Oct. 31, 1961 TAKEO OMORI 3,006,121

MEANS FOR MAKING PAPER CONTAINERS AND FILLING THEM WITH FLUENT MATERIAL

Filed July 29, 1959 5 Sheets-Sheet 1

Fig. 1

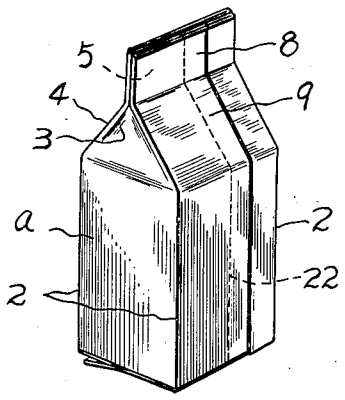
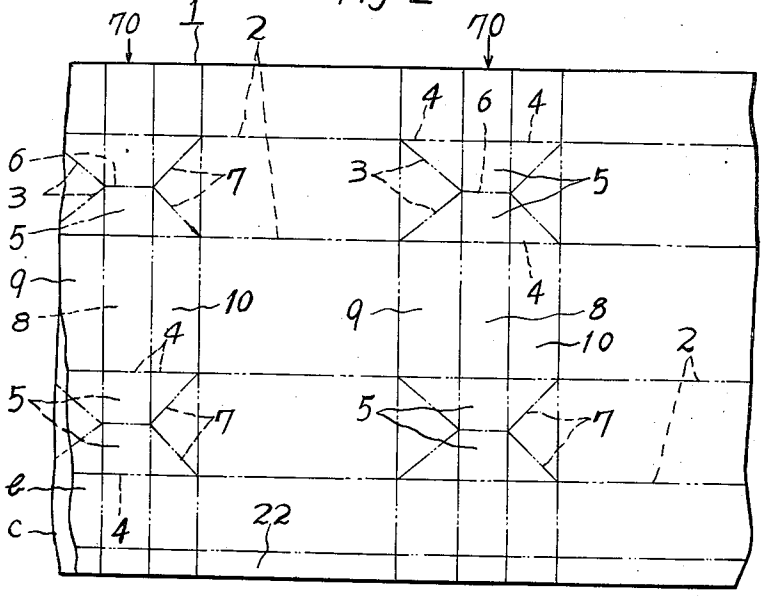


Fig. 2



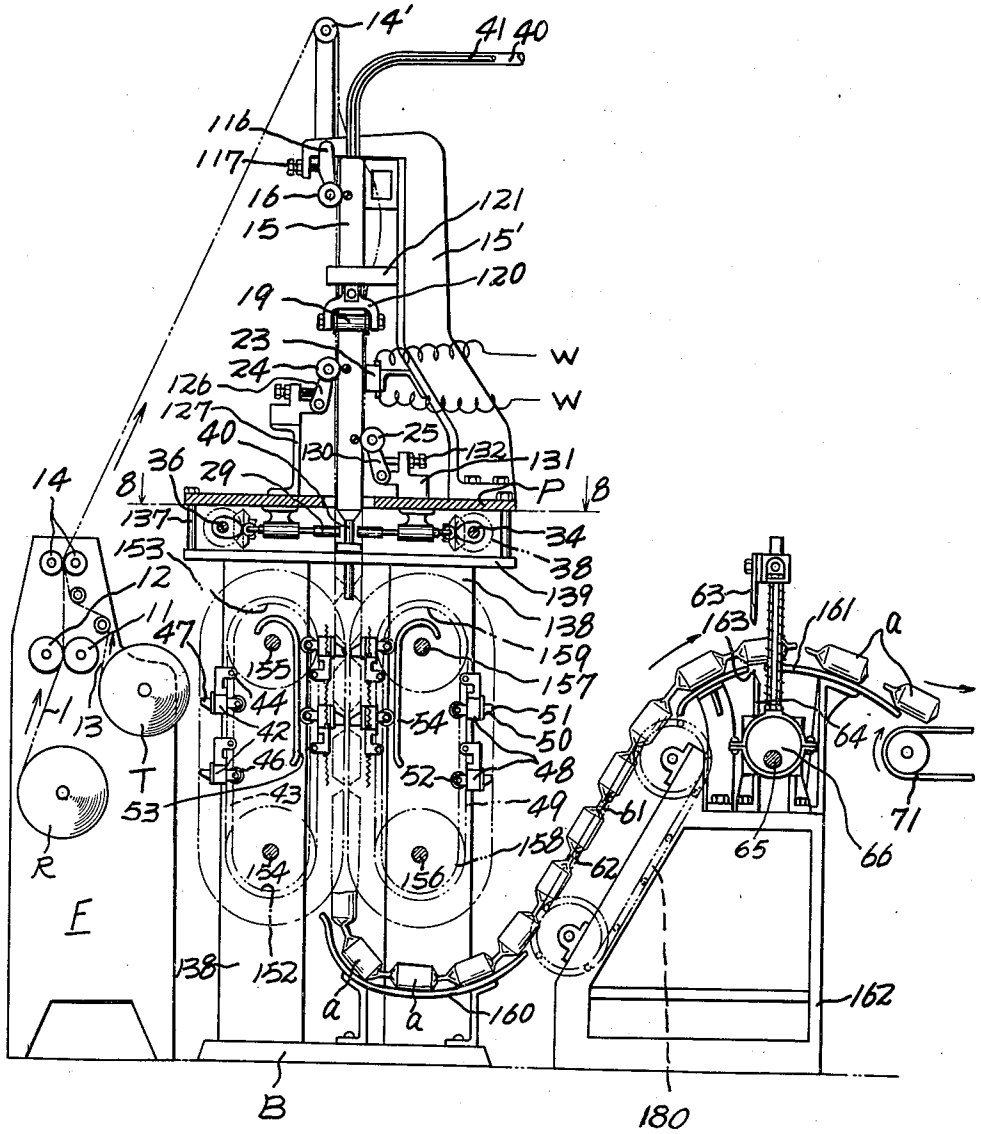
INVENTOR
TAKEO OMORI
BY Chandlee Ridgeon
AGENT

Oct. 31, 1961 TAKEO OMORI 3,006,121

MEANS FOR MAKING PAPER CONTAINERS AND FILLING THEM WITH FLUENT MATERIAL

Filed July 29, 1959 5 Sheets-Sheet 2

Fig. 3



INVENTOR.
TAKEO OMORI
BY
AGENT

Oct. 31, 1961 TAKEO OMORI 3,006,121

MEANS FOR MAKING PAPER CONTAINERS AND FILLING THEM WITH FLUENT MATERIAL

Filed July 29, 1959 5 Sheets-Sheet 3

Fig. 4

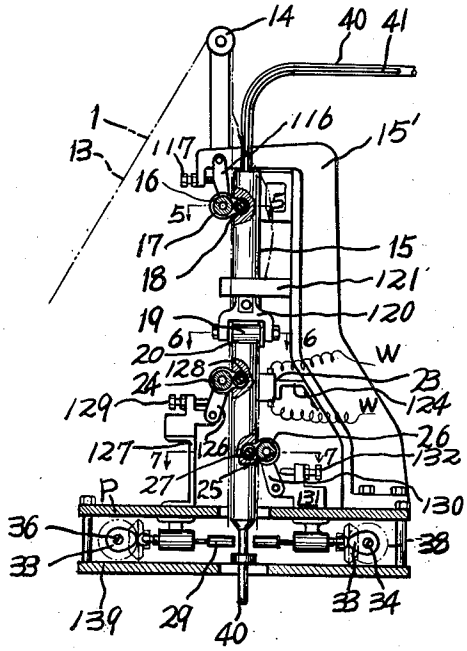


Fig. 5

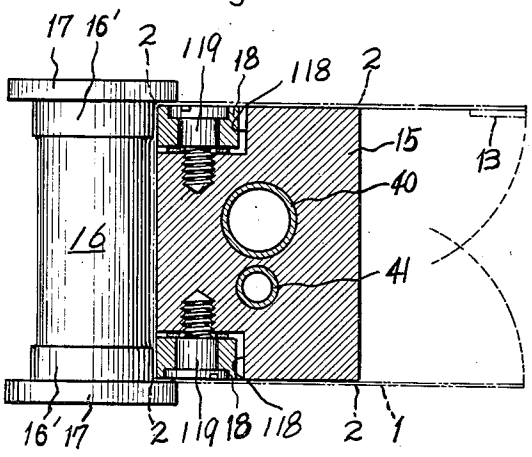


Fig. 6

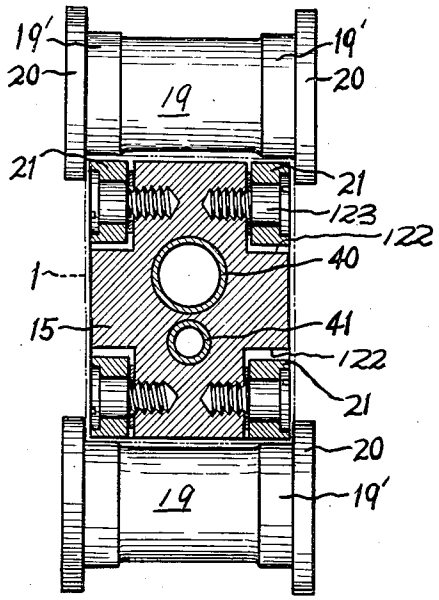
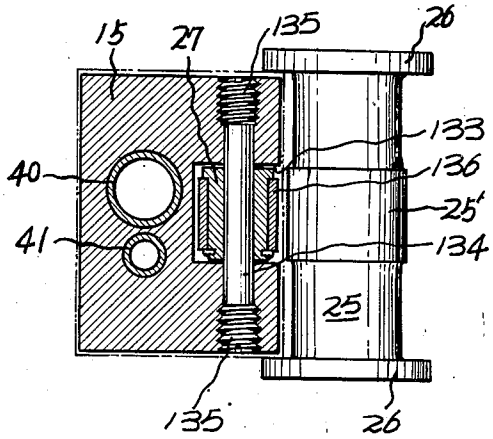


Fig. 7



INVENTOR
TAKEO OMORI

BY

AGENT

Oct. 31, 1961 TAKEO OMORI 3,006,121
MEANS FOR MAKING PAPER CONTAINERS AND
FILLING THEM WITH FLUENT MATERIAL
Filed July 29, 1959 5 Sheets-Sheet 4

Fig. 8

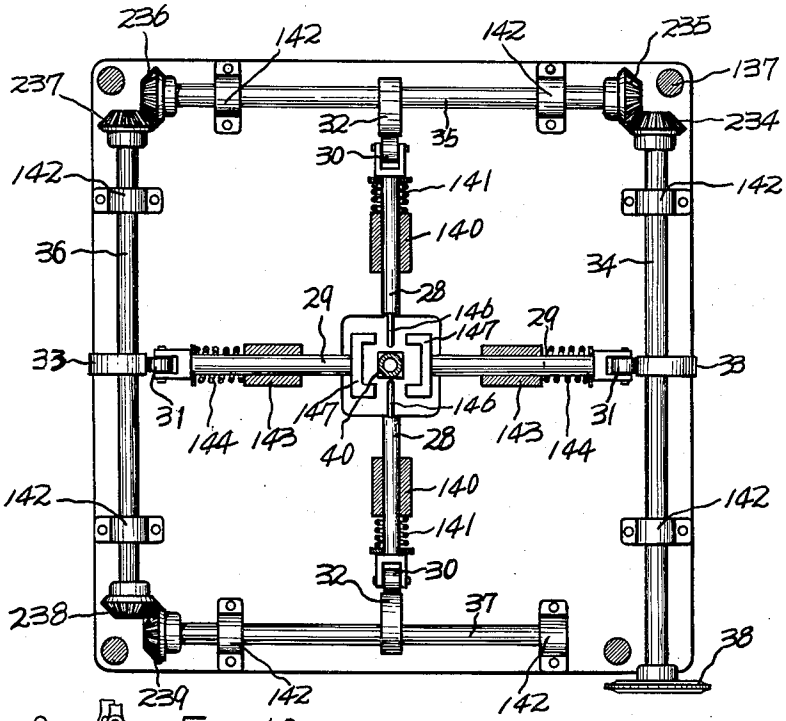


Fig. 10

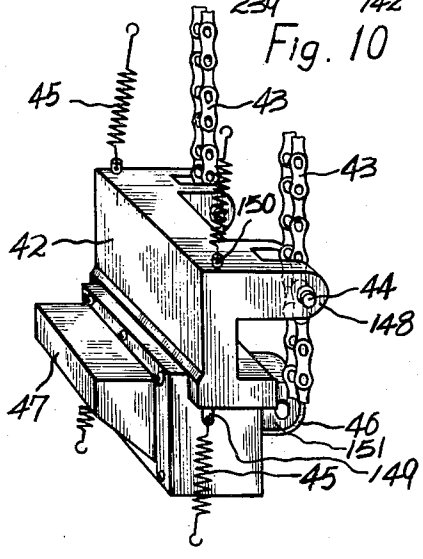
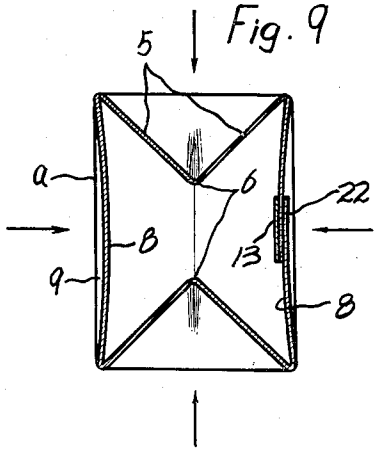


Fig. 9



INVENTOR
TAKEO OMORI
BY C. Chandlee Gregson
AGENT

Oct. 31, 1961 TAKEO OMORI 3,006,121

MEANS FOR MAKING PAPER CONTAINERS AND FILLING THEM WITH FLUENT MATERIAL

Filed July 29, 1959 5 Sheets-Sheet 5

Fig. 11

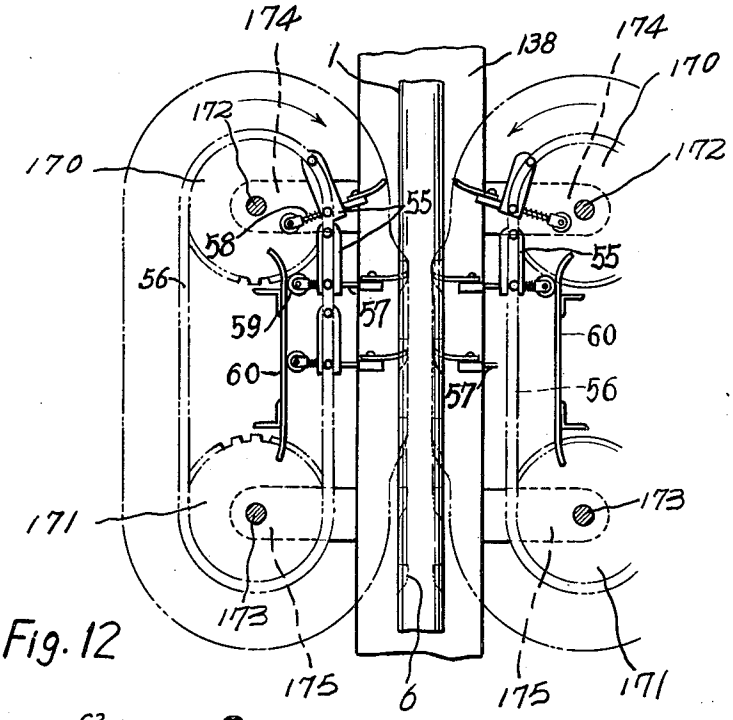
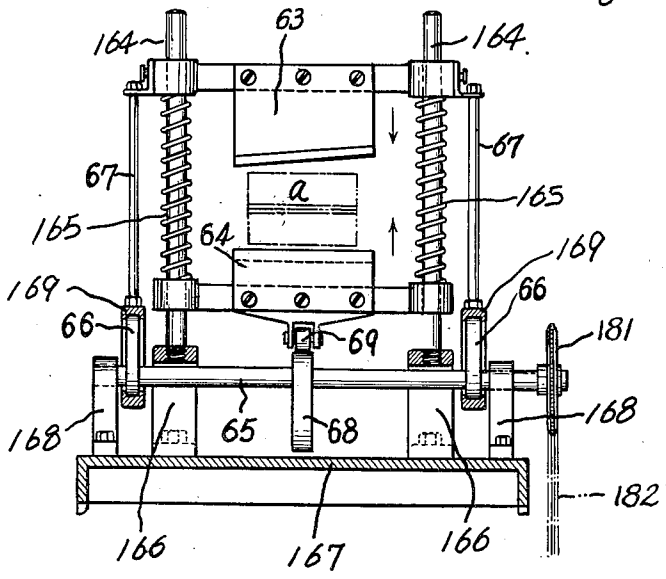


Fig. 12



INVENTOR
TAKEO OMORI

BY

AGENT

United States Patent Office 3,006,121 Patented Oct. 31, 1961

3,006,121

MEANS FOR MAKING PAPER CONTAINERS AND FILLING THEM WITH FLUENT MATERIAL

Takeo Omori, 9–2 Chome, Sosigaya, Setagaya-ku, Tokyo, Japan

Filed July 29, 1959, Ser. No. 830,325
11 Claims. (Cl. 53—180)

This invention relates to means for making paper containers and filling them with fluent material. More particularly this invention relates to apparatus for producing containers from a continuous strip or web of coated paper and filling them with a liquid as they are produced.

A particular object of this invention is the production of bags or cartons from a web of coated paper and filling them with a potable liquid.

A further object of this invention is the continuous production of bags or cartons of coated paper and filling them with a fluent material and sealing them.

An additional object of this invention is the provision of means to fold a web of coated paper into a tube and to form successively a series of containers, fill them with a fluid, seal the tube between and cut them apart.

An additional object of this invention is the provision of a hollow mandrel having means thereabout for folding a web of coated paper and sealing it in tubular form, sealing the end of the tube and admitting fluent material into the mandrel and the sealed tube and sealing the tube after filling to form a filled container.

These and other objects will appear from a consideration of the following specification taken with the accompanying drawings forming a part thereof and together comprising a complete disclosure of my invention.

In the drawings, wherein like characters of reference represent like parts throughout the several views:

FIG. 1 is a perspective view of my container as produced and filled;

FIG. 2 indicates the fold lines for a single container;

FIG. 3 is a side elevation, partly diagrammatic, with parts omitted, showing essential features of my invention;

FIG. 4 is a fragmentary detail, partly in section, showing the mandrel and the folding and edge sealing means;

FIG. 5 is a section along the line 5—5 of FIG. 4;

FIG. 6 is a section on the line 6—6 of FIG. 4;

FIG. 7 is a section on the line 7—7 of FIG. 4;

FIG. 8 is a section substantially along the line 8—8 of FIG. 3;

FIG. 9 illustrates a step in the folding of the blank to form a container;

FIG. 10 is an enlarged detail of a heat sealing means for sealing the container, shown in perspective;

FIG. 11 is an enlarged fragmentary side view of the gusset engaging fingers on their chains, said figure being taken at 90° to FIG. 3;

FIG. 12 is a fragmentary front view of the device for severing the filled containers.

Referring now to FIGS. 1 and 2, I show a completed container, and a blank formed on a continuous web. The container *a* is formed by folding along the lines 2 to form a rectangular tube and then folding along the lines 3 to form the roof type top portion and along the lines 7 to form the bottom portion. The roof top is gusseted in the regions 5 and the line 6 comprises an inner fold at the seal. In sealing, the gusseted portions 5 are folded inwardly and the whole area between two connected containers is sealed, and portion 9 becomes a roof part and portion 10 becomes the bottom. The lines 2, 3, 6 and 7 are scored or embossed on a web of coated paper, as it is fed to the machine, to facilitate folding.

A web 1 of suitable paper *b* having a coating *c* of

polyethylene, on one side, is mounted on a suitable frame F, in the form of a roll R. A roll T of tape 13 is also mounted on the frame F. The tape 13 is a narrow web, in the present instance about a half inch wide, coated on both sides with a polyethylene film. The purpose of this tape will appear in connection with the description of FIG. 9. The web 1 is passed between the rollers 11 and 12 having mating ridges and depressions respectively to form the score lines 2, 3, 6 and 7. From the rolls 11, 12, the web 1 passes to the rolls 14 where it is joined by the tape 13. The assembled web 1 and tape 13 pass over roller 14' to a mandrel 15. The mandrel 15 is substantially rectangular as shown in FIGS. 5, 6 and 7, and is supported on an arm 15' suitably attached to a platform P.

Suitably supported on the arm 15' adjacent the upper end of the mandrel 15 a roller 16 is mounted on an arm 116 and is adapted to be pressed against the mandrel by means of a screw 117. The roller 16 has end flanges 17 adapted to engage opposite sides of the mandrel 15 and also has enlarged portions 16' adapted to press against the adjacent side of the mandrel. The raised portions 16' and the flanges 17 engage the web 1 adjacent the mandrel and fold it along the intermediate fold lines 2. A pair of rollers 18 mounted in depressions 118 in the mandrel 15 rotate on suitable screw 119 and cooperate with the flanges 17 and the raised portions 16' to fold the web 1 about the mandrel 15. Below the rollers 16, on an arm 120 mounted on a bracket 121 I mount a pair of rollers 19, engaging opposite sides of the mandrel and with their axes turned 90° from the axis of the roller 16. Each roller 19 has two raised portions 19' and a pair of end flanges 20. These raised portions 19' and flanges 20 cooperate with four rollers 21 placed in corner depressions 122 in the mandrel 15. The rollers 21 are rotatably mounted on screws 123. The flanges 20 keep the blank folded along the intermediate lines 2, and fold it further along the outer lines 2. The rollers 19 are pressed toward the mandrel 15 by means similar to the means 117.

Below the rollers 19, I mount a heat sealing means 23 mounted on a bracket 124 suitably secured to the arm 15'. The heat sealing means 23 is connected by suitable wires W to a source of electric potential. Opposite the heat sealing means, I mount a pressure roller 24 on an arm 126 secured to an upstanding member 127 on the platform P. A roller 128 mounted in a pocket in the mandrel 15 cooperates with the roller 24 to exert pressure on the tubular mandrel opposite the point of sealing. The arm 126 is pressed toward the mandrel by means 127 similar to the means 117.

Below the heat sealing means 23, I place a pressure roller 25 mounted on an arm 130 pivoted on a bracket 131 upstanding from the platform P. The arm 130 is pressed toward the mandrel by means 132 similar to the means 117. The roller 25 has a pair of flanges 26 and a raised mid portion 25'. The flanges 26 cooperate with the sides of the mandrel to keep the tubular carton forming member folded, and the mid portion 25' cooperates with a roller 27 mounted in a recess 133 and rotatably mounted on a pin 134 held in position by means of screws 135. The roller 27 has a tire 136 adapted to exert great pressure on the seam formed by overlapping edges of the web 1 and by the tape 13 placed adjacent the point of overlap 22 as seen in FIG. 9.

The material of the web 1 is formed into a rectangular tube by the means above described and passes next to the infolding means now to be described. The platform P is spaced from a second platform 139, by means of posts 137. The platform 139 rests on posts or pillars 138, mounted on the base B of which there are preferably four. A pair of push rods 28 are slidably mounted in

blocks **140** affixed to the underside of the platform P. These rods have cam rollers **30** at their outer ends which engage the cams **32** and are urged into contact with the cams by springs **141**. Shafts **34**, **35**, **36** and **37** are arranged on the sides of a square and each shaft rotates in a pair of pillow blocks **142**. The shaft **34** is rotated by means of a suitable chain trained over sprocket **38**. Bevel gears **234**, **235** connect shafts **34** and **35** and shafts **35** and **36** are rotatably connected by bevel gears **236** and **237**, while gears **238** and **239** connect shafts **36** and **37**. Other push rods **29** are slidably mounted in blocks **143** and have cam rollers **31** at their outer ends which are urged toward cams **33**, mounted on the shafts **34** and **36**, by means of springs **144**.

The mandrel **15** terminates slightly below the platform P and the tube **40**, mounted in the mandrel **15**, extends downwardly some distance below the platform **139**. Fluent material for filling the cartons *a* is conducted through the tube **40** which extends away from the mandrel **15** to a source of supply. The tube **41**, also mounted in the mandrel, constitutes an air vent.

The inner ends **146** of the push rods **28** engage the rectangular tube, formed on the mandrel **15**, and push inwardly along the portions **6**, of the scored lines **2**, which form the gusseted portions **5** of the container. At the same time the forked ends **147** of the push rods operate to force the portions **9** and **10** toward the filler tube **40**. This is the first operation in the formation of an individual container. The partially formed containers now pass to the heat sealing means, now to be described.

A plurality of heat sealing blocks are mounted on a pair of parallel chains **43** by means of pivots **44**, mounts in ears **148**. Springs **45** connected to ears **149** and **150** hold the blocks in alignment as the chains **43** move. A roller **46** is rotatably mounted in ears **151** on the back of each block **42**. On the face of each block **42**, a heat sealing portion **47** is mounted and is heated by any suitable known means. The chains **43** pass over suitable sprockets **152**, **153**, rotatably mounted on axles **154**, **155** respectively, mounted in two of the pillars **138**.

Mounted in another pair of pillars **138** is another pair of shafts **156**, **157** rotatably supporting sprockets **158** and **159**, respectively, about which are trained chains **49**, similar to chains **43**. These chains **49** carry pressure blocks **48**. Pressure pieces **50** are attached to the blocks **48** are provided with rollers **52** similar to the rollers **46**. A guide **53** is suitably arranged on the framework and is engaged by the rollers **46** to move the heated portions **47** toward the containers. A guide **54** is similarly arranged to engage the rollers **52** to press the pressure blocks **50** against the containers.

FIG. 11 shows a portion of FIG. 3, turned 90° from the showing in FIG. 3. In FIG. 11, the gusset engaging fingers **57** are mounted on a pair of identical chains **56** carrying blocks **55** in which the fingers **57** are transversely slidably mounted. These fingers **57** engage the gussets **6**, as formed by the pusher members **146**, to insure that the gussets are properly folded in at the time of sealing. Each chain **56** is carried by a pair of sprockets **170**, **171**, mounted on rotatable shafts **172** and **173** respectively carried by brackets **174**, **175**, respectively and mounted on pillars **138**. Springs **58** tend to urge the fingers **57** away from the containers, and rollers **59** on the rear ends of the fingers **57** engage tracks **60** to cause the fingers **57** to engage the gussets **6**.

The containers are thus formed and sealed while traveling with the chains **43**, **49**. As a seal is made, fluent material is introduced into the container through the tube **40**. As the container moves downwardly, another pair of blocks **47**, **50** engage it to seal it above the contents. This action is repeated indefinitely, a chain of filled and sealed containers passing downwardly to the scoop or cradle **160**, suitably mounted on the base B. Air from the container **13** is vented by the tube **41**.

A pair of conveyor chains **180** having spaced bars **61**, **62** thereon engage the spaced containers, the bars **61**, **62** fitting in the sealed area between adjacent containers. These bars **61**, **62** move the filled containers *a* upwardly over an arcuate table **161** mounted on a frame **162**. A gap **163** in the table **161** permits a shear to sever the filled containers, which slide down the table **161** onto a belt conveyor **71**. The shear blades **63**, **64** are slidably mounted on rods **164** and are urged apart by springs **165**. The rods **164** are mounted in blocks **166** on a platform **167**. A shaft **65** mounted in pillow blocks **168** has cam **68** mounted thereon. This cam engages a roller **69** on the shear blade **64** to move said blade upwardly. Shear blade is moved downwardly by links **67** connected to straps **169** engaging eccentrices **66**. The shaft **65** is rotated by a suitable sprocket **181** and a chain **182**.

While the operation of the machine should be apparent from the above description, the following summary is given for simplification:

The paper web **1** having a coating of polyethylene on one side is passed between the rolls **11** and **12** which score it properly for the fold lines. The tape **13** is associated with the web **1** and guided along one edge thereof at the rollers **14**. After passing over the guide roller **14'**, the web passes between the flanged roller **16** and the mandrel **15**. The flanges **17** on the roller **16** fold the web about three sides of the mandrel as shown in FIG. 5. Next the web is engaged by the rollers **19** which complete the operation of forming a rectangular tube. The heat sealing means **23** causes overlapping edges of the web **1** and the tape **13** to be sealed as at **22** in FIG. 9. The roller **24** backs up the mandrel at the heat sealing point. The roller **25** perfects the seal holding it until the web cools. Below the mandrel **15**, the members **146** press the portions **6** of fold lines **2** inwardly to form the gussets **5**, and the members **147** press the portions **8** inwardly toward the tube **40**. As the thus partly formed cartons move downwardly, the heat sealing elements **47** and the pressure blocks engage the portions **8** of the carton and under the heat and pressure cause the sealing of the tube to form the top of one container *a* and the bottom of the next succeeding one. As this seal is made, fluent material from the tube **40** enters the container whose bottom has just been sealed. The operation continues in cycles of folding, pressing, sealing and filling to form a connected chain of containers or cartons *a*. They proceed to the conveyor **172** which carries them to the shear blades **63**, **64** where they are severed into individual containers *a*, and pass to the collecting conveyor **71**.

While I have referred to the fluent material as being a fluid and preferably a potable fluid, it is to be understood that this machine may handle any material, fluent or fluid which can pass through the tube **40** and which is not inimical to the polyethylene coating *c*. The paper *b* may be any suitable paper such as that presently used for packaging milk, orange juice and other potables. The containers or cartons of this invention may be dispensed from coin operated machines.

It is to be understood that various modifications and changes may be made within the skill of the art and the scope of the appended claims.

I claim:

1. In a machine for forming and filling paper containers, means for supplying a web of coated paper to said machine, a tubular rectangular mandrel, a roller adjacent one side of the mandrel for pressing said web against said one side, said roller having flanges for folding the web about the two adjacent sides of the mandrel, further rollers adjacent each of said two adjacent sides of the mandrel for pressing said web against said two adjacent sides, said rollers having flanges for folding the web with the edges thereof in overlapping relation about the fourth side of said mandrel, means for heat sealing said overlapped edges of said web to form a rectangular tube encompassing said mandrel, a further roller following said heat sealing means for pressing the sealed edges against the mandrel to compact the seal, a

pair of conveyors adjacent said mandrel for receiving and forwarding the tube thus formed, one of the conveyors having spaced apart heat sealing lugs engaging the tube, means within the mandrel for supplying fluent material to the tube, said conveyors forming a chain of filled and sealed paper cartons.

2. The machine as defined in claim 1 including means for delineating the pattern of a carton on said web by score lines.

3. The machine as defined in claim 1, wherein the other conveyor of said pair is provided with spaced apart sealing blocks cooperating with the heat sealing lugs to seal the cartons transversely and forward them.

4. The structure as defined in claim 1 including a third conveyor for forwarding the chain of cartons to a receiving station, and means adjacent said third conveyor for severing said chain into single cartons.

5. The machine as defined in claim 1 wherein the coating on the paper is polyethylene.

6. The machine as defined in claim 1 including back-up rollers mounted in the mandrel adjacent each of the rollers which fold the web about the mandrel.

7. The machine as defined in claim 6 including a back-up roller adjacent either end of the roller first engaging the web, and a back-up adjacent either end of each of the rollers engaging the two adjacent sides, and a back-up roller adjacent the middle of the roller engaging the sealed overlapped edges of the carton.

8. The structure as defined in claim 1, including means engageable with the tube for forming spaced gussets in two sides of the tube, and other means pressing the other two sides of the tube toward the filling means.

9. The structure as defined in claim 8, including means for introducing a polyethylene coated paper tape inside the formed tube adjacent the longitudinal seal prior to the sealing of the longitudinal edges of the web.

10. The structure as defined in claim 9, including pressure backing means opposite the heat sealing means.

11. The structure as defined in claim 10, including adjustable means for pressing the roller means and the back means toward the mandrel.

References Cited in the file of this patent

UNITED STATES PATENTS

2,113,636	Vogt	Apr. 12, 1938
2,156,466	Vogt	May 2, 1939
2,259,866	Stokes	Oct. 21, 1941
2,307,890	Lakso	Jan. 12, 1943
2,379,920	Peters	July 10, 1945
2,691,257	Vogt	Oct. 12, 1954
2,889,671	Weisman	June 9, 1959
2,899,875	Leasure	Aug. 18, 1959
2,903,829	Wolff	Sept. 15, 1959