



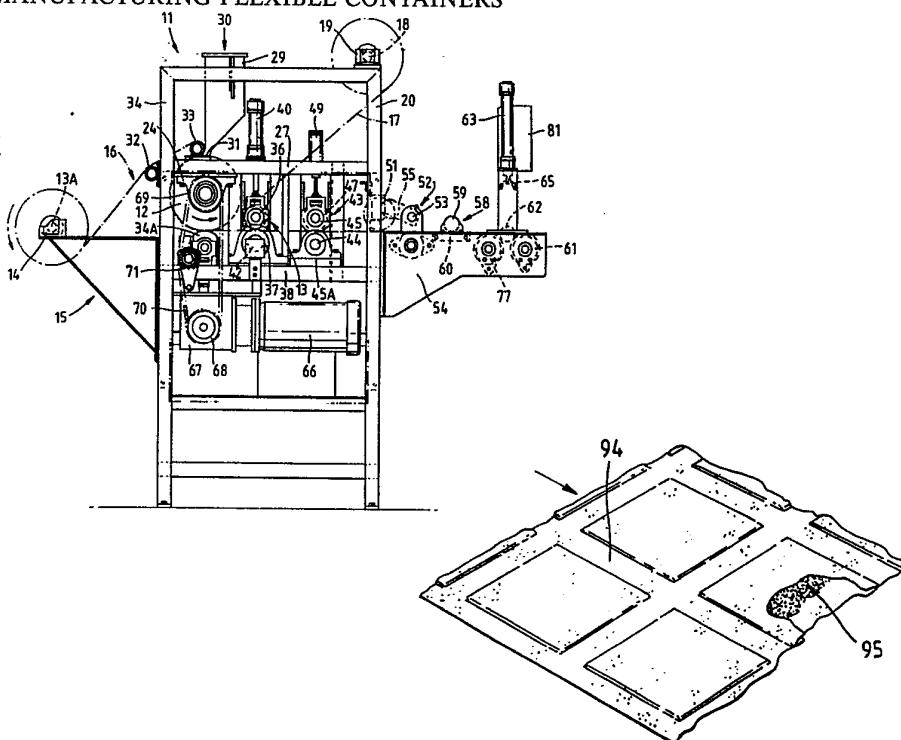
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(54) Title: APPARATUS FOR MANUFACTURING FLEXIBLE CONTAINERS**(57) Abstract**

An apparatus for manufacturing flexible containers of the type comprising particulate material located between two flexible web members (16, 17), the apparatus comprising a first feed means suitably in the form of one or more drive roller assemblies (13, 43) for advancing a first flexible web member through the apparatus, a metering means suitably in the form of a metering roller (12) having recesses (84) on its peripheral face to accommodate the particulate material and to deposit the particulate material onto the first flexible web member, second feed means suitably in the form of a roller assembly (13, 43) to pass a second flexible web member over the first flexible web member containing the particulate material,

and sealing means suitably comprising a roller assembly (13) having one of the rollers including heated zones (94) or portions along its external surface such that when the first and second web members pass between the rollers the web members are sealed together along areas corresponding to contact of the web members with the heated zones or portions. In this manner, there can be formed flexible containers or sachets containing particulate material such as super absorbant polymer which can be immersed in water and subsequently frozen to be used as a heat exchange pad.



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TITLE

APPARATUS FOR MANUFACTURING FLEXIBLE CONTAINERS

FIELD OF INVENTION

5 This invention relates to an apparatus for manufacturing flexible containers and especially for manufacturing flexible containers comprising particulate material located between two flexible web members and a flexible container manufactured by such an apparatus.

BACKGROUND ART

10 Flexible containers such as containers made of fabric or mesh material are usually formed from a single sheet of material which is folded to define edges and then sealed along those edges. Normally, one edge is left unsealed through which material can be inserted into the
15 container whereafter that edge is also sealed. This process however is cumbersome and does not easily lend itself to inexpensive manufacture of such containers.

It is an object of the invention to provide an apparatus for manufacturing flexible containers which may
20 overcome the abovementioned disadvantages.

DISCLOSURE OF INVENTION

In one form, the invention resides in an apparatus for manufacturing a flexible container comprising particulate material located between two flexible web
25 members, said apparatus comprising

first feed means for advancing a first flexible web

member through said apparatus,

metering means for metering the particulate material onto one side of said first flexible web member,

5 second feed means for passing a second flexible web member over said first flexible web member subsequent to the particulate material being metered thereon, and,

sealing means for sealing said first and second flexible web members together to form the flexible container containing the particulate material.

10 The first feed means suitably includes one or more drive roller assemblies for advancing the first flexible web member through the apparatus. The first feed means may also include one or more guide members to assist in the advancement of the first flexible web member.

15 The or each drive roller assemblies may comprise a pair of opposed rollers between which the first flexible web member can pass. Suitably, one of the pair of rollers is a driven roller and the other of the pair of rollers is a free roller. The pair of opposed rollers may be disposed such
20 that one roller extends substantially above the second roller and it is preferred that in this configuration the upper roller is a free roller and the lower roller is a driven roller.

The spacing between the pair of opposed rollers may
25 be varied to allow web members of various thickness to pass between the rollers. Suitably, the driven roller is fixed

and the free roller is movable towards and away from the driven roller. The free roller may be freely movable towards and away from the driven roller or may be actuated by an actuating means.

5 The actuating means may be mechanically, hydraulically or pneumatically powered to move the free roller away from and/or towards the drive roller. Preferably, the actuating means comprises a ram.

10 The first feed means suitably comprises at least two drive roller assemblies spaced from each other.

15 The guide members may comprise elongate tubes having a smooth external radial surface along which the first flexible web member may advance. The guide members can assist in guiding the web member to, from, or between the various rollers in the apparatus. The guide members are suitably fixed in position and do not rotate.

20 The metering means suitably comprises a metering roller. The metering roller is suitably driven about its longitudinal axis. The metering roller may have an outer radial periphery provided with at least one recess to accept the particulate material. Preferably, the periphery is provided with a plurality of such recesses. The recesses may be regularly spaced along the periphery of the roller and in substantially linear alignment and may also be spaced about
25 the periphery of the roller. The recesses may comprise single recesses or groups of recesses.

The first flexible web member suitably contacts the metering roller after the particulate material has been added thereto and may be maintained in contact with the metering roller upon rotation thereof to retain the particulate material within the recesses until the web is in a substantially horizontal position at which time the web suitably separates from the metering roller and contains the particulate material on one side of the web.

The first feed means suitably assists in maintaining the first flexible web member in contact with the metering roller.

The second feed means suitably comprises some or all of the drive roller assemblies of the first feed means as described above. The second feed means may also include one or more guide members. The second feed means may comprise a drive roller assembly as described above which assembly is located downstream from the metering means. The second feed means assists in passing a second flexible web member over the first flexible web member such that the particulate material is located between the two web members.

The sealing means preferably comprises a heating step to heat seal the first and second web members together. Suitably, the sealing means comprises a heated roller assembly. The heated roller assembly may comprise a pair of rollers between which the first and second web members pass. Preferably, one of the pair of rollers is heated and this

roller can be internally heated.

Suitably, the heated roller assembly as described above comprises one of the drive roller assemblies of the first feed means. It is preferred that the heated roller is a driven roller and that the other roller is a free roller.

The heated roller may include heated zones or portions along its external radial surface such that when the first and second web members pass between the rollers, the web members are sealed together along areas corresponding to contact of the web members with the heated zones or portions.

The heated zones or portions are suitably formed by providing the heated roller with spaced recesses with the surface of the roller extending between adjacent recesses forming the heated zones or portions.

Preferably, the heated roller comprises a plurality of recesses spaced along the roller and in longitudinal alignment and also about the periphery of the roller. This provides a regular array of heated zones or portions which in use seal the two web members together along a plurality of positions thereby forming a plurality of flexible containers or pockets in the web.

The apparatus may further include a storage chamber for storing the particulate material to be used in association with the metering means.

Suitably, the storage chamber comprises a hopper. The hopper may include an outlet which extends at least

partially along the metering roller. Preferably, the outlet is in sliding contact with the roller and may be located vertically above the roller such that as the metering roller rotates accross the outlet, particulate material passes into the recesses on the metering roller. The outlet may be in association with a wiper blade to ensure that the particulate material passes into the recesses. Suitably, the outlet is integrally formed with the hopper and is positioned at a lower portion of the hopper.

The apparatus may further include perforating means to perforate the sealed first and second web members subsequent to passing through the sealing means. The perforating means may include at least one cutter to cut the web members either in a continuous manner to provide separate flexible containers or in a non-continuous manner to provide lines of weakness into the sealed web members thereby allowing the various different flexible containers to be torn from the remaining portion of the sealed web members.

The perforating means may comprise a plurality of cutters which in use are spaced accross the web members to cut the members as they pass by the cutters. The cutters are preferably spaced accross the web members such that the cuts are made along the sealed portions and not throught the portions of the web members that are not sealed together.

The cutters may be mounted to a common elongate support and are suitably axially adjustable therealong.

Preferably, each cutter is also adjustable between a operating cutting position and a raised free position. The cutters may comprise a wheel or disk having a peripheral continuous cutting edge or peripheral spaced cutting edges or projections.

The perforating means may perforate the web members in the direction of travel of the web through the apparatus and/or transversely accross the direction of travel.

The apparatus may further include a take-up roller upon which the sealed web members may be wound. Preferably, the take-up roller is a driven roller.

The various drive rollers are suitably driven from a common drive means. The drive means may comprise a electric motor. The drive rollers may be coupled to the drive means by conventional drive chains and/or drive belts. Suitably, the drive means drives the metering roller through a drive chain and sprocket assembly and other drive rollers are driven by the metering roller again through conventional drive chain and/or drive belt assemblies.

The apparatus may further include a vibrating means to vibrate the web members subsequent to being sealed. The vibrating means may comprise a vibrating plate which extends accross the respective web member and vibrates it as it passes along the vibrating plate. The vibrating plate facilitates an even dispersion of the particulate material within its formed flexible container.

The first and second flexible web members are suitably formed from the same material. Preferably, the web members comprise a non-woven fabric which is suitably water permeable. The non-woven fabric is preferably formed from bicomponent filaments having a central core and a surround of a meltable material. The meltable material may comprise a thermoplastic polymer such as polyethylene. Alternatively the meltable material may comprise a heat melt adhesive. The core suitably comprises a polyester. In this manner the two web members can be sealed by heat joining the two layers of fabric. A suitable fabric is an Eleves fabric 40 cm (S0503 WDO) available from C. ITOH & CO.

In another form the invention resides in a flexible container containing particulate material, said container comprising first and second flexible web members joined together to define at least one compartment containing the particulate material, each said web member comprising a non woven fabric formed from bicomponent filaments having a central core and a surround of meltable material. The non woven fabric may be as described above.

The particulate material may comprise a water absorbing compound or composition. Suitably, the particulate material comprises a water absorbing polymer. A preferred water absorbing polymer is a cross-linked sodium polyacrylate super absorbing polymer.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will be better understood by reference to the following description of one preferred embodiment as illustrated by the accompanying drawings in which

Fig. 1 is a side view of an apparatus for manufacturing flexible containers according to a preferred embodiment.

Fig. 2 is a side view of the opposite side of the apparatus of Fig. 1.

Fig. 3 is a front view of the apparatus of Figures 1 and 2.

Figures 4A and 4B are views of the metering roller according to a preferred embodiment.

Fig. 5 is a view of the heated roller according to a preferred embodiment.

Fig. 6 is a view of the flexible containers formed by the apparatus according to an embodiment of the invention.

BEST METHOD FOR CARRYING OUT THE INVENTION

Referring to Figures 1 to 3, there is disclosed an embodiment of the apparatus for manufacturing flexible containers.

The apparatus comprises a main support frame 11 for supporting the various components of the apparatus, a metering means in the form of a metering roller 12, a sealing means in the form of a heated roller assembly 13, and first

and second feed means in the form of various rollers as shall be described in more detail below.

A first flexible web member 16 suitably in the form of a roll of web material can be supported on a roller 13A which is supported for rotation by suitable bearings 14 located on each end of roller 13A. Bearings 14 (only one shown in Fig. 1) are supported by an angle bracket 15 one leg of which is secured to main support frame 11. In this manner, roller 13A is supported at a position spaced from main frame 11 which allows easy access to the roller for mounting a roll of web material. Furthermore, with the web material mounted to roller 13A, the material will not contact the main support frame and this arrangement allows large rolls of web material to be supported by the roller.

The first flexible web member 16 (shown in phantom) is advanced through the apparatus by a series of drive roller assemblies which shall be described in greater detail below.

A second flexible web member 17 (shown in phantom) can be stored on a roll which is supported by roller 18. Roller 18 is supported for rotation by suitable bearings 19 supporting ends of roller 18. Roller 18 is in this manner mounted between opposed frame members 20, 21 of main support frame 11. Roller 18 includes tapered plugs 22, 23 which are supported on roller 18 and locate on each axial face of a roll of flexible material mounted to roller 18 to prevent axial displacement of the roll. Roller 13A can also be

provided with similar plugs (not shown). It should be appreciated that the position of the rollers 13A and 18 is for convenience only and various other positions can be envisaged.

5 Metering roller 12 includes a generally cylindrical body supported at each end by bearings within bearing houses 24 (only one shown) which are mounted to frame members 27, 28 of main support frame 11.

10 The metering roller is more clearly disclosed in Figures 4A, 4B and will be more clearly described below. The metering roller includes a plurality of recesses on its surface to accomodate particulate material.

15 A hopper 29 is positioned generally above metering roller 12 and comprises an inlet 30 in an upper portion of the hopper and an outlet 31 at a lower portion of the hopper.

20 Outlet 31 comprises an elongate opening extending along the length of metering roller 12 and is in sliding contact with the metering roller. The outlet 31 may be associated with a wiper blade to ensure that the particulate material is only received within the recesses on the metering roller (not shown). Outlet 31 is located substantially vertically above metering roller 12 which is the most convenient place to allow the particulate material to contact
25 the metering roller.

 Thus, upon rotation of metering roller 12 in the

direction indicated by the arrow of Fig. 1, the recesses will pass accross outlet 31 and particulate material will flow into the recesses from hopper 29.

Guide members 32, 33 are provided to guide the first flexible web member 16 towards metering roller 12. Guide members 31, 32 comprise cyllindrical tubes having a smooth outer surface over which the first flexible web member can slide. The guide members extend between opposed frame members 34, 35 of the main support frame 11 and are ridgidly mounted thereto. Guide member 31 locates immediately behind outlet 31 such that the first flexible web member 16 is guided over metering roller 12 immediately after particulate material is passed into the recesses as will be described in greater detail below.

Immediately below metering roller 12 is provided a positioning roller 34A which aides in maintaining flexible web member 16 in contact with the periphery of metering roller 12 in the area between guide member 33 and positioning roller 34A. Positioning roller 34A is movable towards and away from metering roller 12 by an hydraulic or pneumatic ram 34B thereby allowing web member of varying thickness to pass between positioning roller 34A and metering roller 12.

A first drive roller assembly 13 is located adjacent metering roller 12 such that the flexible web member passes from metering roller 12 to the first drive roller assembly 13. Assembly 13 comprises a pair of opposed rollers

36, 37 which are supported for rotation about their ends by suitable bearings within bearing housings. Roller 36 is located vertically above roller 37. Roller 37 is supported by its pair of bearing housings which are secured to opposed frame members 38, 39. Upper roller 36 is movable towards and away from roller 37 and can be actuated between these positions by a pair of hydraulic or pneumatic rams 40, 41 located at opposed ends of roller 36.

Roller 37 is a heated roller and is electrically heated internally. A thermostat 42 regulates the temperature of roller 37.

Upper roller 36 is not heated but normally becomes hot because of its contact or close proximity to heated roller 37.

Heated roller 37 includes a plurality of spaced recesses as more clearly shown with reference to Fig. 5. This configuration results in a pattern of heated zones or portions corresponding to the surface of the roller extending between the recesses.

First flexible web member 16 passes from metering roller 12 to first drive roller assembly 13 and passes between lower heated roller 37 and upper roller 36. As well, a second flexible web member 17 can pass from roller 18, around upper roller 36 and between roller 36 and heated roller 37. In this manner, the second flexible web member 17 is caused to pass over flexible web member 16 and the two web

members are sealed together as they pass between rollers 37 and 36, the sealing areas corresponding to contact of the web members with the heated zones or portions of heated roller 37.

5 It can be seen that in this embodiment, the first drive roller assembly 13 functions as the sealing means and also as the second feed means in passing the second flexible web member over the first flexible web member.

10 A second drive roller assembly 43 is located downstream from the first drive roller assembly 35 such that the sealed web members 16, 17 pass from the first drive roller assembly 35 towards the second drive roller assembly 43.

15 Assembly 43 again comprises a lower roller 44 and an upper roller 45. The ends of lower roller 44 are mounted to bearing housings 45, 46 (only one shown in Fig. 1) which are secured to opposed frame members 38, 39. Lower roller 44 is fixed while upper roller 45 is movable towards and away from roller 44. The ends of upper roller 45 are mounted in
20 bearing housings 47, 48 which are connected to hydraulic or pneumatic rams 49, 50 to move upper roller 45 towards and away from lower roller 44. Lower roller 44 is also formed with recesses in a manner similar to heated roller 37.

25 A counting wheel 51 is located adjacent second drive roll assembly 43 and is suitably mounted to frame members 20 and 21.

A perforating means 52 in the form of a plurality of cutters 55 - 57 is located adjacent the second drive roller assembly 43 to cut or perforate the sealed web members. The cutters are mounted to an axle 53 (as most clearly shown in Fig. 3) which is mounted adjacent its ends to a platform 54. Cutters 55 - 57 are axially adjustable along axle 53 and can be secured against axial displacements by a locking screw or similar means (not shown). Cutters 55 - 57 can be moved between an upper free position (as shown in phantom in Fig. 1 and Fig. 2) and a lower cutting position. It should be appreciated that the number of cutters can vary and only three have been shown in the embodiment.

As the sealed web material passes along cutters 55 - 57 they can be continuously cut into separate strips or intermittently cut to form lines of weakness, depending on the type of cutters used.

Adjacent the perforating means 52 is located a vibrator 58 comprising an eccentric generator 59 and a vibrating plate 60 over which the sealed web passes. Vibrator 58 facilitates an even distribution of the particulate material in each formed pocket or sachet within the web.

A take-up roller 61 is located at the end of platform 52 to take-up the web as it passes through the apparatus. A free floating roller 62 is located adjacent roller 61 to provide tension and correct feeding of the web

to take-up roller 61. A pair of hydraulic or pneumatic rams 63, 64 are located on each end of platform 54 and include an arcuate shoe 65 (only one shown) to limit the free travel of roller 62.

5 The various rollers are driven by a drive means in the form of an electric motor 66 located in a lower part of main frame 11 and supported thereby. Electric motor 66 includes a gearbox 67 having a drive sprocket 68. Drive sprocket 68 is connected to a sprocket 69 on one end of
10 metering roller 12 through drive chain 70. A tensioner 71 is located between sprocket 68 and 69 to tension drive chain 70.

 The other end of metering roller 12 (see Fig. 2) is provided with sprocket 72. Sprockets 73, 74 (74 not shown) are also located on complimentary end faces of heated roller
15 37 and roller 44 and these rollers are driven by metering roller 12 through a drive chain 74A extending about the sprockets. Drive chain 74A also extends about a return sprocket 75 and a tensioning sprocket 76.

 Take-up roller 61 is driven by a drive chain 76
20 extending about a sprocket on take-up roller 61 and a sprocket on adjacent roller 77 which itself is driven by roller 44 through drive belt 78 extending about pulleys 79, 80 located on second roller 44 and adjacent roller 77 respectively.

25 In this manner, electric motor 66 can drive the various rollers although it should be appreciated that the

series of pulleys, sprockets, drive chains and drive belts are only in the configuration provided in the embodiment for purposes of convenience and other variations can easily be envisaged.

5 A control box 81 controls the supply of power to electric motor 66 and the various hydraulic or pneumatic rams.

10 Figures 4A and 4B disclose the metering roller 12 in more detail. Metering roller 12 comprises a cylindrical body 82 and extensions 83 which extend into bearing housings to support metering roller 12 for rotation. The outer surface of cylindrical surface 82 is provided with a plurality of recesses 84 which are spaced along the cylindrical body and in linear alignment with each other and
15 also spaced about cylindrical body 82.

Each recess comprises an essentially circular mouth 85 and a tapered rear portion 86 tapering to a point.

20 Fig. 4B illustrates an alternative arrangement of recesses 84. In this alternative arrangement, groups of recesses 87 are spaced along cylindrical body 82 and in linear alignment with each other and also about cylindrical body 82. Each group of recesses 87 comprises a number of recesses 88 in a substantially oval pattern.

25 As the recesses accommodate the particulate material, it can be seen that the arrangement as illustrated in Fig. 4A will result in a web member being provided with

discrete individual mounds of particulate material while the arrangement is illustrated in Fig. 4B will result in groups of particulate material being provided on one side of the web member.

5 Fig. 5 discloses an embodiment of heated roller 37 in greater detail. Heated roller 37 includes end portions 90, 91 which extend into bearing housings (not shown) to rotatably support roller 37. Roller 37 includes a plurality of spaced recesses 92 formed on its outer surface by
10 attaching a framework 93 to the outer surface of heated roller 37. In this manner, there are formed heated zones 94 corresponding to the configuration of framework 93 which is in a heat exchange relationship with heated roller 37. Upon passage of the first and second flexible web members between
15 heated roller 37 and upper roller 36, the web members are heat sealed together corresponding to the arrangement of framework 93. Thus, it can be seen that this particular roller will heat seal the two web members together to form eight separate flexible containers accross the web members.

20 Fig. 6 discloses a sample of the web members subsequent to passing through heated roller 37 and roller 36. It can be seen that the web members have been sealed together along 94 corresponding to the heated zones of roller 37. Particulate material 95 was added by metering roller 12 with
25 the arrangement of metering roller 12 and heated roller 37 being such that the webs are heat sealed together around the

particulate material 95 to provide individual flexible containers or pockets.

The operation of the apparatus shall now be described with reference to Figures 1 to 3. A first flexible web member 16 is passed from roller 13A over guide 32 and around guide 31 and is fed about metering roller 12 and between metering roller 12 and positioning roller 34A. Upon rotation of metering roller 12, the recesses in the surface of the roller pass across hopper outlet 31 and particulate material flows into the recesses. The particulate material is then prevented from exiting the recesses upon further rotation of metering roller 12 by virtue of the the first flexible web member 16 being pressed against the surface of metering roller 12. Subsequent to passing along positioning roller 34A, the first web member 16 now adopts a substantially horizontal position and the particulate material can pass from the recesses onto an upper surface of the web member. At this time, the web member will have located on an upper surface thereon metered quantities of the particulate material at spaced intervals corresponding to the spacing and configuration of the recesses on the metering roller. A second flexible web member 17 is passed from roller 19 about upper roller 36 and passes between roller 36 and heated roller 37 concurrently with first flexible web member 16. the second flexible web member is caused to be positioned over the first flexible web member

and the web members are sealed together along areas corresponding to the heated zones of the heated roller 37.

5 The periphery of heated roller 37 is configured such that the heated zones extends around the metered quantities of particulate material such that upon passage between rollers 36 and 37, the two web members are sealed together around the metered quantities of particulate material to form the flexible containers or pockets. The sealed material is passed between rollers 44 and 45 which
10 function to facilitate movement of the web material through the apparatus. The cutters 55 - 57 either cut or introduce lines of weakness through the sealed web members and the cutters are spaced along axle 53 such that the cuts are made along the sealed joints of the two webs. Thereafter, the
15 material is vibrated to evenly disperse the polymer in the form pocket or sachet and the web is then wound over take-up roller 61.

The heated roller can operate at a temperature of about 180°C.

20 In an alternative, a transverse splitter can be positioned on platform 54 to cut the sealed web material to form the web into sheets or pads instead of the web being wound around take-up roller 61.

25 Thus, it can be seen that the apparatus is suitable for producing flexible containers and the finished product manufactured by the apparatus according to the preferred

embodiment has metered quantities of material such as super absorbent polymer each located in a discrete pocket or sachet which pockets are of a size as to permit the amount of polymer therein to absorb a predetermined quantity of water.

5 It can also be seen that the apparatus can manufacture flexible containers of any desired size or shape and the flexible containers can extend accross the full width of the web members or several flexible containers may be formed in the web members. These various shapes and sizes
10 may be formed by varying the configuration of the heated zones or portions on the heated roller of the sealing means.

The flexible containers thereby formed can be either individually cut from the remainder of the roll by the perforating means or a separate cutter or splitter to form
15 individual flexible containers. Alternatively, a number of separate flexible containers may be cut from the remainder of the roll.

The article produced by the invention is particularly suitable for absorbing liquid such as water that
20 can be taken up by the water absorbing polymer. Thus, when the pad is placed into water, the water can migrate through the fabric and be absorbed by the polymer. The absorption will continue until the pressure exerted on the polymer by the walls of the pocket is effectively equal to the internal
25 pressure in the polymer grains at which time no further water can be absorbed.

Therefore, the water absorbing ability of the pads can be varied by the amount of super absorbent polymer added to each pad and the interior volume of the pad.

5 If the pad is removed from the water and excess water removed by shaking, the pad will be effectively dry to the touch as the absorbent powder removes wetness from the fabric surface. The pad can then be frozen to provide a heat exchange medium.

10 Further advantages of the particular pad are that condensation does not form on the pad as any water condensed by heat exchange is absorbed by the polymer. Furthermore, upon absorbing heat, the frozen pad thaws out but water is not lost from the pad as it is retained by the super absorbant polymer.

15 It should be appreciated that the above embodiment is by way of exemplification of the invention only and the various other changes and modifications can be made to the invention without departing from the spirit and scope thereof as defined in the appended claims.

CLAIMS

1. An apparatus for manufacturing a flexible container comprising particulate material located between two flexible web members, said apparatus comprising first feed means for advancing a first flexible web member through said apparatus, metering means for metering the particulate material onto one side of said first flexible web member, second feed means for passing a second flexible web member over said first flexible web member subsequent to the particulate material being metered thereon, and, sealing means for sealing said first and second flexible web members together to form a flexible container containing the particulate material.
2. The apparatus as claimed in claim 1, wherein said first feed means comprises at least one drive roller assembly for advancing the first flexible web member through the apparatus.
3. The apparatus as claimed in claim 2, wherein said at least one drive roller assembly comprises a pair of opposed rollers between which the first flexible web member can pass, one of said pair of said rollers being a driven roller.
4. The apparatus as claimed in claim 3, wherein the spacing between said pair of opposed rollers may be varied to allow web members of various thickness to pass between the rollers.

5. The apparatus as claimed in claim 4, wherein one of said pair of opposed rollers is fixed and the other of said pair of opposed rollers is movable towards and away from the fixed roller.

6. The apparatus as claimed in any one of the preceding claims, wherein said first feed means comprises at least two drive roller assemblies spaced from each other.

7. The apparatus as claimed in any one of the preceding claims, wherein said metering means comprises a metering roller.

8. The apparatus as claimed in claim 7, wherein the metering roller includes an outer radial periphery provided with at least one recess to accomodate the particulate material.

9. The apparatus as claimed in claim 8, wherein said periphery is provided with a plurality of said recesses.

10. The apparatus as claimed in claim 9, wherein said recesses are spaced along the periphery of the roller and in substantially linear alignment with each other and are also spaced about the periphery of the roller.

11. The apparatus as claimed in claim 10, wherein the first flexible web member contacts said metering roller after the particulate material has been added thereto and accomodated within the recesses and is maintained in contact with the metering roller upon rotation thereof to retain the particulate material within the recesses until said first

flexible web member is in a substantially horizontal position at which time the web member separates from the metering roller and contains the particulate material on one side of the web member.

12. The apparatus as claimed in any one of the preceding claims, wherein said second feed means comprises a drive roller assembly located downstream from said metering means, said drive roller assembly having a pair of opposed rollers and whereby the first flexible web member passes between said rollers and said second flexible web member passes between said rollers and over said first flexible web member such that the particulate material is located between the two web members.

13. The apparatus as claimed in claim 12, wherein said drive roller assembly comprises a drive roller assembly of the first feed means.

14. The apparatus as claimed in any one of the preceding claims, wherein said sealing means utilises heating to heat seal said first and second web members together.

15. The apparatus as claimed in claim 14, wherein said sealing means comprises a heated roller assembly having a pair of opposed rollers between which the first and second web members can pass, one of said rollers being a heated roller.

16. The apparatus as claimed in claim 15, wherein said heated roller assembly comprises a roller assembly of the

first feed means.

17. The apparatus as claimed in claim 15, wherein said heated roller includes heated zones or portions along its external radial surface such that when the first and second web members pass between said rollers, the web members are sealed together along areas corresponding to contact of the web members with the heated zones or portions.

18. The apparatus as claimed in claim 17, wherein the heated zones or portions are formed by providing the heated roller with spaced recesses with the surface of the roller extending between adjacent recesses forming the heated zones or portions.

19. The apparatus as claimed in claim 18, wherein the heated roller comprises a plurality of said recesses spaced along the roller and in linear alignment with each other and about the periphery of the roller to provide a regular array of heated zones or portions.

20. The apparatus as claimed in any one of the preceding claims, including a hopper for storing the particulate material and passing the particulate material to the metering means.

21. The apparatus as claimed in claim 20, wherein said metering means comprises a metering roller and said hopper includes an outlet which extends at least partially along the metering roller and in sliding contact with the roller such that as the metering roller rotates across the outlet,

particulate material passes from the hopper and into the recesses of the metering roller.

22. The apparatus as claimed in any one of the preceding claims, including perforating means to perforate the sealed first and second web members subsequent to passing through the sealing means.

23. The apparatus as claimed in claim 22, wherein the perforating means includes at least one cutter to cut the sealed first and second web members either in a continuous manner to provide separate flexible containers or in a non-continuous manner to provide lines of weakness into the sealed web members thereby allowing the various different flexible containers to be torn from the remaining portion of the sealed web members.

24. The apparatus as claimed in claim 23, comprising a plurality of cutters which, in use, are spaced accross the sealed web members to cut the members as they pass by the cutters.

25. The apparatus as claimed in claim 24, wherein the cutters are mounted to a common elongate support and are axially adjustable therealong and are adjustable between an operating cutting position and a raised free position.

26. The apparatus as claimed in any one of the preceding claims, including a vibrating means to vibrate the web members subsequent to being sealed to facilitate an even dispersion of the particulate material located within its

formed flexible container.

27. The apparatus as claimed in any one of the preceding claims, wherein the drive rollers are driven from a common drive means.

28. The apparatus as claimed in claim 27, wherein the drive means drives the metering roller and other drive rollers are driven by the metering roller.

29. The apparatus as claimed in any one of the preceding claims, wherein said first and second flexible web members comprise a non-woven fabric formed by bicomponent fillaments having a central core and a surround of a meltable material.

30. The apparatus as claimed in claim 29, wherein said fillaments comprise a polyester core and a thermoplastic polyethylene surround.

31. The apparatus as claimed in any one of the preceding claims, wherein said particulate material comprises a water absorbing compound.

32. The apparatus as claimed in claim 31, wherein said water absorbing compound or composition comprises a water absorbing polymer.

33. A flexible container formed from the apparatus as described in any one of the preceding claims.

34. A flexible container containing particulate material, said container comprising first and second flexible web members joined together to define at least one

compartment containing the particulate material, each said web member comprising a non woven fabric formed from bicomponent fillaments having a central core and a surround of meltable material. The non woven fabric may be as described above.

35. The container as claimed in claim 34 wherein said fabric is water permeable.

36. The container as claimed in claim 34 or 35 wherein said core comprises polyester and said surround comprises polyethylene.

37. The container as claimed in any one of claims 34 to 36 wherein said particulate material comprises a water absorbing material.

38. The container as claimed in claim 37 wherein said water absorbing material comprises a water absorbing polymer.

30
AMENDED CLAIMS

[received by the International Bureau
on 29 April 1991 (29.04.91);

original claims 1-38 replaced by amended claims 1-34 (6 pages)]

1. An apparatus for manufacturing a flexible container comprising particulate material located between two flexible web members, said apparatus comprising first feed means for advancing a first flexible web member through said apparatus, metering means for metering the particulate material onto one side of said first flexible web member, second feed means for passing a second flexible web member over said first flexible web member subsequent to the particulate material being metered thereon, sealing means for sealing said first and second flexible web members together to form a flexible container containing the particulate material, opposed ironing rollers between which the sealed web members can pass, vibrating means to vibrate the sealed web members to facilitate even distribution of the particulate material in the formed container, and perforating means to perforate the sealed portions of the web members.
2. The apparatus as claimed in claim 1, wherein said metering means comprises a metering roller.
3. The apparatus as claimed in claim 2, wherein the metering roller includes an outer radial periphery provided with at least one recess to accomodate the particulate material.
4. The apparatus as claimed in claim 3, wherein said periphery is provided with a plurality of said recesses.
5. The apparatus as claimed in claim 4, wherein said recesses are spaced along the periphery of the roller and in substantially linear alignment with each other and are also

spaced about the periphery of the roller.

6. The apparatus as claimed in claim 5, wherein the first flexible web member contacts said metering roller after the particulate material has been added thereto and accomodated within the recesses and is maintained in contact with the metering roller upon rotation thereof to retain the particulate material within the recesses until said first flexible web member is in a substantially horizontal position at which time the web member separates from the metering roller and contains the particulate material on one side of the web member.

7. The apparatus as claimed in claim 1, wherein said sealing means utilises heating to heat seal said first and second web members together.

8. The apparatus as claimed in claim 7, wherein said sealing means comprises a heated roller assembly located downstream from said metering means and having a pair of opposed rollers between which the first and second web members can pass, one of said rollers being a heated roller.

9. The apparatus as claimed in claim 8, wherein said heated roller includes heated zones or portions along its external radial surface such that when the first and second web members pass between said rollers, the web members are sealed together along areas corresponding to contact of the web members with the heated zones or portions.

10. The apparatus as claimed in claim 9, wherein the heated zones or portions are formed by providing the heated roller with spaced recesses with the surface of the roller

extending between adjacent recesses forming the heated zones or portions.

11. The apparatus as claimed in claim 10, wherein the heated roller comprises a plurality of said recesses spaced along the roller and in linear alignment with each other and about the periphery of the roller to provide a regular array of heated zones or portions.

12. The apparatus as claimed in claim 1, wherein said first feed means comprises the opposed ironing rollers.

13. The apparatus as claimed in claim 12, wherein one of said pair of said rollers is a driven roller.

14. The apparatus as claimed in claim 13, wherein the spacing between said pair of opposed rollers may be varied to allow web members of various thickness to pass between the rollers.

15. The apparatus as claimed in claim 14, wherein one of said pair of opposed rollers is fixed and the other of said pair of opposed rollers is movable towards and away from the fixed roller.

16. The apparatus as claimed in claim 14, wherein said fixed roller has a surface profile which contacts the web members on the sealed portions.

17. The apparatus as claimed in claim 1, including a hopper for storing the particulate material and passing the particulate material to the metering means.

18. The apparatus as claimed in claim 17, wherein said metering means comprises a metering roller and said hopper includes an outlet which extends at least partially along the

metering roller and in sliding contact with the roller such that as the metering roller rotates across the outlet, particulate material passes from the hopper and into the recesses of the metering roller.

19. The apparatus as claimed in claim 1, wherein the perforating means includes at least one cutter to cut the sealed first and second web members either in a continuous manner to provide separate flexible containers or in a non-continuous manner to provide lines of weakness into the sealed web members thereby allowing the various different flexible containers to be torn from the remaining portion of the sealed web members.

20. The apparatus as claimed in claim 19, comprising a plurality of cutters which, in use, are spaced across the sealed web members to cut the members as they pass by the cutters.

21. The apparatus as claimed in claim 20, wherein the cutters are mounted to a common elongate support and are axially adjustable therealong and are adjustable between an operating cutting position and a raised free position.

22. The apparatus as claimed in claim 1 wherein the vibrating means comprises a vibrating plate.

23. The apparatus as claimed in claim 1, wherein the drive rollers are driven from a common drive means.

24. The apparatus as claimed in claim 23, wherein the drive means drives the metering roller and other drive rollers are driven by the metering roller.

25. The apparatus as claimed in claim 1, wherein said first and second flexible web members comprise a non-woven fabric formed by bicomponent fillaments having a central core and a surround of a meltable material.

26. The apparatus as claimed in claim 25, wherein said fillaments comprise a polyester core and a thermoplastic polyethylene surround.

27. The apparatus as claimed in claim 1, wherein said particulate material comprises a water absorbing compound.

28. The apparatus as claimed in claim 27, wherein said water absorbing compound or composition comprises a water absorbing polymer.

29. A flexible container formed from the apparatus as described in any one of the preceding claims.

30. A flexible container containing particulate material, said container comprising first and second flexible web members joined together to define at least one compartment containing the particulate material, each said web member comprising a non woven fabric formed from bicomponent fillaments having a central core and a surround of meltable material.

31. The container as claimed in claim 30 wherein said fabric is water permeable.

32. The container as claimed in claim 31 wherein said core comprises polyester and said surround comprises polyethylene.

33. The container as claimed in any one of claims 30 to 32 wherein said particulate material comprises a water absorbing material.

34. The container as claimed in claim 33 wherein said water absorbing material comprises a water absorbing polymer.

1/5

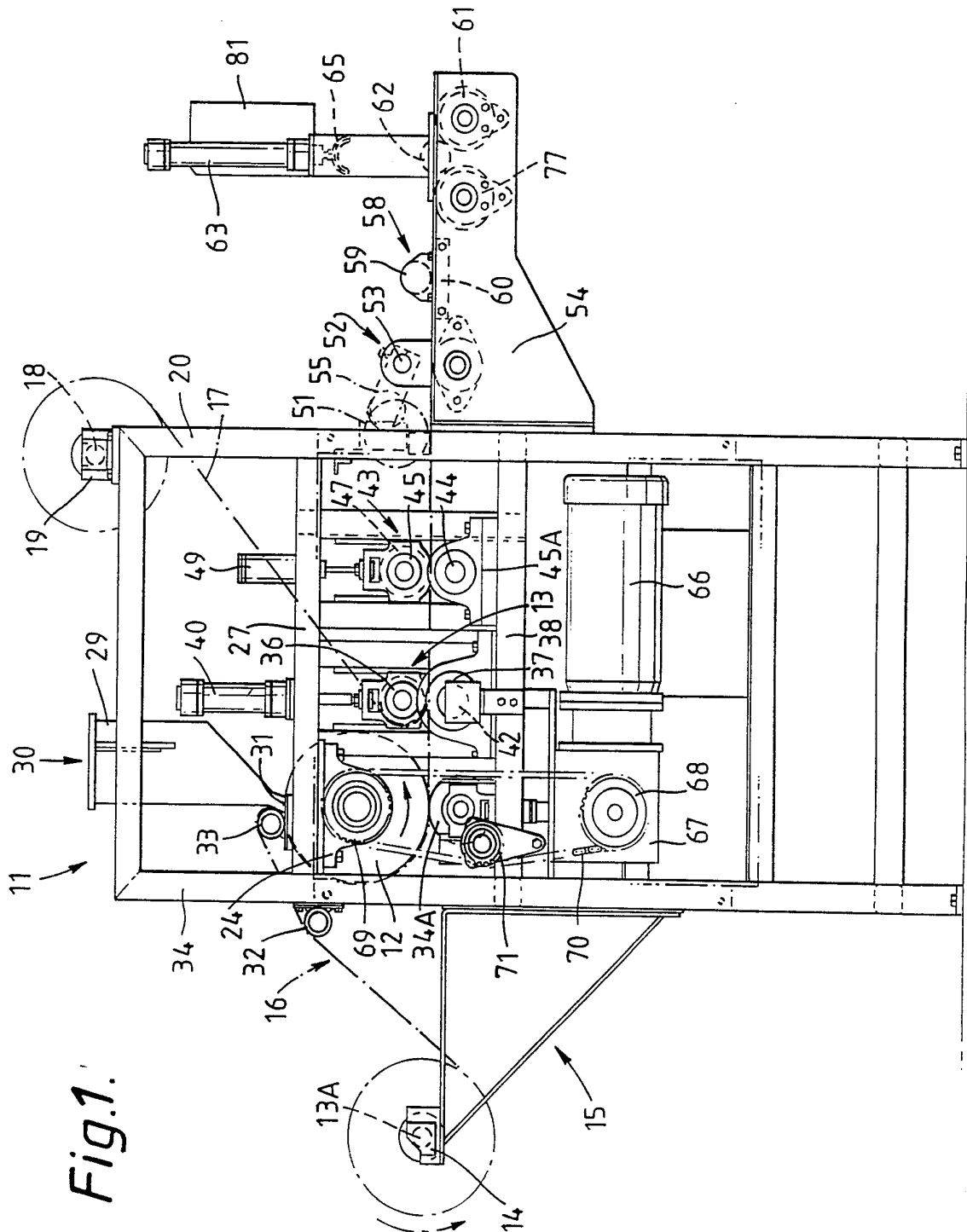
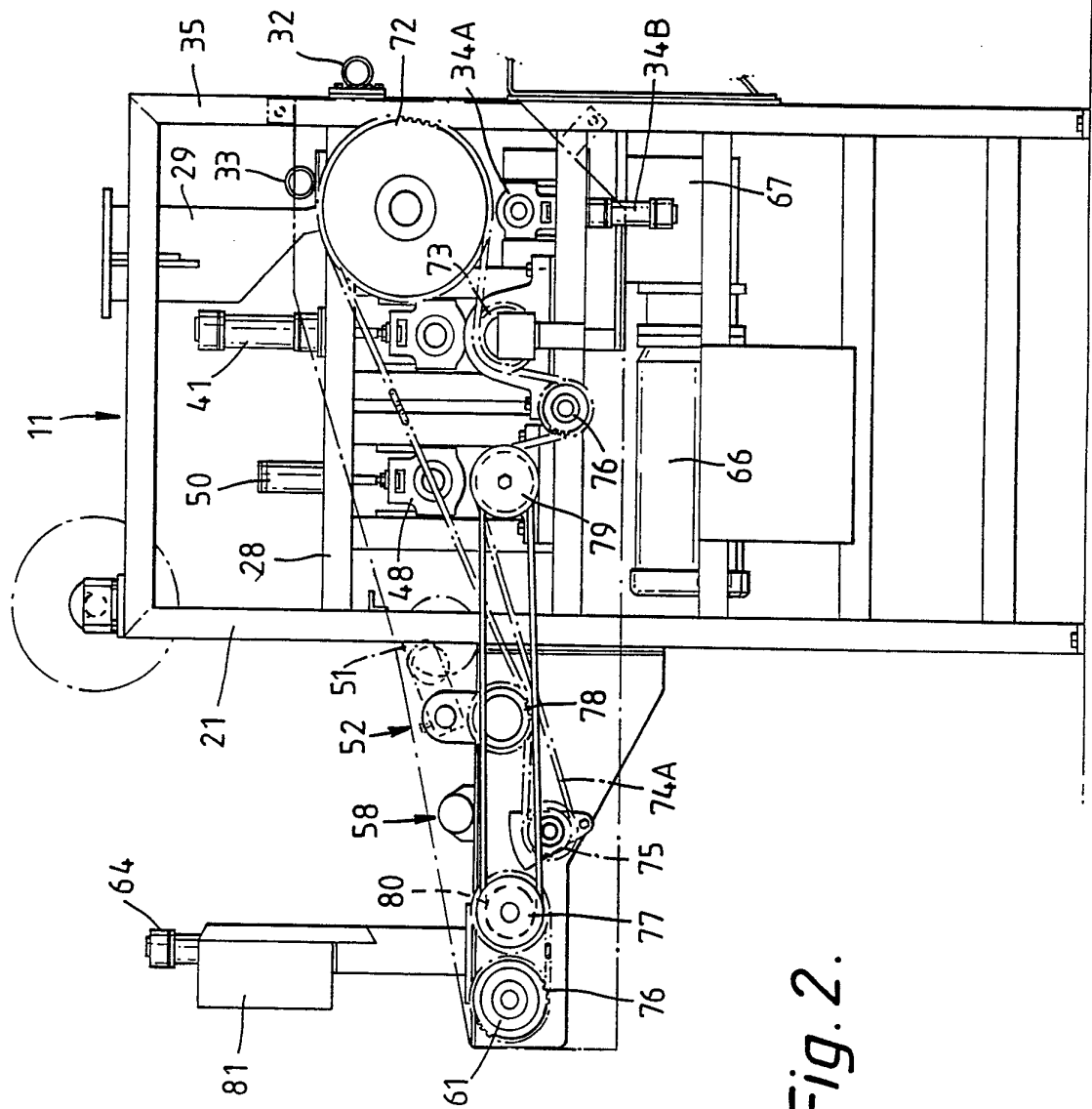
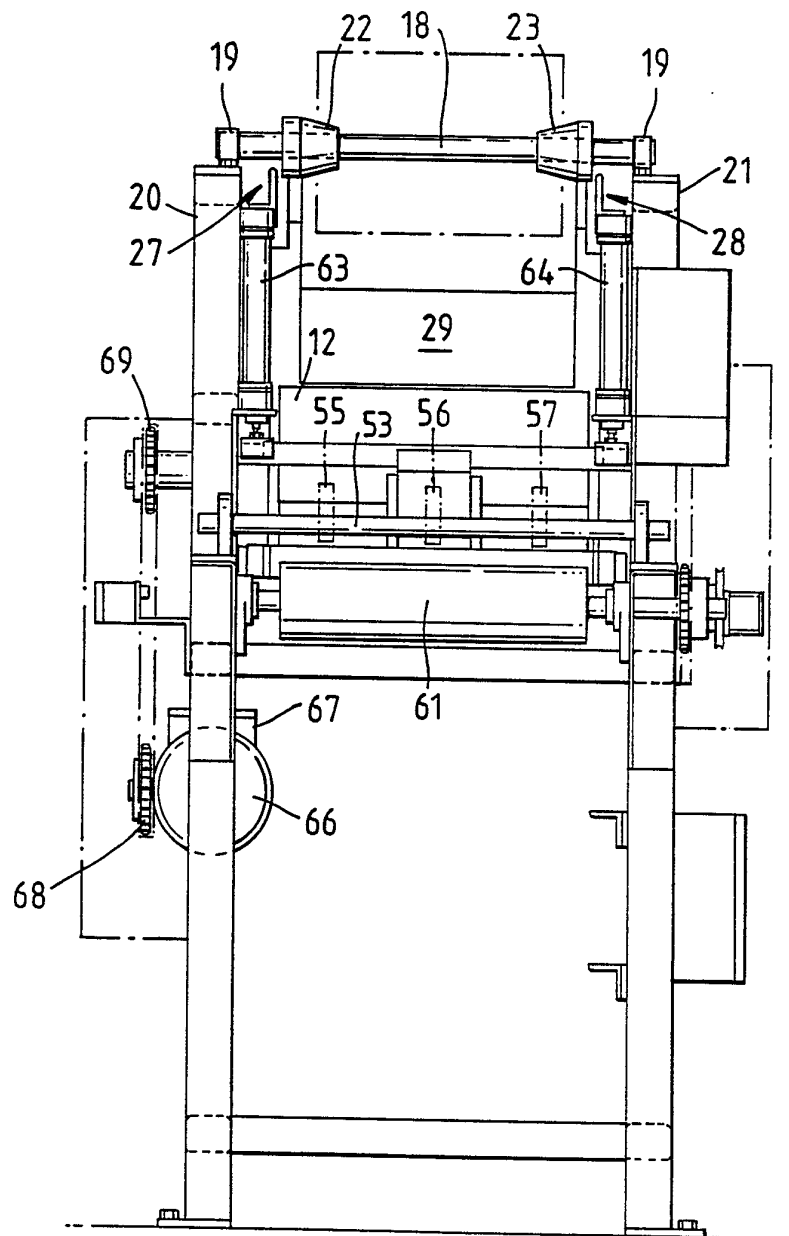


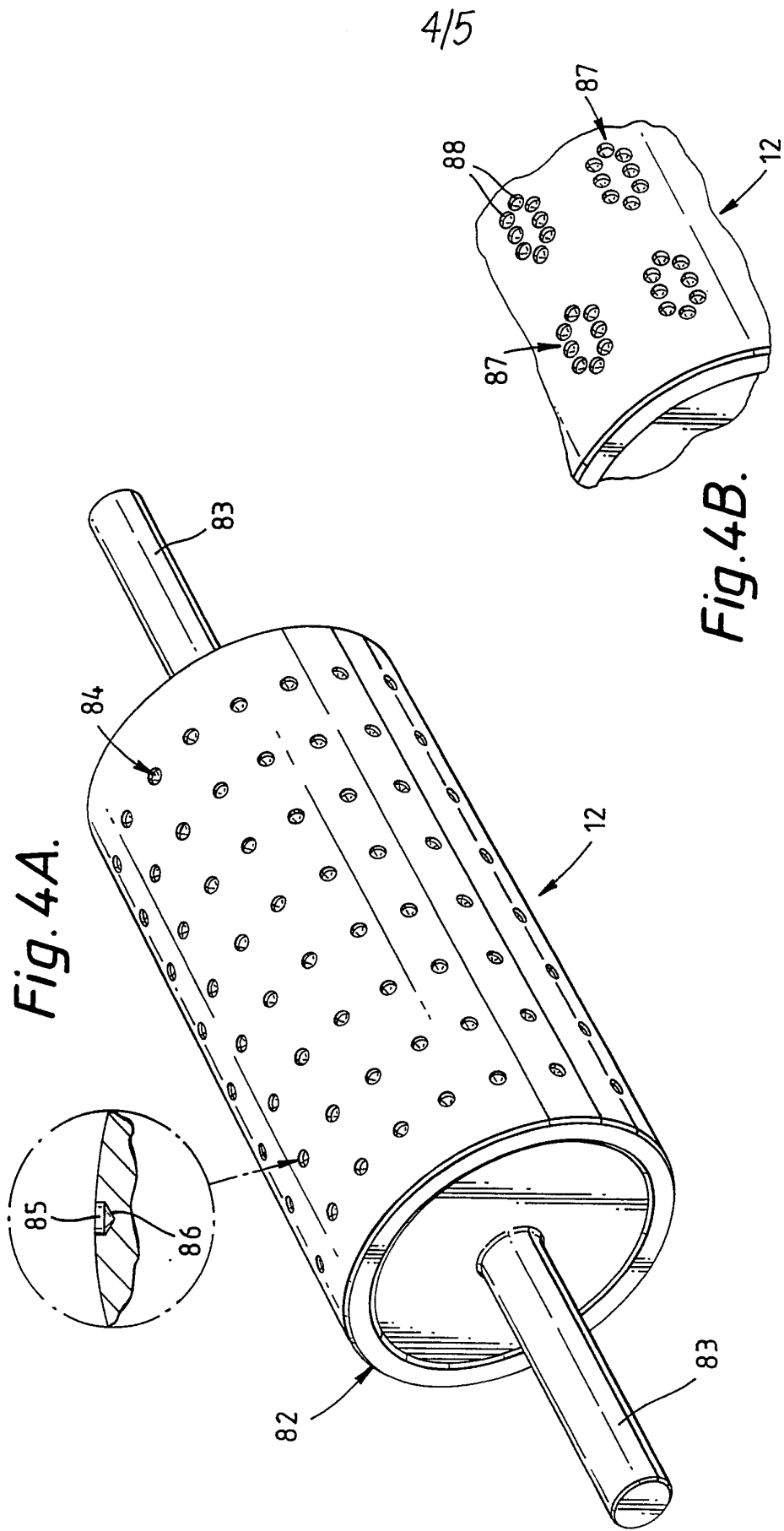
Fig. 1.

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*Fig. 3.*



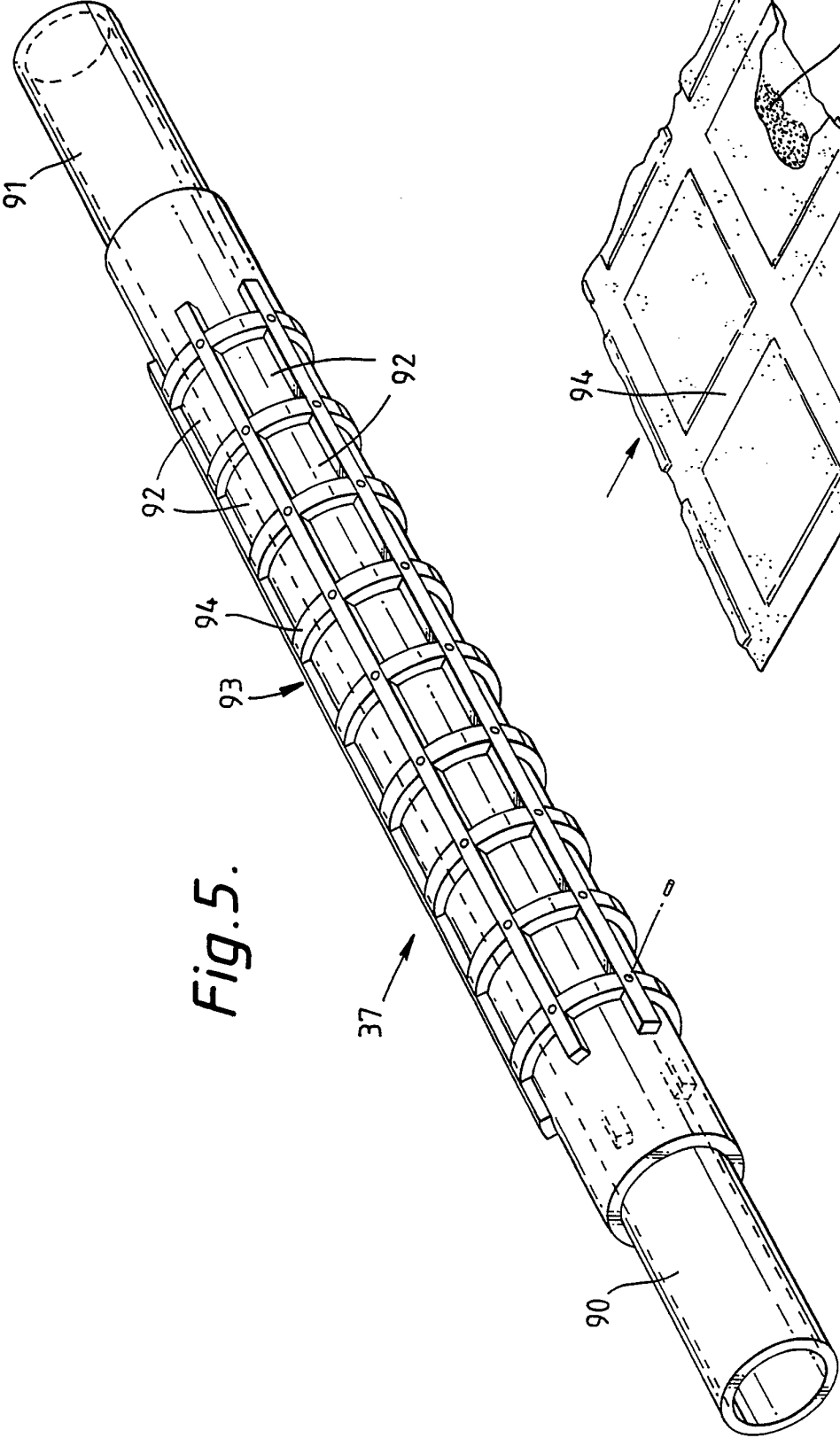


Fig. 5.

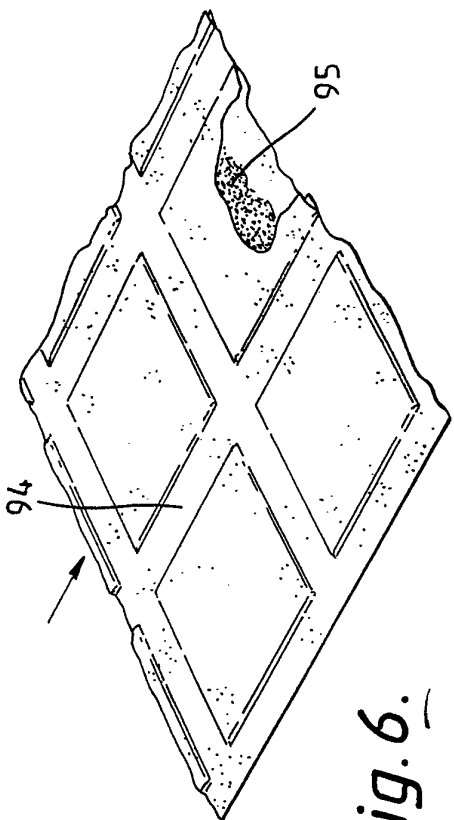


Fig. 6.

INTERNATIONAL SEARCH REPORT

International Application No. **PCT/AU 90/00544**

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) 6				
According to International Patent Classification (IPC) or to both National Classification and IPC				
Int. Cl. ⁵ B65B 9/02, B65D 30/04, 75/30				
II. FIELDS SEARCHED				
Minimum Documentation Searched 7				
Classification System	Classification Symbols			
IPC	B65B 9/02, 9/04, B65D 30/02, 30/04, 75/30, D01D 5/34			
Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched 8				
AU : IPC as above				
III. DOCUMENTS CONSIDERED TO BE RELEVANT 9				
Category*	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages 12	Relevant to Claim No 13		
X,Y	CH,A, 390773 (FR. HESSER MASCHINENFABRIK-AKTIEGESELLSCHAFT) 13 August 1965 (13.08.65) See pages 1-2 and Figs 1-5	(1-38)		
X,Y	DE,A, 1511668 (KUSTNER, FRERES & CIE S.A.) 12 June 1969 (12.06.69) See pages 2-3, Fig 1 and claims 1-3	(1-33)		
X,Y	FR,A, 1218817 (HAMAC A.G.) 12 May 1960 (12.05.60) See the entire document	(1-33)		
X,Y	CH,A, 379380 (KUSTNER FRERES & CIE S.A.) 14 August 1964 (14.08.64) See the entire document	(1-33)		
Y	FR,A, 2604193 (PARIS) 25 March 1988 (25.03.88) See the entire document	(34-38)		
(continued)				
<p>* Special categories of cited documents: 10</p> <table style="width: 100%;"> <tr> <td style="width: 50%;"> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> </td> <td style="width: 50%;"> <p>"T" Later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>"&" document member of the same patent family</p> </td> </tr> </table>			<p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p>	<p>"T" Later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>"&" document member of the same patent family</p>
<p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p>	<p>"T" Later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>"&" document member of the same patent family</p>			
IV. CERTIFICATION				
Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report			
19 February 1991 (19.02.91))	27 February 1991			
International Searching Authority	Signature of Authorized Officer			
Australian Patent Office	P. WARD			

FURTHER INFORMATION CONTINUED FROM THE SECOND SHEET

X,Y	US,A, 3498019 (RAIT) 3 March 1970 (03.03.70) See the entire document	(1-33)
X,Y	US,A, 4437294 (ROMAGNOLI) 20 March 1984 (20.03.84) See the entire document	(1-38)
Y	US,A, 4473617 (VAN LEEUWEN et al) 25 September 1984 (25.09.84) See the entire document	(34-38)
Y	GB,A, 2065474 (WERNER FREYBERG et al) 1 July 1981 (01.07.81) See the entire document	(34-38)
X,Y	AU,B, 39835/85 (574447) (PREMIER BRANDS U.K. LTD) 3 October 1985 (03.10.85) See the entire document	(1-38)
X,Y	AU,A, 59247/86 (KIMBERLY-CLARK CORPORATION) 8 January 1987 (08.01.87) See the entire document	(1-38) (contd)

V. [] OBSERVATIONS WHERE CERTAIN CLAIMS WERE FOUND UNSEARCHABLE 1

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. [] Claim numbers ..., because they relate to subject matter not required to be searched by this Authority, namely:
2. [] Claim numbers , because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. [] Claim numbers ..., because they are dependent claims and are not drafted in accordance with the second and third sentences of PCT Rule 6.4 (a):

VI. [X] OBSERVATIONS WHERE UNITY OF INVENTION IS LACKING 2

This International Searching Authority found multiple inventions in this international application as follows:

Claim 1 defines an apparatus for manufacturing whereas claim 34 defines a flexible container made from a particular matter. The common features being a flexible container made from web members which is well known.

- 1.[X] As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims of the international application.
2. [] As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims of the international application for which fees were paid, specifically claims:
3. [] No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claim numbers:
4. [] As all searchable claims could be searched without effort justifying an additional fee, the International Searching Authority did not invite payment of any additional fee.

Remark on Protest

- [] The additional search fees were accompanied by applicant's protest.
[X] No protest accompanied the payment of additional search fees.

III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)

Category*	Citation of Document, with indication, where appropriate, of the relevant passages	Relevant to Claim No
X,Y	AU,B, 69777/87 (585136) (PREMIER BRANDS U.K. LTD) 18 June 1987 (18.06.87) See the entire document	(1-38)
Y	Patents Abstracts of Japan, C 57, page 101, JP,A, 56-31015 (TORAY K.K.) 28 March 1981 (28.03.81)	(34-38)
Y	Patents Abstracts of Japan, C 643, page 105, JP,A, 1-174612 (SHOWA DENKO K.K.) 11 July 1989 (11.07.89)	(34-38)
P,Y	Patents Abstracts of Japan, C 757, page 75, JP,A, 2-160966 (UNITIKA LTD) 20 June 1990 (20.06.90)	(34-38)

ANNEX TO THE INTERNATIONAL SEARCH REPORT ON
INTERNATIONAL APPLICATION NO. PCT/AU 90/00544

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report		Patent Family Members					
US	4437294	CA	1163549	CH	646387	DE	3115589
		FR	2480707	IT	1133279	JP	57001019
AU	39835/85	GB	2156766	GB	2184052	GB	2184088
		GB	2184100	IT	1181862	NZ	211516
		NZ	219200	NZ	219202	US	4854816
		US	4712358	US	4796409		
GB	2065474	AR	228850	AT	9011/80	AU	56294/80
		BR	8007229	CH	650211	EP	25044
		GB	2065474	IL	59568	MX	154534
		SU	1148552	WO	8001866	ZA	8001382
US	4473617	BR	8200181	CA	1172815	EP	56667
		ES	508725	ES	8305432	JP	57167417
		MX	156392	ZA	8200089		
AU	69777/87	GB	2156766	GB	2184052	GB	2184088
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		US	4712358	US	4796409		
AU	59247/86	US	4715918				