

March 8, 1949.

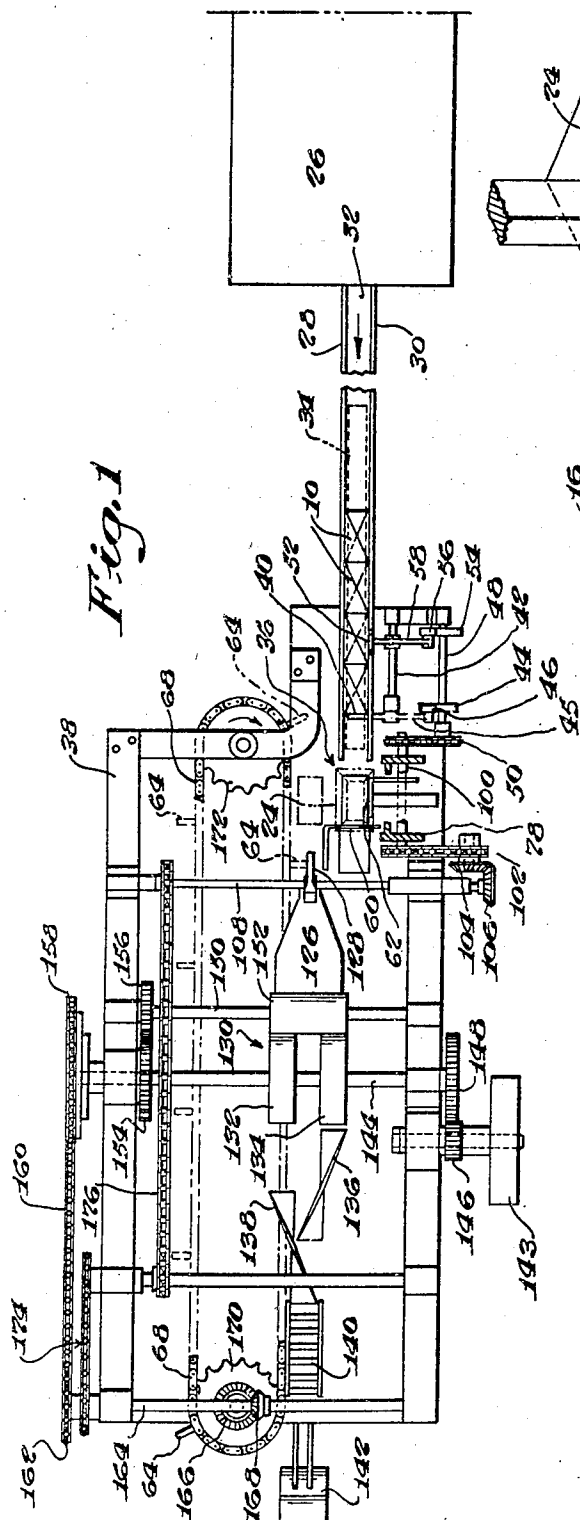
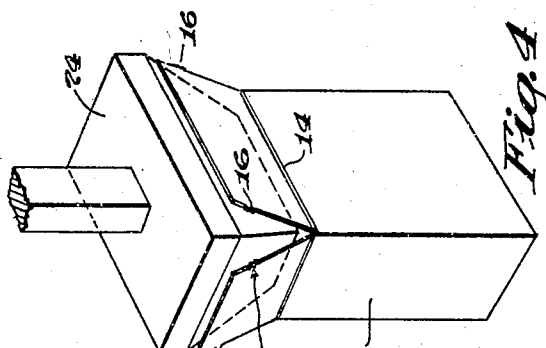
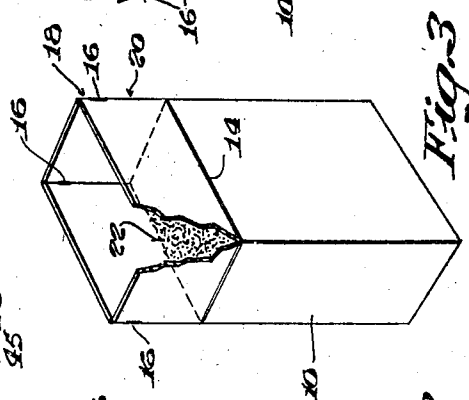
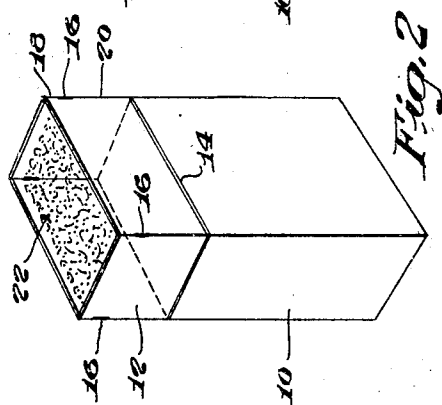
N. S. ROSS

2,464,099

PACKAGING MACHINE

Original Filed Feb. 18, 1944

4 Sheets-Sheet 1



INVENTOR

Norman Stanley Ross

BY J. Stanley Churchill
ATTORNEY

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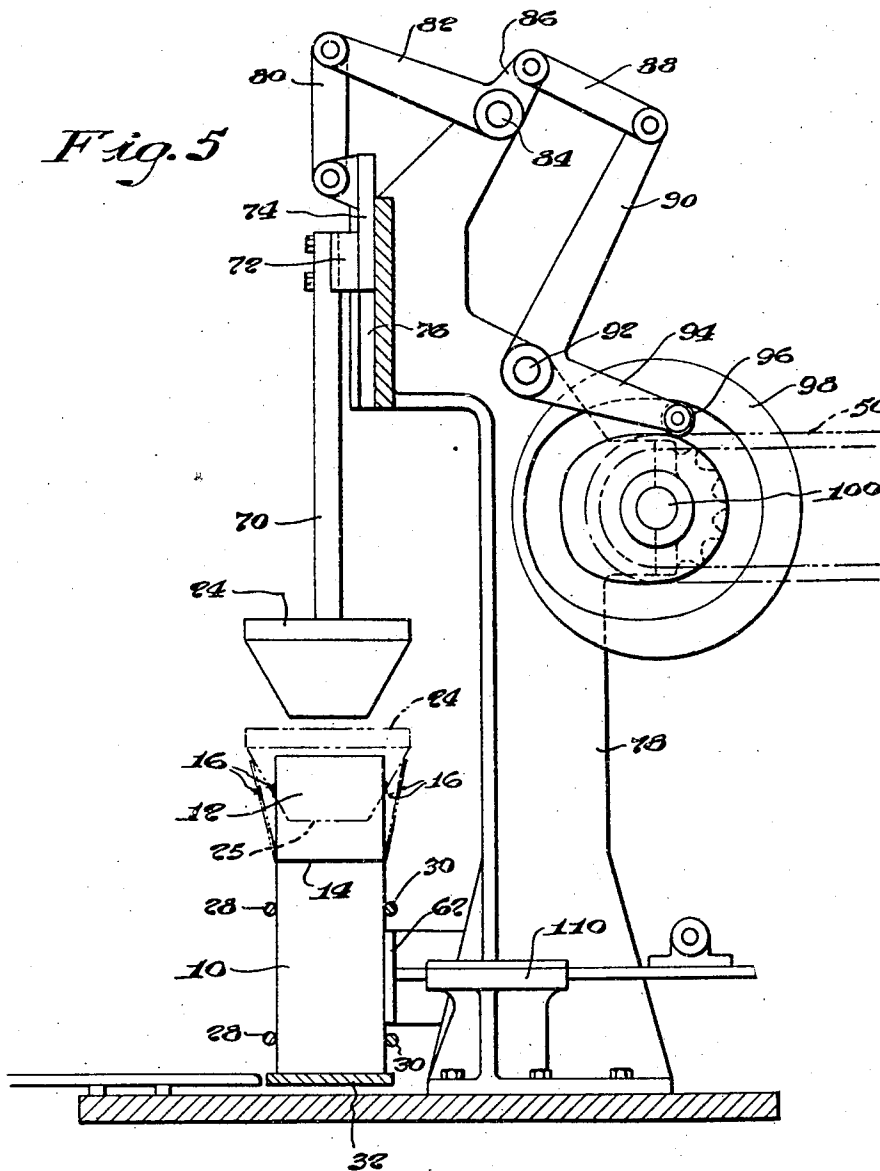
N. S. ROSS

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INVENTOR

Norman Stanley Ross

BY J. Stanley Churchill
ATTORNEY

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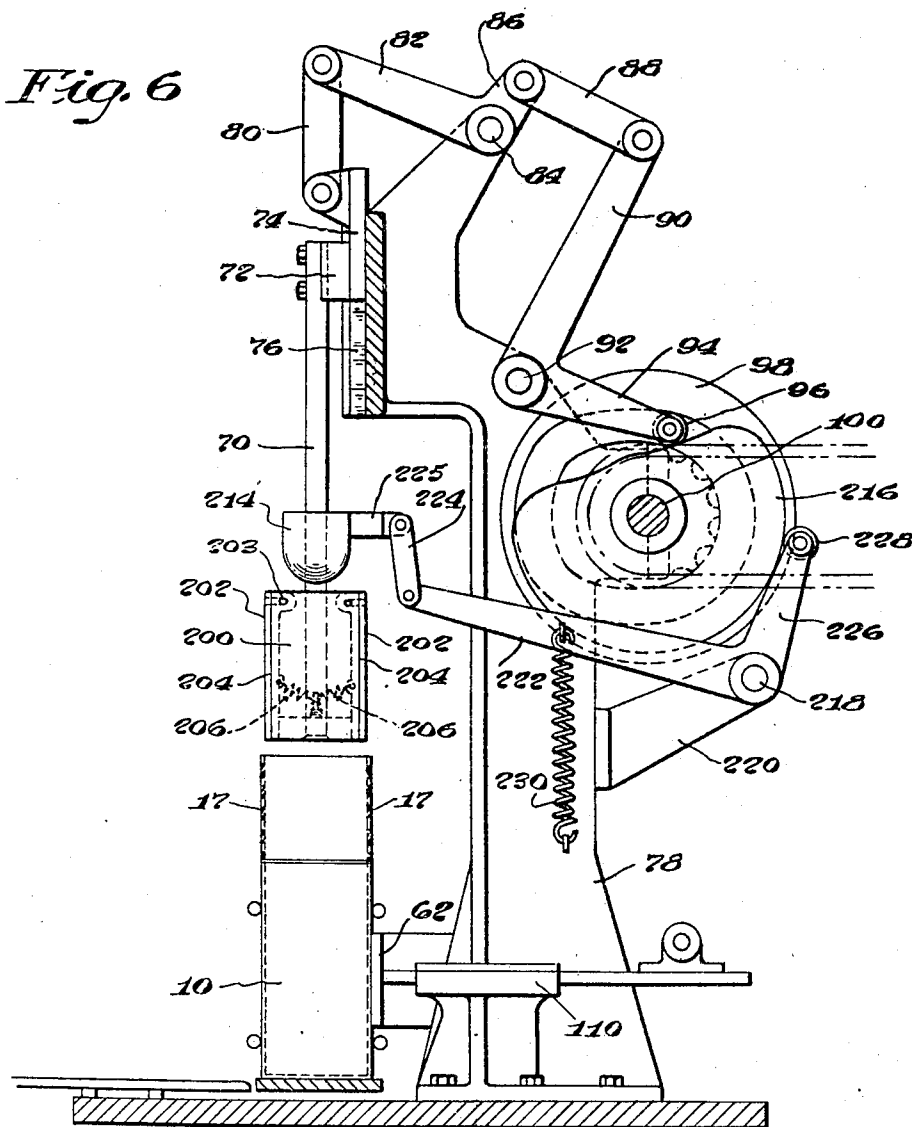
N. S. ROSS

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INVENTOR

Norman Stanley Ross

BY J. Stanley Churchill
ATTORNEY

March 8, 1949.

N. S. ROSS

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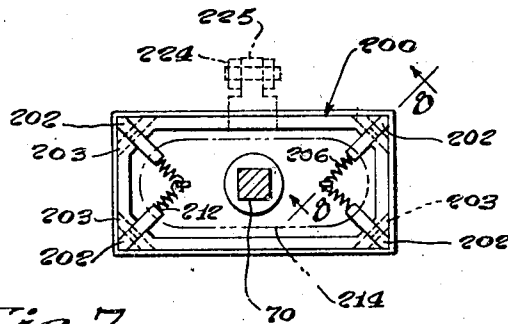


Fig. 7

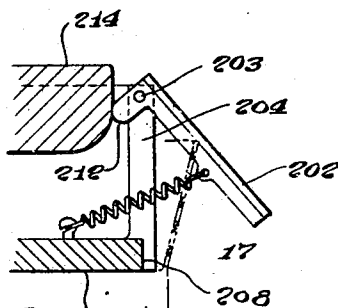


Fig. 8

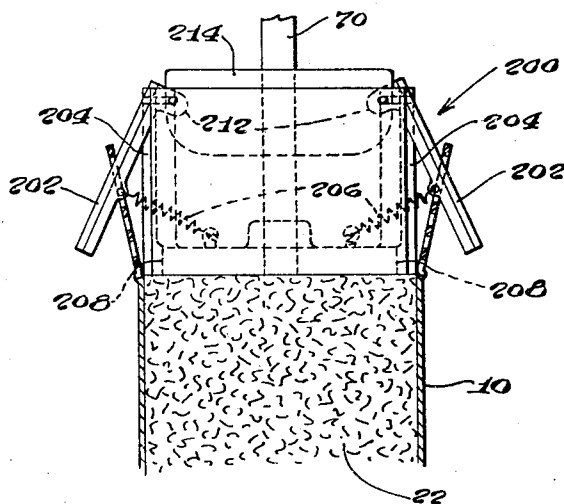


Fig. 9

INVENTOR
Norman Stanley Ross
BY J. Stanley Churchill
ATTORNEY

UNITED STATES PATENT OFFICE

2,464,099

PACKAGING MACHINE

Norman Stanley Ross, Glen Ellyn, Ill., assignor
to Pneumatic Scale Corporation, Limited,
Quincy, Mass., a corporation of Massachusetts

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522,913. Divided and this application October
10, 1945, Serial No. 621,444

2 Claims. (Cl. 93—2)

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This invention relates to a packaging machine, and to a method of packaging.

In general the object of the invention is to provide a novel method of and novel apparatus for packaging compactible materials in a carton, and compacting the same in the carton and for avoiding the production of incompletely filled cartons as a result of the compacting operation.

With this general object in view and such others as may hereinafter appear, the invention consists in the packaging machine and in the various structures, arrangements and combinations of parts hereinafter described and particularly defined in the claims at the end of this specification.

In the drawings illustrating the preferred embodiments of the invention, Fig. 1 is a plan view of a packaging machine embodying the present invention; Figs. 2, 3 and 4 are perspective views illustrating various steps in the production of a package in the present machine; Fig. 5 is a side elevation of mechanism for separating the connected corner portions of the mouth of a filled carton to form the closing flaps, as hereinafter described; Fig. 6 is a view similar to Fig. 5 illustrating a modified form of mechanism for separating the connecting corner portions of the mouth of a filled carton to form the closing flaps; Fig. 7 is a plan view of a portion of the mechanism shown in Fig. 6; Fig. 8 is a cross sectional detail view taken on the line 8—8 of Fig. 7; and Fig. 9 is a side elevation of the mechanism shown in Fig. 7.

In general, the present invention contemplates a novel method of and novel apparatus for producing a filled package, which are particularly adapted to facilitate the packaging of commodities of a character such that the contents of a package would occupy, in the loose and expanded state before packaging, a substantially greater volume than the capacity of the container in which the commodity is to be packaged and consequently wherein compacting of the commodity is required during the packaging thereof in order to deposit a predetermined weight of the material into the package. Such commodities, which become aerated in their loose or flowable condition include finely divided and powdered materials requiring settling to make them more compact, and materials such as soap flakes, dehydrated foods, or the like, requiring compression to confine a predetermined weight thereof in a selected container.

In accordance with the present invention, the capacity of the container for packaging products

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of the character described is selected so as to substantially conform to the volume of the desired predetermined weight of the material when in its compacted condition. The container employed may comprise the usual carton except that the extensions of the side walls of the carton above the score line, which comprise the top flap forming portions, are left connected or partially compacted until after the filling and compacting operations have been performed. The carton with its extended top closing portions thus attached or connected is filled with a predetermined weight of the commodity in its loose or expanded state, such commodity occupying a space extending a substantial distance above the score line and being retained between the walls of the connected closing flap forming portions. Thereafter, the material in the carton is compacted by vibrating or in other suitable manner to settle the material down to a level substantially flush with the score line, or, the material may be compacted by a plunger arranged to compress the material down to such level. The mouth portion of the carton is then expanded to force the connected or attached portions of the closing flap forming portions apart down to the score line, thus forming the closing flaps for the carton. The attached or connected portions of the closing flaps may and preferably will comprise weakened lines such as heavily creased or perforated lines extending from the top of the carton down to the score line, these lines being disposed at the corner of the carton in the usual four closing flap carton, although the weakened lines may extend along the side or end walls for some types of cartons to form two opposed tuck flap portions. After separating the attached portions, the top closing flaps may then be provided with adhesive and closed and sealed in any usual or preferred manner. Thus, in accordance with the present invention, the required predetermined weight of the commodity in its expanded condition may be introduced into a carton, and after being compacted therein, will substantially fill the container to the desired level.

Referring now to the accompanying drawings, and particularly to Figs. 1 to 5 inclusive, 10 represents a rectangular carton of a capacity such as to conform to a predetermined weight of a commodity in its compacted condition. As indicated in Fig. 2, the carton is formed with extensions 12 of the side walls beyond the score line 14 thereof and which comprise top closing flap forming portions joined at the corners along weakened lines shown in Fig. 2 as comprising

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relatively small connecting portions 16 integral with the flaps and disposed a relatively short distance from the top of the carton. The remaining portions 18, 20 of the flap forming portions above and below the integral connecting portions 16 may comprise cut or weakened lines formed in the carton during the manufacture of the carton blank. The carton thus formed is filled with a sufficient quantity of the loosely deposited material 22 to make up the required weight of the package, such a quantity filling the carton to a height well above the score line 14 and being supported within the extended connected flap forming portions 12. The material is then compacted in the carton until it reaches a level substantially with the score line 14, as indicated in Fig. 3. In the embodiment of the invention illustrated in Figs. 4 and 5, a tapered block 24 may then be lowered into the mouth of the carton to break apart the integral connecting portions 16 at the corners to form the usual four top closing flaps. The flaps may then be provided with adhesive and folded over to seal the top of the carton to complete the production of the package.

The above described operations are preferably performed upon automatic machinery, and as illustrated in Fig. 1, the apparatus preferably employed in practicing the present invention may include any usual or preferred filling or weighing mechanism, as indicated diagrammatically at 26 and by which the carton may be provided with the required weight of material in its loose or expanded form as above described. The weighing machine may be arranged to discharge the filled containers between guide rails 28, 30 and upon a moving belt 32 which may pass over a vibratory board or other support 34 disposed beneath the belt so that in operation as the cartons are advanced upon the belt, the material is settled in the cartons.

As illustrated in Fig. 1, the belt 32 is arranged to convey the filled cartons to the mechanism for separating the connected flaps, indicated generally at 36, and which may be supported upon and driven through connections from a top sealing machine, indicated generally at 38. Such flap separating mechanism 36 may form a unitary part of such top sealing machine for breaking apart the connected corner portions of the flaps prior to the passage of the carton through the usual top closing and sealing mechanisms.

Provision is made in the preferred apparatus for permitting the filled cartons being discharged upon the belt to come to rest against a movable stop member 40 in order to form a line thereof, and also, for moving the stop member 40 out of the path of the cartons in order to release successive cartons in timed relation to the operation of the flap separating mechanism 36. As herein shown, the stop member 40 is pivotally mounted upon a shaft 42 journaled in the machine frame, and is arranged to be rocked into and out of the path of the line of filled cartons by a cam 44 in cooperation with a cam roll 46 carried by a cam lever 45 forming part of the pivotally mounted stop member 40. The cam 44 is mounted fast upon a cam shaft 48 journaled in the machine frame and is arranged to be rotated in timed relation to the flap separating mechanism 36 through a chain and sprocket connection 50.

A second stop member 52, also pivotally mounted on the shaft 42 is arranged to engage the second carton in the line in order to prevent the line from being advanced upon the continu-

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ously moving belt 32 until the foremost carton has been released and the stop member 40 has been again returned into the path of the line of cartons. The second stop member 52 is arranged to be rocked into and out of engagement with the second carton in the line in timed relation to the operation of the first stop member by a cam 54 cooperating with a cam roller 56 carried by a lever 58 extending from the second stop member 52.

Upon being released, the foremost filled carton in the line is advanced against a fixed stop member 60 to present the carton in operative relation to the flap separating mechanism 36, and in front of a pusher 62 adapted to be operated, after the flap forming portions have been broken apart, to transfer the carton into the path of the carrier arms 64 carried by an endless conveying chain 68 forming a part of the top sealing machine 38.

Referring now to Fig. 5, one form of mechanism for separating the connected top closing flaps comprises the vertically reciprocable tapered block 24 arranged to be lowered into the mouth of the carton to force the flap forming portions 12 outwardly and to thus effect breaking of the connecting portions 16 at each corner of the carton as indicated in dotted lines in Fig. 5. As herein shown, the tapered block 24 is carried on the end of a rod 70 secured to a block 72 mounted upon a slide member 74 vertically movable in a guideway 76 formed in a supporting bracket 78. Provision is made for reciprocating the slide member 74 to effect raising and lowering of the tapered block 24 into and out of the mouth of the carton, and as herein shown, the slide member 74 is connected by a link 80 to one arm 82 of a bell crank pivotally mounted at 84 in the supporting bracket. The second arm 86 of the bell crank is connected by a link 88 to one arm 90 of a cam lever pivotally mounted at 92, the second arm 94 of the bell crank being provided with a roller 96 cooperating with a closed cam 98 fast upon a cam shaft 100 journaled in the supporting bracket 78. As illustrated in Fig. 1, the cam shaft 100 is arranged to be driven from and in timed relation to the top sealing machine 38 through connections including a chain and sprocket drive 102, and bevel gears 104, 106, the latter being fast on a cross shaft 108 of the top sealing machine, to be hereinafter described. It will be observed that the chain and sprocket connection 50 previously referred to for driving the cam shaft 48 is operatively connected to the cam shaft 100 of the operating mechanism 36.

From the description thus far it will be observed that in the operation of the machine successive filled cartons with their contents settled or compacted down to substantially the level of the score line 14 are advanced to a position beneath the vertically reciprocable tapered block 24. Upon lowering of the block to separate the connected corner portions of the flaps, the block is elevated and the carton with its flaps free is then transferred into the path of the carrier arms 64 of the top sealing machine to be advanced through the mechanism for closing and sealing the top flaps of the carton, whereupon a succeeding carton is released from the line to be received beneath the block 24. Any usual or preferred transferring device may be employed such as the pusher 62 mounted in a slide bracket 110 secured to the machine frame and which may be arranged to be reciprocated in timed relation to the movement of

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the carrier arms 64 through any suitable connections, not shown, from the top sealing machine.

The top sealing machine herein illustrated, and indicated generally at 38, may in general comprise the machine forming the subject matter of the United States patent to Scales, No. 930,090, dated August 3, 1909, to which reference may be had for a complete description thereof. The carton closing and sealing mechanism, as diagrammatically illustrated in Fig. 1, includes a stationary curved and flared rail 126 positioned in the path of movement of the carton which operates to fold down the forward end flaps and to spread the side flaps of the carton. A rotary flap tucker 128, mounted to rotate with the cross shaft 108, is arranged to fold down the rear end flap as the carton passes thereby and to present such flap in a position to be received under the stationary rail 126. The carton, with its side flaps horizontally extended and with its end flaps folded down is then advanced to the adhesive applying device, indicated generally at 130, where adhesive is applied to the extended side flaps by a pair of glue rolls 132, 134. Thereafter, the carton passes between stationary curved rails 136, 138 which operate to fold the side flaps down one upon the other. The carton then passes under pressure rollers 140 to press the flaps into sealing engagement, and is thereafter discharged from the machine into the usual dryer 142 to firmly set the adhesively secured flaps.

The driving apparatus for the top sealing machine may, in general, comprise the apparatus shown in the Scales patent above referred to, and as herein illustrated, see Fig. 1, may include a pulley 143 driven in any usual or preferred manner which is connected to a glue roll shaft 144 by cooperating gears 146, 148. A shaft 150 upon which a spreader roll 152 is mounted to cooperate with the glue rolls 132, 134, is driven from the shaft 144 through the gears 154, 156. The other end of the glue roll shaft is provided with a sprocket 158 which is connected by a chain 160 to a sprocket 162, the latter being fast upon a cross-shaft 164 arranged to drive the carrier chain 68 through cooperating bevel gears 166, 168. As herein shown, the carrier chain 68 is arranged to run over horizontally mounted sprockets 170, 172. The cross shaft 108 from which the flap separating apparatus 36 and the carton releasing mechanism is driven, is arranged to be rotated from the cross shaft 164 through sprocket and chain connections indicated at 174 and 176 in Fig. 1.

In the above described embodiment of the invention, the apparatus as illustrated in Fig. 5 is arranged to compact the contents of the container by vibrating the carton to settle the material therein. Referring now to Figs. 6 to 9 inclusive, a modified form of apparatus for use in the present packaging machine includes mechanism for plunging the material extending above the score line in a container having connected top closing flaps. The plunger is arranged to compress the contents of the carton down to substantially the level of the score line, whereupon the connected portions of the top flaps, which may comprise weakened or perforated lines 17 at the corners thereof, are broken apart by fingers carried by the plunger. As illustrated in Fig. 6, the plunging member may comprise a rectangular block 200 attached to the lower end of the rod 70, and the block may be vertically reciprocated through the same connections pre-

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viously described in the embodiment illustrated in Fig. 5 including the linkage therein shown, and the closed cam 98. In the embodiment illustrated in Fig. 6, the cam 98 is operative to effect lowering and raising of the block 200 to compress the material in the carton.

The modified apparatus for separating the connected flaps of the cartons includes a plurality, herein shown as four fingers 202, one of which is pivotally mounted in the upper end of each corner of the plunger block 200 upon pins 203 extending diagonally through each corner. The fingers 202 extend longitudinally along the corners of the block and are disposed in slotted portions 204 formed therein, and the exposed edges of the fingers are arranged to form a continuation of the sides of the rectangular block at the corner edges thereof, as best shown in Fig. 7. The fingers are held in parallel relation to the longitudinal corners of the block during the plunging operation by springs 206, the lower ends of the fingers engaging the inner edge 208 of the slot formed in the base portion 210 of the block.

Each pivotally mounted finger 202 is provided with an inwardly extended arm 212 having a rounded end portion arranged to cooperate with a vertically reciprocable cam piece 214 to swing the fingers outwardly to perform the flap separating operation. The cam piece 214 is slidably mounted upon the plunger rod 70 and is arranged to be reciprocated upon the rod through connections from a cam 216 fast on the cam shaft 100, such connections including a two-armed lever rockingly mounted at 218 in a bracket 220 extending from the supporting bracket 78. One arm 222 of the two-armed lever is connected by a link 224 to a lug 225 extending from the cam piece 214, and the other arm 226 is provided with a roller 228 for cooperation with the cam 216. A spring 230 connected to the arm 222 is arranged to hold the roller 228 against its cam.

In the operation of the apparatus illustrated in Figs. 6 to 9, the filled carton with its contents extending a substantial distance above the score line 14 and retained between the connected or partially connected top closing flaps is moved to a position beneath the rectangular block 200. Upon lowering of the block to compress the material down to substantially a level with the score line, the cam piece 214 is lowered into cooperative engagement with the fingers 202 to effect outward rocking movement thereof to break apart the connected portions of the mouth of the carton thus separating the closing flap. As clearly shown in Figs. 8 and 9, the fingers 202 effect separation of the connected corner portions from the score line upwardly, the plunger having come to rest at substantially the level of the score line. Thereafter, the cam piece 214 and the plunger block 200 are elevated and the carton with its flaps free is transferred to the mechanism for closing and sealing the top flaps, as previously described.

While the carton herein indicated has been preferably illustrated as being partially cut or perforated along the lines connecting the closing flaps thereof, it will be understood that the contemplated uses of the present flap separating apparatus includes a use for separating the attached portions of the top closing flaps which are connected by any form of weakened line such as a heavily scored or creased line which may be readily separated by expansion of the mouth portion.

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From the above description it will be observed that the embodiment of the invention illustrated in Figs. 1 to 5 may be used with particular advantage in the packaging of commodities which require settling alone to compact the material therein, such as flour, starch and other finely divided materials which do not readily respond to compression, and the embodiment illustrated in Figs. 6 to 9 may be employed with particular advantage in the packaging of materials which may be readily compacted by compression such as relatively light fluffy materials including soap flakes and some of the dehydrated foods. However, it will be understood that in some instances it may be of advantage to partially settle the material in the carton and then compress the same to a level with the score line, and as herein illustrated, these operations may be performed by first passing the filled container over the vibratory board 34 and then compacting the same with the plunger 200 as above described. It will also be observed that a plunging action may be performed with the tapered block 24 by extending the bottom 25 thereof into engagement with the material to provide a compressing action as the block is lowered to effect separation of the flaps as above described.

This application is a division of my application Serial No. 522,913 filed February 18, 1944, now Patent Number 2,440,193 dated April 20, 1948.

While the preferred embodiment of the invention has been herein illustrated and described, it will be understood that the invention may be embodied in other forms within the scope of the following claims.

Having thus described the invention, what is claimed is:

1. In a packaging machine having carton supporting means adapted for supporting in a pre-

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determined position a rectangular carton having a body portion, top flap forming portions, and a score line defining said portions, and having the flap forming portions connected by weakened portions at the corners extending from the top down to said score line, mechanism for expanding and separating said flap forming portions from one another along said weakened portions to form the top closing flaps, said mechanism comprising a vertically reciprocable member provided with a plurality of fingers arranged to be lowered into the mouth of the carton and disposed to contact the corners of said rectangular carton, and means for moving said fingers outwardly to effect breaking apart of said flap forming portions.

2. In a packaging machine having carton supporting means adapted for supporting in a predetermined position a rectangular carton comprising a body portion provided at its upper end with four unformed but connected top flap forming portions, a reciprocatory member adapted to be inserted into the carton provided with a plurality of fingers for engaging the inner surfaces of the flap forming portions at the corners of the carton, and means for operating said fingers to move the same outwardly and force the flap forming portions outwardly and thereby break apart the same to form top closing flaps.

NORMAN STANLEY ROSS.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
930,090	Scales	Aug. 3, 1909
1,625,720	Gangler	Apr. 19, 1927