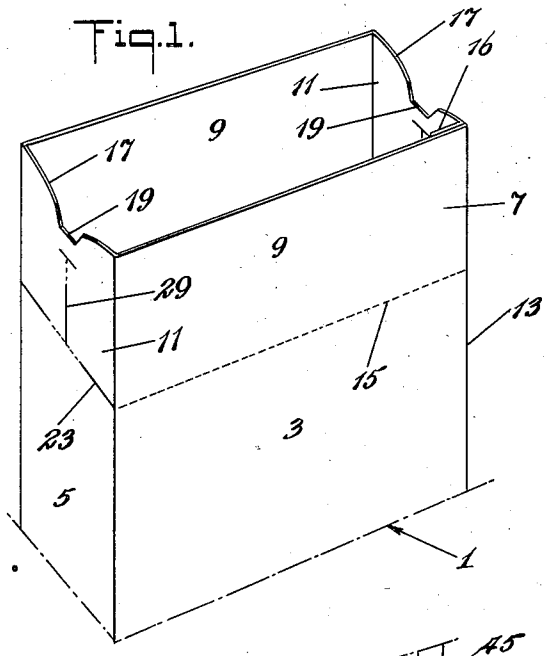
Aug. 30, 1949. D. E. MARSHALL ET AL 2,480,587

METHOD OF FILLING AND CLOSING CARTONS

Filed Aug. 31, 1944 2 Sheets-Sheet 1

Fig. 1.



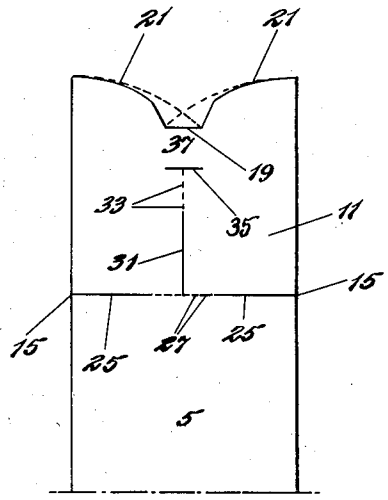


Fig. 2.

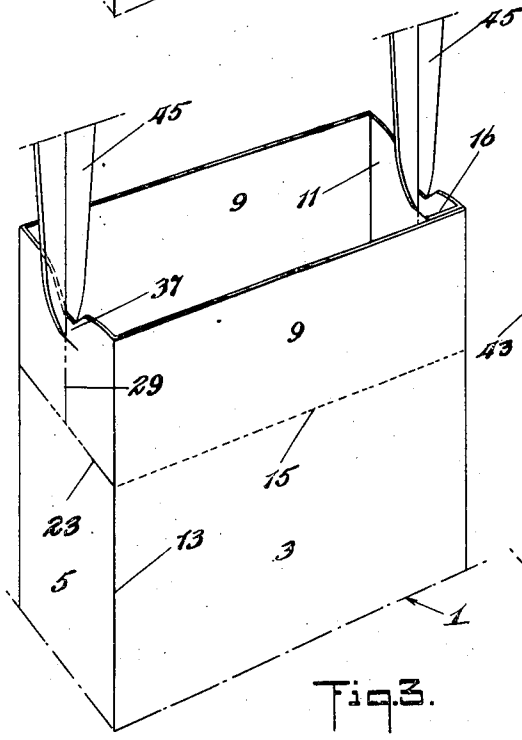


Fig. 3.

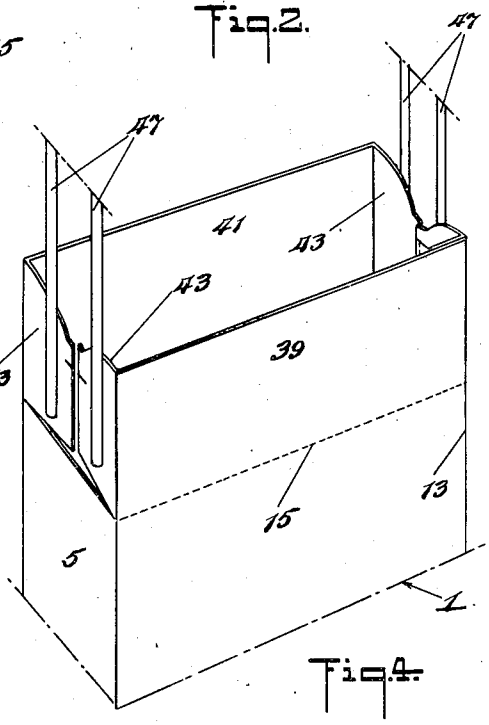


Fig. 4.

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METHOD OF FILLING AND CLOSING CARTONS

Filed Aug. 31, 1944 2 Sheets-Sheet 2

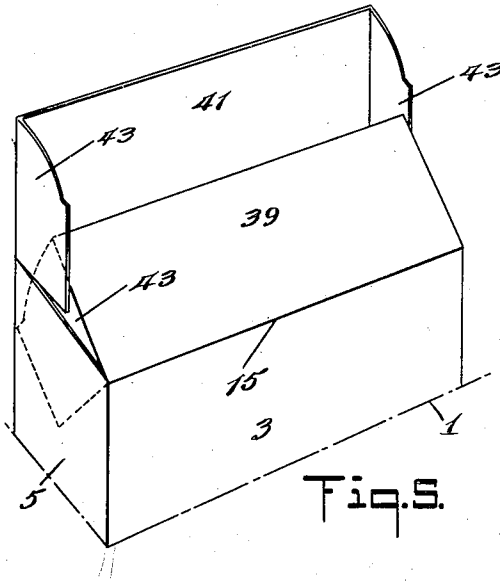


Fig. 5.

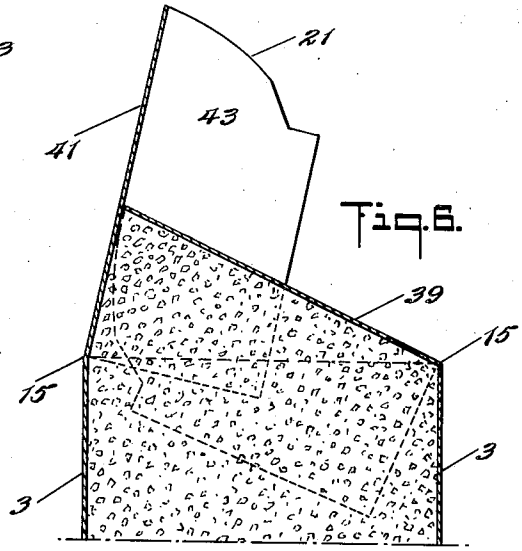


Fig. 6.

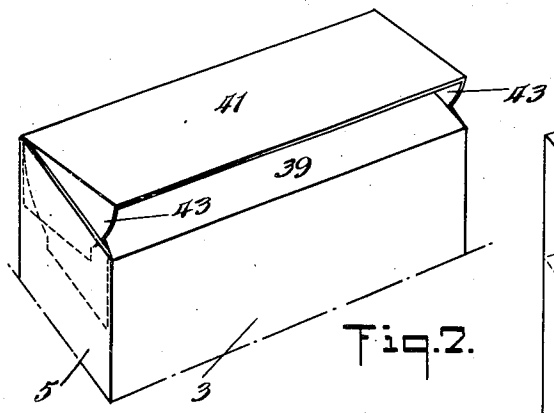


Fig. 2.

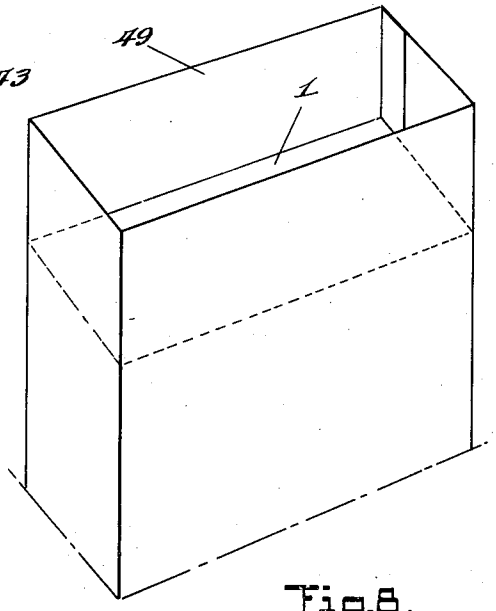


Fig. 8.

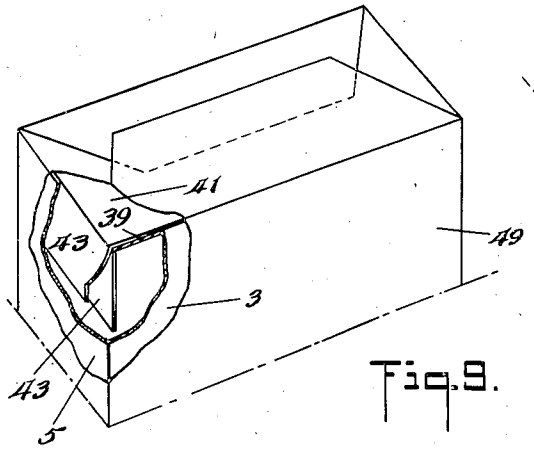


Fig. 9.

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2,480,587

METHOD OF FILLING AND CLOSING CARTONS

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Application August 31, 1944, Serial No. 552,022

18 Claims. (Cl. 93—6)

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The present invention relates to a method of filling and closing cartons and, more particularly, to a method of providing a full package of material in particulate form, such as flakes or granules of soap, etc.

In the conventional method of packaging particulate material, a carton has been used having four separate top closure flaps integral with, and extending from, the four side walls of the carton. It has been commercial practice to fill such cartons with particulate material somewhat below the score lines defining the boundaries between the side walls and the top closure flaps. This partial filling has been necessary because, in moving the carton from station to station in filling and closing machines, the contents tend to shift and pile up higher at some places than at others. If the carton were completely filled at the filling station, the separate flaps could not retain the material as it shifted and piled up; the result being that undesirable leakage between the flaps occurred and, when the package was finally closed, it was only partially filled anyway. Even if the carton arrived full at the closing station, the contents interfered with the application of glue to the flaps and with the sealing of the flaps to each other in the closing operation. Imperfectly sealed cartons allowed the contents to sift out during handling and transportation. Most particulate materials, moreover, pack together more closely after packaging so that, when the packages reached the ultimate consumer, the contents were a considerable distance below the top of the carton. A very bad impression was created on the consumer when such incompletely filled cartons were opened.

Numerous attempts have been made to overcome these disadvantages. One proposal has been to overfill the carton and to compress the contents into the carton by a plunger. This proposal has not been found satisfactory in practice in packaging many commodities, e. g., soap products. Another proposal has been to overfill the usual type of carton, next to fold down the narrow top closure flaps by a machine provided with special means for preventing the contents from oozing out between the ends of the flaps, then to bend the broad top closure flaps outwardly to receive an application of glue, and finally to fold one broad flap over the other to seal the top of the carton. This has not been entirely satisfactory in practice because the particulate material gets between the narrow flaps and the broad flaps and, to a certain extent, adheres to the

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broad flaps and becomes mingled with the adhesive, thereby preventing a satisfactory sealing.

A further proposal has been to provide the outer carton with a liner, either in the nature of an inner bag or as a partial liner adhesively secured to the inner wall of the carton and extending considerably above the ends of the top flaps. When using such a liner, the open end can be sealed and then pressed down into the carton, after which the top flaps can be satisfactorily adhesively secured together. This proposal, however, involves considerable additional expense and an increased number of operations in the making and closing of the carton.

It is an object of the present invention to overcome the disadvantages of the prior art methods of filling and closing cartons and to provide a method of compressing particulate material into a carton by top closure flaps which maintain the top substantially closed against loss of contents during this operation.

It is another object of the invention to provide a method of manufacturing a full package of particulate material, adapted to be performed in automatic filling and closing machines, in which loss of contents from overfilled cartons is prevented during the movement of the cartons from a filling station to one or more stations for the closing operation.

It is a further object of the invention to provide a method of manufacturing a full package of particulate material by reducing the dimensions of a carton after it is filled and packed and using flaps, developed in reducing the dimensions of the carton, to crowd the material into the carton without appreciable spillage or breakage of the material.

Other objects and advantages of the present invention will become apparent from the following detailed description of an illustrative embodiment of the invention, taken in conjunction with the drawings thereof, in which:

Figure 1 is a fragmentary perspective view of the upper end of a carton adapted to the present invention and which may be filled above the score line with material in particulate form;

Figure 2 is a fragmentary elevation of the narrow side of the carton;

Figure 3 illustrates the clipping position;

Figure 4 shows the completion of the severing operation and the positioning of the top closure flaps for the closing operation;

Figure 5 is a fragmentary perspective view showing the flaps in partially closed position;

Figure 6 is a fragmentary vertical sectional

view showing how the flaps are positioned for the closing operation;

Figure 7 is a fragmentary perspective view showing the flaps almost closed;

Figure 8 is a fragmentary perspective view showing the carton completely closed and provided with a tight wrapper secured to the vertical walls; and

Figure 9 is a fragmentary perspective view of the closed and completed carton with parts broken away to illustrate details of construction.

Referring now more particularly to Figure 1, reference character 1 represents a carton having two broad side walls 3 and two narrow side walls 5. The carton is also provided with a bottom (not shown) which will be closed when the contents are introduced into the carton. At the top 7 of the carton, extensions 9, integral with the broad side walls, and extensions 11, integral with the narrow side walls, are provided.

The carton is preferably made from a single blank of cardboard having score lines 13 defining the vertical corners and score lines 15 defining the boundary between the broad side walls 3 and the integral extensions 9. The bottom closure may have any suitable structure; for example, provision may be made for a pouring spout as described more particularly in the Marshall U. S. Patent No. 2,349,362. A flap 16 is provided at one end of the blank, for example on one of the narrow side walls 5, which is adhesively united with one of the broad walls 3 to provide the carton body.

It will be understood that reference in the description to top, bottom and side walls refers only to the position these parts occupy during the filling and closing operations, and that in actual use the various walls of the carton may occupy a position different from that referred to in the description. Thus, where the bottom wall is provided with means to form a pouring spout, it will ordinarily be the top in storage and ordinary use.

The extensions 9 correspond in length to the width of the broad side walls 3 and are wide enough to extend, in closed position, from one broad wall 3 to the other. The extensions 11 are recessed at the top edge, as indicated by reference number 17, so that, when divided medially, no part of the top edge will extend beyond the arcs of circles having their centers at the score lines 15, as illustrated in Figure 2 by the dotted arcuate lines. Preferably the recess comprises a short horizontal section 19 near the center, having a purpose to be described hereinafter, and two generally arcuate sections 21.

The boundary between the narrow side wall 5 and the extension 11 preferably is a line of perforations 23, for example, long slits 25 adjacent to each side and short slits 27 near the center of the line of perforations. The extension 11 is further provided with a medial line of perforations 29, preferably substantially normal to the line of perforations 23, and it may comprise a long slit 31 adjacent to the line of perforations 23 and short slits 33 terminating some distance away from the short horizontal section 19. A short transverse slit 35, substantially parallel to and about the same length as the horizontal section 19, preferably is provided adjacent to the end of the line of medial perforations 29. This leaves a land 37 between the horizontal section 19 and the transverse slit 35.

The structure of the carton as just described, while not limited thereto, finds particular advantage in automatic filling and closing machines. Such machines differ considerably in structural detail, but all commercial filling and closing machines have a number of stations to which the cartons are moved in sequence. Special reference will be had, in the following description of the method of the invention, to the way of performing the steps in a filling and closing machine having a filling station, a turret provided with pockets into which the filled cartons are introduced and which moves them in sequence to a clipping station, a closing station, and a transfer station where the cartons are removed from the turret and transferred into pockets in a second turret for application of a tight wrapper which is adhesively secured to, and completely encloses, the carton. In such a machine, a carton of the conventional type having four separate top closing flaps would not be satisfactory in commercial scale operations, because particles of the contents would be thrown out through the slits between the flaps as the carton is moved rapidly from station to station, even if the cartons are underfilled. With the carton described hereinabove, however, this disadvantage is satisfactorily overcome, even with overfilled cartons, by the extension 7 which is maintained integral until the closing operation, as will appear from the description which follows.

The filling machine preferably operates on a volumetric basis to introduce a quantity of particulate material, e. g., spray dried soap, into the carton sufficient to fill it above the level of the score lines 15. The carton may be jarred to pack the contents somewhat, but for manufacturing packages that will still be completely full when they reach the consumer, the material should still be above the score lines 15 after it has been packed so that when the top is closed, it compresses the material into the carton in the manner described hereinafter.

At the clipping station to which the filled cartons are moved, two pairs of automatic shears 45 slit the lands 37 approximately in line with the perforations 29. These shears may not clip the lands 37 in successive cartons in exactly the same relative position. It has been found advantageous, for this reason, to provide the horizontal section 19 and the horizontal slit 35. This structure gives considerable tolerance to variations in the position of the cut made by the shears 45, without leaving projections beyond the arc of the circle referred to above to interfere with the closing operation, and without leaving an unsevered portion too large to be easily broken by fingers 47.

After the land 37 has been slit, the carton is moved to the closing station where fingers 47 exert pressure against the extension 11 on each side of the line of perforations 29. This pressure readily tears the fibres between the short slits 27 and 33, thus severing the extension 11 into two wings 43 integral with the closure flaps 39 and 41.

The present invention contemplates methods of severing extensions 11 other than that specifically described herein; for example, the lines of perforation 23 and 29 may be composed entirely of short slits similar to those illustrated at 27 and 33 which can be severed or broken by the application of pressure on both sides of the medial line of perforations 29. It has been found in actual practice, however, that such a line of perforations may occasionally be broken in handling before the carton arrives at the

closing station, and when this occurs, some of the contents may be lost through the cracks between the wings 43. The invention also contemplates the use of a carton having no lines of perforation in the top extension, which remains whole until the carton arrives at the closing station, where it is severed along a medially vertical line and along a horizontal line corresponding to the lines 29 and 23, respectively. The carton illustrated in the drawings, however, has proved to be highly satisfactory in actual operation in which the entire filling, closing and wrapping operation is accomplished in a matter of very few seconds, and it is the best mode of carrying out the principle of the invention of which we are now aware. Regardless of the particular method of severing the top extension, the present invention, in effect, reduces the dimensions of a carton after it has been filled and packed by developing flaps out of the carton walls and then uses the flaps so developed to compress the particulate material into the reduced carton without appreciable spillage or breakage of the particles, in the manner now to be described.

One of the fingers 47 at each end presses the free edge of the wings 43, e. g., those on flap 41, inwardly only far enough to clear the upper edge of the side wall 5, whereas the other finger 47 presses the wings on the flap 39 inwardly far enough also to clear the edges of the wings on the flap 41, as may be seen in Figure 4. This permits the top flap 39 to be folded down with its wings inside the carton, as clearly seen in Figure 5. The flap 41 preferably is folded slightly, as may be seen most clearly in Figure 6, so as to contact with the edge of the flap 39. Top flaps of the structure described, when folded in this way, substantially close the top of the carton during the major portion of the closing operation. As the movement of flap 39 continues to horizontal position, the material above the level of the score lines 15 is crowded or compressed into the carton without appreciable spillage or breakage of the material and without the use of any means, such as plungers, belts, etc., which the prior art had found indispensable for temporarily holding the contents of the carton compressed while the flaps were folded into closed position. As soon as flap 39 has been moved to substantially horizontal position, the flap 41 is closed down over it with its wing 43 positioned between flap 39 and the narrow wall 5 of the carton.

The friction between the wings 43 and the adjacent walls of the carton usually suffices to keeps the flaps tightly closed as the carton is moved from the closing station to the transfer station and into the second turret, where a wrapper designated by reference character 49 is applied. In some cases, however, where the material is compressed to a considerable degree, it may be desirable to supplement the frictional force tending to keep the top closed, e. g., by providing a bar or the like in the machine to bear against the top of the carton as it moves from the closing station to the wrapping turret.

Any suitable type of wrapper may be used, but it is preferred to use a tight wrapper which is adhesively secured to the entire outside surface of the carton, as disclosed in the Yates U. S. Patent No. 1,958,256. This wrapper, with the adhesive applied to the inner surface thereof, can be readily applied to three vertical faces of the carton during its transfer from the first into the second turret. Thereafter the free ends are

folded down and pressed against the fourth vertical face to provide a package as shown in Figure 8. The package is then moved to other stations where the top and bottom ends of the wrapper are folded down and adhesively secured to the package as shown in Figure 9.

The completed package manufactured in accordance with the present invention comprises a carton completely filled with material in particulate form slightly compressed into the carton, which is held in closed position by the tight wrapper 49. We prefer to use a wrapper around the carton, but this is not essential. The flaps 39 and 41 may be held in closed position during shipment and use by any suitable means, e. g., staples, adhesives, adhesive tapes, etc. We also prefer to overfill the carton and to compress the contents somewhat during the closing operation in order to produce a package that is full when the user opens it, but the method of the invention has important advantages if the carton is filled only to the score lines, or even underfilled. In closing the top flaps we prefer to tuck the wings inside, particularly when the carton is overfilled, but in some cases the wings on the uppermost top flap may be left outside and be adhesively secured to the side walls, either with or without the use of adhesive between the top flaps. An adhesive bond between at least one wing and the side wall at each end of the top makes the end of the completed package more firm and resistant to deformation or crushing during handling and transportation.

Having thus described our invention, what we claim is:

1. The method of manufacturing a full package of particulate material which comprises flowing the material into a carton having a closed bottom, side walls and side wall extensions on two opposite side walls, until the level of the material is above the top of the side walls; each side wall extension having wings directly connected thereto at either end which serve with said extensions to retain the material above the top of the side wall; and pressing the particulate material into the carton by forcibly folding said two opposite side wall extensions, each of which corresponds in area to the open end of the carton, down upon the particulate material while preventing escape thereof from the ends of the extensions by folding said wings inside and adjacent to the side walls above which they are positioned in the filling operation.

2. The method of manufacturing a full package of particulate material which comprises flowing the material into a carton having a closed bottom, side walls and side wall extensions on two opposite side walls, until the level of the material is above the top of the side walls; each side wall extension having wings directly connected thereto at either end which serve with said extensions to retain the material above the top of the side wall; and pressing the particulate material into the carton by forcibly folding said two opposite side wall extensions, each of which corresponds in area to the open end of the carton, down upon the particulate material while preventing escape thereof from the ends of the extensions by folding said wings inside and adjacent to the side walls above which they are positioned in the filling operation; and enclosing said carton in a tight wrapper.

3. The method of packaging particulate material which comprises depositing in a package having a closed bottom, side walls and an integral extension above the side walls an amount of said

particulate material filling the package above the level of the side walls, severing opposed side wall extensions from the side walls and along a medial line to form two closure flaps having an integral wing at each end, and pressing the particulate material into the package by closing said flaps with the wings inside the package.

4. The method of packaging particulate material which comprises depositing in a package having a closed bottom, side walls and an integral extension above the side walls an amount of said particulate material filling the package above the level of the side walls, severing opposed side wall extensions from the side walls and along a medial line to form two closure flaps having an integral wing at each end, pressing the particulate material into the package by closing said flaps with the wings inside the package, and enclosing the carton in a tight wrapper.

5. The method of manufacturing a full package of particulate material which comprises flowing the material at one station into a carton having a closed rectangular bottom, two broad and two narrow side walls, and corresponding side wall extensions, until the level of the material is above the tops of the side walls; moving the filled carton to another station during which the said side wall extensions prevent loss of contents; severing the narrow side wall extensions medially and from the narrow side walls to form wings integral with the broad side wall extensions; and, without moving the carton after said severing, folding the side wall extensions down over the open end of the carton with the wings inside whereby the particulate material is pressed into the carton.

6. The method of providing a full package of particulate material which comprises flowing the material at one station into a carton having a closed rectangular bottom, two broad and two narrow side walls and corresponding side wall extensions, until the level of the material is above the tops of the side walls; moving the filled carton to another station during which the said side wall extensions prevent loss of contents; severing the narrow side wall extensions medially and from the narrow side walls to form wings integral with the broad side wall extensions; without moving the carton after said severing, folding the side wall extensions down over the open end of the carton with the wings inside whereby the particulate material is pressed into the carton; and enclosing said carton in a tight wrapper.

7. A method of packaging particulate material which comprises depositing particulate material in a carton having integral walls extending above the level of fold lines defining the height of the finished carton, severing the extending walls on opposed sides of the carton to form two closure flaps having a wing at each end thereof, pressing the wings on one flap inwardly sufficiently to clear the carton wall, pressing the wings on the other flap inwardly sufficiently to clear the wings on the first mentioned flap, and forcing said other flap downwardly beneath said first mentioned flap and said first mentioned flap downwardly over said other flap.

8. A method of packaging particulate material which comprises depositing particulate material in a carton having integral walls extending above the level of fold lines defining the height of the finished carton, severing extending walls on opposed sides of the carton to form two closure flaps having a wing at each end thereof, pressing the wings on one flap inwardly sufficiently to clear the carton wall, pressing the wings on the other flap inwardly sufficiently to clear the wings on the first mentioned flap, and forcing said other flap downwardly beneath said first mentioned flap and said first mentioned flap downwardly over said other flap, and enclosing said carton in a tight wrapper.

9. A method of packaging particulate material which comprises using a carton having two broad walls forming the front and back and two narrow walls forming the sides of the carton, integral walls extending from said broad and narrow walls, score lines defining the boundary between the broad walls and the walls extending therefrom, a line of perforations defining the boundary between said narrow walls and the walls extending therefrom, and a line of perforations in each of said side wall extensions potentially dividing the same into wings integral with front and back top closure flaps, said dividing line of perforations extending from a point adjacent to such boundary line perforations to a point short of the edge of the side wall, thereby leaving an unperforated land between the end of said dividing line of perforations and the edge of the side wall extension; filling said carton with pulverulent material above the level of said score lines; severing said lands; applying sufficient pressure inwardly on said side wall extensions on both sides of the dividing line of perforations to break the boundary line of perforations and the dividing line of perforations and to press the wings on one flap inwardly sufficiently to clear the carton wall and to press the wings on the other flap inwardly sufficiently to clear the wings on the first mentioned flap; forcing said other flap downwardly beneath said first mentioned flap; and folding said first mentioned flap downwardly over said other flap.

10. A method of packaging particulate material which comprises using a carton having two broad walls forming the front and back and two narrow walls forming the sides of the carton, integral walls extending from said broad and narrow walls, score lines defining the boundary between the broad walls and the walls extending therefrom, a line of perforations defining the boundary between said narrow walls and the walls extending therefrom, and a line of perforations in each of said side wall extensions potentially dividing the same into wings integral with front and back top closure flaps, said dividing line of perforations extending from a point adjacent to such boundary line perforations to a point short of the edge of the side wall, thereby leaving an unperforated land between the end of said dividing line of perforations and the edge of the side wall extension; filling said carton with pulverulent material above the level of said score lines; severing said lands; applying sufficient pressure inwardly on said side wall extensions on both sides of the dividing line of perforations to break the boundary line of perforations and the dividing line of perforations and to press the wings on one flap inwardly sufficiently to clear the carton wall and to press the wings on the other flap inwardly sufficiently to clear the wings on the first mentioned flap; forcing said other flap downwardly beneath said first mentioned flap; folding said first mentioned flap downwardly over said other flap; and enclosing said carton in a tight wrapper.

11. The method of packaging particulate material which comprises flowing particulate mate-

rial at a filling station into a carton having a closed rectangular bottom, two broad and two narrow side walls, and corresponding side wall extensions; moving the carton to another station during which the side wall extensions prevent loss of contents; severing the narrow side wall extensions medially and from the narrow side walls to form wings integral with the broad side wall extensions; and, without moving the carton after said severing, folding the latter down over the open end of the carton with the wings inside.

12. The method of packaging particulate material which comprises flowing particulate material into a carton having a closed rectangular bottom, two broad and two narrow side walls, and corresponding side wall extensions; severing the narrow side wall extensions medially and from the narrow side walls to form wings integral with the broad side wall extensions; and folding the latter down over the open end of the carton with with wings inside.

13. The method of packaging particulate material which comprises flowing particulate material into a carton having a closed rectangular bottom, side walls and side wall extensions, severing two opposite side wall extensions medially and from the adjoining side walls to form two wings integral with each of the other side wall extensions, and folding the latter down over the open end of the carton with the wings along the side walls.

14. A method of manufacturing a carton completely filled with particulate material which comprises reducing the dimensions of the carton after it is filled and packed by developing closing flaps out of the carton wall, said developed flaps on two opposite sides of the carton being of such length and configuration that in partially folded position they overlap and close the end of the carton, partially folding said opposed developed flaps over the open end of the carton to close it, and completing the folding motion to compress the material into the reduced portion of the carton while maintaining the top closed by said flaps.

15. A method of manufacturing a carton completely filled with particulate material which comprises reducing the dimensions of the carton after it is filled and packed by developing closing flaps out of the carton wall, said developed flaps on two opposite sides of the carton being of such length and configuration that in partially folded position they overlap and close the end of the carton, partially folding said opposed developed flaps over the open end of the carton to close it, completing the folding motion to compress the material into the reduced portion of the carton while maintaining the top closed by said flaps, and enclosing said carton in a wrapper.

16. A method of manufacturing a carton completely filled with particulate material which comprises reducing the dimensions of the carton after it is filled and packed by developing closing flaps out of the carton wall, said developed flaps on two opposite sides of the carton being of such length and configuration that in partially folded position they overlap and close the end of the carton, partially folding said opposed developed flaps over the open end of the carton to close it, completing the folding motion to compress the material into the reduced portion of the carton while maintaining the top closed by said flaps, and securing a tight wrapper on the outside of said carton.

17. The method of manufacturing a carton completely filled with particulate material which comprises flowing the material into a carton having a closed bottom, side walls, and side wall extensions, until the level of the material is above the side walls; said side wall extensions on opposite sides of the carton being of such length and configuration that in partially folded position they overlap and close the end of the carton, partially folding said opposed side wall extensions over the open end of the carton to close it; and completing the folding motion to compress the material into the carton while maintaining the top closed by said extensions.

18. The method of manufacturing a carton completely filled with particulate material which comprises flowing the material into a carton having a closed bottom, side walls, and side wall extensions, until the level of the material is above the side walls; said side wall extensions on opposite sides of the carton being of such length and configuration that in partially folded position they overlap and close the end of the carton, partially folding said opposed side wall extensions over the open end of the carton to close it; completing the folding motion to compress the material into the carton while maintaining the top closed by said extensions; and enclosing the carton in a tight wrapper.

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