

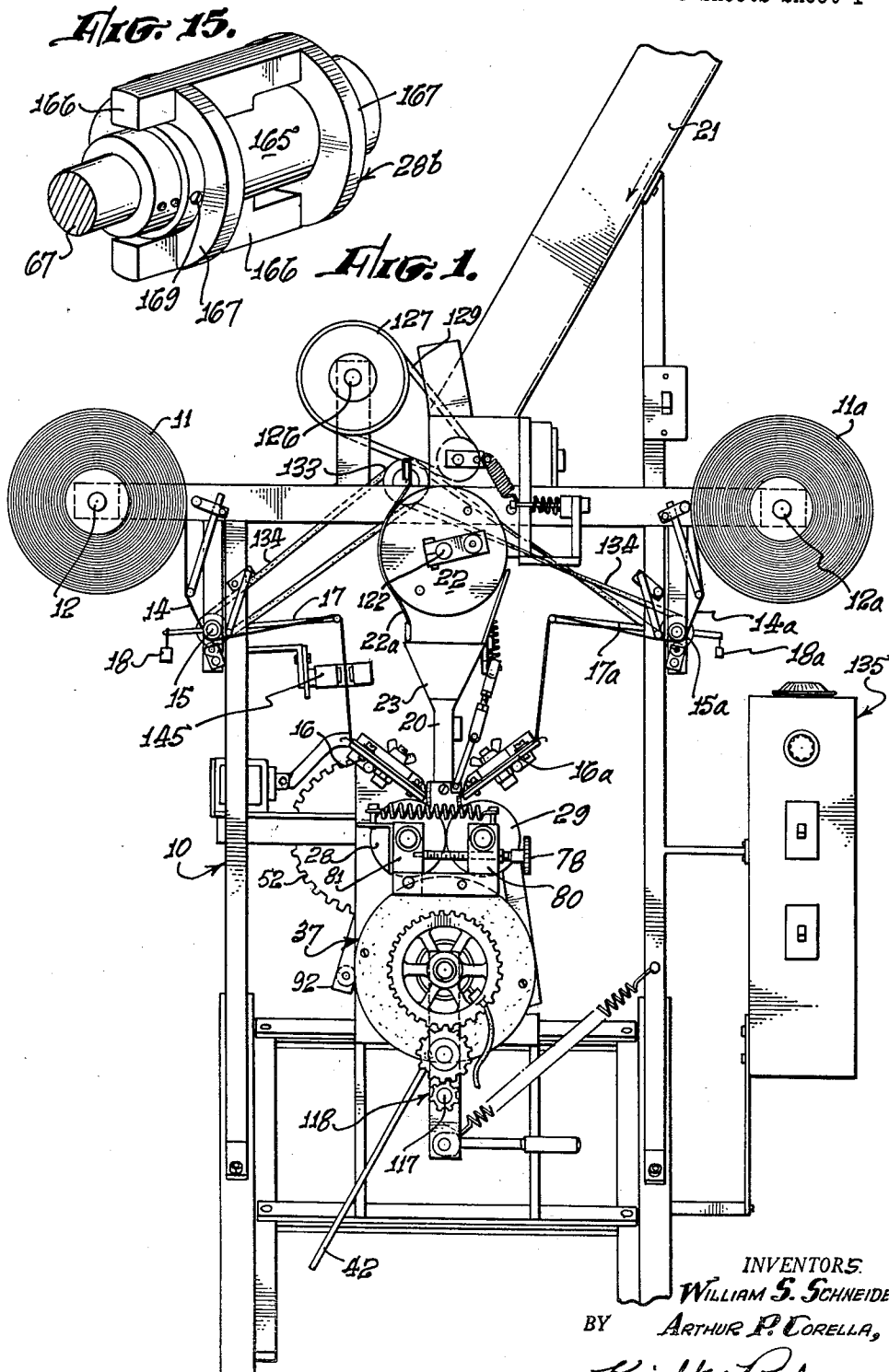
Jan. 22, 1963

W. S. SCHNEIDER ETAL
ROTARY TYPE PACKAGING MACHINE

3,074,214

Filed June 5, 1959

5 Sheets-Sheet 1



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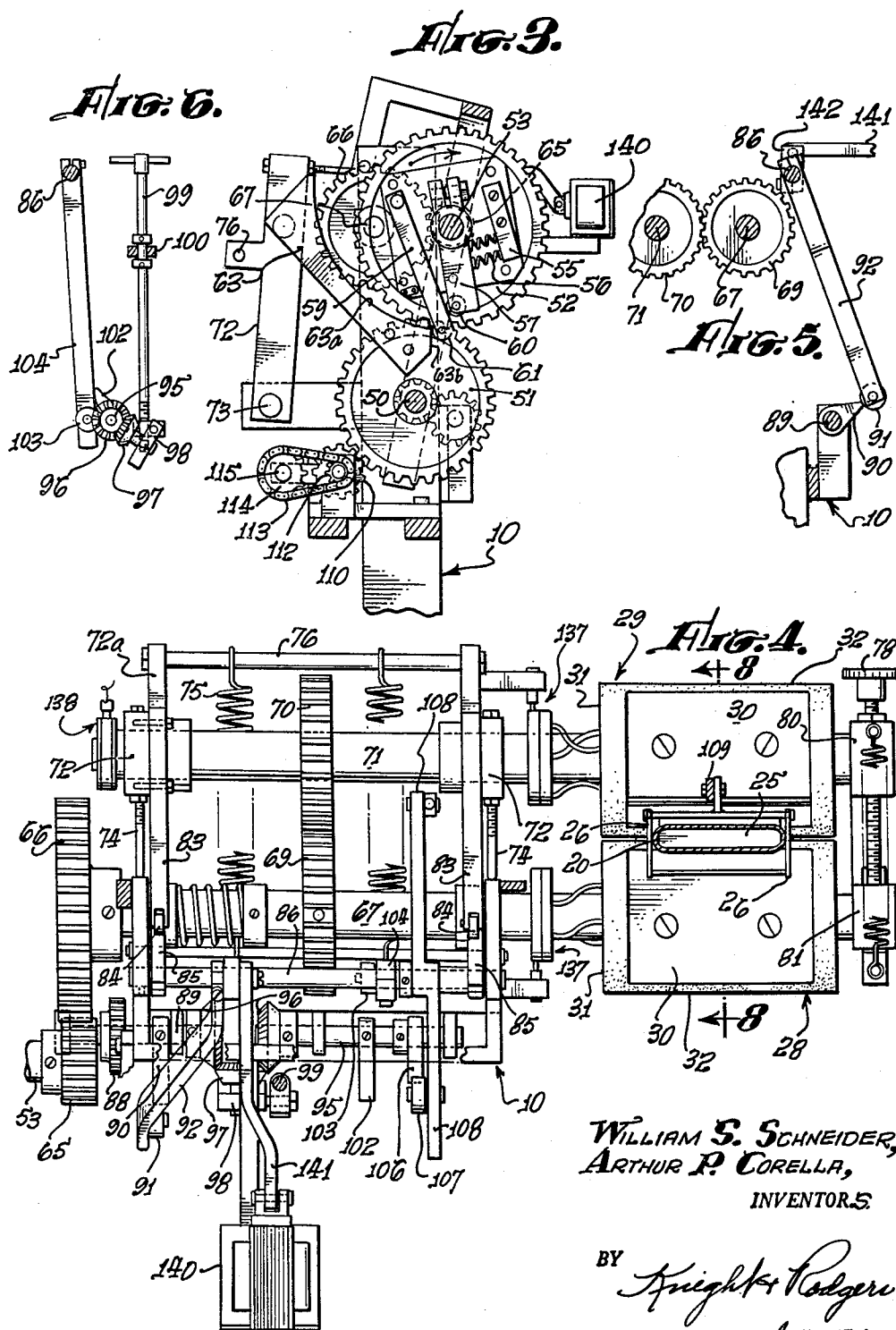
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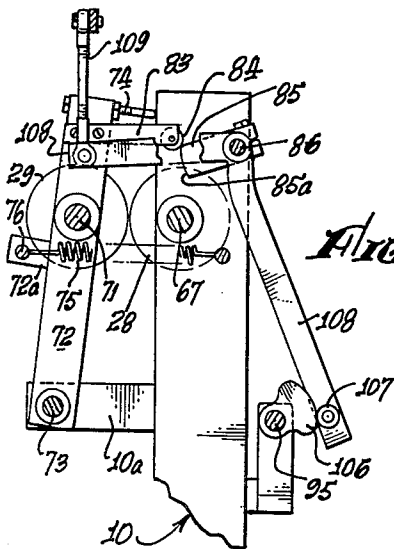


Fig. 7.

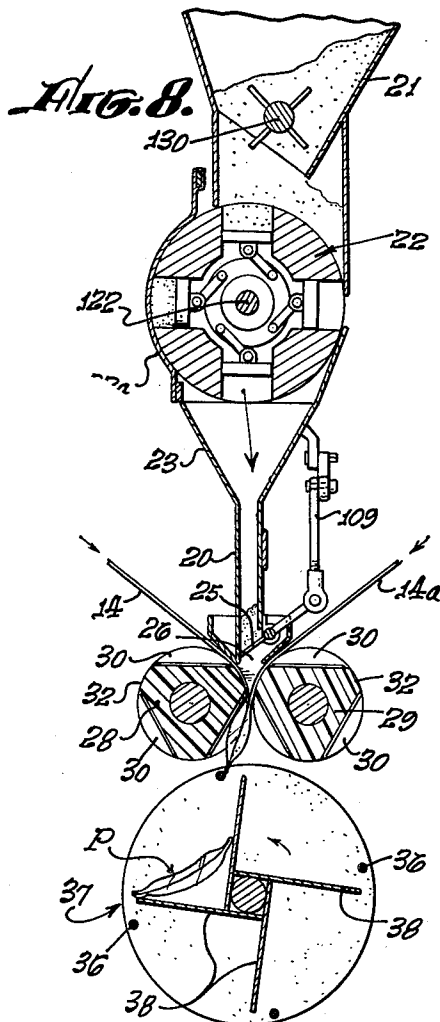


Fig. 8.

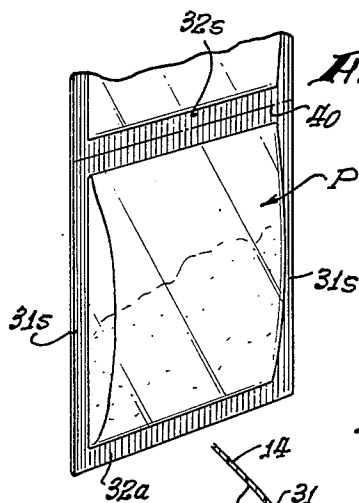


Fig. 9.

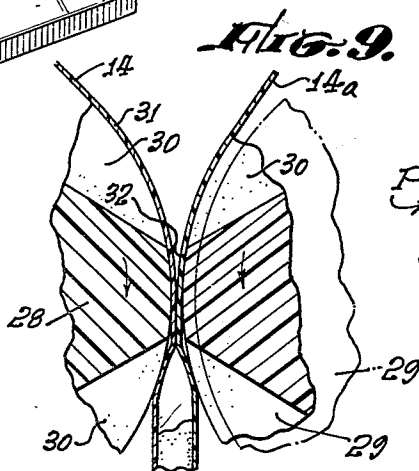
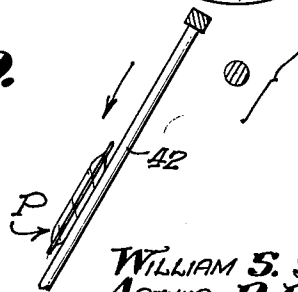


Fig. 10.



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FIG. 14.

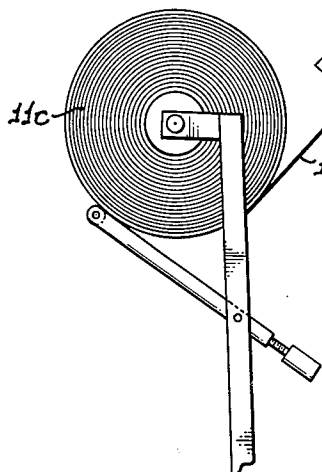
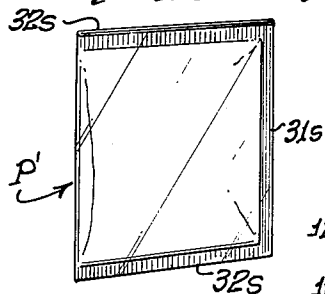


FIG. 13.

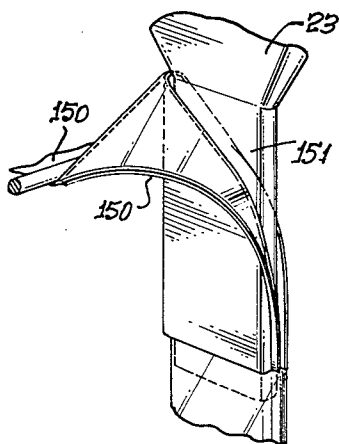


FIG. 11.

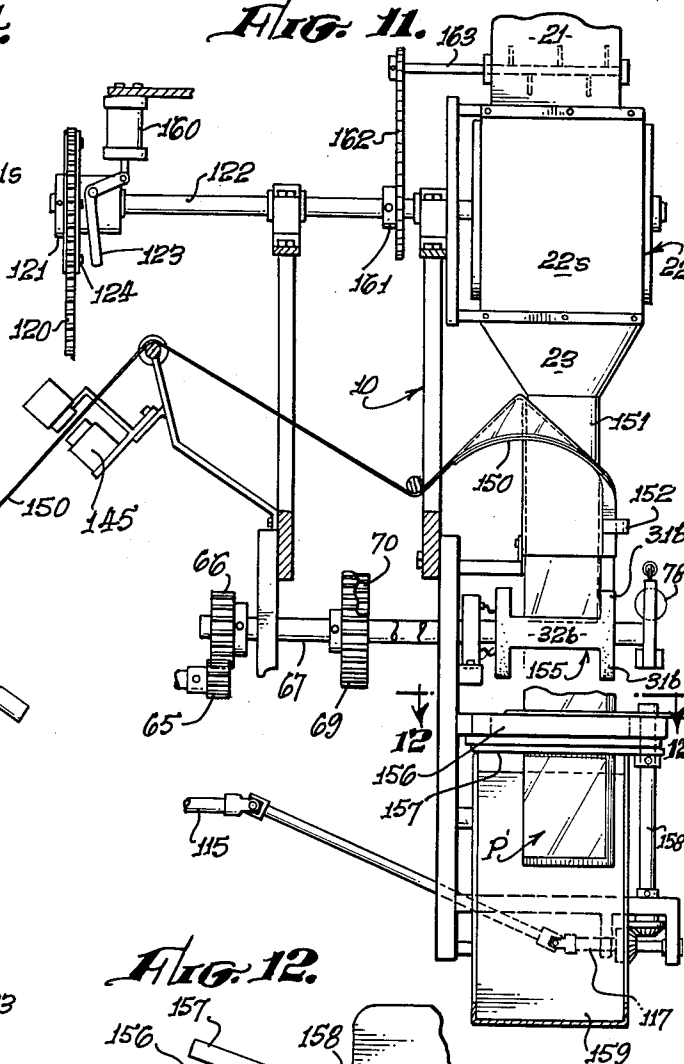
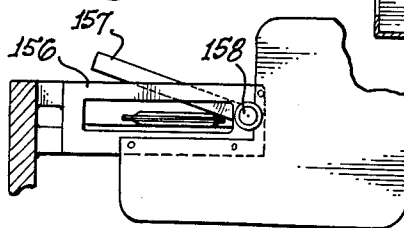


FIG. 12.



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3,074,214

ROTARY TYPE PACKAGING MACHINE

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Filed June 5, 1959, Ser. No. 818,301
22 Claims. (Cl. 53—180)

The present invention relates generally to packaging machines, and more particularly to a machine for producing from a continuous web of sheet material filled packages of the flat or envelope type. Such packages consist principally of two opposing walls joined around the periphery of the package, either integrally or by seals applied in making the package.

One general class of packaging machines for producing flat packages from a continuous web are those having reciprocating sealing heads which advance the web. Another class, with which we are here concerned, provides rotating members arranged in pairs, which advance the web. The advantage of machines of the latter class as compared with the former class is the higher production rate of the machine and also the fact that it is easier and generally less expensive to build and design machines which have rotating elements to advance the web as compared with reciprocating elements performing this function.

In rotary type machines, some designs provide only a single pair of rolls for advancing the web. Machines of this design have generally suffered from the objection that they are not adjustable to produce packages of different sizes. The rolls are designed to produce only packages of one size and it becomes necessary to replace these rolls with others if the package size is to be changed, often requiring many sets of rolls to be kept on hand.

Another type of rotary machine is that in which a plurality of pairs of rolls are provided. Typically two pairs of rolls provide the side seals which seal together two walls to produce a tube which is then filled while a third pair of rolls provides the transversely extending seal which completes the formation of the individual package. The type of machine with the multiple pairs of rolls obviously is more complex and more difficult to design to achieve adjustment as to package size compared with the rotary type having but a single pair of rolls.

However, these advantages have not been sufficient to win widespread acceptance of the rotary machines with but a single pair of rolls. For most types of usage, it is desirable that a machine be adjustable to produce packages of different sizes, since it is not economical to have a different machine for each size of package to be produced. Changing the rolls on machines of this character involves a considerable loss of time in making the change. Furthermore, the size and shape of the packages must be predetermined in order to provide a pair of rolls in advance; and a considerable amount of capital can be tied up in rolls as these are relatively expensive elements of the machine because of the precision with which they must be made.

Perhaps a more important shortcoming of known machines of the rotary type with a single pair of rolls is the fact that it is not possible to position the printing on the web with respect to the sealing rolls. As a consequence, the text or designs printed on the webs cannot be positioned at predetermined locations with respect to the transverse seals produced by these rolls. This situation existed because in known designs, the rate of web withdrawal or advancement is constant for any given

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motion of the sealing rolls and consequently there has been no way in which the web could be repositioned in response to the location of indicia on the web.

Another shortcoming found in known types of machines has been the contamination of sealing areas by the product. When the packages were being filled with powders or liquids, some of the product would adhere to the margins of the web prior to placement of the side seals and as a result of this contamination of the area to be sealed, the seals were unreliable. For this reason machines of this character have been generally limited to packaging solid objects, such as hardware items, tablets, and the like.

Accordingly it becomes a general object of the present invention to provide in a rotary type packaging machine means for adjusting the machine to produce packages of different sizes, both as to width and length.

Another object of the invention is to provide a packaging machine of this character having means for accurately positioning the web with respect to sealing areas on the sealing rolls in order that the designs or printing on the package will appear at predetermined positions thereon.

A further object of the invention is to provide a rotary type machine for producing filled packages in which the release point for powders or liquids to be packaged is located substantially at the sealing position without contaminating the side seal or seals, thus obtaining satisfactory and reliable seals at all positions on the completed package.

A further object of the present invention is to provide a rotary type packaging machine which is suitable for use with webs which are made of dimensionally unstable materials, as for example polyvinyl alcohol.

A still further object is to provide a rotary type of machine with one pair of rollers that produces a rectangular package sealed on three sides from a single web and advances the web by engagement therewith at one longitudinal seal, including means to prevent distortion of the material resulting from pressure of the rollers thereon.

The above and other objects have been attained in a machine for producing filled packages from a continuous web by providing in combination a filling spout, means bringing the web into position to receive product from the filling spout, and sealing means for forming the seals around at least a portion of the periphery of the finished package, the sealing means comprising a pair of counter-rotating sealing rolls between which the web passes. Drive means for rotating the sealing rolls includes means for periodically reducing the speed of the rolls one or more times during each revolution thereof, according to the number of cavities in the rolls which determine the number of packages produced during each revolution of the sealing rolls. The machine also includes means for moving the sealing rolls toward and away from each other in order to grip the web to advance it and subsequently to release the web to permit the rolls to turn without advancing the web, thereby determining the length of package produced.

The timing of the reduction in speed of the rolls in synchronized with the movement of the sealing rolls toward and away from each other to bring the rolls to a stop, or substantially so, at the instant they move together again to grip the web between them. The length of time that the rolls are in engagement with the web is adjustable and is utilized to adjust the length of the package. Stop means are associated with the means for bringing the rolls together to limit the travel of the rolls toward each other. Thus the rolls grip the web firmly though the stop means limits the pressure applied to the web in order not to

deform it. This is of particular advantage in the case of dimensionally unstable webs which stretch easily.

The means for moving the rolls away from each other to disengage the web can be actuated mechanically in synchronism with rotation of the rolls and therefore at a predetermined position in the revolution of the sealing rolls; or the means can be actuated in response to position of indicia on the web as determined by a photo-cell scanning the web, thus causing the rolls to separate and disengage the web in response to a given movement of the web past a given point.

To obtain adjustability of the width of packages produced, the sealing rolls may be provided with one or two axially movable flanges to adjust the spacing between them. In a variational form of the invention, only one longitudinal seal is applied to the web, and the web is gripped at one side only to advance it. Hence in this construction the width of the package can be any dimension within the range of the sealing surface applying the transverse seals at the ends of the packages.

How the above objects and advantages of our invention, as well as others not specifically referred to herein, are attained will be more readily understood by reference to the following description and to the annexed drawing, in which:

FIG. 1 is a side elevation of a rotary type machine for producing filled and flat packages embodying our invention.

FIG. 2 is a front elevation of the machine as viewed from the left in FIG. 1.

FIG. 3 is a fragmentary vertical section and elevation on line 3—3 of FIG. 2 illustrating means for varying the speed of the drive to the sealing rolls.

FIG. 4 is an enlarged partial plan and fragmentary section on line 4—4 of FIG. 2.

FIG. 5 is a fragmentary vertical section on line 5—5 of FIG. 2 illustrating mechanism for operating the cam that controls the position of the rolls, in a manner to grip the web.

FIG. 6 is a fragmentary vertical section on line 6—6 of FIG. 2 illustrating means to operate the cam that controls the position of the rolls, in a manner to disengage the web.

FIG. 7 is a fragmentary vertical section on line 7—7 of FIG. 2 illustrating cam means for moving the rolls toward and away from each other.

FIG. 8 is an enlarged vertical section on line 8—8 of FIG. 2 or FIG. 4 showing the product feed and the web passing between the sealing rolls.

FIG. 9 is an enlarged fragmentary section showing portions of the sealing rolls illustrating movement toward and away from each other, with the axially elongated sealing surfaces in position to form a transverse seal in the web.

FIG. 10 is a perspective view of the completed filled package.

FIG. 11 is a combined vertical section and schematic elevation of a portion of the machine embodying a variational form of our invention.

FIG. 12 is a horizontal section on line 12—12 of FIG. 11 illustrating the shear for severing the completed package from the web.

FIG. 13 is an enlarged perspective view of the lower end of the mandrel around which the web is formed.

FIG. 14 is a perspective view of a completed package produced by the machine of FIG. 11.

FIG. 15 is a perspective view of a sealing roll with an adjustable flange for forming the side sealed areas on different widths of package.

Referring now to the drawing, there is shown in FIGS. 1 and 2 an open framework, generally indicated at 10, upon which the various components of the machine are supported directly, or by means of suitable brackets, bearings, and the like. Frame 10 may be of any suitable con-

struction and shape in order to provide a stationary support at various positions as may be required by and for the operating mechanisms which are later described.

At one side of the machine, as may be seen at FIG. 1, there are two rolls, 11 and 11a of sheet material which are unrolled individually in order to provide the web from which packages are formed. In this particular embodiment of the invention the machine is adapted to handle two separate strips or sheets of material each of which forms one of the two walls of the flat package P illustrated in FIG. 10. In this case the two walls are sealed together around the entire periphery of the package, that is, all four sides of a rectangular package. In another form of the invention later described a single sheet of twice the width of each sheet shown in FIG. 1 is folded longitudinally to produce the package P' illustrated in FIG. 14 wherein the two walls of the package are integrally joined along one side. Since the machine of the present invention may be designed to utilize both sizes of sheet material, the term "web" as used herein is intended to designate the total web, whether the two walls are initially separate and are joined only by sealing, as illustrated in FIG. 10, or the two walls are integral in part and are joined around part of the periphery of the package by sealing, as in FIG. 14.

The two rolls 11 and 11a are mounted respectively on axles 12 and 12a attached to the frame at suitable positions. The two strips 14 and 14a of the web as they are unrolled from the rolls pass under driven feed rolls at 15 and 15a respectively and thence to guides 16 and 16a. Between roll 15 and guide 16 the strip 14 is maintained under proper tension by a pivoted arm 17 carrying at its other end weight 18. A similar arm 17a with weight 18a maintains proper tension in strip 14a.

The web, comprising the two walls 14 and 14a, may be made of any suitable material that can be sealed to itself by the application of heat and pressure. Generally speaking, materials that are most satisfactory are those which are heat-sealable on one side only; but it will be realized that in the broader aspects the present invention is not necessarily limited to any particular type of material for the web from which the packages are made.

As may be seen best in FIG. 8, the two walls 14 and 14a of the web are brought together in overlapping relation directly beneath feeding tube or spout 20 through which the product to be packaged is supplied. The two sections 14 and 14a of the web thus form the two walls of the flat package and the product delivered through spout 20 is fed between the two walls which are sealed together around the product as it is fed into the package.

While the present invention is not limited to any particular type of product, it is shown here as applied to a machine for packaging a powder or granular material. This material is supplied through chute 21 to a metering drum 22 which is rotatably mounted on the machine frame. Drum 22 has a plurality of pockets of adjustable capacity which open to the peripheral surface of the drum and receive a measured charge of product from chute 21 as each pocket moves through the uppermost position directly under the chute. As the drum rotates, the product is held in the pocket by a retaining shield 22a engaging the periphery of the drum. This charge is then discharged by gravity from the drum into hopper 23 at the top of spout 20 through which this measured amount of product is introduced into position between the overlapping walls of the package formed by the two web sections 14 and 14a. A flap valve 25 is pivotally mounted at the bottom end of spout 20 to retain the charge of product therein until such time as is proper for it to drop into the space between the two web walls 14 and 14a. The actuation of valve 25 will be explained later.

As shown in FIGS. 4 and 8 there are two V-shaped retainers 26 mounted on spout 20 at its lower end, one retainer at each side of the spout. Each retainer 26

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extends above the open end of spout 20 and at its lower end conforms to the shape of the sealing rolls so that it is closely spaced from web walls 14 and 14a. Thus retainers 26 laterally confine the product being delivered by the spout to the space between the web walls, thus avoiding contamination of the marginal areas of the web by the product. As a further precaution to avoid such contamination, it is preferred that the distance between the two retainers 26 be not more than about three-fourths of the distance between the seals that extend longitudinally of the web, as will be described.

The individual packages P as shown in FIG. 10 are formed by sealing together the overlying walls 14 and 14a of the web, the seals being made to extend around the complete periphery of each of the individual packages. These sealed areas are formed by a pair of sealing rolls 28 and 29 which are shown in some detail in FIGS. 4, 8 and 9. Each of the sealing rolls 28 and 29 may be considered to be a cylindrical drum with one or more of indentations or cavities 30 in the outer peripheral surface. There is at each end of each drum an annular sealing surface 31, as seen in FIG. 4 which is continuous around the periphery of the drum, each sealing surface 31 defining an end of one of the cavities 30. Successive cavities are separated by elongated sealing surfaces extending axially of the sealing drum, each of these axial sealing surfaces 32 being continuous with the sealing surfaces 31 at each end of the drum. Referring to the package P in FIG. 10, the annular sealing surfaces 31 produce the two side seals 31s of the package, the side seals being continuous longitudinally of the web, while the sealing surfaces 32 produce the transverse seals 32s which are spaced apart in the direction of web movement and the spacing of which determines the length of each of the packages P.

Rolls 28 and 29 revolve in opposite directions, moving downwardly at the position where the web is gripped between them.

Since the web is continuous, the packages produced are in tandem relation to one another, successive packages being connected together at the transverse seals 32s. It is thus necessary to sever the individual packages from the following web. In a preferred embodiment of the invention, this is accomplished by a plurality of heated wires 36, mounted near the periphery of rotating drum 37 which provides a moving support for the wires 36. The wires 36 extend parallel to the axis of rotation of drum 37 and are each spaced above a pocket in the face of the drum formed by two plates 38 disposed at an angle to each other. Each pair of plates 38 provides a package receiving pocket in the outer surface of drum 37, as shown particularly in FIG. 8. At the outer end of each pocket is located one of heated wires 36 which by rotation of the drum is brought into engagement with the web at a transverse seal 32s.

The wire melts the film along the line 40 in FIG. 10 and thus severs the completed package P from the web following behind it. Wires 36 move with the web at the same rate to maintain contact with a given point on the web for a sufficiently long time to melt and cut the web at that point. Since the last package is on the free end of the web, the weight of the filled package keeps the web in contact with the heated wire at the proper point until the web is severed and the package drops down into a pocket between two plates 38. The rotational speed of the drum is coordinated with the web speed and the spacing between successive wires 36 so that they are brought into engagement with successive transverse seals 32s. Although only a single wire is necessary, it is preferred that a plurality of wires be mounted on drum 37 in order to allow a longer time between successive contacts of each wire with the web. This allows the wire to become adequately reheated between each cutting operation which cools the wire.

Although the invention is not limited to this type of

severing means, it is preferred for use with dimensionally unstable webs, such as a web made from polyvinyl alcohol. This particular material stretches very easily and is difficult to cut successfully in the conventional type of shear mechanism. On the other hand, it melts easily when in contact with a heated wire. This type of severing means places no strain or stress upon the web and eliminates problems attendant upon cutting webs which easily stretch and therefore tend not to cut cleanly in contact with a shear blade.

Each individual package is dropped from the rotating drum 37 as it reaches a lowermost position on the drum, a series of rods 42 receiving the package from the drum and guiding it by gravity into any suitable receptacle.

Having described the path of the web through the package making machine, the operations that are performed upon the web to produce a completed, filled package, and the elements which act upon the web, there will now be described the driving mechanism which drives the sealing rolls and other elements acting upon the web in timed relation with each other to produce the ultimate filled package.

Referring now to FIG. 2 there is shown a prime mover in the form of electrical motor 45 suitably supported upon the machine frame. The motor 45 drives through belt 46 to the input pulley 47 of a speed reducer 48. The output shaft of the speed reducer is connected by flexible coupling 49 with shaft 50 which is the primary drive shaft from which power is taken off at various points to operate the several assemblies.

Fastened to shaft 50 is gear 51 which drivingly engages another similar gear 52. Gear 52 is loosely mounted on counter-shaft 53 so that the gear can rotate relative thereto. Power is transmitted from gear 52 to shaft 53 through the mechanism shown in FIG. 3 which provides means for effecting a discontinuity in the drive to the sealing rolls that reduces the speed of the rolls, preferably to zero or substantially so.

On the face of gear 52 is mounted abutment block 55; and against this block one end of each of springs 56 bears. The other end of each spring 56 bears against arm 57 which is non-rotatably attached to shaft 53. Pivotaly attached to this same face of gear 52 is arm 59; and against the outer free end of arm 59 bears roller 60 mounted on the end of arm 57. The free end of arm 59 carries a follower 61 which is designed to engage the upper surface of fixed cam 63. This is in two sections, curved surface 63a and a short end surface 63b.

Assuming that gear 52 is rotating in a clockwise direction as viewed in FIG. 3, driving torque is imparted from the gear to arm 57 through the resilient driving connection afforded by springs 56 bearing against arm 57 and abutment block 55, this torque serving to rotate arm 57 also in a clockwise direction. When the assembly of elements has rotated to the position of FIG. 3, follower 61 then engages end surface 63b on the cam and, moving along this surface is lifted onto the upper curved surface 63a of cam 63, causing arm 59 to swing about its pivot in a counter-clockwise direction. The circumferential speed of the end of arm 59 carrying follower 61 decreases momentarily as the follower moves onto cam surface 63a. This change in speed at the end of the arm occurs as gear 52 continues to rotate at a constant speed since the pivot for the arm is connected to the face of the gear. The decrease in speed of the end of arm 59 relative to the gear causes a similar short decrease in the speed of arm 57 around the axis of shaft 53 since these two arms are in engagement with each other through roller 60. The result is a sudden momentary drop in the angular velocity of driven arm 57 with consequent relative movement between the driven arm and abutment 55, which continuing at a constant velocity approaches the driven arm. This relative movement compresses springs 56.

The amount by which the speed of shaft 53 is decreased depends on the position of cam surface 63b relative to

the circumferential path of roller 61. It is preferable to bring shaft 53 to a stop, or substantially so, but it is not necessary with all kinds of web material. The duration of the reduction in speed is so short as to be hardly visible.

After roller 61 is on cam surface 63a all of the parts move forward at substantially the same velocity. The curvature of cam surface 63a is such that driven arm 57 is gradually returned to its original position relative to driving arm 55, thus allowing springs 56 to expand fully by the time follower 61 leaves the upper end of cam surface 63a. During the expansion of springs 56, shaft 53 rotates at a slightly greater speed than gear 52.

From FIGS. 2 and 4 it will be seen that shaft 53 has attached to it gear 65 which drivingly engages a relatively larger gear 66 that is fastened to shaft 67 which carries at its other end sealing roll 28. Shaft 67 also carries gear 69 which meshes with another gear 70 of the same size. This latter gear is mounted upon shaft 71 which is parallel to shaft 67 and which carries sealing roll 29. Gears 69 and 70 being of the same size, the two sealing heads 28 and 29 are driven in opposite directions at the same rotational speeds by this arrangement. Thus it will be realized that the variation in angular speed of shaft 53 which is obtained by driving shaft 53 through the resilient driving connection comprising the elements 55, 56 and 57, is imparted to both sealing rolls 28 and 29.

Shaft 71 is journaled in bearings supported on a pair of horizontally spaced, upright arms 72 which are both alike, one of the arms being shown in elevation in FIG. 7. Each of the arms is pivotally mounted at its lower end to rock about pivot 73 which is rigidly positioned by arm 10a constituting a part of the structural frame. This arrangement permits shaft 71 and sealing roll 29 to rock about the horizontal axis of pivot 73 to move this sealing roll toward and away from the other sealing roll 28. The two sealing rolls are urged toward each other by coil spring 75 which are in tension. One end of the springs is attached to the structural frame 10 while the other end of the springs is connected to cross bar 76 which extends between projecting brackets 72a on arms 72.

As the sealing rolls are moved toward each other under the influence of springs 75 they grip the web where it passes between them. It has been found advantageous not to allow the full pressure of spring 75 to be applied to the web since this pressure is sufficient to deform the web. This is especially true in the case of dimensionally unstable materials. Also, excess pressure can squeeze out the thermoplastic material forming the seal and thinning the material sufficiently to produce a weak seal. For these reasons stop means are provided limiting the travel of the rolls toward each other to obtain an adequate grip on the web but yet not to deform it. Such travel limiting means comprises various adjustable stops. A pair of stop pins 74 are provided, one at the top of each arm 72 (FIG. 7). Each pin 74 is threaded into an arm 72 for adjustability and bears against a fixed portion of frame 10. Locknuts or the like are provided to hold the pins in position. Two pins are provided to maintain shaft 71 parallel to shaft 67.

Another part of the stop means is shown in FIG. 1 and comprises lead screw 78 threaded into block 80 through which passes shaft 71. Lead screw 78 bears against a similar fixed block 81 through which passes shaft 67. As the rolls approach each other, lead screw 78 butts against block 81 to prevent the rolls from coming into actual contact with each other. A fine adjustment of the amount of separation between the sealing surfaces on the rolls is obtained by turning lead screw 78 to increase or decrease the spacing between the two blocks 80 and 81.

By way of example, assume that the walls are each .003 in. thick. The total thickness of the web is .006 in. The stop means is then adjusted to provide a spacing of .004 between the sealing surfaces on the rolls. This spacing limits the pressure on the web and prevents de-

formation or extrusion of the sealing layer while passing between the rolls.

Means are also provided for moving sealing rolls 28 and 29 apart in order to release their grip upon the web passing between them. This last mentioned means comprises a pair of arms 83 one of which is attached to the upper end of each swinging rocking arm 72 and extends horizontally therefrom. The outer end of each arm 83 carries roller 84 which engages cam 85. Cam 85 is a short arm rigidly attached to rock shaft 86, the actuation of which will be described later. The outer end of arm 85 has an arcuate cam surface 85a the center of which coincides with the axis of rock shaft 86. When roller 84 is off the arcuate cam surface, the parts occupy the position shown in FIG. 7. Under these conditions, the position of the sealing rolls is determined by tension spring 75 and the stop means 72, 78. When cam 85 is rocked upwardly, that is, in a clockwise direction viewed in FIG. 7, roller follower 34 moves on to arcuate surface 85a with the result that arm 72 is moved slightly counter-clockwise about its pivot point 73. This motion separates the two rollers, by moving roller 29 away from roller 28. It will be realized that it is unnecessary to move the roller a greater distance than is required to disengage the web. Consequently the range of movement of roll 29 is preferably limited to only a few thousandths of an inch. The movement is shown greatly exaggerated in FIG. 9. When cam 85 is rocked in the opposite or counter-clockwise direction, arms 72 are free to move and bring the sealing rolls together under the influence of tension springs 75.

Oscillating cam 85 need only move through a relatively small arc to accomplish this action of moving the rolls away from each other. In either position of the cam, the cam and arm 83 are in stable positions with respect to each other. This is obviously true when follower 34 is off the cam surface as in FIG. 7. It is also true when follower 34 is on cam surface 85a because the cam surface is concentric with axis 86 so that the center line of the pressure applied by roller 34 passes through the axis of shaft 86. Consequently there is no resultant force tending to move the cam follower off the cam surface.

The actuating means for rocking cam 85 back and forth will now be described. Returning to primary power shaft 50, it will be noted (FIGS. 2 and 4) that this shaft also carries driving pinion 87 which meshes with and drives the gear 83 which is fastened onto a horizontally extending shaft 89. Shaft 89 is rotatably mounted in the frame structure and has attached to it cam 90 which rotates with shaft 89. As it turns around the axis of shaft 89, cam 90 is adapted to engage roller 91 attached to the free end of bent arm 92 which, as shown in FIG. 5, is fastened at its other end to rock shaft 86. Engagement of the cam with the roller causes arm 92 to move outwardly at its lower end, thus rocking shaft 86 in a counter-clockwise direction and depressing the free end of oscillating cam 85 to free it from roller 34. Thus the action of cam 90 upon engaging follower 91 is to oscillate cam 85 in a direction to cause the sealing rolls to move toward each other and to engage the web passing between them.

Mounted in prolongation of and coaxial with shaft 89, is a second shaft 95 which is driven from shaft 89 at the same rotational speed. (See FIG. 4.) Shaft 95 is driven through a differential mechanism which permits shaft 95 to be varied in angular position relative to cam 89, for purposes which will later be explained. This differential mechanism comprises a pair of beveled gears 96 fastened one on each of shafts 89 and 95 at the opposing ends of the shafts. Meshing with both of beveled gears 96 and transmitting power from one to the other is floating beveled gear 97 which is rotatably mounted on a movable block 98. Block 98 is adjusted in position, and held in the selected adjusted position, by means of lead screw 99, which, at its lower end, has a rotatable connection with block 98 and has threads which engage a threaded bore in fixed block 100 mounted on the structural frame.

Shaft 95 is provided with cam 102 which rotates in a counter-clockwise direction with shaft 95. (See FIGS. 4 and 6.) During each revolution, cam 102 engages follower 103 on the lower end of arm 104 which is connected at its upper end in a non-rotatable manner to rock shaft 86. When arm 104 is in the position shown in FIG. 6, cam 85 is in the position of FIG. 7, allowing the sealing rolls to be in position to engage the web. As cam 102 rotates it engages follower 103, moving the lower end of the shaft to the left as viewed in FIG. 6 and causing a corresponding angular movement of rock shaft 86 in a clockwise direction. This raises cam 85 to bring roller 84 onto the arcuate cam surface 85, causing sealing rolls to move apart and release the web.

Shaft 95 also carries a second cam 106 to rotate therewith. As may be seen better in FIG. 7, cam 106 engages roller 107 on the lower or free end of bell crank 108 which is loosely mounted upon shaft 95 to swing about the shaft as an axis. The other end of bell crank 108 is connected through linkage 109 to flap valve 25 at the bottom of feed spout 20. This arrangement permits valve 25 to be opened in timed relation to the other operations of the machine to feed the product between walls 14 and 14a of the web at a predetermined time in the operation of advancing the web and forming the package.

Rotary drum 37 which carries the hot wires for severing the packages from the web is also driven from primary power shaft 50. Large gear 51 meshes with and drives small gear 110. As may be seen in FIG. 3, pinion 110 is mounted on the same shaft as sprocket 112, which, by means of chain 113 drives a second sprocket 114 on the end of shaft 115. To reach the front of the machine where rotor 37 is located, shaft 115 is connected by two universal joints and a short intermediate shaft to shaft 117 which is located beneath the rotor. Through a gear train indicated generally at 118 (FIG. 2), power from shaft 117 is delivered to the shaft which provides the axle upon which the rotor 37 is mounted, the rotor thus being driven in timed relation to other components of the machine.

Power for operating the elements feeding the product is provided from chain 120 which passes over a drive sprocket on the end of shaft 53, as shown in FIG. 2. Chain 120 passes over a larger sprocket which is loosely mounted on shaft 122. A disconnectable drive connection to shaft 122 from the larger sprocket 121 is effected by means of a clutch mechanism which may be of any suitable type. The clutch mechanism here shown includes arm 123 which is pivotally mounted to a body member that is keyed or otherwise non-rotatably affixed to shaft 122 and which can be moved into engagement with any one of pins 124 on the face of sprocket 121 by means of sleeve 125 slidably mounted on shaft 122.

Arm 123 is normally pulled out of the position to engage pins 124 by means of spring 126 but can be moved into position to engage a pin 124 by movement of sleeve 125 to the left in FIG. 2. This movement of sleeve 125 is produced by bell crank 128 which is pivotally mounted to a stationary element of the frame. One arm of the bell crank 128 engages sleeve 125 while the other arm of the bell crank is pivotally connected to the plunger of solenoid 130. When the solenoid is energized, the plunger is drawn downwardly into the solenoid, rotating the bell crank counter-clockwise from the position of FIG. 2 and moving sleeve 125 to the left, thereby causing arm 123 to be engaged by one of pins 124.

When the clutch is engaged in this manner, shaft 122 rotates. The shaft is connected directly to metering drum 22 which measures a quantity of the product into hopper 23. The number of pins 124 in the clutch mechanism may be one but preferably is equal to the number of measuring cavities in drum 22. Since there are four cavities, there are four pins 124. This arrangement enables a driving connection with shaft 122 to be effected always at a similar position with respect to the product

measuring cavities, after which drum 22 rotates in timed relation to the other components.

Shaft 122 has attached to it pulley 123 which through belt 124 drives another pulley 125 mounted on counter-shaft 126. The counter-shaft has a second pulley 127 which by means of a suitable belt 129 passing over the pulley drives a rotatable agitator 130 located at the base of chute 21 and just above metering drum 22. This agitator may be omitted if unnecessary, but it is helpful with some types of materials in promoting a steady flow of granular material to the metering drum.

Feed rolls 15 and 15a which unwind the web from rolls 11 and 11a respectively, are rotated at a relatively low, constant speed. It is preferred that these be driven from a separate power source. For this purpose, as may be seen in FIG. 2, there is provided a gear head motor 132 having an output shaft on which are mounted a pair of pulleys 133. Over each one of these pulleys passes a belt 134 which also passes over another pulley mounted on the end of the shaft supporting one of the rolls 15 or 15a. Means of this character for feeding the web to the sealing elements are well known in the art and need not be described in detail here.

The electrical circuit for this machine is simple and will be readily supplied by one skilled in the art without a detailed description herein. Switches or other controls are grouped together on a control panel indicated generally at 135 in FIG. 1. Switches here control energization of motors 45 and 132 and current flow to the sealing heads. Sealing heads 28 and 29 are heated by electrical resistance elements. Conductors to these elements include brush and slip ring arrangements, as shown at 137 in FIG. 4, or other suitable means for effecting an electrical connection to the rotating sealing means. A similar slip ring type connection 138 may be provided, if desired, for connection of a thermostat means to the rolls to regulate their maximum temperature.

Having described the construction of one embodiment of the present invention, the operation of the machine will be explained briefly. The path through the machine followed by the web is shown in its entirety in FIG. 1, while the sealing operation is illustrated particularly in FIGS. 8 and 9. A description of this operation will start with the two sealing rolls in the position shown in FIG. 9 where the axially extending sealing surfaces 32 are opposing each other to form between them a transversely extending seal 32s across the web.

When this transverse seal 32s is to be made, the two heads 28 and 29 approach each other and grip the web between them. With the two axially extending sealing surfaces 32 in position opposite each other, the roller 29 moves towards roller 28 from the dotted line position of FIG. 9 to the full line position. Movement of the sealing rolls and their engagement with the web is effected through movement of cam 85 by actuating means that includes cam 90. Cam 90 at this point in the cycle has engaged follower 91 to shift arm 92 to the position of FIG. 5. This movement of the arm rocks shaft 86 and shifts oscillating cam 85 downwardly to the position of FIG. 7, allowing follower 84 to move off of arcuate cam surface 85a. The arms 72 are now free to move under the urging of springs 75, and the sealing rolls come together.

The decrease in speed of the sealing rolls is timed with this movement of the rolls so that when the rolls grip the web, they are not rotating, or at least are rotating very slowly. This pause in rotation means that the rolls have a firm grip upon the web before their rotation is started again and they pull the web downwardly between them. Slipping or skidding of the rolls on the web is avoided by slowing them down. Since the web is stationary when gripped by the rolls, the pull on it is a maximum when it is accelerated from a stop and it is desirable that a firm grip be exerted on the web. This is accomplished when the two surfaces 32 on the rolls are not ro-

tating as they come together, exerting a uniform pull across the entire width of the web.

To effect this pause in the otherwise substantially steady rotation of the sealing rolls, the position of cam 63 is so located that follower 61 strikes cam surface 63b as the two sealing rolls move together, or slightly in advance of engagement of the web so that the rolls have stopped rotating at the instant of web engagement.

As the rolls rotate to advance the web, moving it down from the position of FIG. 9, cam 105 engages follower 107 as shown in FIG. 7 to cause valve 25 to open at the bottom of spout 20. The amount of opening of the valve is controlled by the linkage 109 for a given size of cam 106 and is coordinated with the length of package and the rate of advance of the web so that the product flowing through spout 20 flows between the two wall members 14 and 14a at substantially the same rate that the package is formed by placement of the longitudinal side seals 31s by peripheral sealing surfaces 31.

In the absence of any of the controls about to be described, the length of package P is determined by the distance measured along the circumference of the sealing roll between successive transverse sealing areas 32. This distance is fixed for a given diameter of roll and under some production conditions it will be satisfactory to have a machine equipped to produce only one length of package. For example, if the circumference of rolls 28 and 29 at surfaces 31 is eighteen inches, the packages produced would have a fixed length of six inches. However, in the embodiment of machine described above, means have been incorporated to vary the length of the package within a range of values less than the maximum as established by the circumferential spacing of successive surfaces 32.

A shorter package than the fixed maximum is produced by this machine by the action of cam 103 striking the follower on arm 104, as illustrated in FIG. 6, at some point in the revolution of the rolls before the web has advanced six inches. This action moves arm 104 away from the position of FIG. 6, raising oscillating cam 85 to place follower 84 onto cam surface 85a. This action of the oscillating cam moves sealing roll 29 to the dotted line position of FIG. 9, separating the rolls. Moved apart, they release the web and the web stops advancing although the sealing rolls continue to revolve for a portion of a revolution. The web now remains stationary out of gripping engagement with the sealing rolls until the next pair of transverse sealing surfaces 32 moves into position opposite each other. At this point the rolls re-engage the web, as already described, and place a transverse seal 32s across the web, closing the upper end of one package and forming a seal at the bottom of the next succeeding package.

The length of the package produced is thus controlled by the position in the cycle at which cam 102 engages follower 103 to cause the sealing rolls to disengage. The relative position in a package-forming cycle at which cam 102 becomes operational is controlled by the angular position of shaft 95 with respect to shaft 89. This angular position in turn is determined by the position of traveling block 98 which is adjusted by rotating lead screw 99 to raise or lower the traveling block which, as it moves, causes relative rotation of the two bevel gears 96 and the shafts to which these two bevel gears are attached. By this means within the range of movement of traveling block 98, the length of the package produced may be reduced from the maximum, as determined by the circumferential spacing of sealing surfaces 32, to a lesser value. Since shaft 95 turns once for each package produced, a range of movement of 90° relative to shaft 89 would permit a selection of package lengths from 4½ to 6 inches maximum in our assumed example.

To accomplish these results, it will be realized that gear ratios are selected such that gear 52 which carries the means for interrupting the drive to the sealing rolls makes

one complete revolution for each axial sealing surface 32 or each compartment 30 on the sealing rolls. Likewise the gear ratio between gears 65 and 66 is equal to the number of such sealing surfaces or compartments. For example, there being three sealing surfaces 32 defining three compartments 30 in each of the sealing heads, the ratio of the diameters of gear 66 and gear 65 is 3:1. Shafts 89 and 95, rotating in unison, make one rotation for each sealing surface 32 or compartment 30 since they must complete one cycle of operation for each package formed.

As just explained, the length of the packages in the direction of web movement can be adjusted by changing the angular position of cam 102 by lead screw 99. It is also possible to adjust the length of each package individually in response to the position of indicia printed or otherwise placed on the web. For this purpose there is provided solenoid 140 (see FIG. 4) of which the plunger is connected by rod 141 to lever 142 mounted on shaft 86, as shown in FIG. 5. When energized, the plunger is pulled into the solenoid, pulling on rod 141 which causes lever 142 to rotate shaft 86 in a clockwise direction. This produces the same movement of oscillating cam 85 as is produced by the above-described action of cam 102 on lever arm 104. The result is movement of the sealing rolls to a position releasing the web and stopping the web advance to determine the length of the package.

The impulse for energizing the solenoid can be derived from electric light and photo-cell means 145 placed as illustrated in FIG. 1 to scan web wall 14 as it passes between the cell and a light source on the opposite side of the web. The electric eye is adjustably mounted so that it may be adjustably positioned along the path of the web at the proper point to respond to indicia on the web at a desired point in the cycle of machine operations to control the length of the package as desired. Solenoid 145 does not change the other operations of the machine from those already described. It may be provided in addition to or instead of cam 102.

A variational form of the invention is illustrated in FIGS. 11-14 which is the same as the machine illustrated in FIGS. 1-10 as described above, except for the variational features illustrated and described below. FIGS. 11, 12 and 13 are shown schematically for clarity of illustration, subject matter that is common to both forms of the invention being omitted as far as possible.

This form of the invention is designed to produce a flat package P', as illustrated in FIG. 14 from a web which is twice the width of the package. This web is contained in a roll 11c rotatably mounted upon the framework of the machine which is again generally indicated by the reference numeral 10. Being twice as wide as the package to be formed, the web is folded over on itself centrally to form a longitudinally extending fold. This is accomplished by passing the web over forming means 150, as shown in FIGS. 11 and 13. Forming means 150 shapes the web around filling tube 151 which receives the product to be packaged from hopper 23. The material is fed into this hopper by metering drum 22 constructed and operated as previously described. Here spout 151 serves as a mandrel around which the web is wrapped to form a tubular configuration in which the opposing walls of the web are integral with each other along one side of the web. The product to be packaged is placed between these two walls, as explained before. This spout differs from the one previously described in that one of the V-shaped side members 26 may be omitted; or instead the web may be closed along the open side by running marginal portions of the web at the free edges between a clip 152 above the delivery end of the spout.

Below spout 151 the web is in a position to receive product between the two side walls of the web forming the package and then pass between sealing rolls 155. The two rolls 155 are alike, only one of them being shown in FIG. 11. Each roll 155 differs from rolls 28 and 29 in

that the roll has only two compartments which separate two axially extending sealing surfaces 32b which place the transverse seals 32s on the package.

Although the rolls are provided with an annular sealing surface 31b at each end, it is preferred to use only one of these annular sealing surfaces since the package P' need have only one longitudinal side seal 31s, the other parallel side being closed by the fold in the web. The advantage of using only one pair of annular surfaces 31b is that the width of the package may be varied freely to any desired dimension within the spacing between the annular surfaces 31b and within the length of surfaces 32b placing the transverse seals. Thus adjustment of the package width is greatly simplified.

After the seals are made to form a package P', the web passes downwardly through a slot in platform 156. Mounted immediately beneath this platform is a rotating shear blade 157 which revolves in a horizontal plane, being driven by vertically extending shaft 158. The blade moves counter-clockwise as viewed from above in FIG. 12 and in cooperation with one side of the slot in platform 156 severs the package from the web, dropping it into a chute 159, which delivers a completed package by gravity to any suitable receptacle, not shown.

This variational embodiment of the invention is designed for web materials that are firm or stable in their dimensions. Materials of this character can be pulled through the forming means and downwardly from spout 151 by the sealing rolls when gripping only one side of the web and also permit themselves to be cut by the shear.

The driving means for the sealing rolls and other elements are, generally speaking, the same as described in connection with the preferred embodiment of the invention. Commencing with the top of FIG. 11, it will be seen that chain 120 passes upwardly over sprocket 121 which is provided on one face with pins 124, the number of pins again corresponding with the number of pockets in metering valve 22. These pins are engaged by arm 123 which can be swung into the path of the rotating pins to drive shaft 122 by energizing solenoid 160. Shaft 122 also carries a sprocket 161 which through chain 162 rotates shaft 163 which is connected to the agitator in the bottom of chute 21.

The sealing rolls are driven in opposite directions as before from pinion 65 which meshes with driven gear 66; and it will be noted that the relative diameters of gears 66 and 65 respectively have been reduced to the ratio of 2:1 since there are here only two compartments or pockets in the sealing rolls 155.

The means previously described for controlling or adjusting the length of the packages is also used with this embodiment of the invention. The lamp and photo-cell unit 145 is located to scan the web as it leaves roll 11c to control the package length from the position of indicia on the web.

Since rotary drum 37 carrying a hot wire severing means has been omitted, shaft 117 is now drivingly connected to vertical shaft 158 to drive the rotating shear blade 157.

Adjustment of the width of the package produced is accomplished in the embodiment of the invention just described by engaging the web along only one longitudinal side by the sealing rolls. The other side of the web requires no seal and therefore it can be positioned independently of the longitudinal seal forming surfaces of the sealing rolls. In the embodiment of the invention first described and illustrated in FIG. 1, adjustment of the package width is achieved by adjusting the spacing between the annular sealing surfaces that form the two longitudinal seals. A construction of the sealing rolls suitable for this purpose is illustrated in FIG. 15.

In that figure sealing roll 28b comprises a cylindrical body 165 by which the sealing roll is mounted upon the drive shaft 67. Two T-shaped members 166 are mounted at diametrically opposite positions on the body 165. These members 166 have peripheral surfaces which form

the transversely extending seals on the web. Obviously, the number of these members may be more or less than two depending on the number of packages formed per revolution of the rolls.

Slidably mounted on body 165 is a pair of flanges 167. Each flange has a hub provided with a set screw 169 or other means by which the flange can be fixed in any adjusted position. The flanges are axially movable on body 165 to permit adjustment of the spacing between them. Each flange has a peripheral surface which assists in forming one of the longitudinal seals on the web, these surfaces being continuous with the sealing surfaces of members 166. In FIG. 15, the right hand flange 167 is shown at the end of members 166. A narrower package may be made by moving this flange toward the other flange 167. The left hand flange 167 being inwardly of the ends of members 166, a wider package is produced when the flange is moved outwardly away from the other flange. Obviously one flange may be fixed if desired while only the other one is movable for changing the spacing between flanges. Both rolls of the pair are constructed alike as both are adjusted similarly.

From the foregoing description it will be apparent that various changes may be made by persons skilled in the art, in the design, arrangement, or location of the components of the packaging machine constituting the present invention. Accordingly, it is to be understood that the foregoing description is considered to be illustrative of, rather than limitative upon, the invention as defined by the appended claims.

We claim:

1. In a machine for producing filled flat packages in tandem relation from a continuous web having two opposing walls of sheet material, the combination comprising:

a product feeding tube; means bringing the web into position to receive between the web walls product from the tube;

sealing means for sealing the walls together to define at least a part of the periphery of the finished packages, said sealing means comprising a pair of counter-rotating sealing rolls between which the web passes, each roll having a circumferentially extending sealing surface and an axially elongated sealing surface mutually cooperating to place respectively longitudinal and transverse seals on the web;

cyclic means for periodically moving the sealing rolls radially toward and away from each other to grip and release the web between them, the web substantially ceasing its advance while released by the rolls; and drive means rotating the sealing rolls including means for reducing the speed of the rolls in timed relation to movement of the rolls toward and away from each other, said cyclic means moving the rolls toward each other into web engagement at said reduced speed when the axially elongated surfaces are in opposed mutually confronting positions to distribute across the web the accelerating pull thereon.

2. A machine as claimed in claim 1 which also includes stop means other than the web limiting the movement of the rolls toward each other to maintain a minimum distance between rolls sufficient to grip the web firmly yet not deform it.

3. In a machine for producing filled flat packages in tandem relation from a continuous web having two opposing walls of sheet material, the combination comprising:

a feeder tube; means bringing the web into position to receive between the web walls product from the tube;

sealing means for sealing the walls together to define at least a part of the periphery of the finished packages, said sealing means comprising a pair of counter-rotating sealing rolls between which the web

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passes and having axially elongated sealing surfaces for sealing the web transversely thereof; means for driving the rolls; and means for changing the package length comprising means moving the rolls radially toward each other at a predetermined rotational position to grip the web between them making initial contact at said axially elongated sealing surfaces and means moving the rolls radially apart after rotating through a predetermined arc to release the web at a predetermined package length and substantially stop its advance while the rolls continue to turn out of engagement with the web; and means for reducing the speed of said sealing rolls in timed relation to movement of the rolls radially toward and away from each other so that the rolls re-engage the web at reduced rotational speed.

4. In a machine for producing filled flat packages in tandem relation from a continuous web having two opposing walls of sheet material, the combination comprising:

a feeder tube; means bringing the web into position to receive between the web walls product from the tube;

sealing means for sealing the walls together to define at least a part of the periphery of the finished packages, said sealing means comprising a pair of counter-rotating sealing rolls between which the web passes and having axially elongated sealing surfaces for sealing the web transversely thereof;

means for driving the rolls; and means for changing the package length comprising means moving the rolls toward each other at a predetermined rotational position to grip the web between them making initial contact at said axially elongated sealing surfaces, and means responsive to indicia on the web for moving the rolls apart after rotating through a predetermined arc to release the web at a predetermined package length while the rolls continue to turn out of engagement with the web;

and means for reducing the speed of said sealing rolls in timed relation to movement of the rolls toward and away from each other so that the rolls re-engage the web at reduced rotational speed.

5. In a machine for producing filled flat packages in tandem relation from a continuous web having two opposing walls of sheet material, the combination comprising: a product feeding tube; means bringing the web into position to receive between the web walls product from the tube; sealing means for sealing the walls together to define at least a part of the periphery of the finished packages, said sealing means comprising a pair of counter-rotating sealing rolls between which the web passes; means mounting the rolls for movement toward and away from each other; means urging the rolls toward each other to grip the web between them; oscillating cam means moving the rolls apart to release the web; and cam actuating means operating in synchronism with the sealing rolls to oscillate said oscillating cam, said cam actuating means comprising:

a pair of coaxial rotating shafts, cam means on each shaft, follower means associated with each of said last mentioned cam means and operatively connected to said oscillating cam to shift the oscillating cam in one of two opposite directions;

and means drivably interconnecting said two coaxial shafts and permitting angular adjustment of one shaft relative to the other.

6. In a machine for producing filled flat packages in tandem relation from a continuous meltable web having two opposing walls of sheet material, the combination comprising:

a feeder tube; means bringing the web into position to receive between the web walls product from the feeder tube;

sealing means including a pair of counter-rotating seal-

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ing rolls between which the web passes, the rolls having elongated sealing surfaces adapted to make a seal extending transversely across the web;

and means for severing a filled package from the web at a transverse seal, said last mentioned means including a heated wire and a moving support for bringing the wire into contact with the web at a transverse sealed area and advancing the wire in contact with the advancing web while the heated wire melts the web to sever a package from the web.

7. In a machine for producing filled flat packages in tandem relation from a continuous web having two opposed walls of sheet material, the combination comprising:

a feeder tube; means bringing the web into position to receive between the walls product from the feeder tube;

sealing means including a pair of counter-rotating sealing rolls between which the web passes, the rolls having axially elongated sealing surfaces adapted to make a seal extending transversely across the web;

and means for severing filled packages from the web at successive transverse seals including a rotatable drum and a plurality of heated wires mounted on the drum in spaced positions whereby successive wires are brought into engagement with successive transverse seals by rotation of the drum and move with the web while severing a package from the web.

8. In a machine for producing filled flat packages in tandem relation from a continuous web bearing indicia and having two opposing walls of sheet material, the combination comprising:

a feeder tube; means bringing the web into position to receive between the web walls product from the feeder tube;

sealing means for sealing the walls together to define at least a part of the periphery of the finished packages, said sealing means comprising a pair of counter-rotating sealing rolls between which the web passes and having axially elongated sealing surfaces for sealing the web transversely thereof;

drive means rotating the rolls; means mounting the rolls for movement radially toward and away from each other to release the web;

means operating in timed relation to rotation of the rolls to periodically move the rolls radially apart to release the web and substantially stop the web advance;

means including photo-cell means scanning the web to originate a signal in response to movement of indicia on the web and deliver said signal from the photo-cell means to the means moving the rolls apart, whereby said last mentioned means in response to said signal moves the rolls apart;

means moving the rolls toward each other to grip the web between them, the rolls making initial contact with the web at said axially elongated sealing surfaces;

and stop means other than the web limiting the travel of the rolls toward each other to a minimum spacing between the rolls sufficient to grip the web firmly.

9. In a machine for producing filled flat packages in tandem relation from a continuous web having two opposing walls of sheet material, the combination comprising:

a feeder tube; means bringing the web into position beneath the feeder tube to receive between the web walls product from the feeder tube;

sealing means including a pair of counter-rotating sealing rolls between which the web passes, each roll having a plurality of circumferentially spaced, axially extending sealing surfaces adapted to make a seal extending transversely across the web;

drive means for rotating the rolls; means for moving the rolls radially away from each other to release the

web while the rolls continue to rotate, the web substantially ceasing to advance when released by the rolls;

and means controllably moving the rolls radially toward each other to re-engage the web at a position of the rolls in which the axially extending sealing surfaces on the pair of rolls are in opposed, mutually confronting positions at the time the web is engaged by said axially extending sealing surfaces on both of the rolls.

10. A machine as in claim 9 in which the drive means includes means to bring the rolls substantially to a stop at the instant they re-engage the web.

11. A machine as in claim 10 which also includes stop means other than the web limiting travel of the rolls toward each other to establish a minimum distance between said sealing surfaces sufficient to grip the web but not deform it.

12. In a machine for producing filled flat packages in tandem relation from a continuous web of sheet material, the combination comprising:

a filling mandrel; means forming the web around the mandrel to provide two opposing walls integrally connected along one side and in position to receive between the walls product from the mandrel;

sealing means for sealing the walls together to define a part of the periphery of the finished packages, said sealing means comprising a pair of counter-rotating sealing rolls between which the web passes, each roll having sealing surfaces including an annular sealing surface cooperating with an annular surface on the other roll to place a longitudinally extending seal on the web joining the two opposing walls at marginal portions adjoining the free edges of the web and also axially elongated sealing surfaces cooperating to place seals extending transversely across the web;

means mounting the rolls for movement radially toward and away from each other; resilient means normally urging the rolls toward each other to grip the web between the sealing surfaces on the rolls and advance the web as the rolls rotate; means driving the rolls; and means periodically moving the rolls apart in opposition to said resilient means to release the web and substantially stop the web advance in timed relation to rotation of the rolls to determine the length of packages produced and allowing the rolls to be moved together by said resilient means to make initial contact with the web at said axially elongated sealing surfaces.

13. A machine as claimed in claim 12 which also includes adjustable stop means other than the web limiting the travel of the rolls toward each other to adjustably space apart said annular sealing surfaces whereby the web is firmly gripped without deforming it.

14. In a machine for producing filled flat packages in tandem relation from a continuous thermoplastic web having two opposing walls of sheet material, the combination comprising:

a product feeding means; means bringing the web into position to receive product between the web walls from the feeding means;

sealing means for sealing the web walls together to define at least a part of the periphery of the finished packages, said sealing means comprising a pair of counter-rotating sealing rolls between which the web passes;

means mounting the rolls for generally radial movement toward and away from each other;

resilient means normally urging the rolls toward each other to grip the web between them;

stop means positively limiting the approach of the rolls toward each other to a minimum spacing to limit the pressure applied thereby to the web;

and cyclic means moving the rolls apart in opposition to said resilient means to release the web and sub-

stantially stop the web advance while the web is released.

15. In a machine for producing filled flat packages in tandem relation from a single continuous web folded to provide two opposing walls integrally connected along one longitudinal side, the combination comprising:

a feeder tube; means bringing the web into position to receive between the walls product from the feeder tube;

a pair of counter-rotating sealing rolls between which the web passes to seal the walls together along three sides of a finished package, said rolls each having one of a pair of cooperating annular surfaces forming a seal longitudinally of the web at the free longitudinal edges of the web;

a generally V-shaped retainer at one side of the feeder tube preventing product from flowing to the areas of the web at said longitudinal seal; drive means rotating said rolls including photocell means responsive to indicia on one roll of web for periodically moving the rolls toward and away from each other to grip and release the web between them in timed relation to revolution of the rolls;

and stop means limiting movement of the rolls toward each other to provide a firm grip of the rolls on the web without deforming the web.

16. In a machine for producing filled packages in tandem relation from a continuous web comprising two separate opposing and continuous strips of sheet material on separate supply rolls, the combination comprising:

a product feeding tube;

independent tension controlled means to withdraw each strip separately and simultaneously from one of the supply rolls;

independent guide means receiving each withdrawn strip and maintaining the associated strip in flat, undisturbed condition to a position closely adjacent and beneath the feeder tube to receive product between the strips from the feeder tube;

sealing means for sealing the strips together to define at least in part the periphery of the finished packages, said sealing means comprising a pair of counter-rotating sealing rolls between which the web passes and is advanced from the guide means;

cyclic means for moving the sealing rolls radially toward and away from each other to grip and release the web between them, the web substantially ceasing to advance but the rolls continuing to turn through a controlled arc after release of the web;

and drive means rotating the sealing rolls including means for reducing the speed of the rolls in timed relation to movement of the rolls toward and away from each other,

said cyclic means moving the rolls toward each other into web engagement at said reduced speed to re-engage the web at predetermined positions of the rolls angularly advanced by the length of said controlled arc from positions of the rolls at the time of web disengagement.

17. In a machine as claimed in claim 16, the combination in which each guide means comprises a pair of closely spaced flat plates between which a strip passes.

18. In a machine as claimed in claim 16, the combination in which each strip withdrawal means comprises a continuously rotating feed roller in contact with one strip;

a freely movable pivoted arm engaging said one strip at a position spaced from the feed roller;

and means yieldingly urging the arm in a direction to take up slack in the strip and pull the strip against the feed roller.

19. In a machine as claimed in claim 16, the combination which also includes spring means resiliently urging the rolls together and stop means other than the

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web limiting the movement of the rolls toward each other to establish a minimum distance between rolls sufficient that the rolls grip the web firmly yet do not deform it.

20. In a machine as claimed in claim 16, the combination which also includes means for severing a filled package from the web at a transverse seal including a heated wire and a moving support for the wire bringing the wire into contact with the web at a transverse sealed area and including means advancing the wire in contact with the web while the heated wire is melting the web to sever a package.

21. In a machine as claimed in claim 20, the combination in which the moving support for the heated wire is a rotatable drum.

22. In a machine for producing filled flat packages in tandem relation from a continuous web having two opposing walls of sheet material, the combination comprising:

a product feeding tube;

means bringing the web into position to receive between the web walls product from the tube;

sealing means for sealing the walls together to define at least a part of the periphery of the finished packages, said sealing means comprising a pair of counter-rotating sealing rolls between which the web passes, said sealing roll having opposed sealing surfaces engaging opposite sides of the web to seal together the web walls;

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cyclic means for periodically moving the sealing rolls radially toward and away from each other to grip and release the web between them, the web substantially ceasing to advance but the rolls continuing to turn through a controlled arc after releasing the web;

and drive means rotating the sealing rolls including means for reducing the speed of the rolls in timed relation to movement of the rolls toward and away from each other,

said cyclic means moving the rolls toward each other into web engagement at said reduced speed to re-engage the web at predetermined positions of the sealing surfaces on the rolls angularly advanced by the length of the controlled arc from the positions of the rolls at the time of web disengagement.

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William S. Schneider et al.

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 18, line 20, for "roll" read -- wall --.

Signed and sealed this 3rd day of September 1963.

(SEAL)

Attest:

ERNEST W. SWIDER
Attesting Officer

DAVID L. LADD
Commissioner of Patents