Feb. 17. 1925. 1,527,030

R. D. DELAMERE ET AL

CARTON FILLING MACHINE

Filed Dec. 5, 1921 4 Sheets-Sheet 1

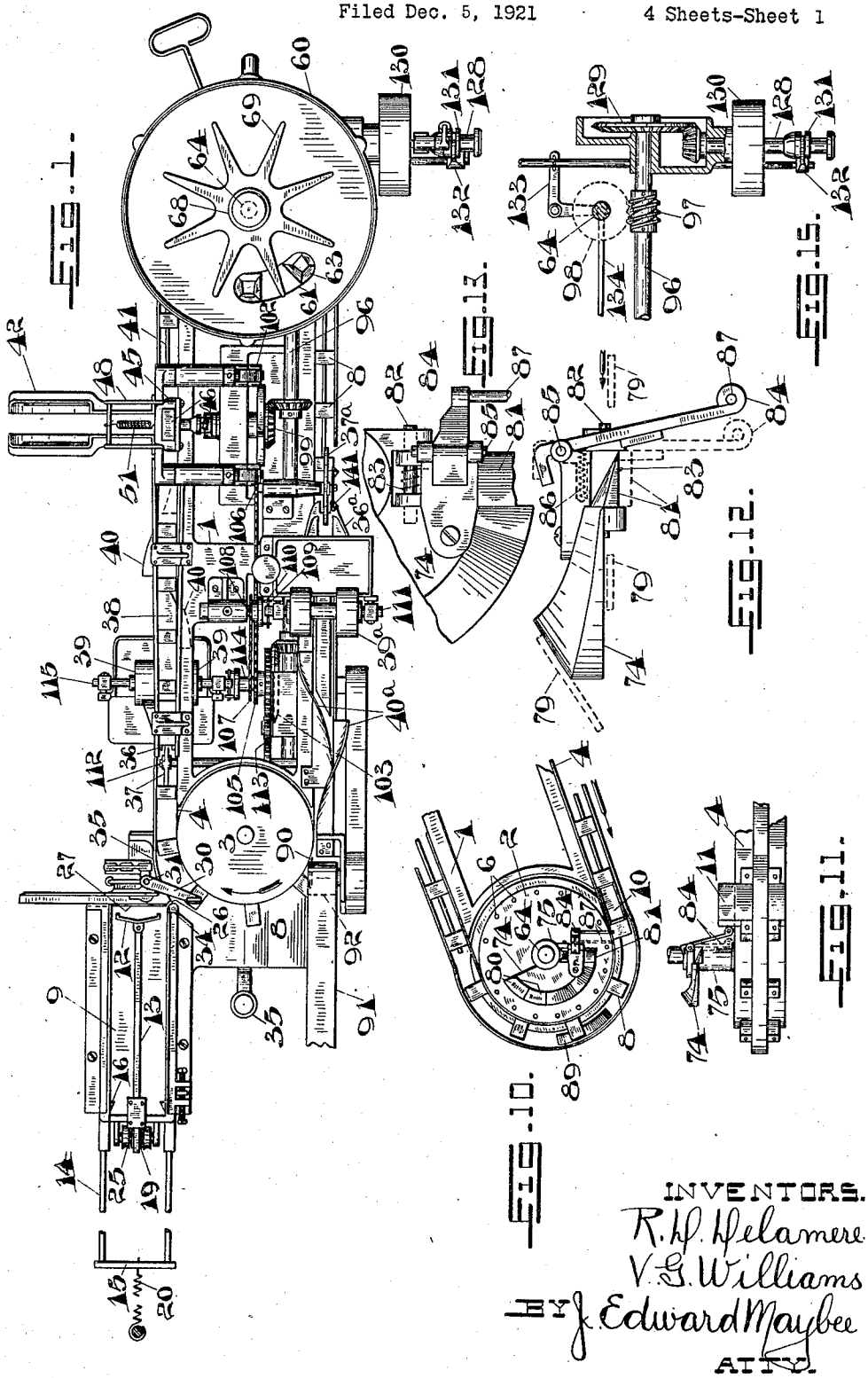


Fig. 1.

Fig. 13.

Fig. 15.

Fig. 12.

Fig. 11.

Fig. 10.

INVENTORS.
R. D. Delamere
V. G. Williams
By J. Edward Maybee
ATTY.

Feb. 17, 1925. 1,527,030

R. D. DELAMERE ET AL

CARTON FILLING MACHINE

Filed Dec. 5, 1921 4 Sheets-Sheet 2

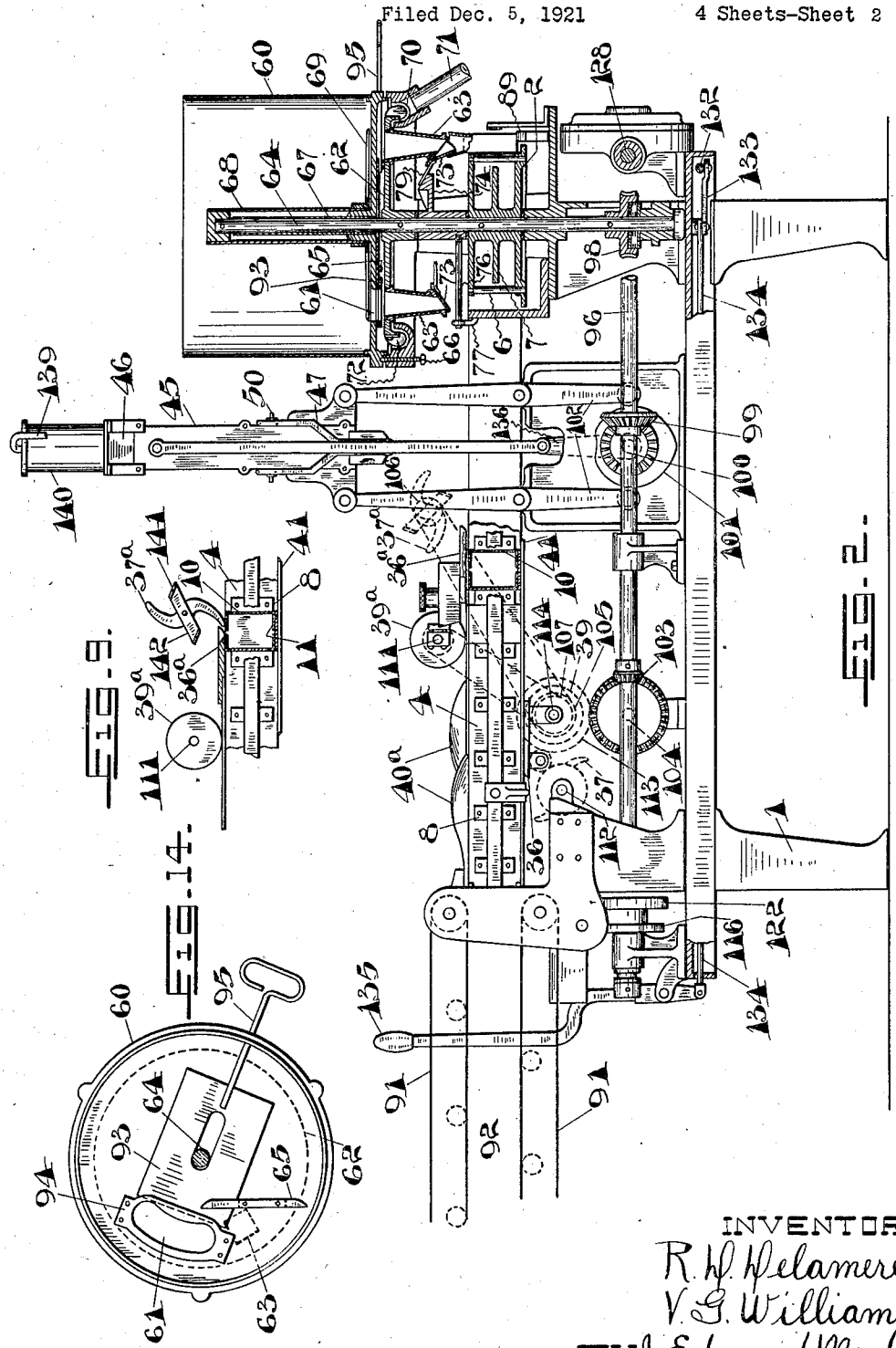


Fig. 2.

Fig. 9.

Fig. 14.

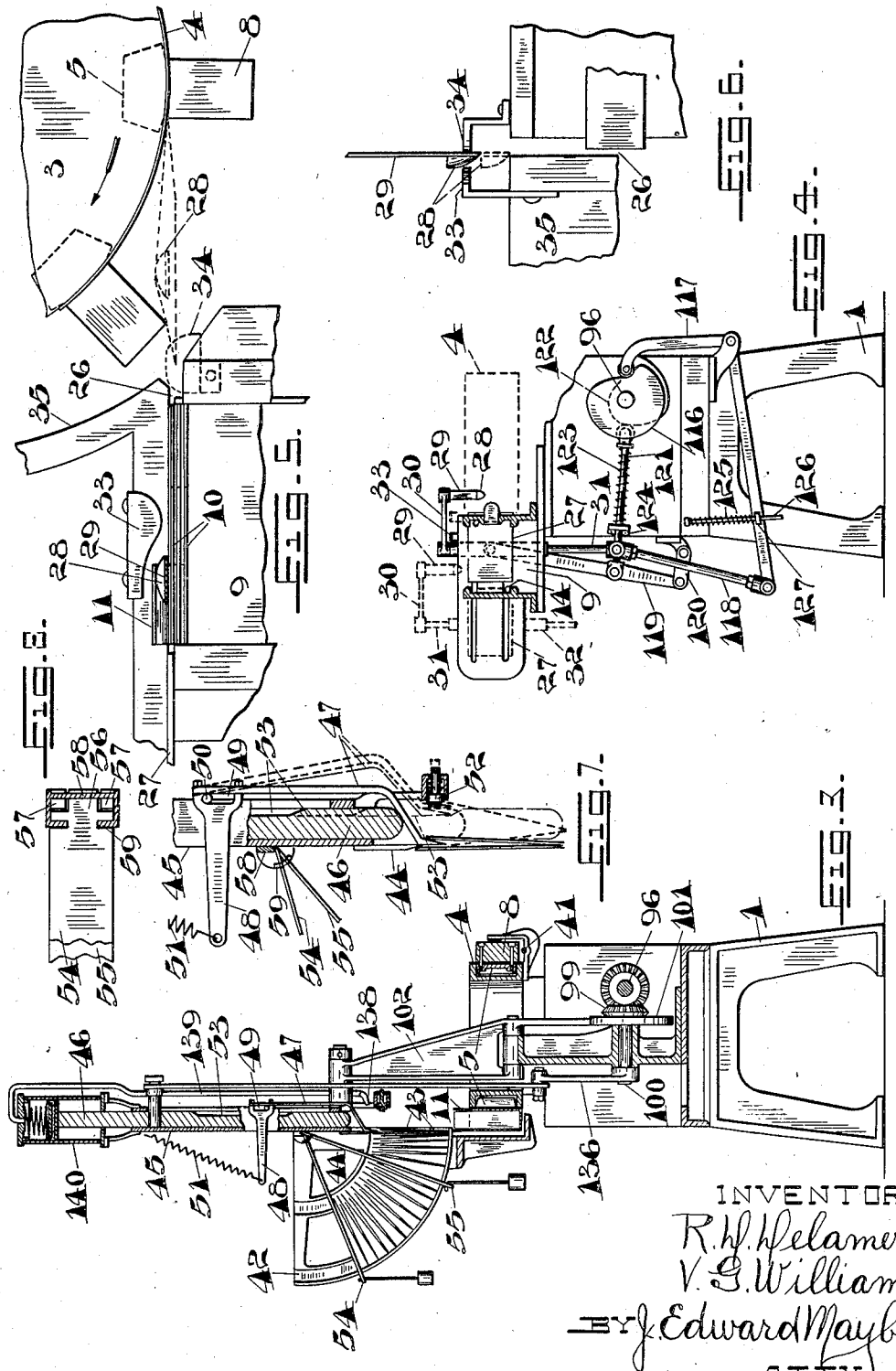
INVENTORS
R. D. Delamere.
V. G. Williams.
BY J. Edward Maybee
ATTY.

Feb. 17, 1925. 1,527,030

R. D. DELAMERE ET AL.

CARTON FILLING MACHINE

Filed Dec. 5, 1921 4 Sheets-Sheet 3



INVENTORS.
R. D. Delamere.
V. G. Williams.
BY J. Edward Maybee.
ATTY

Feb. 17, 1925.

1,527,030

R. D. DELAMERE ET AL

CARTON FILLING MACHINE

Filed Dec. 5, 1921

4 Sheets-Sheet 4

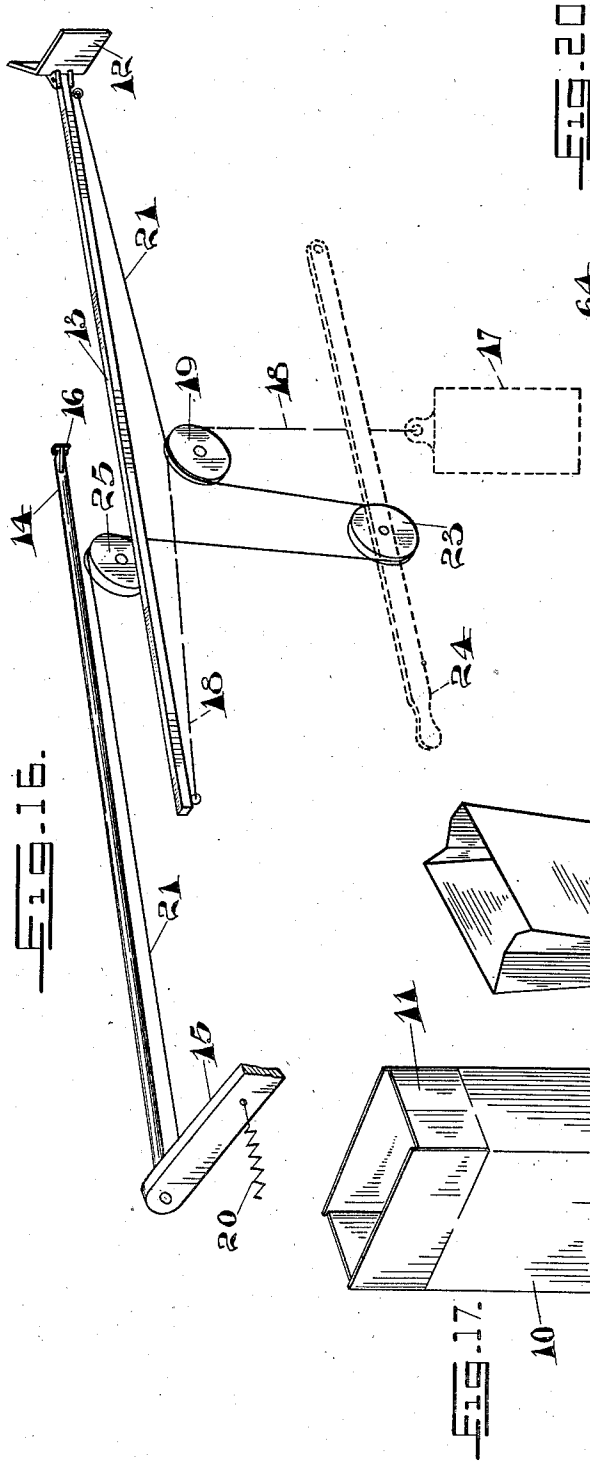


FIG. 16.

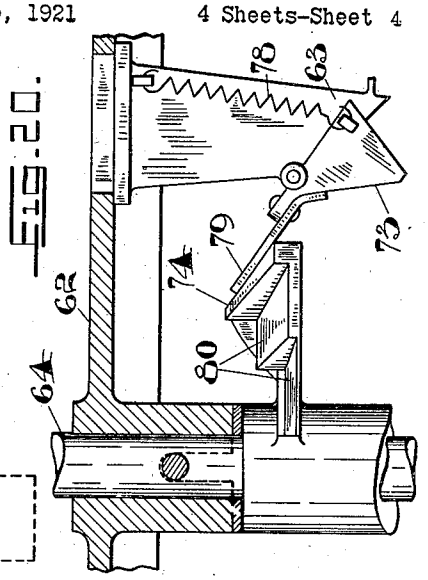


FIG. 20.

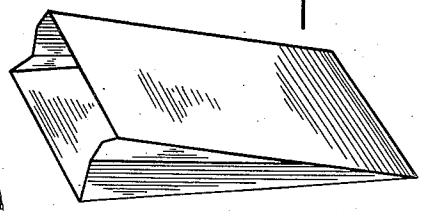


FIG. 18.

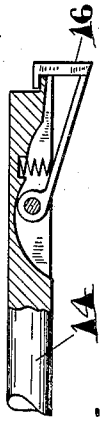


FIG. 19.

FIG. 17.

INVENTORS
R. D. Delamere.
V. G. Williams.
BY J. Edward Maybee.
ATTY.

Patented Feb. 17, 1925. 1,527,030

UNITED STATES PATENT OFFICE.

RUDOLF D. DELAMERE AND VICTOR G. WILLIAMS, OF TORONTO, ONTARIO, CANADA.

CARTON-FILLING MACHINE.

Application filed December 5, 1921. Serial No. 520,128.

To all whom it may concern:

Be it known that we, RUDOLF D. DELAMERE and VICTOR G. WILLIAMS, of the city of Toronto, in the county of York, Province of Ontario, Canada, both subjects of the King of Great Britain, have invented certain new and useful Improvements in Carton-Filling Machines, of which the following is a specification.

This invention relates to machines for filling cartons, and our object is to devise a machine which will feed cartons in a flattened condition, open them and position them on a suitable conveyor, fold in the lower end flaps and gum them, insert a bag-like liner in the carton, fill the carton with a measured quantity of a filling material, fold in and gum the upper end flaps of the carton, and discharge each filled and sealed carton at a convenient point for removal by any suitable means.

We attain our object by means of the constructions hereinafter described and illustrated in the accompanying drawings in which—

Fig. 1 is a plan view of the machine;

Fig. 2 a side elevation of the same, partly in section;

Fig. 3 a vertical section taken adjacent the bag inserting mechanism;

Fig. 4 an elevation, partly in section and partly broken away, illustrating the carton feeding and operating mechanism;

Fig. 5 a plan view on a larger scale, partly broken away and partly in section, illustrating the method of and means for opening the folded cartons and positioning them between the projections or blocks of the carrier belt;

Fig. 6 a side elevation of part of the mechanism shown in Fig. 5;

Fig. 7 a detail, partly in section and partly in side elevation; of parts of the bag-feeding mechanism;

Fig. 8 a plan view, partly in section, of part of the bag magazine;

Fig. 9 a detail in side elevation of part of the flap-closing mechanism;

Fig. 10 a plan view of part of the measuring and filling mechanism;

Fig. 11 a side elevation of the same parts;

Fig. 12 a side elevation of the mechanism for opening the measuring chambers to discharge their contents;

Fig. 13 a plan view of parts of the same;

Fig 14 a plan view of the under side of the hopper for the filling material;

Fig. 15 a detail, partly in section, of the clutch mechanism controlling the drive of the machine;

Fig. 16 a perspective detail of the feed mechanism of the carton magazine;

Fig. 17 a perspective view of the carton;

Fig. 18 a perspective view of the bag or paper liner; and

Fig. 19 a detail of the spring pressed dog of the auxiliary feeders of the carton magazine.

Fig. 20 a detail partly in side elevation and partly in section of part of the gate actuating mechanism of the measuring chambers.

In the drawings like numerals of reference indicate corresponding parts in the different figures.

1 is the frame of the machine suitably shaped to support the different parts. On this frame is supported an endless carrier belt of special construction. This belt is carried by two pulleys 2 and 3 of which 2 is the driving pulley and 3 an idler, the drive being effected as hereinafter described.

The carrier belt comprises an endless flexible sheet metal band 4 provided at its inner side with a series of spaced projections 5 adapted to fit between the driving members formed on or carried by the drive pulley 2. This pulley, it will be noted, is formed with end disks through which extend bolts or rods 6 which form the members between which the projections 5 fit. A central disk 7 is provided intermediate the end disks against which the backs of the blocks or projections 5 may lie. The pulley 3 is of similar construction with the exception that the rods 6 are not required, the pulley being merely an idler.

Secured to the outer surface of the carrier belt are a series of blocks or projections 8, the sides of which are substantially normal to the surface of the belt. These blocks may be secured to the belt by means of the same fastenings which secure the projections 5 in place. A carrier belt constructed as described, while sufficiently flexible, does not stretch and there are no joints in which wear may occur which would introduce lost motion. It also follows that while the sides of the blocks 8 are substantially parallel

and at right angles to the surface of the carrier while travelling from pulley to pulley, yet as they pass round the pulleys their sides diverge, thus facilitating certain operations as will hereinafter appear.

To this carrier belt the cartons are fed by the following mechanism. 9 is a carton magazine in which cartons are packed in a flattened condition. Each carton, it will be noted, comprises the connected sides 10 each having an end flap 11 extending therefrom at each end. The cartons are pressed towards the discharge point of the magazine by means of a pressure plate 12, which is secured to a rod 13 suitably guided in the magazine. An auxiliary feeder 14 is provided at each side of the magazine. These feeders each comprise a bar suitably guided in the sides of the magazine and connected at their outer ends by the cross bar 15. Each auxiliary feeder is provided with a normally projecting spring-pressed dog 16, (see Fig. 19) adapted to engage the back of a stack of cartons and to slide by the edges of the stack of cartons as it is retracted.

Yielding means are provided tending to force the pressure plate against the back of a stack of cartons, the preferred means being a weight 17 to which is secured a cable 18 running over a pulley or guide 19 and connected to the rod 13. A spring 20 connected to the cross bar 15 and a suitable stationary part tends to retract the auxiliary feeders 14.

A cable 21 is connected at one end to the rod 13, passes over the pulley or guide 19, round a pulley or guide 23 journalled on the lever 24 fulcrumed on the frame of the machine, thence round a pulley or guide 25, whence it extends rearwardly and is connected to the cross bar 15. Normally the pressure plate 12 feeds the stack of cartons to the discharge point, but when it is necessary to insert a fresh stock of cartons, the lever 24 is depressed. This creates a tension in the cable 21 which overcomes the tension of the weight 17 and spring 20, causing the auxiliary feeders to be brought forward to engage the edges of the cartons remaining in the magazine while the pressure plate is withdrawn to the outer end of the magazine. A fresh stack of cartons is then placed between the pressure plate and the cartons remaining in the machine. The pressure on the lever is then relieved, whereupon the pressure plate moves forward into engagement with the back of the fresh stack of cartons placed in the magazine, while the auxiliary feeders are retracted, the dogs 16 sliding by the ends of the fresh stack of cartons inserted.

The end of the magazine adjacent the pulley 3 is provided with a lateral discharge opening 26 and a reciprocating feeder 27 adapted to engage the edges of successive cartons and force them through the discharge opening. The movements of this feeder and the carrier belt will be so timed that the forward edge of the folded carton will strike the forward side of one of the blocks 8 while the latter is positioned substantially parallel to the carton magazine. Endwise pressure on the diagonally opposite edge of the carton will then tend to open the carton provided the carton is first partly open. This preliminary opening is effected by means of an opener 28, which is adapted to enter the carton at the discharge point and slightly spread its sides as the carton emerges from the discharge opening. This opener is of wedge-shaped form in vertical section and of substantially lenticular form in cross section, so that it comes to an edge both at its lower end and sides. This opener is connected to a vertical stem 29 which depends from an arm 30 connected to a rod 31 vertically movable in a lug 32 slidable with the feeder plate. The arm 30 is adapted to swing on the rod in a horizontal plane for the purpose hereinafter described and means are provided for moving the rod and the feeder plate to impart the following movements to the opener.

At the beginning of its cycle of operation, the opener and operating parts are in the position shown in dotted lines in Fig. 4, the opener 28 then lying between two end flaps of the end carton. As the feeder plate moves towards the carrier, the opener moves with it, and passes below the level of two suitably supported cams 33 and 34, the purpose of which will hereinafter appear. As soon as the carton is expelled to substantially the position shown in dotted lines in Fig. 5. the opener descends and passes between the sides of the carton, partly expanding it as shown. Its outer edge is then positioned so that as the carrier moves this outer edge is pressed against the fixed curved cam 35, the result of which is that pressure is applied to the diagonally opposite edges of the carton, which gradually expands it until its sides are in parallelism and it is positioned with opposite sides in contact with the adjacent sides of two of the blocks 8 which come into substantial parallelism as soon as they pass the pulley 3. The cartons, being thus held by opposite sides between the blocks 8, are carried so that their ends are free for the performance of the necessary subsequent operations.

As the feeder plate 27 recedes, it carries with it the opener, which, however, is elevated over the top of the carton and to such a position that it will first contact with the cam 34 and subsequently with the cam 33. The cam 34 pushes the opener slightly away from the end carton in the magazine so that it will not engage with

the forward edges of the end flaps, but will pass in front of the same. Thereafter it is pushed slightly in the reverse direction by the agency of the cam 33, and passes between the two flaps remote from the discharge opening. Thereafter it descends slightly so as to lie below the level of the cams 33—34 so that these cams are not operative as the opener moves outwardly synchronously with the feeder plate.

The carrier belt, which is continuously in motion, carries the discharged and opened cartons to the means for folding and sealing the lower end flaps.

The folding means comprises a spreader 36, which is of wedge-shaped form with rounded end, and which is adapted to pass between and spread the end flaps at the lower end of the carton and also to press inwardly the front end flap. Cooperating with this spreader is a rotary kicker 37, which knocks up the rearward end flap, thus enabling it to pass above the spreader. After passing the kicker and spreader, the folded in flaps pass over the plate 38 which holds them up until the lateral side flaps have been gummed and folded in sufficiently to retain the forward and rearward flaps in their folded in position.

Adjacent the spreader 36 are located the gumming roller 39, which will be fed from a suitable paste fount in any suitable manner and which apply gum or paste to the inner surfaces of the lateral end flaps. After passing the gumming rollers, the lateral end flaps come in contact with the curved folders 40, which engage these flaps and fold them in the one over the other as the carton travels past them. After the lateral end flaps are thus turned in, they run over a bottom guide 41 which prevents them springing out again.

The carrier belt now brings the cartons to a position in alinement with the mechanism for feeding a paper bag or liner into the carton. The bags, as will be noted on reference to Fig. 18, have one side somewhat longer than the other for a purpose which will hereinafter appear. The bags in flattened form and with the longer sides outermost are placed in a magazine 42, the bottom of the magazine being preferably formed as the arc of a circle. From this magazine the bags are fed forward as hereinafter described, the front bag contacting with stops 43 engaging its edges. The longer side of the front bag also engages against a chisel-edged stop 44. Above the forward side of the magazine is located a ram guide 45. In this guide is slidably supported the ram 46, which is formed with a rounded lower end and which is adapted to enter the bag and open it and position it within a carton. To enable the ram to enter the mouth of the bag, we provide an opener 47. This has an edge-shaped end which normally lies adjacent the chisel-stop 44. From its end the opener inclines towards the back of the ram and then is forked and extends upwardly, its upper ends being provided with slots 49 embracing the pivots 50 carried by the ram guide.

From one part of the upper end of the opener extends an arm 48. A coil spring 51 is connected at one end to a stationary part and at the other end with the arm 48. This spring thus tends to maintain the opener in the position shown in Fig. 3 of the drawings. When the ram is moved downwardly as hereinafter described, it will engage the opener and push it down to the position shown in full lines in Fig. 7 and thereafter push it back to the position shown in heavy dotted lines in Fig. 7. Opposite the chisel-edged stop 44 is located a pressure plate 52. This is supported on a suitable stationary part and is resiliently supported in a well-known manner. It will be noted that a recess 53 is formed in the back of the ram into which the end of the opener may spring when the ram is sufficiently depressed as shown in dotted lines in Fig. 7.

The operation of this part of the mechanism is substantially as follows. The front bag in the magazine lies with its longer side against the chisel edged stop 44. This causes the shorter side to spring out slightly so that if the opener be depressed it will enter the mouth of the bag. As the ram descends, the point of the ram comes in contact with the inclined part of the opener lying below it and presses the end of the opener into the mouth of the bag. The extent of downward movement of the opener is limited by the length of the slot 49. Thereafter continued downward movement of the ram acting on the said inclined portion swings the opener laterally as shown in Fig. 7 in the heavy dotted lines, thus causing the opener to move the outer side of the bag into contact with the pressure pad 52, while the longer side still remains in engagement with the chisel-edged stop 44. The mouth of the bag is thus held widely open for the entrance of the ram.

At the time the ram has reached the bottom of the bag and has thus completely opened it, the recess 53 has come into alinement with the end of the opener. The opener then springs into the recess as indicated in broken lines in Fig. 7, thus releasing the outer edge of the bag. Continued downward movement of the ram then easily pulls the bag away from the chisel-edged stop and presses it down into the carton, which is in alinement with the magazine. The bottom of the ram preferably descends sufficiently far to firmly press the bottom of the bag into contact with the gummed

and folded lower end flaps of the carton, thus suitably pressing these flaps so as to ensure the proper sealing of the same.

The bag magazine and the ram are so mounted as to travel pari passu with the travelling cartons during the insertion of the bags into the cartons, which construction will be fully described when the general construction of the driving mechanism of the apparatus is set forth.

It is preferable that there should be no stoppage of the machine when the stock of bags in the magazine is being replaced. We therefore provide the following mechanism to maintain pressure on the bags in the magazine, while a further stock of bags is being placed therein. 54—55 are pressure plates adapted to fit in the magazine. These plates are formed with interengaging hinge knuckles 56—57 adapted to fit into the downwardly facing open bearing 58 formed on the magazine. These pressure plates are thus adapted to swing concentrically with one another and with the curved bottom of the hopper. Retainers 59 curved concentrically with the bottom of the hopper and the open bearing are secured to the sides of the magazine and engage in notches formed in the sides of the pressure plates. The retainer is of such length that the plate will disengage itself therefrom before all the bags in front of the plate have been fed from the magazine. The plate will then slip out of the magazine, being sufficiently weighted for that purpose. Before the plate thus disengages itself a fresh supply of bags is placed in the magazine behind the plate and the second plate placed in position thereabove, as shown in Fig. 3. As soon as the plate disengages itself as hereinbefore described, a fresh stock of bags is placed in position and the plate, which has automatically disengaged itself, is placed on top thereof, and thus continuous feed of the bags to the discharge point is obtained.

From the bag placing mechanism, the bag-like cartons travel to the measuring and filling apparatus. Above the drive pulley 2 is supported a hopper 60 adapted to contain the filling material. This hopper has an opening 61 formed in its bottom. A slide 93 movable in a guide 94 is provided whereby the opening 61 may be closed at any time. The handle 95 projects from this slide to a suitable position for operation. Below the bottom is located the rotatable measuring plate 62, through the bottom of which open a series of measuring chambers 63 concentric with the centre of the plate. The plate is connected with the driving shaft 64 of the drive pulley 2, and therefore rotates synchronously with the carrier belt 4 and the cartons carried thereby. The measuring plate is located with its upper surface spaced from the under surface of the bottom of the hopper, and a scraper 65 is provided connected with the bottom of the hopper, from which it follows that as each measuring chamber comes under the opening 61, it is filled to overflowing and the surplus is scraped off by the scraper 65 as the chamber passes under the scraper. It is evident that the amount of material carried by the measuring chamber may be adjusted within certain limits by varying the vertical position of the measuring plate relative to the scraper so that the lower edge of the scraper lies at a distance from the upper surface of the measuring plate. This adjustment is best effected by providing means for the vertical adjustment of the hopper relative to the measuring plate. For this purpose we provide the screws 66 threaded through the rim of the annular trough 70 hereinafter described and bearing against the rim of the hopper bottom. This hopper bottom, it will be noted, is provided with a sleeve 67 through which the shaft 64 extends. A sleeve 68 is secured to the upper end of the shaft 64 and extends down outside the sleeve 67. To the lower end of this sleeve is secured the rotary agitator 69, which serves to keep the material stirred up and fed through the opening 61 to the measuring chambers as they are brought into alinement therewith.

Some disposal must be made of the surplus material scraped off from the measuring chambers by the scraper 65, and we therefore form round the measuring plate an annular trough 70 into which the scraper moves the scraped-off material. At one side of this trough a discharge spout 71 is formed to which any material in the trough is fed by the plows 72 connected to the measuring plate and extending down into the trough.

Each measuring chamber is provided at its lower end with a discharge gate 73. Means are provided to operate each discharge gate after a chamber has been filled and discharge the contents into the underlying carton. For this purpose we provide the following mechanism. A cam 74 suitably arc-shaped in plan is secured to a sleeve 75 loose on the shaft 64, but held from rotation therewith by means of an arm 76 which contacts with a stop 77 on the frame of the machine. The discharge gate of each measuring chamber is normally held closed by a coil spring 78 and from this gate projects a rock arm 79 which extends laterally and is adapted to ride over the upper surface of the cam 74 to cause the gate to open. It will be noted that while the forward part of the upper surface of the cam is formed with a gradual rise, the rearward part is formed with a series of steps or jogs

80, the result of which is the closure of the gate in a series of jerks which vibrates the gate and measuring chamber and causes the disengagement of any portion of filling material which shows a tendency to stick. It is important that there should be no discharge of the filling material unless a carton is positioned beneath the measuring chamber from which the discharge is to take place. We therefore provide means whereby the arms 79 will not be positioned to engage the cam 74 unless a carton is in position below the measuring chamber.

The means provided comprise the guide 81 which is hinged at 82 on the cam 74. Normally this guide is held in such a position by the light coil spring 83 that its upper surface forms practically a forward continuation of the surface of the cam 74. The tension of the spring 83 is, however, so light that the pressure of the guide cannot overcome the tension of the coil spring 78 and the guide will therefore be depressed by the arm 79 allowing the latter to pass under instead of over the cam unless the guide be positively held in position.

Means operable by contact with the carton are provided to thus positively hold the guide 81 in position, these means comprising the scear 84 which is hinged at 85 on the cam 74 and is provided with a shoulder adapted to engage under the guide 81. Normally this scear is held out of engagement with the guide by a light coil spring 86 which is connected with the scear and with a suitable stationary part. From this scear extends an arm 87 engageable by a carton adjacent its end. The carton thus pushes forward the scear, which locks the guide in place so that the arm of the corresponding measuring chamber will ride over the cam and cause the contents of the measuring chamber to discharge as hereinbefore referred to.

Continued movement of the carton draws the carton past the arm 87, which is so hinged that it swings inwardly away from the line of travel of the cartons.

During the operation of filling, it is desirable that the carton be raised towards the measuring chamber from which it is being filled so as to avoid spilling of the filling material. As the cartons pass round the pulley 2 they rest on the flange thereat but at a suitable position is supported a cam 89 adapted to lift each carton in turn and subsequently permit it to drop again to the original level ready for the operation of the folding and sealing mechanism for the upper end flaps.

This mechanism is substantially similar to that for folding in the lower end flaps, comprising a spreader 36ª, a rotary kicker 37ª and curved folders 40ª. Adjacent the spreader 36ª are located the gumming rollers 39ª, which will be fed from a suitable paste fount in any suitable manner and which apply gum or paste to the inner surface of the lateral end flaps as hereinbefore described with reference to the bottom end flaps. The upper end of the bag is folded in with the end flaps of the carton, but we find it desirable to provide means to slightly press out the outer side of the bag during the operation of the spreader 36ª and the rotary kicker 37ª and thus ensure the accurate folding in of the front and rear parts of the mouth of the bag before the sides are turned in. For this purpose we provide the wedge shaped laterally extending fingers 141, each carried by an arm 142 connected to the spindle of the kicker 37ª. The fingers are positioned to operate in advance of the kicker and, as the arms 142 are shorter than the kicker arms, the fingers travel at about the same rate as the cartons but are only in position in the mouth of the bag for a very short time, and are out of the way of the unfolding flaps.

After passing the curved folders 40ª, the folded cartons one by one arrive at a point where the blocks 8 begin to turn round the pulley 3, and therefore draw away from the carton. At this point each carton passes in front of guides 90, which prevent the carton being deflected from the straight path as the block behind it swings and which guide the carton between the belts 91, which are driven in any suitable manner, not shown, and which run round the rollers 92. These rollers brace the adjacent surfaces of the said belts, the two sets of rollers being in staggered relationship so that the cartons at any time are resiliently pressed, and therefore are not in any way damaged by the conveyor apparatus. These belts will discharge the folded cartons to any desired receiving point.

The driving mechanism for the various parts is preferably arranged as follows. A shaft 96 is journalled longitudinally of the machine. This shaft carries a worm 97 meshing with a worm wheel 98 secured to the shaft 64 which actuates the driving pulley 2, the measuring plate 62, and the agitator 69. By means of suitable bevel gearing 99, the shaft 96 actuates the transverse shaft 100. This shaft carries a cam 101, which is adapted to engage between the lower ends of vertical levers 102 which are fulcrumed intermediate their ends on the frame of the machine and which at their upper ends are pivotally connected to the ram guide 45. This cam is so figured as to cause the ram guide to travel synchronously with the cartons at such times as bags are being placed in position therein as hereinbefore referred to.

The ram 46 of the bag-placing mechanism is actuated by means of the crank 136 secured to the shaft 100 and pivotally con-

nected with the ram as shown more particularly in Fig. 3.

The rotary kicker 37ª and the gumming rollers 39ª are actuated as follows. By means of bevel gearing 103 a transverse stub shaft 104 is driven. This shaft by spur gearing 113, drives the spindle 114 which carries a sprocket wheel 105 which, by means of a suitable chain, drives a sprocket wheel 106 on the spindle of the rotary kicker 37ª. On the spindle 114 is also secured a sprocket wheel 107 which, by means of a suitable sprocket chain and sprocket wheel 137 drives a spindle 108 suitably journalled on the frame and carrying at its end a disk provided with pins 109 parallel to the axis of the spindle. These pins engage a transverse pin 110 carried by the spindle 111 of the gumming rollers 39ª. This arrangement of drive with the pins 109 and 110 provides ready means for detaching the gumming rollers and provides also a weak point in the drive which will break in case of the gumming mechanism becoming jambed or stuck.

The rotary kicker 37 is carried by the spindle 112, which is driven by the gearing 113 from the shaft 104. In alinement with the spindle 114, is the spindle 115 of the gumming rollers 39 which is driven by means of a pin drive similar to that employed for the driving of the gumming rollers 39ª hereinbefore described.

The mechanism for feeding the folded cartons to the carrier and for partially opening the same is driven by the following means. On the shaft 96 is secured a cam 116. This cam engages the shorter arm of a bent lever 117, to the other end of which is pivotally connected the lower end of a connecting rod 118, which is pivotally connected with the lower end of the spindle 31 of the opener mechanism.

The vertical movement hereinbefore referred to is thus imparted to the opener 28.

The feeder plate 27 is actuated by the lever arm 119 pivotally connected to the feeder plate at one end and at its lower end pivotally connected with the frame of the machine by means of the link 120. Intermediate of its ends a slide rod 121 is pivotally connected with a lever arm, the other end of this rod being adapted to engage a cam 122 secured to the shaft 96. The slide rod is yieldingly pressed towards the cam by means of the coil spring 123 which engages a shoulder formed on the rod and the guide 124 through which the rod slides. A compression spring 125 mounted on a rod 126 suitably connected to the frame of the machine and extending through a lug 127 on the bent lever 117 yieldingly holds the end of the bent lever 117 in contact with the cam 116. The operating means for the opener 28 only provides for the vertical and transverse movements of the opener and the parts carrying it. The slight movements of the opener longitudinally of the machine as hereinbefore referred to are caused by the cams 33 and 34. Clutch mechanism is preferably provided for starting or stopping, which mechanism is operable from the end of the machine adjacent the carton magazine. This control mechanism comprises the following parts.

A transverse shaft 128 is journalled at the end of the machine remote from the carton magazine, which transverse shaft, by means of bevel gearing 129, actuates the shaft 96. The shaft 128 carries a drive pulley 130, which may be put into or out of clutch with the shaft by means of any ordinary clutch mechanism actuated by the grooved collar 131. A sliding shifter 132 is adapted to actuate this grooved collar, which shifter is suitably connected with a bell crank 133 fulcrumed on the frame of the machine and connected by means of a connecting rod 134 with the shifter lever 135 fulcrumed on the frame of the machine adjacent the carton magazine.

As bags sometimes reach the discharge point of their magazine with a slight inward curve at the mouth which tends to prevent the mouths opening to the slight extent necessary for the entry of the opener 47, we prefer to employ, as an auxiliary opening device, the following means for directing a blast of air against the mouth of the bag.

A nozzle 138 is located adjacent the discharge end of the bag magazine and is directed somewhat downwardly towards the mouth of a bag located at the discharge point. This nozzle is connected by means of a suitable conduit 139 with a cylinder 140 formed at the upper end of the ram guide 45. The upper end of the ram 46 is formed as a plunger operating in the cylinder. The cylinder is valveless, air both entering and leaving through the conduit. A blast of air is thus caused to issue from the nozzle, when the ram moves upwards, which effectively blows open the mouth of the bag as desired.

What we claim as out invention is:—

1. In a carton filling machine, the combination of a suitably carried endless carrier belt provided with a series of equally spaced substantially parallel projections between which cartons are adapted to fit; means for feeding flattened cartons to a discharge point; means for discharging cartons one-by-one to bring an edge in contact with a projection adjacent the base of the latter; means adapted to partly open the carton as it is discharged; and a cam plate adapted to engage the diagonally opposite edge of the carton to fully expand the carton and press it between adjacent projections as the carton is moved past the plate by the carrier belt.

2. In a carton filling machine, the combination of a suitably carried endless carrier belt provided with a series of equally spaced substantially parallel projections between which cartons are adapted to fit; means for feeding flattened cartons to a discharge point; means for discharging cartons one-by-one to bring an edge in contact with a projection adjacent the base of the latter; means adapted to pass down between the sides of the carton as the latter is discharged to partly open it and subsequently to rise and return to its original position; and a cam plate adapted to engage the diagonally opposite edge of the carton to fully expand the carton and press it between adjacent projections as the carton is moved past the plate by the carrier belt.

3. In a carton filling machine, the combination of a suitably carried endless carrier belt provided with a series of equally spaced substantially parallel projections between which cartons are adapted to fit; means for feeding flattened cartons to a discharge point; means for discharging cartons one-by-one to bring an edge in contact with a projection adjacent the base of the latter; means adapted to travel forward with the cartons and pass down between the sides of the carton as the latter is discharged to partly open it and subsequently to rise and return to its original position; and a cam plate adapted to engage the diagonally opposite edge of the carton to fully expand the carton and press it between adjacent projections as the carton is moved past the plate by the carrier belt.

4. In a machine for filling cartons which comprise four connected sides each formed with an end flap, the combination of means for feeding flattened cartons with end flaps extended to a discharge point; means for discharging cartons one-by-one to bring an edge in contact with a projection adjacent the base of the latter; means adapted to pass between overlying flaps, travel forward with the carton as the latter is discharged, pass down between the sides of the carton to partly open it and subsequently rise and return to its original position, a carrier belt adapted to carry said cartons from the discharge point; and a cam plate adapted to engage the diagonally opposite edge of the carton to fully expand the carton and press it between adjacent projections as the carton is moved past the plate by the carrier belt.

5. In a carton filling machine, the combination of a suitably carried endless carrier belt; a pulley round which said belt passes; a plurality of equally spaced projections secured to said belt having their sides substantially normal to the belt's surface whereby sides of adjacent projections diverge as they pass round the pulley; means for partly expanding a flattened carton and feeding it between two adjacent projections as they pass round the pulley; and a cam plate adapted to be engaged by the carton and to press it in expanded condition between the two projections.

6. In a machine for filling cartons which comprise four connected sides each provided with an end flap, the combination of an endless carrier horizontally supported and constantly driven; lateral projections from said carrier; means for expanding folded cartons and positioning them one-by-one between said projections; means adapted to suitably fold the lower end flaps while the carton is in motion; means for measuring the filling material and depositing the same in the carton while the latter is in motion; means adapted to suitably fold the upper end flaps while the carton is in motion; and means for discharging the closed cartons.

7. In a machine for filling cartons which comprise four connected sides each provided with an end flap, the combination of an endless carrier horizontally supported and constantly driven; lateral projections from said carrier; means for expanding folded cartons and positioning them one-by-one between said projections; means adapted to suitably fold the lower end flaps while the carton is in motion; means for measuring the filling material and depositing the same in the carton while the latter is in motion; means for controlling the deposition of the filling material actuable by contact with a travelling carton, whereby no material is deposited unless a carton is positioned to receive it; means adapted to suitably fold the upper end flaps while the carton is in motion; and means for discharging the closed cartons.

8. In a machine for filling cartons, the combination of an endless carrier belt; two pulleys round which said belt passes; a plurality of equally spaced projections secured to said belt having their sides substantially normal to the belt's surface, whereby sides of adjacent projections diverge as they pass round the pulleys; means adjacent one pulley for expanding and feeding a carton between two adjacent projections as they pass round the pulley; and means adjacent the same pulley for withdrawing cartons.

9. In a machine for filling cartons, the combination of an endless carrier belt; two pulleys round which said belt passes; a plurality of equally spaced projections secured to said belt having their sides substantially normal to the belt's surface, whereby sides of adjacent projections diverge as they pass round the pulleys; means adjacent one pulley for expanding and feeding a carton between two adjacent projections as they pass round the pulley; and means adjacent the same pulley for withdrawing filled car-

tons; and means adjacent the other pulley for raising and filling cartons as they pass.

10. In a machine for filling cartons which comprise four connected sides each with an end flap, the combination of an endless constantly moving carrier adapted to convey expanded cartons with one side leading; a spreader adapted to spread the lateral end flaps at one end of the carton and press inwardly the front end flap; and a constantly rotating kicker adapted to bend in the rearward end flap to enable it to pass under the spreader.

11. In a machine for filling cartons which comprise four connected sides each with an end flap, the combination of an endless constantly moving carrier adapted to convey expanded cartons with one side leading; a spreader adapted to spread the lateral end flaps at one end of the carton and press inwardly the front end flaps; a constantly rotating kicker adapted to bend in the rearward end flap to enable it to pass under the spreader; means for gumming the exposed inner surface of the lateral flaps; means for folding in the lateral flaps one over the other; and means for holding down the forward and rearward flaps until the lateral flaps are sufficiently bent in to hold them in place.

12. In a machine for filling cartons which comprise four connected sides each formed with an end flap, the combination of a carton magazine; means for pressing cartons forward to a discharge point; a reciprocating feeder plate adapted to feed cartons one-by-one from the magazine at the discharge point; a bearing slidable with the feeder plate; an opener arm spindle journalled vertically therein; an opener arm secured to said spindle; an opener depending from said arm; means for moving said spindle longitudinally; two cams each adapted to be passed by the opener when the latter moved away from the magazine in a depressed position and to be engaged by the opener when the latter is moved towards the magazine in a raised position, the first cam being adapted to swing the opener slightly away from the end carton in the magazine and the second to subsequently swing it towards the carton.

13. In a machine for filling cartons which comprise four connected sides each provided with an end flap, the combination of an endless carrier horizontally supported and constantly driven; lateral projections from said carrier; means for expanding folded cartons and positioning them one-by-one between said projections; means adapted to suitably fold the lower end flaps while the carton is in motion; means for measuring the filling material and depositing the same in the carton while the latter is in motion; means for lifting each carton as it arrives at the filling position; means adapted to suitably fold the upper end flaps while the carton is in motion; and means for discharging the closed cartons.

14. In a machine for filling cartons which comprise four connected sides each provided with an end flap, the combination of an endless carrier horizontally supported and constantly driven; lateral projections from said carrier; means for expanding folded cartons and positioning them one-by-one between said projections; means adapted to suitably fold the lower end flaps while the carton is in motion; means for inserting a bag like liner in each carton; means for measuring the filling material and depositing the same in the carton while the latter is in motion; means adapted to suitably fold the upper end flaps while the carton is in motion; and means for discharging the closed cartons.

15. In a machine for filling cartons, the combination of an endless carrier belt; two pulleys round which said belt passes; a plurality of equally spaced projections secured to said belt having their sides substantially normal to the belt's surface whereby the sides of adjacent projections diverge as they pass round the pulleys; means for feeding cartons between said projections and folding their ends; and moving means adjacent one of the pulleys adapted to engage the ends of a carton as released by the divergence of its engaging projections and draw it from between the projections.

16. In a machine for filling cartons, the combination of an endless carrier belt; two pulleys round which said belt passes; a plurality of equally spaced projections secured to said belt having their sides substantially normal to the belt's surface whereby the sides of adjacent projections diverge as they pass round the pulleys; means for feeding cartons between said projections and folding their ends; and moving belts adjacent one of the pulleys adapted to engage the ends of a carton as released by the divergence of its engaging projections and draw it from between the projections.

17. In a machine for filling cartons, the combination of an endless carrier belt; two pulleys round which said belt passes; a plurality of equally spaced projections secured to said belt having their sides substantially normal to the belt's surface whereby the sides of adjacent projections diverge as they pass round the pulleys; means for feeding cartons between said projections and folding their ends; moving belts adjacent one of the pulleys adapted to engage the ends of a carton as released by the divergence of its engaging projections and draw it from between the projections; and rollers backing the adjacent surfaces of said belts, the two sets of rollers being in staggered relationship.

18. In a machine for filling cartons which comprise four connected sides each provided with an end flap, the combination of an endless carrier horizontally supported and constantly driven; lateral projections from said carrier; means for expanding folded cartons and positioning them one-by-one between said projections; means adapted to suitably fold the lower end flaps while the carton is in motion; means for inserting a bag like liner in each carton; guides adapted to hold down the cartons as their flaps are folded and as they pass from the flap folding mechanism to the liner inserting mechanism; means for measuring the filling material and depositing the same in the carton while the latter is in motion; means adapted to suitably fold the upper end flaps while the carton is in motion; and means for discharging the closed cartons.

19. In a machine for filling cartons which comprise four connected sides each provided with an end flap, the combination of an endless carrier horizontally supported and constantly driven; lateral projections from said carrier; means for expanding folded cartons and positioning them one-by-one between said projections; means adapted to fold the lower end flaps while the carton is in motion; means for inserting a bag like liner in each carton; guides adapted to engage the upper lateral end flaps to slightly spread the same and to hold down the cartons as their flaps are folded and as they pass from the flap folding mechanism to the liner inserting mechanism; means for measuring the filling material and depositing the same in the carton while the latter is in motion; means adapted to fold the upper end flaps while the carton is in motion and means for discharging the closed cartons.

20. In a machine for filling cartons which comprise four connected sides each with an end flap, the combination of an endless carrier adapted to convey expanded cartons with one side leading; means for folding in the lower end flaps; means for placing a bag mouth upwards in said carton; a spreader adapted to spread the lateral flaps at the upper end of the carton and to press in the front flap; a rotary kicker adapted to bend in the rearward end flap; and a finger movable to and from a position to hold out the outer side of the bag during the first part of the operation of folding in the forward and rearward flaps.

21. In a machine for filling cartons which comprise four connected sides each with an end flap, the combination of an endless carrier adapted to convey expanded cartons with one side leading; means for folding in the lower end flaps; means for placing a bag mouth upwards in said carton; a spreader adapted to spread the lateral flaps at the upper end of the carton and to press in the front flap; a rotary kicker adapted to bend in the rearward end flap; and a finger rotatable with the kicker to and from a position to hold out the outer side of the bag during the first part of the operation of folding in the forward and rearward flaps.

22. In a machine for filling cartons which comprise four connected sides each with an end flap, the combination of an endless carrier adapted to convey expanded cartons with one side leading; means for folding in the lower end flaps; means for placing a bag mouth upwards in said carton; a spreader adapted to spread the lateral flaps at the upper end of the carton and to press in the front flap; a rotary kicker adapted to bend in the rearward end flap; and a finger secured to an arm in advance of the kicker said arm being shorter than the kicker so that the finger moves in an orbit of shorter radius than and in advance of the kicker whereby the finger is movable to and from a position to hold out the outer side of the bag during the first part of the operation of folding in the forward and rearward flaps.

23. In bag feeding and opening mechanism, the combination of a magazine for flattened bags; means for feeding bags in the magazine to a discharge point; means for temporarily holding the bag at the discharge point with the outer edge of its mouth exposed; a vertically movable ram adapted to enter an opened bag; an opener adapted to open the mouth of the bag in advance of the ram; means for continuously moving cartons to and past the magazine to receive bags drawn from the magazine and pushed down by the ram; and means for causing the magazine, ram and opener to travel pari passu with a carton until raised clear of the carton and the bag placed therein.

Signed at Toronto, Canada, this 9th day of Nov., 1921.

RUDOLF D. DELAMERE.
VICTOR G. WILLIAMS.