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(71) Demandeurs/Applicants:
KING, MARIA PERPETUA, AU;
HILL, ROSS ANTHONY, AU

(72) Inventeurs/Inventors:
KING, MARIA PERPETUA, AU;
HILL, ROSS ANTHONY, AU

(74) Agent: RIDOUT & MAYBEE LLP

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(54) Title: ORGANIC ABSORBENT MATERIAL

(57) Abrégé/Abstract:

A product for the control of waste products and odours comprises a peat material and a surfactant to reduce surface tension. The peat having a moisture content of about 10-15 % by weight.



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- (71) Applicants and
(72) Inventors: **KING, Maria, Perpetua** [AU/AU]; 3 Windarra Way, Armadale, Western Australia 6112 (AU).
HILL, Ross, Anthony [AU/AU]; 169 Morrissey Road, Bullsbrook, Western Australia 6084 (AU).
- (74) Agent: **WALLACE, Rohan, James**; c/-Griffith Hack, 256 Adelaide Terrace, Perth, Western Australia 6000 (AU).
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ORGANIC ABSORBENT MATERIAL

FIELD OF THE INVENTION

[0001] The present invention relates to an organic absorbent material suitable for the control of waste products. The organic absorbent material has many applications including, but not limited to, use in pet litter.

BACKGROUND OF THE INVENTION

[0002] Production and sale of products relating to the collection and disposal of pet faeces, in particular cats, is an enormous market. One current product on the market is a cat sand that is made up of clay with quartz silica components. Historically the cat sand has been the industry standard since the 1940's. Such extended use has resulted in significant environmental damage due to the strip-mining of raw materials needed to manufacture the cat sand to meet consumer demand. In America alone over 46 million pounds are mined per week to meet demand. Furthermore such clay-based materials produce dust residue in production and transportation resulting in harmful dust being transferred to the human respiratory system. In addition the clay-based product does not absorb liquids as it is an adsorbent by nature and exhibits only moderate odour suppression qualities and becomes odorous due to liquid that is not absorbed. Expended product is disposed of in landfill consuming vast areas of land.

[0003] Alternative products to clay-based cat sands are available on the market. One such alternative product on the market is a paper based product that adsorbs the urine and faeces but as the urine is not encapsulated in the product it becomes quite odorous in a short period of time.

[0004] The present invention was developed with a view to providing an absorbent product that was useful as an improved pet litter that is absorbent and reduces odour, made from environmentally friendly organic materials. However, it will be understood that the absorbent product of the present invention can also be used to absorb other material, such as for example, to remove other waste materials, such as medical wastes.

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Other applications of the present invention are also envisioned.

SUMMARY OF THE PRESENT INVENTION

[0005] According to a first aspect of the present invention there is provided a product for the control of waste products comprising at least:

- a peat material; and
- a surfactant.

[0006] Preferably the peat material is a sphagnum peat. More preferably, the organic material is sphagnum peat from sphagnum peat moss. Preferably the peat material is dried. More preferably the peat is dried to about 10-15% moisture content by weight. More preferably, the moisture content is 11-12% by weight.

[0007] Preferably an additive is included to assist with biodegradation of waste products. More preferably the additive to assist with biodegradation of waste products is microorganisms, enzymes or a combination thereof. More preferably the additive is task-specific. Preferably the product is pet litter and the additive is to assist with biodegradation of pet faecal matter and urine.

[0008] Preferably the product further includes a wicking agent. Preferably the wicking agent draws liquid into the product by capillary action. More preferably the wicking agent is paper, straw or a combination thereof.

[0009] Preferably the product further includes a deodoriser. Preferably the product may be manufactured in a variety of scents, shapes and colours.

[0010] According to a second aspect of the present invention there is provided a method of producing a product for the removal of waste products and odours, said method including the steps of:

- reducing the moisture content of peat material; and
- adding a surfactant to the peat material.

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[0011] Preferably, the organic material is sphagnum peat. More preferably still, the organic material is sphagnum peat from sphagnum peat moss.

[0012] Preferably reduction of the moisture content is by thermal treatment of the organic material. Preferably the moisture content is reduced to about 10-15% by weight. More preferably, the moisture content is reduced to about 11-12% by weight.

[0013] Preferably said organic material is pelletised. Preferably said surfactant is added during pelletisation.

[0014] Preferably an additive is added to assist with biodegradation of waste products. More preferably said additive to assist with biodegradation of waste products is task-specific. Most preferably said additive to assist with biodegradation of waste products is microorganisms, enzymes or a combination thereof.

[0015] Preferably a wicking agent is included prior to pelletisation to draw liquid into the pellet by capillary action. More preferably the wicking agent is paper, straw or a combination thereof.

[0016] According to a third aspect of the present invention there is provided a method of forming pellets of peat comprising at least the steps of:

- providing an amount of peat to be pelletised;
- drying the peat to about 10-20% moisture content by weight; and
- forming the dried peat into pellets.

[0017] Preferably the drying process is conducted by heating the peat. Preferably the moisture content is 11-12% by weight.

[0018] Preferably the drying process is terminated when the weight of the peat reaches a weight of about 122 to 130 grams per litre.

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[0019] According to a fourth aspect of the present invention there is provided an absorbent product comprising at least:

peat dried to about 10-15% moisture content by weight formed into a suitable shape.

[0020] Preferably the absorbent product further comprises a surfactant.

[0021] Preferably the absorbent product further comprises a microbial agent specific to control the substance to be absorbed by the product. Preferably the absorbent product includes a wicking agent.

[0022] According to a fifth aspect of the present invention there is provided a transport medium for a liquid comprising at least:

peat dried to about 10-15% moisture content by weight formed into a suitable shape.

[0023] According to a sixth aspect of the present invention there is provided a liquid and transport medium combination comprising at least:

dried peat formed into a suitable shape, having a moisture content of about 10-15% by weight (prior to absorption); and
an absorbed liquid.

[0024] According to a seventh aspect of the present invention there is provided a liquid and transport medium combination formed by a method comprising at least the steps of:

drying peat to about 10-15% moisture content by weight;
forming the peat into a suitable shape; and
absorbing the liquid into the peat.

BRIEF DESCRIPTION OF THE DRAWINGS

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[0025] In order to facilitate a better understanding of the nature of the invention preferred embodiments of the invention will now be described in detail, by way of example only, with reference to the accompanying drawings in which:

Figure 1 is an isometric view of a preferred embodiment of an organic absorbent material for the removal of waste products and odours;

Figure 2 is an isometric view of an organic absorbent material of Figure 1 after addition of liquid; and

Figure 3 illustrates an application of an organic absorbent material of Figures 1 and 2 as a pet litter.

DETAILED DESCRIPTION OF THE INVENTION

[0026] Peat is a naturally occurring material that is composed of biodegraded and semi-biodegraded organic matter, which further degrades into a humus rich product. The peat is found worldwide in countries such as Canada, New Zealand, Russia and the United Kingdom. It is collected by a variety of methods, such as for example, mining or industrial vacuuming. Industrial vacuuming enables the peat be collected in such a manner that the soil beneath the peat remains undisturbed. Upon collection the peat is generally in a particulate form similar to that of mulch.

[0027] At high moisture levels the peat is hydro-absorbent, however at low moisture levels the peat tends to be hydrophobic and does not readily absorb water. It however, absorbs hydrocarbons. The present inventors have found that when the peat is dried to an optimum level, in the order of 10 to 15% moisture content by weight, has the capacity to absorb in the order of 8 to 12 times its own weight in liquid. This is achieved through adsorption followed by absorption whereby liquid is transported into the interior of the peat. This encapsulation effect provides a high level of odour suppression by absorption into the gelatinous interior and there is no longer exposure of the liquid to the environment to produce odours. Furthermore the surface of the peat is

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relatively dry after the liquid is absorbed.

[0028] The present inventors have also found that the hydrophobic nature of peat can be overcome by the addition of a surface active agent (surfactant), whereupon the peat will again adsorb and then absorb water or water based liquids.

[0029] It has also been discovered that peat of a moisture content of about 10-20%, preferably 13%, is suited to conglomeration/ pelletisation. Previous attempts to pelletise peat have either used wet peat which results in clogging of the pelletisation machine or the peat being too dry which results in it becoming too dusty. At this moisture content the peat is particularly suited to pelletisation. During the pelletisation process the peat becomes heated, further reducing its moisture content.

[0030] Dry peat weighs approximately 110 gm/L. Once the peat is dried it can be formed into a suitable shape by conglomeration or pelletisation. The drying process can be terminated when the weight of the peat indicates that its moisture content is within the desired range. This may be, for example, when the weight of the peat is between about 122.2 and 129.4 g/L (to achieve 10-15% moisture content). If pelletisation is to occur, drying may be terminated when the peat weighs about 128-135.5 g/L as a further reduction in the moisture content will occur during pelletisation, so that the dried pelletised peat results in the desired range of 10-15% by weight. More preferably the moisture content is between 11 and 12 % by weight. If pelletisation is not to occur, the process of drying the peat can be terminated when it weighs between 123.6 and 125 g/L (to achieve 11-12% moisture content). It will be appreciated that some flexibility in these amounts should be allowed. Furthermore, if other materials are added, compensation should be allowed in these ratios.

[0031] It is also noted that at about or just prior to the desired moisture content range the hydro-absorbency of the peat changes to hydro-repulsion. It is believed that as the moisture content in the peat drops, capillary action of liquid into the peat can no longer occur. However, during the pelletisation process, the drying off of further moisture is

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thought to provide very small channels through which further moisture may be absorbed. Thus pelletised peat again is able to absorb water based liquids.

[0032] Furthermore, the peat may also include a wicking agent assisting capillary action, such as paper or straw. A surfactant further assists in overcoming the hydro-repulsive nature of the dry peat, allowing it to adsorb, then absorb liquids, both water based and hydrocarbon based.

[0033] The dry pelletised/conglomerated peat also provides a medium for housing microorganisms/enzymes which are stable in the relatively dry conditions of the dried peat. When the pelletised/conglomerated peat is used to absorb a liquid, the moisture content of the peat rises thereby activating the dormant microorganisms.

[0034] In the preferred embodiment, the raw material for the production of the organic absorbent material of the present invention is a naturally occurring semi-biodegraded sphagnum peat from sphagnum moss. The peat is thermally treated to reduce the moisture content to the desired amount, and then pelletised. Pelletisation assists in the reduction of dust during processing and, importantly, during use by the consumer. A surfactant is added either simultaneously with pelletisation, or as an additional step. The surfactant reduces the surface tension of the sphagnum peat, enabling a greater rate of absorption of liquids. A task-specific additive, to assist with the biodegradation of the liquid waste is added to the pelletised final product.

[0035] A suitable surfactant is a mixture of anionic and non-ionic surfactants. In particular, a mixture of alkanate and teric surfactants is useful in the present invention. Such a useful surfactant is marketed under the brand name "Stink Stopper" by Southern Cross Laboratories Pty Ltd of New South Wales, Australia. This surfactant also contains microbes and a mild perfume. The surfactant is mixed into the dry peat prior to, during or after pelletisation in a ration of 5-50 L per tonne in the case of liquid surfactants or 2-30 kg per tonne in the case of solid surfactants. For the cat litter product described below, an amount of about 20 L per tonne of the "Stink Stopper"

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surfactant is added. Other surfactants known to be useful are dried granules of a commercially available wetting agent for soils. This is added at an amount of about 15-20 kg per tonne.

[0036] Other surfactants such as cationic or amphoteric surfactants may be suitable for adding to the product depending on the liquid to be absorbed. It will be appreciated by a person skilled in the art that suitable surfactants may be selected for the application in which the absorbent product of the present invention is being used.

[0037] The task specific additive for the pet litter application described below is preferably an odour reducing organism, for example, saprotrophes. More preferably, soil originating non-pathenogenic saprotrophes, such as bacillus organisms. Such a suitable source of microorganisms is marketed under the brand "Odour Eater" by Southern Cross Laboratories Pty Ltd of New South Wales, Australia.

[0038] While a specific genus of mircoorganism is referred to, a person skilled in the art will be readily able to assess whether a given microorganism is suitable for use in the invention.

[0039] The "Odour Eater" product mentioned above is added in dry form in a ratio of about 1-2 kg per tonne. More or less microorganisms may be added depending on the particular application of the absorbent product of the present invention. It is contemplated that a ratio of about 0.05-1% by weight that microorganisms may be added. Again, the person skilled in the art will be readily able to assess the ideal ratio of microorganisms required for a particular application.

[0040] Fibrous materials such as paper, and/or straw, may be added to the peat at the pelletisation stage. Addition of paper or straw improves the wicking process that draws the liquid to the surface of the peat and enabling more rapid absorption. Other fibrous materials may be added as a wicking agent, such as rice husks. The fibrous materials are pulped, such as by using a hammer mill and then mixed with the dried peat prior to

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pelletisation. The amount of fibrous material added depends on the application. For use in absorbing toxic chemicals 10-30% by weight (preferably about 20%) is used. For absorbing ammonia about 40% by weight may be added. In pet litter up to 75%, preferably 60-65%, may be added.

[0041] An example of the use of the organic absorbent material of the present invention is pet litter for the control of pet waste, such as for example, cat waste. In comparative testing when a clay-based pet sand is used, a cat may be observed to spend exaggerated periods of time attempting to "bury" its waste due the inability of the clay-based pet sand to absorb the liquids or adequately coat the solids to conceal the waste. In using the product of the present invention a cat does not spend exaggerated periods of time attempting to bury the waste. The waste is concealed almost immediately upon contact with the organic absorbent product, due to the attraction of the peat to the solids external moisture and absorption of the liquid. It is believed that the cat is psychologically more comfortable with this result as it mimics that experienced in nature.

[0042] Some conventional clay-based cat sand may be used for approximately one day before the cat sand must be disposed of to reduce odour. The odour results from the pet waste not being fully absorbed into the cat sand and the bottom of the tray remains wet.

[0043] Addition of liquid or dry (powder like) task-specific micro-organisms, enzymes, or a combination thereof results in acceleration the biodegradation of the pet waste. This acceleration occurs due to the peat with a moisture content less by 15%, preferably, less than 13% and most preferably between 11 and 12% by weight, supporting a high level of micro-organism activity to assist in the biodegradation of the pet waste. At these moisture content levels the microorganisms are relatively inactive. However, upon absorption of (liquid) waste, they activate to biodegrade the absorbed waste. Expended pet litter advantageously may be used in the garden as a natural fertiliser. Furthermore should the expended pet litter may be deposited in landfill, the activity of the micro-organisms, enzymes or combination thereof assists in breaking

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down some toxic components in the landfill thereby improving soil condition.

[0044] In comparative testing it has been determined that a product in accordance with the present invention weighs less than half the weight of a comparable volume of clay-based pet sand.

[0045] Furthermore in comparative testing it has been determined that a product in accordance with the present invention practically eliminates ammonia odours, however many conventional clay-based cat sand do not eliminate ammonia odours.

[0046] Referring to Figure 1 there is illustrated a side view of an embodiment of the organic absorbent material 10. The organic absorbent material is in the shape of a cylindrical pellet 12. The cylindrical pellet 12 consists of a circular periphery 14, a generally flat top side 16 and a generally flat bottom side. A typical pellet diameter is between 5 mm and 13 mm, although it will be appreciated that other sizes may be used.

[0047] Referring to Figure 2 there is illustrated a further side view of an embodiment of the organic absorbent material 10 wherein liquid 20 is poured from a container 22 onto the pellet 12. Absorption of the water into the pellet 12 results in the noticeable expansion of the diameter of the pellet 12.

[0048] Referring to Figure 3 there is illustrated a side view of an application of the organic absorbent material as a cat litter. A container 24 with a base 26, and sides 28 contains a volume of the organic absorbent material 10. Pellets 12 of the organic absorbent material are randomly distributed on the base 26 of the container. A cat (not shown) will deposit faecal matter in the container 24 on top of the organic material 10. Urine is absorbed into the organic absorbent material 10 and faecal solids coated in the organic absorbent material.

[0049] The pellets described above are formed using a 30 horsepower Lister animal feed pelletising machine. It has been found that using this machine to pelletise the dried

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peat is useful to add a lubricant such as Canolla grain in an amount of about 5% by weight (which has an oil content of about 40%). It is envisaged that other pelletising machines may require differing amounts of lubricant (such as vegetable oil) or may not require any lubricant. It is also envisaged that addition of surfactant would also act as a lubricant.

[0050] Task-specific additives to assist with biodegradation of waste products can be added to enable the present invention to be applicable to a variety of purposes. Such purposes include cleaning up spilt blood, absorbing medical waste and ammonia leaks. A particular task specific additive may be added to a product of the present invention to enable it to be included into bandages for covering leaking pipes transporting ammonia and absorbing leaking ammonia until the leakage may be rectified.

[0051] Many other uses for the absorbent product of the present invention can be found. Below are some examples.

- The dried peat product (without additives) may be used to absorb hydrocarbons, for example, such as in the clean up of oil or petrol spills. Task specific microorganisms may be included also for the clean up of oil spills and to biodegrade spilt oil. Alternatively this product form may be used as an air or smoke filter. In this form, the peat need not be pelletised. It has a loose course matter consistency, but may be packaged or agglomerated using a binder.
- In another application, a surfactant may be added with the product and optionally a wicking agent to absorb material for retention, to absorb various forms of waste or unwanted liquid. Once absorbed, the product operates as a transportation medium until it is disposed of by for example, burial, or destroyed by, for example, combustion.
- The pelletised absorbent product may be saturated with liquid and used as a transport medium for delivery of the liquid. In this regard, applications may

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include: saturation with an insect bait that will attract and then kill insects; saturation with an insect repellent which slowly evaporates thereby repelling insects; or saturation with an aromatic to operate as an aromatic dispenser as the aromatic evaporates. It may be saturated with liquid feed and consumed by animals, or it may be saturated with oils and used as a fish bait. In these embodiments the addition of a wicking agent may assist in the absorption of the liquid and/or dispersion/evaporation of the liquid.

- Where waste liquid is to be controlled, task specific microorganisms may be added so that the product operates as a pet litter as described above, a smoke filter, a portable toilet, (animal) waste liquid absorbent matting, an absorbent material in a vomit bag, chemical spill absorbent matting, biomedical liquid waste absorbent, a chemical disposal unit or a household organic composting unit. Again, a wicking agent may be provided.
- Heavy metals can be drawn into the product and retained therein.

[0052] The form of the absorbent product may vary from pellets described above. They may be agglomerated into some other form or contained within a liquid permeable package. A binder may be used.

[0053] The advantages of the present invention will be evident to the skilled addressee. Particular advantages of the described embodiments of the absorbent material for the removal of waste products include:

- (i) it is lightweight in comparison to conventional products on the market,
- (ii) it is comparatively softer than conventional products on the market thereby reducing discomfort to animals,
- (iii) it reduces odour due to encapsulation of liquid waste,
- (iv) it may be disposed of in the garden as a natural soil fertiliser;
- (v) if disposed of in landfill it will absorb other materials and therefore is reducing environmental impact; and

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- (vi) it can be effectively disposed of by burning as it makes for a fuel that produces minimal ash.

[0054] It would be understood to persons skilled in the art that numerous modifications and variations may be made to the above described embodiments of the present invention, in addition to those already described, without departing from the basic inventive concepts. Such modifications include forming product in the organic absorbent material into a mat, or the addition of silica gel pellets and clay based materials to the absorbent material. All such modifications and variations are deemed to be within the scope of the present invention the nature of which is to be determined from the above description.

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THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A product for the control of waste products and odours comprising at least:
a peat material; and
a surfacant.
2. A product according to claim 1, wherein the peat material is a sphagnum peat.
3. A product according to claim 1, wherein the organic material is sphagnum peat from sphagnum peat moss.
4. A product according to claim 1, wherein the peat material is dried.
5. A product according to claim 4, wherein the peat is dried to about 10-15% moisture content by weight.
6. A product according to claim 5, wherein the moisture content is 11-12% by weight.
7. A product according to claim 1, wherein an additive is included to assist with biodegradation of waste products.
8. A product according to claim 7, wherein the additive to assist with biodegradation of waste products is microorganisms, enzymes or a combination thereof.
9. A product according to claim 7, wherein the additive is task-specific.
10. A product according to claim 9, wherein the product is pet litter and the additive is to assist with biodegradation of pet faecal matter and urine.
11. A product according to claim 1, wherein the product further includes a wicking

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agent.

12. A product according to claim 11, wherein the wicking agent draws liquid into the product by capillary action.

13. A product according to claim 11, wherein the wicking agent is paper, straw or a combination thereof.

14. A product according to claim 1, wherein the product further includes a deodoriser.

15. A method of producing a product for the removal of waste products and odours, said method including the steps of:

reducing the moisture content of peat material; and
adding a surfactant to the peat material.

16. A method according to claim 15, wherein the organic material is sphagnum peat.

17. A method according to claim 15, wherein the organic material is sphagnum peat from sphagnum peat moss.

18. A method according to claim 15, wherein reduction of the moisture content is by thermal treatment of the organic material.

19. A method according to claim 18, wherein the moisture content is reduced to about 10-15% by weight.

20. A method according to claim 18, wherein the moisture content is reduced to about 11-12% by weight.

21. A method according to claim 15, wherein said organic material is pelletised.

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22. A method according to claim 21, wherein said surfactant is added during pelletisation.
23. A method according to claim 15, wherein an additive is added to assist with biodegradation of waste products.
24. A method according to claim 23, wherein said additive to assist with biodegradation of waste products is task-specific.
25. A method according to claim 23, wherein said additive to assist with biodegradation of waste products is microorganisms, enzymes or a combination thereof.
26. A method according to claim 15, wherein a wicking agent is included prior to pelletisation to draw liquid into the pellet by capillary action.
27. A method according to claim 26, wherein the wicking agent is paper, straw or a combination thereof.
28. A method of forming pellets of peat comprising at least the steps of:
providing an amount of peat to be pelletised;
drying the peat to about 10-20% moisture content by weight; and
forming the dried peat into pellets.
29. A method according to claim 28, wherein the drying process is conducted by heating the peat.
30. A method according to claim 28, wherein the peat is dried to a moisture content of about 11-12% by weight.
31. A method according to claim 28, wherein the drying process is terminated when

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the weight of the peat reaches a weight of about 122 to 130 grams per litre.

32. An absorbent product comprising at least peat dried to about 10-15% moisture content by weight formed into a suitable shape.

33. A product according to claim 32, wherein the absorbent product further comprises a surfactant.

34. A product according to claim 32, wherein the absorbent product further comprises a microbial agent specific to control the substance to be absorbed by the product.

35. A product according to claim 32, wherein the absorbent product includes wicking agent.

36. A transport medium for a liquid comprising at least peat dried to about 10-15% moisture content by weight formed into a suitable shape.

37. A liquid and transport medium combination comprising at least:
dried peat formed into a suitable shape, having a moisture content of about 10-15% by weight (prior to absorption); and
an absorbed liquid.

38. A liquid and transport medium combination formed by a method comprising at least the steps of:

drying peat to about 10-15% moisture content by weight;
forming the dried peat into a suitable shape; and
absorbing the liquid into the dried peat.

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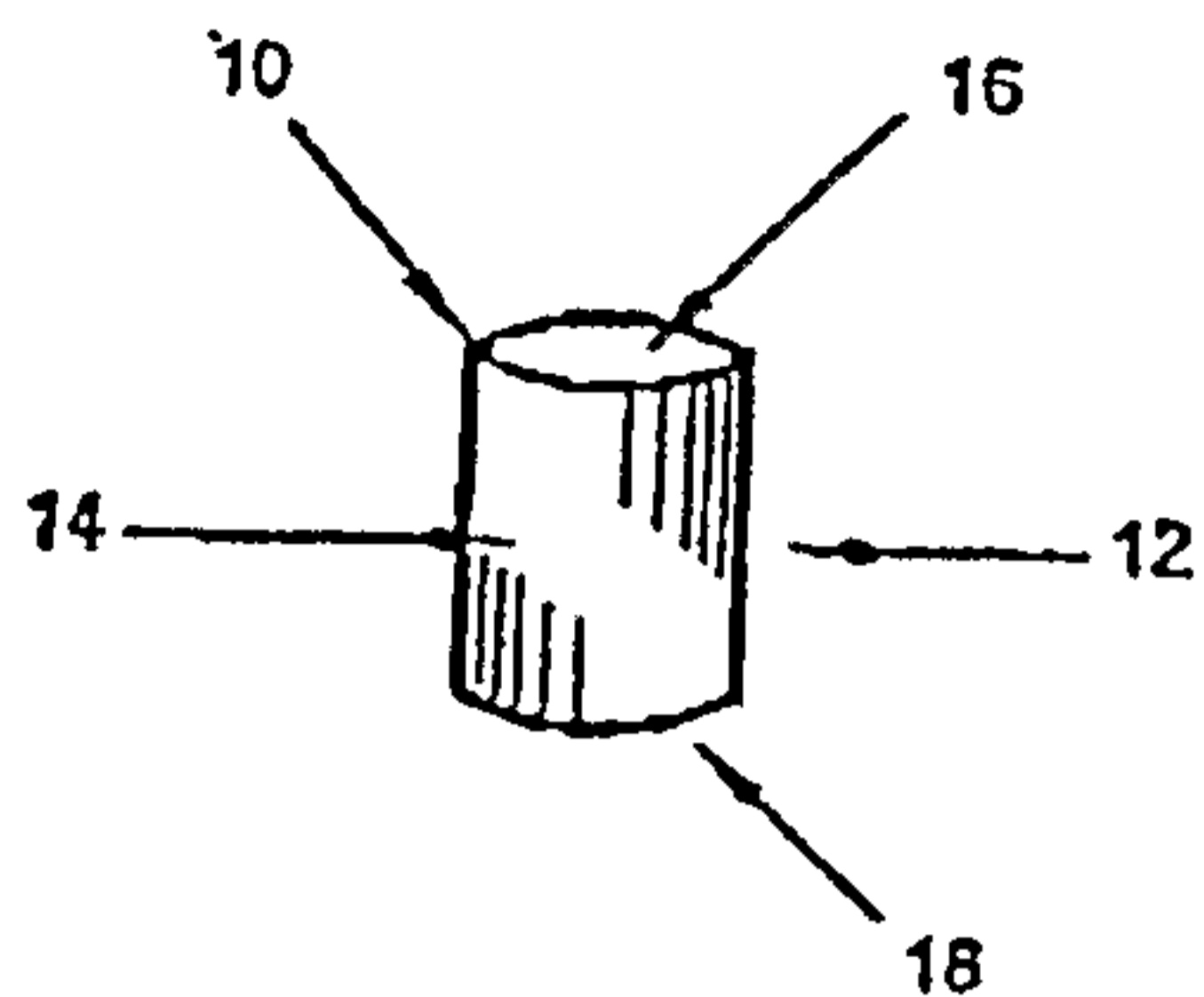


FIGURE 1

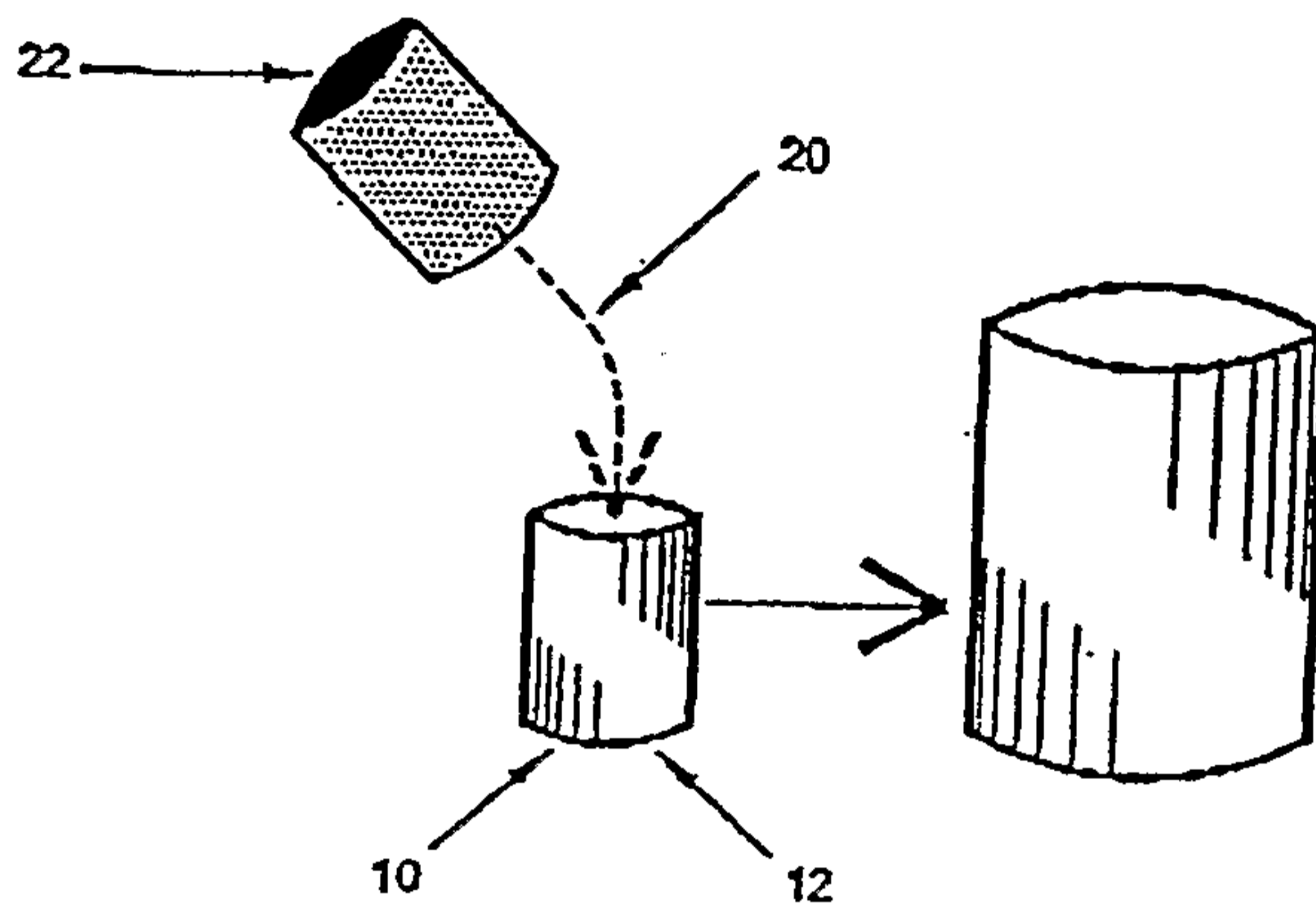


FIGURE 2

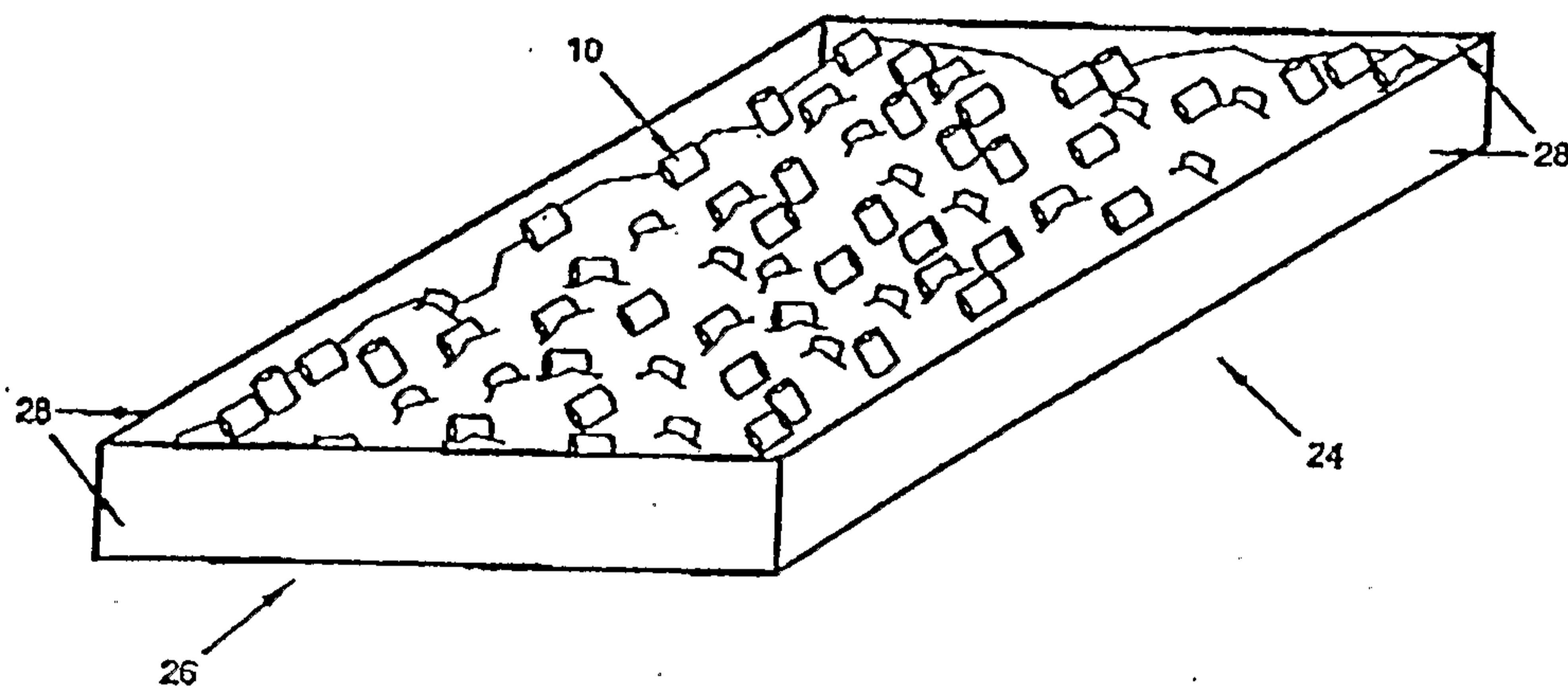


FIGURE 3