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(54) METHOD FOR MANUFACTURING A PACKAGING OR HOLDING UNIT FROM A RECYCLED PAPER FRACTION, AND SUCH UNIT

VERFAHREN ZUR HERSTELLUNG EINER VERPACKUNG ODER HALTEEINHEIT AUS EINER RECYCELTEN PAPIERFRAKTION UND SOLCH EINE EINHEIT

PROCÉDÉ DE FABRICATION D'UNE UNITÉ D'EMBALLAGE OU DE MAINTIEN À PARTIR D'UNE FRACTION DE PAPIER RECYCLÉ, ET UNITÉ DE CE TYPE

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(73) Proprietor: **Huhtamaki Molded Fiber Technology B.V.**
8938 AN Leeuwarden (NL)

(72) Inventor: **KUIPER, Harald John**
8445 SC Heerenveen (NL)

(74) Representative: **Verdijck, Gerardus et al**
Arnold & Siedsma
Bezuidenhoutseweg 57
2594 AC The Hague (NL)

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Description

[0001] The present invention relates to a method for manufacturing a packaging or holding unit from a recycled paper fraction originating from domestic waste.

[0002] Domestic waste is collected and often separated into recyclable fractions. For example, bottles are often collected separately from other waste material. Remaining waste material is often treated in an incineration plant. These plants are relatively costly and the incineration process requires a high amount of energy.

[0003] Therefore, there is a need to increase the amount of recyclable material from domestic waste. In addition, there is a need to achieve a more sustainable life cycle of products and processes.

[0004] WO 01/32987 A1 discloses a moulded fibre product with modified starch.

[0005] WO 00/35588 A1 discloses a method for manufacturing pulp and/or paper and/or board from recycled fibres.

[0006] US 4 517 240 A discloses a process for preparing fibreboard.

[0007] Recycling of paper material from domestic waste and introduce the recycled material in the paper and food industry does not fulfil the requirements therefor. In fact, recycling paper material from domestic waste into existing recycling flows that are present in the paper industry is often not possible due to the higher risk of contaminations caused by the paper material that is recycled from domestic waste. For these purposes paper industries in practice uses recycling flows from paper material originating from packaging material, for example.

[0008] These requirements significantly reduce the possibilities for recycling the paper fraction from domestic waste in paper industry.

[0009] The present invention has for its object to obviate or at least reduce the aforementioned problems in recycling of the paper fraction from domestic waste.

[0010] For this purpose, the present invention provides a method for manufacturing a packaging or holding unit from a recycled paper fraction of domestic waste according to claim 1.

[0011] In general, domestic waste relates to waste material that is generated as a result of the ordinary-day-today waste collection in a household, for example. Domestic waste relates to excess matter in the form of waste material including cardboard, paper, wood, metals, packaging material such as drinking cartons, bottles, cans, newspaper and magazines, food scraps.

[0012] After collecting the domestic waste, the paper fraction is separated from the collected domestic waste. This paper fraction may comprise paper, newspapers, magazines, cardboard, tissue and the like.

[0013] As a next step the paper fraction is dissolved to produce a pulp material. In the production of the pulp material the paper fraction is fiberized/defibrated to break the material into fibers. In a presently preferred embodiment this production of pulp material is performed in a pulper, tank or reactor with a temperature in the range of 15-80°C, preferably in the temperature range of 45-60°C. This enables a relatively short and effective fiberizing in a time range of 1-60 minutes, preferably 3-15 minutes, for example. It will be understood that other temperature and/or time ranges may also be applicable.

[0014] The pulp material is cleaned by removing contaminations/rejects that are present in the pulp material. These contaminations may relate to plastic material and other non-paper material. These rejects are preferably separated and transported to a pressing device. The pressing device, like a press container, preferably reduces the water content and forwards the remaining (waste) material with a solid content of about 50-60% to the incineration plant or other treatment plant. Such other treatment plant may relate to a production plant of fuel pellets, for example.

[0015] The pulp material is sorted to provide a clean pulp material. In one of the preferred embodiments of the invention this cleaning and sorting is performed in a so-called dumping screen, alternatively in a pulper followed by screening steps like slotted screens and/or hole screens, for example.

[0016] Preferably, sorting is performed in a sorter that is provided with sleeves or holes that are preferably stepwise reduced in their characteristic size from 2 mm to 0.1 mm, for example. Optionally, or in addition thereto, the sorting process is performed by increased pressure. Also in this step, the rejects can be sent to the pressing device or other treatment device.

[0017] The cleaned and sorted pulp material is then used for moulding the packaging or holding unit from the pulp material. Such moulding operation is known in the manufacturing process of packaging units for eggs, for example.

[0018] Such moulding operation involves providing the sorted pulp material to a mould and drying the material in the desired shape after the product is released from the mould or involving an in-mould drying process.

[0019] Products that can be manufactured in the moulding process include a plant pot and packaging material for electronic devices or furniture. Especially plant pots that are used in greenhouses, such as in so-called nursery beds, are advantageously manufactured from the cleaned and sorted paper pulp originating from domestic waste. These pots or trays can be used effectively and enable a production of biodegradable products thereby contributing to a more sustainable plant production.

[0020] Other products include holding products, or carrier part, or inserts. These products, like inserts, may advantageously be applied to green waste containers for households and/or landscape refuse containers, for example. This has the additional advantage that containers can be kept much cleaner and/or containers can be emptied easier. Even further, emission of smells is preferably also reduced.

[0021] Preferably, the step of dissolving the paper frac-

tions comprises treating the paper fraction in a pulper. Preferably, the pulper relates to a so-called high-consistency pulper operating in a batch mode. The pulper is operated at consistencies above 10%, preferably in the range of 10-20%, more preferably is operated with a consistency above 15%, more preferably above 17%, and even more preferably with a preferred consistency of about 18%. This enables an effective and efficient treatment process. This preferably leaves non-paper material, like plastic, intact and as large as possible to facilitate easier separation in screening steps, for example.

[0022] According to the invention the method comprises the step of adding an impregnant to the paper fraction and/or pulp material.

[0023] Adding an impregnant to the paper fraction and/or pulp material improves the performance of products that result from the method according to the invention. For example, plant pots used in nursery beds have specific requirements such as being water repellent to a certain extent for a specific period of time to prevent disintegration of the pot.

[0024] According to the invention the impregnant comprises an organic tricarboxylic acid and glycerol. This impregnant prevents disintegration of the product and enable production of a biodegradable product.

[0025] Preferably, the tricarboxylic acid comprises citric acid. This combination of citric acid and glycerol provides an impregnant that is substantially of natural origin, preferably for 100%, and is capable of forming a biopolymer. Preferably, this forming is achieved with a heating step like in a drying process for molded fiber. This biopolymer can be applied by impregnating and/or coating the product.

[0026] Optionally, the impregnant with biopolymer forms a water repellent layer on the outer and/or inner surface of the product.

[0027] Preferably, the impregnant is added to the pulp material before the drying operation of the moulded fiber product. This preferably combines the drying operation with the heating step for the biopolymer.

[0028] The biopolymer, preferably biopolyester, is formed during the drying time of the moulded product thereby achieving the water repellent layer and contributing to the strength and stability of the moulded fiber product. These biodegradable products can be designed to disintegrate after a time period such as weeks or months thereby stimulating plant growth.

[0029] In a further preferred embodiment of the invention at least part of the energy used for the manufacturing of the packaging or holding unit originates from an incineration plant.

[0030] Supplying energy from an incineration plant to the moulding operation, especially the drying process thereof, provides an effective and efficient manufacturing process. Optionally, the steam available from an incineration plant may be used for the dryer and drying process for the production of moulded fiber products. The steam is typically available at a pressure in the range of 3-10 bar. It will be understood that other pressures could also be applied. Preferably, the moulding process is located close to the incineration plant and thereby close to the recycling operation. More preferably, the incineration plant treats the collected domestic waste and contaminations that are separated from the paper fraction and/or pulp material. This enables cost effective manufacturing of the packaging and/or holding units from the moulded pulp material.

[0031] The present invention further relates to a packaging or holding unit that is manufactured from a moulded pulp material, wherein the moulded pulp material comprises pulp material originating from a paper fraction that is separated from domestic waste.

[0032] Such packaging or holding unit provides the same effects and advantages as described in relation to the method.

[0033] More specifically, the pulp material is provided by performing the steps that are described in relation to the manufacturing method. Preferably, the moulded pulp material comprises an impregnant that is configured for forming a biopolymer water repellent layer. Preferably, this layer is formed during the drying process of the moulded fiber product. This impregnant preferably comprises an organic tricarboxylic acid and glycerol, wherein the tricarboxylic acid preferably comprises citric acid. This achieves a substantially biodegradable packaging or holding unit, which is preferably also compostable according to EN13432 in relation to industrial compostable and home compostable.

[0034] Preferably, the packaging or holding unit relates to a plant pot or packaging material for electronic devices or furniture. This plant pot can be used in nursery beds in greenhouses, for example. The packaging material may also relate to packaging/protection elements for transport and storage purposes, for example.

[0035] The life cycle analysis of such a plant pot or packaging product is much more favourable due to the avoidance of CO_2 release (due to the incineration process). This also applies to the method according to the invention.

[0036] Further advantages, features and details of the invention are elucidated on the basis of preferred embodiments thereof, wherein reference is made to the accompanying drawings, in which:

- Figure 1 illustrates a manufacturing method according to the invention; and
- Figure 2 shows a product according to the invention manufactured according to the method of figure 1.

[0037] Manufacturing process 2 (figure 1) receives the collected waste material 4 and performs a separation step in separator 6. Domestic waste 4 is separated in pulp material 8 and waste 10. Waste 10 is forwarded to treatment plant 12 such as an incineration plant. Paper fraction 8 is forwarded to pulper/dissolver 14 that transfers paper fractions 8 to pulp material 16. In the illustrated

embodiment heat 18 can be supplied to pulper 14 from incinerator 12. Pulp material 16 is forwarded to cleaner 20 to produce clean pulp 22 and separate therefrom contaminations 24. To improve pulp quality of pulp 22 sorter 30 performs an additional cleaning/sorting operation.

[0038] Contaminations 24 from cleaner 20 and contaminations 34 of sorter 30 are provided to pressing device 26 that removes water from contaminations 24, 34 and forwards the remaining material 28 to treatment plant 12.

[0039] The cleaned and sorted pulp material 32 is forwarded to moulding system 36 that performs the moulding operation resulting in a moulded fiber product 38. In the illustrated embodiment, the moulding operation performed in moulding system 36 receives heat 40 from treatment plant 12.

[0040] Impregnant 44, 46, 48 and/or other additives are added from tank 42 to pulper 14 and/or to cleaner 20 and/or sorter 30.

[0041] It will be understood that other configurations and additional process steps can be foreseen by the skilled person.

[0042] Plant pot 50 (figure 2) is an illustrative example of moulded fiber product 38 resulting from manufacturing process 2. Plant pot 50 is made of moulded fiber material 52 and comprises bottom 54, sidewall 56 and opening 58. In the illustrated embodiment the outer surface of pot 50 is provided with water repellent layer 60. Pot 50 contains earth or medium 62. It will be understood that also other products can be manufactured with manufacturing process 2.

[0043] The present invention is by no means limited to the above described preferred embodiments thereof. The rights sought are defined by the following claims, within the scope of which many modifications can be envisaged.

Claims

1. Method for manufacturing a packaging or holding unit from a recycled paper fraction of domestic waste, the method comprising the steps of:

   - collecting domestic waste;
   - separating the paper fraction from the collected domestic waste;
   - dissolving and fiberizing the paper fraction, and producing a pulp material;
   - cleaning and sorting the pulp material; and
   - moulding the packaging or holding unit from the pulp material,

   further comprising the step of adding an impregnant to the paper fraction and/or pulp material, wherein the impregnant comprises an organic tricarboxylic acid and glycerol.

2. Method according to claim 1, wherein the step of dissolving the paper fraction comprises treating the paper fraction in a pulper.

3. Method according to claim 2, wherein the pulper operates with a consistency above 15%, preferably above 17%, and most preferably about 18%.

4. Method according to claim 2 or 3, wherein the pulper operates with a temperature in the range of 15-80°C, preferably in the temperature range of 45-60°C, in a time range of 1-60 minutes, preferably 3-15 minutes.

5. Method according to one of the foregoing claims, wherein the tricarboxylic acid comprises citric acid.

6. Method according to one of the foregoing claims, further comprising the step of forming a biopolymer.

7. Method according to claim 6, wherein the step of forming a biopolymer is formed during drying of the moulded product

8. Method according to claim 6 or 7, wherein the biopolymer forms a water repellent layer.

9. Method according to one of the foregoing claims, wherein at least part of the energy used for the manufacturing of the packaging or holding unit originates from an incineration plant.

10. Method according to claim 9, wherein the incineration plant treats the collected domestic waste and contaminations separated from the paper fraction and/or pulp material.

11. Packaging or holding unit from a moulded pulp material, wherein the moulded pulp material comprises pulp material origination from a paper fraction that is separated from domestic waste, and further comprising an impregnant, wherein the impregnant comprises an organic tricarboxylic acid and glycerol.

12. Packaging or holding unit according to claim 11, wherein the impregnant is configured for forming a biopolymer water repellent layer.

13. Packaging or holding unit according to claim 12, wherein the packaging or holding unit is biodegradable.

14. Packaging or holding unit according to claim 13, wherein the tricarboxylic acid comprises citric acid.

15. Packaging or holding unit according to one of the claims 11-14, wherein the unit is one of a plant pot, packaging material for electronic devices or furniture.

Patentansprüche

1. Verfahren zum Herstellen einer Verpackungs- oder Halteeinheit aus einem recycelten Papierfraktion von Hausmüll, das Verfahren umfassend die Schritte:

   - Sammeln von Hausmüll;
   - Trennen der Papierfraktion von dem gesammelten Hausmüll;
   - Auflösen und Zerfasern der Papierfraktion und Produzieren eines Zellstoffmaterials;
   - Reinigen und Sortieren des Zellstoffmaterials; und
   - Formen der Verpackungs- oder Halteeinheit aus dem Zellstoffmaterial,

   ferner umfassend den Schritt eines Hinzufügens eines Imprägniermittels zu der Papierfraktion- und/oder dem Zellstoffmaterial, wobei das Imprägniermittel eine organische Tricarbonsäure und Glycerin umfasst.

2. Verfahren nach Anspruch 1, wobei der Schritt des Auflösens der Papierfraktion ein Behandeln der Papierfraktion in einem Stofflöser umfasst.

3. Verfahren nach Anspruch 2, wobei der Stofflöser mit einer Konsistenz über 15 %, vorzugsweise über 17 % und am meisten bevorzugt etwa 18 % arbeitet.

4. Verfahren nach Anspruch 2 oder 3, wobei der Stofflöser mit einer Temperatur in dem Bereich von 15 bis 80 °C, vorzugsweise in dem Temperaturbereich von 45 bis 60 °C, in einem Zeitbereich von 1 bis 60 Minuten, vorzugsweise 3 bis 15 Minuten arbeitet.

5. Verfahren nach einem der vorstehenden Ansprüche, wobei die Tricarbonsäure Citronensäure umfasst.

6. Verfahren nach einem der vorstehenden Ansprüche, ferner umfassend den Schritt eines Bildens eines Biopolymers.

7. Verfahren nach Anspruch 6, wobei der Schritt des Bildens eines Biopolymers während eines Trocknens des geformten Produkts gebildet wird

8. Verfahren nach Anspruch 6 oder 7, wobei das Biopolymer eine wasserabweisende Schicht bildet.

9. Verfahren nach einem der vorstehenden Ansprüche, wobei mindestens ein Teil der für die Herstellung der Verpackungs- oder Halteeinheit verwendeten Energie aus einer Verbrennungsanlage stammt.

10. Verfahren nach Anspruch 9, wobei die Verbrennungsanlage den gesammelten Hausmüll und die von der Papierfraktion und/oder dem Zellstoffmaterial getrennten Verunreinigungen behandelt.

11. Verpackungs- oder Halteeinheit aus einem geformten Zellstoffmaterial, wobei das geformte Zellstoffmaterial einen Zellstoffmaterialursprung aus einer Papierfraktion umfasst, die von Hausmüll getrennt ist, und ferner umfassend ein Imprägniermittel, wobei das Imprägniermittel eine organische Tricarbonsäure und Glycerin umfasst.

12. Verpackungs- oder Halteeinheit nach Anspruch 11, wobei das Imprägniermittel zum Bilden einer wasserabweisenden Biopolymerschicht konfiguriert ist.

13. Verpackungs- oder Halteeinheit nach Anspruch 12, wobei die Verpackungs- oder Halteeinheit biologisch abbaubar ist.

14. Verpackungs- oder Halteeinheit nach Anspruch 13, wobei die Tricarbonsäure Citronensäure umfasst.

15. Verpackungs- oder Halteeinheit nach einem der Ansprüche 11 bis 14, wobei die Einheit eines von einem Pflanztopf, Verpackungsmaterial für elektronische Vorrichtungen oder Möbel ist.

Revendications

1. Procédé de fabrication d'une unité d'emballage ou de maintien à partir d'une fraction de papier recyclé de déchets domestiques, le procédé comprenant les étapes consistant à :

   - collecter des déchets domestiques ;
   - séparer la fraction de papier par rapport aux déchets domestiques collectés ;
   - dissoudre et fibrer la fraction de papier, et produire un matériau de pâte à papier ;
   - nettoyer et trier le matériau de pâte à papier ; et
   - mouler l'unité d'emballage ou de maintien à partir du matériau de pâte à papier,

   comprenant en outre l'étape consistant à ajouter un agent d'imprégnation à la fraction de papier et/ou au matériau de pâte à papier, l'agent d'imprégnation comprenant un acide tricarboxylique organique et du glycérol.

2. Procédé selon la revendication 1, dans lequel l'étape consistant à dissoudre la fraction de papier comprend le traitement de la fraction de papier dans un triturateur.

3. Procédé selon la revendication 2, dans lequel le triturateur fonctionne avec une consistance supérieure à 15 %, de préférence supérieure à 17 %, et le plus

préférablement d'environ 18 %.

4. Procédé selon la revendication 2 ou 3, dans lequel le triturateur fonctionne avec une température dans la plage de 15 à 80 °C, de préférence dans la plage de température de 45 à 60 °C, dans une plage temporelle de 1 à 60 minutes, de préférence 3 à 15 minutes.

5. Procédé selon l'une des revendications précédentes, dans lequel l'acide tricarboxylique comprend de l'acide citrique.

6. Procédé selon l'une des revendications précédentes, comprenant en outre l'étape de formation d'un biopolymère.

7. Procédé selon la revendication 6, dans lequel l'étape de formation d'un biopolymère est formée pendant le séchage du produit moulé.

8. Procédé selon la revendication 6 ou 7, dans lequel le biopolymère forme une couche hydrofuge.

9. Procédé selon l'une des revendications précédentes, dans lequel au moins une partie de l'énergie utilisée pour la fabrication de l'unité d'emballage ou de maintien provient d'une installation d'incinération.

10. Procédé selon la revendication 9, dans lequel l'installation d'incinération traite les déchets domestiques collectés et les contaminations séparées de la fraction de papier et/ou du matériau de pâte à papier.

11. Unité d'emballage ou de maintien à partir d'un matériau de pâte à papier moulé, le matériau de pâte à papier moulé comprenant un matériau de pâte à papier provenant d'une fraction de papier qui est séparée de déchets domestiques, et comprenant en outre un agent d'imprégnation, l'agent d'imprégnation comprenant un acide tricarboxylique organique et du glycérol.

12. Unité d'emballage ou de maintien selon la revendication 11, dans laquelle l'agent d'imprégnation est conçu pour former une couche hydrofuge biopolymère.

13. Unité d'emballage ou de maintien selon la revendication 12, l'unité d'emballage ou de maintien étant biodégradable.

14. Unité d'emballage ou de maintien selon la revendication 13, dans laquelle l'acide tricarboxylique comprend de l'acide citrique.

15. Unité d'emballage ou de maintien selon l'une des revendications 11 à 14, l'unité étant l'un parmi un pot de fleurs, un matériau d'emballage pour des appareils électroniques ou un meuble.

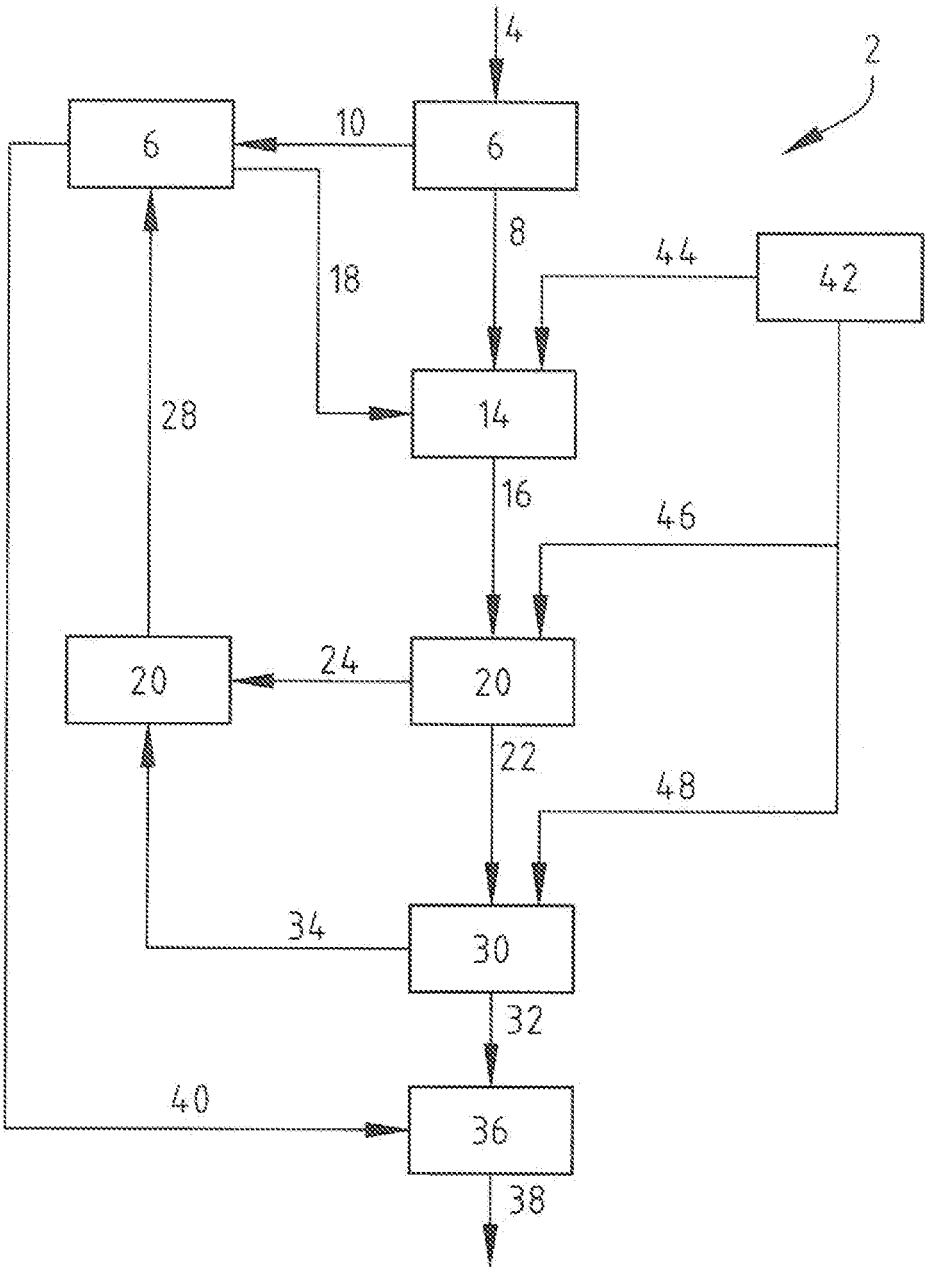

FIG. 1

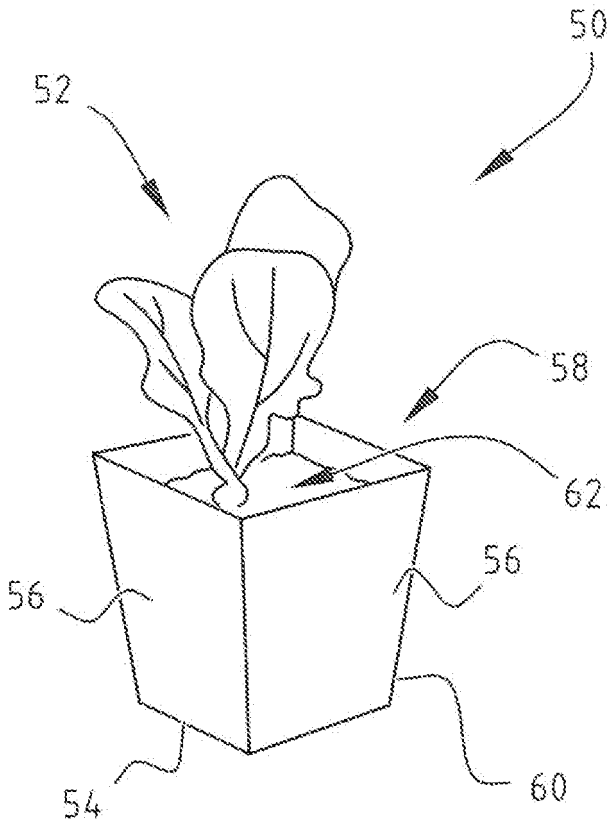

FIG. 2

REFERENCES CITED IN THE DESCRIPTION

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