Note: Within nine months of the publication of the mention of the grant of the European patent in the European Patent Bulletin, any person may give notice to the European Patent Office of opposition to that patent, in accordance with the Implementing Regulations. Notice of opposition shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).
Description

[0001] The object of the invention is a method for manufacturing a fiber material profile product manufactured from a fiber material, such as wood fiber, as well as a fiber material profile product manufactured with the method according to the invention, intended especially for packaging use or reinforcement use.

[0002] Various profile pieces are used in different packagings and reinforcements for protecting products and as padding, and conventionally these different profiles are manufactured from cardboard or from separate plastic profiles.

[0003] It is prior art to manufacture different fiber material profiles for packaging purposes directly from fiber materials, by pressing fiber pulp that contains water into a mold, in which the water evacuates from the pulp, and the profile acquires the shape of the mold. Finally the profile is dried and can be used as packaging protection.

[0004] A problem in prior-art solutions is that in forming the profile its fibers break and this substantially weakens the profile. This is very undesirable.

[0005] A problem in prior-art solutions is also that the manufacturing occurs by pressing into the mold or by sucking the water out, in which case the manufacture of the profile is formed in stages. This stepwise manufacturing method is slow owing to the delay caused by extracting the water and by drying. During the water extraction and drying, care must be taken about the dimensions and shapes of the profile, so that completely unattended drying can also result in poor accuracy of dimension or shape.

[0006] The object of this invention is to achieve a manufacturing method with which the drawbacks of prior art are avoided and which enables the manufacture of a fiber material profile product used as a protection piece made of fiber material used for packaging purposes and for reinforcement use. The purpose of the invention is also to achieve a fiber material product, which is used for packaging purposes and in reinforcement use.

[0007] The GB903567 A publication presents an improved process and apparatus for the manufacture of angularly corrugated board or angles of fibre. The process for the manufacture of angularly corrugated fibre board comprises the steps of feeding fluent raw material under pressure between a pair of suitably shaped rolls to form an angularly corrugated shape, cutting the shape so formed into convenient lengths, and pressing and drying said shaped lengths in a hot press to form an angularly corrugated fibre board.

[0008] The DE10129018A1 publication presents a method for continuous forming of a flat web to form a longitudinally corrugated web.

[0009] The WO99/47347 A publication presents a method and apparatus for forming machine direction flutes within a continuous web. The apparatus includes a first forming curve in a first plane including engagement points which deform the web. The first forming curve includes alternating ridges and grooves. A second forming curve in a second plane includes engagement points which deform the web. The second plane is disposed parallel to the first plane.

[0010] The US2806878 publication presents a method for manufacturing a fiber material product of a fiber material such as wood fiber.

[0011] The US1582841 presents means for producing a paper web which is longitudinally corrugated or fluted for various purposes.

[0012] More particularly, the method according to the invention is characterized by what is disclosed in the characterization part of claim 1.

[0013] Additionally, the method according to the invention is characterized by what is disclosed in the non-independent claims 2-5.

[0014] In the solution according to the invention webs are formed by folding them in a number of consecutive phases, and more particularly essentially without breaking the fibers, by means of shaping and drying cylinders into the profile of the desired shape. In the solution according to the invention different creases or also round shapes can be folded into the webs. Since in the solution according to the invention the profiles can be formed essentially without breaking the fibers, good strength properties are achieved with this for the fiber material products formed, i.e. the profiles, and as a result these profiles are well suited for use in packaging applications, in protecting packages and also for reinforcing use.

[0015] The idea of the invention is to use a wire for the pre-drying of the raw material pulp, in which the pulp suspension is shaped and made into the desired blanks. Excess water is removed from the raw material pulp that moves forward as a wide band. On the wire the pulp is made to bind by means of suction boxes and a suction roll into a sufficiently rigid suspension, so that it can be transferred to further drying and shaping.

[0016] The primary pressing is performed on press rolls, possibly using a felt. By means of the method according to the invention the manufacturing of the profile can operate continuously, and for this reason is fast, and enables assurance of the longitudinal and lateral shape and dimensional accuracy of the product, i.e. of the profile, through to the end of the drying phase.

[0017] In the following, the invention will be described in more detail with reference to the attached drawings, wherein Fig. 1 presents the basic principle of the method according to the invention, Fig. 2a-2d presents a longitudinal section of the profile and its folding, and Fig. 3 presents some possible shapes of the profile. Fig. 1 presents the method according to the invention, and the method according to the invention comprises a board machine 1, which contains one or more headboxes 2, from which headbox the pulp suspension is led via a nozzle to a planar wire section 3. In the wire section the direction of the fibers of the fiber pulp and the thickness of the pulp layer are made to be that desired. Excess water is removed from the pulp on the wire section 3 and...
if needed a number of wire layers are laminated one upon the other, in which case it is possible to add the desired rigidity to the end product, i.e. of the fiber material profile product. In order to make the water content suitable, in the transfer to the suction and extraction roll 4, the pulp suspension 6 is detached from the wire section, and led to the press section 5 in which water is again removed from the pulp suspension 6 by pressing by means of the felt 7 and the rolls 8.

[0018] Water extraction can also be performed either with hot air, infrared light, or microwaves, or using drying cylinders, but this is not presented in the figure.

[0019] In the press section the pulp suspension 6 is dried to the extent that it stays together but can still be shaped. A slitter 9 is disposed after the press section 5, in which slitter the pulp suspension is cut through with the cutting blades 10 to webs of the desired dimensions. It is possible to perform this cutting after the drying also, depending on, among other things, the product - i.e. the profile - manufactured. The webs can also be laminated one upon the other, and the webs 11 are shaped by folding and/or creasing them together in two or more phases, in particular essentially without breaking the fibers by means of shaping cylinders and drying cylinders into fiber material profiles 15 of the desired shape. The profile 15 is shaped by means of cylinders such that the desired shape is approximated with the first cylinders and in the final stage is dried and the desired shape and dimensioning is performed (calibrated).

[0020] The shaping of the profile thus occurs in consecutive, phases, with a number of consecutive instances of folding and/or creasing whereby the angle to be folded is increased or reduced in each instance of folding and/or creasing. The shaping of the profile preferably occurs such that first it is led to the shaping elements 13, 14 for folding and after that it is dried with hot air, infrared light or microwaves, and is again led to the shaping elements and drying. In other words, a little drying and shaping is performed in each phase, so that the profile retains its dimensions and is made sufficiently dense and rigid.

[0021] A slitter 16, in which the profile 15 is cut into blanks of the desired length, i.e. into finished fiber material profiles, is disposed after the shaping and drying cylinder section 12.

[0022] After cutting, the fiber material profiles can still be printed with printing means 17.

[0023] By cutting from the pulp suspension in the manner presented in Figs. 2a-2d, webs are obtained which are then after the cutting formed into profiles by folding them. The figures present only one crease in each web, but Figs. 3a-3j present various possible crease/folding shapes of the web.

[0024] The slitter is marked with the reference number 9, and in the slitter the pulp suspension 6 is cut through with the cutting blades 10 into webs of the desired dimensions.

[0025] Figs. 3a-3j present some possible shapes of the profile, which shapes can be closed or open in terms of their cross-section as presented in the figures, and the profiles can contain one or more creases and/or be round in shape.

[0026] The profiles can be rectangular or square or triangular or circular in their cross-sections, or the profile can also be W-, U-, V- or L-shaped in its cross-section. The profiles can be side protectors, corner protection profiles, or the feet of a loading pallet.

[0027] The figures and their descriptions are intended only to illustrate the present invention.

[0028] In the solution according to the invention it is also possible to use plastic fibers, flax, hemp, and other fiber materials as raw materials, in addition to wood fiber. These raw materials can be used together or separately.

[0029] In addition it is possible to use municipal slurry or agricultural slurry that has passed through a bioreactor and hygienization. Municipal slurry is slurry available from a wastewater treatment plant and biomass obtained from household refuse collection.

[0030] The slurry can be used together with the other materials mentioned earlier.

Claims

1. Method for continuously manufacturing a fiber material profile product of a fiber material, such as wood fiber, in which method in a board machine (1) fiber pulp suspension is led from a headbox (2) to a wire section (3), and in which water is removed from the pulp suspension and after the water extraction the pulp suspension (6) is detached from the wire (3) by means of a suction and detachment roll (4) and led to a press section (5), in which the pulp suspension is dried by means of drying elements, such as press rolls (7) and a felt (8), and in that a slitter (9) is disposed after the press section (5), in which slitter the pulp suspension is cut into webs and after which the webs (11) are led to a shaping and drying cylinder section (12), in which the webs are shaped, characterized in that one or more creases and/or round shapes are formed in the webs by folding and/or creasing them in the longitudinal direction of the web in two or more consecutive phases, whereby the folding angle in each folding instance and/or creasing instance is increased or reduced, in order to reduce breakage of the fibers, by means of shaping cylinders (13,14), into fiber material profiles (15) of desired shape and are led to shearing cutters (16) for cutting.

2. Method according to claim 1 for manufacturing a fiber material profile product, characterized in that folding angle and/or creasing angle is increased or reduced by approx. 10 - 20 degrees.

3. Method according to claim 1 for manufacturing a fiber
Verfahren nach Patentanspruch 1 zur Herstellung eines Fasermaterial-Profilprodukts, dadurch gekennzeichnet, dass das Fasermaterialprofil aus länglichen Formen durch formierende Vorsprünge auf den Formierzylindern (13,14) gebildet wird.

5. Verfahren nach Patentanspruch 1 zur Herstellung eines Fasermaterial-Profilprodukts, dadurch gekennzeichnet, dass das Fasermaterialprofil vor oder nach dem Abschneiden bedruckt wird.

Revendications

1. Procédé pour fabriquer de manière continue un produit à profil de matériau en fibre d’un matériau en fibre, tel que la fibre de bois, procédé dans lequel, dans une machine à carton (1) la suspension de pulpe de fibre est amenée d’une caisse d’arrivée (2) à une section toile (3), et dans lequel l’eau est enlevée de la suspension de pulpe et après l’extraction d’eau, la suspension de pulpe (6) est détachée de la toile (3) au moyen d’un rouleau aspirant et de détachement (4) et amenée vers une section des presses (5), dans laquelle la suspension de pulpe est séchée au moyen d’éléments sèchant, tels que des presses humides (7) et un carton-feutre (8), et dans laquelle un disque coupeur (9) est placé après la section des presses (5), disque coupeur dans lequel la suspension de pulpe est coupée en feuilles et les feuilles (11) sont ensuite amenées vers une section cylin-drique de formage et de séchage (12), dans laquelle les feuilles sont formées, caractérisé en ce qu’un ou plusieurs plis et/ou formes rondes sont formés dans les feuilles en les pliant et/ou en les plissant dans le sens longitudinal de la feuille en deux phases consécutives ou plus, par lequel l’angle de pliage de chaque cas de pliage et/ou cas de plissage est augmenté ou réduit, afin de réduire la rupture des fibres, au moyen de cylindres de formage (13,14), en profils de matériau en fibre (15) de la forme désirée et sont amenés vers les coupeuses (16) pour découpe.

2. Procédé selon la revendication 1 pour fabriquer un produit à profil de matériau en fibre caractérisé en ce que l’angle de pliage et/ou angle de plissage est augmenté ou réduit d’environ 10 - 20 degrés.

3. Procédé selon la revendication 1 pour fabriquer un produit à profil de matériau en fibre caractérisé en ce que le matériau en fibre est cisailé et imprimé.

4. Procédé selon la revendication 1 pour fabriquer un produit à profil de matériau en fibre caractérisé en ce que le profil du matériau en fibre est formé de formes longitudinales avec des protubérances de formage sur les cylindres de formage (13,14).

5. Procédé selon la revendication 1 pour fabriquer un
produit à profil de matériau en fibre caractérisé en ce que le profil du matériau en fibre est imprimé avant le cisaillement ou après le cisaillement.
REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- GB 903567 A [0007]
- DE 10129018 A1 [0008]
- WO 9947347 A [0009]