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(71) Applicant (for all designated States except US): **CONCENTRATED SOLUTIONS LIMITED** [GB/GB]; P.O. Box 133, Etchingham, East Sussex TN19 7ZJ (GB).

(72) Inventor; and

(75) Inventor/Applicant (for US only): **COLLINS, Mark** [GB/GB]; P.O. Box 133, Etchingham, East Sussex TN19 7ZJ (GB).

(74) Agent: **HUTCHINS, Michael, Richard**; M. R. Hutchins & Co., 33 Connaught Way, Tunbridge Wells, Kent TN4 9QP (GB).

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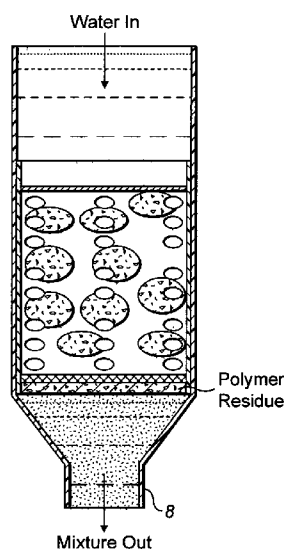


FIG. 1

(57) Abstract: The invention provides an apparatus for storing and dispensing a water dispersible substance, the apparatus comprising an outer container (2) and an inner container (10); wherein the outer container has an inlet and an outlet (8); the inner container has one or more openings through which water may pass and containing one or more dosage units comprising a water-swellable or water-soluble polymer, which polymer has encapsulated therein a water dispersible substance; and the outer and inner containers are configured such that in use, when the inner container is disposed inside the outer container, water may be passed through the outer and inner containers to elute the water dispersible substance from the polymer thereby to provide a solution of the substance.

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APPARATUS FOR STORING AND DISPENSING A WATER DISPERSIBLE SUBSTANCE AND RELATED METHOD

This invention relates to apparatus for storing and dispensing a water dispersible substance.

5 **Background of the Invention**

Corrosive substances such as acids and alkalis generally require special precautions when being transported and cannot easily be transported using normal mail services. The fairly robust handling that they are likely to receive if transported in the normal mail means that bottles or sachets or other containers typically used for
10 carrying liquids may be broken or ruptured thereby releasing their contents.

Summary of the Invention

The present invention provides a means of transporting concentrated forms of water dispersible substances in solid form rather than in bottles, drums and like containers. The water dispersible substance, which may be in a concentrated liquid
15 form, is held within a matrix formed from a protective polymer, thereby rendering it easier to package and transport. On receiving the product, the customer can form an aqueous solution of the water dispersible substance by eluting the substance from the polymer encapsulant with water using an apparatus as described herein.

The product of the invention is sufficiently robust for it to be transported by mail in
20 a mailing container, although it may also be transported by other means.

Accordingly, in a first aspect, the invention provides an apparatus for storing and dispensing a water dispersible substance, the apparatus comprising an outer container and an inner container; wherein

the outer container has an inlet and an outlet;
25 the inner container has one or more openings through which water may pass and contains one or more dosage units comprising a water-swellaable or water-soluble polymer, which polymer has encapsulated therein a water dispersible substance; and

the outer and inner containers are configured such that in use, when the inner container is disposed inside the outer container, water may be passed through the outer and inner containers to elute the water-dispersible substance from the polymer thereby to provide a solution of the water dispersible substance.

- 5 The term “water dispersible substance” as used herein encompasses substances that are soluble in water as well as substances that are insoluble or sparingly soluble in water but can be dispersed in a finely divided form in water, for example as a suspension or emulsion.

In one embodiment, the “water dispersible substance” is a water soluble substance.

- 10 The water-swellaable or water-soluble polymer has encapsulated therein a water-dispersible substance. The dosage units can take the form of capsules in which the water dispersible substance is surrounded by an outer skin of polymer or can take the form of a polymer matrix in which the water dispersible substance is distributed.

The capsules can be microcapsules (e.g. they can have diameter of less than 1 mm)

- 15 or they can have a minimum dimension of greater than or equal to 1 mm.

When the dosage units are in the form of a matrix, they can be prepared in a variety of different shapes and sizes. For example, they can be substantially spherical or ovoidal, or they can have a flattened form. When in a flattened form, they can be, for example, of circular, elliptical, rectangular, polygonal or irregular shape. In one

- 20 embodiment, the dosage units are in the form of discs or biscuits.

For example, the dosage units can take the form of discs or biscuits having a thickness of 1 mm to 10 mm, more usually 1.5 mm to 5 mm and more preferably 1.5 to 3 mm, and a maximum dimension (e.g. diameter) of 5 mm to 30 mm, for example 10 to 25 mm, e.g. 15-20 mm.

- 25 The polymer may be a water soluble polymer but preferably it is insoluble in water.

When the polymer is insoluble, it will be swellaable to allow water to penetrate the matrix or capsule so as to elute the water dispersible substance.

Alternatively, or additionally, when the dosage form takes the form of a polymer matrix, the polymer matrix may be porous so that water may penetrate the matrix to elute water soluble or water-dispersible substances therefrom.

The polymer may be a polymer as described in any of WO 00/06610, WO
5 00/06533, WO 00/06658, WO 01/40874 and WO 2007/012860.

The polymer is preferably a polymer formed by the polymerisation of a dienyl quaternary amine monomer either alone or in the presence of a co-monomer. For example, the dienyl quaternary amine monomer may be a monomer as described in WO 2007/012860 (Novel Polymer Solutions).

10 In one particular embodiment, the polymer is formed by the polymerisation of a N, N, N, N-tetraallylpropane-1,3-dimethanaminium salt such as N, N, N, N-Tetraallylpropane-1,3-dimethanaminium p-toluene sulphonate.

Where the polymer is intended to be insoluble in water, but water-swellaable, it is typically a crosslinked polymer.

15 The monomers can be cured to form the polymer by any of a variety of means but typically polymerisation is effected by means of an initiator or by means of radiation, e.g. UV radiation, or a combination thereof.

Particularly preferred polymers are formed by the cyclopolymerisation of a dienyl quaternary amine monomer as described in WO 2007/012860. More particularly,
20 the polymers are those formed by the cyclopolymerisation of quaternary diallylamine monomers. The diallylamine monomers can be derived from cyclic amines such as piperidine and piperidine derivatives or from acyclic amines such as long chain hydrocarbyl amines. A monomer may have a single dienyl quaternary amine group present or may have two or more dienyl quaternary amine groups
25 present, each linked by a suitable linking chain such as a hydrocarbon chain.

Where two or more such dienyl quaternary amine groups are present, they can form cross links when polymerised to form a three dimensional gel network.

When it is required that the polymer should be water soluble, the polymer will typically not be crosslinked and will usually have only a single diethyl quaternary amine group present. One example of a monomer from which a soluble polymer can be formed is N,N-diallylpiperidinium halide, e.g. N,N-diallylpiperidinium bromide.

The water dispersible substance encapsulated by the polymer can be any of a variety of such substances but, in one embodiment, the water dispersible substance is a liquid, and in particular a liquid concentrate. Thus, the dosage unit comprises a matrix of water swellable or water soluble polymer within which are dispersed pockets of encapsulated water dispersible substance.

The liquid can be a corrosive substance such as an acid or alkali or bleaches as well as any of a wide range of other water dispersible substances.

Other examples of water dispersible substances that can be encapsulated include a wide range of commercial, domestic and retail cleaning products.

The polymer is selected such that it is compatible with the water dispersible substance that it encapsulates, i.e. it is not degraded or dissolved by the substance.

The dosage units may contain a predetermined or metered amount of the water dispersible substance. Thus, for example, the dosage units may each be of a predetermined substantially uniform weight. Alternatively, the dosage units may vary in weight and content.

In one preferred embodiment, the water dispersible substance is an acid such as nitric acid, phosphoric acid or sulphuric acid or a bleach.

The dosage units can be formed by simply mixing (e.g. shear mixing) the monomer and water dispersible substance, dividing the mixture into portions of a desired volume and then polymerising the monomer.

The mixture may be divided into portions by using a pipette to measure out predetermined volumes and deposit the predetermined volume of mixture onto an inert surface or into a mould followed by curing of the mixture.

5 By encapsulating the water dispersible substance to form a dry product, it can be transported with greater security and safety in ordinary mailing packaging and does not need to be contained within drums or bottle.

A customer can be supplied with a kit comprising the outer and inner containers with the encapsulated water dispersible substance present within the water soluble container. The customer can then assemble the apparatus of the invention by
10 placing the inner container within the outer container, removing any closure means present on the inner container and then pouring a required volume of water into the outer and inner containers. The water penetrates the inner container and either dissolves or swells the polymer to release the water dispersible substance and form a solution (or a more dilute solution if the concentrate is already in solution form)
15 which can then be collected in a suitable receptacle.

If a customer has previously been supplied with a kit comprising both the inner and outer containers, then he or she may subsequently only be provided with the inner container containing the dispensing units.

Once used, the inner containers may be sent back to the manufacturer for
20 recharging or recycling.

It will be appreciated from the foregoing that the inner container functions as a cartridge which may be refilled or recycled after use. For convenience, the inner container may be referred to in this application as a cartridge.

The outer container can be of solid construction, i.e. the outer container holds its
25 shape without the need for support, or it can take the form of a bag-like structure.

When the outer container is of solid construction, it is preferably formed from a plastics material, and most preferably is moulded (e.g. injection moulded) from a

plastics material. The outer container may be substantially rigid, or the plastics material may have a degree of flexibility or resilience.

The outer container may take any of a wide variety of shapes provided that it can accommodate the inner container.

- 5 In one embodiment, the outer container is of substantially tubular construction having an inlet opening at one end (which in use is the upper end) into which water can be poured and an outlet opening at the opposing end (which in use is the lower end) through which water or eluted water-soluble substrate can pass out of the container. The tubular construction may be of circular or non-circular (e.g.
10 rectangular) cross section.

In one embodiment, the outer container is of flattened rectangular cross section, a shape which is particularly suitable for transporting in mailing containers.

In one embodiment, the outer container is in the form of a funnel and the inner container is configured to sit within the funnel.

- 15 The funnel may have a substantially tubular upper region and a tapering lower portion. The inner container may be configured so that it can be seated in the tapering portion of the funnel. The tubular upper region may have substantially parallel side walls and may be, for example, of circular cross section or rectangular cross section (e.g. flattened rectangular cross section).
- 20 The tapering portion of the funnel may terminate in a pipe or spout to enable a solution of eluted water-soluble substance to be dispensed from the container in a controlled manner.

The outlet (e.g. the outlet of the tapering portion of the funnel, or the pipe or spout) may be provided with a valve or tap to control the flow of liquid therethrough.

- 25 In another embodiment, the outer container takes the form of a bag. The bag has an opening through which water can be produced. The opening is preferably arranged

to be closable, for example by means of folding or by means of a drawstring around the neck of the bag.

The bag is typically provided with an outlet in addition to the inlet. The outlet can take the form of perforations (e.g. micro-perforations) in the bag wall. Thus, for
5 example, the bag can be formed from a permeable material, e.g. a permeable plastics material.

The inner container may have an opening into which water can be poured and at least one other opening through which water or a solution of the eluted substrate may exit the inner container. Preferably the inner container has a plurality of
10 openings through which the water or solution of eluted substance may exit the container.

In one embodiment, the plurality of openings takes the form of a plurality of perforations in the container wall.

In another embodiment, the plurality of opening takes the form of gaps between the
15 fibres or strands in a mesh, for example a woven mesh.

The inner container can be of solid construction, i.e. the container holds its shape without the need for support, or it can take the form of a bag-like structure.

When the inner container is of solid construction, it is preferably formed from a plastics material, and most preferably is moulded (e.g. injection moulded) from a
20 plastics material. The inner container may be substantially rigid, or the plastics material may have a degree of flexibility or resilience.

The inner container may take any of a wide variety of shapes provided that it can be seated within the outer container.

In one embodiment, the inner container is of substantially tubular construction
25 having an inlet opening at one end (in use the upper end) into which water can be poured and a plurality of exit openings through which water or a solution of eluted substance can exit the container. The exit openings can be present at the end

(which in use is the lower end) opposed to the inlet opening. For example, the lower end of the inner container can be provided with a filter which retains water swellable polymer but allows the passage therethrough of the eluted water dispersible substance. The filter can be of the filter frit type or can be a filter of the
5 fibrous type or can simply comprise an array of holes that are sufficiently large to permit water or eluted water-soluble substance to flow freely therethrough whilst preventing the passage of any particulate matter with a minimum dimension (e.g. diameter) of, for example, 0.1 mm, or 0.5 mm or 1mm or 5 mm or 10 mm.

In addition to the filter, the inner container may be provided a plurality of
10 perforations on a side wall thereof. When the inner container is of substantially tubular form, the side walls may have an array of perforations extending around its circumference. The perforations are preferably evenly spaced.

When the inner container is of tubular construction, it may have a circular or non-circular cross section. For example, it may have an elliptical cross section or a
15 polygonal (e.g. regular polygonal) cross section. In one embodiment, the inner container is of tubular construction and has a circular cross section. In another embodiment the inner container is of tubular construction and has a rectangular cross section, for example a flattened rectangular cross section. A flattened rectangular cross section is particularly suited for transporting in a mailing
20 container.

In another embodiment, the inner container can take the form of a bag, for example a bag resembling a teabag and formed from a porous material or mesh. The dosage units containing the encapsulated water dispersible substance are contained within the bag. In this embodiment, water and eluted water-soluble substance may flow
25 freely in and out of perforations in the bag.

The inner container preferably has means for closing the container when the container is not in use or is in transit. For example, when inner container is of solid construction, the means for closing the container can comprise a lid, plug or a sliding closure.

In one embodiment, the means for closing the container is a lid. The lid may be fully or partially detachable from the container. For example, the lid can be hinged attached to the container. In an alternative, the lid may be fully detachable.

5 The lid may be secured in place by means of a snap fit or “pop off/pop on” arrangement.

The means for closing the container serves to retain the portions of encapsulated water-soluble substance in place when in transit.

As indicated above, the outer and inner containers may be provided to a customer in the form of a kit for assembly to form the apparatus of the invention.

10 In one embodiment therefore, the invention provides the apparatus in kit form.

In another embodiment, the invention provides the apparatus in assembled form.

In a further aspect, the invention provides a product containing a mailing container within which is disposed the apparatus of the invention in kit form or assembled form, and more preferably in kit form. The mailing container may take the form of
15 a box, e.g. a box formed from cardboard or plastics or a combination thereof.

In a still further aspect, the invention provides a mailing container within which is disposed an inner container as hereinbefore defined, the inner container containing a plurality of dosage units as hereinbefore defined.

In another aspect, the invention provides a method for preparing an aqueous
20 solution of a water dispersible substance, which method comprises passing water through an apparatus as hereinbefore defined so as to swell or dissolve the encapsulating polymer and elute the water dispersible substance.

The invention will now be illustrated in more detail (but not limited) by reference to the specific embodiment shown in the drawings

25 **Brief Description of the Drawings**

Figure 1 is a schematic partial side sectional elevation of an apparatus according to one embodiment of the invention.

Figure 2 is a schematic side sectional view of the outer container of the apparatus of Figure 1.

5 Figure 3 is a schematic side view of the inner container or cartridge of the apparatus of Figure 1, but with a lid in place.

Figure 4 is a side sectional elevation through an inner container of slightly differing shape to the inner container of Figure 1.

10 Figure 5 illustrates a mailing box containing a used and unused cartridge from the apparatus of Figures 1 to 4.

Figure 6 illustrates an apparatus according to a second embodiment of the invention.

Detailed Description of the Invention

15 As shown in Figure 1, an apparatus according to one embodiment of the invention comprises an outer container 2 in the form of a funnel formed from a plastics material. The funnel has a generally cylindrical upper portion 4 which is open at its upper end, and a lower tapering portion 6 leading to an outlet or spout 8.

20 Seated inside the outer container 2 is an inner container or cartridge 10 which is of generally cylindrical form and is formed from a moulded plastics material. The cartridge 10 has a filter 12 at its lower end and an array of perforations 14 around the circumference of its side wall. As shown in Figure 3, the cartridge has a snap fit lid 16 which is left in place during transit and is removed when the apparatus is used.

25 Contained within the cartridge is a plurality of discs or "biscuits" 18 which may be stacked one on top of another (as shown in Figure 4) or stacked loosely within the container (as shown in Figures 1 and 3). The biscuits are formed from a water swellable polymer and in particular a polymer of the type described in WO

2007/012860. In one particular embodiment, the polymer is formed by the polymerisation of N, N, N, N-Tetraallylpropane-1,3-dimethanaminium p-toluene sulphonate which can be prepared by the general methods described in WO 2007/012860.

- 5 Encapsulated within the polymer is concentrated nitric acid or phosphoric acid. The biscuits are formed by shear mixing a monomer with nitric acid or phosphoric acid to form a liquid mass which is then divided into portions, for example by means of a pipette or by pouring into a mould. The individual portions are then irradiated with UV light to bring about polymerisation of the monomer. General
- 10 procedures for preparing the polymer discs are set out in the Examples section below. By way of example, the resulting biscuits or discs can be approximately 2 mm in depth and about 19 mm in diameter.

- By encapsulating the nitrate acid or phosphoric acid in a polymer matrix, the liquid acid is converted into a dry form that can readily be transported using a suitable
- 15 mailing container.

- The customer may be presented with a kit consisting of the outer container and cartridge, wherein the cartridge contains the dosage units. The customer may then assemble the apparatus by placing the cartridge inside the outer container so that the lower end of the cartridge is seated just above the tapering portion of the funnel.
- 20 The lid 16 is then removed and a desired amount of water is poured into the open topped cartridge container. Where the biscuits are formed from a water soluble material, the action of the water is to dissolve the biscuits, thereby forming a solution of polymer and nitric acid or phosphoric acid which then passes through the filter 12 and out through the spout 8 where it can be collected in a suitable
- 25 receptacle. Alternatively, if the polymer is a water-insoluble but water-swellaable polymer, the polymer will swell to allow penetration of the water, thereby allowing the nitric acid or phosphoric acid to be eluted through the filter and out through the spout 8. In this case, any polymer residue is retained by the filter as shown in Figure 1.

Once used, the cartridge may be sent back to the manufacturer for refilling or recycling.

Figure 5 shows a typical transport box or mailer that can be used to despatch new cartridges to the customer. The new cartridge is wrapped, for example, in
5 cellophane or a similar waterproof material. The box also has space for accommodating spent cartridges for return to the manufacturer.

An advantage of the apparatus shown in Figures 1 to 5 is that it allows corrosive substances such as acids and alkalis to be packaged and transported by post or courier (or in any other conventional way) in a safe manner without the need for
10 containment within bottles or drums or more complex packaging.

The apparatus shown in Figures 1 to 5 is of a solid construction, i.e. the outer container and cartridge are both self supporting. In an alternative arrangement, as shown in Figure 6, the outer container can take the form of a permeable bag 102 having a draw string 104 around its neck and a locking toggle 106 to allow the bag
15 to be sealed in a closed condition. Within the outer bag 102 is an inner diffuser bag 108 within which are contained the biscuits 110 of polymer encapsulated nitric acid or phosphoric acid.

In this embodiment, the draw string is released and water is poured into the open mouth of the outer bag. The water penetrates the inner diffuser bag 108 eluting the
20 nitric acid, with the result that a more diluted nitric acid or phosphoric acid solution can then pass through the walls of the outer permeable bag and into a suitable receptacle.

EXAMPLE 1

General Procedure 1 for preparing cured polymer discs

25 A portion of dry monomer (typically corresponding to about 55% by weight of the total weight of the final cured composition) is weighed out and heated to a temperature of about 80°C with water to form a solution. Compatible concentrated ingredients, such as acids (e.g. nitric acid or phosphoric acid), soaps, anti foam

- agents, odourising agents, colours/dyes are added, typically in a combined amount corresponding to about 43% by weight of the final cured composition. The mixture is agitated to ensure thorough mixing and then left to cool to about 20°C. A photoinitiator (typically in an amount corresponding to 2% by weight of the total weight of the final cured polymer) is then mixed in and the mixture is dispensed into a mould. The mixture is then irradiated using a UV light source (e.g. a FireFlyTM light source) for about 3 – 30 seconds to cure the mixture. The cured polymer discs are then removed from the mould and packaged in a moisture-barrier container.
- Where the desired colouring or odourising agents are temperature sensitive or susceptible to loss through evaporation at the temperatures used during the mixing step, they can be applied to the discs after curing.

EXAMPLE 2

General Procedure 2 for preparing cured polymer discs containing phosphoric acid

- A UV curable monomer (100 parts by weight), 85% phosphoric acid (30 parts by weight), water (15 parts by weight), antifoam (0.625 parts by weight), B4 surfactant (0.75 parts by weight) and fragrance (0.025 parts by weight) are mixed with heating at 100°C for 10 minutes and then allowed to cool for 5 minutes. Photoinitiator (5 parts by weight) is then added and the mixture is cast into a mould to give disc-shaped portions which are then cured by irradiating for 15 seconds using a UV radiation source.

In each of Examples 1 and 2, N, N, N, N-tetraallylpropane-1,3-dimethanaminium p-toluene sulphonate can be used as the monomer and IrgacureTM 2022 can be used as the photoinitiator. One suitable UV radiation source is a FireFly UV source.

- The embodiments illustrated in the Figures and example above represent merely several ways of putting the invention into effect and it will readily be apparent that numerous modifications and alterations may be made to the specific embodiment shown without departing from the principles underlying the invention. All such modifications and alterations are intended to be embraced by this application.

CLAIMS

1. Apparatus for storing and dispensing a water dispersible substance, the apparatus comprising an outer container and an inner container; wherein
the outer container has an inlet and an outlet;
5 the inner container has one or more openings through which water may pass and contains one or more dosage units comprising a water-swellable or water-soluble polymer, which polymer has encapsulated therein a water-dispersible substance; and
the outer and inner containers are configured such that in use, when
10 the inner container is disposed inside the outer container, water may be passed through the outer and inner containers to elute the water-dispersible substance from the polymer thereby to provide a solution of the water dispersible substance.
2. Apparatus according to claim 1 wherein the dosage units are in the form of
15 capsules in which the water dispersible substance is surrounded by an outer skin of polymer.
3. Apparatus according to claim 1 wherein the dosage units take the form of a polymer matrix in which the water dispersible substance is dispersed.
4. Apparatus according to claim 1 or claim 3 wherein the dosage units are in
20 the form of discs or biscuits.
5. Apparatus according to any one of the preceding claims wherein the polymer is substantially insoluble in water but is swellable to allow water to penetrate the matrix or capsule so as to elute the water dispersible substance.
6. Apparatus according to claim 3 and any claim dependent thereon wherein
25 the polymer matrix is porous so that water may penetrate the matrix to elute water soluble or water-dispersible substances therefrom.

7. Apparatus according to any one of the preceding claims wherein the polymer is a polymer formed by the polymerisation of a dienyl quaternary amine monomer either alone or in the presence of a co-monomer.
8. Apparatus according to claim 1 wherein the polymer is selected from
5 polymers formed by the cyclopolymerisation of quaternary diallylamine monomers.
9. Apparatus according to any one of claims 1 to 6 wherein the polymer is a polymer formed from the polymerisation of a N, N, N, N-tetraallylpropane-1,3-dimethanaminium salt.
- 10 10. Apparatus according to any one of the preceding claims wherein the water dispersible substance is a liquid concentrate.
11. Apparatus according to claim 10 wherein the liquid concentrate is a corrosive substance such as an acid or alkali or bleaches.
12. Apparatus according to claim 11 wherein the corrosive substance is an acid.
- 15 13. Apparatus according to any one of the preceding claims wherein the outer container is of substantially tubular construction having an inlet opening at one end (which in use is the upper end) into which water can be poured and an outlet opening at the opposing end (which in use is the lower end) through which water or eluted water dispersible substrate can pass out of the
20 container.
14. Apparatus according to claim 13 wherein the outer container is in the form of a funnel and the inner container is configured to sit within the funnel.
15. Apparatus according to claim 14 wherein the funnel has a substantially tubular upper region and a tapering lower portion.
- 25 16. Apparatus according to claim 15 wherein the tapering portion of the funnel terminates in a pipe or spout to enable a solution of eluted water dispersible substance to be dispensed from the container in a controlled manner.

17. Apparatus according to claim 16 wherein the outlet (e.g. the outlet of the tapering portion of the funnel, or the pipe or spout) is provided with a valve or tap to control the flow of liquid therethrough.
18. Apparatus according to any one of claims 1 to 12 wherein the outer
5 container takes the form of a bag.
19. Apparatus according to claim 18 wherein the bag is closable by means of a drawstring around the neck of the bag.
20. Apparatus according to claim 18 or 19 wherein the bag is formed from a permeable material, e.g. a permeable plastics material.
- 10 21. Apparatus according to any one of the preceding claims wherein the inner container has an opening into which water can be poured and at least one other opening through which water or a solution of the eluted substrate may exit the inner container.
- 15 22. Apparatus according to claim 21 wherein the inner container has a plurality of openings through which the water or solution of eluted substance may exit the container.
23. Apparatus according to claim 22 wherein the plurality of openings takes the form of a plurality of perforations in the container wall.
- 20 24. Apparatus according to any one of the preceding claims wherein the inner container is of substantially tubular construction having an inlet opening at one end (in use the upper end) into which water can be poured and a plurality of exit openings through which water or a solution of eluted substance can exit the container.
- 25 25. Apparatus according to claim 24 wherein the lower end of the inner container is provided with a filter which retains water swellable polymer but allows the passage therethrough of the eluted water dispersible substance.

26. Apparatus according to claim 25 wherein the inner container is provided a plurality of perforations on a side wall thereof.
27. Apparatus according to any one of claims 1 to 12 wherein the inner container is in the form of a bag.
- 5 28. Apparatus according to any one of the preceding claims wherein the inner container has means for closing the container when the container is not in use or is in transit.
29. Apparatus according to claim 28 wherein the means for closing the container is a lid.
- 10 30. Apparatus according to any one of the preceding claims in kit form.
31. Apparatus according to any one of claims 1 to 29 in assembled form.
32. A product containing a mailing container within which is disposed an apparatus in kit form or assembled form as defined in claim 30 or claim 31.
33. A mailing container within which is disposed an inner container containing
15 a plurality of dosage units as defined in any one of claims 1 to 12.
34. A method for preparing an aqueous solution of a water dispersible substance, which method comprises passing water through an apparatus as defined in any one of claims 1 to 31 so as to swell or dissolve the encapsulating polymer and elute the water dispersible substance.

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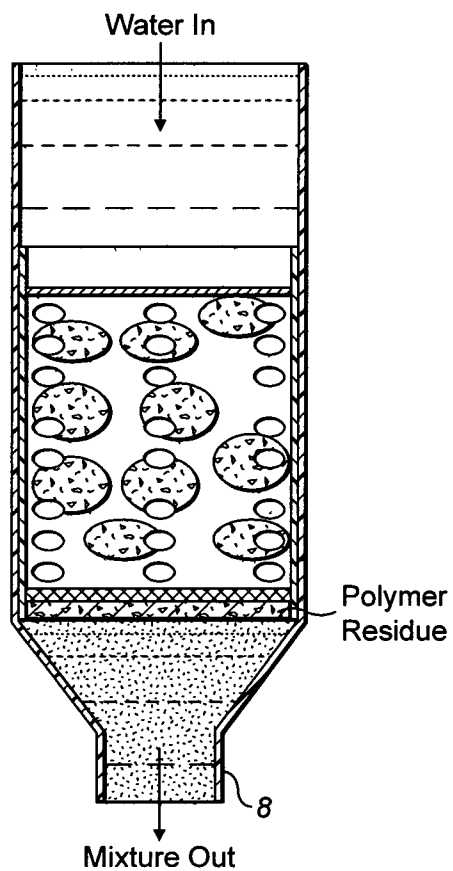


FIG. 1

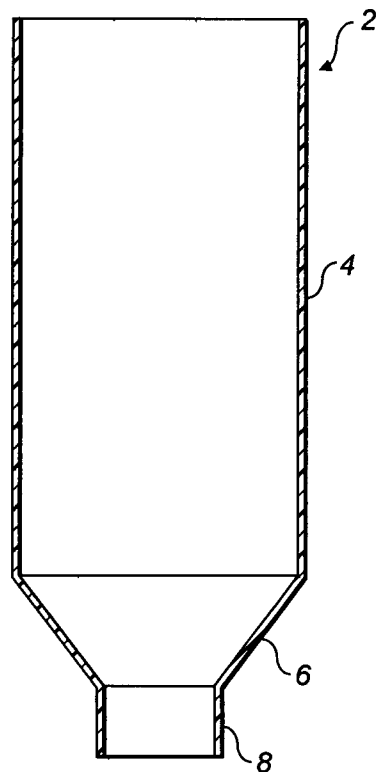


FIG. 2

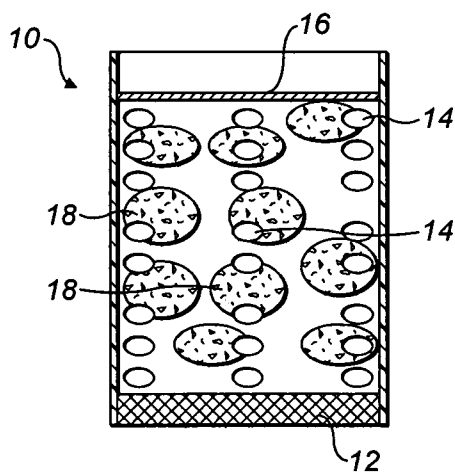


FIG. 3

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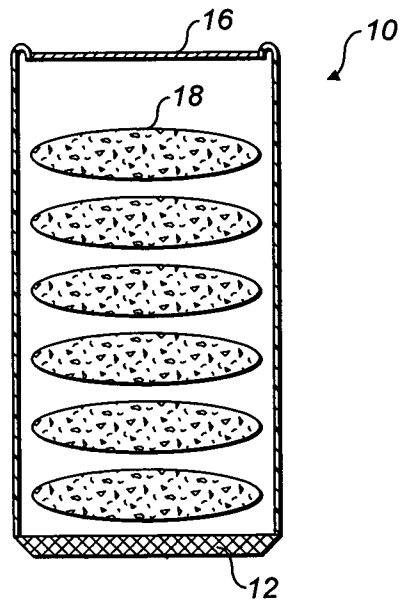


FIG. 4

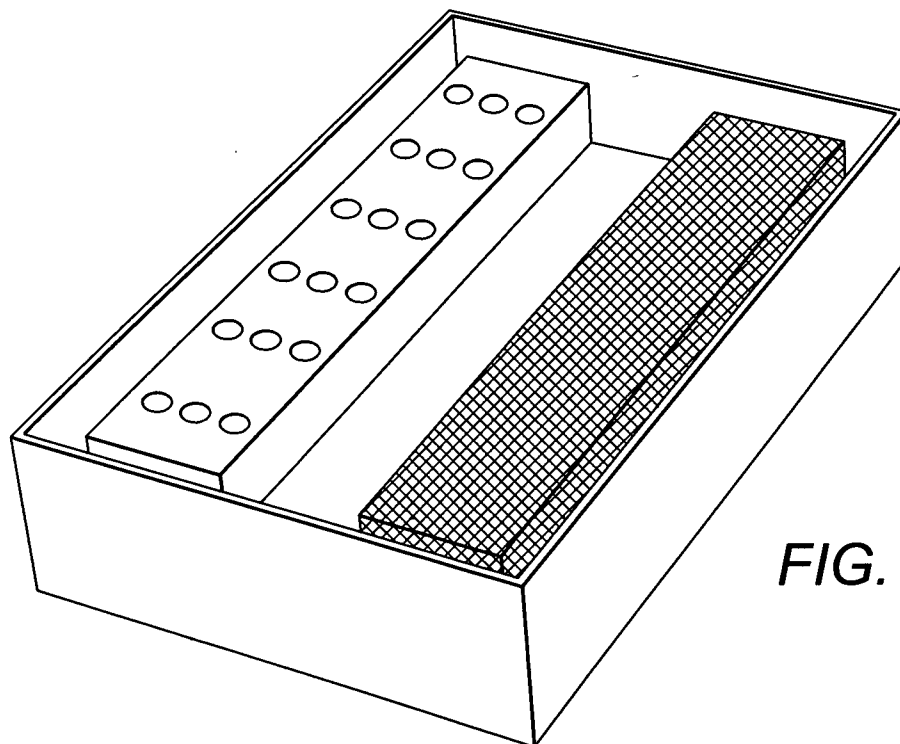


FIG. 5

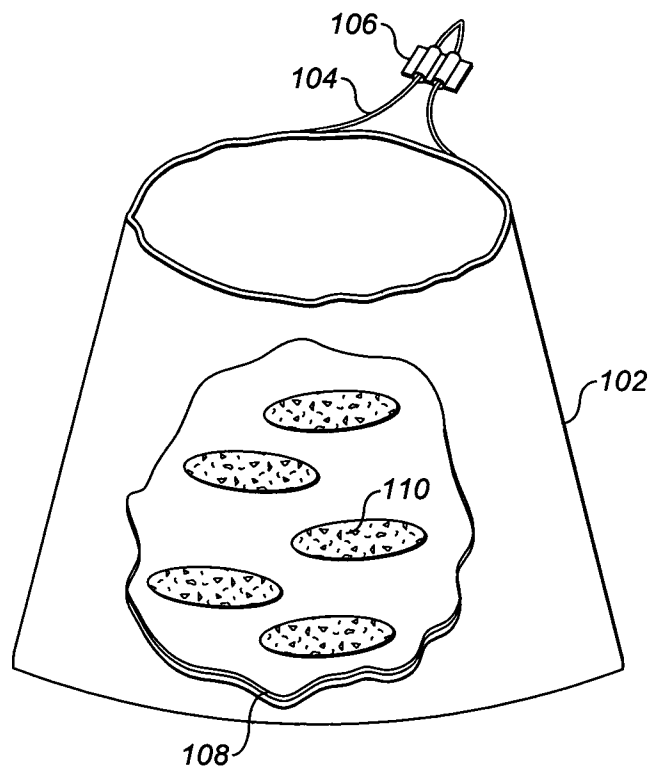


FIG. 6

INTERNATIONAL SEARCH REPORT

International application No
PCT/GB2008/002722

A. CLASSIFICATION OF SUBJECT MATTER

INV. B01F1/00 B01F15/00 B65D81/32
ADD. B01F3/08 B01F3/12

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

B01F B65D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 0 642 987 A (RHONE POULENC AGROCHIMIE [FR]) 15 March 1995 (1995-03-15) column 2, lines 42-53 column 4, line 26 - column 5, line 21 column 5, lines 42-57 column 7, line 19 - column 8, line 3 column 9, line 19 - column 10, line 39 abstract; figures 1,2 -----	1-34
A	EP 0 612 673 A (ILLINOIS TOOL WORKS [US]) 31 August 1994 (1994-08-31) abstract; figures 1-4 -----	1-34
A	WO 02/053696 A (UNILEVER PLC [GB]; UNILEVER NV [NL]; LEVER HINDUSTAN LTD [IN]) 11 July 2002 (2002-07-11) abstract; figures 1-7 ----- -/--	1-34

☒ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

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- *&* document member of the same patent family

Date of the actual completion of the international search

12 December 2008

Date of mailing of the international search report

19/12/2008

Name and mailing address of the ISA/

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040,
Fax: (+31-70) 340-3016

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Brunold, Axel

INTERNATIONAL SEARCH REPORT

International application No

PCT/GB2008/002722

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

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A	EP 1 510 466 A (YOSHINO KOGYOSHO CO LTD [JP]) 2 March 2005 (2005-03-02) abstract; figures 1-7 -----	1-34

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

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