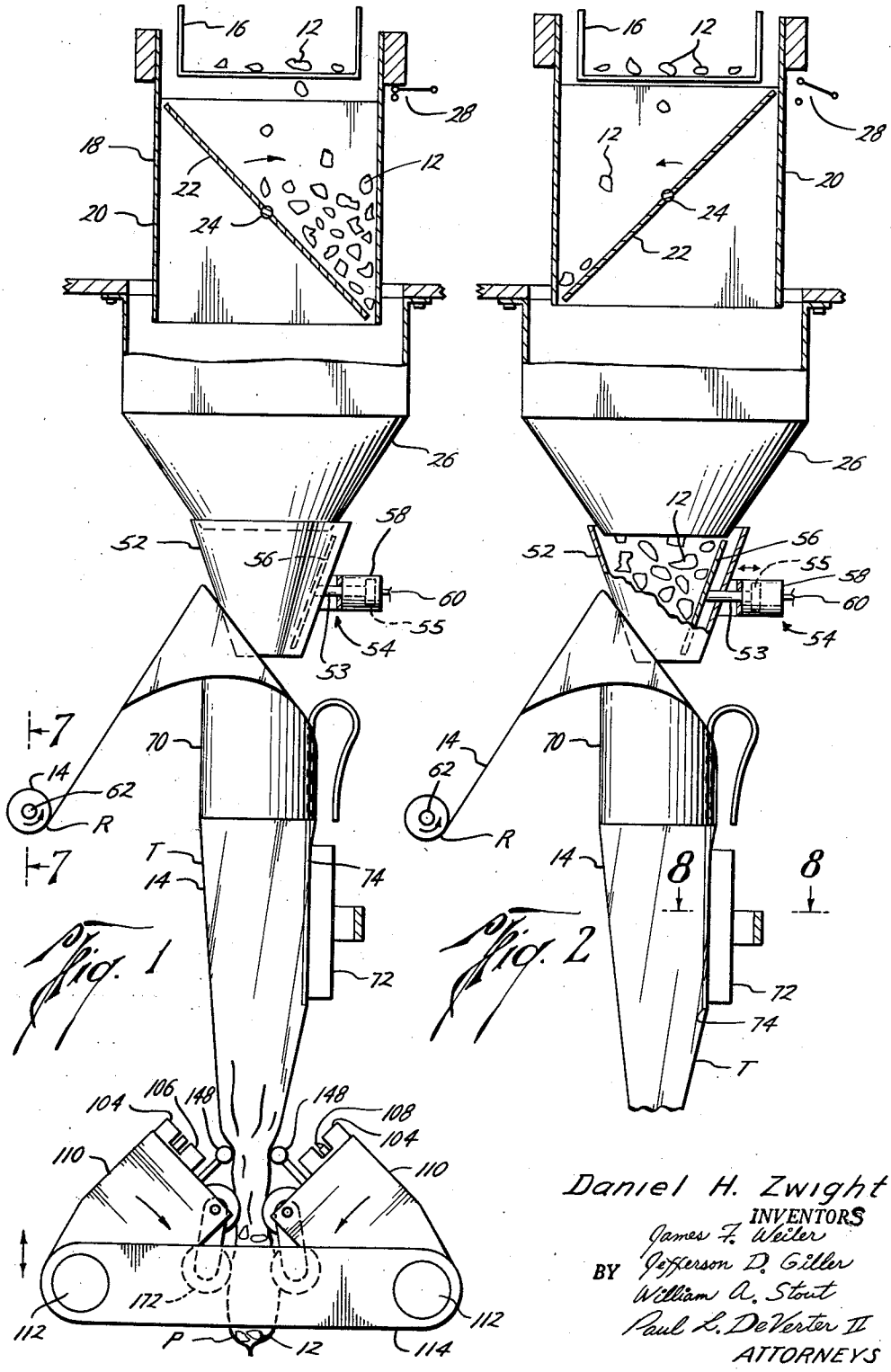
Jan. 1, 1963 D. H. ZWIGHT 3,070,931

PACKAGING MACHINE

Filed Jan. 10, 1961 5 Sheets-Sheet 1



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Fig. 3

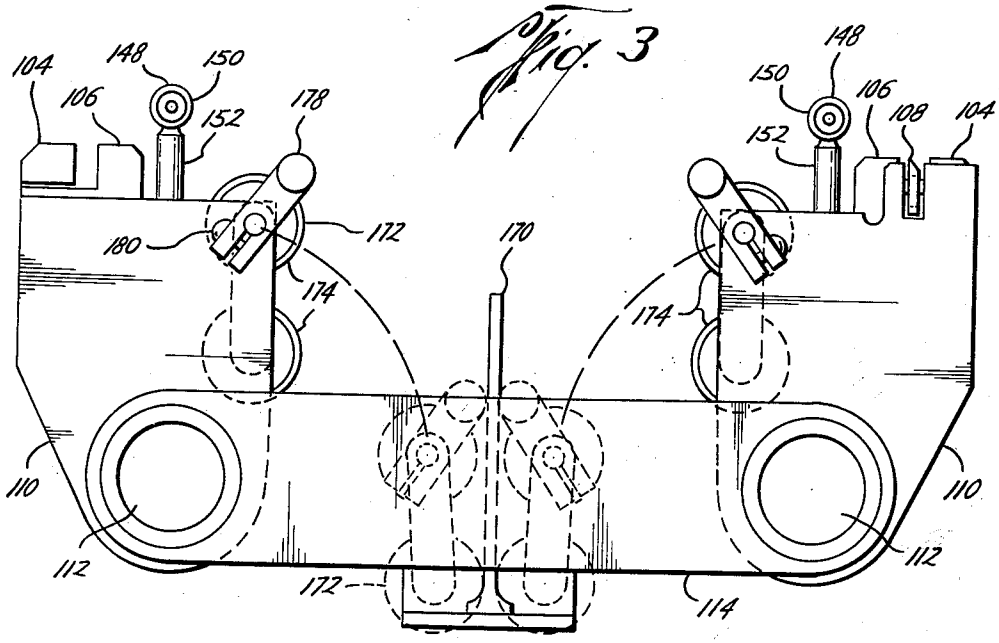


Fig. 4

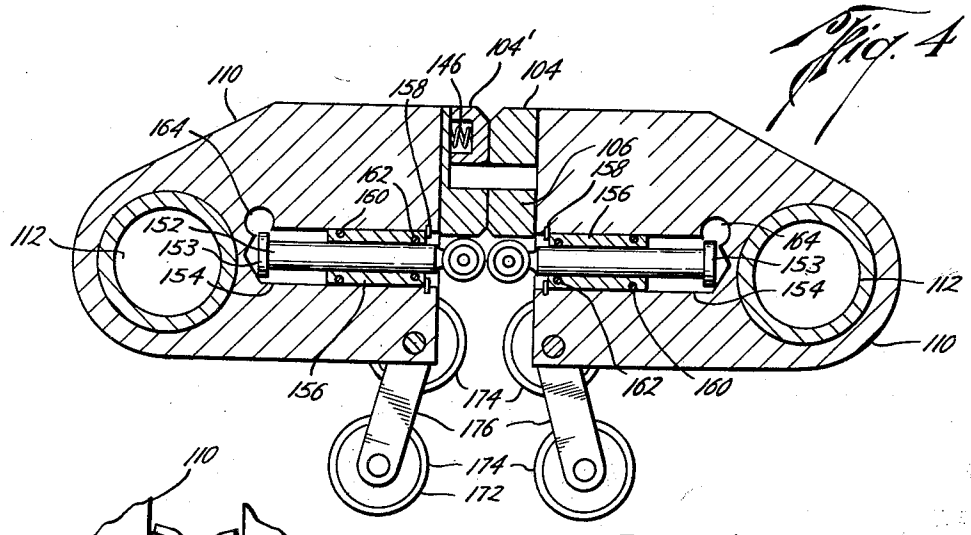
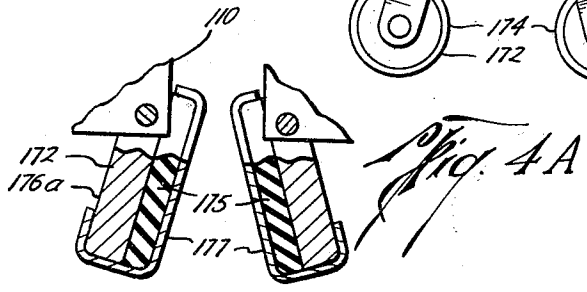


Fig. 4A



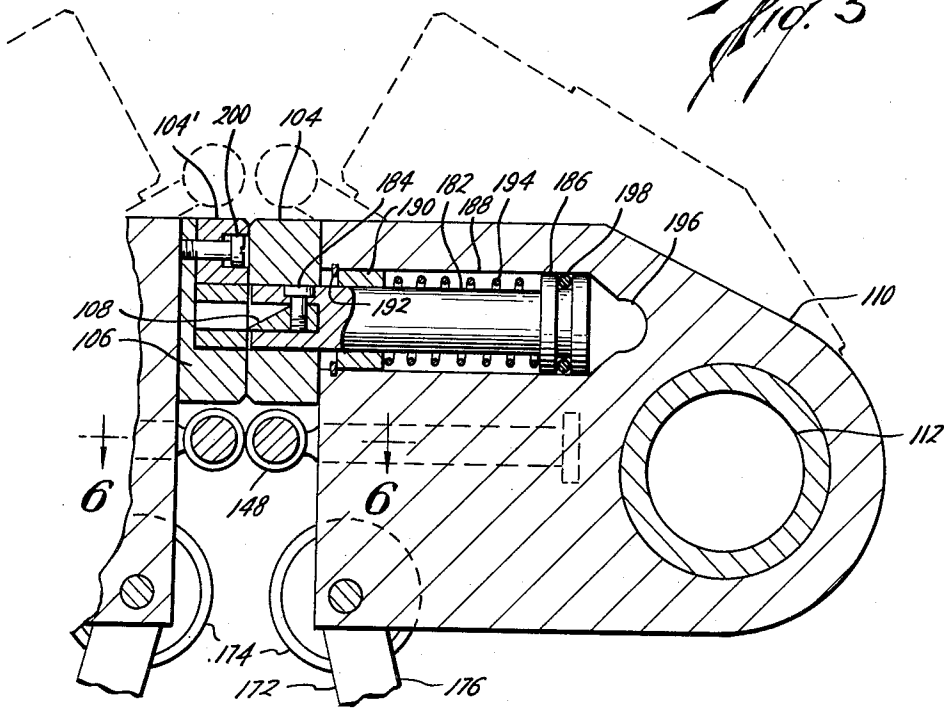
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PACKAGING MACHINE

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Fig. 5



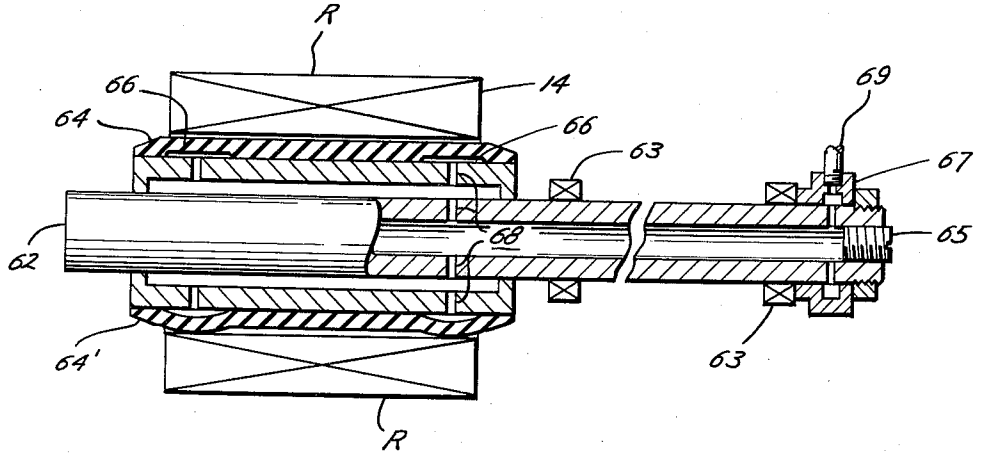


Fig. 7

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PACKAGING MACHINE

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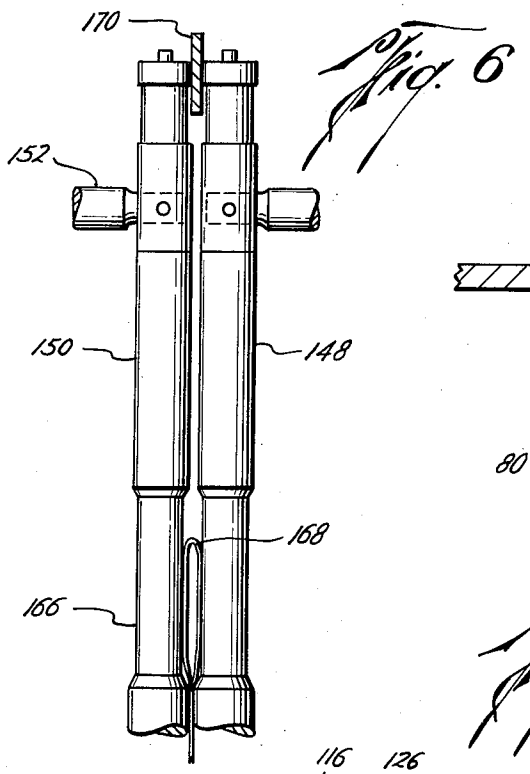


Fig. 6

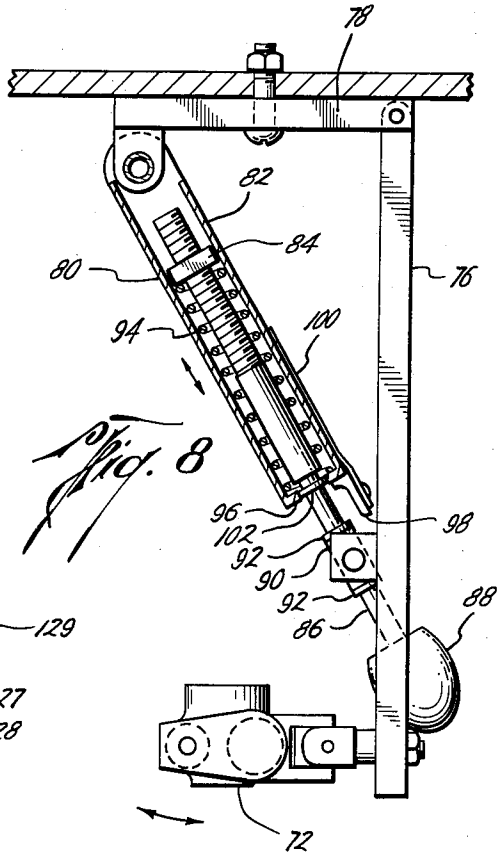


Fig. 8

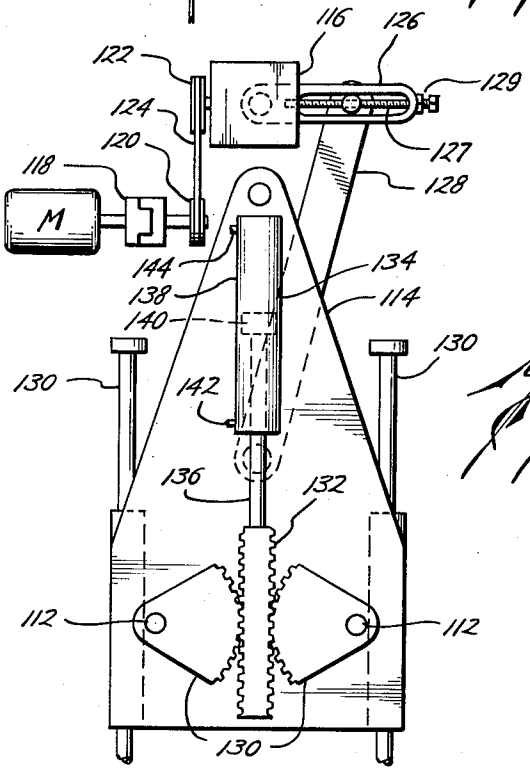


Fig. 9

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Fig. 10

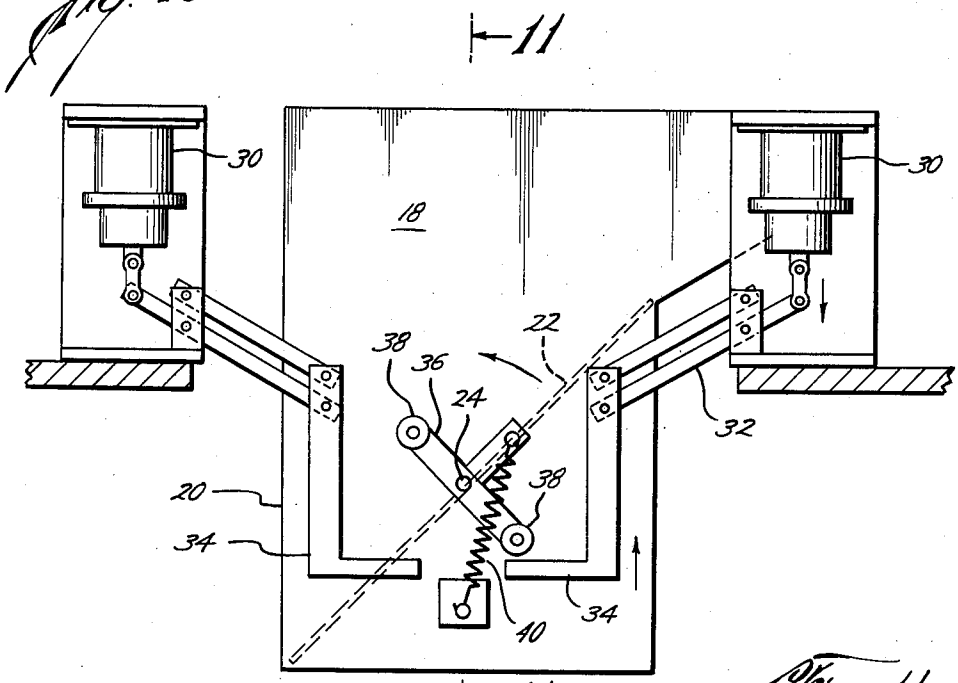
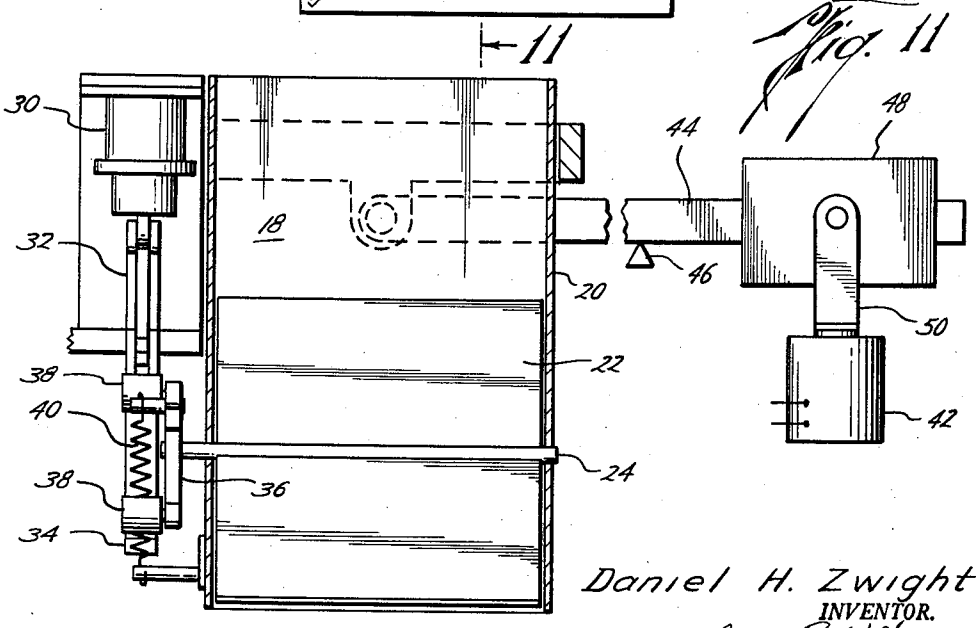


Fig. 11



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Patented Jan. 1, 1963

3,070,931

PACKAGING MACHINE

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Filed Jan. 10, 1961, Ser. No. 81,867
20 Claims. (Cl. 53—182)

The present invention relates to an improved packaging machine in which light products are placed in bags, and more particularly to improvements in various components thereof including an anti-bridging device, weighing dispenser, clearing or stripping, sealing and deflating device, mandrel, and adjustable sealer arm, and their combination with a packaging machine.

Generally, machines for the packaging of free flowing light products, such as potato chips, include means for feeding the product to the machine, means for measuring or weighing the amount of the product to be packaged, means for forming a roll of sealable material, such as cellophane, into a tube, means for sealing the edges of the material, means for sealing across the tube of material thereby forming a bottom for the package, means for directing the weighed product into the tube whose bottom has been formed, means for sealing the tube above the product placed therein thereby forming a top, means for cutting the packaged product from the packaging material, and means for sequentially operating the entire process.

When it is desired to package a uniform amount of a product, some means for measuring the volume or determining the weight to be placed in each package is necessary. In packaging machines, this is generally done by continuously feeding the product to a scale where it is weighed. When the weight reaches a predetermined level, the product is then dumped into the partially formed package. One of the limiting factors encountered in packaging machines is the length of time needed to accurately measure and separate out the predetermined portion for each package. In commercial machines, it is desirable that this be done as rapidly as possible. In other packaging machines of the type of the present invention, on the order of about twenty weighings per minute are realized. The packaging machine of the present invention provides accurate weighings of separate portions of the product at a rate in excess of forty portions per minute.

It is, therefore, an object of the present invention to provide an improved weighing dispenser for free flowing products in which predetermined uniform portions are rapidly and accurately weighed.

As conventional weighing dispensers involve the movement of considerable mechanical equipment and linkages, it is necessary that the weighing device be accurately and quickly reset to the same starting point for each portion. If sufficient time is allowed for the weighing mechanism to balance and thus reset itself after the product is dumped, then, of course, each weighing would be identical. However, when products are to be packaged at a rapid rate, such as the previously mentioned forty packages per minute, an automatic mechanism must be utilized to overcome the inertia of the weighing mechanism. The present invention is designed to rapidly reset to the zero point after each weighing so that speed, accuracy and uniformity are attained.

Thus, another object of the present invention is to provide an improved weighing dispenser utilizing automatic resetting means between each consecutive weighing.

In packaging machines it is generally more economical to form the packages from a large roll of a thin sealable material, such as cellophane. This material is mounted on a suitable mandrel, started off the roll, and fed over a forming device or former such as that disclosed in United States Patent No. 2,899,875 and D. 186,133. Then the material is sealed along its edges forming a hollow tube into which the product to be packaged is dumped and a suitable top and bottom formed on the filled tube. In the process of filling the tube, various heat sealers are used to form the top and bottom of the finished package. As this is done, it is obvious that further cellophane must be pulled off of the roll and into position for making consecutive packages. In the process of doing this at a high rate of speed, such as forty packages per minute, it is important that the roll be accurately aligned with the former so that a satisfactory tube for filling is formed. Therefore, it must be possible to move the roll of cellophane laterally on the mandrel to correct for misalignment and slightly different sizes of rolls. The present invention utilizes a unique and efficient means for adjusting the rolls laterally on the mandrel quickly as well as adjusting for variations in size of the core of the roll of cellophane, as well as firmly gripping the roll.

Thus, another object of the present invention is to provide an improved means for adjustably holding a roll of packaging material so that it may be readily and quickly aligned laterally on the supply mandrel.

Another object of the present invention is to provide a mandrel which is adjustable for and will accommodate varying core sizes of a roll of packaging material.

Yet another object of the present invention is to provide a mandrel which firmly grips a roll of packaging material and holds it in coaxial alignment with the mandrel.

As the product to be packaged is weighed, it is dumped into the tube formed from the packaging material by the former. As the products to be packaged are dumped from the weighing device they must, of course, be directed into the tube of packaging material. This is accomplished by means of a hopper or a funnel. The outer diameter of the funnel must be slightly smaller than the inner diameter of the tube. If the product being packaged is, for example, potato chips, then the outlet diameter of the funnel may be of the order of four inches. Since this type of product is rather light, it must be gently urged downwardly through the funnel and this is normally accomplished by impinging short bursts of air upon the flowing product. Unfortunately, potato chips and other light products still tend to bridge over within the outlet of the funnel, thereby resulting in packages being made which contain none or less than the desired amount of the product. At high speeds, such as the rate of forty packages per minute, the entire weighing dispenser is soon clogged up with bridged product. The present invention, therefore, includes means to eliminate such bridging in the funnel.

It is, therefore, another object of the present invention to provide an anti-bridging device to prevent the accumulation of the product in the funnel which directs the prod-

uct from the weighing dispenser into the tube formed of the packaging material.

As the packaging material is pulled downwardly over the former, the edges are folded or lapped together so that a tube is formed. These lapped edges are thereupon fused together by means of a heat sealer. The heat sealer is an elongate flat electric iron which is thermostatically controlled to provide sufficient heat to the packaging material so that a satisfactory weld or fusing occurs in the time interval allotted while consecutive packages are being made. The sealer must press against the edges of the packaging material to provide a heat seal under pressure. The amount of pressure required depends entirely upon the particular packaging material being sealed. When it is desired to make larger or smaller packages then, of course, the former size must be changed so that the tube diameter is changed and, therefore, the sealer must be adjustable. The present invention accomplishes these objects by providing a yieldably urged adjustable arm which may also be disengaged from and re-engaged with the tube of packaging material in the course of a run so that a new roll of packaging material may be more easily fed to the former, and the like.

Therefore, it is an object of the present invention to provide a yieldably urged arm support for the heat sealer. Another object of the present invention is to provide a yieldably urged adjustable arm for the heat sealer.

Yet a further object of the present invention is to provide a yieldably urged adjustable heat sealer arm which may readily be manipulated to move the heat sealer into contacting and noncontacting position with the packaging material.

After the tube of packaging material has been formed and the edges welded together, a bottom and a top for the package must be formed. This may be accomplished by providing transverse or horizontal heat sealers which flatten the tube and seal it to form a bottom and thereafter the product is dumped into the tube and a second heat sealer transversely closes the tube above the product forming the completed package. Thereupon, the package must be cut loose from the tube, such as with a knife, and the tube pulled down into position for another cycle. The same result may be accomplished if both the top and bottom heat sealers are mounted together with a knife between them whereby the top of the filled package and the bottom of the package being formed may be sealed at the same time and the completed package cut loose from the tubing yet to be filled. Further, the entire assembly of sealers and knives may be mounted in jaws which are reciprocated vertically so that when one package is completed the sealers and knife will move upwardly and close on a new portion of the tubing which will thereupon be pulled downwardly, filled, and sealed. While this is conventional in the present art, nonetheless two distinct problems must be overcome. When the sealers close to form the top of the filled package and the bottom of the new package, the product to be packaged should not be caught between the sealers, for to do so would provide an ineffective seal and an unattractive packaged product. Next, unnecessary air should not remain in the package as it is sealed for this will more rapidly tend to oxidize and discolor the product being packaged. Of course, in some products it is desirable that the bag or package be filled with a particular gas other than air, such as nitrogen, and this may be done by surrounding the equipment involved in a particular atmosphere.

The present invention provides a means to strip that portion of the tubing of the product as it is about to be transversely sealed forming the top of the filled package and the bottom of the next consecutive package. This stripper acts in such a way as to insure the absence of the product to be packaged in the sealing area, but at the same time does not trap or force excess air into the package being formed. Further, the stripper is arranged to not crush nor crumble the product being packaged, such as might be easily done with potato chips. This is accomplished in the present invention by providing a pair of yieldable transverse arms or rods which close together and strip or rake the product below the area in which the sealers fuse the tubing into a completed package. The strippers are also provided with grooves or recessed portions through which the air which is trapped in the partially completed and filled package escapes simultaneously.

It is, therefore, an object of the present invention to provide a stripper which clears the product to be packaged from that area of the tube which is to be transversely sealed.

Yet another object of the present invention is to provide a stripper which is yieldably mounted so that the product to be packaged is urged into the partially formed packages and the product to be packaged is not crushed.

Another object of the present invention is to provide a stripper which urges the product to be packaged into the package being formed and yet permits air trapped in the partially formed package to escape therefrom.

As the product being packaged is stripped downwardly into the partially formed package, air is entrapped in the package which, if given sufficient time, would flow upwardly between the abovementioned recesses through the tube and out of the package. However, at a high rate such as forty packages per minute, sufficient time is not available to allow the air to seek its own pressure differential; therefore, the present invention provides adjustable deflators to drive the air out of the partially formed package and up beyond the stripper. The deflators must be designed so that the maximum amount of air is expelled without crushing the product being packaged, or otherwise deforming the product or package. Further, the deflators must be adjustable for varying weights and types of products being packaged as well as the shape of the package itself. Likewise, the deflators must not interfere with the initial or consecutive filling of the partially formed package.

It is, therefore, an object of the present invention to provide deflators which are adjustable so that the maximum amount of air will be expelled from the package being formed without crushing the product being packaged.

Another object of the present invention is to provide deflators which are readily adjustable for varying types of products and sizes of packages.

Yet another object of the present invention is to provide adjustable deflators which will not interfere with the filling of the partially formed package.

After the product to be packaged has been stripped from the area of the tubing in which the top of the filled package is to be sealed, and after the deflators have forced the excess air drawn into the package by the strippers upwardly through the tubing, the heat sealers close together fusing the packaging material and finishing the package. It sometimes occurs that additional products fall downwardly within the tube after the stripper has passed but before the heat sealers close, and therefore, it is necessary that provision be made in at least the uppermost heat sealer, which is the one used for forming the bottom of a new package, to provide a somewhat flexible or yieldable mounting. Thus, if it should accidentally occur that some of the product to be packaged is caught between the heat sealers when they are closed together, in spite of the best efforts of the abovementioned stripper, then it is obvious that a perfect seal will not result in the package in whose seam the product is caught. This, of course, results in a defective package which is not only unattractive but is also not air tight. However, it further results in the heat sealers not properly gripping the tube of packaging material so that it may be firmly and uniformly pulled downwardly so that a package is made,

in sequence. The present invention is directed to the latter of these problems, that is, the proper gripping of the packaging material so that uniform package lengths are achieved. As is well known in the art, often the packaging material is imprinted with various designs useful in advertising the product. These designs are properly sequenced or coded for the packaging machine so that an electric eye can determine when one package ends and another begins with electrical impulses. These impulses may be properly fed, in a conventional manner, to the reciprocating jaws so that identical packages are produced. It is thus important that the jaws or heat sealers firmly grip the tube of packaging material. Further, this gripping must take place even though part of the product may be accidentally caught between the heat sealers. The present invention is, therefore, provided with a spring-loaded heat sealer on at least one side so that even if a portion of the product is caught within the tubing between the opposed heat sealers, nonetheless the tubing will be firmly gripped and pulled downwardly by the reciprocating motion of the jaws.

Therefore, it is an object of the present invention to provide spring-loaded gripping jaws so that the tube of packaging material will be firmly gripped even if part of the product to be packaged is accidentally caught within the tubing being gripped.

With a combination of the above mentioned means, it is posible to provide a packaging machine which will operate in excess of twice the speeds found in conventional packaging machines, and will thus package more than forty packages per minute. The present invention, therefore, overcomes the disadvantages of uneven weighings, product bridging in the hopper, misalignment of the packaging material roll, pressure sealing of the tubing, the tendency of the product to be caught between packages, the tendency of the packages to be filled with excess air or crushed products, and the tendency of the tube of packaging material to slip in the jaws if part of the product is caught therebetween. Consequently, it is an object of the present invention to overcome all of the above mentioned disadvantages of conventional machines, as well as to accomplish all of the above mentioned objects.

It is a further object of the present invention to provide a packaging machine which is readily adjustable for varying weights and types of packaging materials.

Other and further objects, features and advantages will be apparent from the following description of a presently preferred embodiment of the invention, given for the purpose of disclosure and taken in conjunction with the accompanying drawings, where like character references designate like parts throughout the several views, and where:

FIGURE 1 is a partial sectional view of a packaging machine according to the present invention showing schematically the principal assemblies herein involved,

FIGURE 2 is a view similar to FIGURE 1, showing the relative movement of some of the parts,

FIGURE 3 is an end view of the reciprocating jaws, stripper and deflators, showing in dotted lines the movement of the deflators,

FIGURE 4 is a view similar to FIGURE 3, however, being partially in section and showing the reciprocating jaws closed,

FIGURE 4A is a fragmentary view of FIGURE 4 showing a modification of the deflators,

FIGURE 5 is a further partial sectional view of the jaws showing in detail the jaws and the cutoff knife and horizontal sealers,

FIGURE 6 is a partial top view of the stripper, taken along the line 6—6 of FIGURE 5,

FIGURE7 is a partial sectional view of the adjustable spindle or mandrel for a roll of packaging material taken along the line 7—7 of FIGURE 1,

FIGURE 8 is a partial sectional view from the top of the adjustable arm for holding the tubing heat sealer taken along the line 8—8 of FIGURE 2,

FIGURE 9 is a schematic representation of the reciprocating mechanism for the jaws and showing the opening and closing mechanism,

FIGURE 10 is a partial schematic view of the weighing device, and

FIGURE 11 is a partial sectional side view of the weighing device showing the zeroing or resetting mechanism, taken along the line 11—11 of FIGURE 10.

Referring now to the drawings, and particularly to FIGURE 1, the reference numeral 10 generally designates the packaging machine, wherein a free flowing product 12 is weighed and dispensed into a sealed package formed from a roll of packaging material 14. The product 12 to be packaged may consist of any free flowing material, such as corn chips, potato chips, cookies, popcorn, rice, etc. The packaging material 14 need only be flexible and heat sealable. A conventional material for this purpose is cellophane which is available in various thicknesses, widths, and sizes of rolls, and which may be imprinted or embossed with various designs. The various steps encountered in a packaging machine 10 include the weighing and dispensing of the product 12 into a tube T formed from the packaging material 14, the sealing of the overlapping edges of the packaging material 14 and the formation of the bottom of the package P, filling up the package with the product 12, and the formation of the top of the package and the subsequent cutting loose of the package from the tube of packaging material 14. The product may be fed to the packaging machine 10 in any conventional manner, various conveyors being available commercially, such as the vibrating feed trough 16. As the above features of the packaging machine 10 are well understood in the art, no further explanation thereof is deemed necessary.

The product 12 is fed to the weighing dispenser 18 by means of the vibratory feeding device 16. The weighing dispenser 18 must portion out consecutively equal amounts of the product 12 to be packaged. Further, the weighing dispenser 18 must thereafter discharge these portions of the product 12 so that they may be funneled into the tubing T formed from the packaging material 14. In the process of doing this, the weighing dispenser must not crush the product 12, nor impede the flow of the product 12 for any longer time than is absolutely necessary for weighing the product and it must be readily adjustable for varying weights of the product so that the down time between runs is held to a minimum. To accomplish these results, the weighing dispenser 18 generally comprises a tubular body 20 having a movable door 22, both of which are conventionally suspended as a part of a balance weighing mechanism (not shown). The movable door 22 operates in the manner of a butterfly valve about the shaft 24. The product 12 thus falls into the tubular body 20 and is restrained therein by the door 22. As the product approaches the preset weight, the weighing dispenser 18 moves downwardly to balance against the weights (not shown) until the desired weight of the product 12 is reached. Thereupon, the weighing dispenser 18 stops its downward movement, and the door 22 moves in the direction of the arrow (shown in FIGURE 1) about the shaft 24 dumping the product to be packaged into the hopper 26.

The door 22 is operated when the weighing dispenser 18 has moved downwardly enough to close the switch 28. The switch 28 is shown closed in FIGURE 1, while the switch 28 is shown open in FIGURE 2. The switch 28 thereupon, through means of an electro-pneumatic system, consecutively operates the air cylinders or pistons 30, best shown in FIGURE 10. It is, of course, obvious that the switch 28 and pistons 30 may be replaced with an electro-hydraulic system, a purely mechanical system, a purely pneumatic system, or a purely electrical system, or any other appropriate means.

Referring now to FIGURE 10, when the switch 28 is closed, the piston 30 is energized and acts downwardly to pivot the 4-bar linkage 32 which raises the lift 34, as shown by the arrows. Attached to one end of the shaft 24 and perpendicular to the plane of the door 22 is a toggle arm 36. At each end of the toggle arm 36 are situated rollers 38. Attached to the toggle arm 36 is a spring 40 whose other end is attached to the tubular body 20 of the weighing dispenser 18. In the position of the door 22 shown in FIGURE 11, the spring 40 acting through the toggle arm 36 and shaft 24 holds the door 22 against the side of the tubular body 20. When the piston 30 is activated and the lift 34 is pulled upwardly, it contacts the roller 38 which acts through the toggle arm 36 and shaft 24 to rotate the door 22 within the tubular body 20, and thereby flips the door 22 into the other of its positions against the body 20 where it is there held by the spring 40. The positions of the door 22 are best seen by comparing FIGURES 1 and 2. Referring again to FIGURE 1, as the door 22 rotates, the product 12, which has been weighed, falls downwardly into the hopper 26, and more of the product 12 is fed into the weighing dispenser 18 by the vibratory feed trough 16. It is, of course, possible to interrupt the feed of the trough 16 during the time that the door 22 is being moved from one position to the other with conventional electrical means.

The upward movement of the lift 34 also tends to raise the complete weighing dispenser 18 upwardly toward the normal unloaded position. However, as this is done in excess of forty portions per minute, the weighing dispenser not only rises rapidly and hits the limit stops (not shown), but also tends to bounce back downwardly. Means are provided to prevent this effect, reference being now made to FIGURE 11. As the lift 34 raises the weighing dispenser 18 the electromagnet 42 is energized. Attached to the body 20 of the weighing dispenser 18 is an arm 44 which pivots about the fulcrum 46 and includes at one end the weight 48 for counterbalancing the weight of the product 12. Attached to the arm 44 is a bracket 50 which is attracted by a magnetic field, such as that produced when the electro-magnet 42 is energized. The electro-magnet 42 and bracket 50 are physically arranged so that when the weighing dispenser 18 is empty and perfectly balanced, the bracket 50 is in contact with the core of the electro-magnet 42. Therefore, as the weighing dispenser 18 moves upwardly and the bracket 50 attached to the arm 44 moves downwardly and when the electro-magnet 42 is energized, the bracket 50 will contact the core of the electro-magnet 42 and will be held in that position so long as the electro-magnet 42 is energized. The electro-magnet 42 remains in its energized state momentarily, but long enough to damp the inertia and rebound effect of the weighing dispenser 18. Thereupon to consecutively weigh another portion of the product 12, the electro-magnet 42 is de-energized and the weighing dispenser 18 moves downwardly with the weight of the product against the door 22 and body 20 against the scales (not shown) until the switch 28 is again closed. Thus it is seen that the weighing dispenser 18 in combination with conventional scales, will accurately weigh a predetermined amount of the product to be packaged quickly, and will reset to the zero point after each automatic weighing period. It should also be noted that either side of the door 22 in conjunction with the body 20 may be used to weigh the product 12. Therefore, by one movement of the door 22, the previously weighed product is dispensed downwardly into the hopper 26 and the weighing dispenser 18 is in position to receive a second portion of the product 12 for weighing.

Referring again to FIGURE 1, as the product falls downwardly into the hopper 26 it is directed therethrough by means of a funnel 52 into the tube T formed from the packaging material 14. In order that the product 12 may be placed in the tube T formed by the packaging material 14, it is sometimes necessary that the funnel 52 have an outlet diameter of four inches or even smaller. When the product 12 to be packaged is very light and rather bulky, such as potato chips, the product 12 will tend to bridge over such a small diameter within the funnel, with the result that packages are formed without products, and the weighing dispenser is clogged. To overcome this tendency, the present invention utilizes an anti-bridging device 54 within the funnel 52. The antibridging device 54 includes a false side 56 within the funnel 52. Attached to the false side 56 and extending through the funnel 52 is a connecting rod 53 which terminates within a cylinder 58 as a piston 55. When pulsating air is supplied to the inlet 60 of the cylinder 58, the piston 55, connecting rod 53, and false side 56 reciprocate rapidly. Thus, as shown in FIGURES 1 and 2 the false side 56 is pneumatically operated with consecutive pulses of air through the inlet 60. It is obvious, of course, that other reciprocating means may be utilized, such as an electro-pneumatic vibrator or a cam, neither being shown. It is also true that the false side 56 need only reciprocate when the product 12 is passing through the funnel 52. It has been found that the reciprocating side 56 effectively eliminates any bridging tendencies of the product 12 being packaged.

As it is generally more economical to form packages from a large roll R of thin sealable material, such as cellophane, provision must be made for holding such a roll on the machine. Schematically, such a roll R is shown in FIGURES 1 and 2 mounted on the rotatable spindle 62. As was previously mentioned in the objects of this invention, it is highly desirable to make provision for rapidly adjusting the roll R of packaging material 14 laterally on the spindle 62 as well as adjusting for small variations in the size of the core of the roll of packaging material. Referring now to FIGURE 7, the roll R of packaging material 14 is shown in cross-section mounted on the mandrel 64 which is in turn mounted on the spindle 62. The spindle 62 is conventionally mounted on the frame of the packaging machine 10 so that it will rotate, such as in the roller bearings 63. Between the spindle 62 and the mandrel 64 at each end thereof, are located grooves 66 which are pneumatically connected through the passageway 68 to appropriate supply means (not shown). The spindle 62 is a hollow conduit, each end of which is closed by a plug 65. About the end of the spindle 62 is a groove forming part of the passageway 68. The groove is sealed by the stationary seal 67 which includes the air inlet 69. When it is desired to alter the location of a roll of packaging material 14 upon the spindle 62 air supplied to the inlet 69 and thus to the passageway 68 and grooves 66 is vented to atmosphere so that the mandrel 64 takes the position shown in the upper half of FIGURE 7. After the roll of packaging material 14 is placed in the desired position, air is supplied to the inlet 69 and thus to the passageway 68 and grooves 66 thereby swelling the diameter of the mandrel 64 in the vicinity of the grooves 66 so that the mandrel 64' assumes the position shown in the bottom half of FIGURE 7. The mandrel 64 is made of neoprene or rubber or any other slightly inflatable material which may be secured air tight to the spindle 62 except in the vicinity of the grooves 66. By providing grooves 66 at each end of the mandrel 64, the roll R of packaging material 14 is held in coaxial alignment with the spindle 62. This would not be possible if the entire mandrel 64 were expanded along its length, for then the roll R of packaging material 14 might tend to wobble on the spindle 62. Of course, it is immaterial whether the grooves 66 are within the mandrel 64 or on the spindle 62. Thus it is possible to account for variations in the core diameter of the roll R of packaging material 14 by increasing the air pressure, as well as to readily

laterally adjust the material by venting the passageway 68. Of course, the pressure of the air applied to the passageway 68 and grooves 66 may be varied so that the roll R of packaging material 14 is firmly held to the mandrel 64. Although air has been mentioned as the operating means, any other fluid would be within the scope of the invention.

The roll R of packaging material 14 is fed around and over a former 70, as shown in FIGURES 1 and 2, so that a tube T of packaging material is formed. Immediately after passing through the former, the wedges of the packaging material are fused together to form an elongate tube T. This fusing is accomplished by means of the heat sealer 72 which bears against the packaging material 14, which in turn bears against an appropriate plate 74. The heat sealer 72 is a thermostatically controlled electric iron whose function is to fuse together the overlapped edges of the packaging material 14, thereby forming an air tight seam in the tube T. The heat sealer 72 must accomplish this result in the time allotted while the packaging material 14 is being moved downwardly so that new packages may be consecutively formed. Because there are often variations in the thickness of the packaging material 14, the heat sealer 72 must be yieldingly mounted or pressed against the packaging material 14 and the plate 74. Also, to effect a tight seal in some types of packaging material 14, the seal must be made with an adjustable combination of heat and pressure. Further the heat sealer 72 must be readily adjustable for varying sizes of tubing to be formed and must also be readily disengageable when it is desired to stop making packages in the middle of a run. To accomplish this result, with reference being made now to FIGURE 8, the heat sealer 72 is mounted on the movable arm 76 which is pivotably mounted to the frame 78 of the machine 10. To prevent unwanted movement of the arm 76 and of the heat sealer 72 attached thereto, also pivotably mounted to the frame 78 and to the arm 76 is the adjustable arm 80. The adjustable arm 80 is designed so that its length may be increased or decreased with the proper manipulation thereby moving the heat sealer 72 closer to or further away from the packaging material 14 and plate 74 and likewise adjusting the pressure exerted thereon. Likewise, the adjustable arm 80 is constructed so that it may be readily lengthened a short distance to move the heat sealer 72 completely out of contact with the packaging material 14 and the plate 74. To accomplish these results, the adjustable arm 80 includes a hollow tubular body 82 which is swingably or pivotably mounted to the frame 78. The body 82 is here disclosed as having a rectangular cross-section so that a square nut 84 may slide axially within the body 82 but the square nut 84 will not rotate within the body 82. Obviously, other means may be utilized, to provide the telescopic non-rotatable action of the nut 84, such means including splined body, keyed body, etc. (not shown). Threadably attached to the nut 84 is the shaft 86 which includes a knob 88 at the opposite end. Spaced along the shaft 86 is a bushing 90 in which the shaft 86 rotates, the bushing 90 being held axially on the shaft 86 by conventional retainers, such as the snap rings 92. Within the body 82 a spring 94 presses against the nut 84 at one end and against a shoulder 96 on the body 82. When the knob 88 is rotated, the shaft 86 attached thereto also rotates, thereby threading the shaft 86 into the nut 84 and changing the length of the adjustable arm 80. The bushing 90 is pivotally mounted on the arm 76. Therefore, as the knob 88 is rotated and the shaft 86, for example, threads inwardly through the nut 84, the length of the adjustable arm 80 is shortened, thereby rotating the arm 76 and the heat sealer 72 is moved closer to the tube T of packaging material 14 and plate 74. Because the spring 94 is thereby compressed when the shaft 86 is rotated in the nut 84, the pressure between the heat sealer 72 and the packaging material 14 and plate 74 is adjustable.

Exterior of the shoulder 96 on the body 82 is placed a finger 98 which is attached to the body 82 by a leaf spring 100. Attached to the shaft 86 between the bushing 90 and the nut 84 is a collar 102 which will slide between or within the internal diameter of the shoulder 96 on the body 82. When it is desired to release the heat sealer from the packaging material 14 and plate 74 so that no contact is made therewith, the finger 98 is pulled outwardly and the arm 76 and heat sealer 72 are also pulled outwardly so that the collar 102 is moved beyond the shoulder 96 and the finger 98. Thereupon the finger 98 is released and the leaf spring 100 urges it inwardly toward the shaft 86. Then, when the heat sealer 72 is released, the spring 94 expands and urges the nut 84 and shaft 86 inwardly within the body 82 to shorten the adjustable arm 80, but the collar 102 contacts the outer edge of the finger 98, thereby preventing the arm from returning to its original position. Thus, the hot heat sealer 72 is released from contact with the tube T of packaging material 14 and the plate 74. At this time the run may be interrupted, or the size of the tube T of packaging material 14 changed. When it is again desired to contact the packaging material 14 and plate 74 with the heat sealer 72, the finger 98 is pulled outwardly and the spring 94 presses against the nut 84 shortening the adjustable arm 80 until the heat sealer 72 and the arm 76 pivot into contact with the tube T of packaging material 14 and plate 74.

After a tube T of packaging material 14 has been formed by means of the former 70 and the heat sealer 72, a bottom of the package P must be formed in the tube of packaging material. This is accomplished by means of the horizontal heat sealer 104. Thereafter, when the package is filled by dumping the weighed product 12 into the partially formed package, the top of the package P must be sealed by the heat sealer 106 and the finished package P cut from the tube of packaging material 14 by the knife 108. At the same time, a new portion of tubing must be pulled into position so that the cycle may be repeated. In the present invention, this is accomplished by mounting the heat sealers 104 and 106 and the knife 108 on a pair of movable jaws 110 which pivot on the axes 112. The axes 112 are pivotally mounted upon a reciprocating frame 114 which moves upwardly and downwardly, its total travel being at least the length of the package to be formed. Thus when it is desired to form the bottom of a new package P from the tube T of the packaging material 14, the jaws 110 are pivoted upwardly and outwardly, so that they assume the position shown in FIGURE 3. Thereupon, the entire frame 114, which includes the jaws 110 and sealers 104 and 106, moves upwardly, then the jaws move inwardly and downwardly to the position shown in FIGURE 4. At this time, the heat sealers 104 press against one another through the flattened tube of packaging material 14 and the package of material is fused together forming the bottom of the package. Then the entire frame 114 including the jaws 110 and sealers 104 and 106 move downwardly the length of the package to be formed, whereupon the jaws again open upwardly and outwardly assuming the position shown in FIGURE 3. At this time the product to be packaged is dumped through the tube T into the partially formed package P, while the jaws and frame are moving upwardly where they will again close as shown in FIGURE 4. At this time the bottom of the next succeeding package P is formed by the heat sealers 104 while the top of the previously filled package P is formed by the heat sealers 106. Thereupon the frame 114 and jaws 110 including the heat sealers 104 and 106 move downwardly to bring more packaging material into position for filling, and the knife 108 moves laterally so as to separate the completed package P from the tube of packaging material. The mechanism utilized

to open and close the jaws and to move the frame upwardly and downwardly is illustrated schematically in FIGURE 9.

Referring now to FIGURE 9, a motor M drives the crank mechanism 116 through a conventional clutch 118, appropriate pulleys 120 and 122 and belt 124. The crank mechanism 116 includes the crank arm 126 and the connecting rod 128 which is connected to the frame 114. Thus, as the motor M rotates, the crank arm 126 rotates, the connecting rod moves and the frame 114 moves up and down along the guides 130. The guides 130 are attached to the frame of the packaging machine 10. When the frame 114 has reached the bottom of the stroke, the jaws 110 are opened with the rotation of the shafts 112 by the sector gears 130, which are in turn operated by the rack 132 which is moved upwardly and downwardly by the double acting piston and cylinder arrangement 134. Thus, attached to the rack 132 is a piston shaft 136 which conventionally passes through a stuffing box (not shown) into the cylinder 138 where it terminates in a piston 140. When it is desired to open the jaws 110, hydraulic fluid is supplied through the inlet 142 so that the piston 140 is moved upwardly within the cylinder 138, then the shaft 136 is moved upwardly, and the sector gears 130 rotate upwardly so that the shafts 112 are rotated and the jaws 110 open upwardly and outwardly, as in FIGURE 3. Likewise, when it is desired to close the jaws 110 when the frame 114 has moved to the top of the slope, hydraulic fluid is supplied to the cylinder and piston assembly 134 through the inlet 144 so that the piston 140 is moved downwardly within the cylinder 138, the shaft 136 moves downwardly, the rack 132 moves downwardly, the sector gears 130 are rotated, the shafts 112 are rotated, and the jaws 110 are closed, as in FIGURE 4. It is, of course, obvious that other fluids may be utilized to operate the piston and cylinder arrangement 134, such as air, water, etc. It should be noted that the pivotal connection between the crank arm 126 and the connecting rod 128 is adjustable along the crank arm 126. Therefore, in a conventional manner, it is easy to adjust the ultimate length of stroke produced in the frame 114 when the crank mechanism 116 is rotated, because the effective length of the crank arm 126 is adjustable. In the present invention this is accomplished by rotating the leadscrew 127 which extends through the crank arm 126 and the pivotal connection to the connecting rod 128. An appropriate locknut 129 or setscrew may be utilized to secure the leadscrew 127.

Referring now to FIGURES 3 and 4, it is seen that the jaws 110 have mounted thereon the heat sealers 104 and 106 and the knife 108. As was previously mentioned in the objects, strippers are provided to clear the product 12 out of the immediate area where the horizontal seals are to be effected.

The strippers above referred to are shown schematically in FIGURE 1, being generally identified as 148. It is seen in FIGURE 1 that the strippers 148 urge the product 12 downwardly into the partially formed package P when the jaws 110 close to form the top of the partially finished package P and the bottom of the new package P. Referring now to FIGURES 3 and 4, it is seen that these strippers 148 comprise a grooved or recessed bar 150 which runs the entire length of the jaws 110 and is reciprocally mounted therein by the shaft 152 at each end of the bar 150. In the cross-sectional view of FIGURE 4, it is seen that the shaft 152 fits into a cylinder 154 formed within the jaws 110. The inwardly end of the shaft 152 comprises a piston 153 to prevent the shaft 152 from passing through the shoulder 156 within the cylinder 154. The shoulder 156 is retained within the cylinder 154 by means of the snap ring 158. Around the circumference of the shoulder 156 an O-ring 160 is placed to prevent the operating air for the shaft 152 from leaking to atmosphere around the shoulder 156. Likewise, within the shoulder 156 another O-ring 162 is mounted to prevent air from leaking to atmosphere about the shaft 152. By this simple and effective mechanism, it is possible to remove the entire stripper bar 150 and shafts 152, shoulder 156 and O-rings 160 and 162, for cleaning, adjustment or alteration simply by removing the snap ring 158. Operating air for the stripper 148 is led into the cylinder 154 through the inlet 164 in the jaw 110.

Referring now to FIGURE 3, it is seen that the strippers 148 are in an extended position and ready for the jaws 110 to close so that the sealers 104 and 106 may form the bottom and top respectively of the packages P. As the jaws are closed, the strippers 148 remain in their extended position forcing any product 12 between the stripper bars 150 downwardly into the partially finished package. An intermediate view of this process is best depicted in FIGURE 1, although it is also shown in dotted lines in FIGURE 5. As the jaws continue to close, they assume the position shown in FIGURE 4 wherein the strippers 148 have abutted against each other and the jaws are horizontal with the sealers 104 and 106 sealing the tube T of packaging material 14. In this position, air to the inlet 164 has been vented so that the strippers remain in their inoperative position. Thereupon, to prepare for a second cycle, the jaws 110 are swung upwardly and outwardly and the operating air for the strippers 148 is supplied to the shafts 152 through the inlets 164 and the jaws 110. Thereupon, the shafts 152 move upwardly, as seen in FIGURE 3, until the piston 153 at one end thereof strikes the shoulder 156 within the cylinder 154. The strippers are now ready for another package P to be formed.

Referring now to FIGURE 6, a partial top view of the stripper bars 150 shown in FIGURES 4 and 5 is shown. In this view, it is noted that the stripper bars 150 comprise several diameters. When the stripper bars 150 rake downwardly over the tube of packaging material 14, it is, of course, obvious that air within the tube is pulled downwardly into the partially formed package. To prevent this air from bursting the package being formed, it is necessary that a means of escape for this air be provided. Therefore, the recess 166 is provided in the stripper bar 150. When the stripper bars have butted together, the tube of packaging material is pressed almost flat except for that part of the package which is expanded within the area left by the grooves 166 and thus the package assumes the shape partially shown as 168. Air entrapped within the partially formed package, therefore, escapes upwardly at each end of the stripper bars 150 in the area of the grooves 166. It is to be noted that the strippers 148 are independently connected to air inlets 164, and therefore, if there should be a variation in the air supply, one of the strippers might extend outwardly further than the other stripper. To prevent this accidental occurrence, the upright 170 is provided at the center of closure of the jaws 110. As can best be seen in FIGURE 6, the upright 170 is designed to fit between the stripper bars 150 when in perfect alignment as the jaws 110 are closed. The upright 170 only contacts the strippers 148 in the last phase of their inward and downward movement when the jaws 110 are closing.

Although enough air escapes from the partially formed package P, shown as 168 in FIGURE 6, between the groove 166 and the stripper bar 150, to prevent the package from blowing out the already formed bottom or side seams, nonetheless an excess of air would remain in the filled package P. Therefore, it is necessary to expel as much of this entrapped air as is possible before the top is finally sealed by the heat sealer 106. As was previously mentioned in the objects, the deflators 172 are used for this purpose. Referring now to FIGURES 3 and 4, the deflators 172 comprise elongate rollers 174 mounted in tandem together by the linkage 176, and are pivotally

mounted to the jaws 110. Also attached to the linkage 176 is the adjustable cam 178 which is adjusted by means of the screw 180 or other conventional means. When the jaws 110 are open, as shown in FIGURE 3, the rollers 174 rest vertically one under the other, thereby leaving a wide space between the jaws 110 for the tube T of packaging material 14 and the product 12 therein. As the jaws 110 begin to close, as best seen in FIGURE 1, the deflators 172 move inwardly and toward each other, squeezing the air entrapped within the partially formed package P upwardly through the tube of packaging material 14. Thereupon, when the jaws are completely closed as seen in FIGURE 4, the deflators 172 hang downward and outwardly as shown.

Referring to FIGURE 4A, a modification of the deflators 172 is shown. Instead of the rollers 174 and linkage 176, a plate 176*a* is pivotably mounted to the jaws 110. Attached to the plate 176*a* is a layer 175 of sponge rubber or other similar resilient material. The inward surface of the sponge rubber layer 175 is covered with a sheet 177 of smooth, slick material, such as Teflon (tetrafluoroethylene polymer). The advantage in using an inner surface of Teflon or the like for the sheet 177 is that it is smooth and slick, hence the packaging material 14 will not tend to stick nor temporarily adhere to the sheet. The sponge rubber 175 tends to absorb shock and thereby prevents excessive breaking or crumbling of the product being packaged, yet the sponge rubber layer 175 deforms to better deflate the partially completed package.

Referring now to FIGURE 3, it is seen that the crank cam 178 may be adjusted by means of the screws 180 so that the deflator will assume the position shown in the dotted lines when the jaws are completely closed. Thus, it is possible when the crank cam 178 strikes the upright 170 to eliminate virtually all of the air within the package formed of the packaging material 14. Of course, if the crank cam 178 were placed in the position shown in FIGURE 3, a product such as potato chips would be crushed thereby, and consequently the screws 180 must be losened so that the crank cams 178 do not force the deflators 172 as close together as that shown in FIGURE 3. For a reason which is not fully understood, it has been found that in the rapid downward or closing movement of the jaws 110 it is necessary that the crank cam 178 should strike the upright 170 to prevent the partially completed bag from being filled with excess air, yet at the same time the products therein, such as potato chips, are not crushed. Although logically, it would seen that such is not necessary, nonetheless it has been found to be true. The upright 170 also prevents one of the pair of deflators 172 from swinging off of its side into the path of the other deflator, should the inertia or frictional resistance of one of the deflators 172 be different from that of the other.

Referring now particularly to FIGURE 5, an enlarged partial sectional view of the jaws 110 is shown with particular emphasis on the mechanism for operating the knife 108 and the mounting of the uppermost horizontal heat sealer 104. When the jaws 110 have completely closed so that the heat sealers 104 and 106 contact each other through the flat tube T of packaging material 14 forming the top of the finished package P and the bottom of the next consecutive package P, the knife 108 is moved laterally between the jaws to cut the finished package P from the tube of packaging material 14. The knife 108 is attached to a piston rod 182 in a conventional manner, such as by the screw 184. At the inwardly end of the piston rod 182 is located the piston 186 within the cylinder 188. Inserted around the piston rod 182 and within the cylinder 188 is a shoulder 190 which is held within the cylinder 188 by means of the snap ring 192. Between the shoulder 190 and the piston 186 and about the piston rod 182 is the compression spring 194 which serves to hold or push the piston 186 inwardly within the cylinder 188. Therefore, the knife 108 is held within one of the jaws 110 between the heat sealers 104 and 106. When it is desired to move the knife 108 laterally between the jaws 110, air is supplied to the cylinder 188 through the inlet 196. The air thus supplied will push the piston 186, piston rod 182 and knife 108 laterally so as to cut the finished package P from the tube T of packaging material 14. Located in a recess or groove in the piston 186 is an O-ring 198 which prevents the air introduced from the inlet 196 in the cylinder 188 from escaping about the piston 186. When the air supplied to the inlet 196 is vented to atmosphere, after the finished package has been cut from the tube of packaging material 14, then the spring 194 urges the piston 186, piston rod 182 and knife 108 inwardly within the cylinder 188, thereby ending the knife stroke.

As was previously mentioned in the objects, it sometimes occurs that notwithstanding the best efforts of the strippers 148 to remove all of the product 12 being packaged from that area of the tubing in which the jaws will close so that horizontal seals may be effected, some part of the product might accidentally still remain within the tube T of packaging material 14. And, of course, it is possible for some of the product 12 to fall downwardly within the tube T of packaging material 14 after the strippers 148 have raked downwardly but before the jaws 110 have closed. If either of these conditions were to happen, when the jaws 110 close and the heat sealers 104 and 106 attempt to seal the top of the finished package and the bottom of the next succeeding package, the product 12 may be caught within the seal. When this happens, then a perfect seal does not result in the finished package and consequently that package is lost, so far as commercial activity is concerned. However, the important problem is not the loss of one or two packages, but the insecure grip effected by the jaws 110 and heat sealers 104 and 106 when closed so that the tube of packaging material slips therein and is not uniformly pulled downwardly. If this were to happen, then matter printed upon the packaging material 14 would not uniformly appear in the same place on all of the finished packages. Therefore, it is important to provide a means within the jaws 110 to firmly grasp the tube of packaging material 14 so that it is uniformly pulled downwardly the same distance, thereby resulting in identical packages. This is accomplished in the present invention by spring-loading one of the uppermost horizontal heat sealers 104, such as that designated in FIGURES 4 and 5 as 104'. By this method, a uniform grip on the tube of packaging material 14 is assured.

Referring now to FIGURE 4, it is seen that a compression spring 146 is mounted within a counterbore in the heat sealer 104'. This spring 146 presses against the jaw 110 and against the heat sealer 104', pushing it outwardly. To retain the heat sealer 104' on the jaw 110, with reference now being made to FIGURE 5, also located on the heat sealer 104' at either end is a holding means, such as the screw 200. This screw 200 serves to prevent the spring 146 from urging the heat sealer 104' completely free of the jaw 110. It is, of course, obvious that other means than the helical compression spring 146 may be used, such as a leaf spring (not shown). Therefore, in this manner, a uniform grip between the heat sealers 104 and 104' upon a tube T of packaging material 14 is assured, even though some part of the product 12 may be caught therebetween.

Having thoroughly described the operation and use of the various subcombinations used within the present invention, the operation of the entire combination into a packaging machine accurately and uniformly produces an excess of forty packages per minute. Throughout many of the above disclosed combinations, specific forms or shapes of mechanism have been described. By these descriptions, it was not meant to limit the present invention to those physical forms, but rather to broadly claim

their equivalents as well. Further, some intermixing of the consecutive steps hereinafter described in the use of the packaging machine 10 is likewise obvious. As it is not felt that an extremely detailed sequence need be given, the following summary is presented:

In use, the product 12 to be packaged in the packaging material 14 is fed into the weighing dispenser 18 which contains a butterfly type door 22. The product falls upon one side of the door 22 within the body 20 to be weighed by the scales (not shown). When the proper weight of the product is accumulated, the switch 28 is closed, and the pistons 30 are activated raising the appropriate lifter 34 which close the door 22 into the other of its ultimate positions. Thereupon the product 12 which has now been accurately weighed, is dumped downwardly into the hopper 26 toward the tube T of packaging material formed about the former 70. As this is happening, the weighing dispenser 18 rises upwardly due to the lifting action of the lifter 34, and is momentarily, yet effectively, damped by the contact of the core of the electro-magnet 42 with the bracket 50. In this manner, the weighing dispenser 18 is completely reset and ready to deliver uniform consecutive batches of the product 12 as they are deposited within the weighing dispenser 18.

To prevent the weighed batch of the product 12 from clogging the funnel 52 at the bottom of the hopper 26, the anti-bridging device 54 is placed into operation to prevent the bridging of the products 12 within the outlet of the funnel 52. Previously the roll R of packaging material 14 has been placed upon the spindle 62 which includes the mandrel 64. The packaging material is pulled upwardly over the former 70 and down between the plate 74 and heat sealer 72 into the area dominated by the jaws 110. Generally a few empty trial packages are formed, to see if the various components are adequately adjusted for the packages to be produced. If any misalignment is found in the roll R of packaging material 14, the air supply to the passageway 68 is vented to atmosphere, so that the mandrel 64 assumes the position shown in the top half of FIGURE 7. Thereupon, after lateral adjustment has been made in the roll of packaging material 14, the air is again supplied to the passageway 68 inflating the mandrel 64 into the position 64' so that the roll R of packaging material 14 is firmly held coaxially and laterally on the spindle 62.

Thereafter the heat sealer 72 is brought into contact with the lapped edges of the tube T of packaging material 14 and adjusted to the proper tension by turning the knob 88 on the adjustable arm 80. Then the thermostatically controlled heat sealer 72 is placed in operation if this has not previously been done. When it is desired to shift the roll R of packaging material 14 upon the spindle 62, then, of course, the finger 98 on the adjustable arm 80 may be pulled outwardly and the adjustable arm 80 lengthened so that the heat sealer 72 is not in contact with the packaging material 14 and plate 74.

Thereupon, the heat sealers 104 and 106, for the bottom and top of the packages, respectively, are electrically heated to proper temperature, and the motor M is energized. As the crank 126 rotates, the frame 114 reciprocates thereby moving the jaws 110 upward and downward. By electrically disengaging the clutch 118, it is, of course, possible to run the motor M without reciprocating the frame 114. Then with the proper sequence switches (not shown) the frame 114 is moved upwardly and the jaws 110 are closed by means of fluid through the inlet 144 in the piston and cylinder arrangement 134. At this time, the jaws 110 form the bottom of the package P to be filled, and the clutch 118 is engaged moving the frame 114 downwardly. The product 12 in the weighing dispenser is then dumped downwardly through the hopper 26 and along the anti-bridging device 54 through the former 70 into the tube T of packaging material 14 and downwardly to the bottom of the partially formed package formed by the jaws 110. When the frame 114 is moved to the bottom of its stroke, and the material 12 to be packaged has fallen into the partially formed package, fluid is directed into the inlet 142 opening the jaws and the frame 114 is moved upwardly. Thereupon, fluid to the inlet 142 is released and fluid is supplied to the inlet 144 causing the jaws 110 to close. As the jaws 110 move inwardly and downwardly, the strippers 148 rake along the tube T of packaging material forcing the product 12 into the partially completed package P. At the same time, the deflators 172 push against the filled and partially formed package to expel the air entrapped therein upwardly through the recesses 166 in the stripper bars 150. Next, the jaws 110 completely close so that the heat sealers 104 form the bottom of the next succeeding package P and the heat sealers 106 seal the top of the filled package P. Then as the frame 114 moves downwardly, the knife 108 is moved laterally when air is directed into the inlet 196, separating the completed and filled package P from the tube T of packaging material 14. Thus, a complete package P filled with the product 12 has been manufactured and the packaging machine 10 is ready to repeat the sequence and make additional packages.

Therefore, as previously mentioned, the packaging machine 10 is particularly useful in the packaging of light free-flowing products, such as potato chips, as well as other or heavier products. Further, the present invention may be completely automated, so that the presence of an operator is unnecessary and the entire machine is extremely flexible so that varying weights, sizes and shapes of filled packages may be formed.

The present invention, therefore, is well adapted to carry out the objects and attain the ends and advantages mentioned as well as others inherent therein. While a presently preferred embodiment of the invention is given for the purpose of disclosure, numerous changes in the details of construction and the combination, shape and size and arrangement of parts may be resorted without departing from the spirit and scope of the invention as hereinafter claimed.

What is claimed is:

1. In a packaging machine for packaging a product in packaging material, weighing and dispensing means weighing the product to be packaged and dispensing the weighed product, forming means forming the packaging material into a generally elongate tube, sealing and disengaging means sealing the product within the tube of packing material and disengaging the finished package from the tube, said weighing and dispensing means comprising a balance including a tubular body, a door pivotably mounted within said body, spring biased toggle means operatively connected to said door and substantially closing said door within said body in each of two positions, said body forming part of a weighing means, means for pivoting said door to the other position when the product reaches a predetermined weight within said body and upon said door, and means for resetting and damping said weighing means after said door has pivoted and released the product trapped therein.

2. The invention of claim 1 wherein said means for pivoting said door urges said weighing means toward the balanced position while pivoting said door.

3. The invention of claim 1 wherein said means for resetting and damping said weighing means include an electro-magnet attached to said packaging machine, a bracket attached to said weighing means attracted to said electromagnet when energized, and means for energizing said electromagnet when said door is pivoted, thereby attracting and momentarily holding said weighing means thus resetting and damping said weighing means.

4. In a machine for packaging a product in packaging material, weighing and dispensing means weighing the product to be packaged and dispensing the weighed product, forming means forming the packaging material

into a generally elongate tube, sealing and disengaging means sealing the product within the tube of packaging material and disengaging the finished package from the tube, said sealing means including a tube edge sealer, a first arm attached to said edge sealer and pivotally mounted on said packaging machine, and adjustable arm pivotally mounted on said first arm and on said packaging machine, and said adjustable arm including means for yieldably and adjustably varying its length between said pivotable mounts.

5. The invention of claim 4 wherein said yieldable and adjustable length varying means for said adjustable arm comprises, a tubular body pivotably mounted on said packaging machine, a shaft rotatably and pivotably mounted on said first arm, a shaft extension within said tubular body, screw threads on said extension, a nut telescopically slidable and non-rotatable within said body, and spring means urging said nut and shaft telescopically within said body.

6. The invention of claim 4 wherein said adjustable arm includes means for releasably expanding its length, thereby disengaging said sealer from the packaging material to be sealed.

7. The invention of claim 6 wherein said releasably expanding means comprises, a shoulder on said shaft, a finger on said body arranged to releasably contact said shoulder when said shaft is moved telescopically outwardly in said body, thereby releasably lengthening said adjustable arm.

8. In an anti-bridging device to prevent a product from bridging within a directing means, a false side within said directing means, a rod attached to said false side and extending through said directing means, and means for reciprocating said false side inwardly and outwardly from said directing means, said reciprocating means comprising a piston attached to said rod, a cylinder about said piston mounted on said directing means, fluid supply means communicating with said piston, and means for reciprocating said fluid, thereby reciprocating said piston, rod, and false side to prevent product bridging within said directing means.

9. In a packaging machine for packaging a product in packaging material, weighing and dispensing means weighing the product to be packaged and dispensing the weighed product, forming means forming the packaging material into a generally elongate tube, sealing and disengaging means sealing the product within the tube of packaging material and disengaging the finished package from the tube, and a stripper for clearing the product to be packaged from that area of the tube of packaging material where the top of the package is to be sealed, said stripper comprising a bar pivotably mounted on said packaging machine and adjacent said tube and arranged to rake inwardly and downwardly against the tube of packaging material, thereby forcing the product within said tube downwardly, said bar having at least one recess thereby allowing air raked downwardly within said tube to escape upwardly within said tube adjacent said recess.

10. In a pair of symmetrical opposed strippers for clearing a product to be packaged from that area of a tube of packaging material where the top of a package is to be sealed in a packaging machine, each stripper comprising, a horizontal bar, a shaft connected to said bar, a cylinder about said shaft pivotally mounted on said packaging machine, fluid supply means for pushing said shaft outwardly from said cylinder, and means for rotating said bars upwardly and outwardly away from said tube of packaging material and inwardly and downwardly to rake said bars against the tube of packaging material thereby forcing the product within the tube downwardly, said stripper bars having recesses thereby allowing air raked downwardly within said tube of packaging material to escape upwardly within said recesses.

11. In a machine for packaging a product in packaging material, weighing and dispensing means weighing the product to be packaged and dispensing the weighed product, forming means forming the packaging material into a generally elongate tube, sealing and disengaging means for sealing the product within the tube of packaging material and disengaging the finished package from the tube, a pair of symmetrical opposed deflators expelling excess air from the filled partially completed package, pivotal mounting means attached to said packaging machine for holding said deflators, each deflator suspended from and pivotally mounted on said pivotal mounting means, means for pivoting said mounting means, whereby said deflators are pivoted upwardly and outwardly for filling the tube of packaging material and inwardly and downwardly for pressing said deflators against the filled partially completed package, thereby expelling excess air from the package, a cam attached to the deflator, and an upright attached to said packaging machine arranged to strike the cam thereby pivoting the deflator when moving inwardly and downwardly toward the filled partially completed package.

12. The invention of claim 10 including an upright attached to said packaging machine at the midpoint between said pivotably mounted cylinder thereby preventing either bar when moving inwardly and downwardly from extending past the midpoint between the points where said cylinders are pivotably mounted.

13. The invention of claim 11 wherein said cam is adjustably attached to said deflator.

14. The invention of claim 13 wherein each deflator comprises a first horizontal roller, a linkage pivotably mounted adjacent said first roller, a second horizontal roller suspended from said linkage in tandem with said first roller, and wherein said cam is attached to said linkage whereby said cam pivots said second roller when moving inwardly and downwardly toward the filled partially completed package.

15. The invention of claim 13 wherein each deflator comprises a plate pivotally mounted on and suspended from said pivotal mounting means, and a resilient layer attached to the inner surface of said plate, said layer having a smooth, slick outer surface for contacting said packaging material.

16. In a deflating means for expelling excess air from a filled package formed from a tube of packaging material in a packaging machine, the combination with a pair of vertically reciprocating inwardly and downwardly pivoting jaws of, a deflator on each jaw, an upright member intermediately disposed between said pivoting jaws, and adjustable means operably connected to said deflators contacting said upright member as said jaws move inwardly and downwardly thereby adjusting the final position of said deflators.

17. In a pair of vertically reciprocating inwardly and downwardly pivoting jaws for a packaging machine, a stripper bar mounted on each jaw which rakes inwardly and downwardly to push the product to be package into the partially formed package, said stripper bar having recesses to allow air entrapped in said package to escape upwardly, deflators attached to said jaws to rapidly expel entrapped air upwardly from said package, and a horizontal heat sealer yieldingly mounted on at least one of said jaws to uniformly grip the packaging material and to form a horizontal seal therein.

18. The invention of claim 17 including, an upright mounted reciprocally at the midpoint between said jaws engageable with either stripper at the midpoint thereby preventing either stripper from extending past the midpoint when pivoting inwardly and downwardly.

19. The invention of claim 18 wherein said deflators are pivotably attached to said jaws with a linkage, a cam attached to said linkage which strikes said upright when the jaws move inwardly and downwardly thereby forcing the deflator toward the package.

20. In a packaging machine, the combination of electromagnetic resetting weighing means weighing the product to be packaged, dispenser means dispensing the weighed

product into a hopper, rotatable inflatable mandrel means adjustably securing a roll of packaging material laterally and holding said roll coaxially on said mandrel means, tube forming means forming a tube of said packaging material, anti-bridging means reciprocally mounted within said hopper, edge sealing means sealing said tube of packaging material, said edge sealing means mounted on an adjustable disengageable arm, and reciprocating rotatable jaws, including stripper means forcing said product to be packaged into a partially formed package, deflator means expelling excess air from said package after filling, and sealing means uniformly gripping said tube of packaging material and sealing said product within said tube, thereby forming a package.

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