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(54) **SYSTEM FOR FORMING PACKAGES FROM FILM MATERIAL**

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B65B 31/00	(2006.01)

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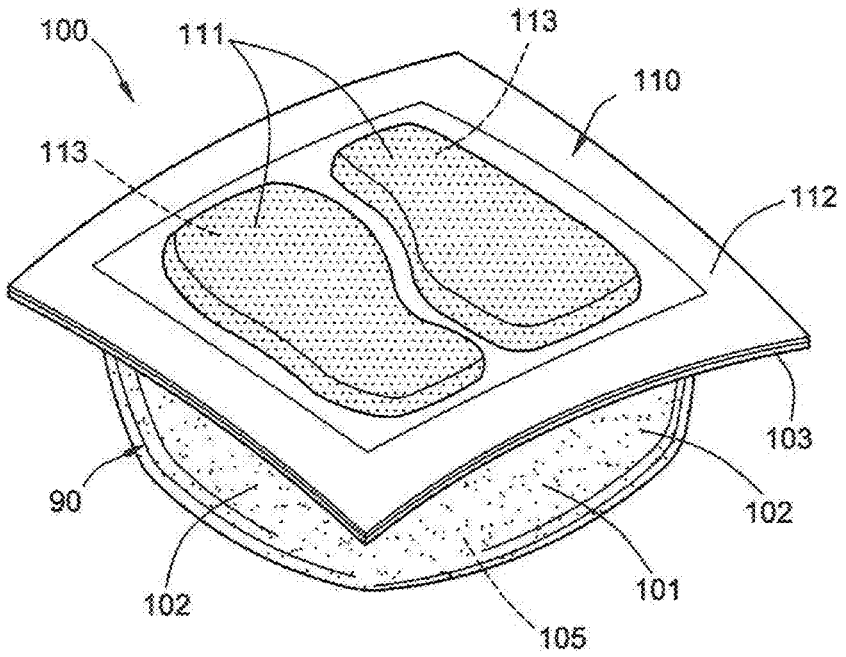
(57) **ABSTRACT**

An apparatus for forming sealed pouches comprising: a rotatable base forming drum having an outer surface with a plurality of base tooling cavities in the outer surface; a base stock supply mechanism for feeding a base stock film of material along a base stock path, a portion of the base stock path extending along the outer surface of the base forming drum; a system for displacing the base stock film into the base tooling cavities to form a pocket of base stock film material within each base tooling cavity; a material feed mechanism for feeding at least one material into each pocket of the base stock film; a rotatable lid forming drum having an outer surface with a plurality of lid tooling cavities in the outer surface; a lid stock supply mechanism for feeding a lid stock film of material along a lid stock path, a portion of the lid stock path extending along the outer surface of the lid forming drum; a system for displacing the lid stock film into the lid tooling cavities to form a lid recess of lid stock film material within each lid tooling cavity; a material feed mechanism for feeding a material into each lid recess of the lid stock film; and mechanism bringing the base stock web and the lid stock web into contact under pressure. In one form, the material fed into the lid recesses is a hardenable material and cooling is used to cool the lid recesses.



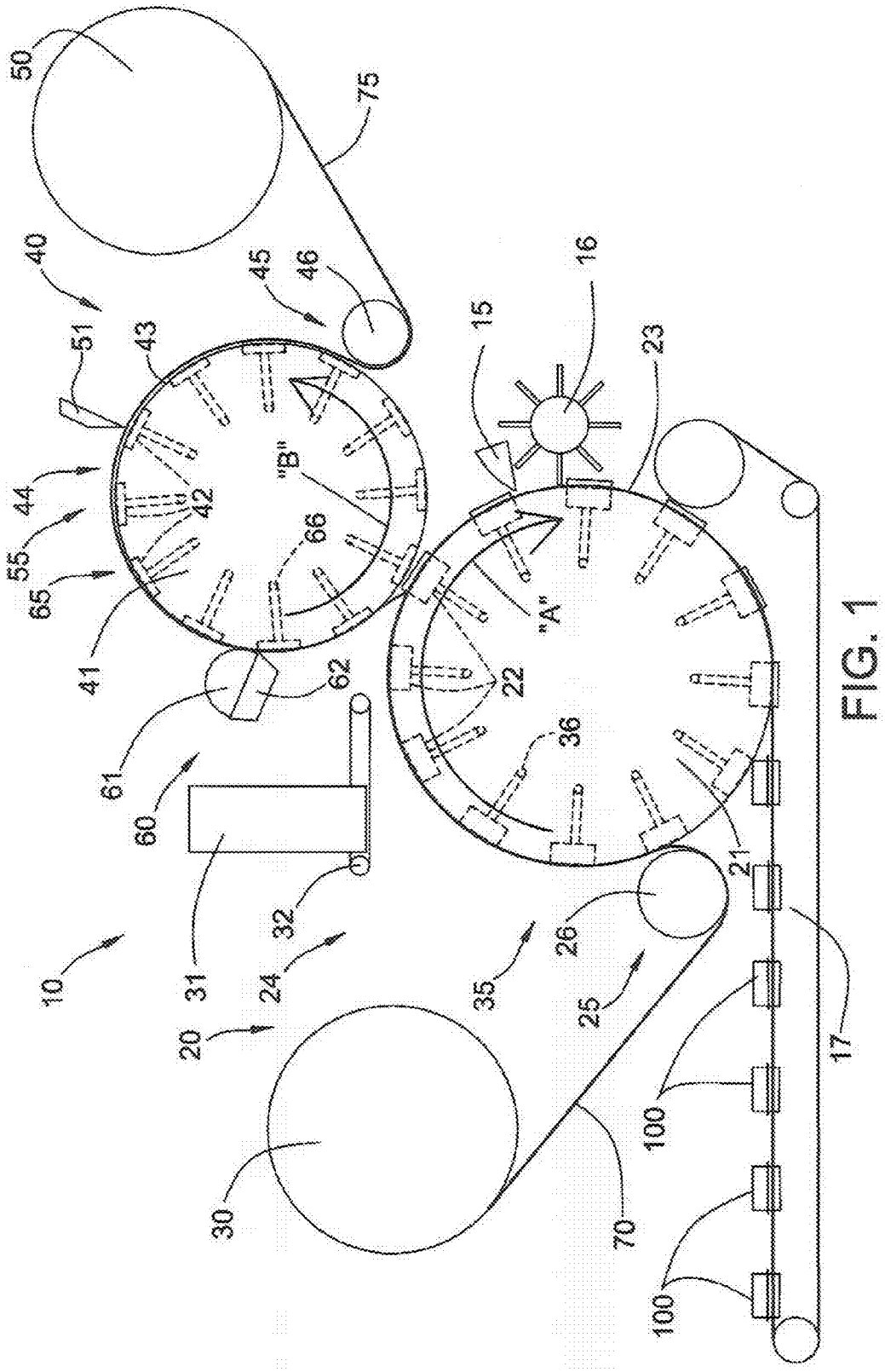

50
75
40
45
46
16
15
23
51
43
"B"
"A"
44
42
66
55
65
41
22
62
61
36
60
21
26
32
31
24
35
25
10
20
30
70
100
100
17

FIG. 1

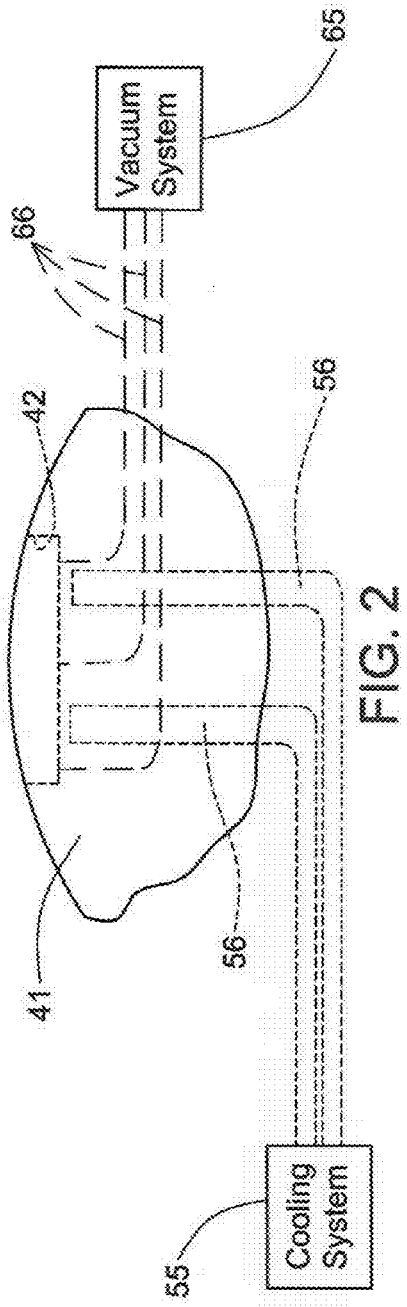

Vacuum System
65
66
42
56
56
41
Cooling System
55

FIG. 2

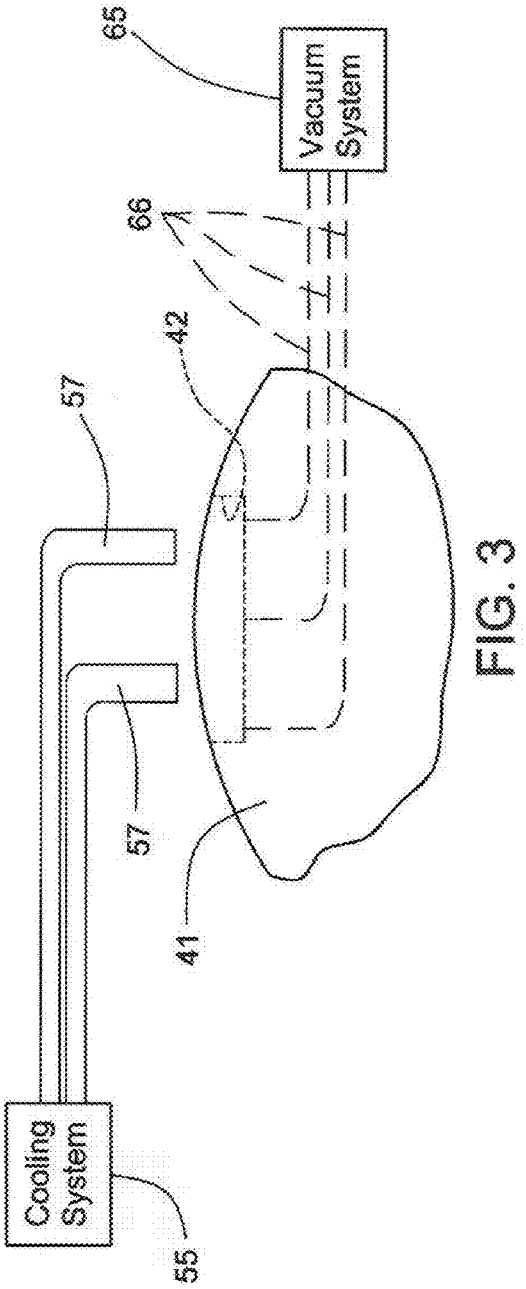

65
Vacuum System
66
42
57
57
41
Cooling System
55

FIG. 3

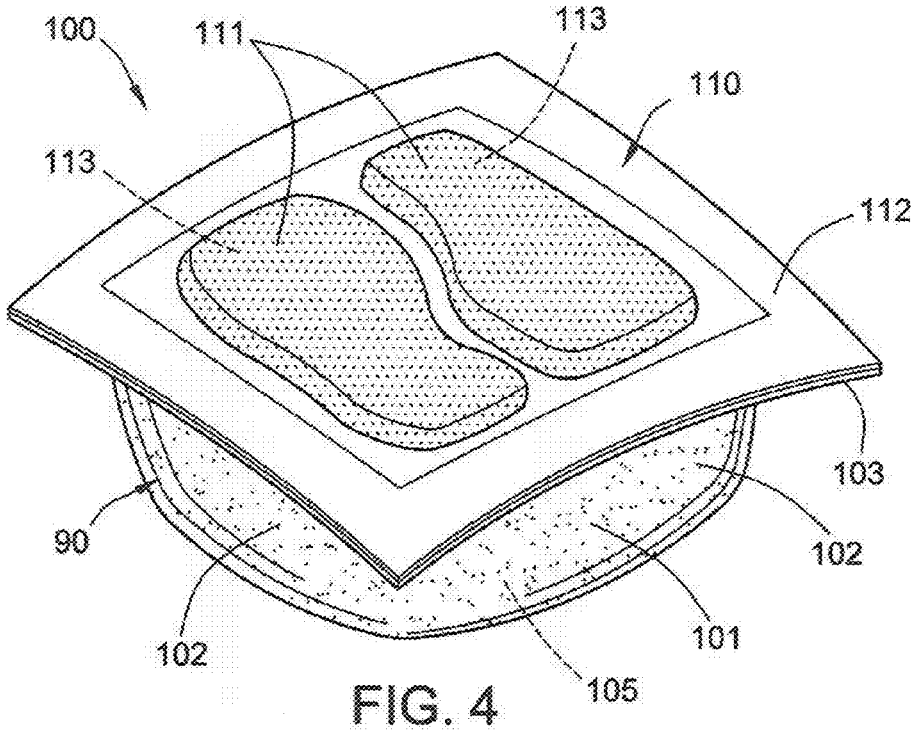

100
111
113
110
113
112
103
90
102
102
101
105

FIG. 4

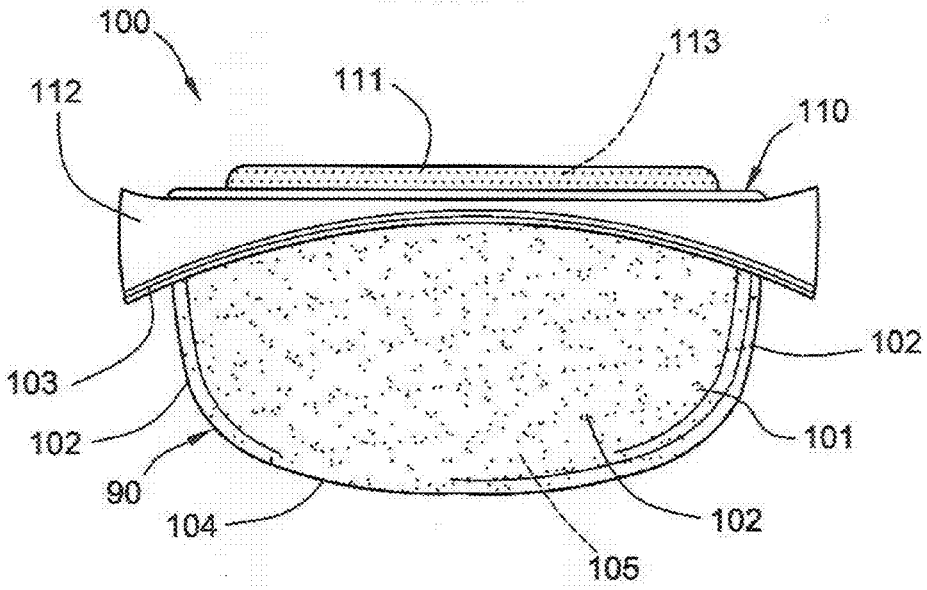

100
113
112
111
110
102
103
101
102
90
104
102
105

FIG. 5

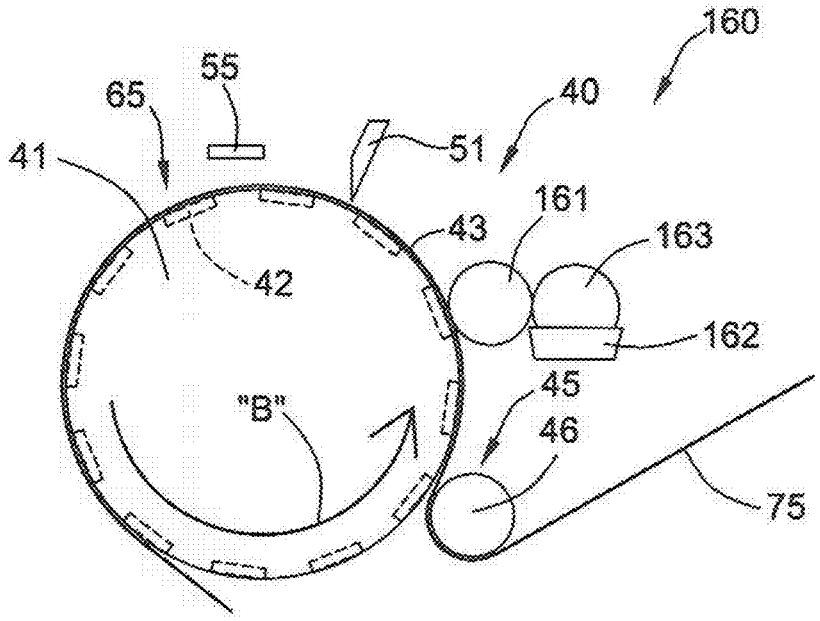


FIG. 6

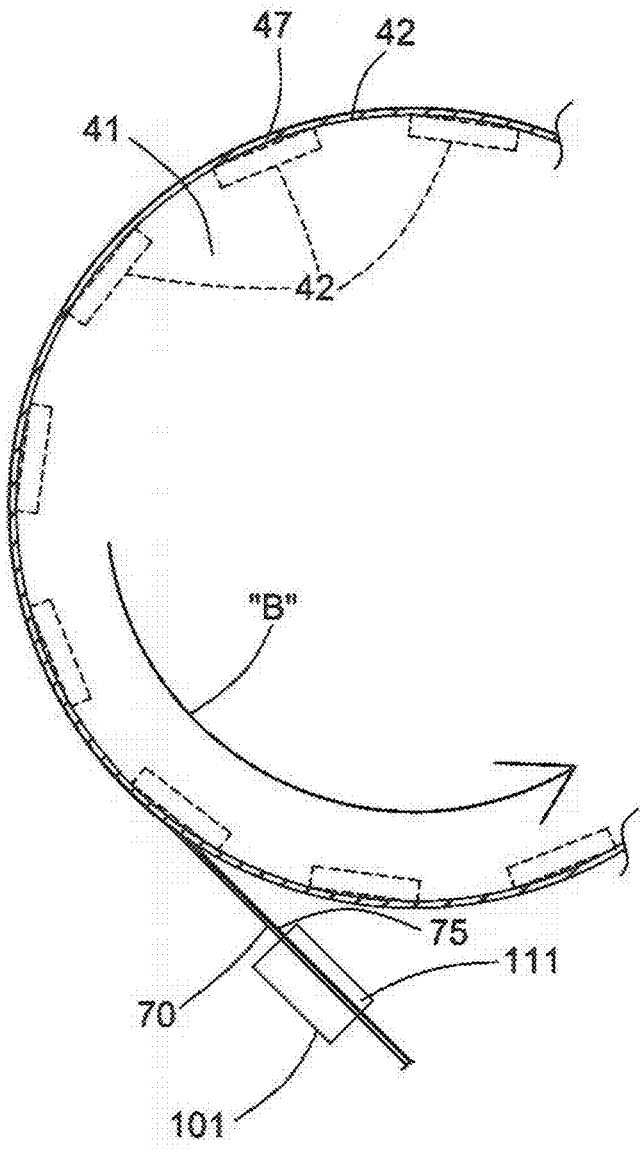


FIG. 7

SYSTEM FOR FORMING PACKAGES FROM FILM MATERIAL

CROSS-REFERENCE TO RELATED APPLICATION

[0001] This application claims priority to U.S. Provisional Application Ser. No. 62/238,494, filed Oct. 7, 2015, entitled "System for Forming Packages From Film Material," and U.S. application for patent Ser. No. 15/004,409, filed Jan. 22, 2016 entitled System for Forming Packages from Film Material, the contents of which are hereby incorporated by reference herein as if fully set forth.

TECHNICAL FIELD

[0002] This disclosure relates generally to a package forming system and, more particularly, to a system utilizing a rotary drum to thermoform pouches from a continuous web and a method of forming and filling the pouches.

BACKGROUND

[0003] Machines or systems are known for forming pouches or packages from two continuous webs in which a first or base stock film is thermoformed to define a pocket that may be filled to some extent with one or more products or materials and subsequently closed by a second or lid stock film.

[0004] To form the pouches, the base stock film is fed from a supply roll and heated to a temperature sufficient to allow thermoforming. The heated film is continuously wrapped or routed around a base forming drum or roller having a plurality of cavities along an outer surface thereof and a vacuum is applied within each cavity to pull a portion of the heated film into each cavity to form a plurality of base stock pockets as the film is fed and the drum rotated. After the base stock pockets are formed and as the base stock film is continuing to be fed and the drum rotated, each of the base stock pockets may be filled with one or more desired products or materials while the pocket is still positioned within its cavity on the drum.

[0005] As the base stock film is being fed from its supply roll, the lid stock film is fed from a supply roll towards the base forming drum and into contact with the base stock film to seal each base stock pocket after the pocket has been filled to a desired level. To do so, any combination of heat, pressure, and/or a solvent may be applied to either or both of the base stock film and the lid stock film before or as the two films are brought together to continuously seal each pocket and form each sealed pouch or package. The combined base stock and lid stock films are subsequently cut to separate the individual pouches. An example of a machine and a process for forming the pouches is described further in U.S. Pat. No. 3,218,776, which is incorporated herein by reference.

[0006] When forming pouches or packages that contain multiple materials that are to be separated (e.g., a powder and a liquid), the systems used to form the pouches may utilize three or more continuous webs. In one known system for forming pouches from three continuous webs, the base stock film is drawn from a supply roll and wrapped around or engages a heated roller and then around a base forming drum and drawn into cavities to form the pockets as described above. As the base stock film and base forming drum continue to be rotated, one or more desired first products or materials may be dispensed into the pockets formed within the cavities of the base forming drum.

[0007] As the pockets in the base stock film are being formed and filled, lid base stock film is drawn from a supply roll and wrapped around or engages a heated roller where the film is heated to a temperature sufficient to allow thermoforming. The heated lid base stock film is wrapped or routed around a lid forming drum or roller having a plurality of cavities along an outer surface thereof and a vacuum is applied within each cavity to pull a portion of the heated film into each cavity to define the pockets as the film is fed and the drum rotated. As the lid base stock film and lid forming drum continue to be rotated, one or more desired second products or materials may be dispensed into the pockets formed within the cavities of the lid forming drum.

[0008] As the pockets in the lid base stock film are being formed and filled, lid closing stock film is fed from a supply roll towards the lid base stock film to seal each pocket of the lid base stock after the pocket has been filled to a desired level. To do so, any combination of heat, pressure, and/or a solvent may be applied to either or both of the lid base stock film and the lid closing stock film before or as the two films are brought together to continuously seal each pocket and form a sealed lid sub-package or structure having products or materials sealed between the layers of film that form the lid sub-package.

[0009] The sealed lid sub-package is then routed towards the base stock forming drum and the base stock film. As described above, any combination of heat, pressure, and/or a solvent may be applied to either or both of the base stock film and the sealed lid sub-package before or as the two structures are brought together to continuously seal each base stock pocket with the lid sub-package and form a sealed pouch having multiple products or materials sealed therein. The combined base stock and lid sub-packages are then cut to separate the individual pouches.

[0010] In another known system, pouches may be formed from four continuous webs. In doing so, the system is similar to that described above that uses three continuous webs but includes an additional continuous web that is applied to seal the base stock pockets before securing together the base sub-packages and the lid sub-packages. More specifically, base stock pockets are formed and filled as described above. An additional sealing film is secured to the base stock film using a combination of heat, pressure and/or solvent to seal the base stock pockets and form base sub-packages. After the lid sub-packages are formed as described above, the base sub-packages and the lid sub-packages are secured together to form the sealed pouches having different products or materials sealed therein. In one embodiment, the base sub-packages and the lid sub-packages may be secured together using a combination of heat, pressure and/or solvent. In another embodiment, the base sub-packages and the lid sub-packages may be secured together using an adhesive. After securing together the base sub-packages and the lid sub-packages, the webs forming the pouches may be cut to separate the individual pouches.

SUMMARY

[0011] An apparatus for forming sealed pouches comprising: a rotatable base forming drum having an outer surface with a plurality of base tooling cavities in the outer surface; a base stock supply mechanism for feeding a base stock film of material along a base stock path, a portion of the base

stock path extending along the outer surface of the base forming drum; a system for displacing the base stock film into the base tooling cavities to form a pocket of base stock film material within each base tooling cavity; a material feed mechanism for feeding at least one material into each pocket of the base stock film; a rotatable lid forming drum having an outer surface with a plurality of lid tooling cavities in the outer surface; a lid stock supply mechanism for feeding a lid stock film of material along a lid stock path, a portion of the lid stock path extending along the outer surface of the lid forming drum; a system for displacing the lid stock film into the lid tooling cavities to form a lid recess of lid stock web material within each lid tooling cavity; a material feed mechanism for feeding a material into each lid recess of the lid stock film; and mechanism bringing the base stock film and lid stock film into contact under pressure. In one form, the material fed into the lid recesses is a hardenable material and cooling is used to cool the lid recesses.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] FIG. **1** is a schematic illustration of a pouch forming apparatus in which the principles disclosed herein may be used;

[0013] FIG. **2** is an enlarged, fragmented view of a portion of the lid forming drum of FIG. **1** and systems associated therewith;

[0014] FIG. **3** is an enlarged, fragmented view similar to FIG. **2** but illustrating a second embodiment of a cooling system associated with the lid forming drum;

[0015] FIG. **4** is perspective view of a pouch that may be formed with the apparatus of FIG. **1**;

[0016] FIG. **5** is an end view of the pouch of FIG. **4**;

[0017] FIG. **6** is a schematic illustration of an alternate embodiment of systems associated with the lid forming drum of FIG. **1**; and

[0018] FIG. **7** is an enlarged, fragmented view of a second embodiment of the lid forming drum of FIG. **1**.

DETAILED DESCRIPTION

[0019] FIGS. **4-5** depict a pouch or package **100** formed from two continuous webs of material. The pouch **100** includes a base **90** including pocket **101** formed from a base stock film or web of material **70**. As depicted, the pocket **101** includes four sidewalls **102** that extend downward from flange **103** and are interconnected by lower surface **104**. The pouch **100** is sealed by a cover or lid **110** formed from a lid stock film or web of material **75**. As depicted, the lid includes a pair of relatively small recesses **111** that extend upward from a flange **112** of the lid. It should be noted, however, that the lid **110** may have one or more recesses **111** and the recesses may be of identical or different sizes and shapes and are oriented to overlie the pocket **101** with flanges **103** and **112** sealed together to form pouch **100**.

[0020] In some instances, such as when the pouches **100** are utilized for cleaning products, the film may be formed of a soluble material such as a water soluble film. In one example, the film may be formed of a polyvinyl alcohol material. Other materials are contemplated. Pocket **101** and recesses **111** may be filled with any desired products and/or materials. As depicted in FIGS. **4-5**, pocket **101** may be filled with a powder material **105** such as a detergent and the recesses **111** may be filled with a paste or a wax-like hardenable material **113** such as another detergent, a liquid, or any other suitable material.

[0021] FIG. **1** is a schematic representation of a pouch forming apparatus or system **10** for forming a plurality of the pouches **100** depicted in FIGS. **4-5**. Pouch forming apparatus **10** is generally similar to that disclosed in aforementioned U.S. Pat. No. 3,218,776. In this regard, it includes a first section **20** for forming and filling the base stock film **70** and a second section **40** for forming and filling the lid stock film **75**. The first section **20** includes a rotatable base forming drum **21**, a heater system **25**, a supply roll **30** of material that is the base stock film **70**, and a product feed mechanism **31**.

[0022] The base forming drum **21** includes a plurality of base tooling cavities **22** extending inwardly along the outer surface **23** of the drum. To increase the efficiency of the system **10**, the base forming drum **21** may include a three-dimensional array of cavities **22** around the outer surface **23** so each manufacturing step operates relative to a plurality of horizontally aligned (into the page in FIG. **1**) cavities **22**.

[0023] A vacuum system indicated generally at **35**, including conduits **36**, seen in FIG. **1**, are operatively connected to each cavity **22** to create a vacuum to draw a portion of the base stock film **70** into the cavity to form one of the pockets **101**. Such a vacuum system is well known in the art as seen, for example, in U.S. Pat. No. 3,218,776. A drive system (not shown) is operatively connected to the base forming drum **21** to rotate the drum continuously or intermittently, as desired in direction "A."

[0024] The heater system **25** is depicted as a rotatable base stock heater roller **26** positioned adjacent the base forming drum **21** and includes an internal heater to heat the base stock film **70** prior to it contacting the base forming drum and being drawn into cavity **22** to form the pocket **101**. In one embodiment, the heater system **25** may be configured as a cartridge-type heater within the base stock heater roller **26** but other types of heaters, either internal or external to a roller, may be used if desired. For example, in another embodiment, a radiant-type heater external to a roller may be used.

[0025] A product feed mechanism **31** is positioned generally adjacent the upper section **24** of the base forming drum **21** to supply one or more products and/or materials into each pocket **101** as the pocket together with base stock film **70** move along with the upper surface of the rotatable drum **21**. The product feed mechanism **31** may be fixed and the base forming drum **21** may be either intermittently stopped or rotated slowly as the material is fed into pockets **101**. In other instances, the product feed mechanism **31** may include a drive mechanism (not shown) to permit the product feed mechanism to move with the pockets **101** as the pockets move during rotation of the base forming drum **21**. The product feed mechanism **31** may be configured to feed any type, number or combination of products and/or materials including a solid, a powder, a liquid including paste or wax-type products, pills, tablets, or even other pouched products.

[0026] The second section **40** includes a rotatable lid forming drum **41**, a heater system **45**, a supply roll of continuous web material that forms the lid stock film **75**, a lid stock product feed mechanism **51**, and a lid stock wetting system **60**. The lid forming drum **41** includes a plurality of lid tooling cavities **42** extending inwardly along the outer surface **43** of the lid forming drum. As with the cavities **22**

of base forming drum **21**, the cavities **42** of lid forming drum **41** may be configured as a three-dimensional array upon the outer surface **43** of the lid forming drum.

[0027] A vacuum system generally similar to the vacuum system **35** of the base forming drum **21** indicated generally at **65** is operatively connected to each of the cavities **42** of the lid forming drum to create a vacuum within each cavity to draw a portion of the lid stock film **75** into the cavities **42** to form one or more lid recesses **110**. Conduits **66** of the vacuum system **65** are depicted schematically in FIGS. **1**, **2** and **3**. A drive system (not shown) is operatively connected to the lid forming drum **41** to rotate the drum continuously or intermittently, as desired in direction "B."

[0028] The heater system **45** is depicted in FIG. **1** as a rotatable lid stock heater roller **46** and is positioned adjacent the lid forming drum **41** and includes an internal heater to heat the lid stock film **75** prior to it contacting the lid forming drum. The heater system **45** may be of any type and, as with the heater system **25** associated with base forming drum **21**, the heater system **45** associated with lid forming drum **41** may be internal or external to roller **46**.

[0029] A lid stock product feed mechanism **51** is positioned generally adjacent the upper section **44** of the lid forming drum **41** to supply one or more products or materials into each lid recess **111** as the recesses together with lid stock film **75** move along with the upper surface of the rotatable drum **41**. As depicted, the lid stock product feed mechanism **51** is fixed but it may include a drive mechanism (not shown) to permit the lid stock product feed mechanism to move with the lid recesses **111** as the recesses move along with the lid forming drum **41**. It is contemplated that the lid stock product feed mechanism **51** may be configured as a hardenable material feed mechanism to feed any type of product or material in the form of a hardenable material such as a liquid, a paste or a wax-like material that hardens or solidifies after delivery. However, it may also be configured to deliver other materials such as solid objects, or the like that need not change phase.

[0030] Lid stock wetting system **60** is positioned adjacent the lid forming drum **41** at a position after (i.e., downstream from) the lid stock product feed mechanism **51** and before the lid stock film **75** seals the base stock film **70** at the base forming drum **21**. The lid stock wetting system **60** may apply a solvent to the lid stock film **75** to increase its tackiness to assist in adhering the lid stock film **75** to the base stock film **70**. To do so, the solvent may be provided through a wetting system or reservoir **62** to a wetting roller **61** that engages the lid stock film **75**. In an embodiment in which the base stock film **70** and lid stock film **75** are formed of a polyvinyl alcohol material, the solvent for the lid stock wetting system **60** may be water.

[0031] In an alternate embodiment depicted in FIG. **6**, a lid stock wetting system **160** may be provided before or upstream of the lid stock product feed mechanism **51**. The lid stock wetting system **160** includes a wetting roller **161** that applies a solvent to the lid stock film **75** upstream of the lid stock product feed mechanism **51**. Such a configuration may be desirable or advantageous in situations in which the material delivered into to the lid recesses **111** of the lid stock film **75** extends above the surface or plane of the lid stock film. By wetting the lid stock film **75** before the material is inserted into the recesses **111**, the material will not contaminate the wetting roller **161**. In other words, in the embodiment depicted in FIG. **1**, if the material within the recesses **111** extends above or is near the plane of the lid stock film **75** (i.e., the outer surface **43** of the lid forming drum **41**), it may contact, and contaminate, the wetting roller **61**.

[0032] As seen in FIG. **6**, in some instances, it may be difficult or undesirable to position the wetting system or reservoir **162** immediately adjacent the wetting roller **161**. In such case, the wetting system or reservoir **162** may be spaced from the wetting roller **161** and the solvent applied to a preliminary or transfer wetting roller **163** that engages the wetting roller **161** to transfer the solvent thereto.

[0033] Returning to the embodiment illustrated in FIG. **1**, the base forming drum **21** and the lid forming drum **41** are positioned adjacent each other so that after forming and filling each of the pockets **101** in base stock film **70** and lid recesses **111** the lid stock film **75** with the desired products and/or materials, the two films may be secured together to form the pouches **100**. Accordingly, one or both of the base forming drum **21** and the lid forming drum **41** may be resiliently mounted to permit relative movement between the two drums in order to apply pressure to the combined base stock film **70** and lid stock film **75** to secure the two films together at the portions defining flanges **103** and **112** of pouches **100**. In another embodiment, a separate roller or rollers could be used to apply the required pressure to secure the two films together. In still another embodiment, one or both of the base forming drum **21** and the lid forming drum **41** may have a resilient coating or material on the outer surface thereof.

[0034] A slitting knife **15** may be positioned after or downstream from the location at which the base stock film **70** and the lid stock film **75** are secured together to slit the combined films in a circumferential direction along the outer surface of base forming drum **21** to create a plurality of circumferential strips that each include a plurality of pouches **100**. A rotary knife **16** may be positioned after or downstream from the slitting knife **15** to cut the combined films laterally relative to the direction of rotation of the base forming drum **21** to cut the combined films into the individual pouches **100**. The individual pouches **100** are discharged onto a conveyor **17** for subsequent processing.

[0035] Optionally, when a hardenable material is delivered to the lid recesses, a cooling system indicated generally at **55** may be associated with the lid forming drum **41** to cool portions of the drum or a portion of a product or material in the lid recesses **111** formed in the lid stock film **75** within the drum cavities. In one embodiment depicted in FIG. **2**, the cooling system **55** may include a liquid system that internally directs a liquid through conduits **56** within the lid forming drum **41** to each of the cavities **42** of the drum to cool all or a portion of the surface (e.g., a lower surface) of the cavity. In another embodiment, the cooling system **55** may include an air or pneumatic system (or a combination of the two) that internally directs a gas through conduits **56** within the lid forming drum **41** to each of the cavities **42** of the drum to cool all or a portion of the surface of the cavity. The location and number of conduits **56** may be dependent upon the material and the temperature of the lid stock film **75**, the temperature of the cavities **42** of the lid forming drum **41**, the amount of cooling desired, the rate at which the lid forming drum is rotated, and the flow rate and type of medium (i.e., the fluid) being used as a cooling agent.

[0036] Referring to FIG. **3**, still another embodiment is depicted in which, the cooling system **55** may include an external air or pneumatic system (or a combination of the

two) that directs a gas from outside the lid forming drum **41** through external conduits **57** towards or into each of the lid recesses **111** in the film **75** within cavities **42** of the drum. The gas cools all or a portion of the lid stock film **75**, for example, the formed lid recesses **111** of the lid stock film, and/or any material placed within the recesses of the lid stock film. In this embodiment, the internal conduits **56** may be omitted from the lid forming drum **41** and the cooling system **55** configured to utilize the external conduits **57** without the internal conduits. Also, depending on the material delivered to the lid recesses **111** in the lid forming film, it may be that no cooling of the material in the lid recesses is necessary. For example, such would be the case if a solid object were placed in lid recesses **111** by the lid stock product feed mechanisms **51**.

[0037] In instances where cooling is employed, if desired, the outer surface **43** of lid forming drum **41** may include an insulative material **47** thereon as depicted in FIG. **7**. The insulative material may be any desired material including rubber, silicone, foam, and the like. If the insulative material **47** is a resilient material, it may function as the resilient coating or material referred to above that operates to assist in applying the desired pressure between the base forming drum **21** and the lid forming drum **41**. The insulative material **47** extends along the outer surface **43** and includes openings that correspond to and are aligned with the cavities **42** along the outer surface of the lid forming drum **41**.

[0038] The insulative material **47** operates to insulate the lid stock film **75** from the lid forming drum **41** except within the cavities **42**. More specifically, as the heated lid stock film **75** meets the lid forming drum **41**, it contacts the insulative material **47** along the outer surface **43** of the lid forming drum rather than contacting the outer surface itself. Upon applying a vacuum through conduits **66** of vacuum system **65**, the heated lid stock film **75** is drawn into the cavities **42**. Once the lid stock film **75** contacts the cooled cavities **42**, the portions of the film that are drawn into the cavities **42** to define the lid recesses are cooled. The portions of the lid stock film **75** that form flanges **112** contact the insulative material **47** outside of the cavities **42** and are not cooled by the cooling system **55** due to the insulative properties of the insulative material **47**. This aids in adhering the films **70** and **75** together to form pouches **100**.

[0039] If desired, in some instances, an insulative material (not shown) may be applied to the outer surface **23** of the base forming drum **21**. The insulative material may be similar or identical to insulative material **47** described above that may be applied to the lid forming drum **41**.

[0040] Turning again to FIG. **1**, in operation, a base stock film **70** such as a polyvinyl alcohol film is fed from supply roll **30** and passes around a portion of rotatable base stock heater roller **26** and is heated to a temperature sufficient to allow thermoforming. In one example, the temperature may be approximately 160° F. but other temperatures may be utilized depending upon the material of the base stock film **70**, the desired manufacturing characteristics, and the performance of the apparatus **10**. The heated base stock film **70** is routed around the base forming drum **21** and a vacuum applied to each cavity **22** pulls a portion of the heated film **70** into each cavity **22** to form the base stock pockets **101** of the pouches **100**. As the base forming drum **21** and the base stock film **70** are rotated, the product feed mechanism **31** operates to fill each base stock pocket **101** to a desired level with one or more products or materials such as powdered detergent or other material.

[0041] As the pockets **101** in the base stock film **70** are being formed and filled, the lid stock film **75** is fed from supply roll **50** and passes around a portion of rotatable lid stock heater roller **46** and is heated to a temperature sufficient to allow thermoforming. As with the example described above with respect to the base stock film **70**, the lid stock film **75** may be heated to a temperature of approximately 160° F. though other temperatures may be used. The heated lid stock film **75** is routed around the lid forming drum **41** and a vacuum applied to each cavity **42** pulls a portion of the heated lid stock film **75** into each cavity to form the lid recesses **111** of the pouches **100**.

[0042] As the lid forming drum **41** and the lid stock film **75** are rotated, the lid stock product feed mechanism **51** operates to deliver material to each lid stock recess **111** to a desired level. The material may be a hardenable material such as a wax- or paste-like detergent in the form of a heated liquid or other suitable material. The cooling system **55**, if employed, is operative to cool the hardenable material within the lid stock recesses **111** sufficiently so that the lid stock film **75** may be further processed without movement of the liquid material within the recesses.

[0043] In the example in which the cooling system **55** is internally located within the lid forming drum **41**, the lid cooling system is operative to cool the heated lid stock film **75** and the material within the recesses **111** as desired. In the example in which the cooling system **55** is located externally from the lid forming drum **41**, the cooling system may direct air or another gas towards the material within the lid recesses **111** to provide cooling. In one example, the liquid material may be sufficiently cooled if a somewhat solidified layer or surface film has been formed about its outer surface such that it adheres to itself to form a unitary element around the liquid interior. It does not flow out of the lid recesses as the lid stock film rotates around the lid forming drum **41**. In addition, such as when a solid material is delivered to the recesses **111**, it may be desirable for the material within the recesses **111** to be sufficiently cool so that it does not react with the material within the pocket **101** as the base stock film **70** and the lid stock film **75** are brought together during the sealing process described. Depending on the material delivered to the lid recesses **111** or the properties of that material, it may not be necessary to include cooling of the lid stock drum **41** or the lid stock film **75** in the process of completing filled pouches **100**.

[0044] After the lid recesses **111** in the lid stock film **75** have been filled, the lid stock film may be wetted by the lid stock wetting system **60**. In doing so, water or another solvent may be applied to the lid stock film **75** so that the film becomes sufficiently tacky to assist in securing the lid stock film **75** to the base stock film **70** along the portions defining flanges **103** and **112**.

[0045] The base forming drum **21** and the lid forming drum **41** are positioned in close proximity to apply pressure and force the base stock film **70** and the lid stock film **75** into contact with sufficient pressure to cause the two films to bond together at flanges **103** and **112** to seal the pockets **101** and form the pouches **100**. The combined base stock film **70** and lid stock film **75** continues to travel around the base forming drum **21** until reaching the slitting knife **15** and the rotary knife **16** which cut the combined films into the

individual pouches **100**. The individual pouches **100** may then be discharged along conveyor **17** for further processing.

[0046] Although the lid **110** is depicted with two distinct lid recesses **111** that include material therein, the lid may include any number of recesses with material therein including one or more.

[0047] It will be appreciated that the foregoing description provides examples of the disclosed system and technique. However, it is contemplated that other implementations of the disclosure may differ in detail from the foregoing examples. All references to the disclosure or examples thereof are intended to reference the particular example being discussed at that point and are not intended to imply any limitation as to the scope of the disclosure more generally. All language of distinction and disparagement with respect to certain features is intended to indicate a lack of preference for those features, but not to exclude such from the scope of the disclosure entirely unless otherwise indicated.

[0048] Recitation of ranges of values herein are merely intended to serve as a shorthand method of referring individually to each separate value falling within the range, unless otherwise indicated herein, and each separate value is incorporated into the specification as if it were individually recited herein. All methods described herein can be performed in any suitable order unless otherwise indicated herein or otherwise clearly contradicted by context.

[0049] Accordingly, this disclosure includes all modifications and equivalents of the subject matter recited in the claims appended hereto as permitted by applicable law. Moreover, any combination of the above-described elements in all possible variations thereof is encompassed by the disclosure unless otherwise indicated herein or otherwise clearly contradicted by context.

1. An apparatus for forming sealed pouches comprising:
- a rotatable base forming drum having an outer surface with a plurality of base tooling cavities in the outer surface;
- a base stock supply mechanism for feeding a base stock film along a base stock path, a portion of the base stock path extending along the outer surface of the base forming drum;
- a system for displacing the base stock film into the base tooling cavities to form a pocket of base stock film within each base tooling cavity;
- a material feed mechanism for feeding at least one material into each said pocket of said base stock film;
- a rotatable lid forming drum having an outer surface with a plurality of lid tooling cavities in the outer surface;
- a lid stock supply mechanism for feeding a lid stock film along a lid stock path, a portion of the lid stock path extending along the outer surface of the lid forming drum;
- a system for displacing the lid stock film into the lid tooling cavities to form a lid recess of lid stock film within each lid tooling cavity;
- a material feed mechanism for feeding a material into each said lid recess of said lid stock film; and
- mechanism bringing said base stock film and said lid stock film into contact under pressure.

2. An apparatus for forming sealed pouches as claimed in claim **1**, wherein said material feed mechanism for feeding material into each said lid recesses is a hardenable material feed mechanism for feeding hardenable material.

3. An apparatus for forming sealed pouches as claimed in claim **2**, further comprising,
- a cooling system associated with the lid forming drum to provide cooling along a length of the lid stock path to assist in cooling the hardenable material fed by the hardenable material feed mechanism.

4. The apparatus of claim **3**, wherein the cooling system includes cooling conduits within the lid forming drum which provides cooling to the lid tooling cavities.

5. The apparatus of claim **3**, wherein the cooling system includes cooling conduits to direct a gas towards the lid tooling cavities of the lid forming drum.

6. The apparatus of claim **4**, wherein the cooling conduits are positioned downstream of the hardenable material feed mechanism.

7. The apparatus of claim **3**, wherein the base stock path and the lid stock path intersect at a location at which the base forming drum and the lid forming drum are adjacent each other and said mechanism bringing said lid stock film and base stock film into contact under pressure forms said sealed pouches.

8. The apparatus of claim **7**, wherein one of said base forming drum and lid forming drum is resiliently mounted for applying pressure against the other drum.

9. The apparatus of claim **1**, wherein the system for displacing said base stock film and said lid stock film includes a vacuum system for generating a vacuum within the base drum cavities to draw the base stock film into the base tooling cavities to form a pocket within each base tooling cavity, and a vacuum system for generating a vacuum within the lid tooling cavities to draw the lid stock film into the lid tooling cavities to form a lid recess within each lid tooling cavity.

10. The apparatus of claim **9**, including a base stock heater to heat said base stock film and a lid stock heater to heat said lid stock film.

11. The apparatus of claim **10**, including a lid stock wetting system to apply a solvent to the lid stock film before bringing said films into contact under pressure.

12. The apparatus of claim **11**, wherein the base stock path and the lid stock path intersect at a location at which the base forming drum and the lid forming drum are adjacent each other and said mechanism bringing said lid stock film and said base stock film into contact under pressure forms said sealed pouches.

13. The apparatus of claim **12**, wherein said apparatus includes cutting mechanism to cut said films to form individual pouches after bringing said films into contact under pressure.

14. The apparatus of claim **13** wherein one of said base forming drum and lid forming drum is resiliently mounted for applying pressure against the other of said base forming drum and lid forming drum.

15. A method of forming sealed product pouches employing an apparatus having:
- a rotatable base forming drum having an outer surface with a plurality of base tooling cavities in the outer surface;
- a base stock supply mechanism for feeding a base stock film along a base stock path, a portion of the base stock path extending along the outer surface of the base forming drum;

a system for displacing the base stock film into the base tooling cavities to form a pocket of base stock film within each base tooling cavity;

a material feed mechanism for feeding at least one material into each said pocket of said base stock film;

a rotatable lid forming drum having an outer surface with a plurality of lid tooling cavities in the outer surface;

a lid stock supply mechanism for feeding a lid stock film of along a lid stock path, a portion of the lid stock path extending along the outer surface of the lid forming drum;

a system for displacing the lid stock film into the lid tooling cavities to form a lid recess of lid stock film within each lid tooling cavity;

a material feed mechanism for feeding a material into each said lid recess of said lid stock film; and

mechanism for bringing said base stock film and said lid stock film into contact under pressure;

said method comprising:

passing said base stock film over said base forming drum and forming said pockets therein filling said pockets with material using said material feed mechanism associated with said base stock pockets;

passing said lid stock film over said lid forming drum and forming said lid recesses therein;

filling said lid recesses with material using said material feed mechanism associated with said lid recesses;

bringing said base stock film and lid stock film into contact under pressure.

16. The method of claim **15** wherein the base stock path and the lid stock path intersect at a location at which the base forming drum and the lid forming drum are adjacent each other and said mechanism bringing said lid stock film and base stock film into contact under pressure forms said sealed pouches.

17. The method of claim **16** in which the apparatus includes a base stock heater to heat said base stock film and a lid stock heater to heat said lid stock web, the method further comprising heating said base stock film and lid stock film.

18. The method of claim **17** wherein said material feed mechanism for feeding material into each said lid recesses is a hardenable material feed mechanism for feeding hardenable material, the method further comprising feeding a hardenable material into said lid recesses.

19. The method of claim **18**, wherein a cooling system associated with the lid forming drum to provide cooling along a length of the lid stock path to the steps further comprising providing cooling along the length of the lid stock path.

20. The method of claim **19** wherein said apparatus includes cutting mechanism to cut said films to form individual pouches, the steps further comprising cutting said films to form individual pouches.

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