May 19, 1925.

1,538,612

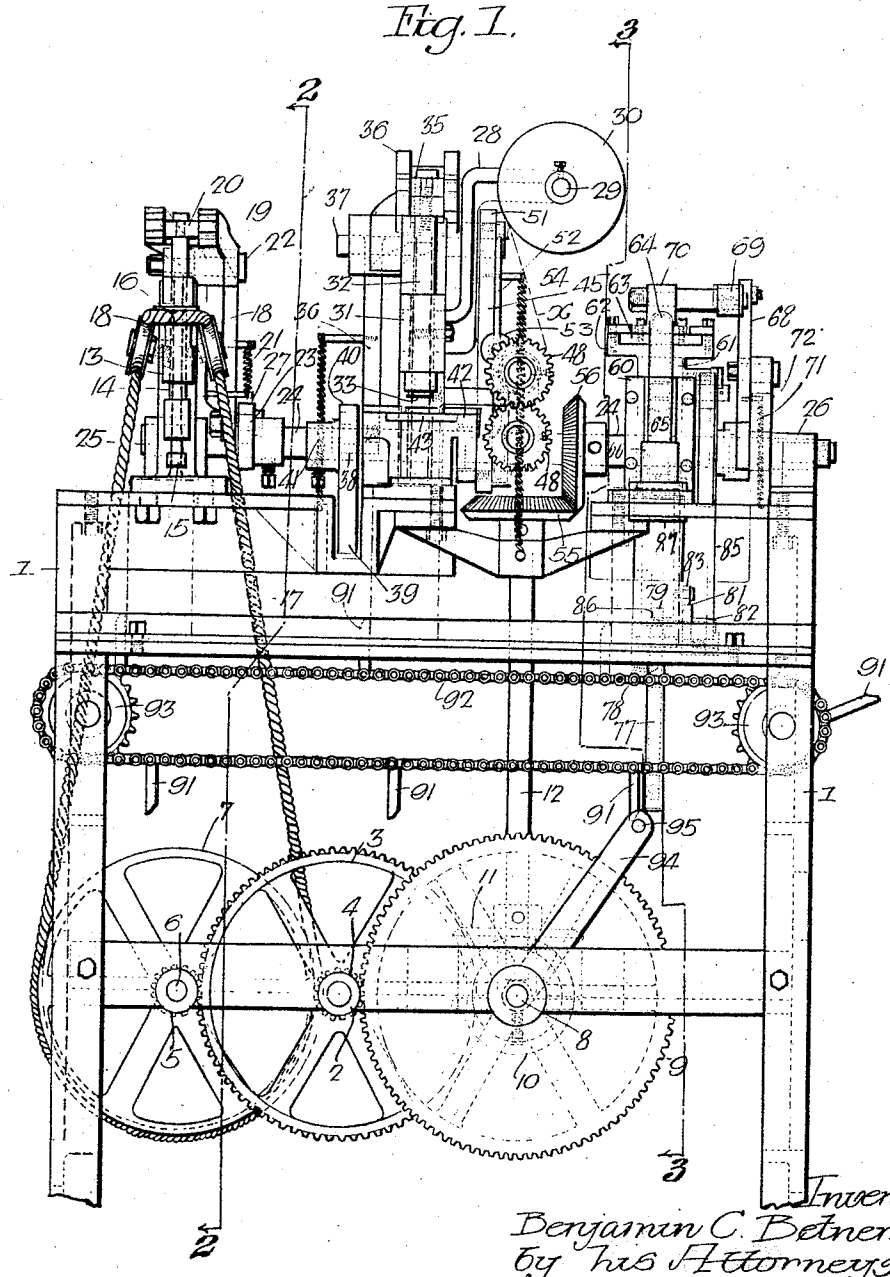
B. C. BETNER

CAPPING MACHINE

Filed Dec. 23, 1920

3 Sheets-Sheet 1

Fig. 1.



Inventor
Benjamin C. Betner
by his Attorneys
Howson & Howson

May 19, 1925.

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3 Sheets-Sheet 2

Fig. 2

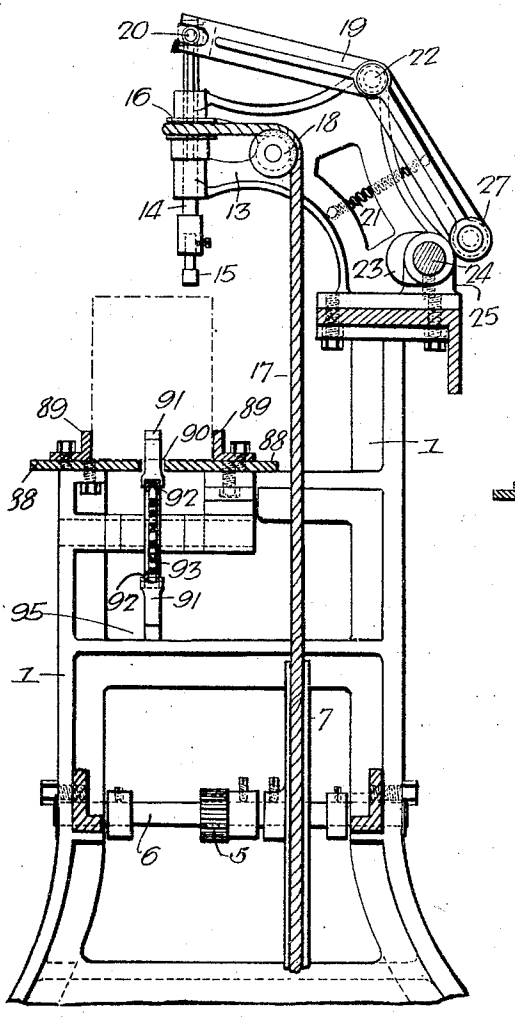
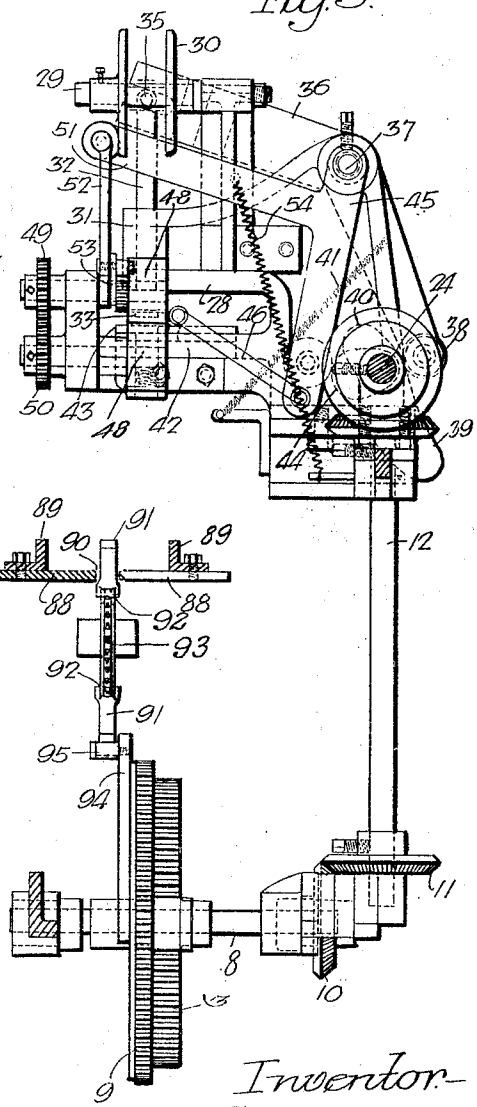


Fig. 3.



Inventor.

Benjamin C. Betner

by his Attorneys.

Howson & Howson

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Fig.8.

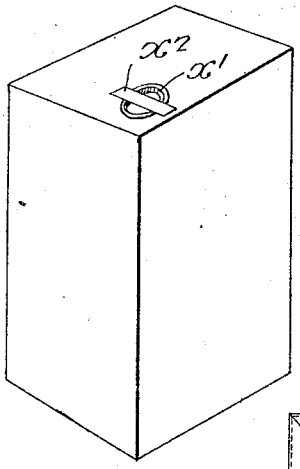


Fig.9

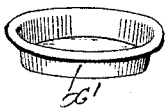


Fig.6.

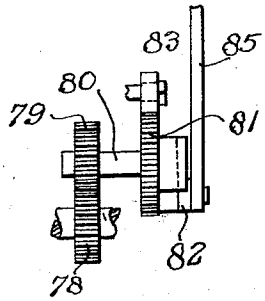


Fig.5

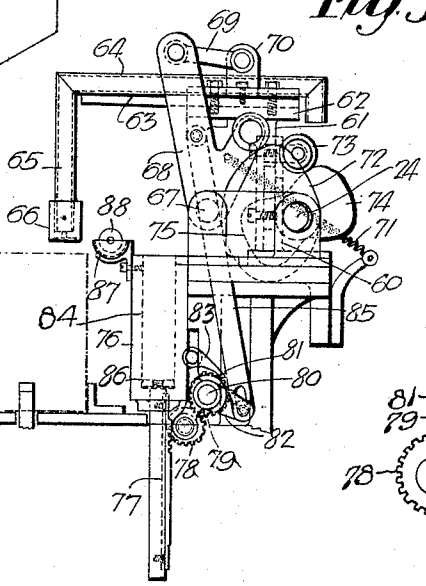
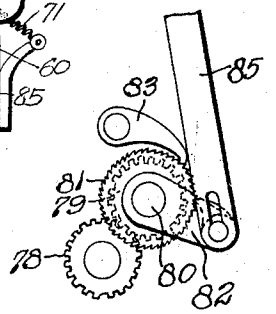


Fig.7.



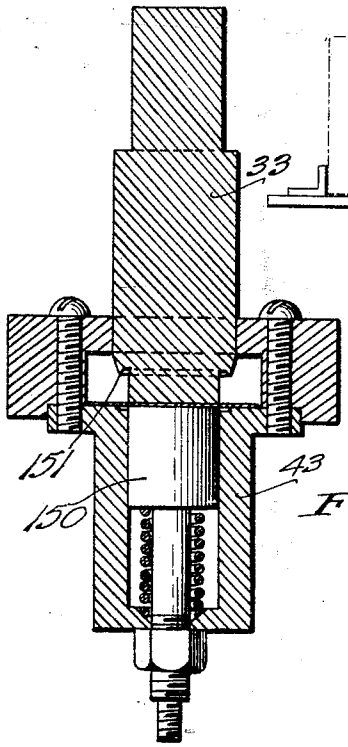


Fig.4.

Inventor—
Benjamin C. Betner
by his Attorneys.—
Howson & Howson

Patented May 19, 1925. 1,538,612

UNITED STATES PATENT OFFICE.

BENJAMIN C. BETNER, OF MERION, PENNSYLVANIA.

CAPPING MACHINE.

Application filed December 23, 1920. Serial No. 432,735.

To all whom it may concern:

Be it known that I, BENJAMIN C. BETNER, a citizen of the United States, residing in Merion, Pennsylvania, have invented a Capping Machine, of which the following is a specification.

Hitherto the use of friction closures in knock down, "flap" or folded paste board or fibre cartons has not been practical, since so far as I am aware, if such a closure should be inserted before the carton was filled, it would interfere with its subsequent mechanical handling by obstructing or interfering with the various devices for lining, packing and sealing it.

One object of my invention therefore is to provide a machine for forming a hole and inserting a closure of suitable material in a knock down carton after this has been opened, lined, packed, wrapped, covered and sealed or otherwise finished for the market; said invention further contemplating the final application of a seal to the closure.

A further object of my invention is to provide a relatively simple, substantial machine for drilling a hole in a previously formed can, carton, box or other package of square, round or other shape made from card board, fibre, celluloid, tin, or other material, either before or after such package is filled and thereafter inserting a friction closure in the hole so formed; my invention including a novel assembly of parts whereby the carton is automatically moved at predetermined times in order to permit of the above operations.

The invention further contemplates novel means for applying a sealing strip over a friction closure in a packed carton or equivalent container, together with novel means for transferring a succession of seals from a source of the same, applying adhesive thereto, and thereafter placing the seals on properly presented cartons.

The invention is also designed to provide novel mechanism for forming a succession of friction closures in combination with a device for successively placing said closures or other properly supplied closures in the previously formed holes of a succession of cartons or containers properly presented at predetermined times; and the invention also contemplates novel means for inserting any desired forms of friction closures in previously formed holes in packages of any kind.

These objects and other advantageous ends I attain as hereinafter set forth, reference being had to the accompanying drawings, in which,

Fig. 1 is a front elevation of a machine constructed in accordance with my invention;

Fig. 2 is a vertical sectional view on the line 2—2 of Fig. 1, illustrating the detailed construction of the hole-forming or drilling mechanism;

Fig. 3 is a vertical sectional view on the line 3—3 of Fig. 1, illustrating the detail construction of the closure-forming and applying mechanism;

Fig. 4 is a vertical sectional view on an enlarged scale illustrating one form of punch and die which may be used as a part of my machine;

Fig. 5 is a fragmentary elevation of the second end of the machine, illustrating the detail construction of the seal-applying mechanism;

Figs. 6 and 7 are enlarged front and side views respectively of the mechanism adapted to accomplish a uniform feed of sealing strip blanks;

Fig. 8 is a perspective view of a carton showing a closure and seal as applied thereto by my machine; and

Fig. 9 is a perspective view of the form of friction closure preferably employed.

In the above drawings, 1 represents a suitable frame, in the lower portion of which is journalled a shaft 2 driven from any suitable source of power such as an electric motor. This shaft has fixed to it a gear wheel 3 and a pinion 4 and of these the former meshes with a pinion 5 fixed to a shaft 6 which also has fixed to it a belt, wheel or pulley 7. The lower part of the frame 1 likewise supports a third shaft 8 having fixed to it a gear wheel 9 meshing with the pinion 4 and has fixed to it a bevelled gear 10, which through a second bevelled gear 11, drives a vertically extending shaft 12.

In accordance with my invention I mount on the upper part of the frame 1 a device for cutting a hole in the top or upper face of a properly presented carton, a second device for applying a removable friction closure to the hole so formed, and a third device for placing a seal over such a closure. The first of the above devices includes a standard 13 mounted on the rear of the ma-

chine and having a forwardly extending portion providing bearings for a vertically extending, longitudinally slidable and rotatable spindle 14 which at its lower end carries a suitable cutter 15 for forming a circular hole in the top face of a properly supported carton. Said spindle is provided also with a pulley 16 driven from the wheel 7 through a belt or band 17 guided by a pair of idler pulleys 18 on the bracket 13. The latter provides also a fulcrum or pivotal support for a lever 19, one of whose ends is forked or slotted for the reception of a pin 20 transversely mounted in the upper end of the spindle 14, which is free to rotate independently of said pin and capable of being moved vertically by the lever 19.

A spring 21 extending between a portion of the bracket 13 and one arm of the lever 19, normally maintains the spindle 14 in and tends to return it to its uppermost position in its bearings. This lever 19 is periodically swung on its pivot or fulcrum 22 to cause a longitudinal movement of the spindle 14, by a cam 23 fixed to a shaft 24 mounted in bearings 25 and 26 and driven from the vertically extending shaft 12 through a pair of coacting bevel gears 55 and 56. Said shaft extends across the rear upper part of the frame and the arrangement is such that as it is turned, its cam 23 acts on a roller 27 carried by one arm of the lever 19 and periodically causes a downward movement of the spindle 14 with its cutter 15;—the spring 21 restoring said spindle to its normal elevated position as soon as the roller 27 has been disengaged from the cam 23.

The mechanism for forming and applying closures includes a second bracket 28 also projecting up and inwardly from the rear of the machine at substantially the middle part thereof and supports a fixed horizontally extending spindle 29 for the reception of a reel or roll 30 carrying a strip of paste board indicated at x from which closures are to be made. At one side of this reel is a vertical guideway 31 for a plunger 32 which at its lower end carries a punch 33 adapted to cut from the strip x a disc of paste board. The upper end of said plunger is provided with a transversely extending pin 35 operative in slots in the forked end of one arm of a lever 36 fulcrumed to the bracket 28 by a pivot pin 37. A second arm of this lever carries a roller 38 actuated by a double cam 39—40 which is held in engagement by a suitably mounted spring 41 acting between a portion of the frame of the machine and said lever.

The bracket structure 28 also provides a guideway 42 for a slide 43 carrying a die designed to coact with the punch 33 to form closures such as that indicated at x^1 in Fig. 9, which include a flat circular base having an upwardly extending flange whose edge is turned outwardly. This die structure however is slidable on the guideway 42 under the action of a cam 44 on the shaft 24 through a lever 45, also fulcrumed on the pin 37 and connected to said die structure by a link 46.

The arrangement of parts is such that at one time the die structure 43 is in line with the plunger so that when lowered under the action of the part 40 of its cam, it coacts therewith to cut out and form a closure x^1 from a strip of material delivered to it from the reel 30. After making the downward stroke to form such a closure, the die structure 43 is drawn back, whereupon the cam portion 39 so acts upon the lever 36 as to cause the plunger 32 with its die to make a relatively longer downward stroke below said die structure for a purpose hereafter noted.

For feeding the strip material from the reel 30 I provide a pair of nip rolls 48—48 mounted on short spindles carried in suitable bearings in the bracket 28 and operatively connected by a pair of gear wheels 49—50. The lever 45 is provided with an arm 51 which through a link 52 is connected to an arm 53 on the spindle of the upper nip roll so that each time said lever is actuated this arm through suitable pawl and ratchet mechanism, causes a partial revolution of said roll spindle and a subsequent feeding of the strip material x through the nip rolls and between the punch 33 and die 43. The construction and arrangement of these two latter parts is such that each closure cut out from the strip material and formed in the die 43 is thereafter retained on the lower end of the punch so that after the retraction of the die by the link 46, it is carried down with the plunger and placed in the opening of a package as hereafter explained. A spring 54 acts between the bracket 28 and the arm 51 of the lever 45 to hold the roller of the latter against its cam 44.

The seal applying device in the present instance is mounted on the right hand end of the frame 1 and includes a vertically extending guideway 60 for a vertically movable bar 61 carrying on its upper end a head 62 whose top portion is provided with a horizontal guideway for a slide 63. Said slide in turn carries a horizontal tubular arm 64 connected at its rear end with any suitable valve-controlled air exhausting or suction device and at its forward end provided with a downward extension 65 terminating in a nozzle 66 whose under face is perforated so that under operating conditions when the valve is open, the suction in said member 64—65 will hold to it a paper sealing strip such as is indicated at x^2 in Fig. 8.

The head 62 and its supporting bar 61 are so mounted that the slide 63 and the tubular arm or conduit 64 are movable both vertically and horizontally in a vertical plane at right angles to the line of the shaft 24. For the purpose of causing the latter of these movements I pivot to the frame of the machine at 67 a bell crank lever 68 having one of its arms connected through a link 69 with a projection 70 on the slide 63 and its other arm held by a spring 71 in engagement with the edge of a cam 72 mounted on the shaft 24, so that as the latter turns said slide and with it the conduit 64—65 are reciprocated in the guide of the head 62.

For giving the bar 61 with its associated parts a vertical movement, I mount on it a roller 73 in position to be acted on by a double cam 74—75 which raises and lowers it twice in each revolution of the shaft 24. This double cam 74—75 is so constructed that the cam 75 is longer than the cam 74, so that on the rearward stroke of the slide 63 and its associated parts, the same moves in a higher plane than on its forward stroke. In or immediately adjacent the vertical plane of movement of the suction head 66, I provide a holder 76 for the sealing strips x^2 which has the form of a vertically extending hollow structure or tubular container of suitable cross section to receive a column or pile of paper seals. Vertically slidable within said holder is a plate or head 86 connected to a toothed feed rack 77 extending through its bottom, and engaged by a gear wheel 78 coacting with a second gear wheel 79 mounted on a short spindle 80 which also carries a ratchet wheel 81 and an arm 82. Said arm is loose on said spindle and is provided with a pawl engaging the teeth of the ratchet 81 which is prevented from rotation in a clockwise direction by a hooked pawl 83 pivotally mounted on the holder 76.

The arm 82 is operatively connected through a link 85 with the lever 68 so that as the latter is oscillated on its pivot or fulcrum 67, the ratchet wheel 81 is intermittently moved and through the gear wheels 79 and 78 intermittently raises the follower or head 86 on the feed bar 77 by an amount substantially equal to the thickness of one of the seals contained within the hollow structure 84. In the forward top edge of this seal-containing structure 76 is mounted a container or reservoir 87 for adhesive in which is rotatably mounted an adhesive applying roller 88 so placed as to lie within or be moved into the path of movement of the seal carrying nozzle 66.

For supporting and successively presenting each of a series of packages to each of the above devices, I provide a table or guideway 88 extending from one side to the other of the front of the frame structure 1—1 and on this mount front and rear guides 89 so that the packages are compelled to move in a predetermined and preferably straight path. Said table is formed with a longitudinally extending slot 90 through which moves a series of package-engaging fingers 91 projecting from a propelling chain or band 92 carried upon suitable sprockets or supporting wheels 93—93 mounted at opposite sides of the machine.

For the purpose of intermittently actuating the conveying device comprised by the chain and its fingers, I mount on the shaft 8 a radially projecting arm 94 having on its outer end a pin 95 which as said shaft is turned, is brought into engagement with one of the fingers 91 and after moving it through a definite distance, disengages it. This distance in the present instance is equal to the distance between the line of movement of the spindle 14 and that of the plunger 32 and is also equal to the distance between the line of movement of said plunger and the plane of movement of the nozzle 66.

With the above described arrangement of parts a series of filled, wrapped, covered and sealed packages, cartons or other containers are delivered to the table 88 and if it be assumed that power from a suitable source be applied to the shaft 2 for example, each of said packages is successively engaged by one of the fingers 91 and moved on the table to a position immediately under the spindle 14 where it temporarily comes to rest. This spindle is rotated at a high rate of speed from the wheel 7 through the belt 17 and after the delivery of the package to the above noted position, said spindle with its drill or cutter 15 is moved downwardly by the action of the cam 23 and the lever 19. The drill thereupon makes a circular hole in the top or upper face of the package, through the wrapping or covering as well as through the body thereof, and any suitable means forming no part of the present invention and not shown, may be provided for removing the cut out disc as well as the dust produced by the cutter.

The spindle 14 with the cutter is thereupon returned to its elevated position after which the pin 95 of the arm 94 engages another one of the fingers 91 of the conveyor chain 92, thus causing the package which has just been drilled to be moved from its first position under the spindle 14 to a second position immediately under the plunger 32. Prior to this operation however the cam 40 on the cam shaft 24 acts on the lever 36 immediately after the cam 44 has acted on the lever 51, so that a predetermined length of strip material is fed from the reel 30 between the punch carried by the plunger 32 and the die carried by the slide 43 whereupon said punch is caused to cut from the strip a disc of paste board

which is immediately thereafter formed by coaction with the die into a friction closure, having the form illustrated in Fig. 9.

The paste board or other material from which these closures are to be made is fed in the form of a continuous strip over the face of the die 43 and is intermittently engaged by the punch 33, which forces it against the upper face of a spring supported plunger 150, and forces the engaged portion with the plunger down into the die. Said punch includes a sharp annular edge 151 which at the bottom of its stroke coacts with the suitably formed top face of the die 43 to cut out from the strip the cap which has been formed on the end of that part of the punch which fits into the die. This finished closure so closely fits the end of the punch as to remain thereon when the punch is withdrawn from the die and raised clear of the same, being transferred thereby to the box into whose opening it is to be inserted. The finished closure is stripped or delivered from the punch by reason of its frictional engagement with the sides of the holes into which it is introduced.

The subsequent raising of the plunger 32 is followed by a rearward movement of the slide 43 with the die so that shortly after the drilled package comes to rest under said plunger this latter with the formed closure on its lower end is moved down by the action of the cam 39 on the lever 36 and forcibly inserts said closure in the previously drilled opening in said package. Thereafter the plunger 32 is raised and the pin 95 again engages the finger 91 of the conveyor chain causing the package in which the closure has just been inserted to be moved to a third position in front of the seal applying mechanism. At the same time a second package, which has just been acted on by the drill or cutter while in the first position, is moved to its second position under the closure forming and applying device or mechanism and a third package is also moved into the first position where it will be acted on by the drill.

Before the first package has been brought to rest in its third position as above noted, the slide 63 is moved to the rear and the bar 61 is lowered so that the nozzle 66 is brought immediately above the top of the seal container 76. Suction is admitted through conduit 64 and a seal in the shape of a rectangular or other suitably formed body of sheet material such as paper, metallic foil or the like is thereupon drawn or sucked from the top of the column of seals in the container and held by atmospheric pressure against the bottom face of said nozzle which is then raised by the action of the cam 74 on the roller 73. At the same time or shortly thereafter the slide 63 with the conduit 64 and nozzle 66 is moved forwardly so that the under side of the seal carried thereby is moved across or in contact with, the upper face of the roller 88 so that it receives a coating of adhesive after which the nozzle is lowered sufficiently far to press the seal upon the package in such position that it extends across the previously inserted closure. The suction in conduit 64 is then cut off thus releasing the seal, and after the adhesive has dried, the seal holds the closure in position, being formed and positioned if desired to serve as an air and moisture proof cover or enclosure therefor.

The bar 61 with the slide 63, conduit 64 and nozzle are then raised by the cam 75 and the slide is moved rearwardly at such a height that the nozzle does not engage the roller 88, after which said bar is lowered to permit of a second seal being picked up by the nozzle. The conveyor chain is then again actuated by the pin 95 of the arm 94 and the completed package with the closure and seal arranged as shown in Fig. 5, is moved off of the table, while three other packages are simultaneously moved into positions to be operated on by the drilling, closure-applying and sealing devices as described.

Obviously without departing from my invention the closure applying device or mechanism may be of such a nature as to insert in the previously drilled holes of the packages, previously formed closures taken from a container or holder of any desired or suitable construction, since while in one form of my invention I prefer to form and immediately thereafter insert each of the closures, this feature of the invention may be omitted if desired.

Obviously the closures may be made of any suitable material such as sheet metal or paste board and if desired the packages may be delivered from the machine after the closures have been inserted without having seals applied.

From the above description it will be noted that I have provided a machine which operates on packages after these have been filled, wrapped, sealed or otherwise prepared for market as finished articles, and which automatically drills or cuts a hole through the wrapping as well as through the body or main portion of the package and thereafter inserts a tightly fitting friction closure in such opening or hole.

Moreover the arrangement of parts is such that the above described operations, either with or without the seal-applying mechanism, may be performed at high speed and with little likelihood of any of its parts getting out of order or requiring any but a minimum of attention.

I claim:

1. The combination in a machine of the character described, of mechanism for

forming a hole in a filled package, mechanism for inserting a friction closure in such hole, and means for intermittently presenting a series of filled packages successively in timed relation to the said hole-forming and closure inserting mechanisms.

2. The combination in a machine of the character described of a device for forming a hole in a filled package; a second device operative in timed relation with said hole-forming device for inserting a friction closure in said hole; and an intermittently acting conveyor for presenting a series of packages successively in timed relation to said two devices.

3. The combination in a machine of the character described, of a device for forming a hole in a filled package, mechanism for forming a closure and thereafter inserting it into said hole, and means for intermittently presenting a series of filled packages successively in timed relation to said hole-forming and closure forming and inserting mechanisms.

4. The combination in a machine of the character described of a device for forming a hole in a filled package; a second device operative in timed relation with said first device for inserting a friction closure in such hole; mechanism for applying a seal to the inserted closure; with an intermittently acting conveyor for presenting a series of filled packages successively to said devices and seal applying mechanism.

5. The combination in a machine of the character described, of mechanism for forming a hole in a filled package, mechanism for forming a closure and thereafter inserting it into the said hole, mechanism for applying a seal to the inserted closure, and means for intermittently presenting a series of filled packages successively in timed relation to the said hole forming, closure forming and applying, and seal applying mechanisms.

6. The combination in a machine of the character described of a device for forming a hole in a filled package; a device operative in timed relation with the first device for forming a friction closure and thereafter forcibly inserting it in the hole of said package; with a conveying device for presenting a series of filled packages successively in timed relation to said devices.

7. The combination of a supporting structure including a package-supporting table; a vertically acting drill on said structure positioned to form a hole in a filled package on said table; a closure-applying machine operative in timed relation with said drill also mounted on said structure and including a plunger positioned to insert a closure in the previously formed hole in a filled package; with a conveyor for intermittently presenting a series of filled packages successively to said drilling and closure-applying machines.

8. The combination of a drilling machine; a closure-applying machine operative in timed relation with said drilling machine; a guideway for filled packages; an endless member having package-engaging projections; and means for intermittently moving said member to cause a series of filled packages to be successively presented to said drilling and closure-applying devices.

9. The combination of a drilling device; a closure-applying device operative in timed relation with said drilling device; a guiding structure for filled packages; an endless member having projections extending into said guideway; a rotatable element positioned to intermittently engage said projections to intermittently actuate said endless element and cause its projections to move filled packages successively under the drilling and closure applying devices.

BENJAMIN C. BETNER.