Oct. 14, 1969 C. E. MONSEES ET AL 3,471,993

TILTING BAG FORMING AND FILLING MACHINE

Filed Sept. 22, 1967 5 Sheets-Sheet 1

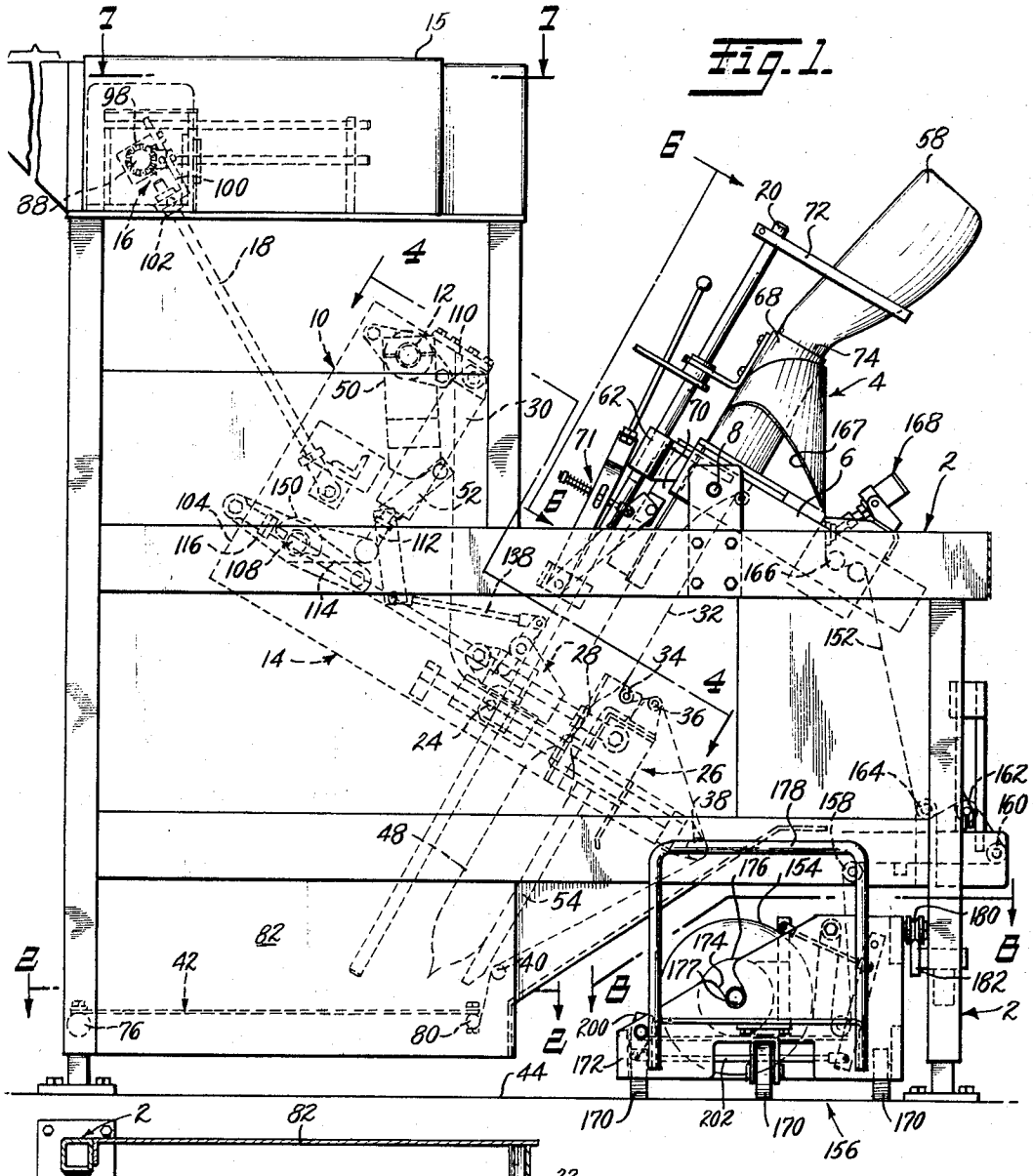


Fig. 1.

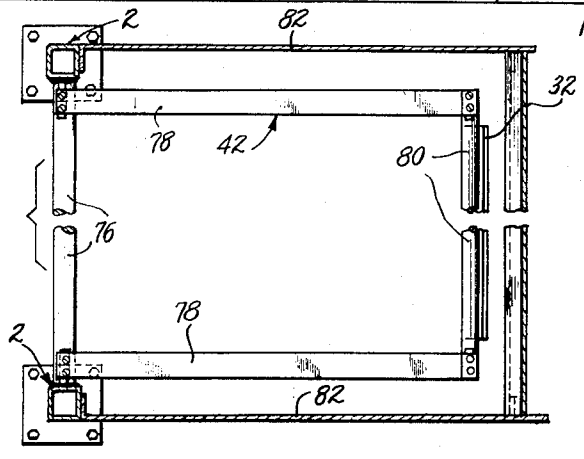


Fig. 2.

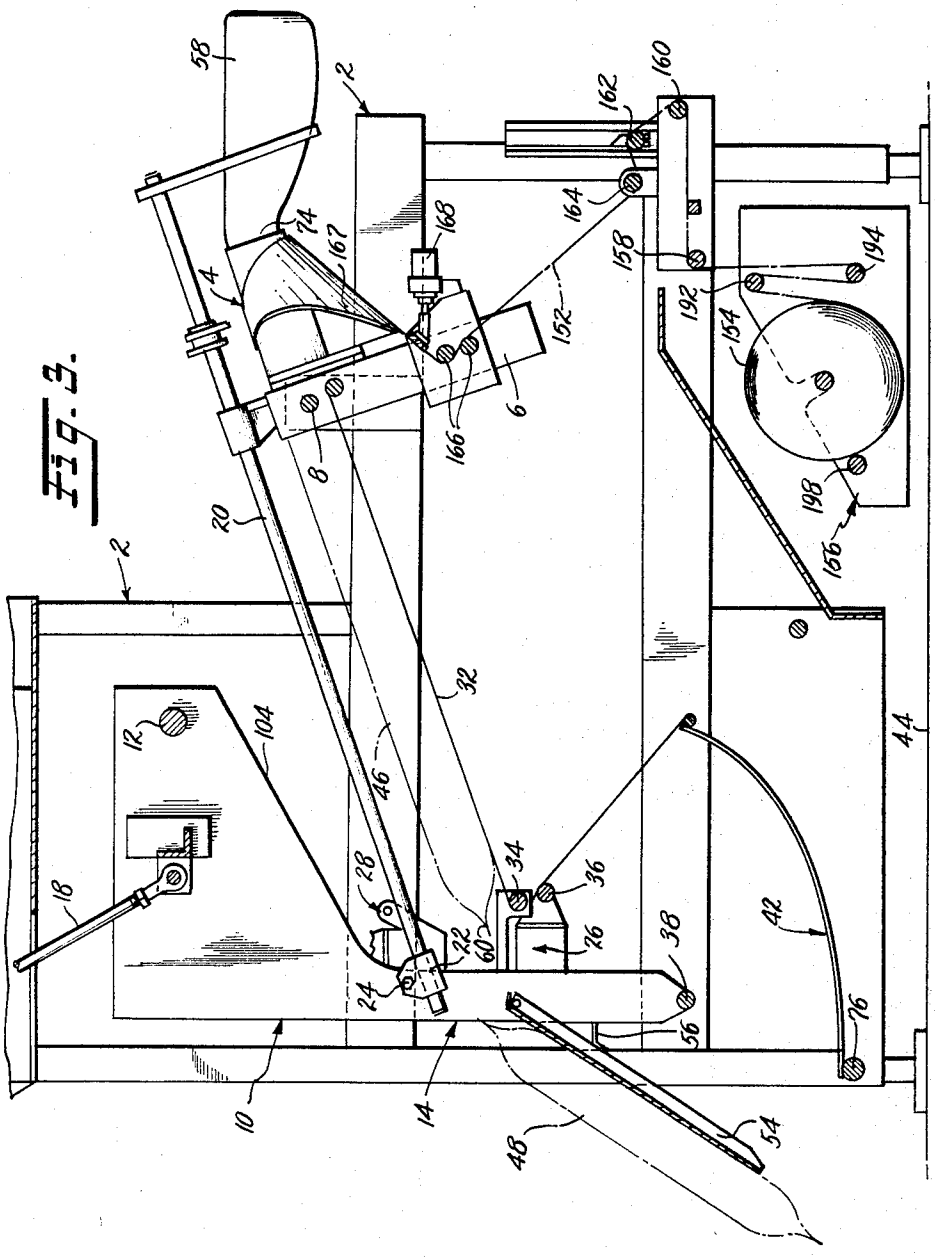
INVENTORS
CLAUDE E. MONSEES
WILLIAM H. McCALL

BY Bacon & Thomas ATTORNEYS

TILTING BAG FORMING AND FILLING MACHINE

Filed Sept. 22, 1967 5 Sheets-Sheet 2

Fig. 3.



INVENTORS
CLAUDE E. MONSEES
WILLIAM H. MCCALL
BY Bacon & Thomas ATTORNEYS

Oct. 14, 1969 C. E. MONSEES ET AL 3,471,993

TILTING BAG FORMING AND FILLING MACHINE

Filed Sept. 22, 1967 5 Sheets-Sheet 3

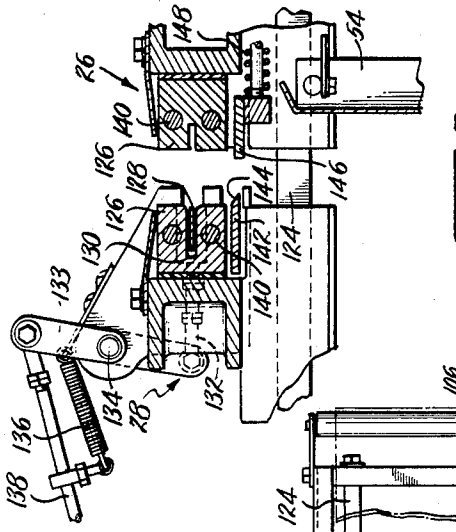


Fig. 5.

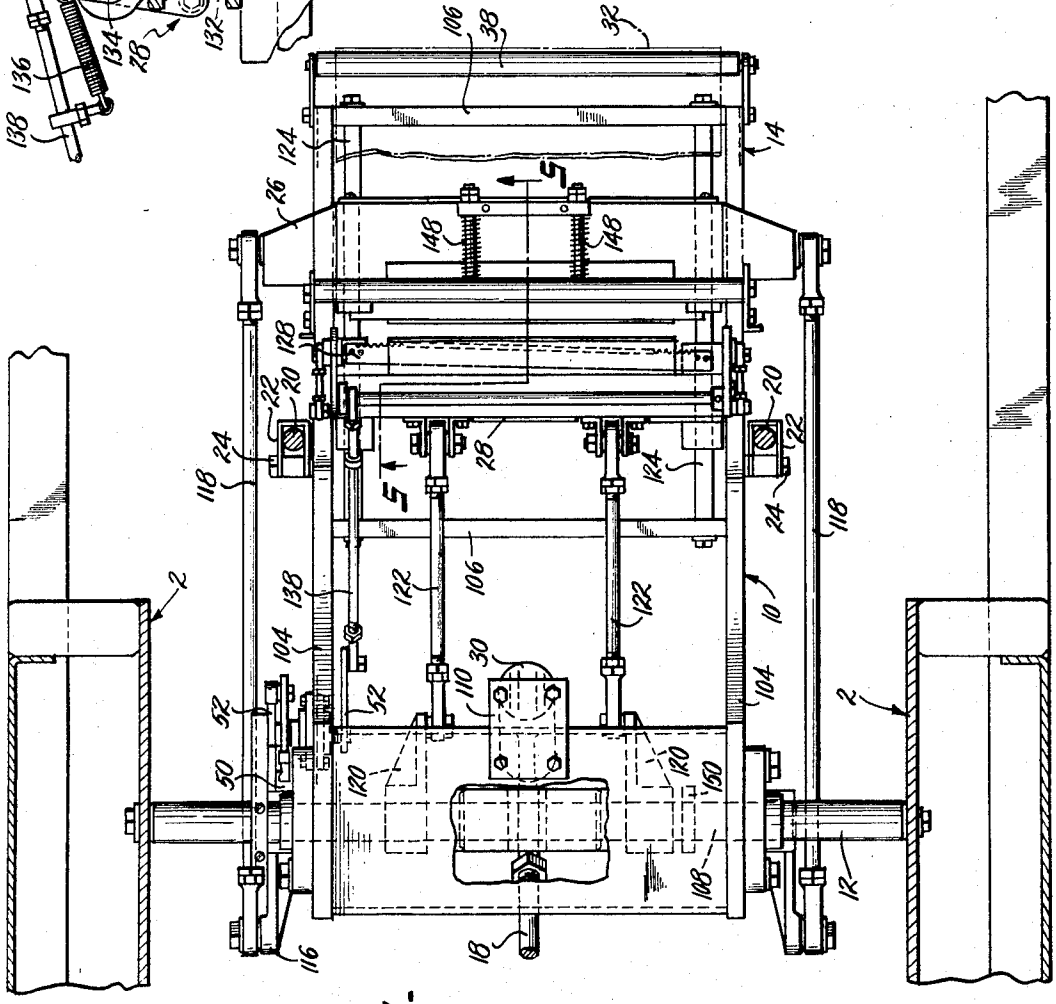


Fig. 4.

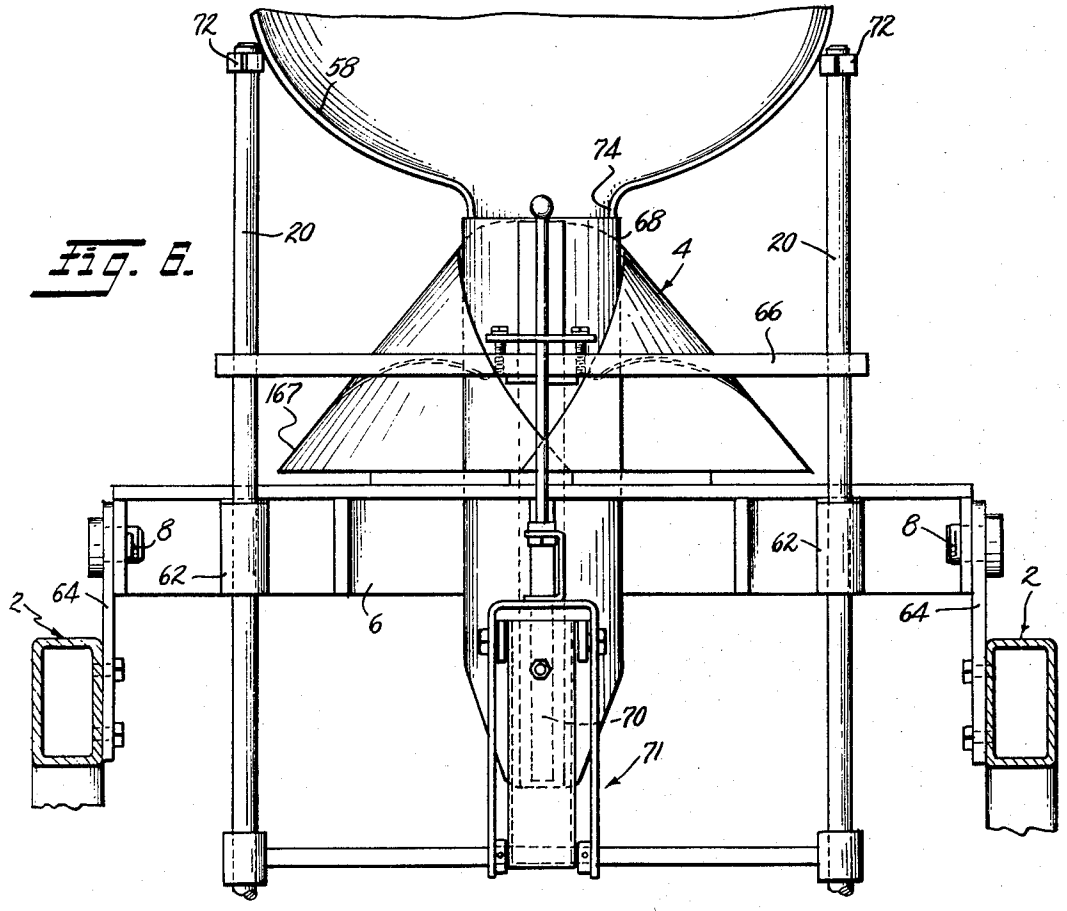
INVENTORS
CLAUDE E. MONSEES
WILLIAM H. McCALL
BY Bacon & Thomas ATTORNEYS

Oct. 14, 1969 C. E. MONSEES ET AL 3,471,993

TILTING BAG FORMING AND FILLING MACHINE

Filed Sept. 22, 1967 5 Sheets-Sheet 4

Fig. 6.



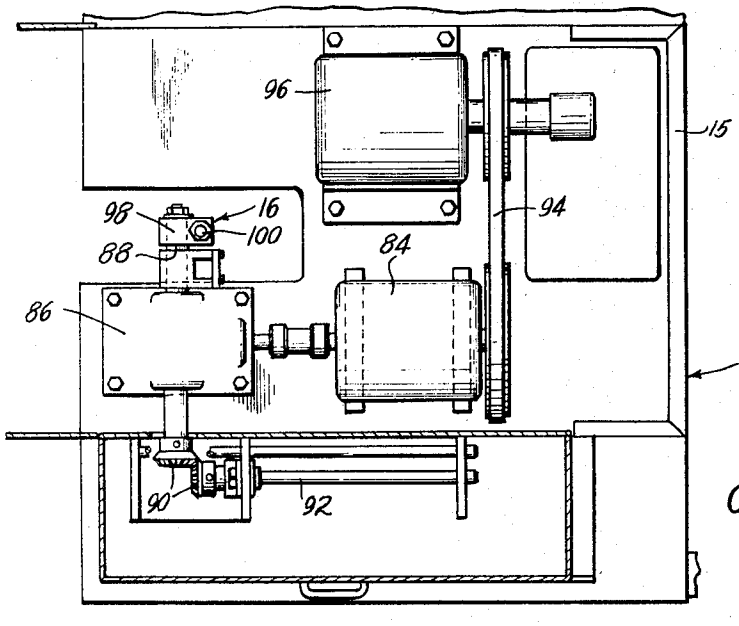


Fig. 7.

INVENTORS
CLAUDE E. MONSEES
WILLIAM H. McCALL
BY Bacon & Thomas
ATTORNEYS

Oct. 14, 1969 C. E. MONSEES ET AL 3,471,993

TILTING BAG FORMING AND FILLING MACHINE

Filed Sept. 22, 1967 5 Sheets-Sheet 5

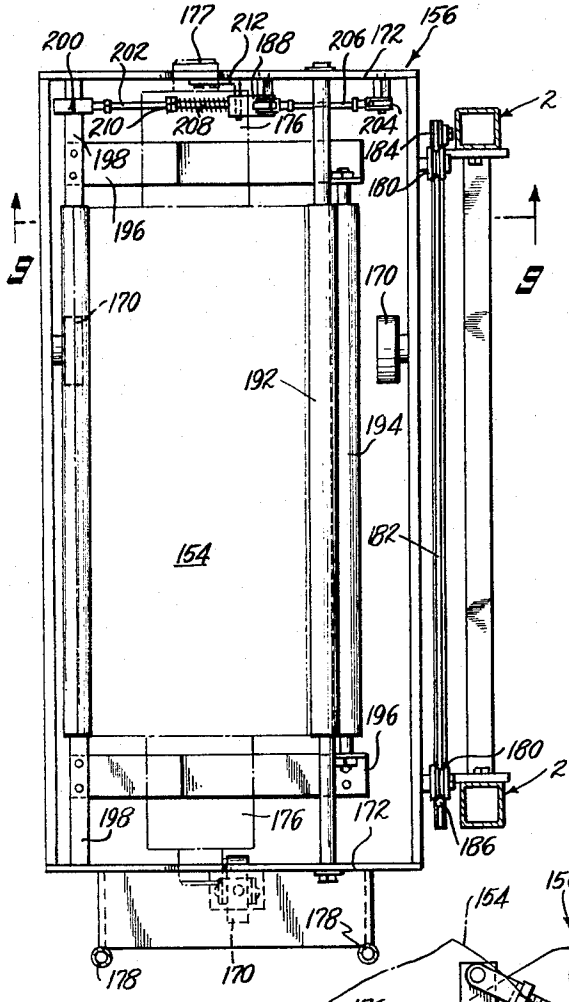
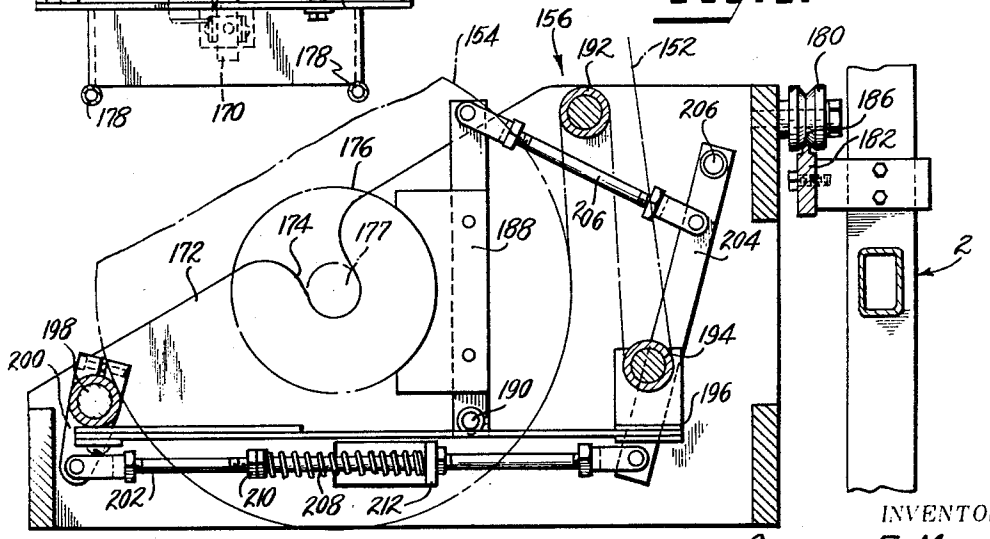


Fig. 8.

Fig. 9.



INVENTORS
CLAUDE E. MONSEES
WILLIAM H. MCCALL

BY Bacon & Thomas ATTORNEYS

United States Patent Office 3,471,993
Patented Oct. 14, 1969

3,471,993

TILTING BAG FORMING AND FILLING MACHINE

Claude E. Monsees and William H. McCall, Durham, N.C., assignors to Wright Machinery Company, Inc., Durham, N.C., a corporation of North Carolina

Filed Sept. 22, 1967, Ser. No. 669,797
Int. Cl. B65b 43/08, 51/30
U.S. Cl. 53—180 7 Claims

ABSTRACT OF THE DISCLOSURE

A tube former pivoted on a horizontal axis for swinging in a vertical plane and a drawbar pivoted on a second horizontal axis for swinging in the same vertical plane. The drawbar carries movable sealing and clamping jaws for drawing tube forming material through the former as the drawbar swings. A guide rod is fixed to the former and is slidable through a pivoted bushing on the drawbar to cause the former to swing so as to keep its centerline always pointed toward the jaws on the drawbar. A spring-tensioned belt is guided between the tube former and drawbar in position to support a formed and filled tube as the centerline swings from an upright position toward the horizontal. A dolly or carriage, separate from the tube forming machine, carries a roll of heat sealable tube forming web material and is rollable over the floor to and from a position where the roll is properly aligned to feed such material to the tube former. A brake on the dolly maintains proper tension in the material being withdrawn from the roll and guiding and positioning means on the machine frame guide the dolly into proper position relative to the machine.

Background of the invention

This invention relates to bag forming and filling machines wherein a length of heat sealable film or web material is drawn through a tube former, heat-sealed longitudinally to form a tube and cross-sealed at intervals in sequence with placing of charges of material in the formed tube. Machines of this general type have been known heretofore wherein a strip of material is fed through a tube former and drawn therethrough by cyclically operable sealing jaws which close on the material below the tube former to form a cross-seal, then move away from the tube former to draw material therethrough. A weighed charge of material is then dropped through the former into the tube above the cross-seal and the previously filled tube section is cut off whereupon the jaws are then opened, moved toward the tube former, again closed on the tube above the charge of material and the cycle is repeated. Machines of this general type are disclosed in the patent to Tew 2,953,882 and the patent to Tew et al. 3,256,673.

In the machines of the prior art it has been customary to provide material weighing and dumping means above a fixed tube former and to draw the tube material through the former in a substantially vertical direction. Heretofore this system has proven satisfactory but in recent times it has become desirable to package such materials in larger bags, considerably longer than those heretofore contemplated. For example, it is often desirable to package potato chips in bags of greater length than is practical with machines of prior art. To construct machines of the known type with sufficient vertical capacity to accommodate the longer bags would result in a machine of such height, when considering also the weighing and dumping mechanism thereover, that many plants would be unable to use such machines, not having sufficiently

high ceilings and such machines would be uneconomically large and bulky.

Summary of the invention

The above-noted disadvantages of the prior types of machines have been overcome by the present invention wherein unusually long bags can be formed and filled in a machine of minimum height and extreme compactness. The basic principles of the invention reside in the provision of a tube former that is pivoted for swinging movement in a vertical plane and a drawbar assembly on which the sealing and pulling jaws are reciprocably mounted with the drawbar assembly being pivoted on a second horizontal axis so that the drawbar swings in the same vertical plane as the tube former. Means interconnecting the tube former and drawbar ensure that they will tilt in unison with the axis of the tube former always pointing toward the region of the jaws on the drawbar and thus assure that the tube forming material will always be drawn straight through the former. The parts are so arranged that the drawbar swings from a generally horizontal position below a generally upright tube former to a position where it is substantially vertical and displaced horizontally a relatively large distance from the tube former. By this arrangement an unusually long bag can be drawn through the tube former even though the parts are initially quite close to the floor. The arrangement also permits the positioning of a product weighing and dumping mechanism at a level somewhat below the top of the machine and thereby further reduces the overall height of the apparatus. A further feature of the invention resides in the provision of a separate carriage or dolly for transporting and positioning supply rolls of bag forming material. With the bags of the large size contemplated here, the rolls of material are quite large and heavy and difficult to manipulate if necessary to position them on the machine itself. By mounting the rolls on a separate dolly, applicant can load rolls of material thereon at a convenient location and by using power equipment, if desired, whereupon the dolly can be rolled into position relative to the machine wherein the roll is in proper alignment with guiding means for directing the material to the tube former. The machine and dolly are provided with cooperating means to effect guidance of the dolly to the proper position and for holding same there during operation.

Brief description of the drawings

FIG. 1 is a side elevational view of the packaging machine of the present invention;

FIG. 2 is a horizontal fragmentary sectional view taken on the line 2—2 of FIG. 1;

FIG. 3 is a diagrammatic vertical section of the packaging machine of FIG. 1 showing the principle elements of the machine actuated to the package delivery position;

FIG. 4 is an enlarged fragmentary sectional view taken along line 4—4 of FIG. 1;

FIG. 5 is an enlarged fragmentary vertical sectional view, taken on the line 5—5 of FIG. 4;

FIG. 6 is an enlarged fragmentary sectional view of the tube forming assembly, taken on the line 6—6 of FIG. 1;

FIG. 7 is an enlarged horizontal sectional view taken on the line 7—7 of FIG. 1, diagrammatically showing the driving arrangement and its component parts;

FIG. 8 is an enlarged plan view of the dolly or carriage assembly, partly in section, taken on the line 8—8 of FIG. 1; and

FIG. 9 is an enlarged vertical sectional view, taken on

the line 9—9 of FIG. 8 showing the braking arrangement for the supply roll.

Description of the preferred embodiment

Referring first to FIGS. 1 and 3, the machine of the present invention comprises a frame generally designated at 2, having thereon a tube former 4 mounted on a sub-frame 6, which in turn is pivotally mounted about a horizontal axis by pivot pins 8, on the machine frame 2. The tube former 4 may be of known construction, for example, like that shown in the patent to Monsees et al. 2,940,408. A drawbar assembly 10 is pivotally mounted by means of a shaft 12 on the frame 2 of the machine and, as shown, is generally L-shaped and comprises a lower drawbar portion 14. Suitable driving means are provided in the upper portion 15 of the machine and will be described in greater detail later but which include a crank 16 connected through connecting rod 18 to the drawbar assembly 10. Thus, as the crank rotates the drawbar assembly will cyclically swing between the positions shown in FIG. 1 and FIG. 3.

Guide rods 20 are fixed relative to the tube former 4 by being fixedly mounted on the sub-frame 6 and extend parallel to but spaced from the axis of the tube former 4 toward the drawbar assembly and slidably through a bushing 22 pivotally mounted on the drawbar portion 14 by suitable pivot means 24. As will be apparent from a comparison of FIGS. 1 and 3, the tube axis of the tube former 4 is thus constrained to always extend toward substantially the same point on the drawbar portion 14.

Suitable sealing and clamping jaw assemblies 26 and 28 are slidably mounted on the drawbar portion 14 for movement toward and from each other, in a manner that will be described in greater detail later. A pneumatic motor 30 operates through mechanism to be described, to move the jaw assemblies 26 and 28 toward and from each other, operation of the pneumatic motor being controlled by a timing or program shaft to be referred to later. The mechanism also includes a cutting knife on the jaw assemblies 26 and 28 and which operates in response to swinging movement of the drawbar assembly to cut off a filled and sealed tube, as will be further described.

A flexible belt 32 of substantial width has one end fixed to the sub-frame 6 in a position to extend therefrom generally tangent to and longitudinally of the hollow tube drawn through the former 4. That belt extends from the sub-frame 6 over a first guide roller 34 on the movable jaw assembly 26, then over a second guide roller 36 on the jaw assembly 26, then over a further roller 38 journalled at the outer end of the drawbar portion 14. From there the belt 32 extends over a fixed roller 40 on the machine frame to where its other end is secured to an end of a cantilever spring assembly 42. The spring assembly 42 is biased as to constantly apply tension to the belt 32 to pull its lower end downwardly toward the floor 44. The direction and ararngement of belt 32 is clearly evident in FIG. 1 and illustrates the shape assumed by that belt when the parts are in a starting position, at the beginning of a cycle of operation. As the drawbar assembly is swung clockwise toward the position of FIG. 3, the belt will eventually leave the roller 38 on the end of the drawbar and extend directly form roller 36 to the cantilever spring assembly 42, as shown in FIG. 3. The parts are so proportioned that swinging movement of the drawbar assembly between the two extreme positions shown will merely cause the cantilever spring assembly 42 to flex downwardly, then upwardly, thus maintaining the belt 32 at all times taut and in a position to support a formed and filled tube portion 46 (FIG. 3) to extend directly outwardly in alignment with the tube former 4 and toward the region of the jaws 26 and 28.

FIG. 1 shows the parts at the start of a cycle of operation. The jaw assemblies 26 and 28 are in their position of nearest approach to the tube former 4 and have just been closed to form a cross-seal on the tube above a charge of material previously placed in the lowermost tube portion 48 to thereby seal that lower bag portion. The drawbar assembly then is caused to swing clockwise by crank 16, to the position of FIG. 3, and during this swinging movement, the jaw assemblies 26 and 28 forcibly draw tube forming material through the former 4. During such drawing movement, a fixed cam 50 actuates a lever 52 on the drawbar assembly to reciprocate a knife to sever the tube between the edges of the cross-seal so as to separate the lower filled bag 48 from the tube material thereabove. However, since the jaws remain closed during this drawing movement, the bag 48 is not dropped until it reaches the position of FIG. 3 wherein the jaws 26 and 28 are moved to the open position, thus releasing the bag 48 to slide off a supporting tray 54 onto suitable receiving means.

The supporting tray 54 is pivotally carried by the drawbar portion 14 for free pendulous suspension therebelow. In the position shown in FIG. 1, the tray 54 engages the belt over the roller 40 to hold the tray in that position wherein the bag 48 is held in alignment with the axis of the tube former 4. Other fixed stop means may be employed, if desired. When the drawbar assembly swings toward the position of FIG. 3, the tray 54 is permitted to drop toward the position shown in FIG. 3 wherein it engages a stop bracket 56 carried by the drawbar portion 14 and thus properly directs the completed bag 48 onto the receiving means.

After the jaw assemblies 26 and 28 have been moved to their open position, as shown in FIG. 3, the drawbar assembly starts to swing counterclockwise back to the position of FIG. 1. The formed tube portion 46 depending from the tube former rests on and is supported by the belt 32.

While the parts are in the position shown in FIG. 3, a suitable product-weighing mechanism operates to weigh and isolate a charge of material, which is then dropped into a charge pan 58 extending generally horizontally from the upper open end of the tube former 4, in the position of FIG. 3. Although the weighing mechanism drops a charge of material into the pan 58 at this time, it does not move through the tube former until the drawbar starts to swing counterclockwise, thus tilting the tube former counterclockwise until material can flow by gravity from the pan 58 into the formed tube portion 46. This flow of product starts while the tube former is still at a substantial angle from the horizontal and thus relieves the hot cross-seal 60 of the direct weight of the product and relieves it of any impact therefrom since the product merely slides rather gently along the entire length of the formed tube to a position of rest against cross-seal 60. The weight of the product is not completely supported by the cross-seal 60 until the parts reach substantially the position of FIG. 1 and sufficient time has elapsed for the heat-sealed material of the bag to cool sufficiently to provide a strong cross-seal at 60. While the charge of material moves into the formed tube, the jaws 26 and 28 are separated and move upwardly along opposite sides of the tube and product until they reach the position in FIG. 1, above the charge of product whereupon the cycle is repeated.

As previously described, the guide rods 20 are fixed relative to the sub-frame 6, which supports the tube former 4. Two such guide rods are provided, one on each side of the machine, as shown in FIGS. 4 and 6. The guide rods 20 are fixedly mounted in brackets 62 constituting fixed portions of the sub-frame 6. As shown in FIG. 6, the sub-frame 6 is journalled on pivot pins 8, carried by brackets 64, which in turn are secured to frame members 2. The guide rods 20 extend upwardly from the sub-frame 6 and support a further bracket 66 to which a hollow mandrel device 68 is secured. The mandrel device extends downwardly into the tube former 4 and the tube forming ma-

terial passes between the tube former and the mandrel in a known manner. The mandrel **68** also constitutes at least part of a back-up structure against which a heated shoe **70** presses the overlapping edges of the tube forming material to form a longitudinal seal along the formed tube as the material is drawn, also in a well known manner. The heated shoe **70** is also supported from structure **71** mounted on the guide rods **20**. At their upper ends the guide rods **20** are provided with a further bracket **72** which supports the hopper or charge pan **58**, previously referred to, and which in turn is provided with an outlet or spout **74** for directing material therefrom into the interior of the mandrel **68**. The details of the longitudinal sealing shoe **70** and its supporting structure will not be described in any greater detail herein.

Referring now to FIG. 2, the cantilever spring assembly **42** comprises a crossbar **76** fixed to frame elements **2** and to which one end of the cantilever leaf springs **78** is secured. The other ends of the leaf springs **78** are secured to a crossbar **80** to which the lower end of the belt **32** is attached. Preferably, the machine frame includes side plates **82** defining an enclosure within which the cantilever leaf spring assembly may flex without interference from external objects.

Referring now to FIG. 7, schematically showing a driving arrangement as provided in the upper portion **15** of the machine frame, a suitable motor **96** provides power for the machine and drives a belt **94** to an electric clutch and brake **84** and from there through a gear box **86** which rotates an output shaft **88** on which the crank **16** is fixed. The gear box **86** also drives, through bevel gears **90**, to a timing and program shaft only schematically shown at **92**. It is contemplated that the shaft **92** be provided with suitable cams for actuating valves, switches and the like to effect proper timed relation of different functions of the apparatus.

Referring again to FIG. 1, the crank **16** comprises a block portion **98** fixed to shaft **88** and in which a crank arm **100** is adjustable to vary its length. At its outer end the crank arm **100** is provided with releasable clamping means **102** pivoted thereto whereby it may be adjusted along the length of connecting rod **18**. Thus, both the effective length of connecting rod **18** and of the crank arm **100** may be adjusted. By adjusting the length of crank arm **100**, the total angular movement of the drawbar assembly **10** can be preset to any desired value, within the capacity of the machine. That is, the total swing of the jaw assemblies **26** and **28** may be predetermined in accordance with the desired length of bag material to be drawn through the former **4** at each cycle of operation. It is, of course, desirable that the severing and release of the sealed and filled bag **48** always be completed at the same point in the machine, which means that the drawbar portion **14** should always be in the vertical position shown in FIG. 3, at the end of each cycle irrespective of the length of bag for which the machine is set. Thus, by adjusting the length of crank arm **100**, the length of the bag may be predetermined and then by adjusting the length of the connecting rod **18**, the terminal position of the drawbar may be regulated so that it always occurs in the position shown in FIG. 3.

Referring now to FIGS. 4 and 5, the drawbar assembly is shown as being of substantial lateral width and as comprising two generally L-shaped side plates **104**. The side plates **104** are rigidly secured together by a plurality of cross members, such as shown at **106**, and the assembly is journalled on the shaft **12** previously referred to and which extends between opposed frame members **2**. Also journalled between the side plates **104** is an actuator shaft **108**, appearing directly below shaft **12** in FIG. 4. The pneumatic motor **30** previously referred to comprises a cylinder pivotally carried by a bracket **110** on the drawbar assembly and having a piston therein, with a piston rod **112** extending downwardly therefrom into operative connection with a crank arm **114** fixed on the shaft **108**. Outer crank arms **116** (FIG. 4) are fixed to the outer ends of shaft **108** and extend generally rearwardly therefrom. Connecting rods **118** connect the crank arms **116** to the outermost movable jaw assembly **26**. Between the plates **104** a second pair of crank arms **120** is fixed to the shaft **108** to extend forwardly therefrom and which are connected, by connecting rods **122**, to the innermost movable jaw assembly **28**. The jaw assemblies **26** and **28** are slidably guided for movement toward and from each other on suitable guide rails or rods **124**. It will thus be seen that actuation of the pneumatic motor **30** to extend its piston rod **112** downwardly will cause shaft **108** to rock clockwise, as seen in FIG. 1. This will result in the connecting rods **112** drawing jaw assembly **28** inwardly and connecting rods **118**, pushing jaw assembly **26** outwardly, so as to separate the jaws. Obviously, as the pneumatic motor **30** is operated to withdraw its piston rod **112** upwardly, shaft **108** is rotated counterclockwise to move jaw assemblies **26** and **28** toward each other.

The jaw assemblies **26** and **28** are shown in somewhat greater detail in FIG. 5. As shown, each of the heated jaw portions **126** is formed to define two spaced heating bands for cross-sealing the tube of material. A knife **128** is rotatably mounted in a slot **130** in the jaw on assembly **28** and that knife is reciprocated outwardly of the jaw by a rod **132** connected to a lever **133** which is pivoted at **134** to the jaw assembly **28**. A spring **136** normally urges a connecting rod **138**, which in turn is pivotally connected to the upper end of lever **132**, to move to the right, as seen in FIG. 5, and thus draw the knife **128** inwardly of the slot **130**. The connecting rod **138** is connected to the bell crank lever **52**, previously referred to. Each of the heated jaw portions **126** may be of known or conventional construction, including electrical heating elements **140** therein providing the heat necessary to maintain the jaws hot enough to effect heat sealing of the tube material.

Below the jaw portion **126** on jaw assembly **28** is a fixed stripper bar **142**, having an edge portion **144** projecting forwardly slightly beyond the bag engaging face of the jaw portion **126**. A second stripper bar **146** is mounted on the jaw assembly **26** and is spring urged, by springs **148**, toward the stripper bar **142** and to a position where its inner edge projects beyond the sealing face of its associated heated jaw portion **126**.

At the start of a cycle of operation and when the pneumatic motor **30** is operated to project the jaw assemblies toward each other, it will be obvious that the stripper bars **142** and **146** engage the sides of the formed tube prior to engagement thereof by the heated jaws. The shaft **108** is provided with a cam **150** (FIG. 4), which is configured to actuate a switch or other suitable mechanism to stop the jaw assemblies **26** and **28** while the heated jaws are still separated but after the stripper bars **142** and **146** have flattened and engaged the formed tube above the charge of product therein. This spacing of the jaws is maintained during the initial swinging of the drawbar assembly **10** so that the stripper bars will strip any stray particles of product from the region to be engaged by the heated sealing jaws so that such particles will not be trapped between the jaws during the heating cycle. At the desired time in the cycle of operation the timing or program shaft **92** will operate a suitable valve or valve control to again actuate pneumatic motor **30** to completely close the heated jaws on the formed bag, thereby heat sealing the same and gripping the same so that further movement of the drawbar assembly will draw tube forming material through the former **4** as already described.

Referring now to FIGS. 1, 8 and 9, the tube former **4** is of the type already identified wherein a strip or web **152** of heat sealable bag forming material is directed to the tube former from a supply thereof. The supply of material comprises a roll **154** thereof mounted on a separate dolly or carriage **156** positioned in predetermined relationship to the machine, as shown in FIG. 1. From the

roll **154** the material passes over and around suitable guide and directing rollers on the dolly, which will be described later, then over a first guide roll **158** on the machine frame **2** from which it is directed over suitable rollers **160**, **162** and **164** and then upwardly to guide rollers **166** on the sub-frame **6**. From the rollers **166** the material is directed to the receiving and web guiding portion **167** of the tube former **4**. Also mounted on the sub-frame **6** is a pneumatically operated brake, designated generally at **168**, for applying a restraining force to the web **152**. From the previous description it will be apparent that cyclical operation of the machine causes the tube former **4** and the sub-frame **6** to swing about the horizontal axis defined by pivots **8**. During that swinging movement the guide rollers **166** move toward and from the fixed guide roller **164** and thus alternately introduce slack and tension into the web. The brake **168** is provided to prevent any slack or looseness from appearing at the tube former **4**, since it is necessary to keep the material in snug contact therewith at all times.

As shown, the roller **162** is adjustable in a vertical direction whereby to change the length of material of the web between the supply roll **154** and the tube former. Such adjustment is sometimes necessary to properly correlate printed material on the web to appear between the cross-seals ultimately formed on the filled packages.

The carriage or dolly **156** comprises a suitable framework having floor engaging supporting wheels **170**, one of which is a caster wheel, whereby the dolly can be freely moved over the floor **44**. Opposed end plates **172** are provided with aligned notches **174** constituting supporting means for a shaft **176** which in turn supports the roll **154** of web material. The web material **152** is wound on a hub member **176**.

The dolly or carriage **156** is provided with a handle **178** by which it may be manually manipulated and is also provided with grooved rollers **180**, extending outwardly from one side thereof. The machine frame **2** is provided with a fixed rail **182** thereon at such elevation and in such position that manual movement of the dolly toward the illustrated relationship to the machine causes the rollers **180** to engage and be guided by the track **182** so as to properly orient the supply roll **154** parallel to the roller **158** on the machine frame. The track **182** is further provided with a stop **184** at the inner end thereof (see FIG. 8) and when the forward roller **180** engages the stop **184**, an abutment or screw **186** is placed in an appropriate opening in the track **182** outwardly of the rear roller **180** to thereby positively hold the dolly in the proper lateral position relative to the machine. In view of the capacity of the machine of the present invention and its ability to produce larger and longer bags than heretofore made, a supply roll of web material must necessarily be rather large to produce a reasonable number of bags without replacement. The rolls **154** are thus quite large and heavy and impractical to manipulate for positioning on supporting means constituting a part of the machine itself. By the use of the dolly or carriage **156**, power equipment may be employed to position a supply roll on the dolly at a location remote from the bag forming machine and it is then easy to move the supply roll into the described position for directing the web to the tube former.

Further structural details of the carriage or dolly **156** are shown in FIGS. 8 and 9 wherein a friction brake **188** is shown pivotally mounted on one of the end plates **172** of the dolly, by means of a suitable pivot **190**. The friction brake **188** is in position to engage the periphery of the hub or mandrel **176** on which the roll **154** is wound and the web **152** is directed from the roll **154** upwardly and over a guide roller **192** on the dolly, then downwardly and around a roller **194** journalled on a movable frame **196**. From the roller **194** the web is directed upwardly to the guide roller **158** on the machine frame. The movable frame **196** is fixed to a shaft **198** which is in turn journalled between the end plates **172** of the dolly and which carries a crank arm **200** depending therefrom. A connecting rod or link **202** is pivoted at one end to the crank arm **200** and at its other end is pivoted to the lower end of lever **204**, which is itself pivoted to end plate **172** on a suitable pivot **206**. An intermediate portion of the lever **204** is connected to the upper end of the friction brake **188** by a link **206**. A spring **208** abuts at one end against an adjustable stop means **210** fixed on the rod **202** and abuts at its other end against bracket **212** fixed to the frame of the dolly **156**. Thus, through the link **202**, crank arm **200**, shaft **198**, and movable frame **196**, the roller **194** is resiliently urged downwardly, tending to apply tension to the web **152**. As web material is drawn into the tube forming machine, it exerts an upward force on the roller **194** and against the action of spring **208**. Any movement of the rod **202** in response to a change of tension in the web will swing the lever **204** to regulate the pressure applied by brake **188** to the hub of mandrel **176**. As is obvious, an increase in the tension of the web **152** will tend to relieve the pressure of the brake **188**, which in turn permits the roll **154** to turn more freely and reduce tension in the web **152**. The abutment **210** may be adjustable on the rod **202** to thus regulate the force exerted by spring **208** and predetermine the magnitude of the tension in the web and tend to maintain the same substantially constant. Furthermore, when the tube former and sub-frame **6** swing about pivot **8** in a direction toward guide roller **164**, the tension in the web between guide roller **164** and the roll **154** would normally be relieved and slack or looseness would be introduced. Reversal of the swinging movement of the tube former would apply sudden shock to the web **152** and due to the high inertia of roll **154**, damage to the web or misalignment thereof could result. Hence, when such slack develops due to the normal operation of the machine, the brake **188** will become set to prevent rotation of the roll **154** until the desired tension is again developed in web **152**.

While a single specific embodiment of the invention has been shown and described herein, it is to be understood that the same is merely illustrative of the principles involved and that other embodiments may be resorted to within the scope of the appended claims.

We claim:

1. In a packaging machine having a tube former, means for guiding a continuous web of material generally downwardly through said tube former along a tube axis to form a longitudinally sealed tube, and cyclically operable means for forming a transverse seal across said tube and for drawing a predetermined length of material through said tube former, the improvement comprising: means mounting said tube former for swinging movement in a vertical plane about a first axis; means mounting said cyclically operable means for swinging movement in said vertical plane, about a second axis; and control means interconnecting said tube former and cyclically operable means for causing simultaneous swinging movements thereof.

2. A machine as defined in claim **1** wherein said last-named means comprises an elongated guide member fixed relative to one of said tube former and cyclically operable means and slidably engaging a guide element on the other.

3. A machine as defined in claim **1** wherein said first axis extends substantially through said tube axis at said tube former; said second axis being laterally spaced from said first axis and at an elevation at least equal to that of said first axis; said cyclically operable means comprising a rigid structure including a drawbar portion extending across said tube axis below said tube former and sealing and clamping jaws slidably mounted on said drawbar portion on opposite sides of said tube axis for movement toward and from each other.

4. A machine as defined in claim **3** wherein said con-

trol means comprises at least one rigid guide rod fixed to said tube former and extending therefrom, parallel to said tube axis, and slidably through a guide bushing pivotally mounted on said drawbar portion.

5. A machine as defined in claim 1 including a flexible supporting means extending between said tube former and said cyclically operable means, spaced from but adjacent said tube axis; and tensioning means for holding said flexible means taut.

6. A machine as defined in claim 3 including a machine frame and a flexible belt having one end thereof secured to said tube former and extending, in substantially tangent relation to said formed tube, over guide rollers on said drawbar then to tensioning means on said frame, said belt being arranged to be below said formed tube as said tube former swings in said vertical plane whereby to support the weight of said formed tube and any contents therein.

7. A machine as defined in claim 1 including drive means for swinging said cyclically operable means in said vertical plane, said drive means comprising a drive crank; means for adjusting the throw of said crank; a connecting rod drivingly connecting said crank to said cyclically operable means; and means for adjusting the effective length of said connecting rod.

References Cited

UNITED STATES PATENTS

3,097,462	7/1963	Langdon	53—180
3,335,540	8/1967	Reil et al.	53—180 X

FOREIGN PATENTS

1,294,575	4/1962	France.	

THERON E. CONDON, Primary Examiner

E. F. DESMOND, Assistant Examiner