APPARATUS FOR PRODUCING MULTIPOCKET PACKAGES

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The present invention, generally, relates to packages and, more particularly, to a new and improved method and apparatus for producing multipocket packages for enclosing predetermined quantities of one or more materials.

A principal object of the invention concerns the provision of a method of making multipocket packages and an apparatus for carrying out that method.

Another object of the invention is to provide a method and an apparatus for packaging an infusion material in separate pockets of a unitary package.

In accordance with the invention a strip of material is folded and sealed along selected zones to form pairs of separate pockets which are closed at their bottom and side edges and are joined only at one side edge, each of the pockets, as formed, having an open end into which a product is introduced prior to sealing the open ends of the pockets.

An apparatus in accordance with the invention for carrying out the above method includes folding members positioned so that a web of package-forming material moving past the folding members is progressively folded lengthwise into a substantially double-U cross-sectional configuration. By sealing the free edges of the folded material to the center fold and also sealing the folded portions transversely, pockets are formed for receiving a product. The apparatus includes means for introducing a product into each pocket and for sealing the open ends of the pockets to form completed packages. Other structural features are provided for guiding, positioning and controlling the movement of the package-forming material and for feeding the filling product to form the finished package as will be described in greater detail hereinafter.

For the purposes of convenience, the following detailed description of an illustrative embodiment of the method and apparatus of the invention will relate to the provision of double-pocket infusion tea bags, it being understood that the invention is not limited to this illustration.

For a more complete understanding of these and other objects of the present invention, reference may be had to the description which follows and to the accompanying drawings in which:

Fig. 1A shows an unfolded strip of filter paper of unit size for making one package in accordance with the invention;

Fig. 1B shows the filter paper of Fig. 1A as it is folded for the first step in the method of the invention;

Fig. 1C shows the folded filter paper of Fig. 1B with additional folds in accordance with the method of the invention;

Fig. 1D shows the filter paper folded as in Fig. 1C after selected edges are sealed;

Fig. 1E shows the package of Fig. 1D after it has been sealed in the final step of the method in accordance with the invention;

Fig. 2 is a perspective view of an apparatus for operation in accordance with the method of the invention

with parts shown broken away and in section to disclose details of the apparatus;

Fig. 3 is a side view in elevation and partly in section showing the funnel and feed chute arrangement in accordance with the invention;

Fig. 4 is a front view in elevation and partly in section of the arrangement shown in Fig. 3;

Fig. 5 is a view of Fig. 3 without the cut-away portion;

Fig. 6 is a plan sectional view taken along the line 6—6 in Fig. 3;

Fig. 7 is a plan sectional view taken along the line 7—7 in Fig. 3; and

Fig. 8 is a plan sectional view taken along the line 8—8 in Fig. 3.

To describe the method of the invention, reference is made to Figs. 1A—1D of the drawings. A unit strip of suitable tea bag filter paper is shown in Fig. 1A as having a width A—I greater than its length A—B. Such paper is of a special type particularly adaptable for making tea bags and is provided with a coating of a suitable heat-sensitive adhesive on the side opposite from that viewed in Fig. 1A.

The first step in forming the double-pocket package is to fold the strip shown in Fig. 1A along its center line E—F to present an arrangement as shown in Fig. 1B, a portion of the adhesive coated side now being on the visible side I—E—F—J. Then, the opposite edges A—B and I—J of the arrangement as shown in Fig. 1B are folded back to form an arrangement as shown in Fig. 1C having a substantially double-U cross-section. In this position, the edges A—B, E—F and I—J are in alignment to be joined together to form a double-pocket package as shown in Fig. 1D. The sealing is effected by applying a heated surface against the outer edges of the filter paper along the lines A—B, I—J, B—D and J—H. Inasmuch as the heat-sensitive adhesive is applied only to one surface of the filter paper, the outer surfaces along the lines F—D and F—H are not sealed together, the seal being effected only on the inner surfaces along the lines B—D and F—D. A suitable product such as tea is deposited in predetermined amounts into each pocket, and then the edges A—C, E—C and E—G, I—G are sealed to complete the package as shown in Fig. 1E.

By this method, two separate pockets for receiving an infusion product such as tea, are attached together only along one edge, the edge E—F, Fig. 1E. If it should be desired to separate the two pockets after they have been formed in a manner such as just described, they may be torn along the line AEL—BJF without spilling the enclosed tea. A package constructed in this manner does not require the use of threads, staples or other separate fastening means, which renders the package readily adaptable to assembly line production. Inasmuch as a heat-sensitive adhesive is used, the filter paper may be prepared prior to the manufacturing process, and the unit strip shown in Fig. 1A will represent one measured length which may be severed by a suitable cutting element after the package is formed. The method of the invention will be better understood from a detailed description of an illustrative embodiment of an apparatus for making multipocket packages in accordance with the invention.

One embodiment of an apparatus constructed in accordance with the present invention is shown diagrammatically in Fig. 2 of the drawings, and various elements of this apparatus are shown in Figs. 3—8. Referring now in particular to Figs. 2—8, a roll 11 of special infusion paper is supported in a position vertically above the apparatus such that a continuous web of paper 12 is fed over a series of guide rollers 13, 14 and 15. From
the guide roller 15, the paper 12 is directed downwardly past a guide plate 16 having a rounded edge over which the paper is drawn and bent transversely without creasing.

The apparatus of the invention may be supported by any suitable means and may be enclosed within a housing, if desired. If a housing is provided, an opening 17 will be provided in the upper end 18 of the housing to permit the paper 12 to pass through.

A funnel-like folding member 21 having an open side 22 is positioned within the housing directly below the open end 17. As best seen in Fig. 6, the folding member 21 is substantially U-shaped in cross section and has trapezoidal sides 23, 24 and 25. The paper 12 passes downwardly over the open side 22 of the folding member 21.

To fold the center portion of the paper 12 within the folding member 21, a folding tongue or plate 30 is supported on a suitable frame opposite the open side 22. The position of the tongue 30 is adjustable mounted on the frame by any suitable means such as, for example, a bolt and slot connection 31 to regulate the distance that the folding tongue 30 extends between the sides 23 and 25 of the folding member 21.

Actually, for the purposes of forming a double-pocket package, the sides 23 and 25 of the folding member 21 may be separate plates overlapping and spaced from the folding tongue 30. The package-forming paper 12, when drawn between the tongue 30 and over the outer edges of the plates 23 and 25 will be folded transversely into a substantially double-U cross-section, as shown in Fig. 6.

The opposite edges of the paper 12 are pressed against the outer sides of the plates 23 and 25 by means of bronze brushes 34 and 35 positioned on opposite sides of the funnel, as best seen in Fig. 2. It is preferred that the bristles of the brushes 34 and 35 be formed of metal fibers in order to conduct away any static electricity developed in the paper 12. Of course, the position of these brushes 34 and 35 may be adjustable, if desired, by any suitable means.

Two feed chutes 36 and 37, each being substantially U-shaped in cross-section, are formed integrally with the bottom of the funnel 21 or positioned adjacent thereto. By this arrangement, a continuous surface is provided downwardly against which the folded paper 12 is pressed to maintain its fold in a desired position.

To prevent the paper 12 from riding inwardly into the space between the feed chutes 36 and 37, two rubber covered rollers 38 and 39 are provided, one on each side of the funnel 21, as shown in Fig. 4. Each of these rollers is provided with means for adjusting the position of its axis of rotation relative to the direction of movement of the paper 12. As illustrated in Figs. 2 and 5 of the drawings, it is desired to have the axis of each roller tilted slightly toward the edge of the paper 12 to draw the paper outwardly. The exact position of the axis of each roller depends upon the force needed to keep the edges of the paper from moving inwardly between the feed chutes 36 and 37.

An adjustment for the position of the roller 38 is obtained by loosening the thumb screw 41 and tilting the roller 38 to an angle which is sufficient to maintain the paper 12 in its desired position. A support for the roller 38 is in the form of a hollow tube 42, which contains a compression spring element (not shown). The spring element resiliently urges a plunger 46, which supports the rollers 38, toward the funnel 21. The force exerted by the spring element is adjustable by slideably moving the support tube 42 within the journal 42 and, when the desired force is obtained, the thumb screw 41 is tightened to lock the support tube 42 in place.

As best seen in Fig. 5 the arrow 43 represents the direction of movement of the paper 12, and the arrow 44 represents the plane of rotation for the roller 38 as it is turned due to its frictional engagement with the paper 12. Now it may be seen that a resultant force, represented by the arrow 45, will be directed toward the edge of the paper 12.

Positioned in spaced-apart relation, just below the roller 38, are two guide plates 47 and 47a which maintain the outer edge of the paper 12 relatively close to the feed chute 36. Similar guide plates (not shown) are positioned below the roller 39 on the opposite side of the feed chutes.

With the paper thus formed in a double-U cross-section, it passes between sealing pads 48 and 49. At predetermined intermittent intervals while the paper web is stationary, the pads 48 and 49 are moved toward each other to seal the paper in an L-shaped seal. This form of sealing is well known in the art and is also adaptable for use with the apparatus according to the present invention.

The pad 48 is heated by an electric coil having leads 51 and 52, and the electric current flow through these leads 51 and 52 is controlled by a suitable source (not shown) to accurately control the temperature developed by the pad 48. On the other hand, the pad 49 is made of a rubber-like substance, such as neoprene, and is not heated.

The paper 12 is passed through the apparatus in step or intermittent fashion by two gripper plates 53 and 54 which are movable horizontally and vertically. The shafts 55 and 57 which support the gripper plates 53 and 54, respectively, are slidable journaled within suitable housings 58 and 59, respectively, to permit the horizontal movement of the gripper plates 53 and 54. In addition to the horizontal movement, the housings 58 and 59 are movable vertically on suitable guide rods 56a and 56b.

To advance the paper 12, the gripper plates 53 and 54 are retracted away from the paper and the housings 58 and 59 are raised upwardly a distance equal to the height of one package. While in this raised position, the gripper plates 53 and 54 are extended to grasp the paper 12, and then the housings 58 and 59 are moved downwardly, pulling the paper web 12 through the apparatus a distance equal to the height of one package. The mechanism for controlling the movement of these gripper plates to pull the paper web through the apparatus in step fashion is well known in the art.

Positioned at some point below the gripper plates 53 and 54 is a shearing mechanism illustrated diagrammatically as including cooperating blades 60 and 61 in Fig. 2. Of course, any suitable cutting mechanism may be used, it only being required that each cut be made substantially along the middle of the horizontal seal, indicated by the numeral 62.

For illustration purposes, assume that it is desired to fill the two pockets of the package with an infusion product such as tea. A supply of tea will be stored in a suitable hopper 70 from which it is fed by any suitable means through a conduit 71. For gravity feed, the conduit 71 may be inclined downwardly.

From the conduit 71, the tea is directed within the funnel end 72 of an intermediate conduit 73. The tea fills the top portion of the conduit 73 and is divided into two substantially equal streams by means of the partition 74 extending lengthwise of the conduit 71 for discharge through the openings 76 and 77 into the funnel-like folding member 21 and the feeding chutes 36 and 37. A gate valve 78 retains the tea in the conduit 73, pending its release into the chutes 36 and 37.

Two gate valves 80 and 81, Figs. 2 and 7, are arranged to open downwardly when the valve 78 is closed to permit the tea previously deposited into the folding member 21 to pass through the feed chutes 36 and 37 and be directed into the double pockets formed by sealing the free edges and middle fold of the sheet and sealing the movable folds transversely as indicated in Figs. 1D and 2.

After the portions of tea are introduced into the pockets, the folded sheet 12 is advanced another incre-
ment by the gripper plates 53 and 54, the heat sealing pads 48 and 49 are again actuated to seal the top of the filled pockets and also the bottom and sides of the next pockets. As mentioned above and as seen in Fig. 2, the blades 60 and 61 will cut along the middle of each horizontal seal.

After the heat-sealing pads 48 and 49 have sealed the top of each filled package, and after the blades 60 and 61 have cut along the middle of each horizontal seal, the packages produced by the apparatus will appear as shown in Fig. 1E of the drawings.

While the method and form of apparatus herein described constitute preferred embodiments of the invention, it is to be understood that the invention is not limited to this precise method and form of apparatus, and that changes may be made therein without departing from the scope of the invention which is defined in the appended claims.

I claim:

1. An apparatus for manufacturing multipocket packages comprising a funnel-like folding member having a pair of downwardly converging side walls, a back wall and an open front, means for moving a strip of sheet material in one direction over said open front in engagement with said side walls, a plate-like member extending between said side walls toward said back wall and engag- ing the opposite side of said strip from that against which the side walls bear to fold the strip along its longitudinal center line, means to fold lateral edge portions of the strip against the outsides of said side walls to render said folded sheet material substantially double-U in cross-section, means to seal the free edges of the folded strip to its mid-portion along said longitudinal center line and transversely to form at least two pockets and separate feed chutes means extending downwardly from the lower end of said funnel-like member into the folds of said strip for directing the product into the respective pockets.

2. An apparatus for manufacturing multipocket packages comprising a funnel-like member having an open side, downwardly converging side walls having free edges adjacent to said open side and a substantially trapezoidal back wall, means for supplying a web of filter paper in a substantially vertical direction over said open side in engagement with the free edges of said side walls, a folding member extending lengthwise of the web of filter paper and between said side walls almost into engagement with said back wall adjacent to the lower end thereof, said folding member engaging the side of the web opposite from that engaged by said side walls, means to fold the opposite edges of the web against the outside of said side walls to form a substantially double-U cross-sectional configuration, sealing means to seal the folded filter paper along predetermined edges to form at least two pockets, means to deposit a product into each pocket, the sealing means being adapted to seal closed each pocket after the product is deposited therein, and means to sever each completed package from the web.

3. An apparatus for manufacturing multipocket packages as set forth in claim 2, wherein the means to deposit a product includes a feed conduit having a constricted portion of predetermined dimensions, and a partition the upper edge of which is spaced a predetermined distance from the input to the conduit so that the product divides in a predetermined manner on each side of the partition.

4. An apparatus for manufacturing multipocket packages as set forth in claim 3, wherein the feed conduit is provided with a gate on each side of the partition for controlling the product passing therethrough.

5. An apparatus for manufacturing multipocket packages comprising means for supporting a roll of infusion filter paper having a heat-sensitive adhesive coating on one side thereof, roller means for directing a web of the filter paper downwardly in a substantially vertical direction, first guide means to urge the center portion of the web in one direction, a three-sided funnel-like folding member positioned below the first guide means with the open side extending in a direction opposite to the first guide means, a brush positioned on each side of the folding member, roller means positioned below each of the web, a tongue extending in the same direction as the first guide means and positioned to urge the center portion of the web into the open side of the funnel-like folding member, roller means positioned below each of the brushes to be in frictional engagement with the web adjacent each opposite edge, the roller means being adapted at a predetermined angle to provide a resultant force directed toward each edge of the web, separate feed chute means positioned below the funnel-like folding member for providing a continuous outer surface against which the web is urged, means to apply an L-shaped seal to the folded web to form two separate pockets, a feed conduit positioned above the folding member for communicating a supply of an infusion product from a reservoir to the funnel-like folding member, a portion of the feed conduit adjacent its input end being constricted to predetermined dimensions, a partition within the feed conduit spaced from the upper constricted end by a predetermined distance for dividing the infusion product, gate means on each side of the partition adjacent its lower end for controlling the flow of the infusion product therethrough whereby a supply of an infusion product is divided between opposite sides of the funnel-like folding member for supplying the two feed chutes to deposit the product within each pocket formed by the L-shaped seal, the sealing means being adapted to close each pocket, and a cutting means to sever each pocket from the web.

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CERTIFICATE OF CORRECTION

Patent No. 2,978,853

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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 6, line 23, for "member, roller means positioned below each of" read -- member for folding back the opposite edges of --.

Signed and sealed this 26th day of September 1961.

(SEAL)
Attest:

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