June 13, 1944. V. G. WILLIAMS 2,351,382

PACKAGING MACHINE

Filed Jan. 11, 1940 4 Sheets-Sheet 1

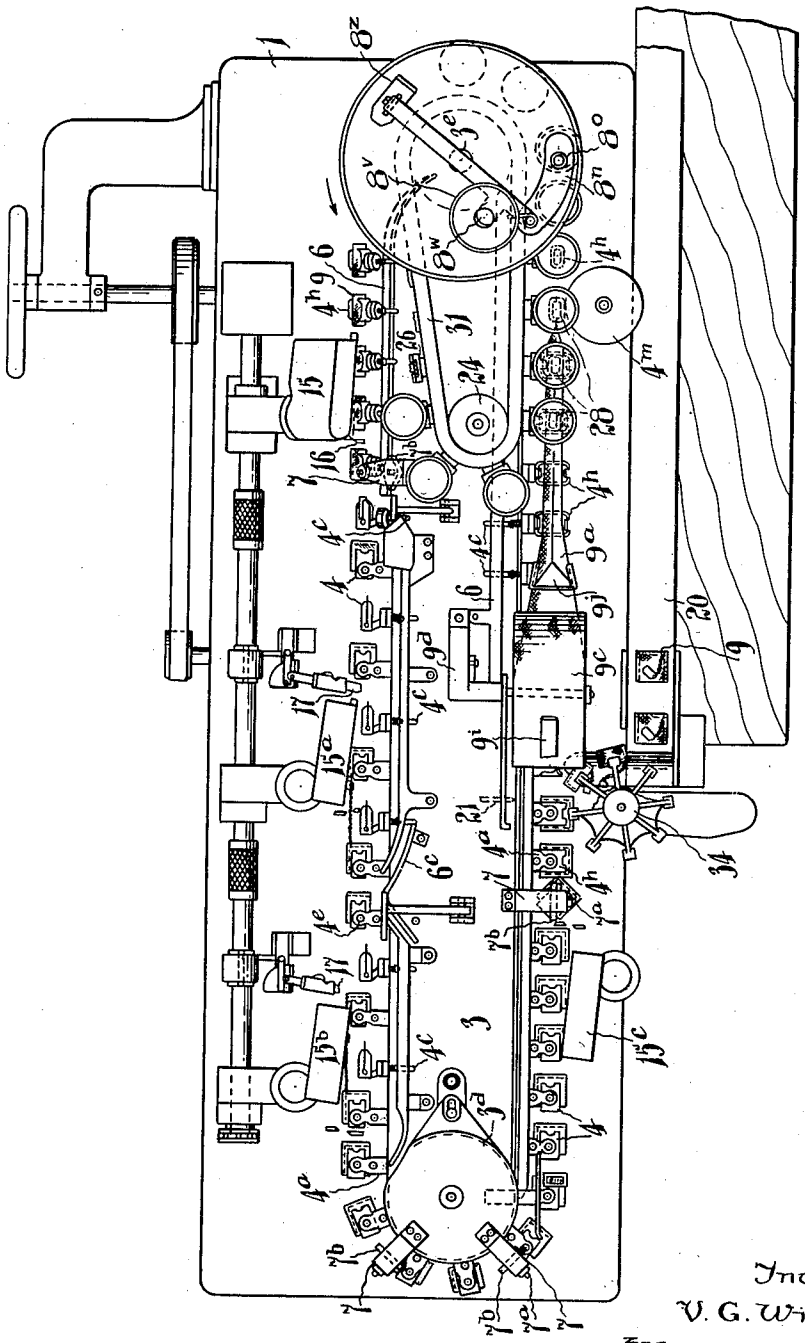


Fig. 1.

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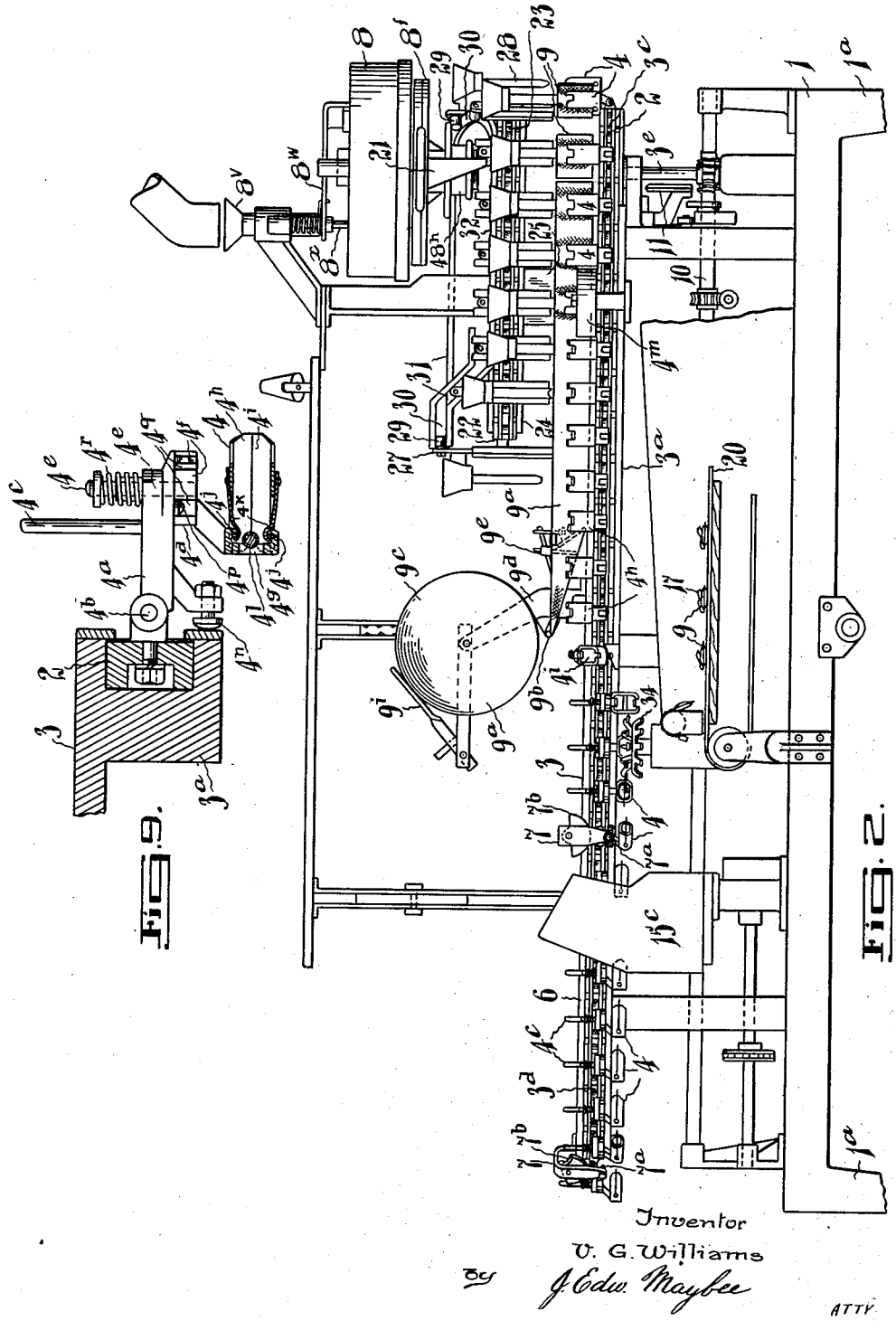


Fig. 2.

Fig. 9.

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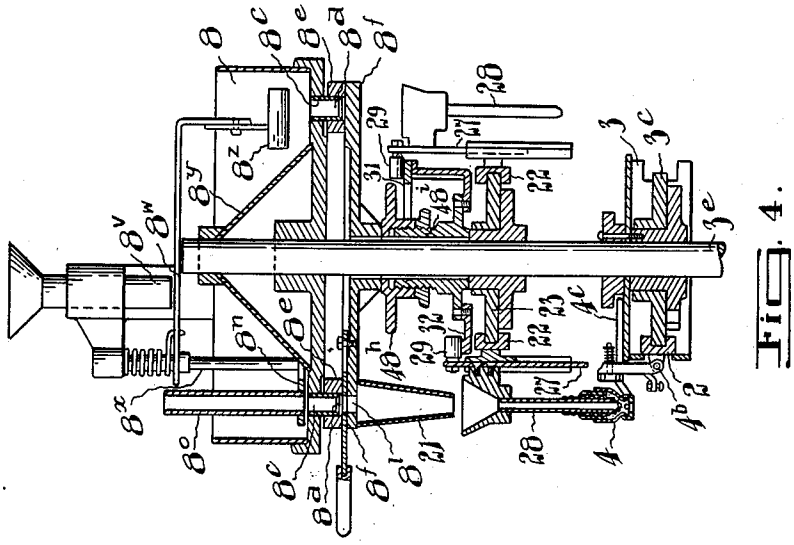


Fig. 4.

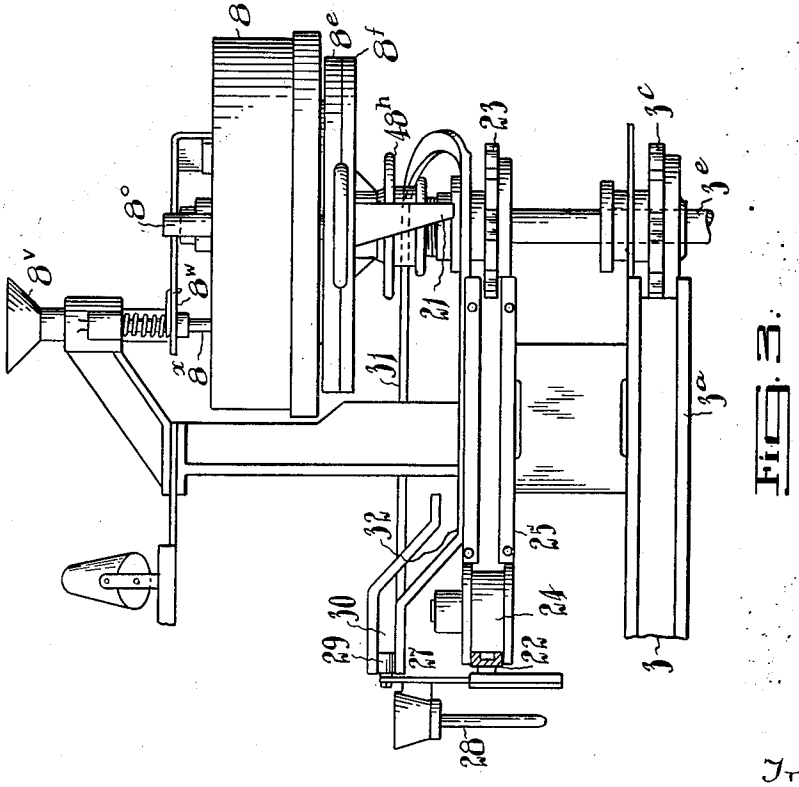


Fig. 3.

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PACKAGING MACHINE

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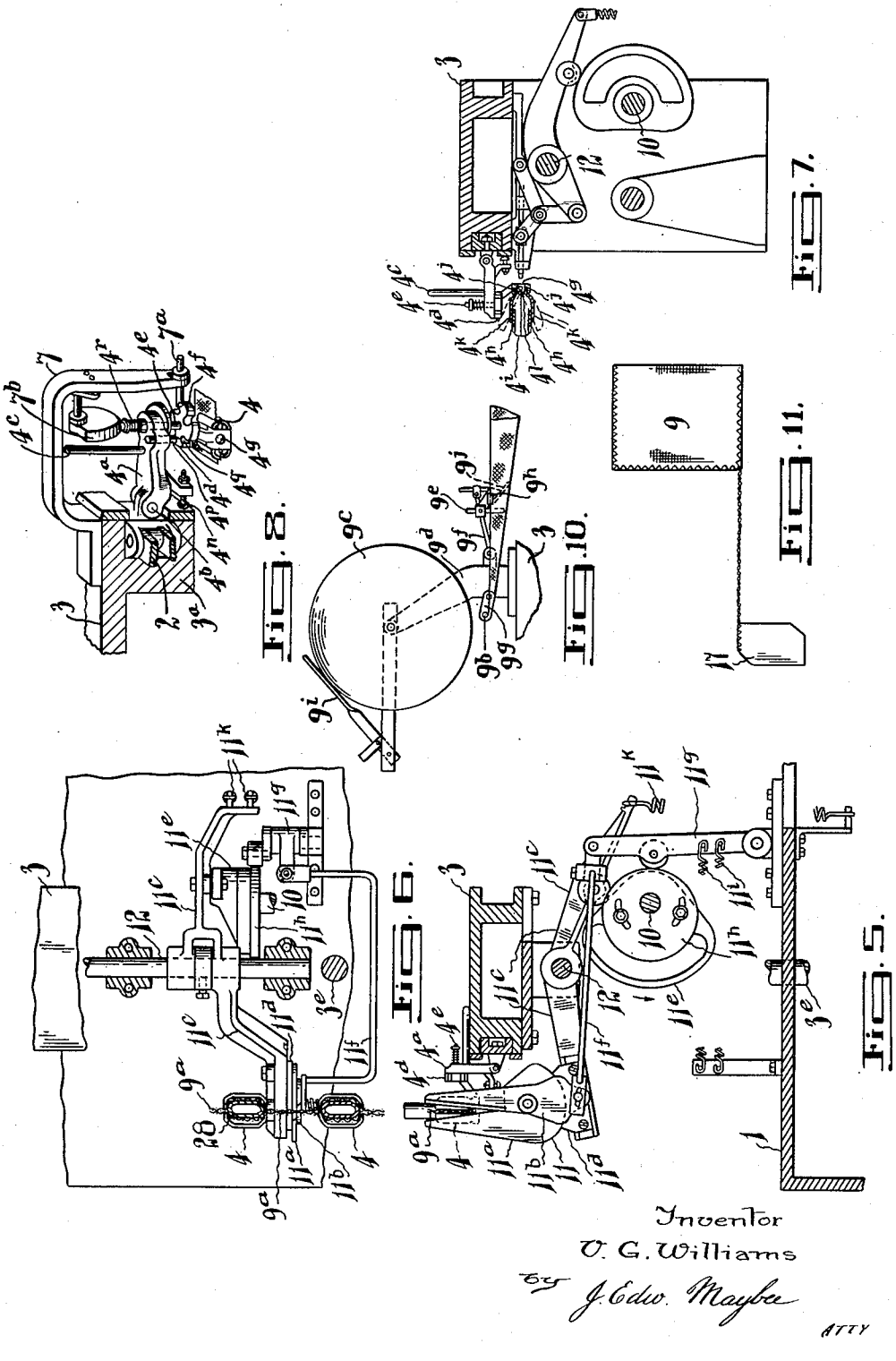


Fig. 8.

Fig. 7.

Fig. 10.

Fig. 11.

Fig. 6.

Fig. 5.

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2,351,382

UNITED STATES PATENT OFFICE

2,351,382

PACKAGING MACHINE

Victor G. Williams, Toronto, Ontario, Canada

Application January 11, 1940, Serial No. 313,307
In Canada January 17, 1939

4 Claims. (Cl. 226—50)

This invention relates to packaging machines and more particularly to that type of machine disclosed in my prior United States Patent No. 2,071,244, issued February 16, 1937, in which tea is packaged in fabric bags having tags applied thereto and the object of this invention is to devise an improved machine of this character which is more efficient and smoother in operation.

I attain my object by providing a nozzle carrier above a portion of the carrier for conveying the grippers which carry the containers or bags to be filled. The grippers are adapted to be swung vertically and are also adapted to be rotated horizontally. The filling material, which may be tea, is carried in a hopper concentric to the gripper carrier at one end of the machine. The hopper is provided with measuring chambers which communicate one by one with a spout. The nozzles are vertically movable on their carrier so that each will be lowered into an open substantially vertical gripper. Bag making fabric is drawn from a roll thereof through the open grippers and shaped in the form of a V to receive the descending nozzles which serve as bag formers. The grippers are closed, one by one, on the bag material and around their nozzles. The latter then pass beneath the spout to receive tea from the hopper and subsequently are withdrawn from the grippers. The fabric strip is cut transversely by a cloth knife, between adjacent closed grippers to form bag sections, each of which is thus carried by a gripper. The knife is so positioned that the lead end of the fabric strip is continuously being drawn by one or more of the closed grippers through one or more of the open grippers. The cloth knife is moved longitudinally with the fabric strip during the cutting thereof and is lowered out of the path of the grippers and nozzles during its return stroke. While the nozzles are being raised out of the bag sections any tea in the nozzles falls by gravity into the bag sections which are then carried by the grippers past a sewing or surging machine for trimming and sewing the ends or mouths of the bag sections. The thread is cut and the grippers are lowered one by one, to a substantially horizontal position. One side of each bag section is positioned for being sewn and trimmed by either one of two spaced apart surging machines adapted to form suitable stitching for attaching tags to the bag sections. To space the tags from their bags, alternate grippers are swung to a position in which the bag sections carried thereby will not be engaged by the first of the said two surging machines. The tags are fed to and sewn into the stitching at a maximum distance from their bags and the stitching is cut between the tags and the adjacent bag section. The grippers carrying the tagged bag sections are then swung upwardly to a position in which the tagged bags will not be engaged by the second of the said two surging machines, and the grippers which were originally moved out of position for engagement by the first of the two surging machines are now lowered to position the untagged bag sections carried thereby for engagement by the second of the two surging machines whereby tags are applied to the untagged bag sections. The stitching is cut between each tag and its adjacent bag section. The grippers carrying the first tagged bags are then lowered into alinement with the grippers carrying the second tagged bags and all the grippers are turned, one by one, 180° to bring the other, unsewn, side of each bag section into position for being trimmed and sewn by another sewing machine. The three machines for sewing the mouths of the bags and for sewing one side and attaching the tags thereto are arranged along one side of the packaging apparatus and are driven by a sectional shaft so that each sewing machine may be readily removed from the apparatus independently of the other sewing machines. The fourth sewing machine is positioned on the opposite side of the apparatus. After the bags leave the fourth sewing machine the thread is cut, the grippers are released and turned 90°, the bags are engaged by a rotary clamping device, and the grippers are opened to permit the clamping device to remove the bags from their grippers and drop them on to a conveyor. All the grippers are then swung upwardly to a substantially vertical position to receive fresh bag making fabric.

The constructions are hereinafter more fully described and are illustrated in the accompanying drawings in which

Fig. 1 is a plan view of my machine;

Fig. 2 a side elevation thereof;

Fig. 3 a detail in side elevation of the hopper end of the machine;

Fig. 4 a longitudinal section of the hopper;

Fig. 5 a cross sectional detail of the machine showing a side elevation of the cloth knife in position to cut the bag making material;

Fig. 6 a plan view of the parts shown in Fig. 5, the bridge being omitted;

Fig. 7 an enlarged longitudinal section showing the jaw opening device;

Fig. 8 a detail of the mechanism for releasing the gripper frame locking mechanism and for turning the gripper frame;

Fig. 9 a detail partly in section and partly in elevation of the gripper;

Fig. 10 a detail in side elevation of the cloth feed;

Fig. 11 a plan view of a finished bag.

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

1 is the frame which is suitably shaped to support the various parts of the machine and is provided with legs 1^a. An endless carrier 2 preferably formed as a chain is supported intermediate its ends on a flange 3^a of a bridge 3 which is carried above the frame 1 by suitable supports. The chain carrier 2 meshes with sprocket wheels 3^c, 3^d journalled at opposite ends of the bridge 3, the wheel 3^c being secured to a shaft 3^e for driving the carrier. On the carrier 2 are pivotally mounted a plurality of grippers 4 so that they may be swung in a vertical plane and rotated in a horizontal plane (see Figs. 1, 2, 4, 5, 7, 8, 9). This is accomplished by providing certain of the chain links with laterally extending blocks on which gripper carrying arms 4^a are pivoted at 4^b to swing in a vertical plane. These arms are provided with upwardly extending fingers 4^c adapted to be engaged by rails 6 carried around the periphery of the bridge to determine the position in a vertical plane of the grippers as desired.

Gripper

Each gripper 4 includes a frame 4^d (Figs. 7, 8 and 9) which is journalled at 4^e to rotate on its carrying arm 4^a at right angles to the pivot 4^b thereof. The frame is provided with a plurality (preferably four) of radially directed projections 4^f which are equidistantly spaced apart for engagement one by one with stationary pins 7^a carried by brackets 7 mounted around the periphery of the bridge 3 so that as the gripper passes each of the brackets 7 it will be rotated a quarter turn on its pivot 4^e (in a clockwise direction of rotation in Figs. 1 and 8) for a purpose hereinafter described.

To prevent the grippers from moving more than the desired quarter turn as they are engaged by each pin 7^a and to lock the grippers positively to their carrying arms 4^a at the end of each turning movement, I provide each arm 4^a with a depending projection 4^p adapted to be received in any one of four recesses 4^q in the frame 4^d. The frame is drilled adjacent its periphery and the latter is cut into the drilled holes to form the hereinbefore described radial projections 4^f. The said drilled holes thus form the recesses 4^q which are adapted to receive and engage the depending projection 4^p, seriatim. To release the projection 4^p from any of the recesses, the frame 4^d is axially moved relative to the arm 4^a. The frame may now be turned on its vertical pivot 4^e to bring it into position for engaging the next recess with the projection. This axial movement of the frame 4^d, to move the recesses 4^q clear of the projection 4^p, is obtained by securing the journal pin 4^e to the frame 4^d. The pin 4^e is journalled and axially movable in a bushing carried by the arm 4^a and extended above it to increase the bearing surface. On the bushing is disposed a compression spring 4^r having one end engaging the arm 4^a, the other end engages a collar disposed on the pin 4^e and bearing against the head of the pin. Each spring 4^r thus urges the frame 4^d towards its arm 4^a and tends to maintain the wall of a recess 4^q in engagement with the depending pin 4^p. Each frame is axially moved, to release the locking means, by a depressor 7^b having a curved underside adapted to engage a rounded end on the head of the journal pin 4^e. Each depressor is carried by a bracket 7 and is adapted to shift the frames 4^d, one by one, so that the locking means is released whenever one of the radial projections 4^f is engaged by a pin 7^a for turning the frame as the latter moves past the pin. The head of the pin 4^e moves out of engagement with the depressor 7^b before the turning movement of the frame is completed. Thus the spring 4^r causes the frame to move into contact with the end of the depending projection 4^p and thereafter snaps the frame into contact with the arm immediately the next recess 4^q is moved into register with the projection 4^p.

Each frame 4^d is provided with a passageway 4^g which communicates with the space between the jaws 4^h of the gripper (see Figs. 7, 8 and 9).

These jaws are adapted when closed, to form a substantially imperforate pocket having its rear end communicating with the passageway 4^g and its front end provided with an opening 4^i for a purpose hereinafter described. The bag making material is adapted, as hereinafter described to extend across the space between the jaws, project beyond the sides and front end thereof and be gripped between the said sides.

The opposed outer ends of each frame 4^d are provided with open bearings or rounded surfaces 4^j on which the top and bottom walls 4^k of a pair of jaws are pivoted. These walls are formed of inserts made of springy material having their free ends rounded to fit the surfaces 4^j. Each set of jaws is also pivotally connected with one another by means of a pin 4^l which extends transversely of the jaws across the front or outer end of the passageway 4^g and engages open bearings in the sides of the jaws. As the jaws are swung on their pivots 4^j to close the jaws, the pin 4^l is moved rearwardly relative to the pivots and when the pin moves beyond an imaginary center line through the pivots 4^j, the spring walls 4^k snap the jaws closed. Similarly as the jaws are opened against the pressure of the spring walls 4^k, the pin 4^l is moved forwardly relative to the pivots 4^j and when the pin is moved past the dead center of the said pivots, the jaws will remain open. These pivotal connections and spring walls 4^k thus form a snap-over mechanism whereby the jaws of each set or pair may be closed by moving only one of the jaws towards its closed position and the jaws may be opened by moving the pin 4^l longitudinally of the frame (or the jaws) past the dead center of the pivots 4^j.

Measuring and directing mechanism for the filling material

The tea or other material with which the bags are filled is carried in a hopper 8 secured to the carrier shaft 3^e (see Figs. 1, 3 and 4). In the bottom of the hopper are formed a plurality of holes in which are suitably secured tubular chambers 8^c. The tubular chambers 8^c depend from the bottom of the hopper and are adapted to be telescopically fitted in holes, forming chambers 8^d, which are formed in a ring 8^e. By raising and lowering the ring 8^e relative to the bottom of the hopper, it is obvious that the capacities of the telescopic chambers 8^c, 8^d will be varied. The ring is supported on a non-rotating disk 8^f which is axially movable on the shaft 3^e and is sup-

ported on a nut 48h. The nut is threaded on the upper end of the bearing 48i in which the shaft 3e is journalled. By turning the nut 48h, the disk 8f and the ring 8e are moved axially away from or towards the bottom of the hopper 8. A lock nut is provided to restrain movement of the nut 48h after it has been adjusted.

The tea in the hopper drops into the chambers 8c and 8d, and the disk 8f (over which the ring 8e rotates) prevents the tea from spilling through the chambers until they reach a discharge opening 8l in the disk. This opening is closable by a slide which moves in a slot in the upper surface of the disk so that the upper surface of the slide will be flush with the upper surface of the disk. To prevent the tea within the hopper above the measuring chambers from passing through the chambers as they come into register with the discharge opening and to ensure all the contents of the measuring chamber in register with the discharge opening being discharged therethrough, I provide a scraper 8n which is held from rotation in the hopper just above the upper surface of the bottom thereof and provide this scraper with an air vent tube 8o which extends upwardly above the upper end of the hopper to establish communication with the atmosphere and the chamber in register with the discharge opening. On the underside of the disk 8f is carried a spout 21 which communicates with the discharge opening 8l.

Above the gripper carrier 2, at one end thereof, is a nozzle carrier 22 comprising an endless chain meshed with a sprocket 23 secured to the shaft 3e which also drives the carrier 2 and the hopper 8. The other end of the chain nozzle carrier 22 passes round an idler sprocket 24 which is smaller in diameter than the sprocket 23 and which is so positioned on the machine that only a portion of the carrier 22 will overlie a portion of the carrier 2. The carrier 22 is supported intermediate its ends by a flange on a short bridge 25 which is suitably supported by the bridge 3. On the carrier 22 are suitably mounted a plurality of guides 23 in each of which is mounted a slide 27 carrying a nozzle 28, the latter being adapted to be received in the opening 4i of a gripper 4. Each slide is provided with a lateral extension, such as an antifriction roller 29 which runs in a cam track 30. The latter has high and low portions 31, 32 for causing the nozzles 28 to be raised and lowered vertically out of and into position for co-operation with the gripper jaws 4h.

As the nozzles 28 move from the idler sprocket 24 to the drive sprocket 23 and towards the spout 21, the rollers 29 move down the inclined portion of the cam track 30 from the high portion 31 to the low portion 32 whereby the nozzles 28 are lowered, one by one, into co-operative position with the grippers 4 while the jaws thereof are open. Before the grippers pass beneath the spout, the jaws are closed around the nozzles. As each gripper and nozzle passes beneath the spout they receive the contents of a chamber 8c, 8d. After the nozzles and grippers pass the spout, the rollers 29 move up the inclined portion of the track 30 to the high portion 31 thereof and fully withdraw the nozzles from the closed jaws of the grippers. Thereafter the nozzles move across the machine and out of the path of the grippers as they travel from the sprocket 23 to the idler sprocket 24. After the nozzles move around the idler sprocket 24, they again move into vertical alinement with fresh grippers. The nozzles are then lowered into co-operative position with the new grippers and the cycle is completed as above described.

It is desirable to maintain a predetermined level of tea in the hopper 8 otherwise the quantities of tea in the measuring chambers 8c, 8d are likely to vary. A tea spout 8v leading from a suitable source of supply has its discharge end directed into the hopper (see Figs. 4 and 1). A closure 8w for the discharge end of the spout is pivoted on any suitable part, such as the rod 8x for carrying the scraper 8n and the air vent tube 8o, to swing across the underside of the mouth of the spout 8v and thus regulate the quantity of tea discharged therefrom. The central portion of the bottom of the hopper is raised by means of a conical bottom 8y which leaves an annular space for tea above the measuring chambers. The closure 8w extends across the hub and its free end carries a plate 8z adapted to be engaged by the tea in the annular space. As the tea is revolved with the hopper it tends to move the plate with it and thus moves the closure to its position for closing the mouth of the spout. The closure is spring actuated to tend to hold it at least partly open so that the higher the level of the tea in the annular space, the greater the pressure against the plate to overcome the spring.

Bag material feeding and cutting mechanism

The bag making material 9a is drawn by the grippers 4 from a supply roll 9c, which is journalled on a bracket 9d secured to any suitable part of the frame 1. Any suitable means, such as an arm 9i resting on the surface of the roll 9c, may be employed to serve as a brake. The lead end of the bag making material 9a is passed around a stud 9b, under a finger 9e, then under a V shaped spreader 9j, the latter being adapted to spread the bag material to receive the nozzles 28 as they descend into co-operative position with the open gripper jaws 4h, and finally the lead end is gripped between the constantly advancing gripper jaws when they are closed around the nozzles. See Figures 2 and 10.

The stud 9b is carried on a link 9g pivotally mounted on the bracket 9d so that the stud may be adjusted vertically. The bracket also carries a vertically adjustable offset spindle 9f on which the finger 9e and the spreader 9j are so carried that they may be adjusted relative to one another and to the offset portion of the spindle. Thus the finger and spreader are adjustable vertically by means of the spindle and may be adjusted relative to the latter to cause the strip of bag making material to be spread in the shape of a V which facilitates the entrance of the nozzles 28 between the sides of the bag making material at the latter, the nozzles and the open grippers 4 are moving towards the filling spout 21. To center the bag making material relative to the open gripper jaws 4h (which are also spread apart in the shape of a V), the upper ends of the sides of the V shaped spreader 9j are provided with guides 9h for engaging the edges of the B shaped strip of material.

The jaws 4h of each gripper are closed to grip the strip material around a nozzle 28 before the latter reaches the spout 21. The jaws of each gripper may be closed by one of them being engaged by or engaging any suitable means such as a rubber-covered roller 4m, journalled on an arm carried by the frame 1, see Figs. 1 and 2.

A cloth knife 11 (see Figs. 5 and 6) is oscillated transversely of the strip of bag making material 9a between adjacent closed grippers 4

and is actuated to cut the strip, while moving longitudinally with it, to form bag sections 9. The knife comprises a fixed shear blade 11a carried by a lever 11c which is pivoted on an axially movable shaft 12 on opposite side of a collar secured thereto. The lever is thus axially moved with the shaft 12 but is free to oscillate thereon. The shaft is moved at substantially the same rate of speed as that of the grippers 4.

The fixed blade 11a is secured to a bracket 11d which is adjustably carried on one end of the lever 11c. On the fixed blade is pivoted a movable blade 11b which is normally positioned in spaced relationship to the fixed blade so that the blades pass on opposite sides of the folded strip of material 9a as the lever is rocked upwardly. A cam 11e secured to a rotating shaft 10 engages an anti-friction roller journalled on the other end of the lever 11c. The width of the cam is such that the lever may move longitudinally of the machine while the lever is being rocked by the cam.

The movable blade 11b is moved relative to the fixed blade 11a by a link 11f adjustably secured to the movable blade and pivotally connected with a pivoted arm 11g. A cam 11h secured to the shaft 10 actuates the arm 11g, and the pivotal connection between the latter and one end of the link permits the other end thereof to move longitudinally of the machine with the lever 11c so that the cut is made while the knife blades are moving with the bag material 9a. After the bag material is cut, spring means 11i connected with the arm 11g cause the link 11f to be moved to open the knife blades. The cam 11e then causes the lever 11c to be rocked to move the blades out of the path of the grippers 4 whereupon the lever is moved by the shaft 12 longitudinally of the machine in the direction opposite to the travel of the grippers. A spring 11k rocks the lever to move the open blades upwardly again after they have thus been positioned ahead of the next gripper. The blades then move with the bag material and the grippers and are actuated again by the cam 11h to cut the material whereby each gripper carries a bag section 9.

Filling mechanism

After the bag sections are formed and while the nozzles 28 are still positioned in the grippers 4, they pass beneath the spout 21 and each nozzle receives tea from a set of measuring chambers 8c, 8d. As each set of said chambers moves into register with the discharge opening 8i and beneath the air vented scraper 8n, the tea drops by gravity through the spout and into the nozzle passing beneath the spout. The nozzles are provided with flared upper ends to prevent any tea from spilling.

It will be understood that during the hereinbefore described operations, the gripper jaws 4h are directed upwardly by the engagement of the fingers 4c with the rail 6 which causes the gripper carrying arms 4a to be rocked on their horizontal pivots 4b and retained in this position. The rail 6 extends from a point, adjacent the bag making material supply roll 9c at one side of the machine, along the said side and around the hopper end of the machine past the point where the nozzles 28 are withdrawn from the gripper jaws. As the nozzles are being withdrawn upwardly through the bag sections 9, any tea in the nozzles passes into the bag sections so that each bag section receives the full amount of tea which has been measured by the chambers 8c, 8d.

Thus, it will be seen that in the operation of the machine the nozzles 28 are lowered between the walls of the V-shaped strip of bag forming material and the gripper jaws are closed upon the strip and about the nozzles prior to arriving at the filling mechanism. By such arrangement each bag section is in readiness to receive its charge from the feeding hopper as soon as it arrives at a point of tangency with the hopper, thus allowing ample time for the operation of the gravity filling device to deposit its charge whereby a relatively higher speed of production may be obtained.

After receiving its charge of tea, each bag section is carried by a gripper past surging machines indicated generally at 15, 15a, 15b and 15c, which operate to sew the open edges of the bags as presented thereto by the grippers and also to stitch a tag 17 to each bag section in a manner similar to that disclosed in Patent No. 2,071,244 above referred to, and, since such mechanisms do not form a part of the present invention, further description thereof is deemed unnecessary.

The completed bag may then be discharged from its gripper by a transfer mechanism, indicated generally at 34, which operates to deposit successive bags upon a discharge conveyor 20 to be carried away from the machine.

While the preferred embodiment of the invention has been herein illustrated and described, it will be understood that the invention may be embodied in other forms within the scope of the following claims.

What I claim as my invention is:

1. In a packaging machine, in combination, an elongated endless carrier provided with a plurality of equally spaced gripper members each comprising a pair of jaws, means for advancing a V-shaped strip of bag forming material between the open jaws of said grippers, a second elongated endless carrier provided with a plurality of spaced nozzles arranged to be advanced in alignment with said gripper members, means for lowering said nozzles between the walls of said V-shaped strip, material feeding means for depositing a charge of material into successive nozzles, and means for closing successive of said gripper jaws upon said V-shaped strip and about said nozzles prior to arriving at said material feeding means.

2. In a packaging machine, in combination, an elongated endless carrier provided with a plurality of equally spaced gripper members each comprising a pair of jaws, means for advancing a V-shaped strip of bag forming material between the open jaws of said grippers, a second elongated endless carrier shorter than said first mentioned carrier and provided with a plurality of spaced nozzles arranged to be advanced in alignment with the gripper members of a portion of said first mentioned carrier, means for lowering the nozzles between the walls of said V-shaped strip as they arrive in alignment with said grippers, material feeding means for depositing a charge of material into successive lowered nozzles, and means for closing successive of said gripper jaws upon said V-shaped strip and about said nozzles prior to arriving at said material feeding means.

3. In a packaging machine, in combination, an elongated endless carrier provided with a plurality of equally spaced gripper members each comprising a pair of jaws, means for guiding the

carrier around opposite ends of the machine, means for advancing a V-shaped strip of bag forming material between the open jaws of said grippers, a second elongated endless carrier having at least one end concentric with said gripper carrier and provided with a plurality of spaced nozzles arranged to be advanced in alignment with the gripper members of a portion of said gripper carrier, means for lowering the nozzles between the walls of said V-shaped strip, material feeding means including a rotary hopper concentric with said one end of the carriers for depositing a charge of material into successive nozzles, and means for closing successive of said gripper jaws upon said V-shaped strip and about said nozzles prior to arriving at said material feeding means.

4. In a packaging machine, in combination, an elongated endless carrier provided with a plurality of equally spaced gripper members each comprising a pair of jaws, means for advancing a V-shaped strip of bag forming material between the open jaws of said grippers, a second elongated endless carrier concentric with one end of said gripper carrier and having a straight line portion in alignment with said gripper carrier, said second carrier being provided with a plurality of spaced nozzles arranged to be advanced in alignment with said gripper members, means for lowering the nozzles between the walls of said V-shaped strip, material feeding means including a rotary hopper concentric with said one end of the carriers for depositing a charge of material into successive nozzles, and means for closing successive of said gripper jaws upon said V-shaped strip and about said nozzles while traversing through said straight line portion and prior to arriving at said material feeding means.

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