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(54) **Device for coiling fibres and for the production of capsules made of a coiled fibre and a wrapping of glue or frozen water**

(57) Device for coiling fibres and for the production of capsules made of a coiled fibre and a wrapping of glue or frozen water, consisting of a container (3) in which a cutter (6) is slidably arranged, the cutter (6) being provided with an upper lid (13) and a wall (12), wherein the upper lid (13) is provided with an aperture (8) and the lower rim of the wall (12) is provided with a cutting edge (9), and wherein the container (3) is provided with an opening (7) in its wall (10), intended for introducing the fibre (2).

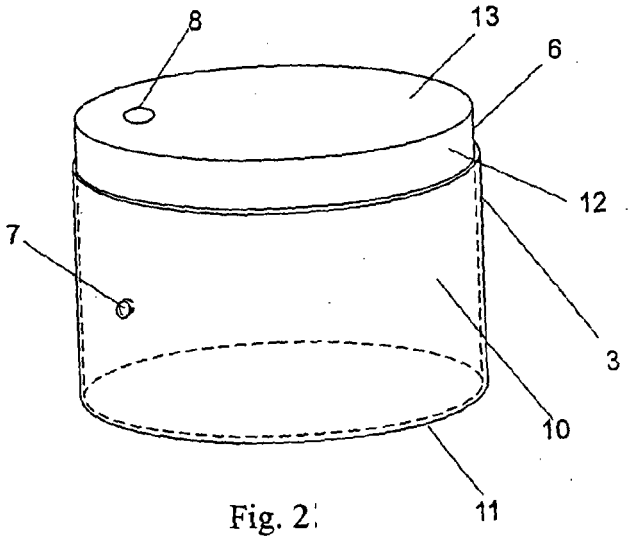

Fig. 2

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Description

Background of invention

[0001] The invention concerns the device for coiling of the fibres and for production of capsules from the glue or frozen water.

State of the art

[0002] The concrete is characterized by low tension strenght. For that reason concrete elements, which are exposed to tension stress, bending stress or shear stress are reinforced. Most traditional method for reinforcing of elements is by steel reinforcement, which creates so-called "steel reinforced concrete" or by prestress reinforcement, which creates so-called "pre-stressed concrete". In last few decades a technology of "fibre concrete" is developped, wherein tension forces are absopted by plastic, glass or metal fibres. Ideally said fibres should be uniformly dispersed in a tension stressed part of the concrete element and oriented so that their maximum reinforce effectivity is reached. By known technologies with use of fibres there is not sufficient effectivity of dispersion and clusters of a non-uniformly dispersed reinforcement, are created. Consequently the fibres do not offer sufficient reinforcement and there are local breaking strength areas. When the clusters are close to the external surface of the construction, it is unaesthetic.

[0003] The documents US 3,616,589 and CA 2547694 A1 suggests adding steel fibers with diameters from 1,15 to 1,8 mm. The disclosure, however, does not mention any particular solution of the problem resulting from the formation of fibrous clusters and, besides that, the application of steel is unsuitable.

[0004] The document US 7,285,167 suggests adding carbon nanofibers. The disclosure neither mentions any particular solution of the problem resulting from the formation of fibrous clusters.

[0005] The document US 4,565,840 suggests adding carbon fibers having dual length, the longer ones having the values of Young's module higher than the base concrete material has and, conversely, the shorter ones having the values of Young's module lower than the base concrete material has. The preparation of such dual fibers is arduous and, moreover, it is not obvious whether the embodiment provides a sufficient solution of the aforesaid problem resulting from the formation of fibrous clusters.

[0006] In DE 4214540 C1 a manufacture method of a fibre concrete is presented, where the plastic fibres are placed into soluble plastic bags, which are made by polyvinyl-alcohol. A geometry of that bags, which are used for this method, is different in comparison with a geometry of the another part of the mixture, moreover arrangement of the bags is nonuniformly. Furthermore insertion of the fibres into the bags is very complicated, whereas said method of insertion of the fibres into the bags does not solve the problem with the clumps of the fibres and does not solves nonuniformly dispersion of the fibres.

[0007] In WO 01/64599 A1 a manufacturing method of the fibred concrete is presented, where long ropes of the fibres are placed into an epoxy matrice, which will let to be tough. After it those fibred sticks are cut onto smaller parts of a lenght from 20 mm to 60 mm. Afterwards it is admixed into the concrete mixture. During this process an epoxide is not solubled, so clear fibred effect is not reached, and reinforcing is made by stakes instead by fibres. Covering of the fibres by epoxy is not soluble so its chemistry has a negative effect on a chemistry of the concrete mixture.

[0008] In CZ 19399 U1 a CZ 19400 U1 capsules made by fibres and glue or by ice, intended for reinforcing of the fibred concrete are presented, including a method of its production and implementation but cited utility models do not describe particular a device for production of the capsules.

[0009] The aim of the present invention is to present device for coiling of the fibres and for production of capsules from the glue or frozen water for the reinforced concrete with added fibers.

Feature of the invention

[0010] The above mentioned disadvantages are considerably eliminated by use of the device for coiling of the fibres and for production of capsules from the glue or frozen water, where it consists of a container in which a cutter is slideable arranged, the cutter is provided with an upper lid, whereas the upper lid is provided by apperture and the lower rim of a wall is provided by cutting edge, whereas the container is provided by an opening in its wall, intended for introducing of the fibre.

[0011] In an advantageous embodiment the wall of the container and the cutter are mutually modificated for their tight guide and for their possibility of a mutual circling movement.

[0012] In another advantageous embodiment the container and the cutter are made as cylinders.

[0013] In another advantageous embodiment the fibre is arranged in an unrolling roll.

Description of the drawings

[0014] The invention will be further explained by using the drawings, in which Fig. 1 presents a roll with an unrolled fibre, which is introduced into the device according to the invention, with schematicaly shown feeding device, Fig. 2 presents detailed view of device intended for production of the capsules according to the invention and Fig. 3 presents detail of cutting area with cutter and a bottom of a container.

Preferred embodiments of the invention

[0015] In Fig. 1 a roll 1 with wounded fibre 2 is present-

ed, where the fibre 2 is introduced through an opening 7, which is placed on a casing of a container, into the container 3, which has a diameter of 5 mm to 7 mm and a height of 2 mm to 3 mm. The fibre 2 is caught by a fork 5 of a machine 4 and afterwards it is put into the container 3 by the said fork 5, where the fibre 2 hits an inner wall of the casing of the container and then it is coiled along that wall. Insertion of the fibre 2 is stopped immediately after insertion of a demanded length of the fibre 2, for example 20 mm. The machine 4 contains an electric motor or another suitable drive, intended for drawing the fibre 2 by the fork 5 into the container 3. The fibre 2 is held by the fork 5 until the fibre is not cut. Afterwards clamping of the fibre 2 by the fork 5 is unblocked and the machine 4 will shift the fork 5 into the determinated position, for example 20 mm backwards. Afterwards the fibre 2 is caught again by the fork 5 and said cycle is repeated.

[0016] In Fig. 2 the container 3 with an opening 7 is presented, through which the fibre 2 was introduced into the container 3. In the present embodiment there is a cutter 6 made as a cylindre, which consists of a wall 12 and a lid 13, which is pushed into the container 3 by circling movement. As well the container 3 is made as a cylindre, which consists of a wall 10 and a bottom 11. The wall 10 of the container 3 and the wall 12 of the cutter 6 are mutually modificated for their tight guide with a possibility of mutual circling guide and with a possibility of a mutual circling movement. It is clear that the wall 10 of the container 3 and the wall 12 of the cutter 6 can be e.g. elliptic or it can be constituted e.g. as a cuboid or in another shape. Disadvantage of such alternative shapes is imposibility to use a circling movement for pushing the cutter 6 into the container 3.

[0017] When the cutter 6 is pushed approximately into the half of the height of the container 3 the fibre 2, which is passed through the opening 7, which is provided at the wall 10 of the container 3, is cut. Pushing of the cutter 6 into the container 3 is continued until its absolute insertion, in other words, until the edge 9 of the wall 12 will not be in contact with the bottom 11 of the container 3

[0018] In case the capsule is made by a fibre and frozen water, water is droped into the container 3, where the fibre 2 is coiled, through the apperture 8, which is placed in the lid 13 of the cutter 6, until completely flooding of the container 3. Afterwards the container 3, with inserted cutter 6 and with the flooded coiled fibre 2 inside is placed for few seconds into a container with liquid nitrogen. Afterwards the container 3 is removed from the deep freezing container, whereas the cutter 6 is pulled out from the container 3 and the capsule is pushed out from the cutter 6 by a thorn inserted into the apperture 8. Created capsules are placed into a common freezer for transportation or storing. A temperature of the capsule have to be under -18°C such as a prevention from joining the number of the capsules into one iced unit. Before its use the capsules are placed into storage container, where the slightly mutually frozen capsules are separated due to vibration of the container, and afterwards they are applied into the concrete mixture.

[0019] In case the capsule is made by fibre and glue, the glue is droped into the container 3, wherein the fibre 2 is coiled, through the apperture 8, which is placed in the lid 13 of the cutter 6, unitil completely flooding of the container 3. Afterwards the container 3, with inserted cutter 6 and the flooded coiled fibre 2 inside it, is placed for few minutes into the dryer. Afterwards the container 3 is removed from the dryer, whereas the cutter 6 is pulled out from the container 3, and the capsule is pushed out from the cutter 6 by a thorn inserted into the apperture 8. Created capsules are placed into a dry atmosphere for transportation or storing. Before its use the capsules are placed into a container, wherein the slightly mutually glued capsules are separated due to vibration of the container, and than applied into the concrete mixture.

[0020] In Fig. 3 a detail of the wall 10 and the bottom 11 of the container 3 and of the wall 12 of the cutter 6 is presented, which are inserted into the container 3, whereas the rim of the wall 12 of the cutter 6 is shaped into a cutting edge 9, which is able to cut the fibre 2 in accordance to the above mentioned description.

[0021] Advantageously, the present device for coiling of the fibres can be used in automated production lines, which can comprise up to tens of such devices, whereas manipulation with the fibres and the containers is provided by programmed manipulators.

Claims

1. Device for coiling of the fibres and for production of capsules from the glue or frozen water **characterized in that,** it consists of a container (3) in which a cutter (6) is slideable arranged, the cutter (6) is provided with an upper lid (13), whereas the upper lid (13) is provided by apperture (8) and the lower rim of a wall (12) is provided by cutting edge (9), whereas the container (3) is provided by an opening (7) in its wall (10), intended for introducing of the fibre (2).

2. Device according to the claim 1, **characterized in that,** the wall (10) of the container (3) and the cutter (6) are mutually modificated for their tight guide and for their possibility of a mutual circling movement.

3. Device according to the claim 1, **characterized in that,** the container (3) and the cutter (6) are made as cylinders.

4. Device according to the claim 1, **characterized in that,** the fibre (2) is arranged in an unrolling roll (1).

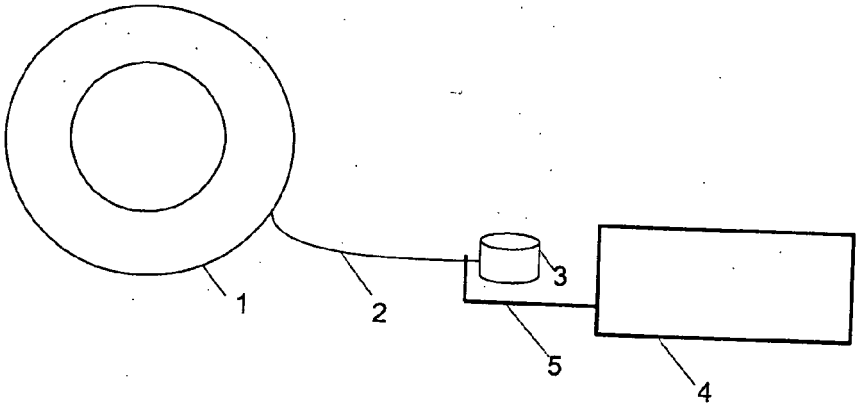

Fig. 1

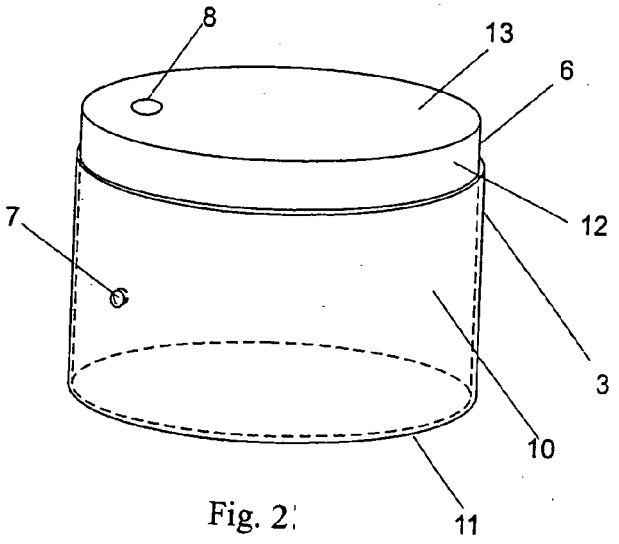

Fig. 2

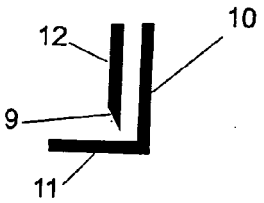

Fig. 3

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EUROPEAN SEARCH REPORT

Application Number
EP 10 46 6033

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	EP 2 206 848 A (CENTRUM DOPRAVNIHO VYZKUMU) 14 July 2010 (2010-07-14) * paragraph [0010] - paragraph [0018]; figures *	1-4	INV. E04C5/01 E04C5/07
A	DE 93 18 666 U (V.F.A. S.R.L.) 27 January 1994 (1994-01-27) * abstract; figures *	1	
A	WO 96/02715 A (K. FRECH) 1 February 1996 (1996-02-01) * abstract; figure 1 *	1	

TECHNICAL FIELDS SEARCHED (IPC)

E04C
B28C
B65H
B21C
B21F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	13 May 2011	Righetti, Roberto

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 10 46 6033

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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13-05-2011

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 2206848 A	14-07-2010	NONE	
DE 9318666 U	27-01-1994	NONE	
WO 9602715 A	01-02-1996	CH 686367 A5	15-03-1996

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

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- CA 2547694 A1 **[0003]**
- US 7285167 B **[0004]**
- US 4565840 A **[0005]**
- DE 4214540 C1 **[0006]**
- WO 0164599 A1 **[0007]**
- CZ 19399 U1 **[0008]**
- CZ 19400 U1 **[0008]**