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(54) Benævnelse: **Fremgangsmåde til fremstilling af en såmateriale-enhed**

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Description

Method for producing a seed unit

The invention relates to a method of producing a seed unit comprising a tablet of water-retaining material, seed, and an envelope for the tablet and seed.

Seed units having a tablet of water-retaining material, for example compressed layered silicate, enable seeds to be sown without the seeds having to be placed below the surface of a soil. In particular, it has been shown that reforestation of forest areas with trees is also possible with the aid of such seed units by placing the seed units on the forest floor.

From the publication WO 2015/030656 A1, for example, a seed unit is known in which a seed is positioned in a trough of a tablet. A water-soluble coating of the tablet is formed by laterally projecting paper discs between which the tablet is positioned. The paper discs are glued together at the protruding edge to close the envelope. Preferably, paper with short cellulose fibers is used, which dissolves quickly and eventually also composts.

A disadvantage of the described seed unit is the complex processing, in which each tablet with the inserted seed has to be positioned individually between two appropriately prepared paper discs, which then have to be joined together after an adhesive application at the edge.

From the publications US 3,733,745 A, US 3,524,279 A, US 2005/097816 A1 and US 2011/0173879 A1, seed units are known which are wrapped in a plastic film sealed at the edge. According to the publication US 3,733,745 A, the plastic film is provided with incisions to allow the seed to absorb water. According to the publication US 2011/0173879 A1, a water-soluble plastic film surrounds the seed. For production, one or even two separate plastic films are placed around a prefabricated seed tablet and welded at the edge. A disadvantage is that the seed tablet is first prefabricated and then wrapped separately.

It is an object of the present invention to create a production method for a seed unit of the type mentioned at the beginning, with which seed units can

be easily produced, even in larger quantities, with lower manufacturing effort.

This object is solved by a production method with the features of the independent claim. Advantageous designs and further developments are the subject matter of the dependent claims.

A method for producing a seed unit according to the invention has the following steps:

A first plastic film is provided in the form of a running product, e.g. from a reel, in which at least one indentation is formed. A tablet of water-absorbent material is placed in the indentation by introducing loose material into the indentation and compressing it to form the tablet. The seeding material is then positioned in the form of at least one seed in the area of this indentation. This can be carried out either on top of the tablet or before it is placed in the indentation so that the seed is below the tablet. In a next step, a second film is also placed in the form of a running fabric, which is then joined to the first film circumferentially around the region of the indentation, preferably in a welding process. Subsequently, the two films lying on top of each other are cut in an area outside the circumferential welding, thus separating a seed unit.

The production method described is a quasi-continuous process in which the seed units are produced in continuous succession on the basis of reel material. In addition, compared with the known prior art, in which water-soluble paper is used to wrap the tablet, there is no need for an additional application of adhesive to join the two paper halves of the wrapper.

By placing loose material in the indentation and compressing it into the tablet, the production of the tablet can be integrated into the manufacturing process of the seed unit, simplifying the overall process.

In an advantageous design of the method, the plastic films comprise a water-soluble plastic material. Water-soluble plastic material, for example PVOH (polyvinyl alcohol), is also quickly and completely water-soluble and fully compostable, so that no residues remain. Advantageously, the plastic

material can be elastically deformed and thus, for example, in a deep-drawing process, an indentation, for example pot-shaped, can be formed in which the material for the tablet made of the water-retaining material is introduced. Further advantageously, plastic material can be easily joined in a welding process without additional adhesive.

In an advantageous design of the method, the tablet contains mineral and/or organic material. Preferably, the tablet contains layered silicate and/or natural fibers.

In a further advantageous design of the method, at least one trough is pressed into a surface of the tablet on at least one side of the tablet. The seeding material of the seed unit may comprise at least one seed, in particular a tree seed. Furthermore, one or more nutrient pellets may be disposed within the envelope. Preferably, the at least one seed and/or the at least one nutrient pellet is positioned within the at least one trough.

The invention is explained in more detail below by means of exemplary embodiments with the aid of figures, wherein:

Fig. 1a shows schematic diagram of a device for producing seed units; and

Figs. 2a-2d each show a sectional view of different designs of a seed unit.

Fig. 1 shows a schematic representation of a device for producing a seed unit. The device is used to carry out an exemplary embodiment of a method according to the invention for producing such a seed unit, which is explained below with reference to Fig. 1.

The device comprises a first reel 1 for a first plastic film 21 including unwinding and transporting devices for the first plastic film 21 unwound from the reel 1, which are not shown here. The first plastic film 21 can, for example, be a PVOH film. This moves in the course of the manufacturing process in Fig. 1 from the left-hand side towards the right-hand side of the figure, with the dispensing of seed units 20 taking place at the end of the manufacturing process.

In an (optional) printing device 2, the first plastic film 1 can first be provided in sections with an imprint comprising, for example, the type and production date of the seed unit 20.

A printed section is deformed in a subsequent deep-drawing device 3 so that a pot-shaped indentation is formed in the first plastic film 4. Instead of deep drawing, another forming process can also be carried out, for example a forming process using a stamp.

Fig. 2a shows a cross-section of a seed unit 20 that can be produced in the device according to Fig. 1. In this figure, the deformation of the first plastic film 21 can be seen. As a result of the deformation, a pot-shaped indentation, for example round in plan view, is formed, in which a tablet 30 of water-retaining material is located in the finished seed unit 20. The tablet 30 may, for example, be made of or comprise vermiculite. Alternatively, other mineral materials, particularly layered silicates, or organic materials or mixtures of such materials may be used to produce the tablet 30. In a subsequent germination process, the tablet 30 serves as a water reservoir, possibly as a heat reservoir and also as a protection for the seed, as well as a buffer reservoir for the continuous release of nutrients.

In a next manufacturing step, the recess formed in the first plastic film 21 is filled by a filling unit 4 (see Fig. 1) with the material from which the tablet 30 is to be formed. The material, for example the vermiculite, is filled into the indentation in the form of granules as bulk material. In a subsequent method step, a press 5 is used to press the loose material into the tablet 30. As can be seen in the exemplary embodiment of Fig. 2a, the press 5 can press a trough 31 into the tablet 30 during the pressing process.

In subsequent method steps, functional products 40 are placed in the resulting trough 31 or on the formed tablet 30. The functional products 40 comprise, for example, the seeding material, which in the example of Fig. 2a is placed in the trough 31 in the form of at least one seed 41. A depositing station 6 is used for positioning the seed 41. If necessary, more than one seed 41 can also be deposited in this process step.

Furthermore, in the exemplary embodiment of Fig. 2a, a nutrient pellet 42

is inserted into the trough 31. This optional nutrient pellet 42 can be added to deliver metered nutrients during the germination process of the seed 41. For this purpose, the nutrient pellet 42 itself may be water-soluble so that it releases the nutrients over an extended period of time in the presence of moisture. The nutrient pellet 42 is deposited in the trough 31 at a further depositing station 7.

In a next manufacturing step, a second plastic film 22 is placed from a further reel 8 onto the first plastic film 21 and thus also the inserted tablet 30 with the functional products 40, and is fed through the remaining stations of the device together with the first plastic film 21. The second plastic film 22 is preferably made of the same material as the first plastic film 21.

As a next method step, a circumferential connecting seam 23 (cf. Fig. 2a) is produced in a welding device 9 to connect the first and second plastic films 21, 22. Due to the circumferential connecting seam 23, the tablet 30 with the functional products 40 is enclosed by a sealed envelope. Further, this envelope prevents the functional products 40 from slipping out of the trough 31 when the seed unit 20 is rotated with respect to the representation of Fig. 2a. This effect can be assisted if the encased portion of the seed unit is subjected to a vacuum before the connecting seam 23 is completed.

The joining seam 23 can be created, for example, in a thermal welding process by pressing a heated die onto the composite of the first and second plastic films 21,22. Alternative welding processes, for example laser or ultrasonic welding of the two plastic films 21,22, are also possible.

Finally, in a last method step, the seed units 20 are separated from each other in a separating unit 10, for example by cutting the films 21, 22 between two produced seed units 20. A punching process which, in accordance with the basic shape of the seed units 20, punches them out of the superimposed first and second films 21, 22 is also possible here.

For sowing, the seed unit 20 is preferably spread lying on the second film 22 so that the material of the tablet 30 covers and protects the seed 41 from above. As soon as the water-soluble films 21, 22 dissolve, the tablet

30 can also absorb water or moisture and release it to the seed. In this way, the seed is caused to germinate and is protected from drying out. The resulting seedling penetrates the tablet 30 and thereby finds a foothold until it takes root in the soil on which the seed unit 20 lies.

In Figs. 2b-d, further exemplary embodiments of a seed unit 20 that can be produced with the device shown in Fig. 1 are shown in the same way as in Fig. 2a. In these figures, identical reference signs indicate identical or similarly acting elements as in Fig. 2a.

In its basic design, the seed unit of Fig. 2b corresponds to that of the exemplary embodiment of Fig. 2a, the description of which is hereby expressly referred to.

In contrast to the example of Fig. 2a, in the present case several, in this case two, troughs 31 are pressed into the tablet 30. In this example, each of the troughs 31 accommodates one of the functional products 40, i.e., one of the troughs 31 accommodates the seed 41 and the second of the troughs 31 accommodates the nutrient pellet 42. In this way, a distance of the nutrient pellet 42 from the seed 41 can be more precisely defined, for example, to achieve a uniform and not too highly concentrated nutrient delivery to the seed 41.

The two troughs 31 can be arranged side by side as shown here. Alternatively, a concentric arrangement of the wells 31 is also possible, for example. Such an embodiment is shown in Fig. 2c. Here, a central trough 31 is provided for the seed 41 and a circumferential annular trough for several nutrient pellets 42.

In principle, the number of wells 31 can be adapted to the number of functional products 40 and can also be greater than two.

As mentioned above, the addition of one or more nutrient pellets 42 is optional. Fig. 2d shows an exemplary embodiment of a seed unit 20 with only one central trough 31, in which only one seed 41 is inserted as functional product 40.

List of reference signs

1	Reel (for first plastic film)
2	Printing device
3	Deep-drawing device
4	Filling unit
5	Press
6	Depositing station
7	Further depositing station
8	Further reel (for second plastic film)
9	Welding device
10	Separating unit
20	Seed unit
21	First plastic film
22	Second plastic film
23	Connecting seam
30	Tablet
31	Trough
40	Functional product
41	Seed
42	Nutrient pellets

PATENTKRAV

1. Fremgangsmåde til fremstilling af en såmateriale-enhed (frø-enhed) (20), omfattende de følgende trin:

- Tilvejebringelse af en første kunststoffolie (21) i form af et løbende produkt;
- dannelse af mindst en fordybning i kunststoffolien (21);
- anbringelse af en tablet (30) af vand-absorberende materiale i den mindst ene fordybning, idet løst materiale indbringes i fordybningen og sammenpresses til tabletten (30);
- positionering af såmateriale-enheden i form af mindst et såmateriale-korn i fordybningsområdet;
- pålægning af en anden kunststoffolie (22) i form af en løbende vare på den første kunststoffolie (21) og tabletten (30);
- forbindelse af den første og den anden kunststoffolie (21, 22) langs periferien omkring fordybningsområdet og tabletten (30); og
- separation af en såmateriale-enhed (20) fra kunststoffolierne (21, 22), hvorved såmateriale-enheden (20) omfatter tabletten (30) og såmaterialet.

2. Fremgangsmåde ifølge krav 1, hvorved fordybningen i den første kunststoffolie (21) dybtrækkes.

3. Fremgangsmåde ifølge krav 1 eller 2, hvorved den første og den anden kunststoffolie (21, 22) sammensvejses med henblik på at skabe den rundgående forbindelse.

4. Fremgangsmåde ifølge et af kravene 1 til 3, hvorved kunststoffolierne (21, 22) omfatter et vandopløseligt kunststofmateriale.

5. Fremgangsmåde ifølge et af kravene 1 til 4, hvorved tabletten (30) indeholder mineralsk og/eller organisk materiale.

6. Fremgangsmåde ifølge krav 5, hvorved tabletten (30) indeholder lagdelt silikat og/eller naturfibre.

7. Fremgangsmåde ifølge et af kravene 1 til 6, hvorved der på mindst en side af tabletten (30) er indpresset mindst et trug (31) i en overflade af tabletten (30).

8. Fremgangsmåde ifølge et af kravene 1 til 7, hvorved såmaterialet mindst omfatter et såkorn (41), navnlig et træ-såkorn.

9. Fremgangsmåde ifølge et af kravene 1 til 8, hvorved der inden i indhyllingen er arrangeret mindst en næringsstofpellet (42).

10. Fremgangsmåde ifølge et af kravene 1 til 9, hvorved det mindst ene såkorn (41) og/eller næringsstofkapslen (42) positioneres i det mindst ene trug (31).

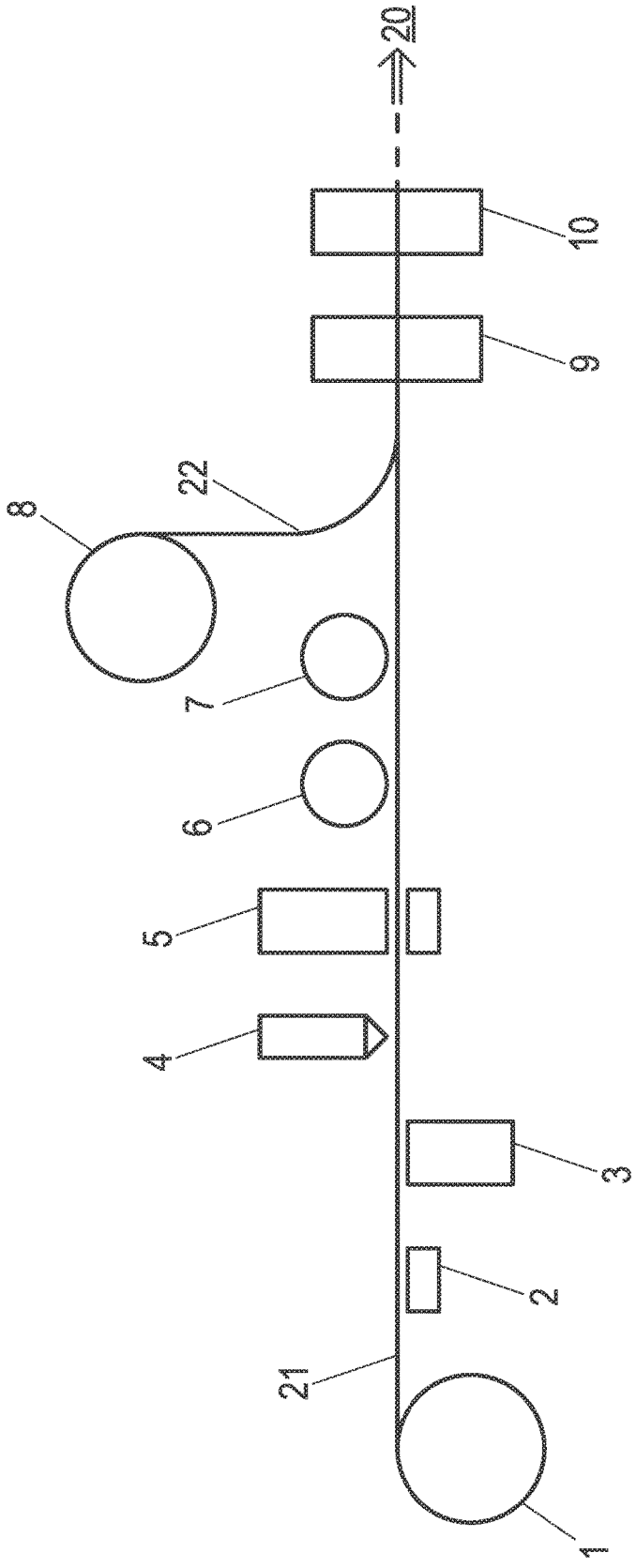

Fig. 1

Fig. 2a

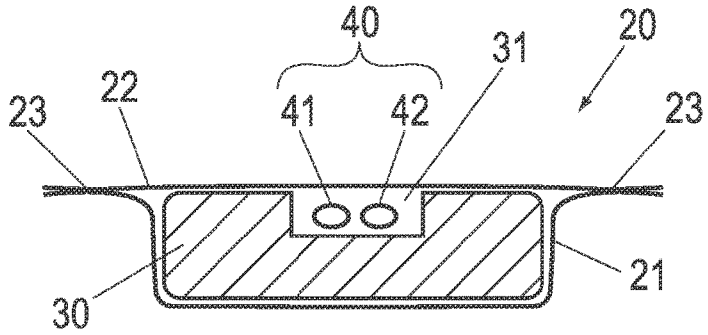

Fig. 2b

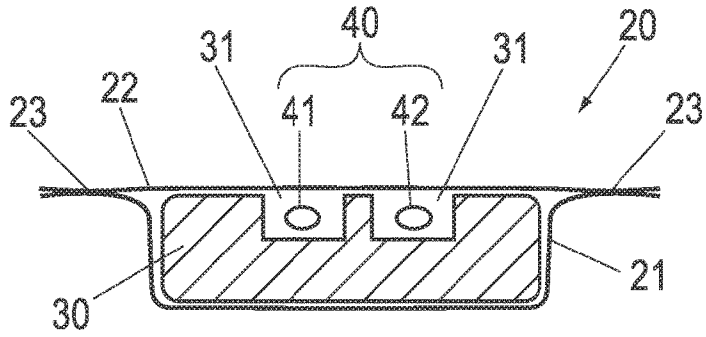

Fig. 2c

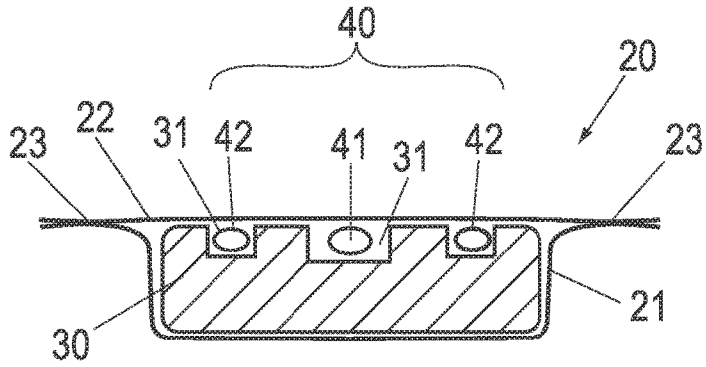

Fig. 2d