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(54) **SEALED PACKAGE**

ABGEDICHTETE VERPACKUNG

EMBALLAGE ETANCHE

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Description

This invention relates to a package particularly suitable for containing a pesticidal composition.

Pesticides, e.g. herbicides, are often potentially harmful materials and are commonly produced as a concentrated solution or dispersion in an organic liquid, as a gel or in solid form. Such chemicals are typically supplied in a metal or blow-moulded plastics container. To use the chemical pesticides, e.g. herbicides, a quantity of the pesticide is measured out of the container in concentrated form and then mixed with a large volume of water before being sprayed onto a locus to be treated or onto plants. Such concentrated materials are frequently highly toxic so great care must be taken in measuring and mixing them to avoid spillage and to avoid human or animal contact with the concentrated pesticide.

Efforts have been devoted to the design of containers to minimise the risk of accidental spillage of their contents when used and also to reduce residues remaining in the containers after use. Plastics containers with wide necks to facilitate pouring of their contents have been used Blow moulded plastics containers having hollow handles have been made in which the hollow handles are isolated from the body of the container to avoid retention of material in the handle.

Nevertheless, with present packages it is relatively easy to spill the contents during the mixing process with the resulting risk of contamination of the environment and risk of contact with humans or animals. Also, it is relatively rare to empty containers so that farmers, and other users, tend to have partly full containers left around. These represent a further hazard. Even when all of the contents have been used it is difficult to dispose of the empty container. It is also difficult to wash adequately the containers and measuring instruments in which the concentrated pesticides are handled. These devices represent a further hazard to personnel and to the environment.

It has been proposed to package agricultural chemicals in a container comprising a screw fitting adapted to screw onto a corresponding fitting on a spray tank. The contents of the container should be released only when a satisfactory seal exists between the tank and the container. Practical difficulties exist in securing widespread use of such a system in view of the need for standardisation of screw-fitting sizes and the possibility of leakage if a satisfactory tight seal is not achieved.

It has also been proposed to package chemicals in a water soluble container which releases the packaged chemical only after contact with water (see for example GB-A-922,317 and EP-A-0,347,220). Such applications have however been limited by the capabilities of known water soluble containers which are often flexible and prone to rupture. In particular when a package is dropped it is particularly prone to rupture due to mechanical or hydraulic shock if it contains a liquid, gel or a fine powder.

In other fields where flexible packaging is employed, there is also a need to reduce the likelihood of rupture occurring due to mechanical shock.

FR-A-1,088,598 discloses a package containing liquid suitable for dropping from an aeroplane without using a parachute. The package comprises a central pocket containing the liquid with a series of seals around the central pocket. Subjected to a mechanical shock starting from the innermost seal, seals can be ruptured successively leaving at least the outermost seal intact. GB-A-943,498 discloses a package in the form of an envelope of heat sealable material which comprises a seam comprising a rupturable area such that the seam area comprises either discrete bonded or unbonded areas. Typically, the rupturable seam area divides the packaging into compartments, the contents of which may be mixed by rupturing the seam.

The present invention seeks to overcome the disadvantages of known packages and to provide a flexible package having an improved resistance to mechanical shock.

Accordingly the present invention provides a closed package comprising one or more flexible water dispersible or water soluble polymeric sheets sealed to form an outer non-breachable seal as known from EP-A-0 347 220 with, at least one inner breachable seal of lower peel strength than the non-breachable seal and optionally a space between the inner and outer seals containing substantially none of the contents of the package.

When the package is subjected to mechanical shock the breachable seal may be breached dissipating the energy of the shock without damaging the outer seal. Where the package comprises a space between the inner and outer seals, the space contains substantially none of the contents of the package: if the inner seal is breached the extra volume accessible to the contents may help to dissipate shock.

The breachable seal used in the package is one which may be breached when the package is subjected to mechanical shock for example when dropped from a height of 1 to 2m. The breachable seal can be breached by peeling apart the seal; additionally it can be breached by means of a gap in the seal.

The package of the invention comprises one or more sheets of flexible material, preferably thermoformable material, sealed to form a closed package. Preferably if more than one sheet is used, they are of the same material, but they may be different. Preferably the package is formed by two separate sheets of material sealed to form a closed package.

According to the invention, the or every sheet comprising the package is of water soluble or water dispersible material. The use of such material which e.g. is known from EP-A-0 347 220 may allow one or more of the following advantageous features, particularly if the contents comprises a hazardous chemical, such as a pesticide:

the contents of package are released only after

contact with water in which it is to be dissolved or dispersed, minimising the possibility of accidental contact of the undiluted material with the environment or with humans or animals;

the contents can be provided in unit dosage form suitable for dilution with a predetermined amount of water removing the need for the contents to be measured out in undiluted form;

the package is easy to use : the package can be simply placed in water prior to use; and

the need for washing out of the residual chemical from containers to render them safe for disposal is removed; containers which have been in contact with the contents remain uncontaminated which facilitates their disposal.

Specific suitable water soluble or water dispersible materials include polyvinylalcohol, polyethylene oxide; alkyl and hydroxyalkylcellulose, such as hydroxymethylcellulose, hydroxyethylcellulose, hydroxypropylcellulose; carboxymethylcellulose; polyvinyl ethers such as polymethylvinyl ether or poly(2-methoxy or ethoxy ethylene); poly(2,4-dimethyl-6-triazinylethylene; poly(3-morpholinylethylene); poly(N-1,2,4-triazonylethylene; poly(vinylsulfonic acid); polyanhydrides; low molecular weight urea-formaldehyde resins; low molecular weight melamine-formaldehyde resins; poly(2-hydroxyethyl methacrylate); polyacrylic acid and its homologs. Preferred materials are polyethylene oxide, methyl cellulose, or polyvinyl alcohol, most preferably polyvinyl alcohol. Generally polyvinylalcohol will be used as a partially or fully alcoholised or hydrolysed polyvinyl acetate film.

Most preferably a thermoformable, eg Vinex, polyvinylalcohol resin is used: such resins possess the advantages of being adaptable to deep draw molding without significant shrinkage problems.

The material may be unoriented, momo-axially oriented or bi-axially oriented. Water soluble materials are preferred since they provide less disposal problems. The materials used will generally be cold water soluble; cold water soluble polyvinyl alcohol is preferred. In one specific embodiment, cold water soluble polyvinyl alcohol which is 40 to 99% hydrolysed or alcoholised is used. It will be understood that other materials may be used when the package is to be dissolved or dispersed in hot water.

The maximum tensile strength of the water soluble or water dispersible material of the sheets comprising the package is preferably at least 20, more preferably from 30 to 80, N/mm^2 and the elongation at break is preferably 200 to 380%, more preferably from 220 to 350%. Testing for these values is generally carried out at 23°C and 50% relative humidity.

Preferably the package of the invention should release its contents in less than about 10 minutes. Typically the package will be placed in the spray tank of a conventional sprayer. The tank will generally be partly filled with water, and the package added. When the tank is provided with means to agitate the water, the contents of the bag will be released more rapidly. It is preferred that release it should take place in less than about a minute, for example in 30 to 40 seconds. It will be understood that the time taken to release the pesticide will depend upon a number of factors apart from the nature of the bag, including the temperature of the water and the level of agitation.

The package may contain material in liquid, gel or granular form. When the contents is in liquid or gel form it is particularly important to avoid pinholes in the package through which leakage of the contents may occur. In such cases therefore the or each sheet may be a laminate, generally of two layers of different or the same material, as pinholes are unlikely to coincide in two layers of material.

When the contents are in granular form, the sheets typically comprise a single layer of material. However, in cases where it is particularly desirable to avoid pinholes in the package, eg. to prevent the escape of unpleasant odours, a laminate material of the type described above may be used.

The or each sheet comprising the package will generally be from 20 to 500μm, preferably 50 to 250μm, thick.

The thickness of the sheets will be kept to the minimum needed to prevent rupture of the package, so that the water soluble or dispersible material is dissolved or dispersed as quickly as possible and the contents then released.

According to a particular embodiment the package is provided with an inner breachable seal or seals in the region of the package most likely to fail. The region of the package most likely to fail will vary according to a number of factors including the contents, shape and size of the package, the storage and usage conditions of the package and can be determined by routine experimentation.

The package comprises an inner seal and an outer seal of a higher peel strength than the inner seal. The inner seal may itself comprise regions of varying peel strength, typically being of lower peel strength in the inner region of the seal, or it may be of uniform peel strength. The inner and outer seals may be joined to form a single continuous seal of varying peel strength or they may be separated by a space.

Alternatively there may be more than one, typically up to four, inner seals of lower peel strength than the outer seal each of which is separated by a space, containing substantially none of the contents of the package. In cases where more than one inner peelable seal is present then peel strengths may be the same or different. Where the strength of the seals does vary, then typically the innermost breachable seal will be of lowest peel strength, the outermost breachable seal of highest peel strength and any intermediate seals will be of intermediate strength, progressively increasing towards the outermost seal.

Mechanical shock to such a package, when filled

with liquid, gel or granular contents may result in partial peeling of the inner seal or seals thereby absorbing the energy of the shock without damaging the outer seal.

The inner and outer seals may be heat seals. The outer seal may be a conventional heat seal typically, 2 to 5 mm thick. The or each inner heat seal will typically have a thickness from 1 to 10mm, e.g. 2 to 5mm.

Where the inner and outer seals are produced by the same sealing platen then typically each inner seal will be within 20 mm of the outer seal. For example there may be 1 to 3 inner heat seals, each 2 to 3mm thick with a spacing of 2 to 3 mm from the outer seal or from each other.

Alternatively where the or each inner heat seal is produced by a separate sealing platen from the outer heat seal, then the inner and outer seals may be widely separated with the proviso that the space between them does not contain any of the contents of the package. For example the inner seal or seals may seal the portion of the package containing the contents and the outer seal be formed around a handle portion of the package.

Rather than using heat seals, either the or each inner peelable seal or the outer non-peelable seal may be sealed using an adhesive. Conventional polymeric adhesive may be used; the strength of the adhesive used may be adjusted to provide a peelable or a non-peelable seal as desired.

Suitable adhesives include small amounts of water or low molecular weight solutions of polyvinyl alcohol, optionally mixed with polyvinyl acetate.

The non-peelable and peelable seal or seals may constitute a double or multiple seal around the whole the package. In other cases however, the inner seals or seals may be used to reinforce the outer seal only in those regions of the package which are particularly vulnerable to damage by mechanical shock. In such cases the inner and outer seals may be joined to prevent the contents of the package entering the space between them, if present.

According to a particular embodiment the package of the invention may comprise an outer non-breachable seal and one or more inner seals having a narrow gap in or between them providing access to a space between the inner seal or seals and the outer seal which space contains substantially none of the contents of the package. Mechanical shock to the package may be dissipated by the entry of the contents of the package into the space between the inner and outer seals. For example the package may comprise a single inner seal with a narrow gap in it, or a pair of overlapping seals with narrow gaps between them, which gaps are in a portion of the interior of the package which does not contain any of the contents of the package when in its normal upright orientation. The same type of seals may be used as are described above: a combination of non-peelable outer seal and peelable inner seals will be used.

The contents of the package may be in liquid, gel or granular form, preferably liquid or gel form. Where the contents are in liquid form they may be in the form of a solution or of a dispersion e.g. an emulsion or a suspension. Similarly in gel form, the contents may be a single phase gel or a dispersion

For the package comprising water soluble or water dispersible material, the contents will be substantially dry. They may comprise any conventional carrier, diluent or surfactant.

When the contents are in liquid or gel form and comprises an organic solvent, the water soluble or water dispersible material will be one which is insoluble in the organic solvent.

The packages of the present invention generally contain from 0.1 grams to 7kg, preferably 1g to 5kg, where the composition is in granular form. Where the contents are in liquid or gel form, the package typically contains from 5ml to 10 litres, preferably from 50ml to 5 litres.

Generally the package will contain at least a small amount of unfilled space, eg at least about 5% by volume, so as to minimise the likelihood of spillage of the composition during the production of the package. The unfilled space further provides an area into which the contents of the package may move on exposure to mechanical shock which tends to dissipate the energy from the shock.

The package of the invention may, in a particular embodiment contain a pesticidal composition. Such a composition may be of conventional type.

Suitable pesticides which may be used in the package of the present invention include fungicides, insecticides and herbicides (for example hydroxybenzonitrile herbicides, e.g. bromoxynil or ioxynil or derivatives thereof such as salts or esters, e.g. heptanoates or octanoates). Specifically a hydroxybenzonitrile herbicide comprising a mixture of ioxynil and bromoxynil ester may be used. Molluscicides, suitable for addition to, for example, ponds or streams may also be employed.

More generally, the package of the invention may contain chemicals which are potentially toxic or damaging or detrimental to health or to the environment. As well as pesticides this includes chemicals which are to be dissolved or dispersed in a large volume of water or aqueous liquid, such as compounds, e.g. metronidazole, used to combat spoilage in industrial aqueous liquids, or compounds for addition to the aqueous circuits of e.g. domestic or industrial heating systems, compounds for addition to swimming pools, photographic materials, inks, dyestuffs, non-aqueous organic acids and cement additives.

When the material comprising the sheet or sheets of package is a polyvinylalcohol the contents should generally not comprise borates, chlorides or chlorates in amounts effective to lead to deterioration of the material unless the material is protected from them.

Where the contents are in liquid form then suitable organic solvents which may be used as carriers include petroleum based solvents, e.g. petroleum ethers, mineral oils, aliphatic or aromatic hydrocarbons, e.g. hex-

ane, octane, cyclohexane, benzene, xylene and naphthalene, halogenated aliphatic or aromatic hydrocarbons, e.g. carbon tetrachloride, chloroform, methylene chloride and chlorobenzene, esters e.g. amyl acetate, ketones, e.g. cyclohexanone, ethers, or a higher alcohol (lower alcohols may migrate through the water soluble or water dispersible materials described above: this can result in product appearing on the outside of the package). It will be understood that mixtures of solvents, e.g. mixtures of a hydrocarbon solvent with another solvent such as a ketone or a higher alcohol, may also be used. The organic liquid must be reasonably dry and typically contains less than 2 to 3% of water if the package is water soluble or water dispersible to ensure that it does not leak prematurely from the package.

Such compositions may comprise a surfactant, in addition to, or in some cases instead of, an organic solvent as a carrier or diluent. Preferably, such a surfactant, which is reasonably dry in that it contains less than 2 to 3% water. Suitable surfactants may be of the ionic or non-ionic types: for example sulphoricinoleates, quaternary ammonium derivatives, products based on condensates of ethylene oxide with alkyl and polyaryl phenols, e.g. nonyl- or octyl-phenols, or carboxylic acid esters of anhydrosorbitols which have been rendered soluble by etherification of the free hydroxy groups by condensation with ethylene oxide, alkali and alkaline earth metal salts of sulphuric acid esters and sulphonic acids such as dinonyl- and dioctyl-sodium sulphonosuccinates and alkali and alkaline earth metal salts of high molecular weight sulphonic acid derivatives such as sodium and calcium lignosulphonates and sodium and calcium alkylbenzene sulphonates.

Suitably, the contents may comprise up to 10%, e.g. from 0.05% to 10% of surfactant but, if desired, may comprise higher proportions of surfactant for example up to 15% in liquid emulsifiable suspension concentrates and up to 25% in water soluble concentrates.

The contents of the package may be thickened or rendered thixotropic to provide a gel. An increased viscosity in the contents can reduce the likelihood of the of rupture if the package is subjected to mechanical shock. The contents of the package may be rendered more viscous or thixotropic by the inclusion of additives, for example, a modified organophile, or bentonite, lecithin, polymethylene oxide or silica gel.

The concentrations of the chemical, such as pesticide, dissolved or dispersed in the organic liquid or in the gel will generally be those conventionally used: in order to reduce the bulk of each package, however, concentrations may be increased. Each package will preferably contain at least about 500 ml and will preferably contain a convenient standard volume, for example 500 ml or 1 litre, although it will be appreciated that any convenient standard volume may be chosen.

When the contents are in granular form then this may comprise any conventional carrier or diluent which if the package is water soluble or dispersible is reasonably dry, in that it contains less than 2 to 3% of moisture. Examples of suitable solid diluents or carriers are aluminium silicate, talc, calcined magnesia, kieselguhr, tricalcium phosphate, powdered cork, adsorbent carbon black and clays such as kaolin and bentonite. Solid compositions may comprise surfactants, such as dispersing agents, for example those surfactants previously mentioned. In some cases such surfactants may also be used as diluents or carriers.

As with compositions in liquid form, the concentration of chemical such as pesticide in the solid pesticidal compositions may be as conventionally used: concentrations may however be increased to reduce the bulk of the package.

The contents, such as pesticidal compositions, present in the package of the present invention may be prepared by conventional means.

The packages of the present invention may be obtained by first forming a receptacle adapted to retain the contents, filling the open receptacle with contents and then sealing it.

The open receptacle may be obtained by conventional means. For example, this may be achieved by a vacuum forming where material forming the receptacle is deformed to conform to the shape of a suitable mould and may, if desired, be a thermoforming process to cause the sheet to retain its shape after release from the mould.

Where the deformation is by vacuum forming, the mould may be equipped with pinholes through which the space between the mould and the sheet can be evacuated.

Where deformation is by thermoforming, the sheet may be driven against the mould by vacuum forming, or by applying a superatmospheric pressure to the other side of the sheet, or by mechanical displacement of the sheet (plug forming).

After forming the open receptacle, the contents of the package are placed inside and the receptacle closed to form a sealed compartment. The sealing step may involve the sealing of two surfaces of the package together, the folding of a or the sheet of the material forming the receptacle onto itself and then sealing to itself or the sealing of an additional sheet of material to the open receptacle. It will be appreciated that the open receptacle may be partially sealed prior to filling it.

The inner breachable seal and outer non-breachable seals of the package may be produced simultaneously or using separate sealing steps. Either seal may be produced, at least partially prior to filling the package. As previously mentioned either seal may be produced by heat sealing or by an adhesive.

Where the package is sealed by heat sealing, the heat sealing may be carried out using conventional heat sealing equipment and conventional conditions. The parameters of sealing jaw temperature, jaw pressure and dwell time may be controlled to obtain an optimum heat seal. In order to ensure optimum processability, of the

water soluble or water dispersible material, heat sealing is generally carried out at 15 to 85% relative humidity (measured at 18 to 22°C). The relative humidity is preferably 35 to 55%. Some routine experimentation may be required to obtain a suitable heat seal depending on the material forming the package, e.g. the particular grade and thickness of PVOH chosen. The quality of the seal can be checked, for example by visual inspection for areas of opacity or for bubbles. Imperfections in the seal may give rise to a lack of water solubility or water dispersibility of the seal where this is desired.

According to a specific embodiment, an inner peelable seal and an outer non-peelable seal may be produced simultaneously using the same heat sealing platen. In such a case the strength of the heat seal produced may be varied for example by varying the sealing jaw temperature over the heat seal platen. A slightly lower jaw temperature may be used on the inner portion of the sealing surface which produces a peelable seal: a variation in sealing jaw temperature may be obtained using a stepped sealing jaw having a first sealing surface closer to a heating element and at a higher temperature than a second sealing surface. Rather than a stepped sealing jaw a contoured jaw may alternatively be used and there may be a space between the inner and outer sealing surface corresponding to a space between the seals. Similarly, a sealing jaw comprising more than two sealing surfaces may be used to produce a package comprising more than one inner breachable seal.

As an alternative to varying peel strength by varying sealing jaw temperature as described above, such variation may be obtained by varying sealing jaw pressure or dwell time.

A stepped jaw may also be used in conjunction with a planar member of resilient material. A seal of variable strength may then be obtained by the variation in jaw pressure which is produced by the stepped jaw.

Packages according to the invention are shown, by way of illustration, in the accompanying drawings in which:

Figure 1 illustrates the formation of a package of the invention.

Figure 2 illustrates a package of the invention having an integral handle.

Figure 3 shows two heat sealing jaw arrangements which may be used to provide a variation in peel strength across a seal by varying the jaw pressure applied during the sealing process.

Figure 4 shows two heat sealing jaw arrangements which may be used to provide a variation in peel strength by varying the jaw temperature across the seal during the sealing process.

Figure 5 shows a heat sealing arrangement which may be used to provide a variation in peel strength by varying the dwell time.

Figure 6 shows a heat sealing jaw arrangement in which variation in peel strength is provided by a combination of variation in jaw pressure and temperature.

Figure 7 shows a heat sealing arrangement in which variation in peel strength is provided by a combination of variation in jaw pressure and dwell time.

Figure 1 illustrates a package formed by thermoforming or vacuumforming a sheet 1 of water-soluble material into a mould 2, a pesticidal composition 3 being contained in the recess thus formed. A second sheet 4 of water-soluble material is heat sealed to the first sheet on the flange 5 of the mould 2. The heat seal comprises an outer non-breachable seal 6 and an inner breachable seal 7.

Figure 2 illustrates a package having an integral handle 8. The package contains a quantity, for example 1 to 5 litres, of a liquid 9. The heat seal comprises an outer non-breachable seal 10 and an inner breachable seal 11 and may also comprise an additional breachable seal 12 at the bottom of the container. The breachable seals 11 and 12 may have different peel strengths. The handle may have an area 13 of non-breachable seal.

Figure 3 shows two heat sealing jaw arrangements which may be used to provide a variation in peel strength across the seal by varying the jaw pressure applied during the sealing process. Figure 3(a) shows a resilient planar sealing jaw 14 which is heated and a non-heated stepped sealing jaw 15 having a sealing surface a portion of which 16 is closer to the jaw 14 and a portion 17 further from jaw 14. In operation variation in jaw pressure is produced by the difference in the distance x between 14 and 16 and the distance x + y between 14 and 17, bearing in mind the jaw 14 will resile on closing. It will be appreciated that more than one step may be present in the non-heated jaw leading to provide more than one variation in the peel strength of the seal. Figure 3(b) shows an alternative arrangement in which the sealing surface of the non-heated jaw has a portion 18 parallel to the heated jaw and a further portion 19 which slopes away from the heated jaw providing a continuous variation in the jaw pressure. Jaw 14 may be resilient.

Figure 4 shows that two heat sealing jaw arrangements which may be used to provide a variation in peel strength by varying the jaw temperature across the seal during the sealing process. Figure 4(a) shows a stepped heated sealing jaw 20 and a corresponding stepped non-heated sealing jaw 21. The distance between the corresponding sealing surface of the jaws is a constant x. Variation in the temperature at the steps of the sealing jaw, which is due to variation in the distance of the sealing surface from a heating element, produces a variation in peel strength. Either of the jaws 20 and 21 may be resilient. Figure 4(b) shows an alternative arrangement in which two planar sealing jaws are employed, a non-heated jaw 22 and a heated jaw 23 in which a variation in temperature is produced by the

presence in the jaw of insulating material 24. Due to the insulating material the portions 25 and 26 of the heated jaw are at lower temperatures than the portion 27 when in operation. Either of the jaws 20 and 21 may be resilient.

Figure 5 shows a heat sealing arrangement which may be used to provide a variation in peel strength by varying the dwell time. A heated jaw 28 is employed together with two separately removable non-heated jaws 29 and 30. In operation the heated and non-heated jaws are separated by a constant distance x and variation in dwell time is achieved by withdrawing one of the jaws 29 and 30 while continuing to seal against the other. In this case a jaw, preferably jaw 28, may be resilient.

Figure 6 shows a heat sealing jaw arrangement in which variation in peel strength is produced by a combination of variation in jaw pressure and temperature. The arrangement shown is similar to that shown in Figure 3b save that the non-heated jaw 31 is planar and the heated jaw 32 has a portion 33 of its sealing surface parallel to 31 and a portion 34 which slopes away from 31. Variation in the jaw pressure is provided by variation in the distance between the jaws and variation in the temperature of the heated jaw 32 is provided by the variation in the distance of the sealing surface of 32 from a heating element. Either of the jaws may be resilient.

Figure 7 shows a heat sealing jaw arrangement in which variation in peel strength is produced by a combination of variation in jaw pressure and dwell time. A planar sealing jaw 34 is employed with a non-heated jaw 35 having a stepped sealing surface. The portion of the stepped surface of 35 which is closer to 34 is mounted on a spring 37 and is movable relative to the remainder of 35. In operation a variation in jaw pressure is produced by the variation in the separation of the jaws. When the non-heated jaw 35 is withdrawn the spring 37 extends increasing the dwell time of the sealing surface 36 in contact with the preferably resilient jaw 34.

If in Figure 7 jaw 35 is resilient but jaw 34 and member 36 are not, or are more rigid, the contact pressure at the interface 34/36 will be higher than that at the interface 34/35 when the jaws are fully closed together.

Claims

1. A closed package comprising one or more flexible water dispersible or water soluble polymeric sheets (1,4) sealed to form an outer non-breachable seal (6), characterized by at least one inner breachable seal (7) of lower peel strength than the non-breachable seal (6) and optionally a space between the inner and outer seals containing substantially none of the contents of the package.

2. A package according to claim 1 which comprises more than one breachable seal (11,12).

3. A package according to claim 1 or 2 which comprises a narrow gap in the inner seal (7) or between inner seals providing access to the space between the inner and outer seals and which is effective to dissipate mechanical shock applied to the package by entry of the contents into the space.

4. A package according to claim 1, 2 or 3 comprising more than one inner breachable seal (11,12) of lower peel strength than the outer non-breachable seal (10), and a space between the inner and outer seals and between each inner seal.

5. A package according to any one of the preceding claims in which the outer non-breachable seal (6) and inner breachable seal (7) or seals are heat seals.

6. A package according to any one of claims 1 to 4, in which the outer non-breachable seal (6) and inner breachable seal (7) or seals are adhesive seals.

7. A package according to any one of the preceding claims which comprises a breachable seal (7) in the region of the package most likely to fail.

8. A package according to any one of the preceding claims in which the or each water soluble or dispersible flexible polymeric sheet (1,4) comprises polyethylene oxide, methyl cellulose or a polyvinyl alcohol.

9. A package according to claim 8 in which the water soluble or water dispersible material comprises a cold water soluble polyvinyl alcohol which is 40 to 99% hydrolysed or alcoholised polyvinyl acetate.

10. A package according to claim 8 or 9 in which the contents are released in less than 10 minutes after contact with water.

11. A package according to claim 10 in which the contents are released in less than 1 minute.

12. A package according to any one of the preceding claims which contains a composition in liquid or gel form (9).

13. A package according to any one of the preceding claims which contains from 5ml to 10 litres in liquid or gel form (9).

14. A package according to any one of the preceding claims which contains a pesticidal composition (3).

15. A package according to claim 14 in which the composition (3) comprises a hydroxybenzonitrile herbicide.

16. A package according to claim 15, in which the

hydroxybenzonitrile herbicide comprises a mixture of ioxynil and bromoxynil esters.

17. A package according to any one of the preceding claims in which the or each sheet (1,4) has a thickness from 20 to 500μm.

Patentansprüche

1. Geschlossene Verpackung, umfassend eine oder mehrere in Wasser dispergierbare oder wasserlösliche polymere Bahnen (1, 4), die miteinander versiegelt sind unter Bildung eines nicht aufgehenden Verschlusses (6), dadurch gekennzeichnet, daß mindestens ein innerer aufgehender Verschluß (7) mit einer geringeren Schälfestigkeit als der nicht aufgehende Verschluß (6) und gegebenenfalls ein Zwischenraum zwischen dem inneren und dem äußeren Verschluß, enthaltend im wesentlichen keinen Packungsinhalt, vorhanden ist.

2. Verpackung nach Anspruch 1, umfassend mehr als einen aufgehenden Verschluß (11, 12).

3. Verpackung nach Anspruch 1 oder 2, umfassend einen engen Spalt in dem inneren Verschluß (7) oder zwischen den inneren Verschlüssen, der einen Zugang darstellt zu dem Zwischenraum zwischen den inneren und äußeren Verschlüssen und der wirksam ist, einen mechanischen Stoß auf die Verpackung aufzufangen, indem der Inhalt in den Raum eintritt.

4. Verpackung nach Anspruch 1, 2 oder 3, umfassend mehr als einen inneren aufgehenden Verschluß (11, 12) mit einer geringeren Schälfestigkeit als der äußere nicht aufgehende Verschluß (10) und einen Zwischenraum zwischen den inneren und äußeren Verschlüssen und zwischen jedem inneren Verschluß.

5. Verpackung nach einem der vorangehenden Ansprüche, wobei der äußere nicht aufgehende Verschluß (6) und der innere aufgehende Verschluß (7) oder die Verschlüsse Heißversiegelungen sind.

6. Verpackung nach einem der Ansprüche 1 bis 4, bei der der äußere nicht aufgehende Verschluß (6) und der innere aufgehende Verschluß (7) oder die Verschlüsse Verklebungen sind.

7. Verpackung nach einem der vorangehenden Ansprüche, umfassend einen aufgehenden Verschluß (7) in dem Bereich, in dem die Verpackung am leichtesten versagt.

8. Verpackung nach einem der vorangehenden Ansprüche, wobei die oder jede wasserlösliche oder dispergierbare flexible polymere Bahn (1, 4) Polyethylenoxid, Methylcellulose oder einen Polyvinylalkohol umfaßt.

9. Verpackung nach Anspruch 8, wobei das wasserlösliche oder in Wasser dispergierbare Material einen in kaltem Wasser löslichen Polyvinylalkohol umfaßt, der zu 40 bis 99 % hydrolysiertes oder alkoholisiertes Polyvinylacetat ist.

10. Verpackung nach Anspruch 8 oder 9, wobei der Inhalt in weniger als 10 Minuten nach Kontakt mit Wasser freigesetzt wird.

11. Verpackung nach Anspruch 10, wobei der Inhalt in weniger als 1 Minute freigesetzt wird.

12. Verpackung nach einem der vorangehenden Ansprüche, enthaltend eine Zusammensetzung in flüssiger oder Gelform (9).

13. Verpackung nach einem der vorangehenden Ansprüche, enthaltend 5 ml bis 10 Liter in flüssiger oder Gelform.

14. Verpackung nach einem der vorangehenden Ansprüche, enthaltend ein pestizides Mittel (3).

15. Verpackung nach Anspruch 14, wobei das Mittel (3) ein Hydroxybenzonitril-Herbizid umfaßt.

16. Verpackung nach Anspruch 15, wobei das Hydroxybenzonitril-Herbizid ein Gemisch aus Ioxynil- und Bromoxynilestern umfaßt.

17. Verpackung nach einem der vorangehenden Ansprüche, wobei die oder jede Bahn (1, 4) eine Dicke von 20 bis 500 μm besitzt.

Revendications

1. Conditionnement clos, comprenant une ou plusieurs feuilles polymériques flexibles hydrosolubles ou dispersables dans l'eau (1, 4) soudées pour former un joint extérieur (6) ne pouvant être rompu, caractérisé par la présence d'au moins un joint intérieur (7) pouvant être rompu, de plus faible résistance au pelage que le joint (6) ne pouvant être rompu, et, facultativement, un espace entre les joints intérieur et extérieur ne renfermant pratiquement aucune quantité du contenu du conditionnement.

2. Conditionnement suivant la revendication 1, qui comprend plus d'un joint (11, 12) pouvant être rompu.

3. Conditionnement suivant la revendication 1 ou 2, qui comprend un intervalle étroit dans le joint inté-

rieur (7) ou entre les joints intérieurs, permettant un accès à l'espace entre les joints intérieur et extérieur et étant efficace pour dissiper un choc mécanique appliqué au conditionnement par pénétration du contenu dans cet espace.

4. Conditionnement suivant la revendication 1, 2 ou 3, comprenant plus d'un joint intérieur (11, 12) pouvant être rompu, de plus faible résistance au pelage que le joint extérieur (10) ne pouvant être rompu, et un espace entre les joints intérieur et extérieur et entre chaque joint intérieur.

5. Conditionnement suivant l'une quelconque des revendications précédentes, dans lequel le joint extérieur (6) ne pouvant être rompu et le ou les joints intérieurs (7) pouvant être rompus sont des joints thermosoudés.

6. Conditionnement suivant l'une quelconque des revendications 1 à 4, dans lequel le joint extérieur (6) ne pouvant être rompu et le ou les joints intérieurs (7) pouvant être rompus sont des joints adhésifs.

7. Conditionnement suivant l'une quelconque des revendications précédentes, qui comprend un joint (7) pouvant être rompu dans la région du conditionnement la plus susceptible de présenter une rupture.

8. Conditionnement suivant l'une quelconque des revendications précédentes, dans lequel la ou chaque feuille polymérique flexible hydrosoluble ou dispersable dans l'eau (1, 4) comprend un polymère d'oxyde d'éthylène, de la méthylcellulose ou un polymère d'alcool vinylique.

9. Conditionnement suivant la revendication 8, dans lequel la matière hydrosoluble ou dispersable dans l'eau comprend un polymère d'alcool vinylique, soluble dans l'eau froide, qui est un polymère d'acétate de vinyle ayant subi une hydrolyse ou alcoolyse de 40 à 99 %.

10. Conditionnement suivant la revendication 8 ou 9, dans lequel le contenu est libéré en moins de 10 minutes après contact avec l'eau.

11. Conditionnement suivant la revendication 10, dans lequel le contenu est libéré en moins de 1 minute.

12. Conditionnement suivant l'une quelconque des revendications précédentes, qui contient une composition sous forme d'un liquide ou d'un gel (9).

13. Conditionnement suivant l'une quelconque des revendications précédentes, qui a une contenance de 5 ml à 10 litres, le contenu étant sous forme d'un liquide ou d'un gel (9).

14. Conditionnement suivant l'une quelconque des revendications précédentes, qui contient une composition pesticide (3).

15. Conditionnement suivant la revendication 14, dans lequel la composition (3) comprend un herbicide du type hydroxybenzonitrile.

16. Conditionnement suivant la revendication 15, dans lequel l'herbicide du type hydroxybenzonitrile comprend un mélange d'esters d'ioxynil ou de bromoxynil.

17. Conditionnement suivant l'une quelconque des revendications précédentes, dans lequel la ou chaque feuille (1, 4) a une épaisseur de 20 à 500 μm.

Fig.1.

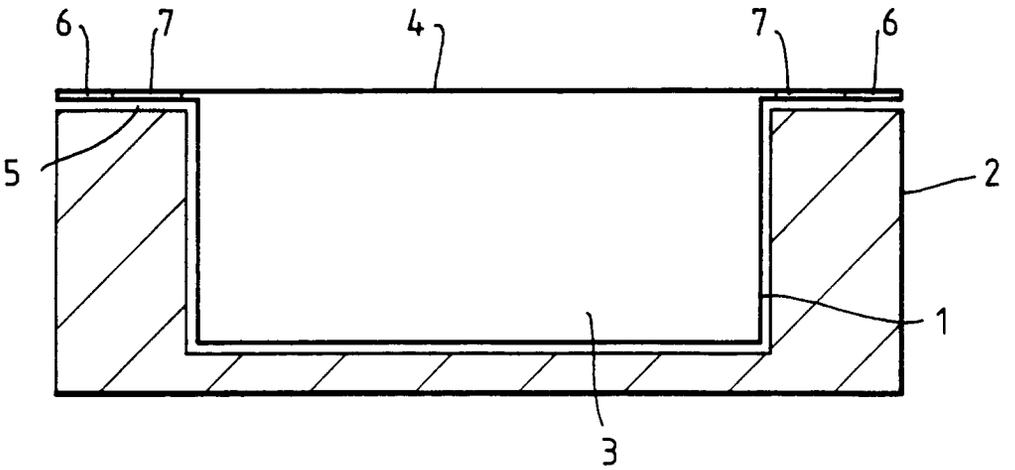

Fig.2.

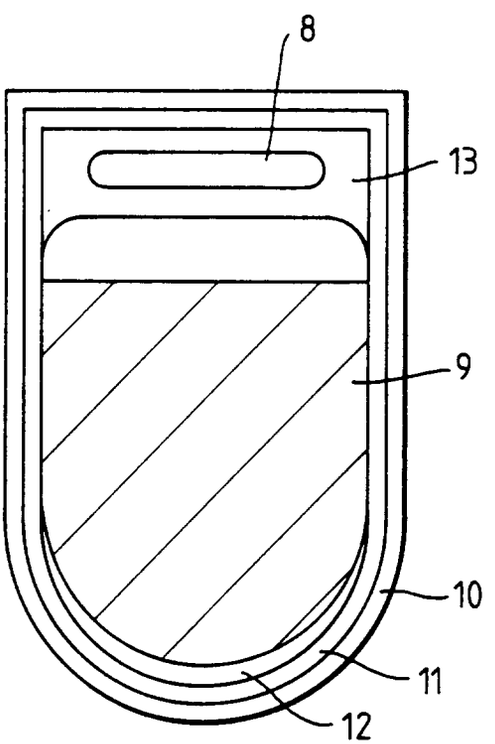

Fig.3.

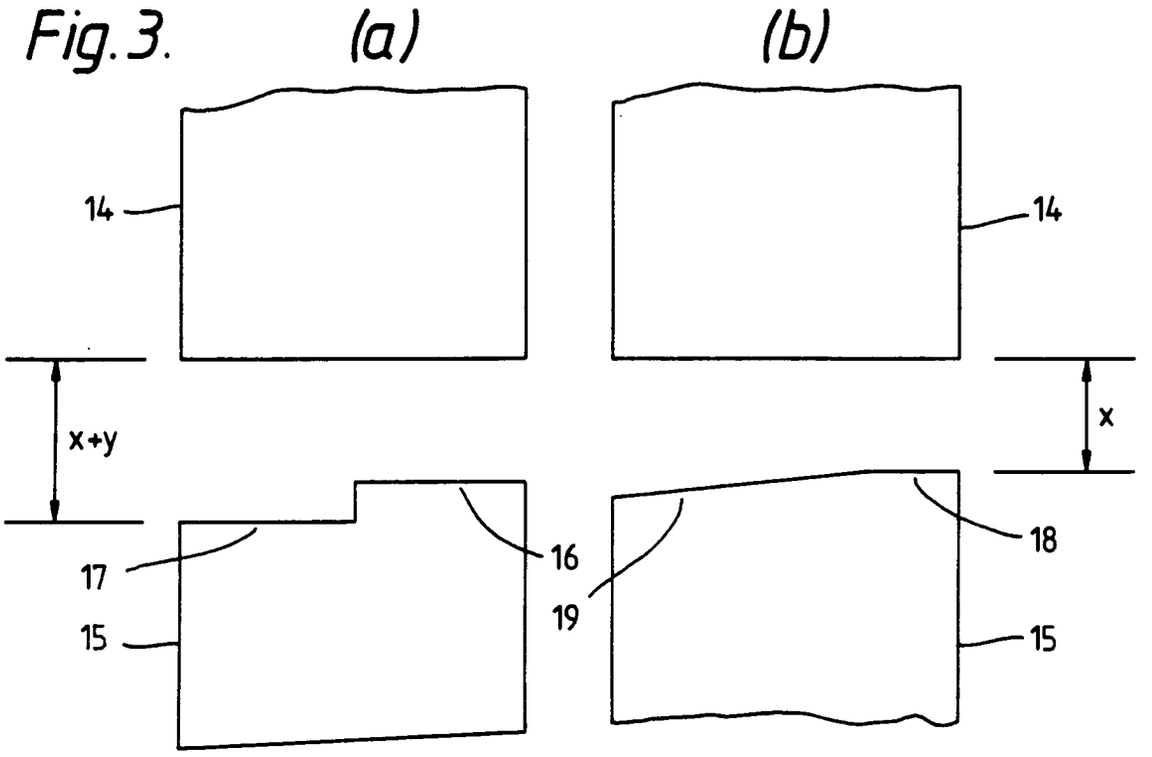

Fig.4.

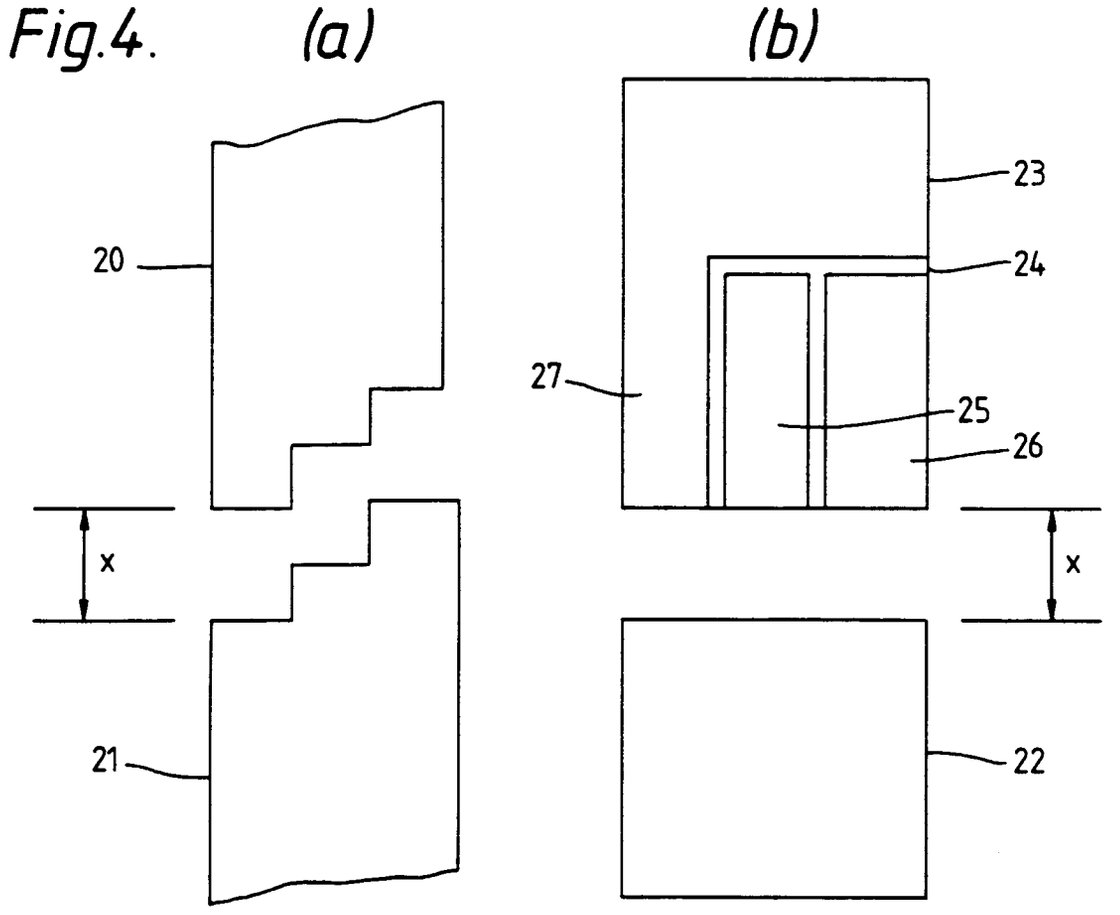

Fig.5.

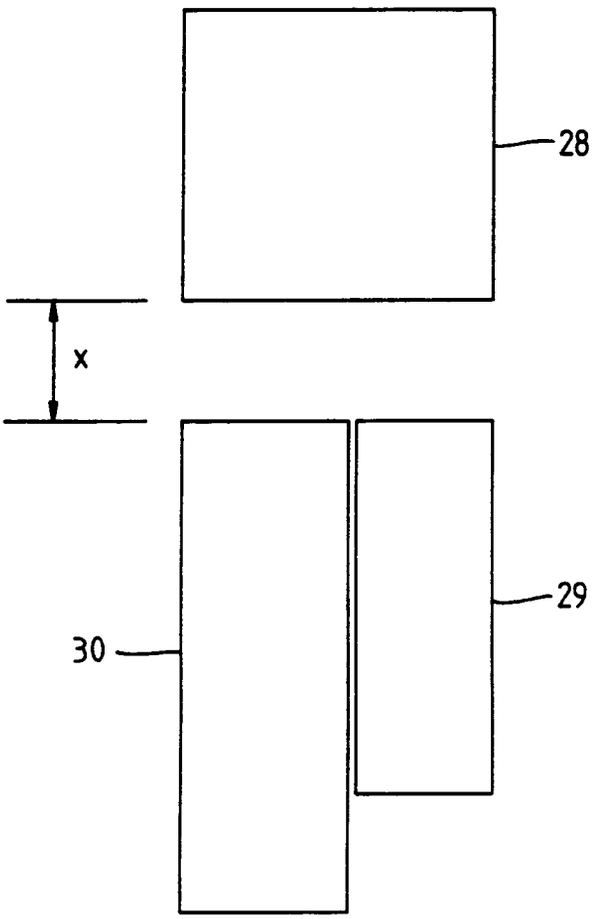

Fig.7.

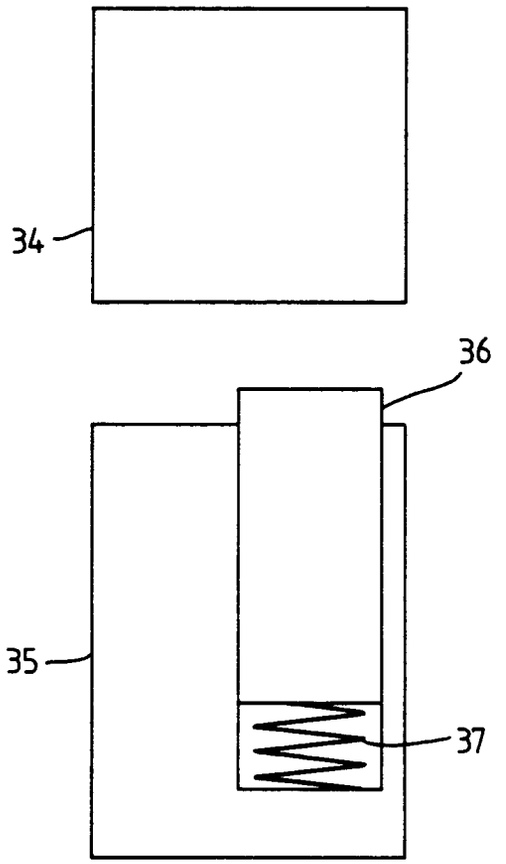

Fig.6.