Jan. 31, 1961 W. C. LEASURE 2,969,627

METHOD AND APPARATUS FOR PACKAGING

Filed Feb. 1, 1960 3 Sheets-Sheet 1

Fig. 1.

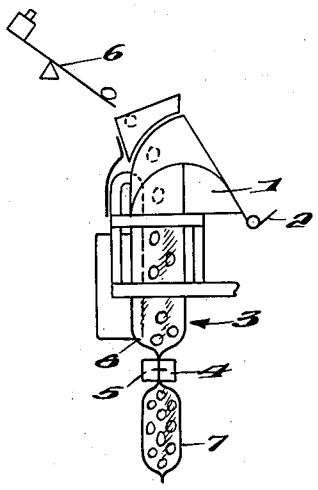


Fig. 2.

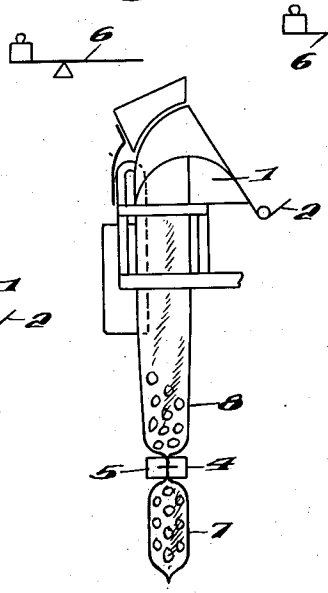


Fig. 3.

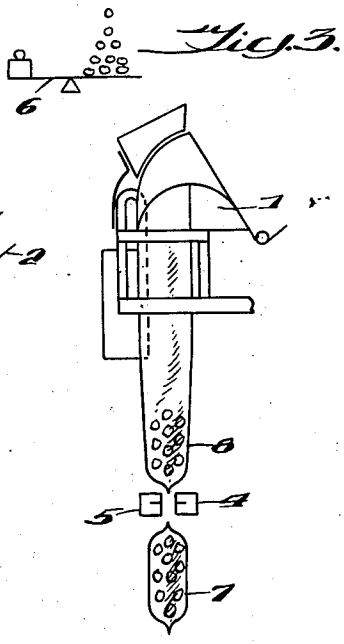


Fig. 4.

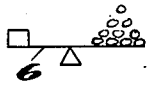


Fig. 5.

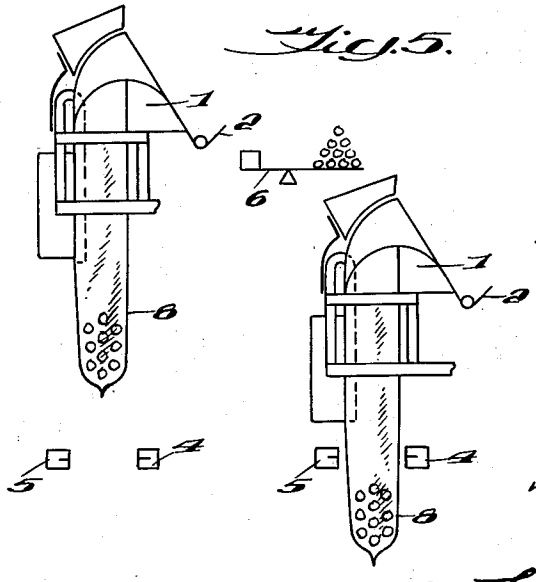
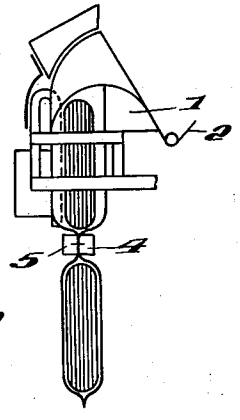


Fig. 6.



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Fig. 7.

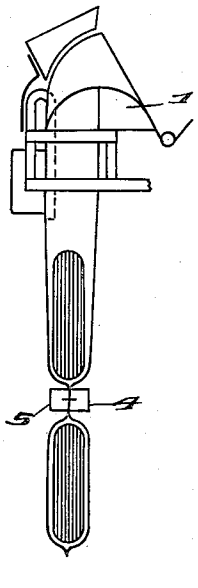


Fig. 8.

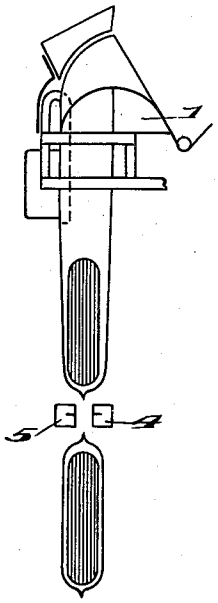


Fig. 9.

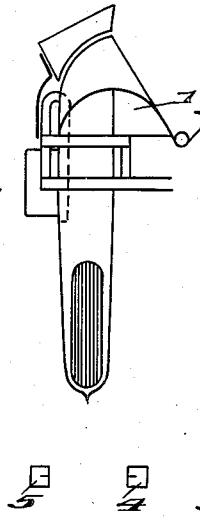


Fig. 10.

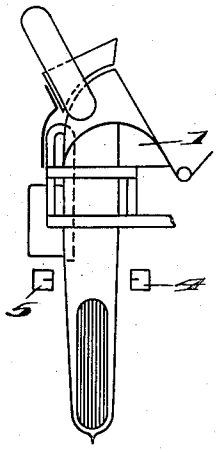


Fig. 14.

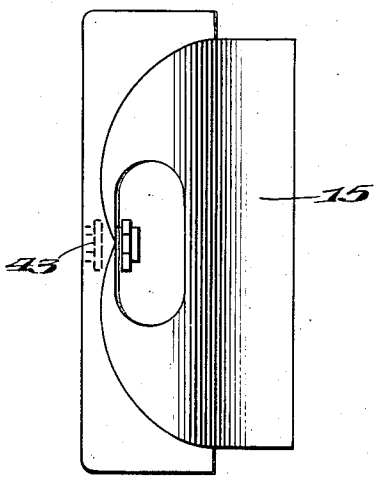
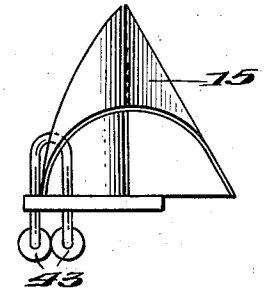


Fig. 13.



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Fig. 2.

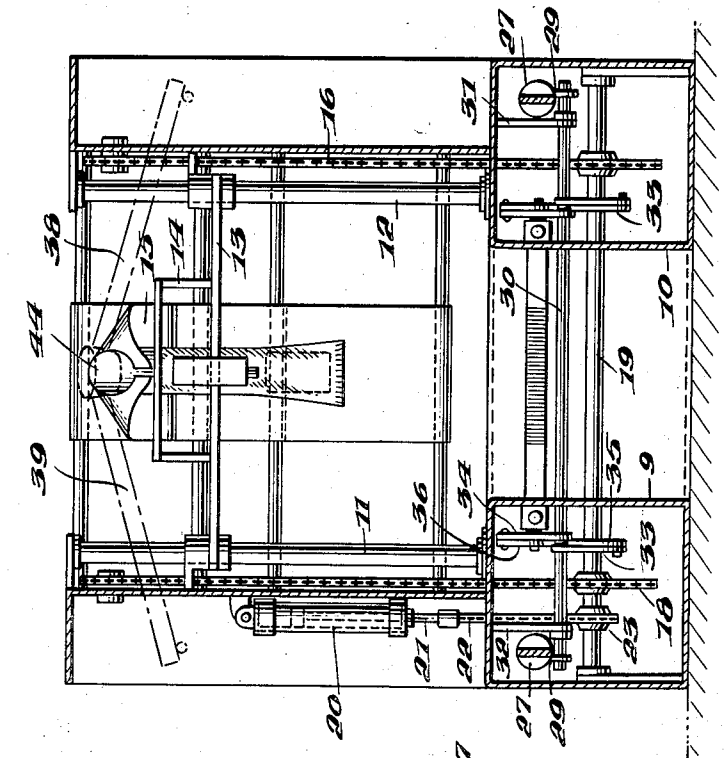
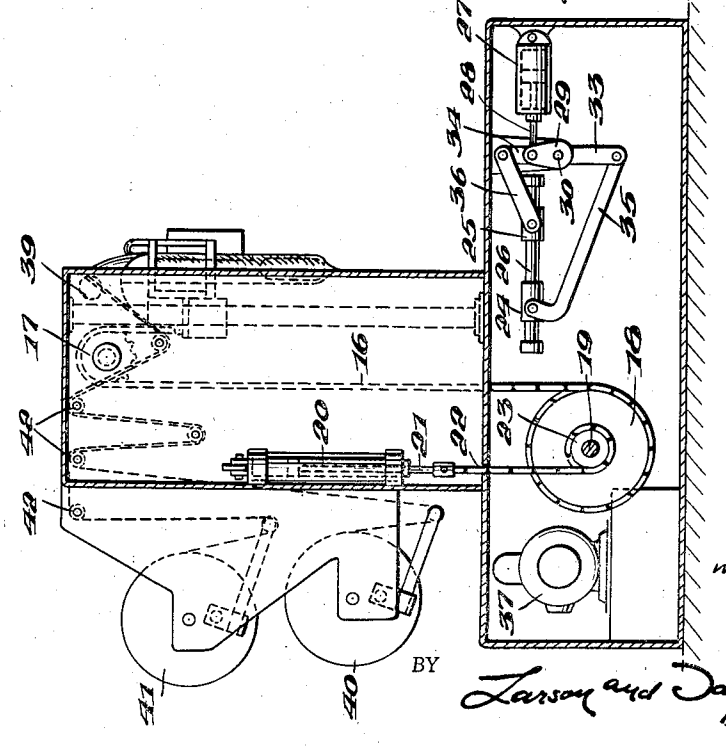


Fig. 1.



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METHOD AND APPARATUS FOR PACKAGING

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14 Claims. (Cl. 53—28)

This invention relates to an apparatus and method for packaging and more particularly to a packaging process for products which are irregular in shape, fragile and light weight or are unusually heavy and which present problems when packaged by prior art processes.

Packaging apparatus and methods in which a continuous web of sheet material is shaped into tubular form and a plurality of packages are formed from this tubular material are well known and shown, for example, in the patent to Zwoyer, Patent No. 1,986,422 issued January 1, 1935.

In the Zwoyer patent referred to above there is disclosed and described an apparatus and method of packaging in which strip packaging material is automatically formed into a package shape, is filled and sealed. Briefly stated, there is provided a former over which the strip material passes and which causes the longitudinal edges of the strip material to overlap to form in effect an elongated vertically disposed tube. Means is provided for sealing the overlapping longitudinal edges together and a pair of jaws is provided for clamping the tubularly formed material together and sealing the same transversely of the longitudinal seal. These jaws are provided with means for severing the packaging material intermediate of the transverse seal. The jaws are adapted to reciprocate vertically in such prior art processes. The sequence of operation of the prior art apparatus is as follows: With strip material extending over the former to shape it in substantially tubular form and with the longitudinal sealing means continuously sealing the longitudinal edges of the strip material together, the gripping and sealing means clamps the tubular formed material and pulls it downwardly to pull additional strip material over the former into a tubular shape. During this movement the product is released at the upper end of the former so that it drops through the tubular shaped material into the package being former. As the gripping and sealing means moves downwardly it forms the bottom seal of the package being filled and the top seal of the previously filled package and at the bottom of its vertical movement the severing means operates to cut one packaging material intermediate the formed seal. The gripping and sealing means then release so that the previously filled package on which the top seal has been formed drops off. The gripping and sealing means moves upwardly around the stationary filled package, clamps at the upper end of the stroke and the cycle is repeated.

In the Zowyer patent there is provided in addition to an external former an inner mandrel or tube which extends downwardly into the tubular formed strip material in order to maintain the tubular shape of the material for filling. In my prior Patent No. 2,899,875 issued August 18, 1959 there is disclosed a novel former which is disposed entirely externally of the strip material so that the inner mandrel may be eliminated. The advantages of such an apparatus and method are clearly brought out in that patent. However, in connection with packaging certain types of products such as lightweight or

fragile products and in addition very heavy products there are disadvantages in the use of the method and apparatus described in both the Zowyer patent and in my prior patent.

In connection with packaging lightweight products, for example, potato chips, the product is not always entirely within the package at the time the upper end seal is to be formed. This is due to the fact that when the product is released at the upper end of the former for entry into the package, the gripping and sealing means is pulling the package away from the product so that the product must move rapidly in order to reach the bottom of the package before the gripping means releases the package, moves upwardly and moves into sealing engagement to form the top seal. Chips are normally irregular in shape and are lightweight and consequently do not pass through this distance in as short a length of time as a heavier object would. Consequently the potato chips are not always all in the bag when the machine is cycling at the normal economic rate. Furthermore, because of fragile characteristics certain products may become broken or damaged in passing through the distance from the supply of metering hopper to the bag.

Difficulties have been encountered also in connection with packaging heavier products as, for example, produce. When the product enters the package the jaws have formed the bottom seal, have disengaged the package and are moving upwardly. The seal at the bottom is not normally sufficiently cooled at this time and the weight of the product entering the package may force open this bottom seal. Further the length of product drop may damage certain products.

According to the present invention all of the foregoing disadvantages of prior art methods and apparatus are overcome and a method and apparatus is provided which is particularly well suited for packaging products of the character outlined above. There is provided an apparatus which has a former and a pair of jaws serving as sealing and severing means and these parts may be generally constructed in a manner similar to that described in the prior art. However, the pair of jaws are mounted so that they reciprocate into and out of engagement with the packaging material but do not move vertically within the frame. The former is, however, mounted for reciprocating movement on the frame. Thus, according to the present invention the cycle is as follows: commencing with the former in its lowermost position and the jaws in engagement to complete the end seals, the product is dispensed into the package, the former moves upwardly, the jaws are released when the bag length has been made and the former continues its upward movement with the package, top unsealed, the former then reverses and moves downwardly passing the filled package through the opening between the jaws and the jaws are reengaged to form the top seal of the package.

It is also possible according to a variation in the cycle timing of the presently disclosed method to fill the package after the jaws have formed the bottom seal and have released the package. Thus the filling operation occurs entirely during the overstroking movement of the former so that the package and product are moving in the opposite direction with respect to each other. This relative movement assists in causing the product to become firmly seated within the package.

The advantages in the process and apparatus outlined above are readily apparent. The product or object need move only into the container being formed and not through any great length of package formed material and thus requiring less time to become fully packed within the package. Further, fragile product is less likely to become broken inasmuch as there is less distance through which it falls. The jaws in one embodiment are still in

engagement forming the bottom seal and thus absorb the momentum of heavier products entering the package thereby preventing the bottom seal from becoming broken. Light and hard to fill objects move into the container opening and if not completely in place the movement of the bag quickly deposits them firmly in the container inasmuch as the product is moving one direction while the bag is moving in the other.

An object of the present invention is to provide a packaging apparatus and method which is particularly well suited for packaging products which are irregular in shape, fragile and light weight or which are unusually heavy.

Another object of the present invention is to provide a packaging apparatus and method in which the former reciprocates longitudinally with respect to the strip of packaging material and the sealing and severing jaws reciprocate transversely with respect thereto.

Still another object of the invention is to provide a packaging apparatus in which the gripping jaws remain in engagement with the packaging material while the product enters the package and seats to the bottom so that the momentum of the movement of the product is absorbed by the gripping jaws rather than being borne entirely by the package end.

Other objects and many of the attendant advantages will become more fully apparent upon consideration of the following detailed specification in connection with the accompanying drawings wherein:

Figures 1 to 5 are diagrammatic drawings showing the sequence of operations of the present invention in connection with the packaging of a lightweight and frangible product such as, for example, potato chips,

Figures 6 to 10 inclusive are diagrammatic drawings showing the sequence of operations in connection with the packaging of heavier products such as, for example, produce,

Figure 11 is a side elevation of an apparatus according to the present invention,

Figure 12 is a front elevation thereof,

Figure 13 is a side elevation showing one type of longitudinal sealer and,

Figure 14 is a top plan view of the former shown in Figure 13.

Referring now more specifically to the drawings wherein like numerals indicate like parts throughout the several views there is shown at **1** in Figure 1 a former which may be of the type disclosed and claimed in my prior patent referred to hereinbefore. Strip material of which may be of any of the well known packaging materials is passed over this former and, in the embodiment shown, is shaped in a substantially tubular package form as at **3**. There is provided a pair of jaws **4** and **5** which may be of the type disclosed in the Zwoyer patent hereinbefore referred to and which are provided with heat sealing means to seal the package material together and which is also provided with a cutter to sever the top of the lower package from the bottom of the upper package. The package is filled through the open upper end of the former and a scale or other suitable filling means is diagrammatically shown at **6**.

The sequence of operations in connection with filling a product with a lightweight or frangible product such as potato chips is shown in Figures 1 to 5. In Figure 1 the jaws **4** and **5** are in engagement with the package material to heat seal the top of the package **7** and the bottom of the package **8**. The former **1** is in its lowermost position and the filling means **6** is dumping product into the open upper end of the former. In Figure 2 the jaws **4** and **5** are shown still in engagement with the package but the former **1** has commenced its movement upwardly and because the jaws **4** and **5** are gripping the material, additional strip material **2** is pulled over the former as the former moves upwardly to provide further strip material in a tubular package shape. In Figure 3 the jaws **4** and **5** have released the package material so that the lower filled package **7** drops off and the bottom seal of the upper package **8** has been completely formed. In Figure 4 the jaws **4** and **5** have moved outwardly to provide sufficient space for the package **8** to pass there-between and the former **1** has continued to move upwardly in what may be termed an overstroking movement. This overstroking movement assists in firmly seating the product within the package **8**. The product is moving downwardly into the package and the package is moving upwardly so that the motion in the opposite direction tends to firmly seat all of the product in the package. It is also possible to provide a plate of some sort which may be located at a fixed point with respect to the vertical movement of the former so that the overstroking movement of the former and the upward movement of the package with the product therein causes the plate to come in contact with the upper surface of the product and tamp the product so that this surface is always at the same point with respect to the package **8**. In Figure 5 the former **1** is shown as having moved downwardly to the lowermost position thereof so that the package **8** has passed between the jaws **4** and **5**. The jaws **4** and **5** are now ready to engage the package and form the upper end of the package **8** so as to repeat the cycle.

Figures 6 to 10 inclusive disclose the method of packaging as used in connection with packaging heavier items such as produce and the like. Essentially the sequence of operations is similar to that shown in Figures 1 to 5. However, there are certain important advantages in the use of the method here described in connection with these heavier products. The product in entering the package need only pass through a distance slightly greater than the length of the package itself. Furthermore the jaws **4** and **5** are engaged with the package when the product engages the bottom seal so that the jaws absorb the momentum of movement of the product and the bottom seal will not be opened by the weight of the product thereagainst. As the former is moving upwardly around the product an overwrapping action occurs so that highly irregularly shaped objects may be packaged. This may be considered as a process wherein a stationary object is enveloped by the wapping material. There is sufficient flexibility in most packaging materials so that the packaging material will pass around produce such as lettuce, cucumbers and like irregularly shaped products.

An apparatus for carrying out the method disclosed is more clearly shown in Figures 11 to 14 inclusive. Many of the details of this apparatus are similar to those disclosed in the prior art and such details have been omitted herein. Referring now to Figure 12 there is shown a stand or frame comprising L-shaped frame members **9** and **10**. These frame members support vertically extending uprights or posts **11** and **12**. Slidably journalled on the posts **11** and **12** is a cross bar **13** and this cross bar **13** has fixedly mounted thereon a frame **14** supporting the former **15**. Thus it can be seen that the former **15** is adapted to be shifted vertically with respect to the frame. The means for moving the former vertically comprises a chain **16** having one end thereof fixed to the cross bar **13**. This chain passes over a sprocket **17** (Fig. 11) journalled in the frame and extends downwardly onto a sprocket wheel **18** which is fixedly mounted on shaft **19**. The end of chain **16** is fixed on the sprocket **18** so that rotation of the sprocket **18** causes the chain **16** to be wound or unwound thereon to produce vertical movement of the former **15**.

The drive means for the sprocket comprises a hydraulic cylinder **20** having a piston thereon with the piston rod **21** having a chain **22** fixed to the outer end thereof. This chain engages a sprocket **23** fixed on the shaft **19**. Thus it can be seen that movement of the piston within the cylinder **20** produces rotation of the shaft **19** and in turn causes vertical movement of the former **15**. Identical

means is provided on each side of the cross bar 13 for raising and lowering the same.

The gripping and severing means for forming the end seals of the packages and for separating the individual packages comprises a pair of jaws 24 and 25 as shown in Figure 11. These jaws are slidably mounted on transverse rods 26 which are fixedly mounted in the frame. The means for opening and closing the jaws comprises a hydraulic cylinder 27 having a piston and piston rod 28 slidably disposed therein. The outer end of the piston rod 28 is pivotally mounted on an arm 29 which is fixed to a rotatable shaft 30. The shaft 30 is rotatably journalled in brackets 31 and 32 which are fixedly mounted on the frame members 10 and 9 respectively. Fixed on the shaft 30 are links 33 and 34 which have the outer ends thereof pivotally connected with levers 35 and 36 respectively. The outer ends of the levers 35 and 36 are pivoted to jaws 24 and 25 respectively. It can be seen that by virtue of the linkage arrangement shown movement of the piston rod 28 into and out of the hydraulic cylinder will cause rotation of the shaft 30 which will in turn cause the jaws 24 and 25 to move together or apart depending upon the direction of rotation of the shaft. It can be seen from Figure 12 that identical hydraulic operating mechanism and linkage is provided on each side of the frame. Thus, a smooth even movement of the jaws 24 and 25 is assured.

A hydraulic pump 37 is provided with suitable flow lines to actuate the piston rods 21 and 28 within their respective hydraulic cylinders. Suitable relay means which is well known in the art may be provided for sequentially operating the jaws and former so that the apparatus carries out the sequence of operation as disclosed in Figures 1 to 5 or 6 to 10 inclusive. Additionally means is provided in jaws 24 and 25 to sever the packaging material. This means may be similar to that disclosed in the Zwoyer patent.

As pointed out hereinbefore the package is filled with product through the open upper end of the former. Any suitable prior art weighing and dumping apparatus may be used in connection with the packaging apparatus hereindescribed and pivoted chutes such as disclosed at 38 and 39 may carry the product from the weighing and dumping mechanism to the open upper end of the former through an intermediate transitional member 44. These chutes are pivoted to the frame at their outer ends and their inner ends rest on the edge of the member 44 so that they are free to swing up and down as the former is moved vertically.

As shown in Figure 11 there are provided two rolls 40 and 41 of packaging material so as to provide in this example a doubled walled package although it is obvious that a single walled package may be also formed. The packaging material passes in strip form over a series of rollers such as shown at 42 and is passed over the former 15 to shape the strip material into a substantially tubular form. As is disclosed in the Zwoyer patent and in my prior patent hereinbefore referred to means is provided adjacent the front face of the former for sealing the longitudinal edges of the strip material together to form the package envelope. This longitudinal seal forming means may take the form of a pair of rollers such as shown at 43 in Figure 13 which are provided with heating elements therein and between which pass the longitudinal edges of the strip material.

It is believed that the many advantages of the presently disclosed apparatus and method are apparent from the foregoing description. By moving the former instead of moving the sealing jaws to form additional length of package shaped strip material it is possible to considerably reduce the distance through which the product must fall thus reducing the likelihood of damage to fragile product. In addition by reducing the distance through which the product must fall the overall cycling time may be reduced. Furthermore, in connection with packaging light-weight products the overstroking movement in which the former continues its upward movement with the sealing jaws released provides a relative movement between the product and bag in opposite directions so as to more firmly seat the product within the bag. In connection with heavier products the method and apparatus hereindescribed insures that the sealing jaws will absorb the momentum of the product when it reaches the lower end of the package. By moving the former with respect to a stationary product an over-wrapping action is achieved so that irregularly shaped articles may be packaged.

Obviously many modifications and variations of the present invention are possible in light of the above teachings. For example, the parts need not be disposed in the position shown relative to a horizontal surface. If desired, the former could move in a horizontal plane and the sealing jaws move in a vertical plane. While a tubular shaped package has been disclosed, it is obvious that other shaped packages could be equally formed. What is claimed as new and desired to be secured by Letters Patent is:

1. A method of packaging wherein a package is formed from a continuous web of sheet material in which a former is reciprocated longitudinally with respect to the continuous web and clamping means is reciprocated transversely with respect to the movement of the former, comprising the steps of filling the package while the clamping means is engaged therewith and while the former is moving away from the clamping means, and releasing the clamping means and moving the former towards the clamping means to bring the other end of the package adjacent the clamping means.

2. A method of packaging comprising the steps of forming a container from a continuous web of packaging material, clamping and sealing one end of the package, filling the package with product, moving the former to form a length of tubular container from the continuous web, releasing the clamp, reciprocating the former to bring the other end of the package adjacent the clamp, and clamping and sealing the other end of the package.

3. A method of packaging comprising the steps of sequentially gripping and sealing tubular formed material to form a closed package end, forming additional length of tubular material while maintaining the package gripped and releasing the gripping means and moving the tubular material to bring the other end of the package adjacent the gripping means and sealing and severing the formed package.

4. In a method of the class described in which a former is adapted to shape a continuous web of material into a substantially tubular form and the former is adapted to reciprocate with respect to a sealing and severing means comprising the steps of, sealing the tubular shaped material to form one end of a package, filling the package through the open upper end thereof so that the product passes through a distance substantially equal to the length of the package, moving the former away from the sealing and severing means to form additional length of tubular material, releasing the sealing and severing means from said one end of the package, moving the former towards the sealing and severing means a distance substantially equal to the length of the package, sealing the other end of the package and severing the completed package.

5. In a method of the class described for forming and filling packages in which a pair of jaws form a sealing and severing means and are adapted to reciprocate transversely and a former is mounted to reciprocate vertically with respect thereto, the former adapted to shape a continuous sheet of material into tubular form, the steps comprising shaping a continuous sheet of material into substantially tubular form and sealing the longitudinal edges of the sheet material together, engaging the pair of jaws

with the tubular formed material to form a transverse seal in the material and one end of the package, filling the tubular package with product while the pair of jaws engages said one end of the package, the product passing through the tubular formed material a distance substantially equal to the length of the package to be formed, moving the former vertically away from the pair of jaws a distance substantially equal to the length of the package to be formed while maintaining the pair of jaws in engagement with the tubular formed material, releasing the jaws, moving the former vertically towards the pair of jaws a distance substantially equal to the length of package to be formed, engaging the pair of jaws with the tubular formed material to seal the other end of the package and severing the completed package from the continuous length of material.

6. Packaging apparatus comprising a frame, former means adapted to have strip material passed thereover to shape the strip material into tubular form, said former means being disposed externally with respect to the tubular formed material, means mounting said former means on said frame for reciprocating movement thereon, a pair of jaws forming sealing and severing means, means mounting said pair of jaws on said frame for reciprocating movement, the axis of the plane of movement of said former means extending substantially normally with respect to the axis of the plane of movement of said pair of jaws.

7. In an apparatus of the class described, in combination, a frame, means supporting strip material on said frame, a former adapted to shape the strip material into tubular form thereon, said former being disposed externally with respect to the tubular formed material, means mounting said former on said frame for reciprocating movement with respect thereto, a pair of jaws, heat sealing and severing means mounted in said jaws for sealing and severing package ends from said tubular formed material, means mounting said pair of jaws for reciprocating movement on said frame transversely with respect to the movement of said former whereby said jaws grip said tubular shaped material while said former moves to shape additional strip material.

8. In an apparatus for forming packages from strip material comprising, in combination, a supporting frame, a pair of posts mounted on said frame, collars slidably disposed on said posts, a former mounted on said collars, said former adapted to shape strip material in tubular form, a pair of jaws, heat sealing and severing means associated with said jaws, means mounting said jaws for movement into and out of engagement with said tubular formed material, and means for moving said former on said posts towards and away from said jaws.

9. An apparatus according to claim 8 wherein said posts are vertically disposed and said jaws move transversely with respect thereto.

10. An apparatus according to claim 8 wherein said former is externally disposed with respect to the strip material and means is disposed adjacent the upper end of said former for filling packages formed from said strip material.

11. An apparatus according to claim 8 wherein said former reciprocates on said posts a distance substantially equal to the length of the package to be formed.

12. An apparatus according to claim 8 and further including means for filling the package formed from the strip material, said means being disposed adjacent the open upper end of said former.

13. A method of packaging comprising the steps of passing strip material over an external former to form the strip material into a package shape, clamping and sealing one end of the package with gripping means reciprocating the former while gripping the package to form additional strip material into package shape and while passing product into the package, the product and former moving in opposite directions, releasing the gripping means and moving the former to pass the package with the product therein through the gripping means and clamping and sealing the other end of the package.

14. A method of packaging comprising the steps of passing strip material over a former to provide a substantially vertically disposed package shape, clamping and sealing the package shaped strip material with gripping means comprising a pair of jaws to form one end of the package, moving the former vertically to pull additional length of strip material into package shape, filling the package with product through the open upper end of the package shaped strip material so that the former and product are moving in opposite directions, the gripping means absorbing the inertia of the product as the product comes in contact with the package end, releasing the gripping means and moving the former downwardly to pass the package with product therein between the jaws of the gripping means and clamping and sealing the upper end of the package.

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