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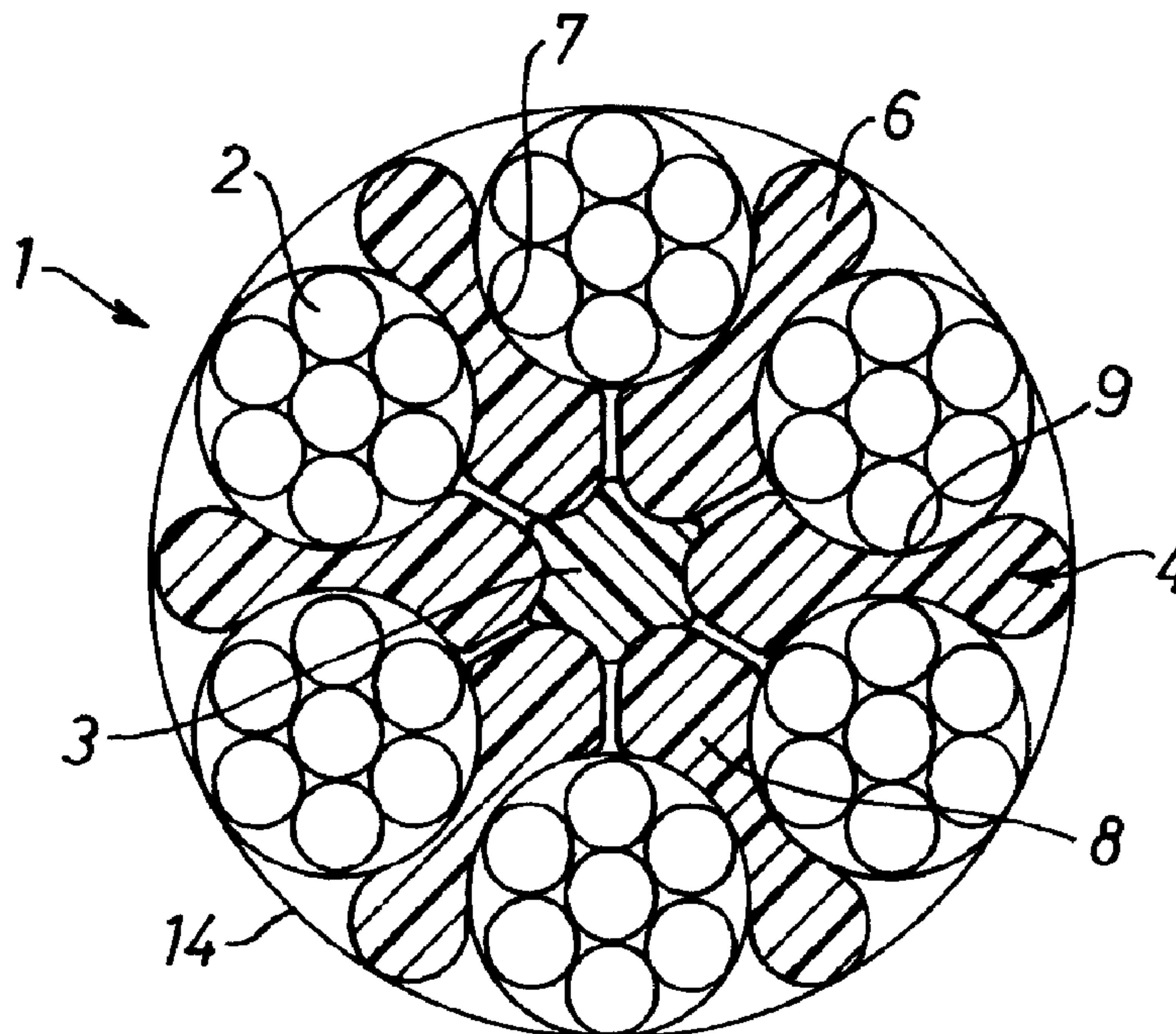
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(54) Titre : CABLE DE FILS TORSADES COMPORTANT DE MULTIPLES ELEMENTS DE TORSADE, ET METHODE DE FABRICATION

(54) Title: STRANDED WIRE ROPE OR CABLE HAVING MULTIPLE STRANDED ROPE ELEMENTS AND METHOD OF ITS MANUFACTURE



(57) Abrégé/Abstract:

To reduce elongation of a stranded wire rope or cable (1), particularly when running over sheaves, or pulleys, and decrease vibration as well as operating noise while increasing operating speed, insert elements (4) are placed between adjacent rope elements (2). The insert elements, in cross-section, have an intermediate portion part (7) with oppositely positioned concave recesses (9), a head portion (6) which can be widened to the circumferential diameter of the rope or cable (1) and a widened base portion (8). The base portions (8) are not interconnected. The insert ribbons or tapes are preferably formed along their length with slits (11) extending from the head portion (6) to about the middle of the ribbon or tape to allow for bending of the rope, and the inserts about circular pulleys.

ABSTRACT OF THE DISCLOSURE.

To reduce elongation of a stranded wire rope or cable (1), particularly when running over sheaves, or pulleys, and decrease vibration as well as operating noise while increasing operating speed, insert elements (4) are placed between adjacent rope elements (2). The insert elements, in cross-section, have an intermediate portion part (7) with oppositely positioned concave recesses (9), a head portion (6) which can be widened to the circumferential diameter of the rope or cable (1) and a widened base portion (8). The base portions (8) are not interconnected. The insert ribbons or tapes are preferably formed along their length with slits (11) extending from the head portion (6) to about the middle of the ribbon or tape to allow for bending of the rope, and the inserts about circular pulleys.

"STRANDED WIRE ROPE OR CABLE HAVING MULTIPLE
STRANDED ROPE ELEMENTS AND METHOD OF ITS MANUFACTURE"

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FIELD OF THE INVENTION.

The present invention relates to a stranded wire rope or cable, especially a cable made of steel strands which strands, in turn, are formed by steel strand wire elements. Preferably, the cable has at least four spirally distributed stranded elements, stranded together.

BACKGROUND.

It is customary to make wire ropes or cables by twisting already stranded wire rope elements in a stranding machine about a core. Usually, the core is round. This spiral twisting causes deformation of the initially round core due to the radial pressure being exerted by the rope or cable elements. The wire rope or cable thereby receives the final shape or form.

Difficulties arose in use of such wire ropes or cables due to elongations which may be permanent. Measures must be taken to compensate for elongation and maintain desired, or necessary tension on the wire rope. When the wire ropes are passed about sheaves, pulleys, or the like, vibrations can be transferred from the rope, or the sheaves or pulleys to structural or machine parts. The vibrations are a consequence of the helical surface of the wire rope running off support rollers or sheaves. Such vibrations in many instances limit the possible speed of

operation of the rope, and hence the transport capacity of carriers or the like connected thereto.

THE INVENTION.

5 It is an object to provide a stranded wire rope, and typically a stranded steel wire rope or cable having multiple strand stranded rope elements which, in comparison to conventional wire ropes or cables has a substantially decreased remanent elongation when in operation, and which is less, or hardly at all subject to vibration when running over rollers or
10 pulleys, while having an increased life-time.

Briefly, adjacent stranded rope elements of the wire, rope or cable are separated from each other by inserts in forms of tapes or ribbons, placed on edge, which have a head portion at the outer circumference of the wire rope and a base portion at
15 the inside. The head and base portions are enlarged, or thickened with respect to an intermediate portion of the insert tape or strip or ribbon. The intermediate portion is formed with oppositely located concave depressions, and constricting the cross-section of the tape or ribbon. These concave portions
20 engage against the normally round stranded rope elements. The head portions terminate at the theoretical outer diameter circle of the rope or cable. The base portions are separated from each other, that is, not mutually interconnected.

The arrangement provides for precisely defined location of
25 the rope elements, and thus precise maintenance of the stranding or twist length, or spiral pitch of the wire or cable. The inserts, in tape or ribbon form prevent migration of the rope elements towards the center. Thus, the spacing of the rope elements from the center, and the pitch of the twisted or
30 stranded rope element is fixed, or predetermined. As a consequence, the remanent elongation of the overall steel wire rope or cable will be substantially less than steel wire ropes or cables of the prior art.

The insert elements between the respective rope elements
35 separate adjacent rope elements from each other. The unavoidable

shifts to compensate for different diameters when the rope is passed over a curved surface, for example a pulley, thus can be accepted much easier than heretofore. Consequently, the individual stranded wires, as well as the stranded rope elements are substantially less stressed than heretofore, resulting in an increased life-time of the rope or cable as a whole.

The inserts, which extends up to the theoretical outer circumference of the rope elements have another advantage in that they effect increase, up to doubling of the contact and support points when the overall rope or cable runs over support or guide rollers. As a result, the run will be substantially more quiet and less vibrating than heretofore, and tendency to oscillations or vibrations is substantially reduced or even entirely eliminated. Elimination of such spurious movement permits increase of operating speed of the rope or cable with respect to a fixed point, for example the axis of rotation of a roller or pulley.

DRAWINGS.

Fig. 1 is a highly schematic cross-sectional view through a stranded steel wire rope or cable having multiple stranded rope elements;

Fig. 2 is a schematic side view of a portion of a insert ribbon or tape;

Fig. 3 is a side view of the stranded steel wire rope or cable, and illustrating an end cut;

Fig. 4 is a cross section, (similar to Fig. 1) and illustrating a second embodiment of the invention, without a central core; and

Fig. 5 is a cross section illustrating a third embodiment of a stranded steel wire rope or cable without a central core, and having enlarged head portions on the inserts.

DETAILED DESCRIPTION.

The stranded steel wire rope or cable 1 is particularly suitable as a support cable, or as a pull cable, for example for use in cableways, cable cars or the like. The wire rope 1 is a

composite formed of a plurality, preferably at least four, in the example six, or eight wire elements 2. More than eight may be used for special applications. Each one of the wire elements 2 has seven individual wires which, in turn, can again be stranded wire structures. A larger or lesser number than such individual wires, or composite form of strands, can be stranded together to form one of the rope elements 2.

A core 3 of elastic or elastomer material is located in the center of the wire rope 1. It extends in longitudinal direction of the wire rope. Insert elements 4, spiralled according to the shape of the rope elements 2 are uniformly located in a circle about the core.

In accordance with the present invention, the insert elements 4 are of ribbon or tape form which have, at the outer side, a head portion 6, a central portion 7 and a base portion 8. The head portion 6 and the base portion 8 are thickened, in cross-section, with respect to the central portion 7. The central, or intermediate portions 7, looked at in cross-section, is formed of two oppositely placed concave recesses 9. The radius of the recesses 9 corresponds at least approximately to the circumferential radius of the adjacent rope element 2, see Fig. 1. The insert elements 4 are not connected to the core 3 or to each other.

Two adjacent rope elements 2, thus, engage against the internally bulged, or recessed central portions 7 of the separating tape or ribbon 4, and are spaced by the tape or ribbon 4 from each other. The head portions 6, as best seen in Fig. 1, are rounded at the outside and end at the theoretical surrounding circle 14 of the rope 1. Consequently, the engagement points for support, guidance, or carrying rollers or pulleys is doubled which results in extremely quiet running operation of the rope.

The base portions 8 are rounded where they face the core and each other. They are not connected among each other, and are widened with respect to the intermediate portion 7. Due to

radial pressure when the rope is stranded, the originally round core 3 is deformed at the engagement regions of the rounded base portions 8 of the inserts. This deformation, along the rope, is in spiral form.

5 The inserts 4, preferably, are made of a drawn, or pultruded, or of extruded plastic wire or ribbon structure having the profile, or shape as described. Suitable materials are glass fiber reinforced epoxy-vinyl ester resin, or polyethylene. Other materials may also be used for the inserts 4.

10 As best seen in Fig. 2, the inserts 4 are preferably formed with regularly recurring cuts 11 which extend from the head portion 6 up to about the center of the intermediate portion 7. The purpose of the cuts is to reduce tensions which result due to the difference in length between the head portion and the base
15 portion when the cable runs over a curved surface, for example a pulley or sheave.

 The embodiment of Fig. 4 is similar to that described, except that the wire or rope or cable 1' does not have a central core. The base portions 8' are extended close to the center 12
20 of the cable; the base portions 8', again, are not interconnected.

 The embodiment of Fig. 5 illustrates inserts in which the head portion 6" is widened to the extent that a bulge 10 results which is located in a space formed by the peripheries of two
25 adjacent wire elements 2 and the theoretical circular circumference of the wire or rope 1". This space is filled essentially entirely by the head portion 6" of the insert 4". Such a cable will have essentially areal contact with rollers or pulleys rather than line contact as has the cable of Fig. 1.

30 Splicing of such cables is simplified when the core 3 of Fig. 1 or the space which it occupies is selected to have a dimension which at least roughly corresponds to the diameter of a rope unit 2. This permits removal of the core in the region of the splice without essentially changing the diameter of the cable
35 as a whole.

The stranded steel wire rope of any one of the embodiments can be readily made on a customary and standard rope making, or a stranding machine. The insert 4, in accordance with the present invention, can be inserted during stranding similar to additional
5 wires or serving strands, or similar to the rope elements 2, and can be stranded together with the rope elements 2 as they are being supplied.

If the wire or cable does not have a core, the base portions 8' can be formed in wedge shape (Figs. 4 and 5), the
10 apex of which extends up to close the core-less center line 12 of the wire or cable.

Various changes and modifications may be made and any features described herein may be used with any of the others, within the scope of the inventive concept.

THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:

1. A stranded wire rope or cable having six stranded wire rope elements (2) helically stranded about a center line (12) extending longitudinally within the rope or cable;

insert elements (4) located between the stranded rope elements (2),

wherein the insert elements comprise

ribbons (4), each having two end portions defining, each, a head portion (6) and a base portion (8), and an intermediate portion (7) between said head portions and base portions,

wherein the base portions are essentially wedge-shaped defining lateral surfaces and an apex, said apex facing said center line (12), each with an angle of 60° at said apex, and extend close to the center line (12) of the rope or cable with said lateral surfaces of adjacent wedge-shaped portions engageable with each other,

wherein said base portions (8) of the respective insert ribbons are separate from each other;

wherein the intermediate portions (7), in cross section, are formed with two opposite concave depressions (9), said depressions engaging against adjacent rope elements (2); and

wherein the head portions (6) terminate at a theoretical outer surrounding circle (14) of the rope or cable (1).

2. The rope or cable of claim 1, wherein the head portions (6") of the insert elements (4") are formed with an outer bulge (10) which at least approximately fills the

space between peripheries of two adjacent rope elements (2) and the theoretical outer circle (14) of the rope or cable (1).

3. The rope or cable of claim 1, wherein the ribbons (4) are formed with spaced radial slits (11) extending from the head portion (6) and up to part of the intermediate portions (7).

4. The rope or cable of claim 1, wherein the insert ribbons (4) are formed of extruded plastic material.

5. A method to make a stranded wire rope or cable (1) as claimed in claim 1, comprising the steps of stranding together said six wire rope elements (2) and, in one stranding operation and while stranding, positioning said insert ribbons (4) between adjacent rope elements (2), by alternately stranding wire rope elements (2) and insert ribbons (4); and

providing said insert ribbons before stranding, with a shape which includes, for each ribbon, the enlarged head portion (6), the wedge-shaped base portion (8), and the intermediate portion (7) between the head and base portions, in which the intermediate portion (7), in cross section, is formed with two concave recesses (9); and

wherein said stranding step comprises placing said recesses (9) against adjacent rope elements (2) and fitting the wire rope elements in the concave recesses during said one stranding operation.

6. A stranded wire rope or cable having six stranded wire rope elements (2) helically stranded about a center

line (12) extending longitudinally the rope or cable; and insert elements (4) located between the stranded rope elements (2), wherein the insert elements comprise;

ribbons (4), each having two end portions defining a head portion (6) and a base portion (8), respectively, wherein the base portions (8) are essentially wedge-shaped with a wedge angle of 60° , said ribbons further having an intermediate portion (7) between said head and base portions, a central core (3) located essentially along the center line (12) of the rope or cable (1); wherein the central core (3) comprises elastomer material;

wherein the base portions (8) of the respective insert ribbons are separate from each other and from the core;

wherein the base portions (8) of the ribbons (4) and the central core (3) are in engagement,

wherein the base portions (8) are rounded at regions of engagement with the core (3) and at sides facing an oppositely positioned base portion;

wherein the intermediate portion (7) in cross section, is formed with two opposite concave depressions (9), said depressions engaging against adjacent rope elements (2), the concave depressions (9) of the intermediate portion (7) being essentially part circular and formed with a radius which at least approximately corresponds to the radius of the rope elements (2); and

wherein the head portions (6) terminate at a theoretical outer surrounding circle (14) of the rope or cable (1).

7. The rope or cable of claim 6, wherein the ribbons (4) are formed with spaced radial slits (11) extending

from the head portion (6) and up to part of the intermediate portion (7).

8. The rope or cable of claim 6, wherein the base portions define lateral surfaces and rounded apices facing said core, with the lateral surfaces of adjacent base portions being engageable with each other; and

the insert ribbons (4) are formed of extruded plastic material.

9. The rope or cable of either claim 4 or claim 8, wherein the plastic material is selected from the group consisting of epoxy-vinyl ester resin and polyethylene.

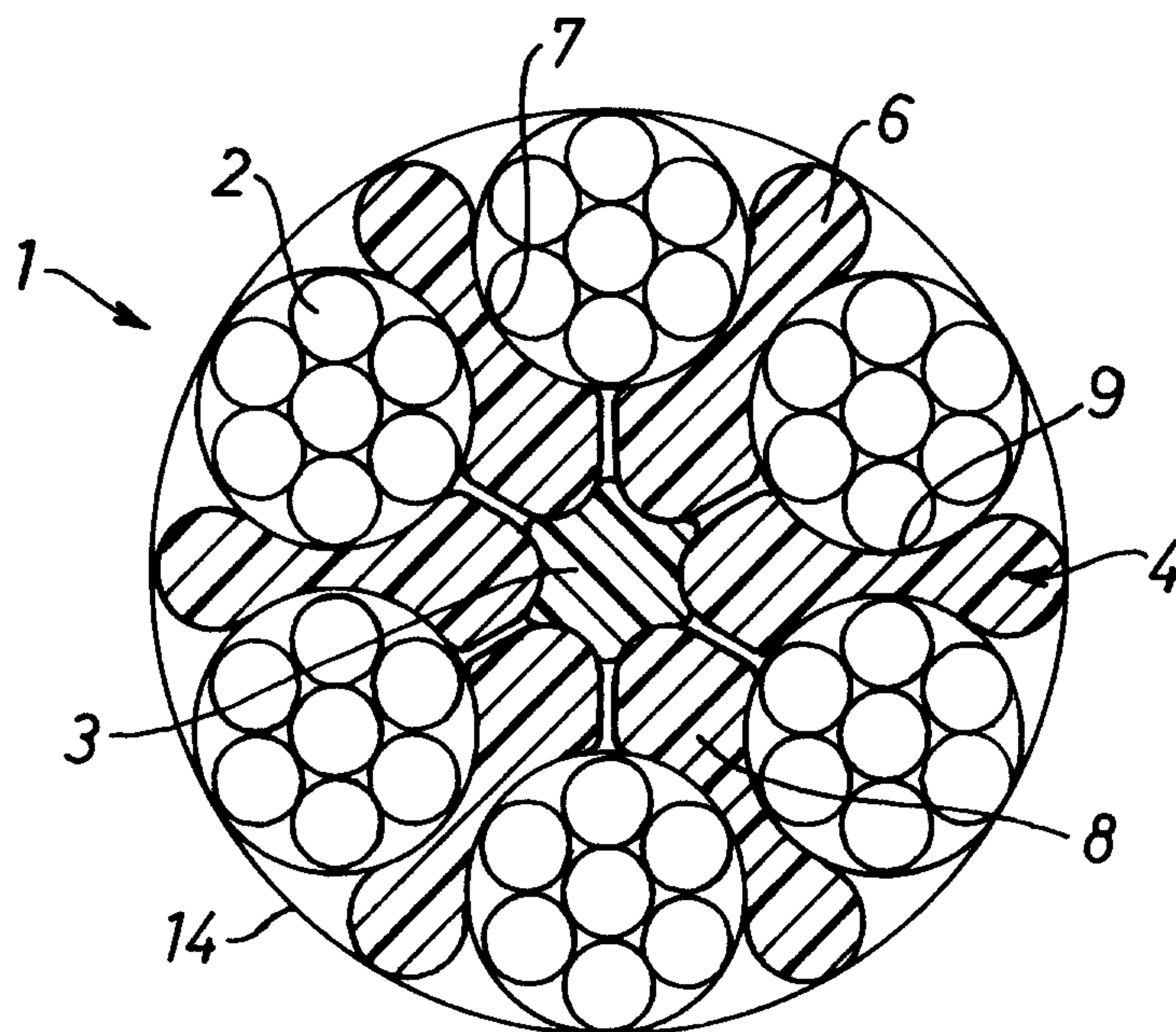


Fig. 1

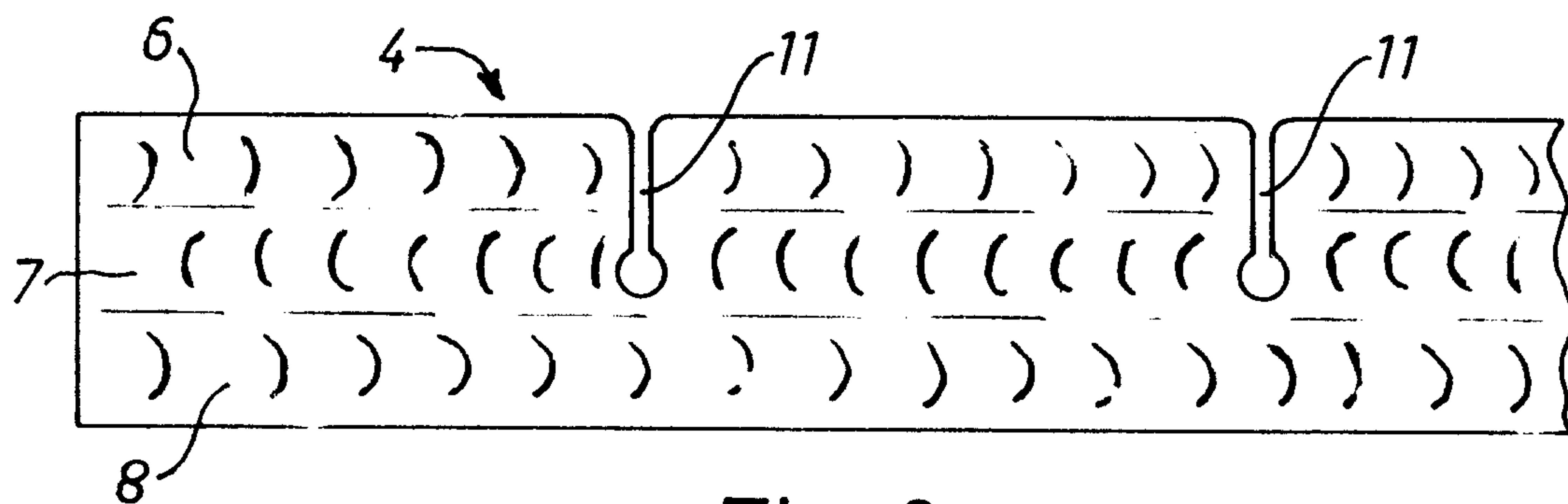


Fig. 2

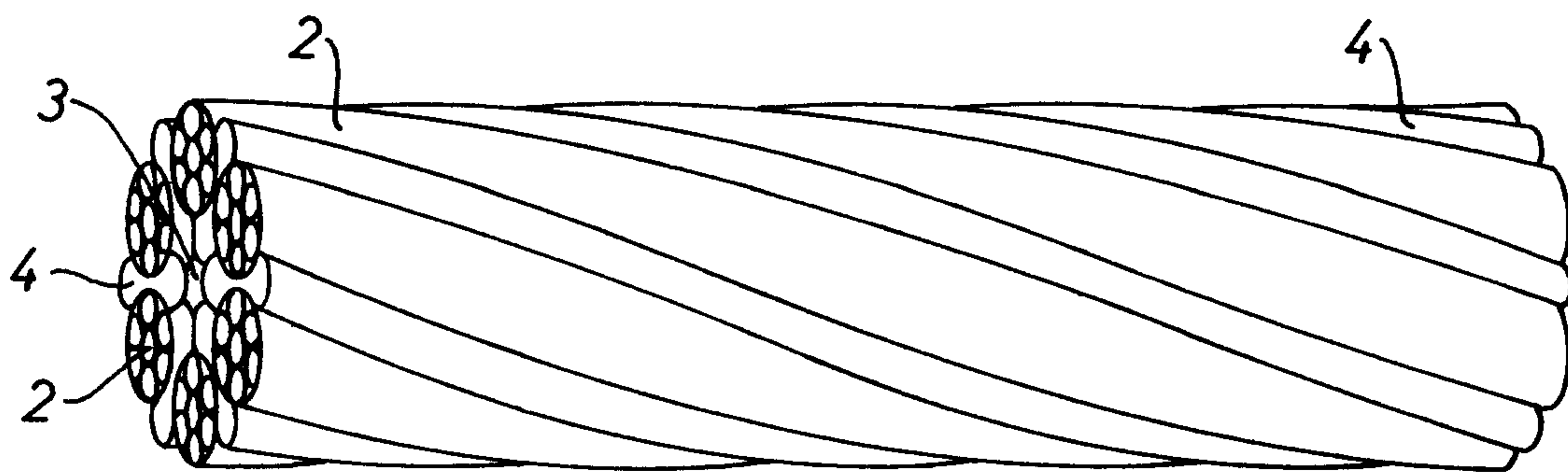


Fig. 3

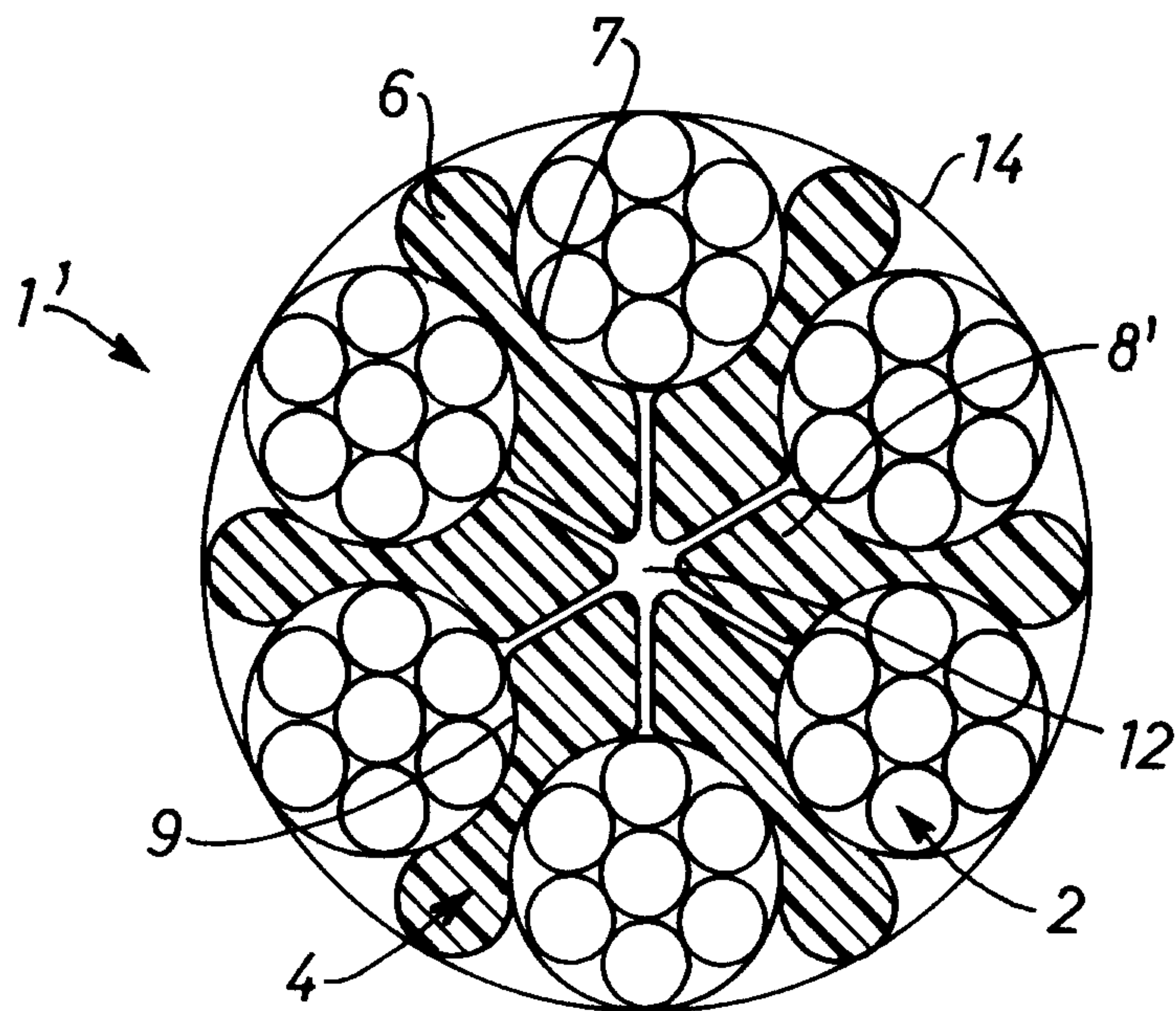


Fig. 4

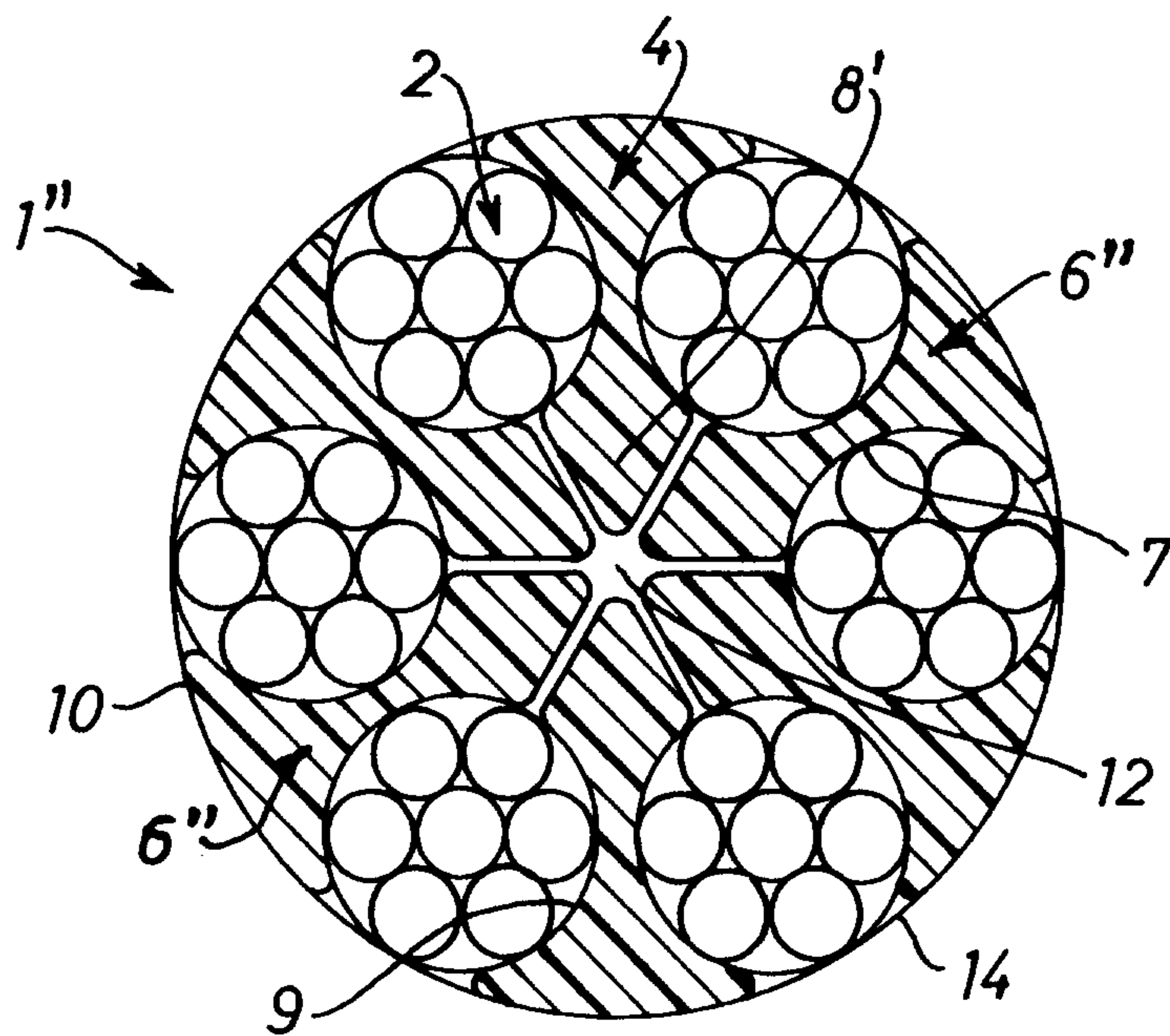


Fig. 5

