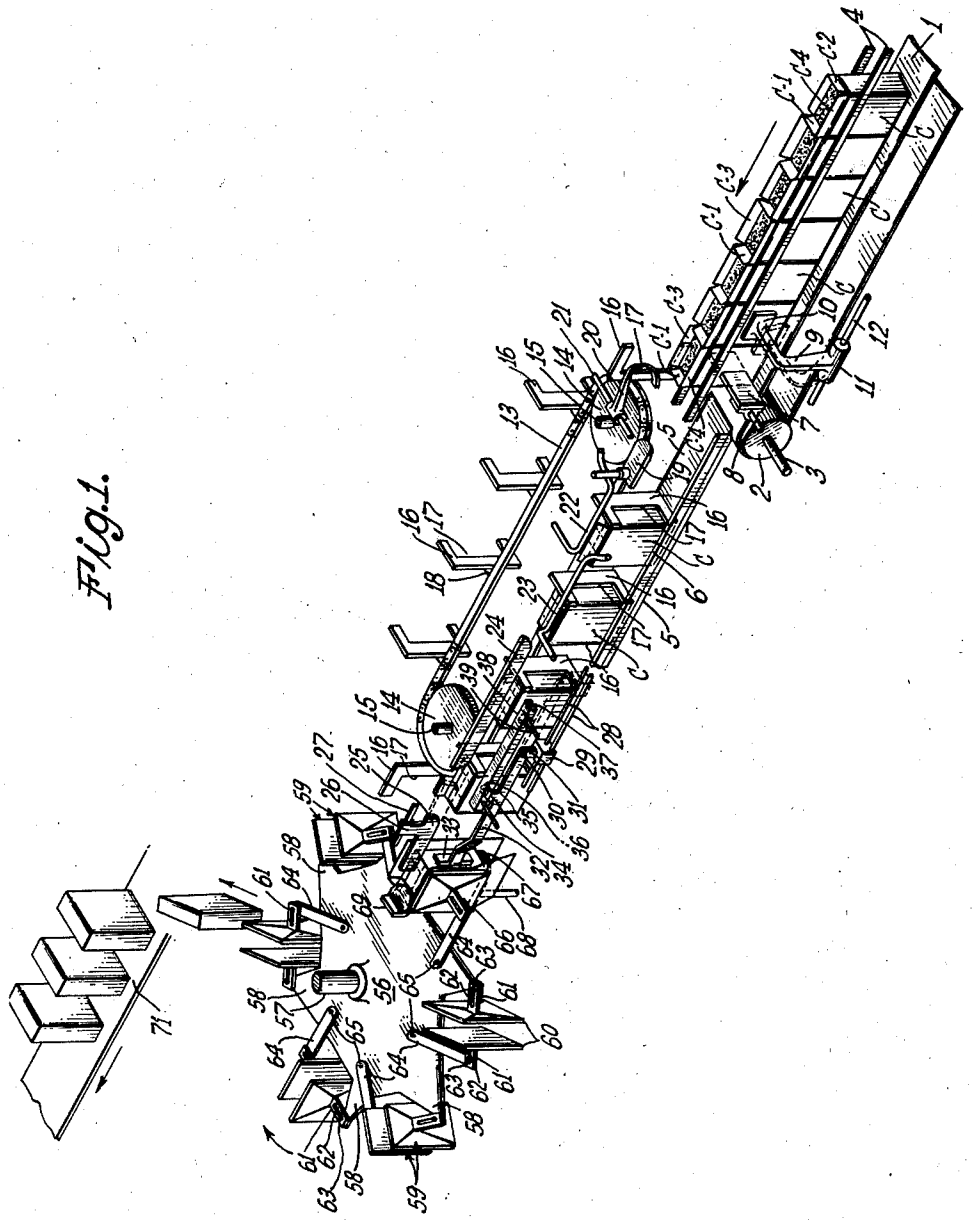
July 22, 1947. D. E. MARSHALL ET AL 2,424,406

METHOD AND APPARATUS FOR TIGHT-WRAP PACKAGING

Filed Nov. 25, 1941 5 Sheets-Sheet 1

Fig. 1.



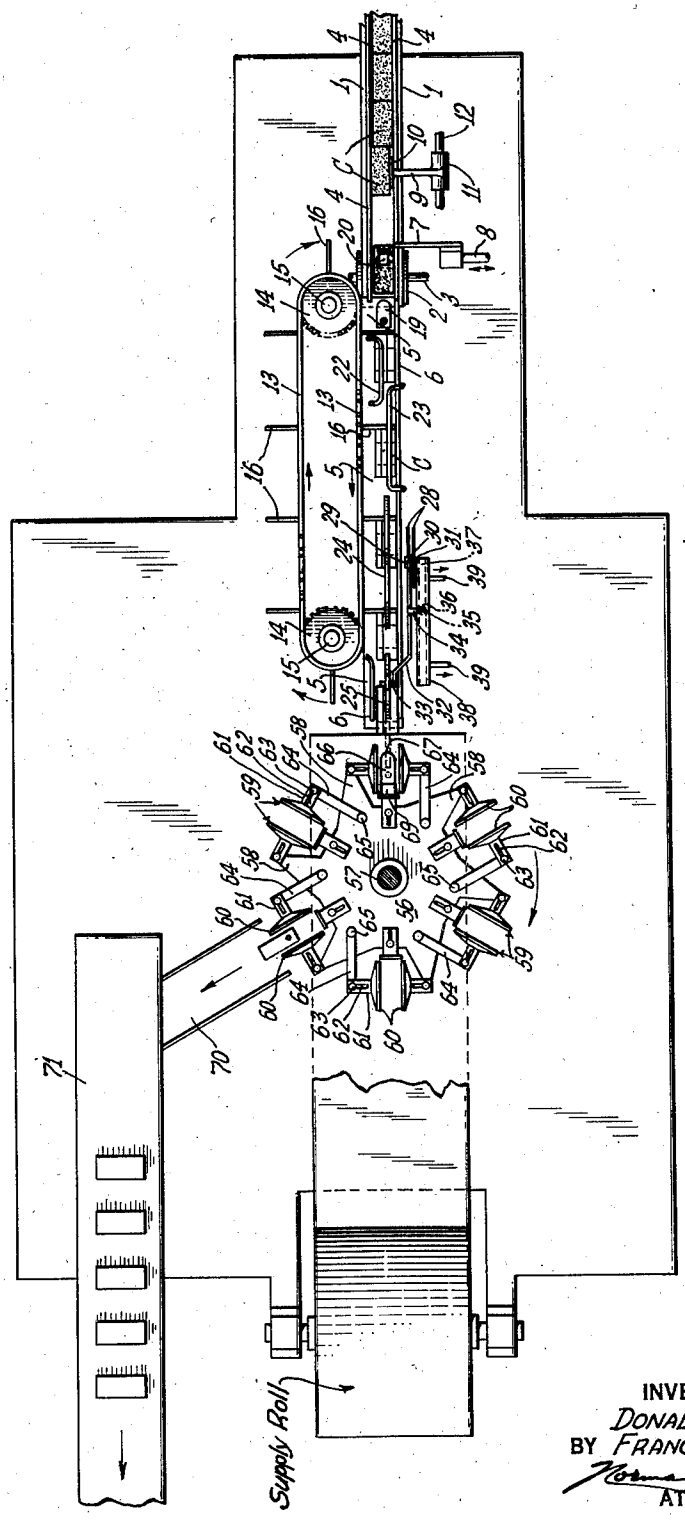
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METHOD AND APPARATUS FOR TIGHT-WRAP PACKAGING

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Fig. 2.



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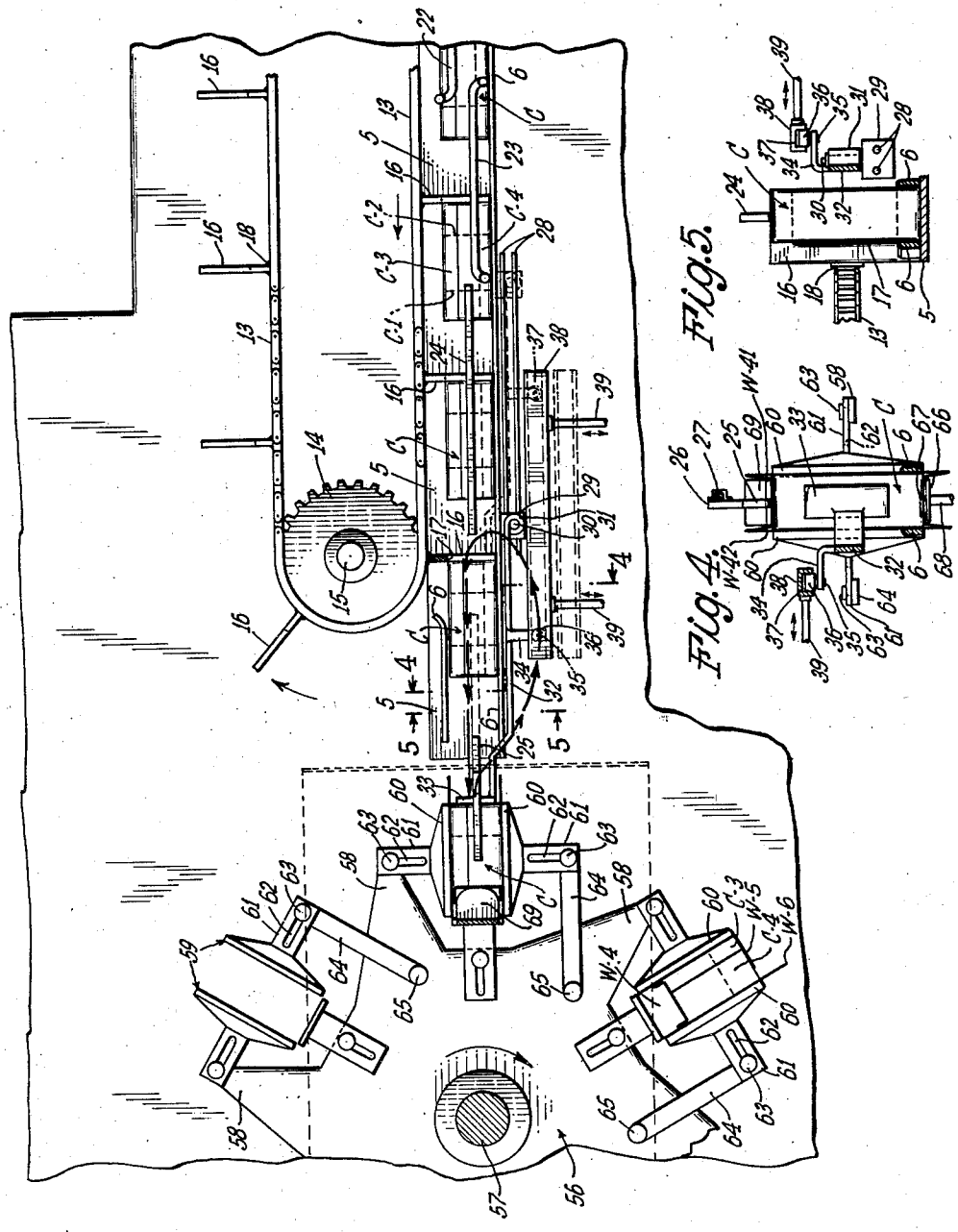


Fig. 3.

Fig. 5.

Fig. 4.

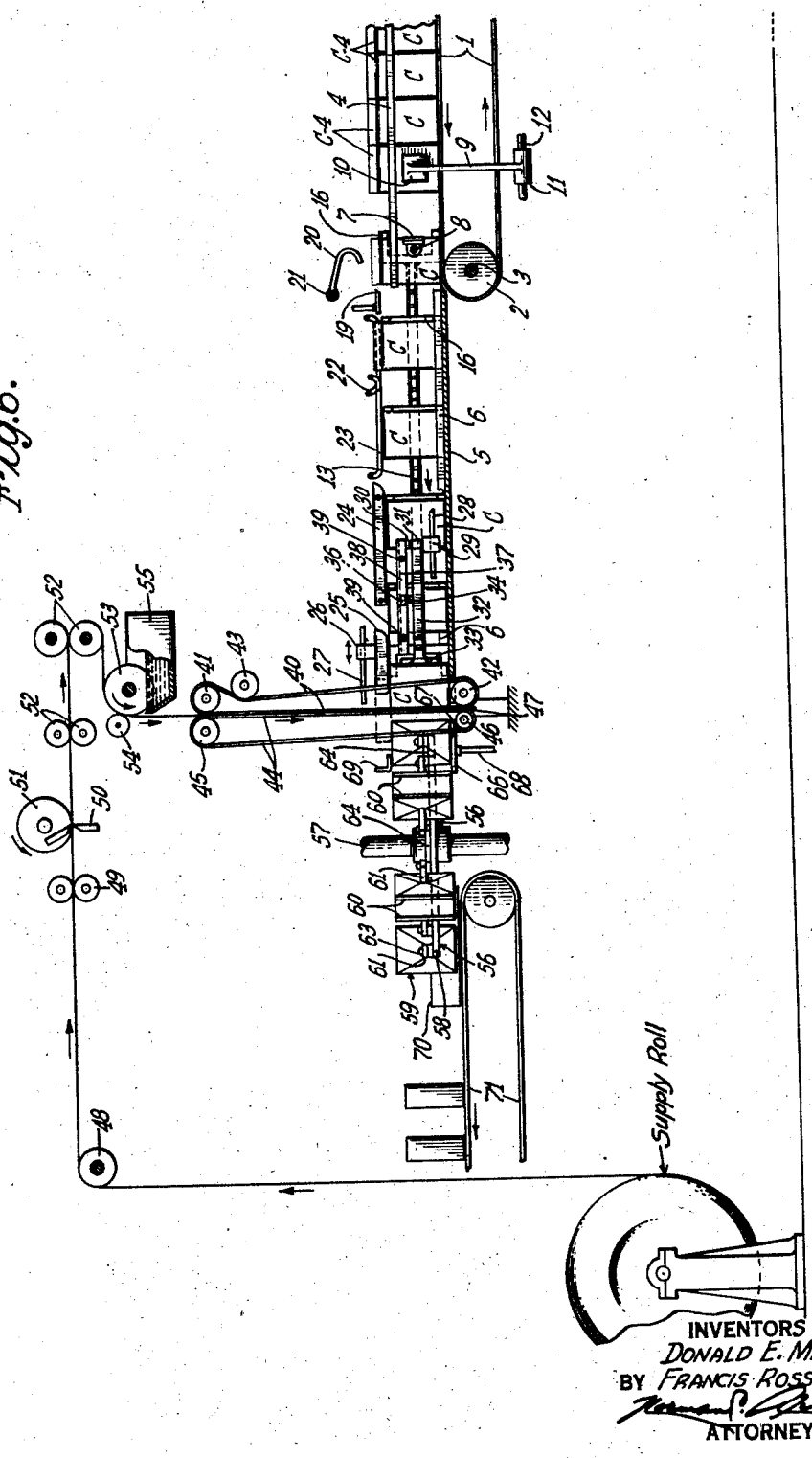
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METHOD AND APPARATUS FOR TIGHT-WRAP PACKAGING

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Fig. 6.



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Fig.7.

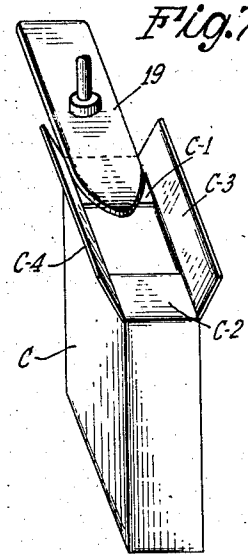


Fig.8.

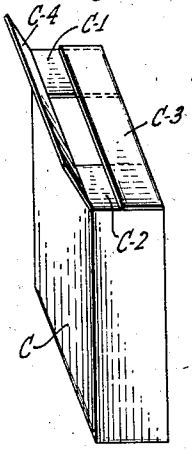


Fig.9.

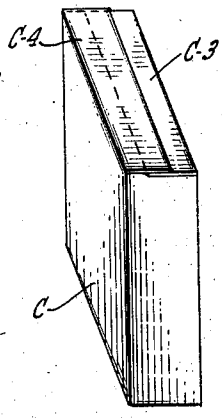


Fig.10.

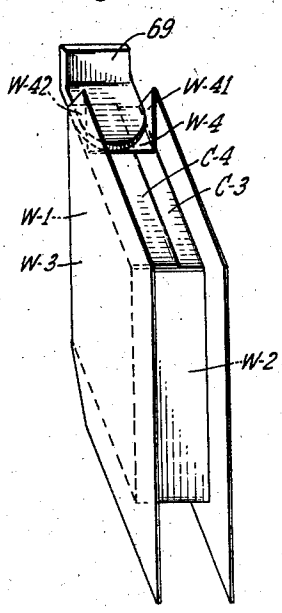


Fig.11.

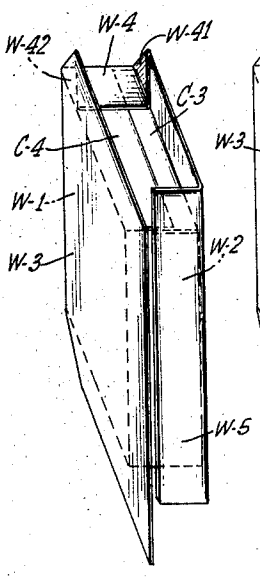


Fig.12.

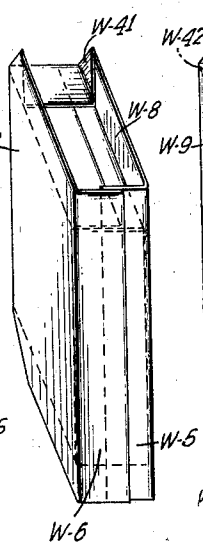


Fig.13.

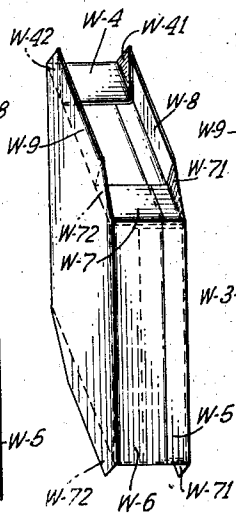


Fig.14.

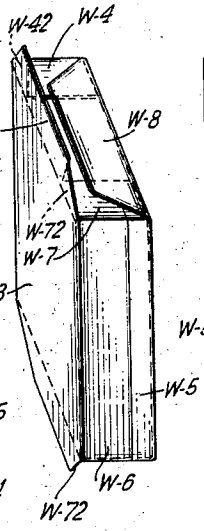
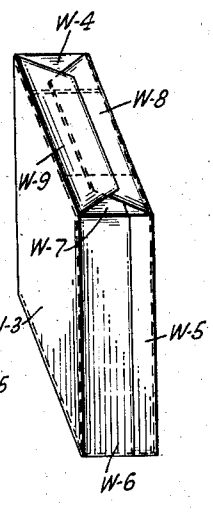


Fig.15.



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Patented July 22, 1947 2,424,406

UNITED STATES PATENT OFFICE

2,424,406

METHOD AND APPARATUS FOR TIGHT-WRAP PACKAGING

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Application November 25, 1941, Serial No. 420,374

13 Claims. (Cl. 93—2)

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The present invention relates to a combination packaging device and, more particularly, to a combined top closing and tight wrapping machine for cartons and the like, as well as to a method of packaging, and to packages formed thereby.

The packaging industry has for many years employed top closing machines for cartons, boxes and the like in conjunction with tight wrapping machines for putting a wrapper about the already sealed carton. According to the methods and machines which have been in use, the carton is filled and closed in an upright position and then tipped upon its side and rotated about a horizontal axis to apply the tight wrapper. Although this method is satisfactory for some purposes, it has definite disadvantages when finely divided and pulverulent materials are contained in the carton. Where the contents are sufficiently comminuted so that they sift easily, the top of the carton must be permanently sealed during the closing operations, so that the contents are retained when the carton is turned upon its side and/or rotated. As there is no means for supporting the top of the carton from the inside during the closing thereof, it is difficult to obtain a closure which will prevent sifting of a pulverulent product, and, although outside pressure is applied, this is usually insufficient to obtain the desired result.

The disadvantage of having the contents sift out of the carton is considerably aggravated when the contents are such as will interfere with the glueing of the tight wrapper. Thus, where soap products or other materials of an alkaline nature are used, contact of the product with the wet adhesive surface of the wrapper neutralizes or deteriorates the glue thereon, so that a poor seal of the tight wrapper is made. It will also be apparent that, when the carton is tipped upon its side, the contents of the carton must flow against its insecurely sealed end. Upon clamping the carton with its wrapper partly around it and with the glued surface of the wrapper projecting over the ends of the carton, the sudden clamping pressure expels air in the carton and pushes the product out against the wet glued surface.

In order to obtain as effective a sealing of the folded carton as can be made without using a form within the carton, the prior art provides a relatively long compression unit wherein the carton is conveyed under a series of upwardly displaceable pressure rollers. Such pressure equipment for sealing the glued carton requires a length of about 20 to about 25 feet, thus moving the tight wrapping machine at least that distance

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away from the filling equipment. This spreading of the points of operation in a complete finishing line makes it necessary to employ more than one operator, as the distance is too great for one man to cover with efficiency. Moreover, since there is so long a pressure unit between the carton folding and the tight wrapping operations, it is necessary to supply an additional timing device for registering the carton with the tight wrapping mechanism.

It has been discovered that this prior art problem is capable of solution in a relatively simple manner.

It is an object of the present invention to provide a new combination device for top closing and tight wrapping cartons while maintaining substantially the same vertical axis of the cartons throughout said operations.

It is another object of the invention to provide a novel device for closing a carton without sealing the same and for tight wrapping said closed and unsealed carton without substantial spillage of its contents, irrespective of the state of comminution of said contents.

It is also an object of the invention to provide a combined top closing and tight wrapping machine of improved construction wherein a carton can be closed and wrapped without rotation of the carton about a horizontal axis therethrough.

Another object of this invention is the provision of an improved machine for combining top closing and tight wrapping operations upon cartons with only a single timing station for registering said cartons with the machine for all steps in said operations.

The present invention further contemplates the provision of a process for closing the top of a filled carton and tight wrapping said carton without sealing the top thereof.

This invention has in contemplation the provision of a novel process for tight wrapping a closed but unsealed carton while maintaining the carton in a vertical position.

The invention further provides a novel tight wrapped package wherein the top of the carton is held in closed position by the wrapper.

Other objects and advantages of this invention will be apparent from the following description, taken in conjunction with the accompanying drawings, wherein:

Fig. 1 depicts a perspective view, partly diagrammatic, of a portion of a combined top closing and tight wrapping machine according to the present invention;

Fig. 2 illustrates a top plan view of the machine in Fig. 1 in a different operative position;

Fig. 3 represents a detail of Fig. 2, showing the machine in an operative position corresponding to Fig. 1;

Figs. 4 and 5 are transverse sectional views taken on lines 4—4 and 5—5, respectively, of Fig. 3, looking in the direction of the respective arrows;

Fig. 6 is a longitudinal elevational view of the machine depicted in Fig. 1, indicating diagrammatically its operative relationship with external elements; and

Figs. 7 to 15 show a carton and wrapping sheet therefor after successive operations during passage through a device according to the present invention.

Broadly stated, according to this invention, filled cartons are delivered in a continuous line against an escapement stop, where carrier arms upon an endless carrier chain pick up the cartons and carry them individually along a track through a top closing mechanism. As each carrier arm advances through this mechanism, the end flaps and side flaps at the top of the carton are folded down seriatim, preferably without the use of adhesive. As the last folding operation is completed, the arm carries the carton under a stationary restraining member or curb which keeps the flaps in folded position. At the end of the stationary curb and in alignment therewith, a movable restraining member or curb is provided, and, in front of this movable member in its withdrawn position, there are holders for releasably retaining an adhesive-coated wrapping sheet in transverse position to said member. A reciprocating pusher is introduced behind the carton at this point, the carrier arms travelling off to one side, and the pusher inserts the carton into the wrapping sheet which is correctly positioned with respect thereto. The pusher further urges the carton with the wrapping sheet around it into a wrapping spider or folding wheel, the movable restraining member moving along with the carton and keeping the top flaps folded. A vertically displaceable stage or sustaining member below the folding wheel rises beneath the carton as it leaves the platform under the urging of the pusher. The wrapping spider rotates intermittently about a vertical axis and is provided with a plurality of clamps having vertical sides for gripping the cartons and wrapping sheets as they are introduced into the spider by the pusher. The pusher and movable curb return to their original positions for picking up the next carton, and a new coated wrapping sheet is put in position for tight-wrapping said carton. The operative steps performed upon the carton and wrapping sheet in the wrapping spider may be as desired, the present invention not being concerned with the details of the tight-wrapping mechanism.

According to the novel method provided, the end and side flaps at the top of a filled carton are folded down seriatim, maintaining the carton in substantially vertical position during said folding steps, and an adhesive material is preferably not applied. The folded flaps are held in folded position while an adhesive-coated wrapping sheet is applied to one end thereof and folded over the top of the carton to maintain said folded position of the carton flaps. Thereafter, still keeping the carton in vertical position and without rotating the carton about a non-vertical axis therethrough, the wrapping operation is completed. The resulting novel package formed by this combination has the folds at the top of the carton unsealed and held in folded position by the tight wrapper which is sealed outside the carton.

Referring to Figs. 1 to 6 of the drawings, wherein like reference characters denote corresponding parts in the respective figures, a conveying belt 1, driven by means not shown, passes around an idler pulley 2 mounted upon a substantially horizontal axis 3 at its forward end. A pair of rails 4 are disposed above the conveying belt and in parallel position thereto. At the forward end of the conveying belt, adjacent idler pulley 2, there is a platform 5 substantially in alignment with the upper surface of the conveying belt and adapted slideably to receive cartons therefrom. The platform has guides 6 therealong adapted to form a track for the cartons.

Above the conveying belt and adjacent to its forward end, there is an escapement stop 7 connected by a slide rod 8 to a cam means, not shown in the drawings. The escapement stop is adapted to retain a line of cartons on the conveying belt by blocking the first carton on the line. Adjacent thereto and in suitable position for acting upon the second carton in the line, there is a clamp lever 9 having a clamp plate 10 adapted for frictional contact with the side of a carton and for holding said carton in fixed position against the rail 4 at the opposite side of the belt. The hub 11 of the clamp lever is fixedly mounted upon a rock shaft 12, which is operated by a suitable cam.

Above the platform 5 and extending partly over the conveying belt 1, there is one side of an endless chain 13. The chain is mounted upon two sprocket wheels 14, its links being adapted to be picked up seriatim by the cogs on said wheels. Each sprocket wheel is fixedly mounted upon a vertical shaft 15, and one of these shafts is connected to the primary drive, not shown, of the device. At regular intervals therealong, the chain bears a series of carrier arms 16 substantially perpendicular thereto, each arm having a recess 17 at its middle portion, the said arms being attached to the chain by supports 18. Attached to the frame, which is not shown in the drawings, and above the uppermost line of travel of the carrier arms, there is a stationary end flap folder or tucker 19 having its nose parallel to the conveying belt at a position approximately the height of a carton above the end of said belt and beyond the escapement stop 7. A hooked oscillating end flap folder or tucker 20 is positioned upon a rock shaft 21 located transversely above the stationary folder, and said oscillating folder is so shaped that its nose is substantially in alignment with the nose of the stationary folder 19 when the rock shaft is at the limit of the oscillation in the downward direction.

Serially positioned above the platform 5 and beyond the stationary folder 19, there are two side flap folders or folder rails 22 and 23 curved in opposite directions above the uppermost line of travel of the carrier arms and adapted for folding the side flaps of a carton passing beneath them. Immediately beyond said folder rails and substantially parallel to the platform in approximately the same horizontal plane as the folder rails, there is a curb bar 24 adapted for contact with the folded flap of a carton passing therebeneath. In alignment with said curb, there is

a movable restraining member 25 attached by means of a vertical support 26 to a slide rod 27 which is operated by a cam means, not shown.

To one side of the line of travel of the carrier arms and parallel thereto, there are a pair of stationary slide bars 28 upon which a pivot 29 is slideably mounted. The pivot has a vertical pin 30 whereon is rotatably mounted a hub 31 at the end of a pusher 32. The pusher has a transverse plate 33 at its other end adapted for thrusting contact with the end of a carton passing along the platform 5, and said pusher is offset to an extent required for locating the pusher plate 33 in the line of travel of the cartons during its contact therewith. At a middle portion of the pusher, there is an extension 34 whereto is attached a pin 35 having a roller 36 rotatably mounted thereon. The roller is adapted to travel in a grooved track 37 longitudinally cut in a guide bar 38 positioned above the pusher and parallel to the stationary slide bars 28. The guide bar 38 is supported by a pair of transverse slide rods 39 attached to a cam, not shown, and adapted to give the guide bar a reciprocal transverse motion. The slide rod 27 attached to the movable restraining member 25 is adapted to be moved by its cam in the same direction and at substantially the same time as the pivot 29, which is also attached to a cam by means not shown in the drawing. The cam by which the transverse slide rods 39 are moved is of such shape that the guide bar 38 is reciprocated in a full cycle transversely away from its normal position adjacent the side of the endless chain above the platform and then back to this position again during the backward or withdrawal motion of the pusher and the movable restraining member 25.

Referring to Fig. 6, there are a pair of belts 40 (only one of which is shown) at the delivery end of platform 5 and beyond the pusher 32 and the movable restraining member 25 in their withdrawn position, said belts being positioned, respectively, upon either side of the pusher in its extended position and each being mounted upon two pulleys 41 and 42, respectively rotatably mounted above and below the line of travel of a carton upon the platform and adapted to rotate upon axes transverse to said line of travel. Tension rollers 43 rotatable upon axes similarly positioned are adapted to hold the belts in firm frictional contact with the pulleys 41 and 42. Forward of each of said belts and in substantially parallel position thereto and in frictional contact therewith along one side thereof, there is a belt 44. These belts 44 (only one shown in the figure) are each also mounted upon two pulleys 45 and 46, respectively above and below the line of travel of the cartons, and there is a V-shaped trough 47 immediately below the lines of contact of belts 40 with belts 44 and extending transversely under both pairs. The four belts together are adapted to provide means for delivering a sheet of adhesive-coated paper to the trough 47 and for holding the sheet stretched across the line of travel of a carton upon the platform 55. The paper is fed to the belts from a supply roll and is drawn over an idler roll 48 by a pair of unwinding rolls 49 which feed the paper to a cutter. The cutter comprises a stationary knife 50 and a rotary knife 51, and the cut sheets pass therefrom to two pair of delivery rolls 52. These rolls deliver the sheets to a coating roll 53, against which they are held by a pressure roll 54. The coating roll dips into a tank 55 of adhesive and is adapted to coat one side of each sheet therewith. In practice, there

is a slide rod attached to the axis of pressure roll 54 and the same is reciprocated by means of a cam to withdraw the pressure roll from contact with the coating roll when there is no sheet of paper therebetween; neither slide rod nor cam is represented in the drawings. After being coated with the adhesive, the sheets are taken up by belts 40 and 44, as described supra.

Beyond the delivery end of the platform 5, there is a wrapping spider or folding wheel 56 mounted upon a vertical axis 57 and having a plurality of arms 58 radially attached thereto. Between each pair of arms there is a vertical clamp 59, and the spider or wheel is so positioned that each clamp can be in turn stationed at the end of the platform and in substantial alignment with the pusher 32. The clamp comprises a pair of substantially parallel clamp plates 60, vertically positioned; each of the plates is supported by a bar 61 attached to its central portion at the rear thereof, and said bars have slots 62 adapted to receive bolts 63 therethrough. One of these bolts for each pair of clamp plates passes through an orifice at the end of an arm 58, and the other bolt for the opposite plate of the pair passes through the free end of a lever 64 attached by means of a pin 65 to a middle portion of the opposite arm of the pair of arms.

In front of the delivery end of the platform 5 and beyond the pusher 32 in its extended position, there is a vertically movable, substantially horizontal stage 66 having a tucking or folding nose 67 facing in the direction of the platform 5. The stage is preferably narrower than the distance between the clamp plates 60 in each pair and is supported by a vertical slide rod 68, operated by cam means not shown. It is adapted at the upper limit of its reciprocation to be substantially aligned with the platform 5. There is a short folder 69 positioned above the rear end of stage 66 at a distance of about the height of a carton and therefore at a horizontal level slightly above the line of travel of the clamps 59, said folder being adapted to make the first top end tuck in the wrapping sheet as the carton is passed into the clamp. Various mechanisms, not shown in the drawings, are provided for making the several folds and tucks in the wrapping sheet as the folding wheel is turned upon its axis. A conveyor 70 is positioned adjacent the folding wheel at one of the stations of the clamps in their rotation about the vertical axis 57, and said conveyor is adapted to receive the wrapped carton and to carry the same to a conveyor 71 which removes the finished package.

The operation of the device of the present invention is relatively simple and is fully automatic. Cartons, sealed at their bottoms, are filled and passed in upright position upon the conveying belt 1 to the escapement stop 7 and the clamp lever 9, where the line of cartons is held. After the escapement stop has moved across the conveying belt to restrain the line of cartons, the cam-operated clamp lever 9 releases the line to the escapement stop and then completes its cycle to act upon the second carton in the line and to hold said carton against the rail 4 above the opposite side of the conveying belt. The escapement stop is then withdrawn to permit the passage of the first carton, the rest of the line now being restrained by the clamp 9. After the first carton passes beyond the escapement stop, the cam-actuated stop again goes into restraining position across the conveying belt, and the clamp lever 9 oscillates back and forth to release the

line of cartons and thereafter to act against the next carton in the line.

As the carton is passed by the conveying belt toward the platform 5, one of the carrier arms 16 upon the endless chain 13 is brought up behind the carton and urges the carton forward onto and along the platform. Referring to Figs. 1 and 7 to 15, as the carton C moves forward, the forward end flap C—1, standing upright, comes into contact with the stationary folder 19 and is folded down along the top of the carton. The oscillating folder 20 moves after the carton with accelerated speed and folds down the rear end flap C—2 (see Fig. 7), which passes beneath the stationary folder as the oscillating folder returns to its upper inoperative position. As the carton is urged forward by the carrier arm and passes beneath folder rail 22, the side flap C—3 at one side of the carton is folded down upon the top of the carton (see Fig. 8), and, the forward movement of the carton continuing, side flap C—4 at the other side thereof is folded down upon flap C—3, as shown in Fig. 9, by folder rail 23.

As the carton is moved along, the folded but unsealed flaps at the top are maintained in folded position by contact with the stationary curb 24, and the carton passes under the movable curb or restraining member 25 as the pusher 32 is withdrawn to its rearmost position and comes into contact with the carton at the rear end thereof. The pusher fits within the recess 17 in the carrier arm and is therefore in contact with the carton before the carrier arm releases the same. The pusher and movable restraining member are advanced together in a substantially straight line, the movable restraining member cooperating to retain the flaps in folded position. As the carton is urged forward, it is removed by the pusher from contact with the carrier arm, and the carrier arm, being at that portion of the endless chain which is at such time adjacent the forwardmost sprocket wheel, is turned off to one side to be returned to the other end of the platform.

The pusher inserts the carton into the adhesive-coated wrapping sheet which is stretched transversely of the line of travel of the cartons, the forward end of the carton first coming into contact with the middle portion W—1 of the adhesive-coated side of the sheet. The vertical axis of the wrapping spider or folding wheel turns to bring the next clamp into alignment with the pusher and oncoming carton, and the stage 66 is raised to a position substantially in alignment with the platform 5. The carton and wrapper are pushed upon the stage and between the plates 60 of the clamp 59, the contact of the clamp plates being sufficient to seal the sides W—2 and W—3 of the adhesive sheet upon the respective sides of the carton. As the pusher urges the carton upon the stage, the tucking nose 67 at the front of the stage folds down the lower portion W—4 of the wrapping sheet extending below the forward end of the carton, the adhesive coating causing the sheet to adhere to the carton. With the further forward thrust of the carton and wrapping sheet into the clamp, the upper portion W—4 of the wrapping sheet extending above the forward end of the carton is tucked down by the short folder 69 as the end of the carton is slid beneath it. The adhesive coating upon the inner surface of the wrapping sheet causes the upper portion W—4 to adhere to the top flaps of the carton and to maintain them in folded position.

The carton now being in its farthest forward position with respect to the clamp, a tightening mechanism, not shown in the drawings, is employed to hold the carton firmly gripped between the clamp plates 60, and the stage is dropped to its inoperative position. The pusher and the movable restraining member are also withdrawn, and the adhesively-maintained folded portion W-4 of the wrapper at the top of the package now restrains the flaps in their folded position. As indicated supra, although the movable restraining member can be withdrawn in a substantially straight line, the pusher must follow a curved withdrawal path to avoid the oncoming carton next in line and to be put into position behind said oncoming carton in the recess of the carrier arm. As the pivot 29 is retracted in a straight line parallel to but outside of the line of travel of the cartons, the guide bar 38 is moved transversely away from the platform, carrying with it the roller 36 which is permanently located with respect to a point on the middle portion of the pusher, as hereinbefore described. The effect of this first movement of the guide bar is therefore to fulcrum the pusher upon the pivot 29, which is moving backward in a line parallel to the line of travel of the cartons and carrying the roller backward also in the grooved track 37 of the guide bar 38. The roller and hence the middle portion of the pusher therefore have a compound motion, which is transferred to the pusher plate 33 and the plate travels in an arc around the oncoming carton (see Fig. 3). After the pusher plate has cleared the carton, the cam-actuated guide bar is returned to its original position, carrying the roller 36 into such position that the pusher is again parallel to the line of travel of the cartons and the pusher plate is behind the next carton to be wrapped.

While the mechanisms for the individual steps in the tight-wrapping operation are not a part of the present invention, it is preferred to employ for the horizontally rotatable folding wheel of the present invention elements similar to those disclosed by Joplin in United States Patent No. 1,606,233 for similar purposes on a vertically rotatable wheel. According to this disclosure, after the carton is laid against substantially the central portion W—1 of the wrapper, so that its adjacent portions W—2 and W—3 contact with and cover the front and back sides of the carton, and the carton and wrapper so contacted have been inserted into the clamp 59, the tucking nose 67 of stage 66 and the folder 69 turn the edges of W—4 (bottom and top) below and above the central portion W—1 inwardly as the carton is pushed between them. The inward folding of folds W—4 leaves uncoated folded portions W—41 and W—42 (two at each of top and bottom) in perpendicular position to W—4 and adapted to be laid thereon. The carton and wrapping sheet are at this point as shown in Fig. 10.

After the tightening of clamp 59 and the withdrawal of the pusher 32 and the stage 66, the overextending edge W—5 of the wrapping sheet adjacent side W—2 is folded upon the rear end of the carton by a cam-operated roller, the package appearing as in Fig. 11. As the spider begins its initial phase of rotation, the overextending edge W—6 on the opposite side is brushed across the rear end of the carton and overlaps W—5, the stationary short folder 69 being brushed by the outer uncoated surface W—41.

As folder 69 is short, it does not come in contact with the exposed, adhesive-coated, upper overhanging side flap W—8 above the side of the carton. The condition of the package is now as shown in Fig. 12. At the next station of the spider, a pair of folders, at the top and bottom respectively, fold inwardly the overhanging edges of W—5 and W—6 to form folds W—7, as shown in Fig. 13.

The inward folding of folds W—7 leaves two uncoated folded portions W—71 and W—72 at each of top and bottom in perpendicular position to W—7 and adapted to be laid thereon; portions W—71 and W—72 are thus opposite portions W—41 and W—42, respectively. If the wrapping sheet is unwaxed, it is preferred to fold back the overhanging side flaps W—8 and W—9 of the wrapping sheet at top and bottom and to apply adhesive along the inside of these sheets, thus providing a first adhesive coat upon W—41, W—42, W—71 and W—72 as well as a second coat upon the exposed portions of W—8 and W—9. Where the outer surface of the sheet is waxed, it is preferred to incorporate heating rolls in the mechanism of the folding wheel for the purpose of partially melting the wax when flaps W—8 and W—9 are folded back, thereby providing an improved seal. Considering only the wrapping at the top of the package (the wrapping at the bottom being similar), the flaps W—8 are rolled down upon the top of the carton (see Fig. 14), and, with the next phase of rotation of the spider, the flaps W—9 are folded down and are overlaid upon the flaps W—8. In this manner, the carton remaining in an upright position throughout, the top of the carton is tightly sealed, as shown in Fig. 15, so that there is no leakage or sifting from the unsealed flaps of the carton.

Although throughout the present description the part of the carton through which the carton is filled has been referred to as the top, it will be understood from the foregoing that intelligence may be so printed upon the carton or its wrapper that some other portion may be taken to be the top thereof. Indeed, it is preferred that the wrapper be so applied that the top of the carton with respect to its filling, top closing and wrapping will be the bottom of the carton in use. It is especially desirable to have a pouring spout, if any, at the bottom of the carton during its passage through the device of the present invention.

The designation of the carton as being in a "vertical or an "upright" position is intended to indicate the maintenance of the position of the carton in which it has been filled. The statement that the carton is not rotated "about a horizontal axis therethrough" between the filling and the wrapping operations means that it is not rotated or revolved to a substantial amount about a non-vertical axis, that is to say, to an amount sufficient to cause the contents of the carton to come into contact with the folded flaps at the top.

The package provided by the present invention comprises a carton having flaps which are preferably unsealed on one surface of the carton, said carton being tightly wrapped to maintain the flaps in folded position. By this means, the contents of the carton, regardless of how finely comminuted, are retained against any substantial spillage, leakage or sifting.

While the present invention has been described with respect to a particular embodiment thereof,

it will be appreciated from the foregoing that various equivalents can be substituted for elements in the present combination and that variations and modifications can be made therein without departing from the principles of this invention. Thus, while the curb for restraining the folded flaps after their leaving the folder rails and before application of the wrapping sheet has been described as comprising two elements, a stationary restraining member and a movable restraining member, it will be understood from the foregoing that other suitable means for maintaining the flaps in folded position can be substituted therefor. For example, although the combination set forth is a preferred modification, two stationary members, one upon each side of the wrapping sheet, would also be operative. The stationary member on the folding wheel side of the sheet would be vertically movable, similar to the stage below the receiving station of the clamps, and would be upwardly withdrawable to avoid wiping across the adhesive-coated portion of the sheet when the clamp is moved to the next station.

Since, according to this invention, the cartons are not rotated about a non-vertical axis during folding and wrapping, there is no contact between the contents and the top folds. It is therefore feasible to employ any desired means for temporary partial retention of the top flaps in folded position, as they are permanently tightly wrapped by the application of the adhesive-coated wrapping sheet. Thus, glue or other adhesive may be applied to the top flaps without the use, before wrapping, of pressure necessary to provide a good seal, the tight-wrapping operation applying the pressure and effectively sealing the package. Similarly, tucking means, taping, stapling and/or other means may be employed for restraining the folded flaps from opening before folding the wrapping sheets about the cartons, and such means may be used along with or in substitution for the curbs set forth supra in the description of a preferred modification of the invention. These and other variations and modifications are believed to be within the scope of the present specification and within the purview of the appended claims.

We claim:

1. In apparatus for producing tight wrapped cartons containing pulverulent material in which cartons having flaps open at the top are filled and the top flaps folded but not adhesively held in overlapping relation, the improvement which comprises means for receiving in upright position a filled and closed carton, means for engaging the top of said carton to hold the flaps in closed position, means for applying an adhesive-coated wrapping sheet to vertical walls of said carton, means for making a top fold in said wrapping sheet against a portion of the top flap, means for disengaging said engaging means from contact with the top of said carton, and means for folding said wrapping sheet completely around the carton.

2. Apparatus for tight wrapping cartons comprising a shaft rotatable about a vertical axis, a plurality of carton holders mounted on said shaft, means for intermittently rotating said shaft to move said carton holders in a horizontal plane and position them successively at a receiving station, means for positioning and releasably holding successive wrapping sheets coated on one surface with adhesive in a vertical plane adjacent to said receiving station, means for feeding succes-

sive cartons horizontally against the adhesive coated surface of successive wrapping sheets and into successive carton holders at the receiving station whereby the wrapping sheets are successively disengaged from the positioning means and carried with the respective cartons into the carton holders, and means for folding each wrapping sheet about the carton while retained in the carton holder.

3. Apparatus for tight wrapping cartons comprising a shaft rotatable about a vertical axis, a plurality of carton holders mounted on said shaft, means for intermittently rotating said shaft to move said carton holders in a horizontal plane and position them successively at a receiving station, means for positioning and releasably holding successive wrapping sheets coated on one surface with adhesive in a vertical plane adjacent to said receiving station, means for feeding successive cartons having their upper ends closed by folded flaps against the adhesive coated surface of successive wrapping sheets and into successive carton holders at the receiving station whereby the wrapping sheets are successively disengaged from the positioning means and carried with the respective upright cartons into the carton holders, and means for folding each wrapping sheet about the carton while retained in the carton holder.

4. A device for tight wrapping cartons having folded flaps closing an end which comprises means for wrapping an adhesive-coated wrapping sheet about said carton, means for urging cartons into operative position relative to said wrapping means, means for retaining said cartons in substantially vertical position with the end closed by said flaps at the top during the wrapping thereof, and restraining means for keeping the flaps of the cartons folded until held by said wrapping sheet.

5. A device for tight wrapping cartons having top closing flaps in folded position which comprises a horizontally rotatable wheel having means adapted for retaining successive cartons in upright position, means for delivering said cartons to said wheel in upright position, and means for folding an adhesive-coated wrapping sheet entirely about a carton during retention in said wheel.

6. A device for tight wrapping cartons having folded flaps at the top thereof which comprises a horizontally rotatable wheel having means adapted for retaining successive cartons in upright position, means for delivering said cartons to said wheel in upright position, means for folding an adhesive-coated wrapping sheet about a carton during retention in said wheel, and restraining means bearing against the top flaps of the carton until engaged by a portion of said wrapping sheet.

7. A device for tight wrapping cartons having folded flaps at the top thereof which comprises a horizontally rotatable wheel having means adapted for retaining successive cartons in upright position, means below said wheel for sustaining a carton, means for delivering said cartons to said sustaining means, and means for folding an adhesive-coated wrapping sheet entirely about a carton during retention in said wheel.

8. A device for tight wrapping cartons having unglued folded flaps at the top thereof which comprises a horizontally rotatable wheel having means adapted for retaining successive cartons in upright position, a movable stage beneath the wheel, means for delivering said cartons to said stage, restraining means for keeping the top flaps of the cartons folded during said delivery, and means for folding an adhesive-coated wrapping sheet entirely about a carton during retention in said wheel.

9. A device for tight wrapping cartons having unglued folded flaps at the top thereof which comprises a horizontally rotatable wheel having means adapted for retaining said cartons in upright position, a vertically movable stage beneath the wheel, means for delivering said cartons to said stage, reciprocating restraining means for keeping the top flaps of the cartons folded during said delivery, and means for folding a wrapping sheet entirely about a carton during retention in said wheel.

10. A device for tight wrapping cartons having unglued folded flaps at the tops thereof which comprises supporting means, means for urging said cartons along said supporting means at regular time intervals, a curb for keeping the top flaps of the cartons folded while urged along said supporting means, a horizontally rotatable wheel adjacent said supporting means and adapted for retaining said cartons, a vertically movable stage below the wheel adapted to be positioned in substantial alignment with said supporting means, means for delivering said cartons from the supporting means to said stage, reciprocating restraining means for keeping the cartons folded during said delivery, and means for folding an adhesive-coated wrapping sheet entirely about a carton while retained in said wheel.

11. A device for tight wrapping cartons having folded top closing flaps which comprises a platform, means for urging said cartons along the platform, a wheel adjacent to the platform intermittently rotatable about a substantially vertical axis and adapted for holding said cartons, means for delivering said cartons from the platform to said wheel, means for keeping the cartons folded during said delivery, means for releasably retaining an adhesive-coated wrapping sheet between the platform and the wheel, and means for folding said wrapping sheet entirely about a carton while said carton is held by the wheel.

12. A device for tight wrapping cartons having folded top closing flaps which comprises a platform, means for urging said cartons along the platform, a wheel adjacent to the platform rotatable about a substantially vertical axis and having a plurality of clamps for holding said cartons, means for closing said clamps, means for intermittently rotating said wheel, means for delivering said cartons from the platform to successive clamps on said wheel, means for keeping the cartons folded during said delivery, means for releasably retaining an adhesive-coated wrapping sheet between the platform and the wheel, and means for folding said wrapping sheet entirely about a carton while said carton is held in vertical position in a clamp.

13. A method for filling, top closing and tight wrapping cartons open at their tops which comprises filling a carton with pulverulent material, folding down the flaps at the top of a carton, restraining said folded flaps from opening, and folding an adhesive-coated wrapping sheet about the carton while maintaining said carton in vertical position with said flaps at the top, said adhesive adhering upon contact to said carton.

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