

- [54] **APPARATUS FOR PACKING PLASTIC BAGS WITH CONTENTS OF CONSTANT AND PRESELECTED WEIGHT AND OPERATING IN A CONTINUOUS AND AUTOMATIC CYCLE .**

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- [30] **Foreign Application Priority Data**

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53/384

- [51] **Int. Cl.²... B65B 1/02; B65B 9/12; B65B 41/14**

- [58] **Field of Search** **53/183, 180, 182, 191,**
53/389, 193, 138 A, 137, 187, 198 A, 384

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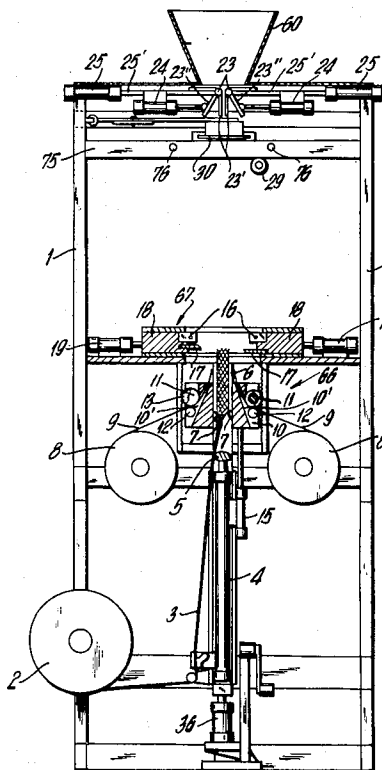
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- [57] **ABSTRACT**

A vertically reciprocable clamp embraces the end of flattened plastic tubing wound on a reel and clamps the same against a clamping insert in the end of the tubing and resting freely on inwardly projecting portions of the outer clamp, and a length of the flattened tubing, equal to the height of the bag, is drawn upwardly in a supporting frame and through a sealing, cutting and gripping station. The upper end of the drawn length is gripped by nippers, and the outer clamp and the insert are then withdrawn downwardly. A sealing device at the sealing, cutting and gripping station then seals the lower end of the drawn length to form a bag, and a cutting device cuts the formed bag from the length of flattened tubing. Grips at the sealing, cutting and gripping station then lift the sealed lower end of the bag, and the nippers are actuated to open the upper end of the bag for discharge of the contents into the bag. A further sealing device adjacent the nippers then seals the open upper end of the filled bag, after which the filled bag is released for delivery. The operation is cyclically repeated in an automatic and continuous repetitive cycle.

9 Claims, 20 Drawing Figures



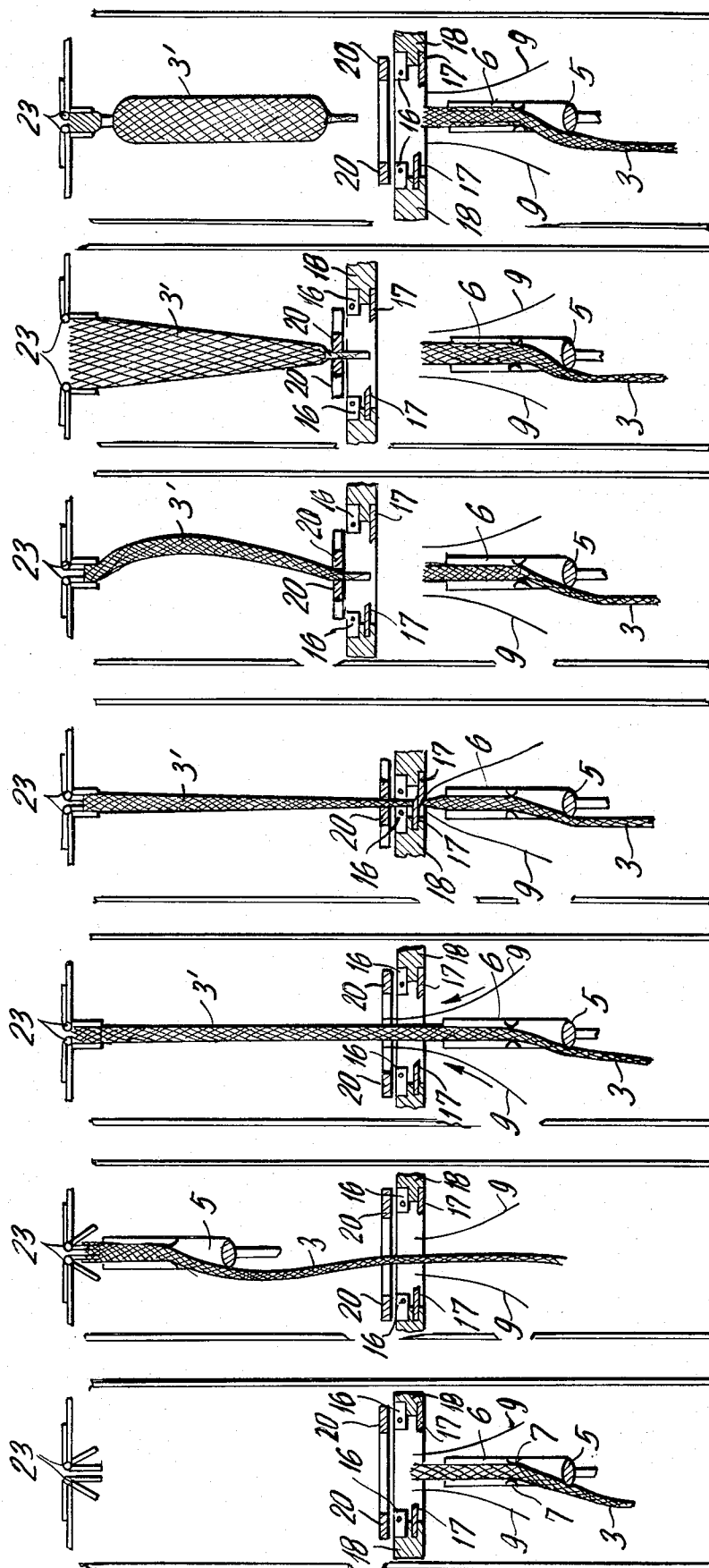


FIG. 1 FIG. 2 FIG. 3 FIG. 4 FIG. 5 FIG. 6 FIG. 7

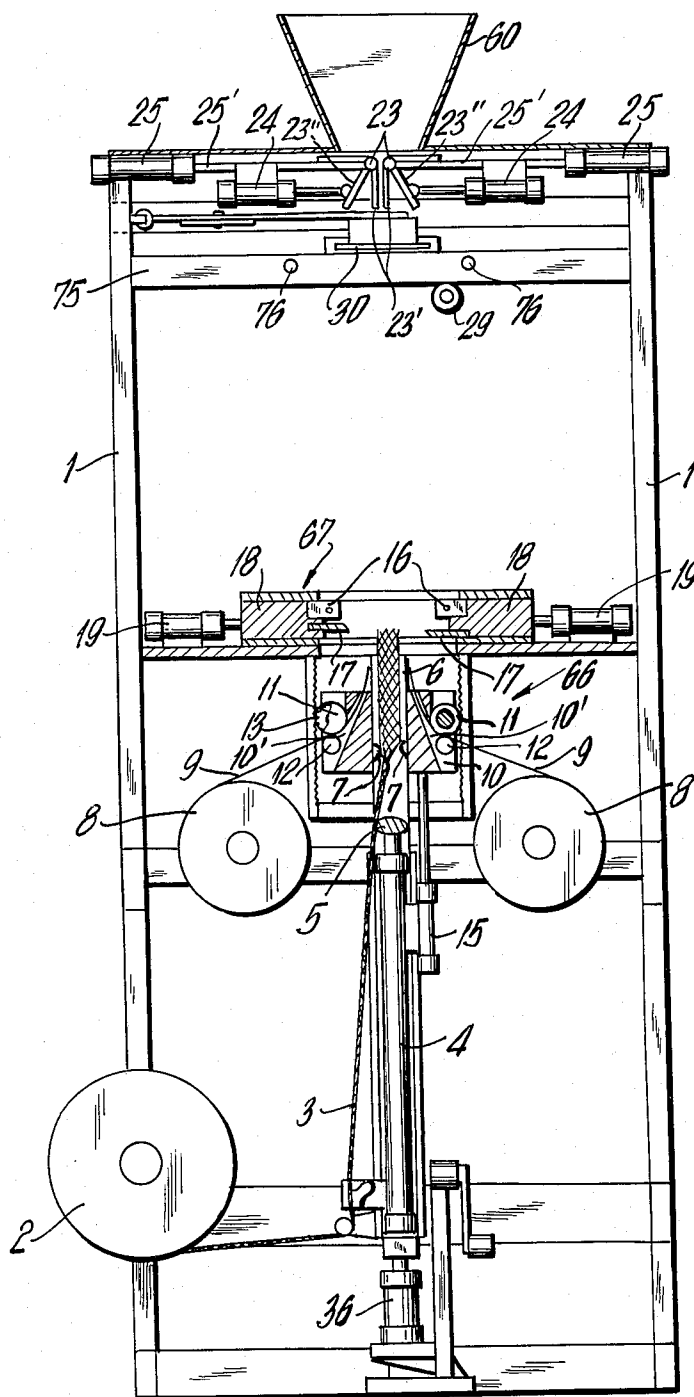


FIG. 8

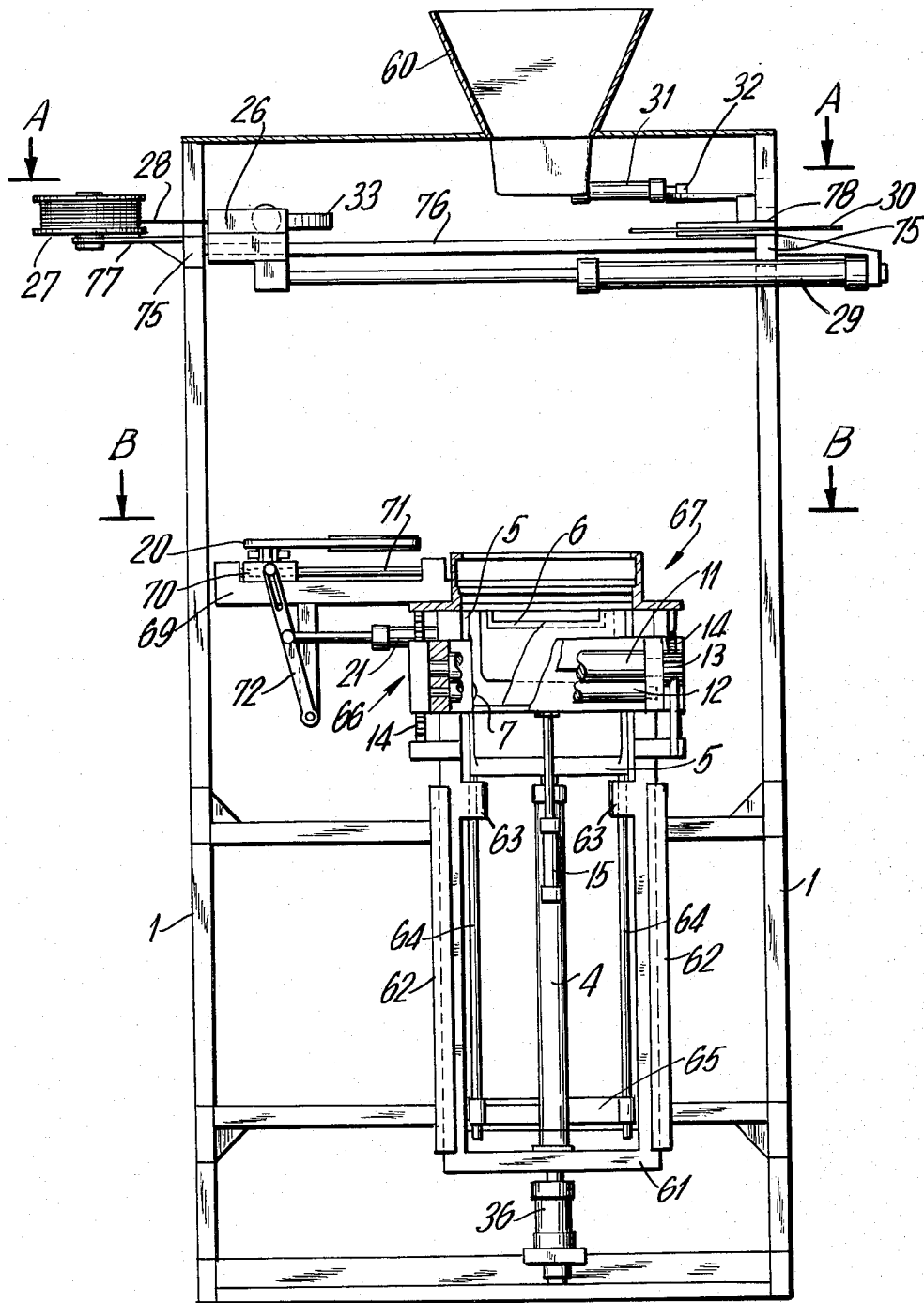


FIG.9

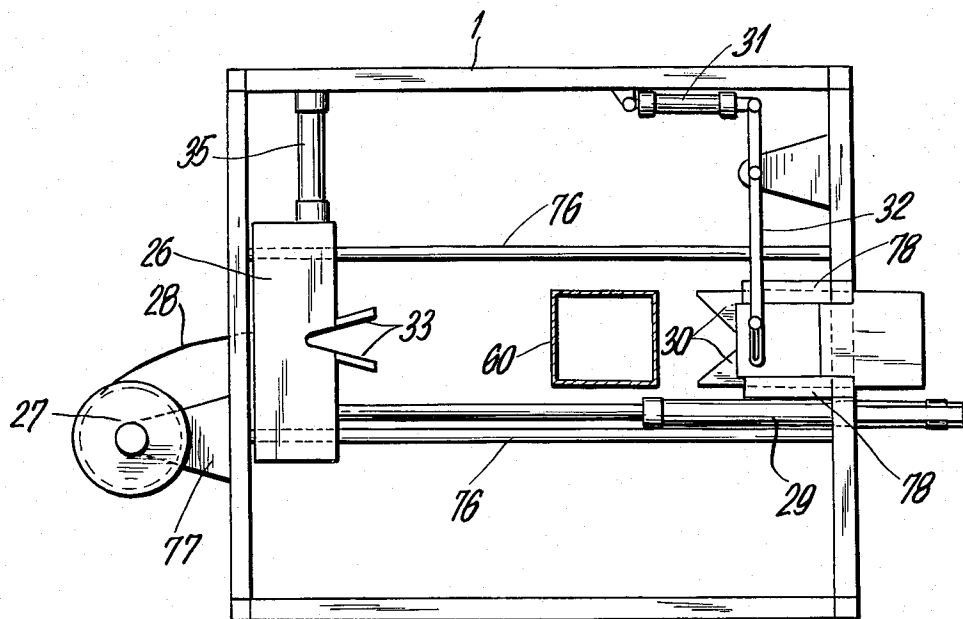


FIG. 10

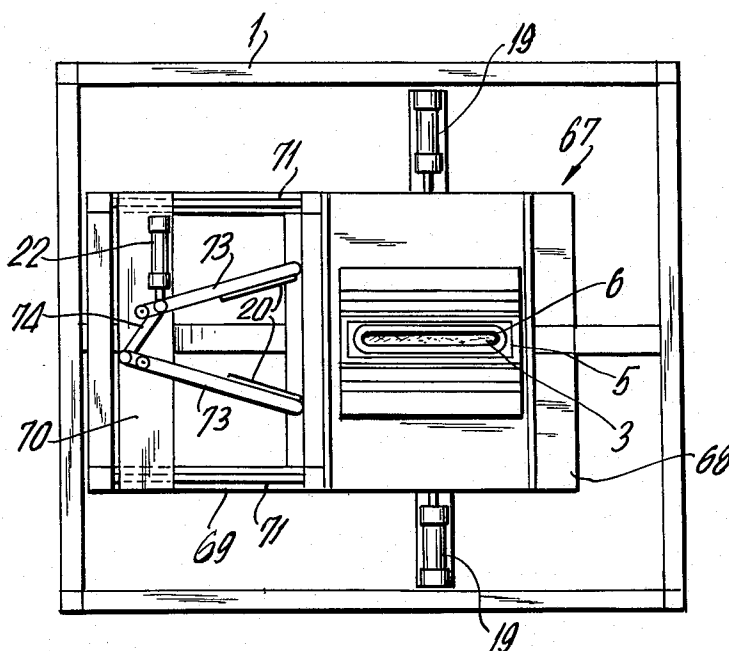


FIG. 11

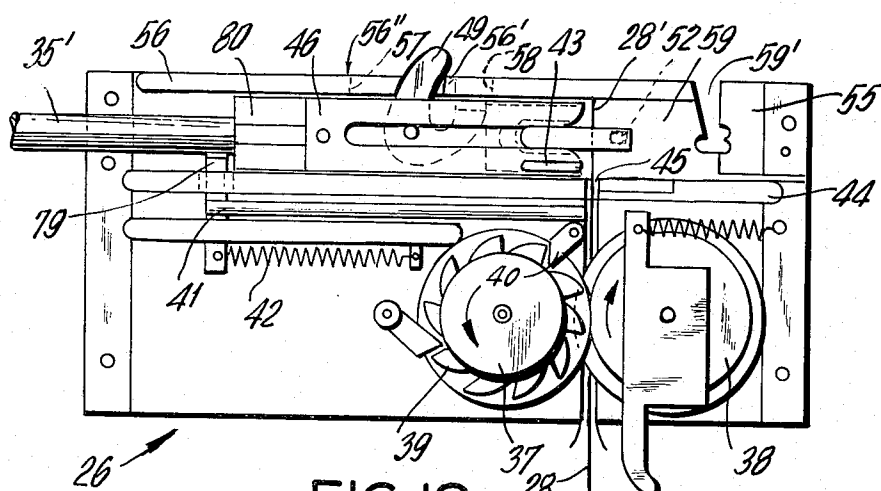


FIG. 12

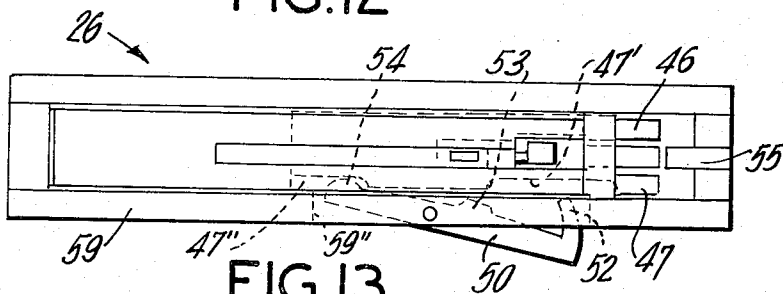


FIG. 13

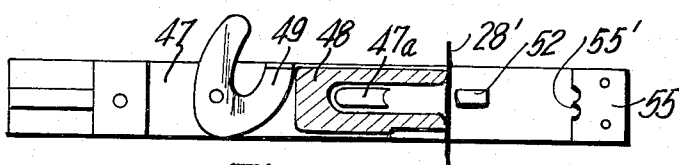


FIG. 14

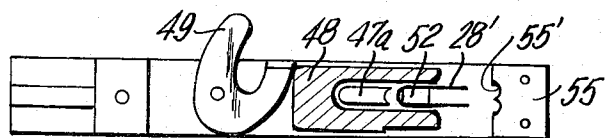


FIG. 15

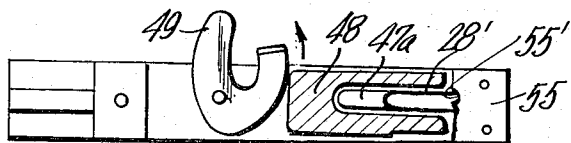


FIG. 16

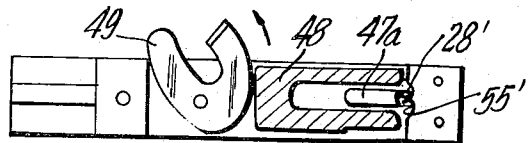


FIG. 17

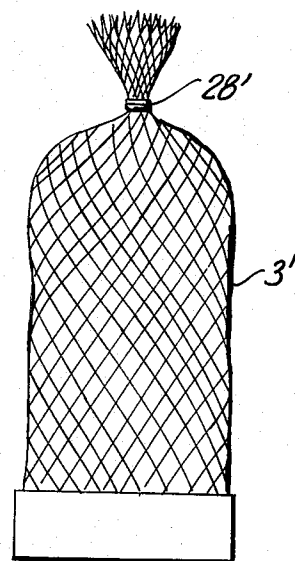


FIG. 18

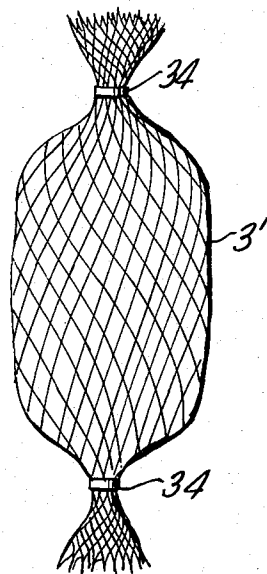


FIG. 19



FIG. 20

APPARATUS FOR PACKING PLASTIC BAGS WITH CONTENTS OF CONSTANT AND PRESELECTED WEIGHT AND OPERATING IN A CONTINUOUS AND AUTOMATIC CYCLE

FIELD AND BACKGROUND OF THE INVENTION

This invention relates to apparatus for packing bags with contents of constant and preselected weight by forming, filling and sealing the bags automatically and continuously in a repetitive cycle and, more particularly, to a novel and improved apparatus of this type.

It is a known problem, especially in the food industry, to pack, that is, to fill and seal, in large numbers, bags and small sacks with various products having a constant and preselected or pre-established weight. This problem affects among others, a broad gamut of horticultural products which are usually sold by weight. There is accordingly a demand for efficient apparatus, operating in a continuous and automatic cycle, to pack bags and small sacks, of netting or tubular plastic laminate, with products of a roundish form and of moderate dimensions, such as potatoes, onions, oranges, nuts and the like.

SUMMARY OF THE INVENTION

To solve this problem, the apparatus of the invention includes means for storing an envelope of continuous tubular or netting type plastic material, and means for advancing, in a vertical ascent, a length of the envelope corresponding to the height of the bag. The apparatus includes means for gripping the upper end of the vertically oriented envelope, and having the further function of opening and closing the open upper end of the envelope. Means are provided to seal the bottom end of the envelope to form an open top bag, and cutting means sever the open top bag from the remaining portion of the envelope. Gripping means are operable to grip the open top bag above its bottom end and to raise the bottom of the bag, while the top of the bag is opened to receive the contents. After the bag is filled, further sealing means seal the open upper end of the bag.

The apparatus further includes means for controlling the movement of the various sliding and/or rotating parts, means for programming the various operations constituting the operating cycle, and means for intervening in the pre-established cycle.

An object of the invention is to provide improved apparatus for packing bags with contents of constant and preselected weight.

Another object of the invention is to provide such an improved apparatus for forming, filling and sealing the bags automatically and continuously in a repetitive cycle.

A further object of the invention is to provide such an apparatus which is simple in construction, reliable in operation, and economical to manufacture and to operate.

For an understanding of the principles of the invention, reference is made to the following description of typical embodiments thereof as illustrated in the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

In the Drawings:

FIGS. 1 through 7 are partial elevation views of apparatus embodying the invention, and representing, in or-

der, the essential operations for forming, filling and sealing bags automatically and continuously in a repetitive cycle.

FIG. 8 is a front elevation view, partly in section, of apparatus embodying the invention;

FIG. 9 is a side elevation view, partly broken away and partly in section, of the apparatus shown in FIG. 8;

FIG. 10 is a horizontal sectional view taken on the line A—A of FIG. 9;

FIG. 11 is a horizontal sectional view taken along the line B—B of FIG. 9;

FIG. 12 is a plan view of a wire stitcher forming part of the apparatus;

FIG. 13 is a front elevation view of the wire stitcher shown in FIG. 12;

FIGS. 14, 15, 16 and 17 are vertical sectional views illustrating the successive steps in the formation of a seal fastener;

FIGS. 18 and 19 are elevation views of two types of network bags formed in accordance with the invention, having respectively different bottom closures; and

FIG. 20 is a perspective view illustrating a detail of a seal fastener.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring first to FIGS. 1 through 11, the apparatus embodying the invention includes a tower-type frame 1 having mounted, adjacent its lower end, a rotatable spool or reel 2 for storing a continuous flattened tubular envelope 3 of synthetic resin material, and preferably in the form of a tubular netting. A vertically oriented piston-cylinder fluid pressure actuator 4 is arranged to vertically reciprocate a box-form outer clamp 5, which is open at its top and at its sides, and whose function it is to grip and hold open the tubular envelope at the upper end or mouth of each bag to be formed. For this purpose, outer clamp 5 cooperates with an insert or block 6, of substantially parallelepiped form, within the envelope 3, insert or block 6 is arranged to have a rounded lower or base end and being supported by horizontally extending internal projections 7 of outer clamp 5.

Actuator 4 is mounted is a rectangular U-shaped frame 61 mounted for vertical reciprocation in upright guides 62 supported in main frame 1. Reciprocation of frame 61 is effected by a vertically oriented piston-cylinder fluid pressure actuator 36 secured to the bottom cross member of the frame. Frame 61 carries bearings 63 through which are slidably guided rods 64 whose upper ends are connected to outer clamp 5, the lower ends of rods 64 being interconnected by a cross-member 65. Thus, not only is frame 61 vertically reciprocable, for a purpose to be described, but also rods 64 and outer frame 5, together with insert 6, are vertically reciprocable relative to frame 61.

At substantially the mid-height of frame 1, a cross-member of the frame supports two rotatable spools 8 having wound thereon respective strips 9 of thermoplastic material serving as sealing labels. An assembly, generally indicated at 66, is connected to actuator 4 through the outer clamp 5 at the rods 63. A guide 10, formed with inwardly and upwardly converging guide slots 10' for the labels 9, is reciprocable vertically of assembly 66 under the action of a piston-cylinder fluid pressure actuator 15 mounted on the actuator 4. Two pairs of cooperating rollers 11 and 12, for entraining

labels 9, are rotatably mounted in guide 10 adjacent the slots 10', and rotation of the rolls is effected by respective rack and pinion groups 13 and 14 which act only during the vertical upward movement of guide 10 effected by actuator 15.

Above the assembly 66, there is an envelope gripping, sealing and cutting assembly 67 supported on the upper ends of the legs of rectangular U-shaped frame 61. Assembly 67 includes a pair of horizontally reciprocable supports 18 each supporting a respective heat sealing or welding bar 16 and a respective shearing or cutting blade 17. Supports 18 are horizontally reciprocated toward and away from each other, to effect a sealing and cutting operation, by horizontally oriented piston-cylinder fluid pressure actuators 19. The supports 18 are slidably mounted, and guided for horizontal movement, on a substantially horizontal guide structure 68. Guide structure 68 is formed with an extension 69 extending therefrom substantially perpendicular to the direction of movement of the supports 18, and extension 69 supports, for horizontal reciprocation, a slide 70 guided on guide rods 71. Slide 70 is reciprocated, at right angles to the direction of reciprocation of the supports 18, by a horizontally oriented piston-cylinder fluid pressure actuator 21 connected thereto through a swinging link 72. Slide 70 supports nipping means 20 comprising a pair of arms 73 pivotally mounted on slide 70 and articulatedly connected by a link 74 for conjoint opening and closing movement by the action of a horizontally oriented piston-cylinder fluid pressure actuator 22 mounted on slide 70. The nipper or nipping means 20 has the function of gripping the envelope 3 after the formation or closing of the bottom of the bag.

At the top of frame 1, two vertically oriented nipper assemblies 23 are supported at the outer ends of the piston rods 25' of respective horizontally oriented piston-cylinder fluid pressure actuators 25 mounted on frame 1. Each nipper assembly 23 includes a substantially vertically oriented fixed arm 23' and a pivoted arm 23''. The nipper assemblies 23 are closed and opened by respective horizontally oriented piston-cylinder fluid pressure actuators 24, each mounted on a respective piston rod 25' and each connected to a respective pivoted arm 23'. Nipper assemblies 23 have the function of receiving and gripping the open upper end of the envelope length 3' when this is advanced upwardly by the clamping arrangement 5-6, and the further function of opening the mouth of the bag for filling of the contents thereinto.

A short distance below the top of frame 1, a pair of frame cross-members 75 support two spaced and parallel guide rods 76 on which there is reciprocable a stitcher assembly generally indicated at 26. A cantilever support 77 extends outwardly from frame 1 and rotatably supports a spool 27 on which is wound a sealing wire or tape 28. Stitcher assembly 26 is horizontally reciprocated by a horizontally oriented piston-cylinder fluid pressure actuator 29 mounted on frame 1. Directly opposite stitcher assembly 26, a horizontally oriented forked plate 30 is slidably mounted in a pair of guides 78 for reciprocation toward and away from a bag held in the nipper assemblies 23. Forked plate 30 is horizontally reciprocated by a piston-cylinder fluid pressure actuator 31 articulated on frame 1, through the medium of a link 32, pivotally mounted intermediate its ends on frame 1 and having one end articulated

to the piston rod of actuator 31 and the other end articulated to plate 30. Forked plate 30 cooperates with a second fork 33 secured to stitcher assembly 26, and the two forked plates have the function of receiving and pressing or squeezing the envelope 3' near the upper end of the bag after the bag has been filled with its contents, as well as during the application of a seal fastener 34.

The products or contents are supplied to each bag from a hopper 60 mounted on the upper end of frame 1. The apparatus further includes automatic means for controlling the supply and exhaust of pressure fluid to the various operating cylinders, in the order and for the period required by the operating cycle. The distributor means have not been shown in the drawings, for the sake of simplicity, as such distributor means may be of any known type such as, for example, a distributor provided with valves operated by cams on a cam shaft. The various operating cylinders further include a piston-cylinder fluid pressure actuator 35 associated with the stitcher assembly 26.

Stitcher assembly 26 comprises means for advancing the metal wire or tape 28 drawn from spool 27, means for cutting a portion of the wire needed for the formation of a ringshape fastener around the neck of the bag, and means for fastening the wire portion around the neck of the bag. More particularly, the wire feeding means comprises, as best seen in FIG. 12, a pair of co-operating feeding rollers or rolls 37 and 38 mounted for rotation on vertical axes and having knurled external surfaces, the opposing surfaces of the two rolls being maintained close to each other. Roll 37 is fixed to a ratchet gear 39 concentric therewith, and is controlled to rotate in the feeding direction of the wire 28 by means of a pawl 40 mounted on the end of rod 41 and spring-biased into engagement with the teeth of ratchet wheel 39. Rod 41 has a stop 79 fixed to its opposite end and engageable by a stop 80 on the piston rod 35' of actuator 35 during return movement of stitcher assembly 26. A helical spring 42 biases rod 41 in the opposite or idling direction. Thus, wire 28 is advanced stepwise during each return movement or idle movement of stitcher assembly 26.

The wire cutting means comprises a straight blade 43 secured fixedly to the stitcher head 26 and cooperating with a diaphragm 44 having an aperture 45 through which the wire 28 extends. Straight blade 43 thus operates in the nature of a guillotine whenever the stitcher head, in its active course, covers aperture 45.

The means for forming the ring-type fastener comprise, essentially, a base 59 having a first transverse slot 59' for the passage of the neck of the bag, and also having a longitudinal slot 59'' for mounting a rocker arm 50. The fastener formation means further include an active head, formed by an upper plate 46 and a lower plate 47 which are superposed and secured to each other to define an intermediate space slidably receiving an intermediate plate 48 retained between a flap 47a of plate 47 and a pivotally mounted eccentric 49. A diaphragm 56 is secured to base 59 and has a double horizontal and longitudinal slot 57-58. Eccentric 49 is interposed between plates 46 and 47 for pivoting on a vertical axis, eccentric 49 being coplanar with intermediate plate 48. The rocker arm 50 is pivoted internally of base 59 for pivoting about a horizontal axis, and is formed with three lugs 52, 53 and 54 projecting verti-

cally from its upper edge. An anvil 55 is mounted opposite plate 48 and is coplanar therewith.

Eccentric 49 is shaped somewhat like a boomerang and has a shorter arm in contact with one end of plate 48. The eccentric is oscillated, in opposite directions during the alternating movement of the active head of the stitching assembly, by engagement of its longer arm against the post 56' of diaphragm 56, during the active movement of the head, and engagement of its longer arm against the post 56'' of diaphragm 56 during idle movement of the active head. This oscillation of eccentric 49 causes, respectively, the return and the forward movement of plate 48 relative to flap 47a of plate 47.

The three lugs 52, 53 and 54 of rocker arm 50 are insertable, respectively, in slot 59' of base 59, in a longitudinal groove 47' in the lower face of plate 47, and in a longitudinal groove 47'' also formed in the lower surface of plate 47, the position of the lugs 53 and 54 defining that of lug 52. In the position shown in FIG. 12, lug 54 is below the lower surface of plate 47 and lug 53 is within groove 47', so that lug 52 runs in the slot 59'' and hence is in a raised position with respect to base 59. In the position shown in FIG. 13, on the contrary, lug 54 is engaged in groove 47'', lug 53 is below the lower surface of plate 47, and lug 52 therefore engages beneath the lower surface of plate 47 and is in a lowered position relative thereto.

The ring-shaped fastener is formed in a manner which will now be described. From the position shown in FIG. 12, the active stitcher head, advancing toward the anvil 55 under the thrust of actuator 35, blade 43 cuts the portion 28' of wire 28 protruding from aperture 45, and wire portion 28' is retained between plates 46 and 47 of the active head, and horizontally in notches at the right end of the two arms of plate 48, as well as against the lug 52 as shown in FIG. 14. Subsequently, wire portion 28' is pressed by the two legs of plate 48 against lug 52 so that, while remaining tightly engaged between the inner flanks of the legs of plate 48 and the sides of lug 52, it is formed into a U-shape as shown in FIG. 15. Immediately thereafter, the convex part of wire portion 28' engages flap 47a of plate 47, while lug 52 descends beneath the slot 59'', as shown in FIG. 16. At this point, flap 47a strongly forces the free ends of wire portion 28' against the concavities or recesses 55' of anvil 55, causing the ends of wire portion 28' to be wound around each other to form a ring fastener around the neck of the bag, as shown in FIG. 17.

The overall operation of the apparatus will now be described. At the beginning of the operative cycle comprising the making up or formation of a bag, the apparatus is in the position illustrated in FIG. 1, FIG. 8, FIG. 9 and FIGS. 10 and 11, namely, with the actuators 4 and 36 at lower dead center, the welding bars 16 and cutting blades 17 spread apart, nippers 20 spread and off-center, forks 30 and 33 spread apart, and nippers 23 engaged but with their jaws or arms 23', 23'' open.

To form a bag, the apparatus performs a continuous and automatically operative cycle comprising, in order, the following operations:

1. Raising the outer clamp 5 by action of actuator 4 to the upper dead center to introduce the open end of the envelope 3 between the jaws of nippers 23, as shown in FIG. 2.
2. Closing of the jaws of nippers 23 by action of the cylinders 24 to grip the envelope at its upper end,

followed by lowering of clamp 5 to lower dead center, as shown in FIG. 3.

3. Advance of the label strips 9 by the action of cylinder 15 to reciprocate the guide 10 to rotate the rolls 11 and 12 through the medium of the rack and pinion groups 13 and 14.
4. Converging of welding bars 16 and cutting blades 17 toward the envelope by the operation of actuators 19, and advance of nipper 20, with subsequent closing of its jaws, by the action of actuators 21 and 22, for welding together the labels with the container interposed therebetween, cutting of the labels and container below the weld, and gripping of the envelope near its lower end but above the weld, as shown in FIG. 4.
5. Raising of the gripping, sealing and cutting assembly 67 by actuation of actuator 36 to its upper dead center position to hold the open top bag ready for filling, as illustrated in FIG. 5.
6. Spreading of nippers 23 apart by the respective cylinders 25 to open the mouth of the bag and to permit filling of the bag from hopper 60, as shown in FIG. 6.
7. Closing of nippers 23 by operation of actuators 25, converging of forks 30 and 33, and application of the seal fastener to the mouth of the bag by the action of stitcher assembly 26, as shown in FIG. 7.
8. Opening of the jaws of nipper 20 and retraction of the assembly 67 downwardly to the lower dead center position.
9. Opening of the jaws of nippers 23, retraction of stitcher assembly 26, and delivery of the formed, filled and sealed bag.

The bag formed according to the operating cycle just described is of the type shown in FIG. 18. As an alternative, the bag may be formed without the bottom weld, by means of two opposed thermoplastic labels, but with the bottom being sealed by a metallic ring-shape fastener, as shown in FIG. 19. In accordance with another alternative embodiment of the invention, the bags may be formed from a continuous tubular sheath of thermoplastic material or the like, the bottom and/or mouth of which are sealed in the manner described, or by welding.

While specific embodiments of the invention have been shown and described in detail to illustrate the application of the principles of the invention, it will be understood that the invention may be embodied otherwise without departing from such principles.

What is claimed is:

1. Apparatus for packing bags with contents of constant and preselected weight by forming, filling and sealing the bags automatically and continuously in a repetitive cycle, said apparatus comprising, in combination, drawing means operable to take, from a supply thereof, a length of tubular envelope equal to the height of the bag and to orient such length vertically; first gripping means operable to receive the length from said drawing means and to grip the upper end of such length to suspend the length; first sealing means operable to seal the bottom end of the suspended length to form an open top bag; second gripping means operable to grip and lift the bottom of the formed bag; spreading means, including said first gripping means, operable to spread open the upper end of the bag for filling of the contents into the bag; second sealing means operable to seal the upper end of the filled bag; means for storing

a continuous tubular envelope; said drawing means including means for holding spread and partially open the free end of the envelope, and means for gripping and extending vertically a portion of the envelope equal to the height of the bag; said first gripping means being further operable to open and close the free end of the vertically extended envelope portion; said first sealing means including cutting means operable to cut off the bag below the sealed bottom end thereof to sever the bag from the remaining length of the envelope; means operable to control the operation of said drawing, gripping, sealing and spreading means in accordance with a preselected program; said means for holding spread and partially open the free end of the envelope comprising a substantially parallelepiped block freely movable within the envelope; said drawing means comprising a box form outer clamp open at its top and laterally and surrounding said block; said outer clamp having inwardly extending projections maintaining said block against downward movement relative to said outer clamp.

2. Apparatus for packing bags, as claimed in claim 1, including a vertically oriented fluid pressure actuator connected to said outer clamp to move said outer clamp vertically to extend a portion of the envelope equal to the height of the bag.

3. Apparatus for packing bags with contents of constant and preselected weight by forming, filling and sealing the bag automatically and continuously in a repetitive cycle, said apparatus comprising, in combination, drawing means operable to take, from a supply thereof, a length of tubular envelope equal to the height of the bag and to orient such length vertically; first gripping means operable to receive the length from said drawing means and to grip the upper end of such length to suspend the length; first sealing means operable to seal the bottom end of the suspended length to form an open top bag; second gripping means operable to grip and lift the bottom of the formed bag; spreading means, including said first gripping means, operable to spread open the upper end of the bag for filling of the contents into the bag; second sealing means operable to seal the upper end of the filled bag; means for storing a continuous tubular envelope; said drawing means including means for holding spread and partially open the free end of the envelope, and means for gripping and extending vertically a portion of the envelope equal to the height of the bag; said first gripping means being further operable to open and close the free end of the vertically extended envelope portion; said first sealing means including cutting means operable to cut off the bag below the sealed bottom end thereof to sever the bag from the remaining length of the envelope; means operable to control the operation of said drawing, gripping, sealing and spreading means in accordance with a preselected program; said first sealing means comprising a pair of rotatable spools each having wound thereon a respective strip of thermoplastic material; respective pairs of rollers operable to feed each tape into engagement with the bottom end of the suspended length of envelopes; a guide rotatably mounting said pairs of cylinders and formed with respective guide slots for each strip of thermoplastic material; respective rack and pinion assemblies associated with each pair of rolls to rotate the same responsive to vertical reciprocation of said guide; a fluid pressure actuator operable to reciprocate said guide vertically; said first sealing

means further including a pair of supports mounted for movement horizontally toward and away from each other; respective horizontally oriented welding bars on each support; and respective horizontally oriented fluid pressure actuators engaged with said supports to move said welding bars toward each other to engage and heat seal said tapes to the suspended length of envelope and to seal the bottom end of the suspended length.

4. Apparatus for packing bags, as claimed in claim 3, including respective shearing blades carried by said supports below the associated welding bars to sever the bag from the continuous envelope.

5. Apparatus for packing bags with contents of constant and preselected weight by forming, filling and sealing the bags automatically and continuously in a repetitive cycle, said apparatus comprising, in combination, drawing means operable to take, from a supply thereof, a length of tubular envelope equal to the height of the bag and to orient such length vertically; first gripping means operable to receive the length from said drawing means and to grip the upper end of such length to suspend the length; first sealing means operable to seal the bottom end of the suspended length to form an open top bag; second gripping means operable to grip and lift the bottom of the formed bag; spreading means, including said first gripping means, operable to spread open the upper end of the bag for filling of the contents into the bag; second sealing means operable to seal the upper end of the filled bag; means for storing a continuous tubular envelope; said drawing means including means for holding spread and partially open the free end of the envelope, and means for gripping and extending vertically a portion of the envelope equal to the height of the bag; said first gripping means being further operable to open and close the free end of the vertically extended envelope portion; said first sealing means including cutting means operable to cut off the bag below the sealed bottom end thereof to sever the bag from the remaining length of the envelope; means operable to control the operation of said drawing, gripping, sealing and spreading means in accordance with a preselected program; said second gripping means comprising a flat-tipped nipper having a pair of jaws pivotally interconnected for pivotal movement about a vertical axis; a first horizontally oriented fluid pressure actuator operable to open and close said jaws; and a second horizontally oriented fluid pressure actuator operable to move said flat-tipped nipper horizontally toward and away from the bottom end of said suspended length.

6. Apparatus for packing bags, as claimed in claim 5, including a support for said second gripping means; and a third vertically oriented fluid pressure actuator engageable with said support and operable, when said nipper is in gripping relation with the bottom end of the suspended length, to lift said gripper.

7. Apparatus for packing bags with contents of constant and preselected weight by forming, filling and sealing the bags automatically and continuously in a repetitive cycle, said apparatus comprising, in combination, drawing means operable to take, from a supply thereof, a length of tubular envelope equal to the height of the bag and to orient such length vertically; first gripping means operable to receive the length from said drawing means and to grip the upper end of such length to suspend the length; first sealing means operable to seal the bottom end of the suspended length to

form an open top bag; second gripping means operable to grip and lift the bottom of the formed bag; spreading means, including said first gripping means, operable to spread open the upper end of the bag for filling of the contents into the bag; second sealing means operable to seal the upper end of the filled bag; means for storing a continuous tubular envelope; said drawing means including means for holding spread and partially open the free end of the envelope, and means for gripping and extending vertically a portion of the envelope equal to the height of the bag; said first gripping means being further operable to open and close the free end of the vertically extended envelope portion; said first sealing means including cutting means operable to cut off the bag below the sealed bottom end thereof to sever the bag from the remaining length of the envelope; means operable to control the operation of said drawing, gripping, sealing and spreading means in accordance with a preselected program; said second sealing means comprising closing means operable to close the mouth of the bag after filling of the bag and while the bag is held by said second gripping means; said closing means comprising two horizontally opposed forks mounted for horizontal sliding movement toward each other into overlapping relation to engage and close the mouth of the bag; respective horizontally oriented fluid pressure actuators connected to each fork and operable to move said forks simultaneously toward each other and simultaneously away from each other; one of said fluid pressure actuators being connected directly to one fork and the other fluid pressure actuator being articulated to the other fork through a lever pivoted intermediate its ends; said second sealing means comprising an automatic stitcher operable to clamp an elongated metal element around the closed mouth of the bag to form an annular fastener sealing the closed mouth of the bag; said automatic stitcher comprising a rotatable spool having wound thereon an elongated length of fastener forming metal; means operable to intermittently draw, from said spool, a length of metal sufficient to form a ring fastener; means operable to cut said length of metal from the remaining length of metal; and means operable to form said length of metal into an annular fastener embracing the neck of the filled bag; said means operable to intermittently draw the length of metal from said spool comprising a pair of cooperating rolls rotatable on parallel axes with their peripheries in closely spaced relation; one of said rolls being freely rotatable on a support; means biasing said support to force said one roll against the other roll; a ratchet gear fixed to rotate with said other roll; a pawl operable to rotate said other roll in a metal length feeding direction; said stitcher including a stitcher head reciprocable toward and away from said second gripping means; an elongated bar connected to said pawl and operable, responsive to reciprocation of said stitcher head away from said second gripping means, to operate said pawl

to rotate said ratchet gear; and spring means connected to said bar and biasing said bar in the opposite direction during movement of said stitcher head toward said second gripping means.

8. Apparatus for packing bags, as claimed in claim 7, in which said cutting means of said stitcher head includes a diaphragm formed with an aperture through which the length of metal extends, an active head of said stitcher reciprocable toward and away from said second gripping means, and a straight blade secured to said active head and movable along said diaphragm across said aperture, during advance of said active head toward said second gripping means, to sever a short length of the metal.

9. Apparatus for packing bags, as claimed in claim 8, in which said annular fastener formation means comprises, in combination, a base having a transverse slot to receive the neck of the bag to be sealed, and a longitudinal slot; a rocker arm pivotally mounted, intermediate its ends, in said longitudinal slot; an active head formed by an upper plate, a lower plate, and an intermediate plate slidably mounted between said upper and lower plates; a U-shape eccentric pivotally mounted intermediate its ends between said upper and lower plates, and having a longer arm and a shorter arm; a diaphragm fixed to said base and having a pair of longitudinally spaced abutments engageable with the longer arm of said eccentric; said intermediate plate being contained between a flap of said lower plate and said eccentric; said rocker arm having an elongated abutment on one end, a second abutment on its opposite end, and a third abutment between its pivot and said elongated abutment; said upper, lower and intermediate plates defining an opening for projection of said longer abutment therethrough; said lower plate having respective longitudinal grooves in its lower surface engageable with said second and third abutments; a fixed anvil located opposite and in planar relation with an operative end of said intermediate plate, and formed with two concavities therein; said intermediate plate having a pair of spaced arms facing said anvil and each formed with a horizontally extending groove in its outer end, the two grooves being aligned with each other; a fluid pressure actuator operable to reciprocate said active head in a manner such that, when said intermediate plate is moved toward said anvil, the grooves in the ends of its arms initially engage the cut length of metal and press the same against the elongated lug of said rocker arm to bend the cut length into U-shape, after which said flap of said lower plate engages the convex part of the bent length of metal and, with said rocker arm rocked to retract said elongated lug out of contact with the bent length of metal, compresses the free ends of the bent length of metal against and into said concavities of said anvil to force the free ends to bend and twist together to tightly engage the neck of the bag.

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