Nov. 28, 1961 OD VIKAR CHRISTENSSON 3,010,264

ARRANGEMENT IN CLOSING MACHINES FOR PACKAGES

Filed Nov. 9, 1959 3 Sheets-Sheet 1

Fig. 1.

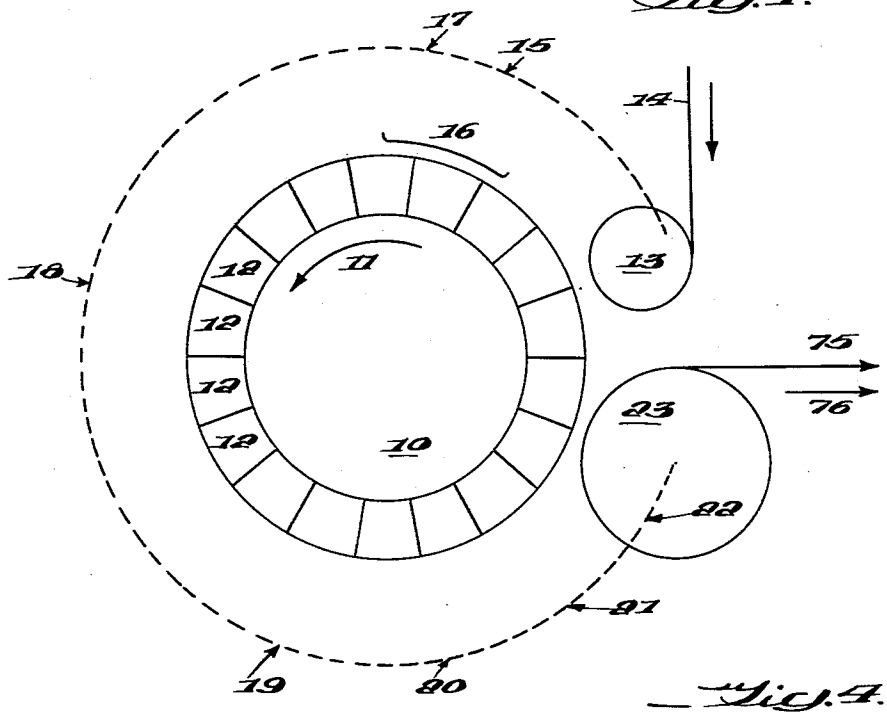
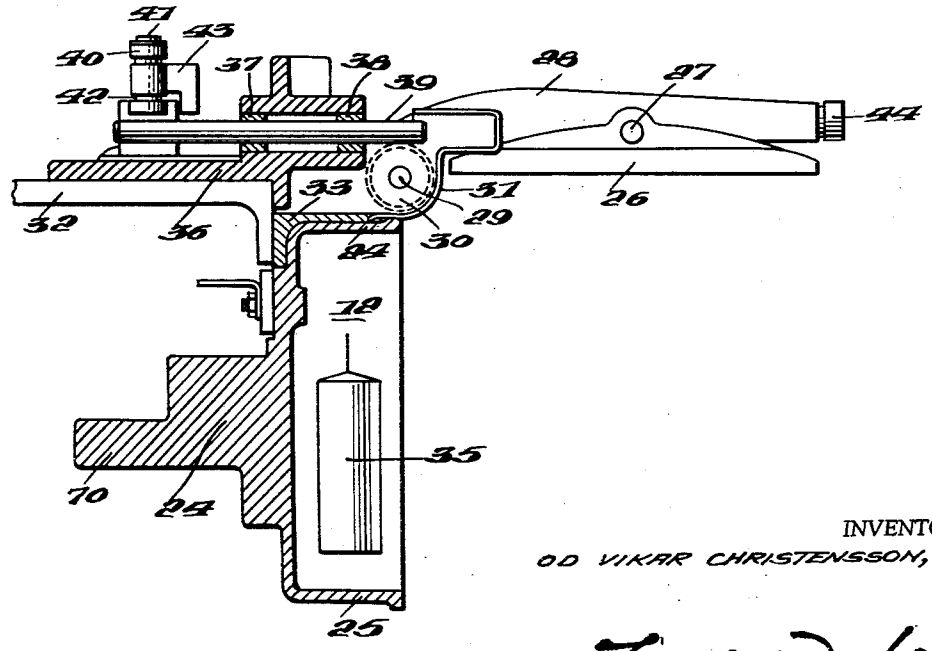


Fig. 4.



INVENTOR
OD VIKAR CHRISTENSSON,

BY Lawrence and Dayton

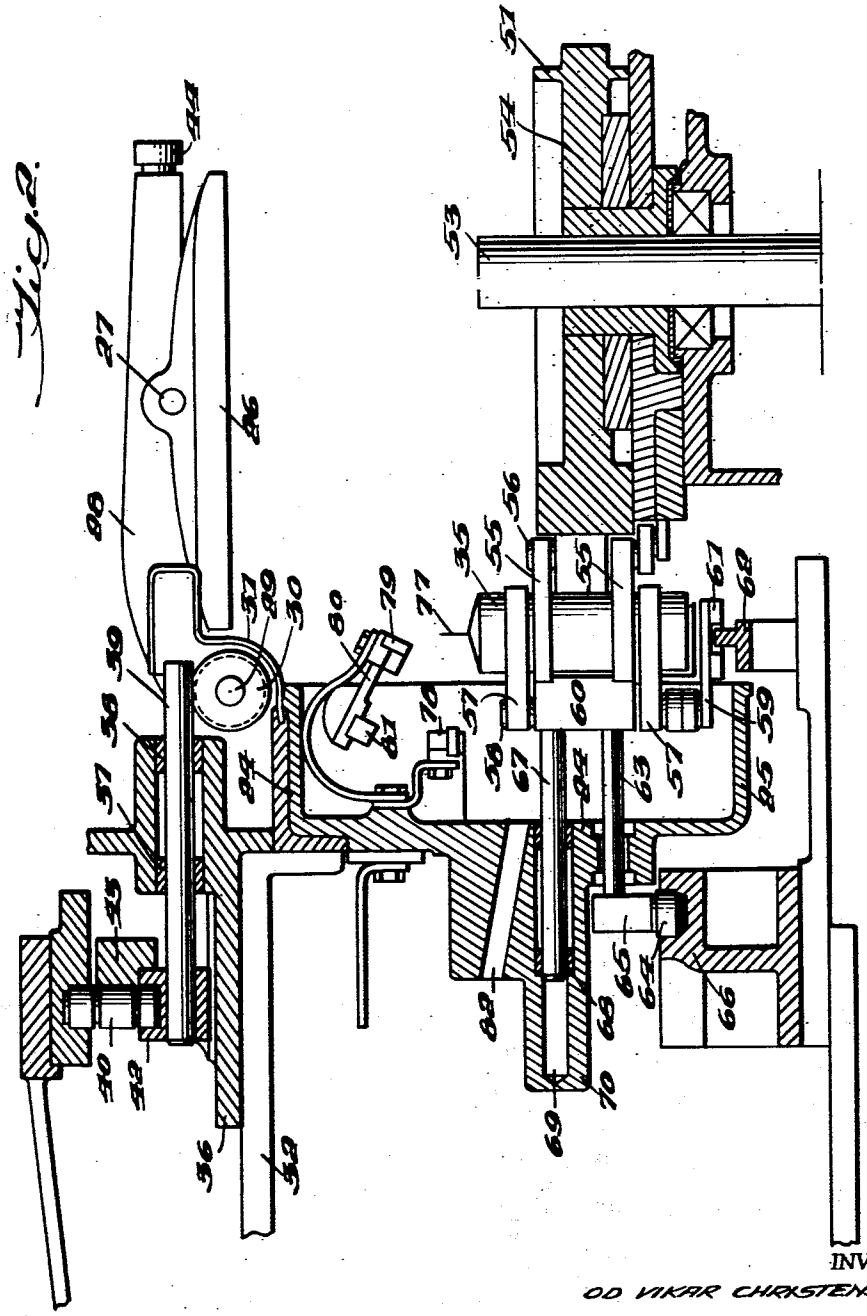
ATTORNEYS

Nov. 28, 1961 OD VIKAR CHRISTENSSON 3,010,264

ARRANGEMENT IN CLOSING MACHINES FOR PACKAGES

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Fig. 2.



INVENTOR
OD VIKAR CHRISTENSSON,

BY Lawy and Dayton

ATTORNEYS

Nov. 28, 1961 OD VIKAR CHRISTENSSON 3,010,264

ARRANGEMENT IN CLOSING MACHINES FOR PACKAGES

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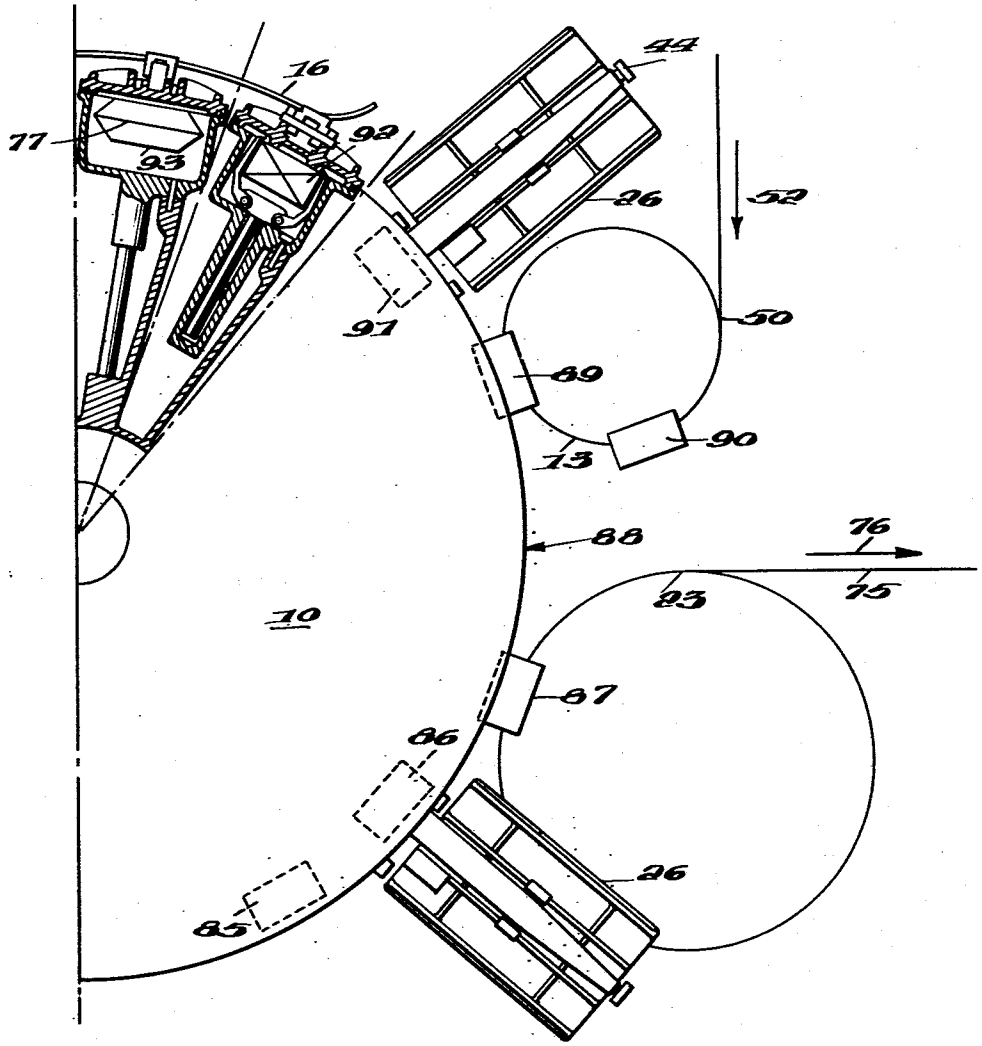


Fig. 3.

INVENTOR
OD VIKAR CHRISTENSSON,

BY Lawson and Taylor

ATTORNEYS

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3,010,264
ARRANGEMENT IN CLOSING MACHINES FOR PACKAGES

Od Vikar Christensson, Vikavagen 5, Bromma, Sweden

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6 Claims. (Cl. 53—95)

This invention relates to the packing of certain types of products which are sensitive to atomsphere in evacuated packages, the packages being rectangular in cross-section and made of cardboard or similar material with an inner lining of a strong, air-tight plastic or the like. After the package is filled with material, the inner lining is evacuated and heat sealed in its evacuated state. The durability of the packed material will thus be increased because it is prevented from being effected by the atmosphere.

It has been the practice in the past to enclose certain types of vacuum packages in a sheet metal box and the box then placed on a turntable arrangement. During the rotation of the turntable, the box is evacuated and often closed and soldered at the same time. The apparatus of the present invention also utilizes the principle of a rotating turntable. However, with packages of an easily deformable material such as cardboard or the like, certain steps must be taken in order to avoid damage to the package. Such damage may occur in a number of different ways. First of all, means must be utilized to place the package on the turntable, and these means may damage the package. Secondly, too rapid evacuation of the package may cause the lining to shrink so quickly that the outer package is not free of the lining and deformation may result. Finally, the closed package must be removed from the turntable and again damage may occur to the package at this time.

In order to avoid such damage insofar as is possible, the packages are held in place during evacuation by means of holders. The actual construction of these holders is, however, of no importance to the present invention. Each of the packages is placed on the turntable in a separate chamber, and the chamber is evacuated in such a manner that no damage to the outer package results. For this reason the different evacuation chambers are independent of each other, so that a vacuum can be created in each one successively. Each chamber therefore has separate closing means which allow the package to be introduced or removed from the chamber when open without interfering with the normal working of the machine, especially in the rotation thereof, and which when closed are of sufficient air-tightness to allow the required vacuum to be maintained in the chamber.

According to the present invention, each of the evacuation chambers is provided with a shutter on the outermost side of the chamber, that is the side toward the periphery of the turntable. The shutter is of such size that when opened the package together with the holder therefor can pass in or out of the chamber. In order to avoid interfering with the rotation of the turntable, the shutter is rotatable about a horizontal shaft located at either the bottom or the top of the shutter.

Further deails of the invention will be evident from the following description of an arrangement according to the invention, but it should be understood that the invention is not limited to this specific form of execution and that many modifications may occur within the scope of the invention. The invention will be described in connection with the attached drawings, in which:

FIGURE 1 shows a schematic view of the turntable,

FIGURE 2 is a vertical section through a portion of the turntable,

FIGURE 3 is a corresponding horizontal section through a portion of the turntable, and

FIGURE 4 shows a view of a portion of the turntable carrying one of the chambers adapted to receive a package.

In FIGURE 1 the turntable is indicated at **10**. It is assumed that the turntable is in continuous rotation in the direction of the arrow **11**. A number of chambers or pockets are provided on the turntable so that each may be evacuated individually, although a common vacuum conduit may be used with a system of valves connecting the vacuum conduit to the chambers. The turntable is shown to contain eighteen such chambers or pockets **12**. These pockets or chambers are provided with a shutter, as will be described in detail below in connection with FIGURES 2, 3 and 4. This shutter covers the front of the chamber which faces the periphery of the turntable and opens upwardly about a horizontal shaft provided at the upper edge of the shutter. However, the horizontal shaft could also be provided at the lower end of the shutter.

The packages to be evacuated are fed to the turntable by means of a feeder device **13** which receives the packages from a path **14** and transfers them to an open pocket **12** which is opposite the feeder device. Due to the fact that the shutter of this particular pocket is at this time turned upwardly into a substantially horizontal position, the working of the feeder device and the introduction of the package into the pocket is not impeded. During the continuous rotation of the turntable in the direction of the arrow **11**, the shutter is closed at approximately the position indicated at **15**. The shutter is then pressed against the shutter coamings by means of a cam **16** so that the chamber will be sufficiently air-tight for the initial formation of a vacuum. As the chamber passes the position indicated at **17**, it is connected with a vacuum conduit so that the shutter is sucked tightly onto the shutter coamings by the vacuum and the cam **16** is no longer necessary and may be removed. At the position **18**, the chamber is connected to a conduit containing a higher vacuum so that the evacuation within the chamber is increased. Heat sealing of the lining of the package takes place at the position **19**. At the position **20** air is introduced into the chamber so that the shutter can be opened and the heat sealed joint cooled to obtain the required strength. In the position **21** the shutter is opened and at **22** the package is removed. For removal of the package another conveyor is used and which is schematically indicated at **23**.

For an explanation of the opening and closing movement of the shutter reference is made to FIGURE 4. This figure shows a single chamber together with the means required for operation of its shutter. The manner in which this chamber is connected to the turntable will be described below in connection with FIGURES 2 and 3.

In FIGURE 4 the walls of the chamber are indicated at **24**, the bottom by **25** and the shutter by **26**. Shutter **26** is hinged on a first shaft **27** which is located at approximately half the height of shutter **26**. This shaft, which may be regarded as a balancing shaft, is mounted in an arm **28** carrying the shutter, said arm in its turn being mounted on a horizontal shaft **29** at the upper edge of the shutter. The shaft **29** also carries a gear **30** which is surrounded by a protective sleeve **31** of sheet metal.

In the arrangement according to FIGURE 4 the turntable is represented by a disc **32** which carries the various parts. Thus, by means of the L-iron the disc carries the chamber **12** having a package **35** therein. The disc also carries a ring **36** having slide bearings **37** and **38** for a bar **39**, which has a rack at one end cooperating with the gear **30**. At the other end of the bar **39** a contact or follower wheel **40** rotates around a shaft **41** mounted in a block **42** on the end of the bar. The follower pulley **40** is in con-

tact with a cam contour in the form of a ring **43** which extends around the entire turntable.

In the specific position shown in FIGURE 4 it is assumed that the follower pulley **40** has been forced by the cam ring **43** to the position farthest to the left so that the rack on the end of bar **39** in cooperation with the gear **30** has turned the shaft **29** and the arm **28** into such a position that the shutter **26** has been lifted into a horizontal position. Thus the shutter is lifted out of the way of the means for introducing or removing a package from the chamber.

During rotation of the turntable when the chamber enters the position **15** as shown in FIGURE 1, the cam **43** is displaced outwardly and consequently the bar **39** will also be displaced to the right in FIGURE 4. This displacement may take place merely because of the weight of the shutter, but as a rule it is advantageous to provide a spring for this purpose which is not shown in the drawing. Alternatively, the cam may be arranged in the form of a groove which moves the follower pulley in both directions. During this movement, the shutter is closed and the edge will contact the frame around the chamber **12**. At this time there is no vacuum in the chamber and two additional steps are then taken to insure adequate sealing of the chamber.

First of all, the shutter is not rigidly carried by the arm **28** but is attached to the arm by means of the shaft **27** so that it is readily adjustable. Secondly, a further cam is provided outside the turntable as indicated in FIGURE 1 by **16**. This cam cooperates with a follower pulley **44** at the end of arm **28** and forces the shutter **26** into the best possible contact with the frame of the opening of the chamber **12**.

As evacuation of the chamber is commenced, the shutter is sucked against the frame and a good seal is obtained without cooperation of the above mentioned means. The cam **16** is therefore of only a limited length.

In FIGURE 4 some parts of the arrangement have been omitted for the purpose of clarity. These additional means shall now be described in connection with FIGURES 2 and 3.

A conveyor **50** is arranged in a known manner, not forming a part of the present invention, to feed packages to an auxiliary turntable **51**. The feeding of the packages which have already been closed at the bottom and filled with the material to be packed takes place in the direction of the arrow **52**. The turntable **51** is mounted on a continuously rotating shaft **53** carrying a disc **54**. This is in turn provided with a number of catcher arms **55**. In the example shown in FIGURE 2 one pair of such catcher arms is arranged at the same level as the upper part of the package **35**, and a second pair of such catcher arms are arranged at the same level as the lower part of the same package. These catcher arms are turnable around shaft **56** and are guided by means of a follower pulley and a groove in the auxiliary turntable **51**, not shown in the drawing, so that they catch a package approaching on conveyor **50**. The package is thereafter brought into the position shown in FIGURE 2 by the rotation of the auxiliary turntable. When the package is in this position it is fed into the chamber **12** of the main turntable by the movement of additional catcher arms which are attached to the main turntable and which catch the package **35** at the same time as the catcher arms **55** lose contact with the package.

These last mentioned catcher arms **57** are mounted on shaft **58** which are in turn mounted in a catcher plate **59** and surrounded by a hub **60**. The catcher plate **59** is provided with two control means **61** enclosing a cam disc **62** which is shaped in the form of an undulating ring around the path about which the turntable rotates. The hub **60** is attached to a push bar **63** carrying at its end a follower pulley **64** mounted on hub **65**, and this follower pulley **64** enters into a groove and a groove ring **66** which is fixed to the base of the main turntable. The cam disc **62** is broken off at regular intervals as will be evident from the following description.

For a description of the operation of the machine, it is assumed that the machine has run through the working cycles described in connection with FIGURE 1 up to the position **21**, in which the shutter **26** is opened in order to remove a completed package from the machine and introduce a new package in its place.

It should be borne in mind that the turntable **10** is in continuous rotation and that the turntable **51** is also in continuous rotation with a peripheral speed corresponding to the peripheral speed of the turntable **10** but rotating in the opposite direction. The catcher means **55** and **57**, respectively, will therefore interact with each other in about the same manner as the teeth of a pair of gears with the addition of certain superimposed movements which will be described below.

During the continuous progress of the turntable after the opening of the shutter **26**, a set of catcher arms **55** on the auxiliary turntable **51** approach the position in which a complete package is to be removed from the main turntable **10**. In this position a further auxiliary turntable is provided which is indicated by **23** in FIGURE 1. In all such elements it is similar to the auxiliary turntable **51** as shown in section in FIGURE 2 and a specific description is therefore not required.

Further operation of the machine is as follows. The groove ring **66** is formed in such a way that, immediately after the opening of the shutter **26**, the follower pulley **64** is displaced outwardly. The catcher mechanism including the catcher arms **57** together with the package **35** carried by said catcher arms is also displaced outwardly. To control this movement a steering guide is provided in the form of a bar **67**, which runs in slide bearings **68** in a bore **69** in an extension **70** on the back side of the bottom **25** of the pocket **12**. These details are not shown in FIGURE 4. When the catcher arms **57** together wtth the package are in their outermost position, the catcher arms **55** on the auxiliary turntable **23** close around the package **35** at the same time as the catcher arms **57** open to free the package. The package is then rotated by the auxiliary turntable **23** so that it is taken out of the chamber **12** and deposited on a conveyor **75**, as shown in FIGURE 1, by which it is removed in the direction of the arrow **76**. The chamber **12** continues to rotate until it is in a position to receive a new package which has not yet been closed from the auxiliary turntable **13** as shown in FIGURE 1. Assuming that this turntable is that shown at **51** in FIGURE 2, then a set of catchers on the auxiliary turntable **51** are approaching the periphery of the main turntable **10** with a package not yet closed within its catcher arms. When these are opposite the chamber **12**, which is now empty, the catcher arm construction on the main turntable engages the package which is taken into the chamber by the catcher arm construction **57** guided by the groove ring **66** and the follower pulley **64** and guide bar **67**. The shutter is then closed in the manner described above and evacuation and closing of the package takes place in the manner which has already been described.

The package is assumed to be of the type which is closed by drawing apart the upper mouth of the lining so that it assumes a straight lying position. This preliminary closing is assumed to have already been done in connection with the filling of the package before it is conveyed to the auxiliary turntable **23**.

The closed mouth in a straight lying position is shown in FIGURE 2 at **77**, and the package **35** is in such a position that this closed mouth will be brought into contact with a heat sealing block **78** which is fixed to the wall of the chamber **12**. A second heat sealing block **79** is provided on an arm **80** mounted on a shaft **81**. The shaft **81**, as well as means for feeding electrical heating current to the heat sealing blocks (not shown in the drawing) are controlled in such a way that the block

79 is turned toward the block 78 and the required current is fed to these blocks for carrying out the heat sealing of the opening 77 when the package has been evacuated, and which is completed at the position 19 in FIGURE 1. A further description of this part of the arrangement is not required as it does not form a part of the present invention.

For the same reason the evacuation conduits and the valves controlling evacuation have not been shown in the drawing. It will be sufficient to mention that they are connected to an opening 82 in the extension 70 of the chamber 12.

FIGURE 3 shows a horizontal section of the portion of the apparatus which has been described above with reference to the vertical section shown in FIGURE 2. For purposes of clairty, however, the turntables 13 and 23 have been shown schematically. A package 85 is shown on its way to the discharge position but with the shutter of its chamber still closed. In the next following position where the package 86 is located, the shutter 26 has been opened in the manner described above. The shutter is not shown in a number of following positions for the purpose of clarity. In the next following position a package 87 is shown in a position where it has just been freed from the catcher arms connected with the main turntable and is being introduced into the catcher arms connected to the auxiliary turntable 23 in order to be removed by them from the machine.

It may be seen however, that in this position the package has been displaced outwardly by the catcher arms of the turntable 10, and is in a position where it will be caught by the catcher arms of the turntable 23.

In the position 88 no package is shown because none has yet been introduced. As a matter of fact it is of some importance that air be allowed to circulate in the chambers of the turntable before the next package is introduced. At 89 a package is shown in the position where it is about to be introduced in the chamber. This package is at the same radial distance as the package 87 just mentioned, but the operating procedure of the catcher arms is the opposite. The catcher arms of the turntable 10 which remained displaced outwardly and remained open now close about the package 89 at the same time as the catcher arms of the turntable 13 lose contact with the package.

The packages are fed to the turntable 13 in a manner which does not form a part of the present invention. A package 90 is shown in a position where it is to be introduced to the next chamber in the main turntable 10 after the package 89. The package 91 is shown in a position where it has already been inserted into a chamber of the main turntable. The shutter 26 is, however, still open in this position but during movement into the next following position where the package 92 is shown the shutter has been closed. At the same time the pulley 44 on the shutter moves inwardly under the influence of the slide rail 16, so that th shutter is kept tightly pressed onto its frame when evacuation is started. This evacuation may be assumed to start as soon as the package is in the position shown by the package 93.

The packages 92 and 93 have a different appearance in FIGURE 3. This is due to the fact that the chambers are shown in section along a line of a different height. While the section at the position where the package 92 is shown are at a lower level, so that they run through the package itself and show it in its cross-sectional rectangular form, the section through the position in which the package 93 is situated has been made at a higher level and above the package 93. This package is therefore seen in full so that the closed mouth 77 is visible.

The evacuation and closing of the package then continues in a manner which has already been described with reference to FIGURE 1.

It is evident from the foregoing that there are many advantages to the arrangement of the present invention. By providing each separate chamber with a separate evacuation, the packages are not subjected to so-called vacuum pushes which might otherwise cause deformation of the packages or even cause them to explode. For this reason each chamber must have a separate shutter. In order that this shutter does not interfere with the means for removing a package or feeding a new package to be closed, the shutter is opened by turning it about a horizontal shaft. In order that the shutter allows sufficient space for the package being taken into or out of the pocket, the horizontal shaft is placed either at the lower or the upper edge of the shutter opening.

What is claimed is:

1. Apparatus for closing and evacuation of deformable packages comprising a turntable having a plurality of separate fixed chambers radially positioned thereon, said chambers having an open side facing the periphery of said turntable, means for rotating said turntable, shutter means mounted on each of said chambers and adapted to close the open side thereof, said shutter means being rotatable about a horizontal shaft disposed at one end of said chamber, means actuated by the rotation of said turntable for opening and closing said shutter means, and means for successively evacuating each of said chambers.

2. Apparatus according to claim 1 wherein each of said shutter means comprises an arm rotatably mounted on said shaft, said shaft mounted at one end of said open side of said chamber, and a shutter member rotatable about a further horizontal shaft mounted on said arm and disposed at the center of said shutter member.

3. Apparatus according to claim 1 including means for forcing said shutter means into sealing engagement with said chambers after closing thereof.

4. Apparatus for evacuation and heat sealing of easily contractable packages comprising a turntable having a plurality of fixed separate chambers radially positioned thereon, said chambers having an open side facing the periphery of said turntable, means for rotating said turntable, shutter means mounted on each of said chambers and adapted to close said open side, said shutter means being rotatable about a horizontal shaft mounted on said chamber, means for opening and closing said shutter means, and means for successively evacuating each of said chambers, said chambers adapted to heat seal said packages.

5. Apparatus according to claim 4 wherein each of said shutter means comprises an arm rotatably mounted on said shaft, said shaft mounted at one end of said open side of said chamber, and a shutter member rotatable about a further horizontal shaft mounted on said arm and disposed at the center of said shutter member.

6. Apparatus according to claim 4 wherein said means for opening and closing said shutter means comprises cam means actuated by the rotation of said turntable.

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