said die, a punch cooperating with said die to force said cup into said die to crimp over the rim of said cup, a lever fulcrumed to said frame and engaging said punch to reciprocate the latter, a revolving drive shaft carried by said frame, an eccentric carried by said drive shaft to revolve therewith and to engage said lever to oscillate it, a magazine secured to said frame and containing a supply of discs arranged one above the other in an orderly fashion to form a column, said magazine being arranged opposite said die and having an opening at the lower part thereof, a feed member engaging the lowermost disc to push it through said opening onto said yielding member in said die, means operated by said eccentric to actuate said feed member, a railway secured to said frame and extending upwardly to support a supply of cups lined up thereon in an orderly fashion to be guided by same, the lower end of said railway leading near a point intermediate said punch and said die, a stop to arrest the lowermost cup to remain in the path of travel of said punch to be picked up by the latter before entering said die, a hopper adapted to contain a supply of cups, said hopper being arranged at the upper extremity of said railway, and means for feeding cups from said hopper onto said railway.

3. The construction as claimed in claim 2 where the lower portion of said railway is in a horizontal position whereby one cup at a time is pushed into the path of said punch due to the weight of said supply of cups positioned on said railway which is extending upwardly.

4. The construction as claimed in claim 2, a clutch intermediate said drive shaft and said eccentric, and manually operated means to engage said clutch.

5. The construction as claimed in claim 2, a clutch intermediate said drive shaft and said eccentric, manually operated means to engage said clutch, and automatic throwout means to disengage said clutch after one revolution of said eccentric at the end of a sealing cycle.

6. The construction as claimed in claim 2 where said lever has a transversely disposed arm operatively engaging said feed member and arranged to move the latter in a disc feeding direction relative to the retractile movement of said punch.

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