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(54) Infusion package

(57) An infusion package (1) comprising a chamber (5) for containing an infusible substance, said chamber (5) being formed from three or more corresponding pieces (10) of porous material that are joined at their respective peripheral margins such that when the package (1) is immersed in a liquid the chamber (5) swells to approximate a spherical shape. The chamber (5) is preferably formed from three or four pieces (10) of porous material that are substantially round or otherwise elliptical in shape. A method and an apparatus for making such infusion packages are also described.

Fig.2.

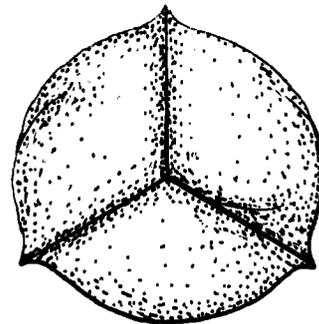
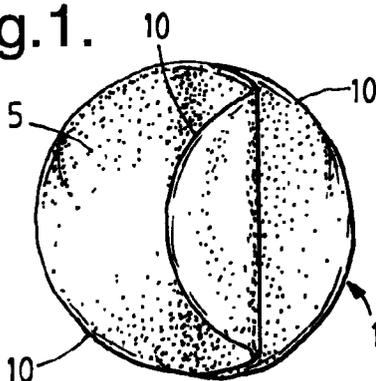


Fig.1.



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Description

Field of the Invention

The present invention relates to infusion packages, or more specifically infusion bags that have a chamber for containing an infusible substance which swells to approximate a spherical shape after immersion in a liquid. The invention also relates to a method and an apparatus for making such infusion packages.

Background

Infusion packages such as tea and coffee bags are well known in the art. Typically formed from corresponding pieces of porous material that are joined at their peripheral margins, they are predominantly rectangular in shape and substantially two dimensional. This construction facilitates high speed mass production as well as tidy and efficient collation into secondary packaging such as cardboard cartons.

However the amount of solids extracted from an infusible material is directly proportional to the surface to volume ratio of the infusible material and the infusing liquid. That means the most efficient shape for an infusion package is of equal width in all three dimensions, ie spherical. When standard rectangular tea bags are immersed in hot or cold, they tend to swell a little but their construction prevents them from even approximating a spherical shape. Indeed infusible material is substantially restricted to circulating in two dimensions. One can buy spherical infusers made of stainless steel but they are obviously not suitable for cheap mass production or convenient disposal after a single use.

There are examples of infusion packages in the literature that have two, three or even four chambers (eg bags made by the well known CONSTANTA brand tea bag machines, US 2,793,120 and EP 384,106) but the chambers are mutually exclusive ie they do not define a single chamber.

The present inventor has however developed an infusion package that approximates a spherical shape when immersed in a liquid thus maximising the extraction of infusible solids.

Statement of the Invention

The present invention may in broad terms be said to be an infusion package comprising a chamber for containing an infusible substance, said chamber being formed from three or more corresponding pieces of porous material that are joined at their respective peripheral margins such that when the package is immersed in a liquid the chamber swells to approximate a spherical shape.

Such an infusion package maximises the extraction of infusible solids from an infusible material contained in the package. It also infuses faster than comparable standard infusion packages.

The chamber is preferably formed from three or four pieces of porous material that are substantially round or otherwise elliptical in shape since such constructions enable the package to best approximate a spherical shape when immersed in a liquid.

The present invention may also in broad terms be said to relate to a method of manufacturing an infusion package comprising forming a chamber for containing an infusible substance by joining three or more corresponding pieces of porous material at their respective peripheral margins, said chamber being constructed such that when the package is immersed in a liquid the chamber swells to approximate a spherical shape.

The infusion package is formed by joining substantially one half of one piece of porous material with substantially one half of the peripheral margin of an adjacent piece of porous material. In that way when three pieces of porous material are used the infusion package will appear to have three flaps or pockets, when four pieces of porous material are used the infusion package will appear to have four flaps or pockets, and so on.

The present invention may yet also be said to relate to an apparatus for making infusion packages comprising a conveyor for supplying a continuous web of porous material, and means for forming a chamber for containing an infusible substance by joining three or more corresponding pieces of porous material at their respective peripheral margins, said chamber being constructed such that when the package is immersed in a liquid the chamber swells to approximate a spherical shape.

Detailed Description of the Invention

The infusion package of the present invention will now be described with reference to the following schematic drawings wherein:

Figure 1 shows an infusion package which is formed from three substantially round pieces of filter paper that are joined at their peripheral margins.

Figure 2 shows the infusion package of Figure 1 viewed from above and having been immersed and left to swell in hot water.

Figure 3 shows an infusion package formed from three substantially elliptical pieces of filter paper that are joined at their peripheral margins.

Figure 4 shows the infusion package of Figure 3 when viewed from above and having been immersed and left to swell in hot water.

Figure 5 shows an infusion package formed from four substantially round pieces of filter paper that are joined at their peripheral margins.

Figure 6 shows the infusion package of Figure 5

when viewed from above.

Figure 7 schematically represents a first method of making a three panelled infusion package of the present invention.

Figure 8 schematically represents a first method of making a four panelled infusion package of the present invention.

Figure 9 graphically represents the results of the Example that is discussed below.

Referring to Figure 1 there is provided an infusion package 1 that has a chamber 5 for containing an infusible substance (not shown) which is defined by three panels 10.

The infusible substance can be any suitable infusible substance or mixture of infusible substances, preferably being suitable for preparing a beverage. For present purposes the infusible substance is tea which is intended to include black, green, oolong, rooibos, mate or any other variety or product of a tea plant. It might also be desirable to include some instant tea or coffee, milk powder, sweetener or flavouring.

The panels 10 are made from a porous material such as filter paper, nylon netting, muslin or gauze which are joined together by suitable means to form the chamber 5. Heat sealable filter paper is particularly suitable for high speed mass production.

The infusion package shown in Figure 1 has three panels 10 which are substantially round in shape. However alternatively the panels could square, rectangular or some other regular shape that allows one to form of a chamber.

The infusion package shown in Figure 1 is formed by joining substantially one half of the peripheral margin of a first piece of porous material with substantially one half of the peripheral margin of a second piece of porous material - which is in turn joined to substantially one half of the peripheral margin of a third piece of porous material - which is joined to the remaining peripheral margin of the first piece of porous material. In that way when three pieces of porous material are used the infusion package will appear to have three flaps or pockets.

When the infusion package shown in Figure 1 is immersed in a liquid, for example water, the tea containing chamber will take in liquid and swell to its maximum volume (see Figure 2). Since the panels are made of similarly shaped pieces of porous material the swollen tea bag will approximate a sphere. This maximises the surface to volume ratio of the tea leaves to the infusing liquid thus also maximising the extraction of tea solids in terms of both rate and extent of infusion.

The infusion package shown in Figures 3 and 4 differs from that shown in Figures 1 and 2 by virtue of the panels being substantially elliptical or oval as opposed to substantially round or circular.

The infusion package shown in Figures 5 and 6 is formed from four panels which are once again substantially round or circular.

While it would be possible to make infusion packages from five or more panels they require the use of more porous material and it would be increasingly difficult to manufacture them efficiently at high speed.

Infusion packages of the present invention may be made by joining three or more corresponding pieces of porous material at their respective peripheral margins. This can be achieved by joining substantially one half of one piece of porous material with substantially one half of the peripheral margin of an adjacent piece of porous material. In that way when three pieces of porous material are used the infusion package will appear to have three flaps or pockets, when four pieces of porous material are used the infusion package will appear to have four flaps or pockets, and so on. However, when the package is immersed in a liquid the chamber will swell to approximate a spherical shape.

Infusion bags can be made of nylon and muslin. But nowadays heat-sealable filter paper is commonly used for making infusion bags at high speeds and volumes. It is important to note that often only one side or face of such has been provided with heat-sealable glue.

On the level of basic engineering one skilled in the art would appreciate that this method could be carried out in many ways.

Figures 7a to 7f schematically represent a method of making a three panelled infusion package of the present invention.

One begins with a first piece of porous material 21 that is laid flat with the glued side facing upwards (See Figure 7a). This first piece is most conveniently part of a continuous web from which the bags are cut from downstream.

A second piece of porous material 22 is laid over one half of the first piece with the glued side facing downwards (See Figure 7b). The second piece is preferably folded beforehand to leave the other halves of the first and second pieces free.

A third piece of porous material 23 is laid over the free half of the first piece with the glued side facing downwards (See Figure 7c). The third piece is preferably folded beforehand to leave its free half ready for the next stage.

The free half of the second piece of porous material 22 is folded onto the free half of the third piece of porous material 23 (See 7d and 7e).

The pieces of porous material could be heat-sealed after each step but the heat-sealing is preferably carried out in a single step after all of the pieces of porous material are in place.

This can then be followed by cutting the bags from the web using art known means eg a cutter and block mechanism or a system of rotary cutters, to obtain a bag as shown in Figure 7f. The sealing and cutting could be performed simultaneously and non rectangular bags can be made by simply providing the appropriately

shaped cutters. The web of porous material may be wide enough to produce pairs of infusion bags which can be separated downstream or, if perforated lines are provided, by the consumer.

Naturally the above steps could be modified to allow for the production of infusion packages having four or more panels. However it may be preferable to add an intermediate folding and/or sealing stage to reduce the thickness of porous material at the final sealing stage and/or the cutting stage.

The web of porous material may be wide enough to produce pairs of infusion bags which can be separated downstream or, if perforated lines are provided, by the consumer.

High speed manufacturing will however be facilitated by forming each infusion package from a single strip of porous material and folding same to create the flaps. One skilled in the art will appreciate that that can be achieved in a variety of ways.

Figures 8a to 8f schematically represent a method of making a four panelled infusion package of the present invention as but one example of this.

A continuous strip of porous material 30 is processed in unit strips 31 that are substantially four times the diameter of the panels (See Figures 8a and 8b). The glued side faces upwards. Each unit strip 31 comprises a first cell 32, a second cell 33, a third cell 34 and a fourth cell 35 of substantially equal dimensions.

The second cell 33 and the third cell 34 are folded in half and the first cell 32 and the fourth cell 35 are slid together so that they are adjacent or even touching one another (See Figures 8c).

The fourth cell 35 is then folded over onto the first cell covering it in its entirety (see Figures 8e and 8f).

The pieces of porous material could be heat-sealed after each step but the heat-sealing is preferably carried out in a single step after all of the pieces of porous material are in place.

Naturally the above steps could be modified to allow for the production of three or five panelled bags and the like. It may be preferable to add an intermediate folding and/or sealing stage to reduce the thickness of porous material at the final sealing stage and/or the cutting stage.

This can then be followed by cutting the bags from the web using art known means eg a cutter and block mechanism or a system of rotary cutters. The sealing and cutting could be performed simultaneously and non rectangular bags can be made by simply providing the appropriately shaped cutters.

Naturally the above steps could be modified to allow for the production of infusion packages having three, five or more panels. However it may be preferable to add an intermediate folding and/or sealing stage to reduce the thickness of porous material at the final sealing stage and/or the cutting stage.

The web of porous material may be wide enough to produce pairs of infusion bags which can be separated downstream or, if perforated lines are provided, by the

consumer.

The infusion packages of the present invention will now be described with reference to the following non-limiting Example.

Example

The example includes infusion measurements that have been made in accordance with the following method. This can be conducted on a dynamic or a static basis.

According to the dynamic method a tea bag is mechanically dunked in a 250 ml measuring cylinder containing 200 ml of freshly boiled water. The liquor is circulated through the flow cell of a spectrophotometer where the absorbance at 445 nm is measured every 2 seconds for 2 minutes during dunking. The bag is clasped by an arm that is pivotally supported by a vertically rotating disc. The pivot point of the arm is located between the centre and periphery of the disc so that the bag is dunked each time the disk completes a revolution. In the experiment the disk completes 5 revolutions (ie 5 dunks) 12 in 12 seconds with an amplitude of 6 cm.

The inventors used a PERKIN ELMER brand spectrophotometer where UV/V is Lambda 3B with a 1 cm path length flow cell connected to about 1 m of 1 mm internal diameter silicon tubing. The pump pushed liquor through at 1 ml/second.

Measurements are recorded and graphically displayed using a computer and appropriate software. From these curves one can make comparisons between blends, paper or tea bag design.

In the static method the method is the same except the bag remains immersed in the water. That simply involves ceasing the rotation of the disk when the arm is at the bottom of its cycle. In that position the tea bag is suspended just above the bottom of the measuring cylinder.

In the Example the infusion performance of a 3 panelled infusion bag according to the present invention was measured alongside a round tea bag. In both cases the bags were made from CROMPTONS brand 381703 heat seal paper, their diameter was 51 mm and the quantity of black tea they contained was 2.0 g. The blend of tea was also identical.

The respective infusion profiles are graphically represented in Figure 9. In that Figure:

AD1 and AD2 are standard round and flat tea bags that have been subjected to the dynamic method of infusion testing. BD1 and BD2 are three-round-panelled tea bags according to the invention that have also been subjected to the same dynamic method of infusion testing.

Similarly AS is a standard round and flat tea bag that has been subjected to the static method of infusion testing while BS is a three-round-panelled tea bag according to the invention that has also been subjected to the same static method of infusion testing.

It can be seen from these results the bag of the

invention significantly out performs the standard bag both in terms of the infusion rate and the extent of infusion after 6 minutes. Not surprisingly the rate and extent of infusion is greater for both types of bags when tested under dynamic rather than static conditions.

Claims

1. An infusion package comprising a chamber for containing an infusible substance, said chamber being formed from three or more corresponding pieces of porous material that are joined at their respective peripheral margins such that when the package is immersed in a liquid the chamber swells to approximate a spherical shape. 10
2. An infusion package according to Claim 1 wherein the pieces of porous material are rectangular or elliptical. 20
3. An infusion package according to Claim 2 wherein the pieces of porous material are substantially square or substantially round.
4. An infusion package according to Claim 1 wherein the chamber is defined by three pieces of porous material. 25
5. An infusion package according to Claim 4 wherein substantially one half of the peripheral margin of a first piece of porous material is joined with substantially one half of the peripheral margin of a second piece of porous material - which is joined to substantially one half of the peripheral margin of a third piece of porous material - which is joined to the remaining peripheral margin of the first piece of porous material. 30 35
6. An infusion package according to any preceding claim wherein the infusible substance is tea. 40
7. A method of manufacturing an infusion package comprising forming a chamber for containing an infusible substance by joining three or more corresponding pieces of porous material at their respective peripheral margins, said chamber being constructed such that when the package is immersed in a liquid the chamber swells to approximate a spherical shape. 45 50
8. A method according to claim 7 wherein a first piece of porous material is laid flat, half the periphery of a second corresponding piece of porous material is joined to half the periphery of the first piece, half the periphery of a third corresponding piece of porous material is joined with the remaining half of the periphery of the first piece, and then the remaining halves of the peripheries of the second and third pieces are joined together to form the chamber. 55
9. A method according to claim 7 or 8 wherein the pieces of porous material comprise round or oval shaped pieces of heat-sealable paper.
10. A method according to any one of claims 7, 8 or 9 wherein the chamber is constructed by successively folding a portion a strip of porous material prior to sealing and cutting infusion packages from said strip.
11. An apparatus for making infusion packages comprising a conveyor for supplying a continuous web of porous material, and means for forming a chamber for containing an infusible substance by joining three or more corresponding pieces of porous material at their respective peripheral margins, said chamber being constructed such that when the package is immersed in a liquid the chamber swells to approximate a spherical shape.

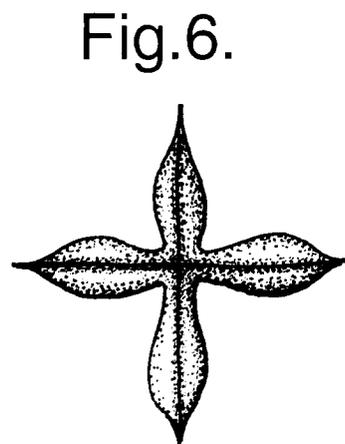
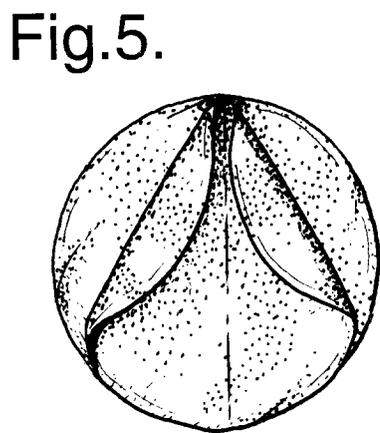
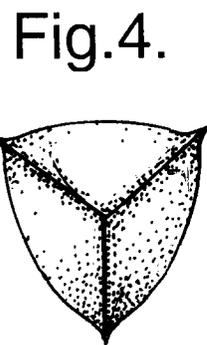
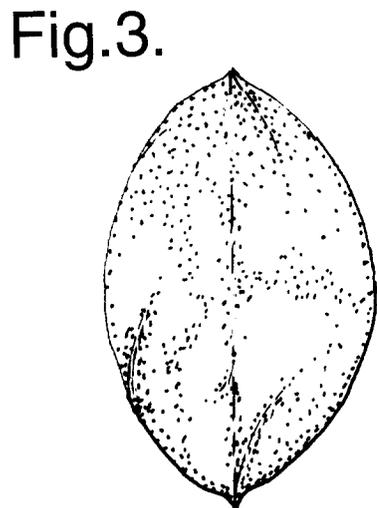
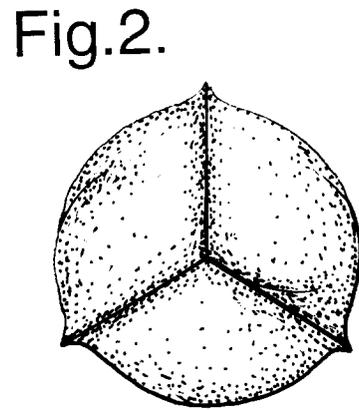
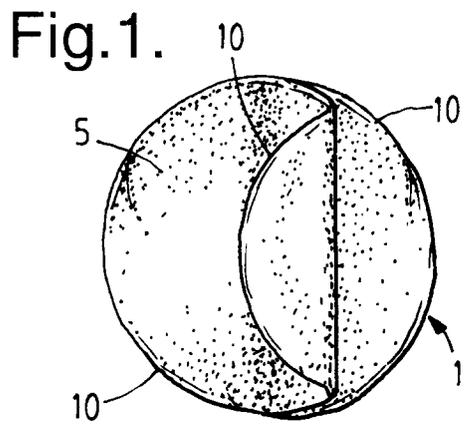


Fig.7 a.

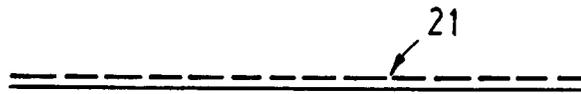


Fig.7 b.

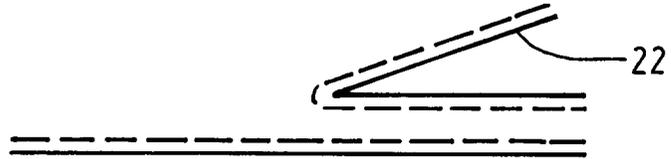


Fig.7 c.

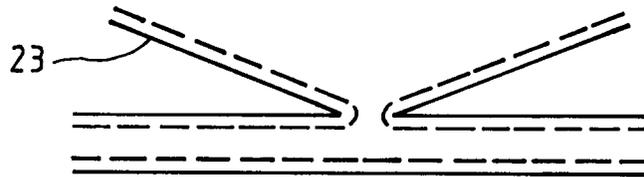


Fig.7 d.

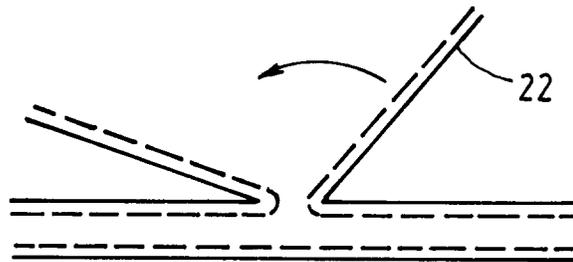
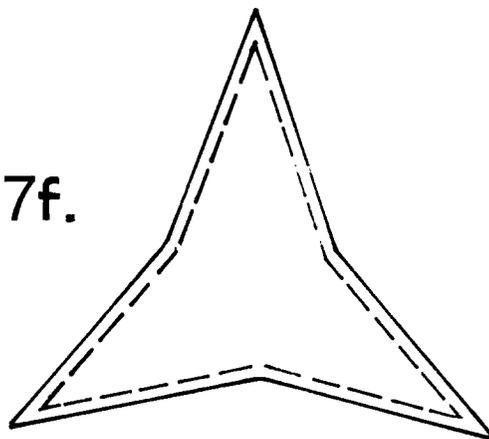


Fig.7 e.



Fig.7f.



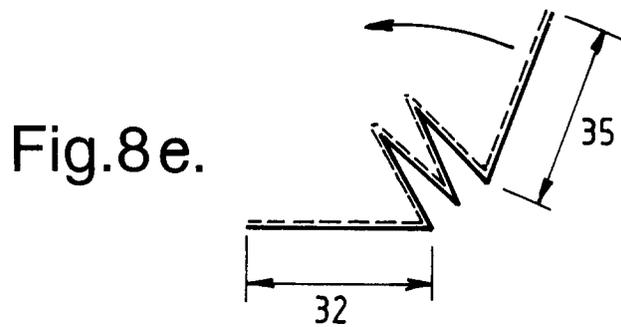
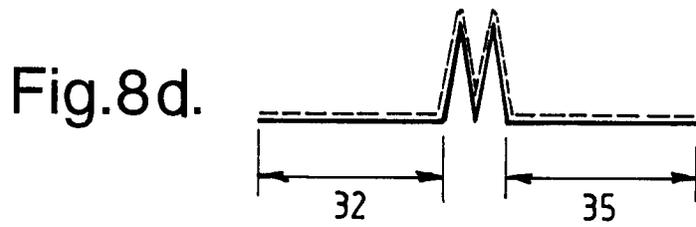
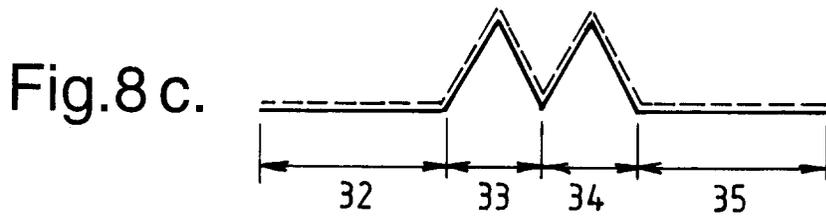
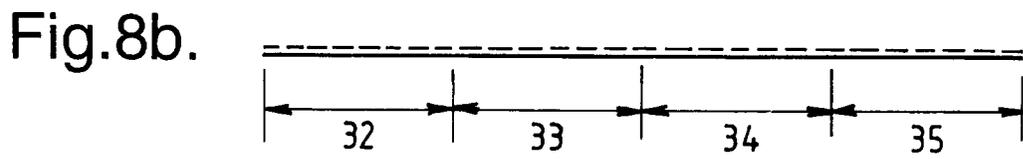
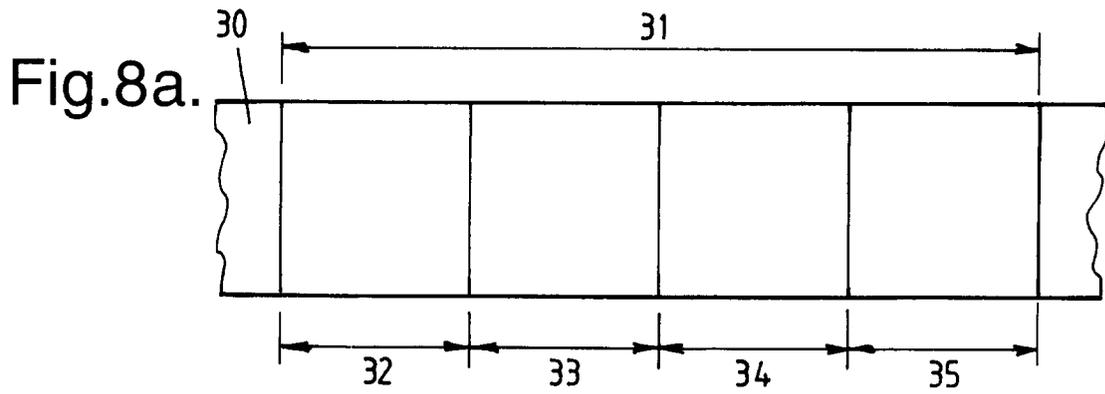
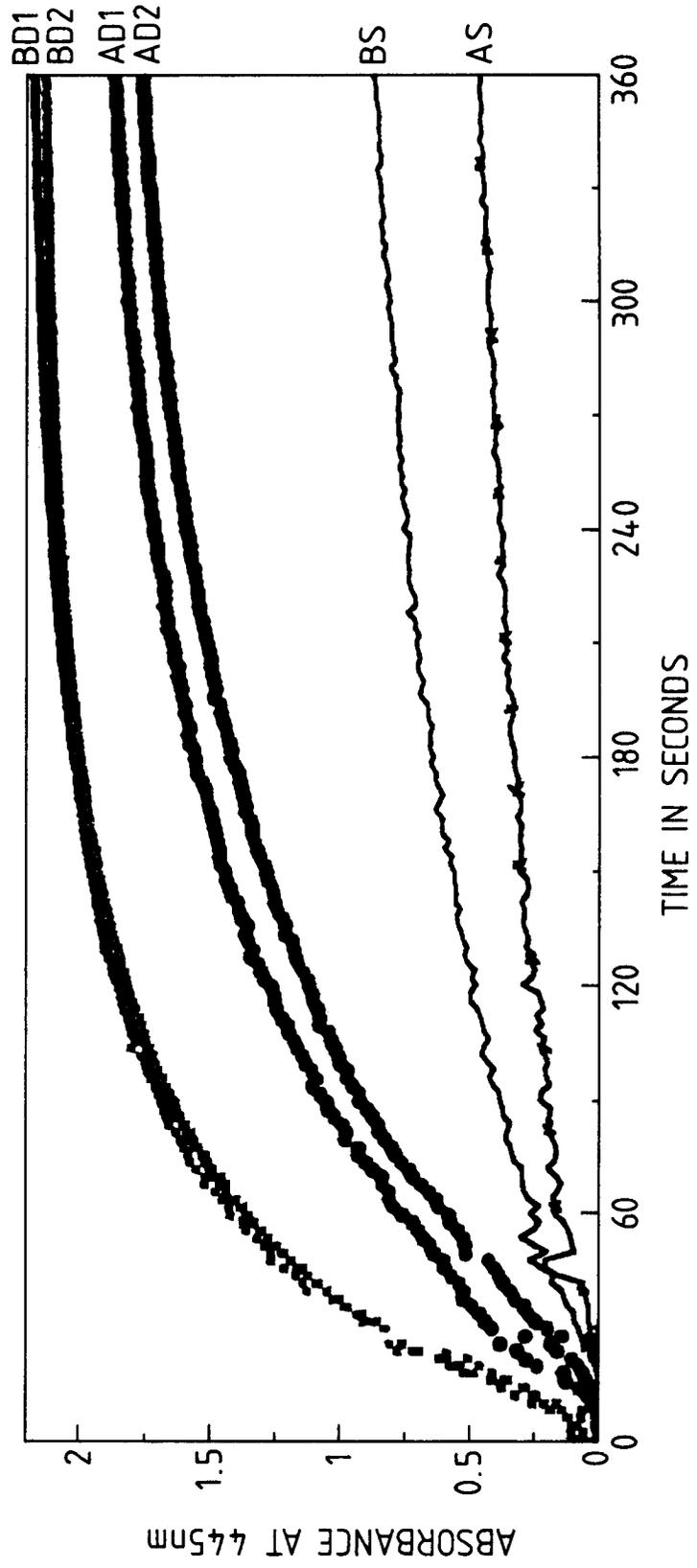


Fig.9.





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EUROPEAN SEARCH REPORT

Application Number
EP 96 30 4066

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
A	US-A-4 551 336 (CHEN) * column 3, line 53 - column 4, line 18; figures 1-11 * ---	1	B65D81/00 B65B29/02
A	EP-A-0 128 495 (DOW CHEMICAL CO.) * page 5, line 1 - line 20; figures 1-3 * ---	1	
A	WO-A-92 03345 (LAFOND) * page 7, line 20 - page 8, line 4; figures 1-3 * ---	1	
A	US-A-2 769 290 (HARRIMAN) * figures 1-10 * -----	7,11	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			B65D B65B
Place of search		Date of completion of the search	Examiner
THE HAGUE		21 October 1996	Berrington, N
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