A method for production of a sink line (1) with sinkers (3), e.g., for a fishing net, the sinking line (1) including a central longitudinal core yarn (2), the sinkers (3) enclosing the core yarn (2) in a concentric way and consisting of a weight material with a specific gravity greater than 1, the weight material consisting of a mixture of powdered mineral material and a binder in the form of a suitable plastic material, wherein the sinkers (3) are connected to the core yarn (2) by extrusion while the latter assumes a shortened condition, and where the sinkers (3) after extrusion and cooling have been divided into mutually separated, relatively short sinkers (3') which are still connected to the core yarn (2).
A METHOD FOR PRODUCTION OF A SINK LINE WITH SINK ELEMENTS

Field of the Invention
The present invention relates to a sinking line with sinkers and of the kind indicated in the preamble of claim 1.

The invention also concerns a method for production a sinking line with sinkers according to the invention.

Background of the Invention
In the production of fishing nets, it is prior art to use sinking or weight lines with sinkers or weight elements consisting of a core yarn with a core of lead which on the core yarn is divided into relatively short weight elements, which subsequently are provided with an external stocking with the object of achieving a flexible sinking or weight line.

However, for environmental reasons lead has now been banned in connection with fishing equipment, including sinking or weight lines for fishing nets.

From Finnish utility model registration Fl 0003064 UI is known a sinking or weight line which is enclosed by a stocking, and which has a weight element with a core yarn with a surrounding core of a weight material consisting of a weight material, which consists of a mixture of crushed or powdered mineral material and a binder of a suitable plastic material. This prior art weight element is made by extrusion of the core of the said mixtures around the core yarn. The core of the weight element is subsequently divided into relatively short weight elements which are still connected with the core yarn.

Object of the Invention
On this background, it is the object of the invention to provide an improved weight or sinking line combining environmental friendliness with easy production and good structural strength and application properties.

Description of the Invention
The sinking line with sinkers according to the invention is characterized in that the sinkers are connected to the core yarn by extrusion while the latter assumes a shortened condition, and that the sinkers subsequently have been divided into mutually separated, relatively short sinkers which are still connected to the core
yarn. In a simple way is hereby achieved a new and improved sinking line with sinkers for use in production a flexible weight or sinking line that combines environmental friendliness with easy production and good structural strength and application properties.

It will be understood that the sinkers are connected by extrusion to the core yarn while it is still being in the shortened condition, and that the sinkers by the subsequent division into relatively short and still coherent sinkers are imparted extraordinary flexibility in that the twined or gathered core yarn is released, ensuring an actual mutual spacing between the individual sinkers, such that these will be arranged "as beads on a string" in form of the core yarn.

Hereby is achieved that a sinking or weight line with sinkers or weight elements according to the invention, when subsequently provided with a usual external stocking-like sleeve, is able to maintain an uncommonly good pliability and flexibility in general.

The sinking line according to the invention is suitably designed such that the core yarn consists of longitudinal filaments and is imparted the shortened condition in that the core yarn is twined before extrusion.

Alternatively, the sinking line according to the invention is designed such that the core yarn consists of longitudinal filaments and is imparted the shortened condition in that the core yarn is gathered before extrusion.

With the intention of temporarily ensuring the shortened condition of the core yarn prior to extrusion, the sinking line according to the invention is designed such that the core yarn shortened by twining or gathering is fixed by means of a thermolabile material, e.g. an ionomer wax.

Preferably, the sinking line according to the invention is designed such that the sinking or weight material consists of crushed granite or corresponding rock and a binder, e.g. polyethylene or other suitable plastic material. The mixing ratio between crushed granite (rock) and binder is suitably 80-95% granite and 5-20% binder.

The invention also concerns a method for production a sinking line according to claim 1, including a central longitudinal core yarn externally upon which the sinkers are formed by extrusion as an elongated sausage of a plastic mass consisting of a mixture of powdered mineral material and a binder, the method
being characterized in that the sinkers are connected by extrusion around the core yarn while it assumes a shortened condition, and that the sinkers after extrusion and cooling are divided into mutually separate, relatively short sinkers which are still connected to the core yarn.

By the method according to the invention is used a core yarn consisting of longitudinal filaments and imparted the shortened condition in that the core yarn is twined before extrusion.

Or, by the method according to the invention there is used a core yarn consisting of longitudinal filaments and imparted the shortened condition in that the core yarn is gathered before extrusion.

By the method according to the invention and with the object of ensuring the said shortened condition of the core yarn before extrusion, a thermolabile material, e.g. an ionomer wax, is used for temporarily fixing the core yarn, with the intention of maintaining the shortened condition until the fixing material during extrusion is melted together with core material, e.g. polyethylene.

**Description of the Drawing**

The invention is now explained in detail in connection with the drawing, in which:

Fig. 1 shows a plan view of a prior art sinking or weight line, cf. FI 0003064 Ul, as seen in longitudinal section;

Fig. 2 shows a schematic plan view of an apparatus for producing a prior art sinking or weight line, cf. FI 0003064 Ul;

Fig. 3 shows an elementary sketch for illustrating production an embodiment of a sinker according to the invention; and

Fig. 4 shows a detail for illustrating the production of a sinker according to the invention.

**Detailed Description of the Invention**

The prior art sinking or weight line 1 shown in Fig. 1, cf. Finnish utility model registration FI 0003064 Ul, for example representing a lower line of a fishing net, includes a core yarn 2 and sinking or weight material 3 arranged around the core yarn 2. The sinking or weight material forms a core 3 with mainly circular cross-
section in the longitudinal direction of the line and arranged around the core yarn, which is preferred made of heat-resistant material, e.g. carbon fibres.

In order to improve the flexibility of the sinking line 1, the core 3 is divided into separate parts in a way know by itself, as between these notches 4 or similar are formed, predominantly extending inwards to the core yarn 2. The shown notches 4 have the purpose of enhancing flexibility and thereby the handling of the sinking line 1.

In addition, Fig. 1 shows an external stocking 5 which is braided around the core 3, and which may consist of any suitable stocking braiding material, e.g. a suitable plastic thread or a plastic coating.

The weight material constituting the core 3 is composed of a crushed mineral rock material and a binder, preferably a plastic material.

Fig. 2 shows a known embodiment of a plant for production a sinking or weight line, cf. the Finnish utility model registration FI 0003064 Ul. Crushed/powdered mineral material, e.g. rock, and binder, e.g. plastic material, are supplied at 8 to an extruder 7. The plastic material is already melted, or it is heated and melted in the extruder 7 as the melted plastic material and powdered rock material (stone or rock) are mixed together.

The mixture of mineral powder and plastic material is then extruded through a die 6 with the object of forming a uniform core 3 around the core yarn 2 running continuously out from the die 6. After production, the core 3 is cooled, divided into uniform core parts 3' and rolled up.

Alternatively, with the intention of production the core 3 more compact, the weight or sinking line may be pressed between two pressing wheels 9 and 10 with oppositely shaped depressions in the pressing face, preferably while it is still hot.

Moreover, it may be further advantageous that the mixture of mineral powder and plastic material passes through a compactor before the mixture is supplied to the extruder, as it has appeared that the self-weight of the sinkers thereby may be increased with up to 20%.

With the purpose of this percentage weight increase of the sinkers, it may be further advantageous that a combined machine is used, including a compactor as well as an extruder, preferably in the said sequence.
The division is performed in a way known per se by means of two counterrotating wheels 11 and 12 which are provided with projections 13 intended for shaping the said notches 4 such that the core 3 is divided into uniform core parts 3' which are still connected with the core yarn 2. The stocking 5 may then in a known way be made by braiding directly externally upon the core 3 divided into uniform core parts 3'.

However, it has appeared to be problematic to achieve sufficiently good flexibility by the hereby described prior art method for production sinking or weight lines with sinkers of the actual kind.

More specifically, it has been associated with great disadvantages that a real spacing between the separated parts into which the sinkers are divided immediately after extrusion has not been feasible to establish. Simply speaking, it has been almost impossible to achieve a real optimising the mutual separation into separate sinking or weight elements which are still securely connected to the core yarn.

When optimal division of the weight or sinker element into separate sinkers has been achieved, it is most often at the expense of serious problems with inadvertent cutting of the core yarn, such that subsequent finishing of the sinking line by braiding of the outer stocking was substantially disturbed.

The present invention, which is described in more detail with reference to Figs. 3 and 4, has thus provided a quite significant breakthrough in the production of sinking lines with sinkers for use in production of e.g. fishing nets.

As most clearly shown in Fig. 4, the core yarn 2 has been shortened before the extrusion (Fig. 2), either by twining the core yarn 2 or by gathering it. Most importantly it is, however, that the core yarn 2 as a whole is fixed in the thus shortened condition, until the core yarn 2 has been fastened to the surrounding core material 3 by the extrusion.

Only by the subsequent cutting of the core material 3 by passage between the toothed wheels 11 and 12 and the projections 13, an immediate separation into separate core parts 3' will take place, as by this operation between the separate core parts 3' the core yarn 2 is allowed to return again to its original greater length. In other words, the core yarn 2 shortened in advance still remains shortened internally in the separate core parts 3', while the core yarn 2 in the
separation zone between the individual core parts 3' is allowed to be elongated such that a real mutual spacing between the core parts 3' is provided.

In that connection, it is important to note that the projections 13 on respective toothed wheels (Figs. 3 and 4) do not get in direct contact with each other, i.e. damage or cutting of the core yarn 2 cannot occur, where yarn 2 will be provided space for the described elongation, cf. Fig. 4, such that a clear mutual separation between individual core parts 3' is established in a secure way.

Finally, it is to be mentioned that the disclosed sinking or weight line with sinkers or weight elements according to the invention can be applied more generally to the manufacture of sinking and weight lines which e.g. also find application in quite different fields, such as the furniture and curtain fields, where it may be relevant to hold items stretched out by providing e.g. a lower seam of a curtain with a weight line according to the invention.
CLAIMS

1. A sinking line (1) with sinkers (3), e.g. for a fishing net, the sinking line (1) including a central longitudinal core yarn (2), the sinkers (3) enclosing the core yarn (2) in a concentric way and consisting of a weight material with a specific gravity greater than 1, the weight material consisting of a mixture of powdered mineral material and a binder in the form of a suitable plastic material, characterized in that the sinkers (3) are connected to the core yarn (2) while it assumes a shortened condition, and that the sinkers (3) subsequently have been divided into mutually separated, relatively short sinkers (3') which are still connected to the core yarn (2).

2. Sinking line (1) according to claim 1, characterized in that the core yarn (2) consists of longitudinal filaments and is imparted the shortened condition in that the core yarn (2) is twined before extrusion.

3. Sinking line (1) according to claim 1, characterized in that the core yarn (2) consists of longitudinal filaments and is imparted the shortened condition in that the core yarn (2) is gathered before extrusion.

4. Sinking line (1) according to claim 2 or 3, characterized in that the core yarn (2) shortened by twining or gathering is temporarily fixed in the shortened condition by means of a thermolabile material, e.g. an ionomer wax.

5. Sinking line (1) according to claim 1, characterized in that the weight material consists of crushed granite or corresponding rock and a binder, e.g. polyethylene or other suitable plastic material.

6. Sinking line (1) according to claim 1 and 5, characterized in that the mixing ratio between crushed granite (rock) and binder is 80-95% granite and 5-20% binder.

7. A method for production a sinking line (1) with sinkers (3) according to claim 1, including a central longitudinal core yarn (2) externally upon which the sinkers (3) are formed by extrusion as an elongated sausage of a plastic mass consisting of a mixture of powdered mineral material and a binder, characterized in that the sinkers (3) are connected by extrusion around the core yarn (2) while it assumes a shortened condition, and that the sinkers (3) after extrusion and cooling are
divided into mutually separate, relatively short sinkers (3') which are still connected to the core yarn (2).

8. Method according to claim 7, characterized in that there is used a core yarn (2) consisting of longitudinal filaments, and that the core yarn (2) is imparted the shortened condition in that the core yarn (2) is twined before the extrusion.

9. Method according to claim 7, characterized in that there is used a core yarn (2) consisting of longitudinal filaments, and that the core yarn (2) is imparted the shortened condition in that the core yarn (2) is gathered before the extrusion.

10. Method according to claim 8 or 9, characterized in that the core yarn (2) shortened by twining or gathering is temporarily fixed in the shortened condition by means of a thermolabile material, e.g. an ionomer wax.
# INTERNATIONAL SEARCH REPORT

**International application No.**

PCT/DK2008/050250

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## A. CLASSIFICATION OF SUBJECT MATTER

IPC: see extra sheet

According to International Patent Classification (IPC) or to both national classification and IPC

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## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

**IPC:** AOIK

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## C. DOCUMENTS CONSIDERED TO BE RELEVANT

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<tr>
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<td>WO 0228176 A1 (CONRAD HANSEN SMEDE &amp; MASKINVAERKSTED EL AL), 11 April 2002 (11.04.2002), abstract</td>
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**X** See patent family annex.

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**Date of the actual completion of the international search**

16 December 2008

**Date of mailing of the international search report**

16-01-2009

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**Name and mailing address of the ISA/ Swedish Patent Office**

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INTERNATIONAL SEARCH REPORT

International patent classification (IPC)

A01K 75/06 (2006.01)
A01K 91/00 (2006.01)
B29C 47/02 (2006.01)

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Information on patent family members

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<td>16/06/2003</td>
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<td>27/11/2003</td>
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