Jan. 2, 1962 D. M. HAWLEY 3,015,603

PROCESS OF MAKING FELTED CONTAINERS

Filed Aug. 12, 1957 2 Sheets-Sheet 1

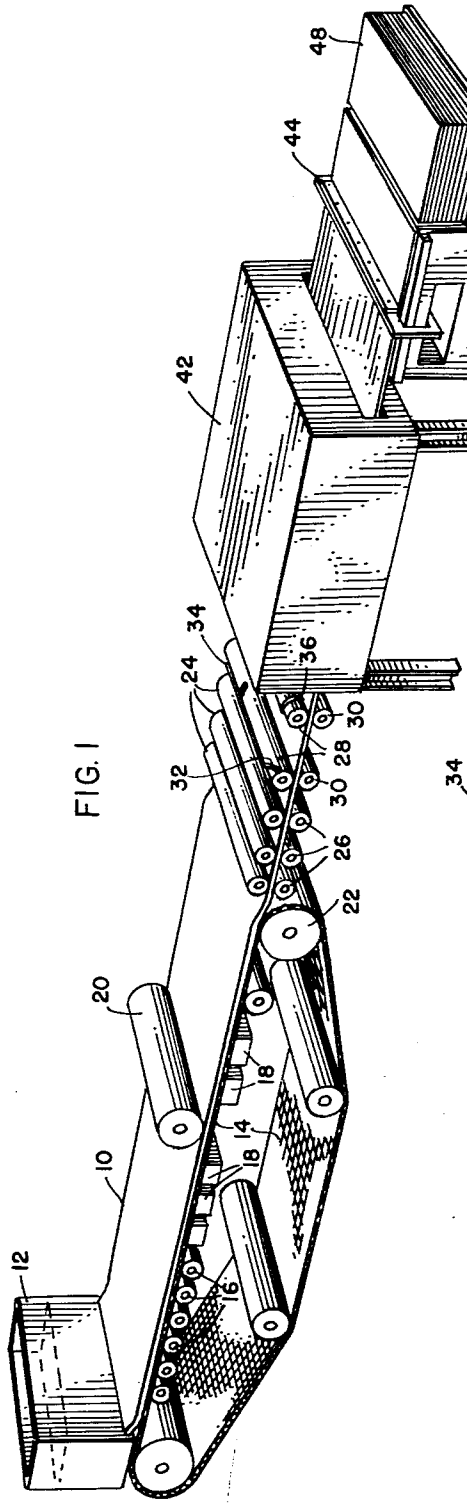


FIG. 1

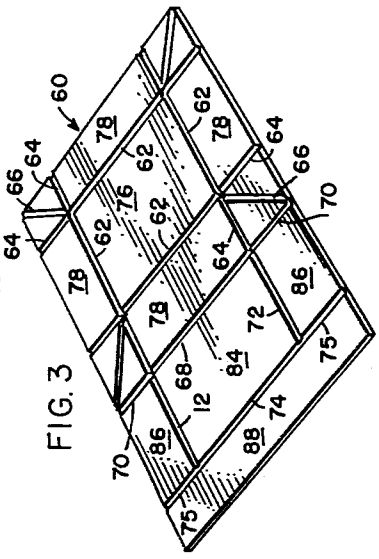


FIG. 3

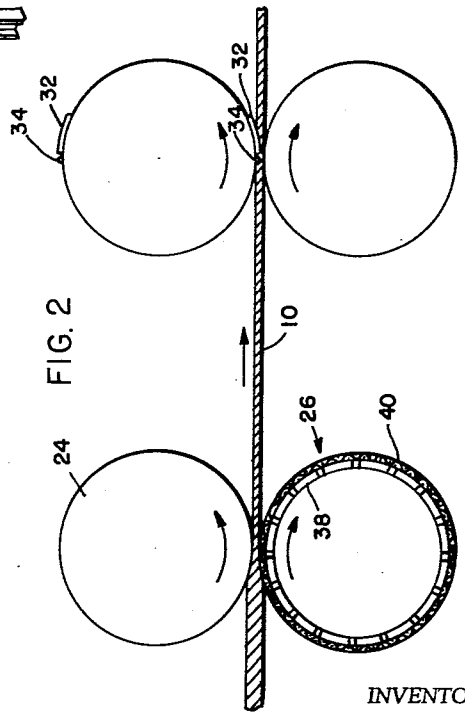


FIG. 2

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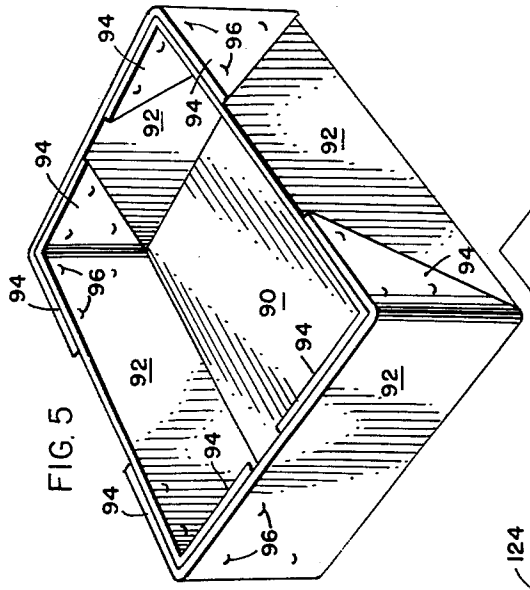


FIG. 5

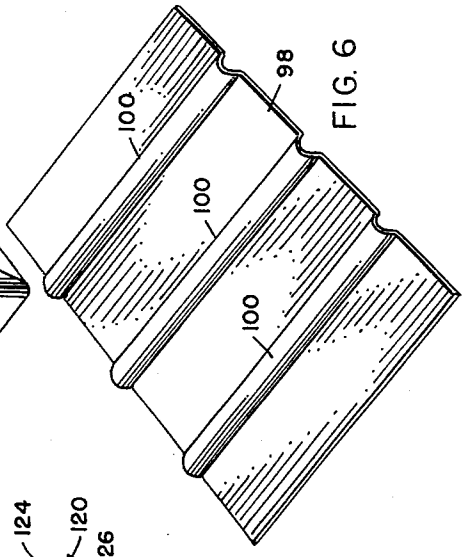


FIG. 6

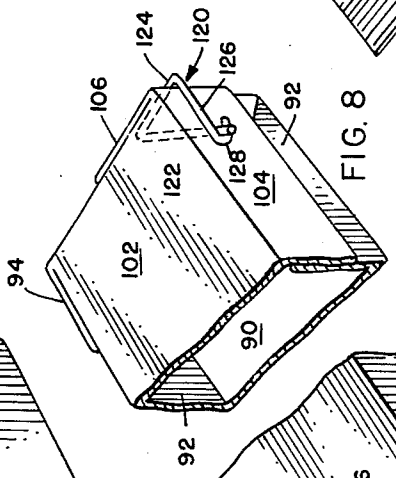


FIG. 8

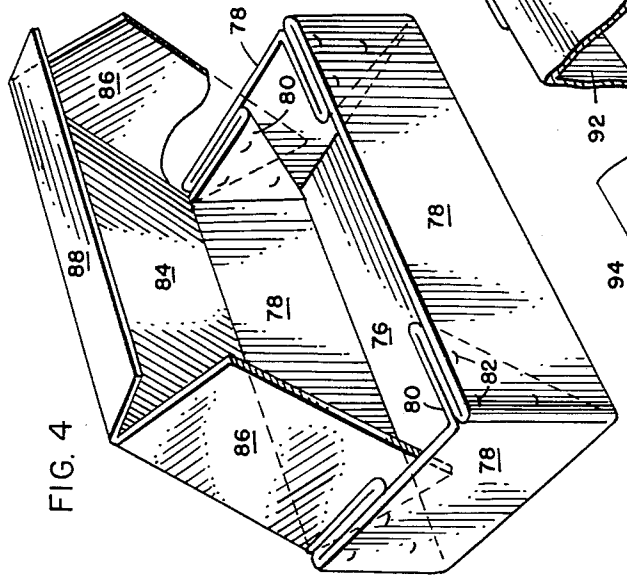


FIG. 4

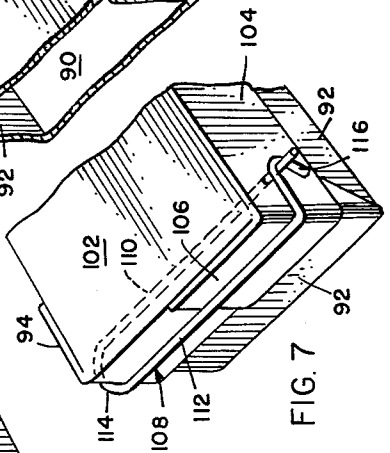


FIG. 7

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3,015,603

PROCESS OF MAKING FELTED CONTAINERS

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Filed Aug. 12, 1957, Ser. No. 677,612
3 Claims. (Cl. 162—117)

This invention, in general, relates to a continuous process for making blanks to be folded into cartons.

The process of the instant invention is designed to produce paperboard blanks having scored lines therein, which blanks may be subsequently foldled along the scored lines into containers or cartons. The flat cellulosic fibrous felt may be made on any type of paper or pulp machine capable of making a continuous felt of the desired thickness. The quality of the cellulosic pulp may be varied widely, ranging from 100% scrap materials, such as newspaper and corrugated box scrap, to high quality wood pulp—depending upon the quality of the carton or container desired.

Broadly speaking, the invention is concerned with the continuous formation of a continuous, heavy felt of fibrous pulp into a container. The felt or heavy sheet is formed on a paper-making machine such as a cylinder machine or a Fourdrinier machine. After the felt leaves the felt-forming machine, it is passed through a series of squeeze rolls. These rolls are preferably arranged in pairs, and as the felt passes through the series of rolls the pressure exerted on the felt is increased progressively with each pair of rolls. The function of the pressure rolls is to squeeze out a considerable portion of the water in the felt. The lower rolls are usually vacuum rolls, i.e., hollow rolls having a foraminous cylindrical surface. A vacuum is applied to the roll from within to assist in removing the water which gathers at the nip of the rolls as the sheet is being squeezed. The vacuum rolls are necessary, for otherwise the large amount of water squeezed out accumulates in the nip and weakens the sheet so that it breaks.

The squeezed, wet felt thereafter is passed through one or more pairs of scoring rolls, which are rolls having rods or bras forming protrusions on the cylindrical surface to score the sheet in the desired pattern. The scoring provided by the rolls determines the ultimate type of box which may be shaped from the blank produced by the scoring. The circumference of the rolls may be changed to produce various sizes of box—the size of the box being dependent upon the circumference of the roll.

After the scoring operation the sheet is passed through a drier and thereafter cut into scored blanks by an automatic cutter.

It is an object of the present invention to provide a continuous process for the manufacture of flat, scored paperboard blanks for cartons or containers wherein the formation of the paperboard sheet and the scoring of the sheet are carried out in a continuous operation.

Another object is to provide a continuous process in the manufacture of paperboard blanks for cartons or containers in which the scoring is done on the wet paperboard sheet.

Still another object is to provide processes for making blanks for folding into cartons of the type herein described. Other objects will appear hereinafter.

The invention will be further described in conjunction with the drawings, wherein:

FIG. 1 is a perspective view of a series of apparatus adapted to carry out the process of this invention;

FIG. 2 is a more detailed view of two of the roller pairs of FIG. 1;

FIG. 3 is a perspective view of a scored, paperboard blank adapted to be produced by the process illustrated in FIG. 1;

FIGS. 4 and 5 are perspective views of cartons or containers which may be made from the blank of FIG. 3;

FIG. 6 is a perspective view of a carton segment or panel provided with ribs for improving the rigidity thereof; and

FIGS. 7 and 8 are partial, perspective views of cartons produced by the process of the invention and additionally illustrate devices for holding the covers closed.

The process of the invention is illustrated in FIGS. 1 and 2 in which the fibrous felt **10** is formed from cellulosic pulp extruded from the headbox **12** onto the continuous, moving wire screen **14** of a Fourdrinier machine. The screen is supported by a series of rolls known as table rolls **16**. On the underside of the Fourdrinier screen **14** are suction boxes **18** for removing water from the felt, and a dandy roll **20** is provided to even out the upper surface of the felt. A suction couch roll is provided at **22**. The Fourdrinier machine has been described only sketchily because the details of the machine are well known and do not comprise a part of the instant invention.

After the felt leaves the Fourdrinier machine, it passes through a series of pressure rolls comprising pairs of upper rolls **24** and lower rolls **26**. The lower rolls **26** are vacuum rolls which are illustrated in further detail in FIG. 2. The vacuum roll comprises a foraminous, cylindrical, hollow body **38** upon which is supported a wire screen **40**. The vacuum is applied to the interior of the roll. The function of the vacuum roll is to remove water which is squeezed out of the felt as it passes between the pressure rolls.

After the pressure rolls, the squeezed, wet felt is passed between a series of scoring rolls **28, 30**. The upper scoring rolls **28** have protrusions formed by bars or rods **32—34—36** on the surface of the rolls **28**. These protrusions impart the scoring to the felt to provide fold lines for the subsequent shaping of the container or carton. The bars or rods **32—34—36** may be positioned on the rolls to provide the desired pattern of score lines. In the embodiment illustrated, the diagonal bars **32** provide diagonal score lines, the longitudinal bars **34** provide transverse score lines, and the circumferential protrusions **36** provide longitudinal score lines on the felt.

The scored felt is then passed through a drying oven **42** where the sheet is dried. After the sheet emerges from the drying oven **42**, it is cut into the carton blanks by an automatic cutter **44** mounted on the cutting and stacking table **46**. The cut blanks, under the urging of the movement of the sheet, fall onto the stacking support **50** and thus form a stack of cut blanks **48**.

FIGS. 3–7 illustrate blanks and cartons which may be manufactured according to the process previously described. In FIG. 3, the blank comprises a paperboard sheet **60** having score lines **62** defining the fold between the bottom panel **76** and the four side walls **78**. Corner

score lines **64** define the corner fold lines for the carton. At each corner, defined by the corner score lines **64**, a score or slit **66** is provided which diagonally cuts across the corner formed by the corner score lines **64**.

If a cover is desired, a score line **68** is provided to define the fold between a side wall **78** and the cover panel **84**. The score line **68** is extended to the edges of the blank by score lines **70** which are slit before the box is assembled. Score lines **72** define the junction between the cover panel **84** and the side flaps of the cover **86**. An additional score line **74** defines the junction between the cover panel **84** and the cover front flap **88**. If desired, the corner of the front flap may be cut out along the line **74** and the extension of the score lines **72**.

FIGS. 4–7 illustrate cartons which can be formed from the carton blank of FIG. 2. The carton shown in FIG. 4 is especially useful where water leakage is to be avoided, because this container has no slits or seams through which the water can leak as long as the carton remains upright. It is assembled by folding the sides **78** vertically about the bottom panel **76**. The diagonal scores **66** are folded inwardly toward the center of the box to form triangular folds **80**. The triangular folds **80** are secured to the side panels **78** of the box by staples **82** or other suitable fastening means and thus reenforce the side panels. The cover **84** may be omitted if desired, but if such cover is provided it is formed by slitting the score line **70** and also the score line **75**. The side flaps **86** of the cover are then bent downwardly along score lines **72** and the front flap **88** is bent downwardly along score line **74**. The portion of the front flap **88** extending beyond the score line **72** at each end may be cut off to provide a front flap **88** coextensive with the width of the cover **84**.

The carton of FIG. 5 is assembled from a similar blank to that illustrated in FIG. 3 with the cover portion omitted. Instead of folding the diagonal scores **66**, each diagonal score is slit up to the corner of the bottom panel. Thus, the carton in FIG. 5 comprises a rectangular bottom panel **90** and four regular trapezoidal, upstanding side panels **92**, the right triangular end segments **94** of the trapezoidal sides being folded and secured to alternate sides of the adjacent side panels at the corners of the box by suitable means such as staples **96**.

FIG. 6 is an illustration of an insert **98** of a box, which provides a bottom panel having ribs **100** for adding rigidity to the box. The ribs **100** can be formed integrally and initially in the moving wet sheet by circumferential protrusions similar to the protrusions **36** on the rollers for providing the score lines.

FIGS. 7 and 8 illustrate containers similar to the open container of FIG. 5. However, the containers of FIGS. 7 and 8 have covers thereon. Like numerals have been used in FIGS. 7 and 8 to indicate like parts illustrated in FIG. 5, where applicable. In addition to the similar parts, the containers of FIGS. 7 and 8 have covers **102** hingedly connected to the rear side panel **92**. The covers **102** have downwardly folded front flaps **104** which may have side tabs **106** extending therefrom. The cover in FIG. 7 is held closed by a fastening device **108** comprising two straight legs **110—112** connected by a bight **114**. The straight leg **110** extends through aligned apertures in the rear panel of the box and the front panel of the box and the flap **104** of the cover **102** to hold the lid against opening. The locking member **108** is secured on the box by a hook-shaped catch **116** which is a transverse extension of the leg **112** and hooks about the leg **110**.

Another modification of a locking member is shown in FIG. 8 wherein a triangular-shaped locking member **120** has the hypotenuse leg **122** extending through apertures in the front panel **92** and front flap **104** of the box and also through apertures in a side panel and cover side flap **106** of the box. The remainder of the locking member comprises legs **124** and **126**, the latter terminating in a hook-shaped catch **128** adapted to hook about the protruding end of the hypotenuse leg **122**.

In the process and apparatus described the felt is relatively thick, preferably around ¼ inch to ½ inch in thickness. The screen or wire side of the felt is relatively smooth. The grooves or recesses placed in the top side of the felt by the scoring roll or rolls are relatively wide, being approximately the same width as the thickness of the felt. The container is preferably folded with the smooth or screen side outward. Although the fibers used are preferably cellulose, the invention contemplates the use of different types of fibers including, wood, cotton, linen, wool, ramie, jute, hemp, sisal, glass fibers, glass strands, hennequen, caroa and/or asbestos.

In practicing the invention the placement of the scoring rolls is subject to variation. For example, the scoring rolls may be alternated with respect to the squeeze rolls.

The term "thick" as used herein means having a thickness which is relatively greater than the ordinary thickness of paper or paperboard. This thickness, moreover, is preferably sufficient to make the resultant container relatively rigid or non-flexible. The web or fibrous felt from which the container is formed is also relatively rigid or non-flexible except for the recessed or grooved portions which are sufficiently flexible to permit bending.

The invention is hereby claimed as follows:

1. A continuous process for making carton blanks comprising forming a continuous, fibrous, thick felt from an aqueous slurry of cellulosic fibers on a felt-forming mechanism of a paper-making machine; passing the continuous, fibrous felt, upon leaving said forming mechanism, through a series of pairs of squeeze rolls and thereby squeezing water from said felt, the pressure exerted by each pair of squeeze rolls being progressively greater; scoring in the squeezed, wet felt fold lines extending longitudinally of and laterally across the wet felt for the folding of said blank into box form; and drying the scored, wet felt, all in one continuous operation.

2. A continuous process for making carton blanks comprising forming a wet, continuous, thick, felted, fibrous, sheet from an aqueous slurry of fibers on continuous felt-forming machine; passing the wet, continuous, fibrous felt through a series of squeeze rolls, exerting pressure on said felt and removing water squeezed from said felt under pressure; passing the squeezed, wet felt through a further series of rolls and therein scoring folding lines into said felt with raised portions on said rolls, thereby providing repeating sections, each having a predetermined, scored pattern on said felt for the folding of said blank into box form, each section including a pair of parallel, longitudinal, scored fold lines and a pair of lateral, scored fold lines dividing each section into a rectangular center panel, four rectangular side panels of an equal length with the corresponding side of the center panel and four rectangular corner panels and also including diagonal, scored fold lines extending from the corners of said center panel to the diagonally opposite corners of said corner panels; and drying the scored, wet felt.

3. A continuous process for making carton blanks comprising forming a wet, continuous, thick, felted, fibrous, sheet from an aqueous slurry of fibers on continuous felt-forming machine; passing the wet, continuous, fibrous felt through a series of squeeze rolls, exerting pressure on said felt and removing water squeezed from said felt under pressure; passing the squeezed, wet felt at a felt thickness of about ¼ to ½ inch through a further series of rolls and therein scoring folding lines into said felt with raised portions on said rolls, thereby providing repeating sections, each having a predetermined, scored pattern on said felt for the folding of said blank into box form, each section including a pair of parallel, longitudinal, scored fold lines and a pair of lateral, scored fold lines dividing each section into a rectangular center panel, four rectangular side panels of an equal length with the corresponding side of the center panel and four rectangular corner panels; diagonally slitting the corner panels

along a line between the corners of said center panel and the diagonally opposite corners of said corner panels and drying the scored, wet felt.

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CERTIFICATE OF CORRECTION

Patent No. 3,015,603 January 2, 1962

Don Milligan Hawley

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

Column 1, line 13, for "foldded" read -- folded --; line 43, for "bras" read -- bars --.

Signed and sealed this 19th day of June 1962.

(SEAL)
Attest:

ERNEST W. SWIDER
Attesting Officer

DAVID L. LADD
Commissioner of Patents