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(54) **Titre :** CHEMISE DE CABLE COMPRENANT UN BLINDAGE INCORPORE ET PROCEDE POUR SA REALISATION
(54) **Title:** CABLE JACKET WITH EMBEDDED SHIELD AND METHOD FOR MAKING THE SAME

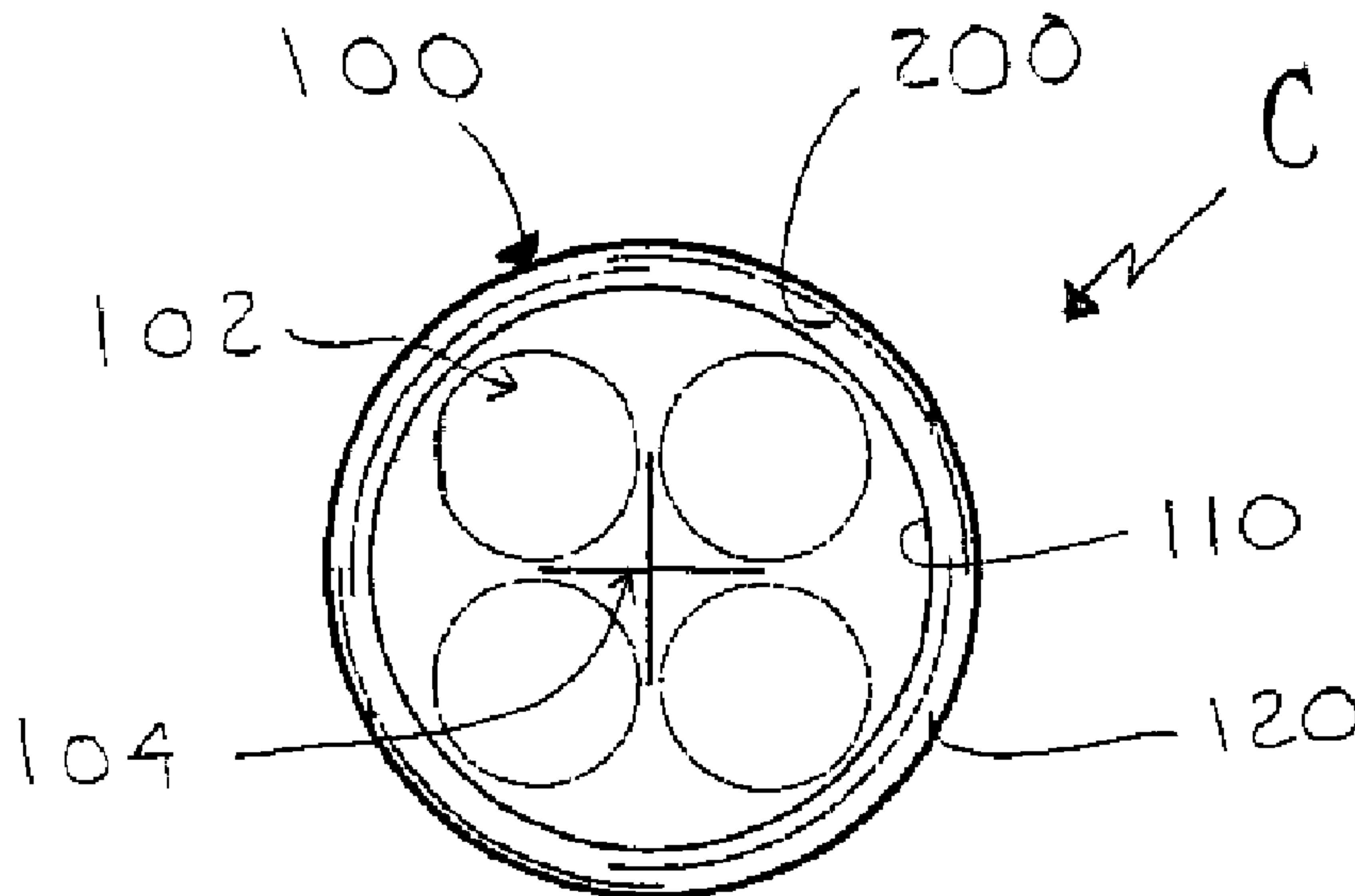


FIG. 1

(57) **Abrégé/Abstract:**

A cable jacket that comprises first and second jacket layers each formed of a jacket material. At least one shielding tape is embedded between the first and second segment layers. The shielding tape is formed of a substrate material and the substrate material has at least one conductive segment.



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(54) Title: CABLE JACKET WITH EMBEDDED SHIELD AND METHOD FOR MAKING THE SAME

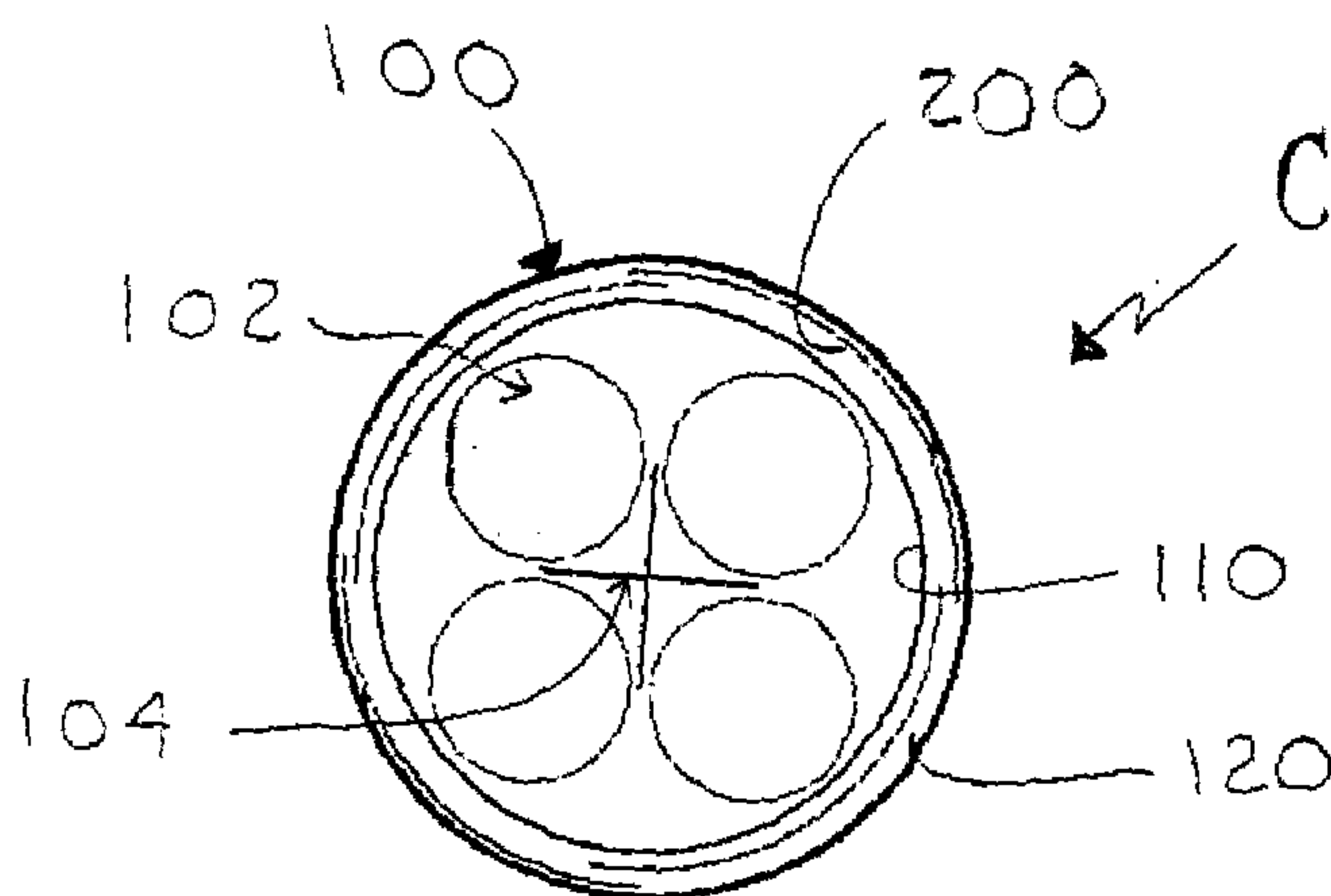


FIG. 1

(57) Abstract: A cable jacket that comprises first and second jacket layers each formed of a jacket material. At least one shielding tape is embedded between the first and second jacket layers. The shielding tape is formed of a substrate material and the substrate material has at least one conductive segment.

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- *with amended claims (Art. 19(1))*

CABLE JACKET WITH EMBEDDED SHIELD AND METHOD FOR MAKING THE SAME

Field of the Invention

[0001] The present invention relates to a jacket for a cable that includes an embedded shield and the method for making the jacket. More specifically, the jacket includes a shield that is a shielding tape with discontinuous conductive shielding segments. The shielding tape is embedded with the jacket by co-extruding the shielding tape with the jacket.

Background of the Invention

[0002] Conventional communications cables typically include a core of twisted pairs of insulated conductors that are enclosed in a protective jacket. To avoid crosstalk with other cables, often referred to as alien crosstalk, conventional cables often include at least one shielding layer disposed around the core of twisted pairs of conductors. A non-conductive barrier layer between the shielding layer and the pairs must also be provided to insulate the core of pairs of the cable.

[0003] Such cables, however, are often bulky because of the requirement of both a shielding layer and a barrier layer. Therefore, a need exists for a cable that protects against alien crosstalk and that is not bulky.

Summary of the Invention

[0004] Accordingly, the present invention may provide a cable jacket that comprises first and second jacket layers each formed of a jacket material. At least one shielding tape may be embedded between the first and second jacket layers. The shielding tape is formed of a substrate material and the substrate material has at least one conductive segment. In a preferred embodiment, the substrate material and the jacket material are the same, although different materials may be utilized. In another embodiment, the substrate material includes a plurality of conductive segments disposed in a spaced discontinuous arrangement. In yet another embodiment, a plurality of shielding tapes are embedded between the first and second jacket layers.

[0005] The present invention may also provide a cable that comprises at least one twisted pair of insulated conductors and a jacket that encloses the twisted pair of insulated conductors. The jacket is formed of a jacket material. A shielding tape may be embedded in the jacket. The shielding tape is formed of a substrate material that has at least one conductive segment. The cable does not include a barrier layer.

[0006] The present invention may further provide a cable assembly that comprises a plurality of cables that are bundled together. Each of the plurality of cables includes at least one twisted pair of insulated conductors, a jacket enclosing the at least one twisted pair of insulated conductors where the jacket is formed of a jacket material, and at least one shielding tape embedded in the jacket. The at least one shielding tape is formed of a substrate material and the substrate material has at least one conductive segment, whereby the cable does not include a barrier layer enclosed by the jacket.

[0007] The present invention may also provide a method for making a cable jacket that comprises the steps of providing at least one shielding tape that has a substrate formed of a substrate material where the substrate includes at least one conductive segment; inserting the at least one shielding tape between first and second jacket layers of the cable jacket and each of the layers is formed of a jacket material; and co-extruding the shielding tape with the first and second jacket layers, wherein the substrate material of the shielding tape and the jacket material of the first and second jacket layers are the same such that during the co-extrusion step, the substrate and the first and second jacket layers bond together.

[0008] Other objects, advantages and salient features of the invention will become apparent from the following detailed description, which, taken in conjunction with the annexed drawings, discloses a preferred embodiment of the present invention.

Brief Description of the Drawings

[0009] A more complete appreciation of the invention and many of the attendant advantages thereof will be readily obtained as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings, wherein:

[0010] FIG. 1 is a cross-sectional view of a cable having a jacket according to an exemplary embodiment of the invention, showing the jacket with a plurality of shields embedded therein;

[0011] FIG. 2 is a plan view of a shield of the cable jacket illustrated in FIG. 1, showing the shield as a tape with a plurality of conductive segments; and

[0012] FIG. 3 is a cross-sectional view of a cable assembly according to an embodiment of the invention, showing a plurality of the cables bundled together.

Detailed Description of the Invention

[0013] Referring to Figs. 1 and 2, a jacket 100 for a cable C, such as a communications cable, according to an exemplary embodiment of the present invention minimizes noise coming from external cable sources, i.e. alien crosstalk, without the need for grounding the cable C. The jacket 100 of the present invention accomplishes the above by combining at least one discontinuous shield 200 with the jacket material.

[0014] As seen in Fig. 1, the cable C includes the jacket 100, one or more twisted pairs of insulated conductors 102, and an optional separator 104 disposed between the pairs 102 to isolate the same. The jacket 100 includes inner and outer layers 110 and 120 that, when combined with one or more of the shields 200, form a single jacket. Preferably, the inner and outer layers 110 and 120 are extruded with the shields 200, such that the layers and shields melt together to form the jacket. Alternatively, the layers 110 and 120 and the shields 200 may be bonded to one another by any known method, such as adhesive and the like. The inner and outer layers 110 and 120 may be formed of any known jacket material for communication cabling, such as PVC, HDPE, FEP, flame retardant PE, or the like. Because the one or more shields 200 are incorporated in the jacket 100, a separate shielding layer surrounding the conductor pairs 102 is not required. Also, the inner layer 110 acts as a barrier between the one or more shields 200, thereby eliminating the need for a separate barrier layer. The overall diameter of the cable is reduced because less jacket material is required for the jacket 100 and both the shielding and barrier layers have been eliminated.

[0015] The shield 200 may be a shielding layer or tape made up of a substrate 202, as seen in Fig. 2, that is preferably of the same type and chemical nature of the material of the

jacket 100. For example, if the material of the jacket 100 is PVC, then the substrate of the shielding tape is also PVC. That allows the jacketing material to properly bond with the substrate material of the shielding tape 200 to form the single jacket 100.

[0016] The shielding tape 200 may include a plurality of conductive segments 204, such as aluminum, copper, ferrite, or any other conductive bricks. The segments 204 may be applied to the surface of the substrate 202 by adhesive, heat pressing, laser ablation, vapor deposition, or by spraying conductive particles onto the substrate 202 to form the segments. Alternatively, the conductive segments 204 can be sandwiched between two layers of the substrate 200. The conductive segments 204 are preferably spaced from each other, thereby forming a discontinuous shield, as seen in Fig. 2. Although the conductive segments 204 are shown as having a substantially rectangular shape, the segments 204 may have other shapes, such as square, trapezoidal, diamond, and the like. Additionally, the segments 204 may all be substantially the same size or may have various sizes. The conductive segments 204 may also be placed in a random pattern along the substrate.

[0017] According to an exemplary method of the present invention, one or more of the shielding tapes 200 is inserted into the jacket 100 during the jacket extrusion process. Specifically, the shielding tape 200 is pulled through the actual die/crosshead or tooling for the jacket 100 in between the inner and outer layers 110 and 120 of the jacket. Thus, one or more shielding tapes 200 may be sandwiched by the inner and outer jacket layers 110 and 120. During that co-extrusion process, the material of the jacket layers 110 and 120 is in a molten or near molten state. When the shielding tape or tapes 200 come into contact with the molten jacket material, bonding/melting of the shielding tape or tapes occurs within the jacket

material. Alternatively, the two jacket layers may be preformed materials (not in a molten state) that are bonded together.

[0018] Preferably, the material of the jacket 100 and its layers 110 and 120 are the same as the substrate 202 of the shielding tapes 200, so that the materials readily mix and bond to each other. This creates a near seamless dispersing of the shielding tape 200 within the jacket 100. Alternatively, the jacket layers 110 and 120 may be formed of a different material than the substrate 202 of the shielding tapes 200. In that case, the jacket layers 110 and 120 may be bonded to the substrates 202 of the shielding tapes by any know method, such as adhesive bonding, high pressure, or the like. On the other hand, the outer jacket layer 120 may suffice as a barrier to hold the shielding tape 200 and the inner jacket layer 110 in place.

[0019] During the co-extrusion process, the conductive segments 204 are encased in the jacket 100 while also maintaining the original orientation of the segments on the shielding tape 200. That orientation of the segments insures consistent electrical properties of the cable, such as return loss and attenuation. Thus, the method of the present invention allows conductive shielding segments 204 to be inserted into the jacket 100 without negatively impacting the physical properties of the jacket, such as tensile strength and elongation. That is because the near continuous material of jacket 100 (incorporated with one or more shielding tapes 200) maintains its original tensile strength as well as elongation properties.

[0020] Referring to Fig. 3, a plurality of the cables C may be bundled together. An optional outer jacket 300 may be provided that encloses the bundle cables C. Each cable C includes the jacket 100, as described above.

[0021] While particular embodiments have been chosen to illustrate the invention, it will be understood by those skilled in the art that various changes and modifications can be made therein without departing from the scope of the invention as defined in the appended claims.

AMENDED CLAIMS

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1. A cable jacket, comprising:

at least one layer formed of a jacket material, said jacket material being insulative; and

at least one conductive segment embedded in said at least one layer.
2. A cable jacket according to claim 1, wherein

said at least one conductive segment forms a substantially rectangular brick.
3. A cable jacket according to claim 1, further comprising

a plurality conductive segments embedded in said at least one layer that are disposed in a spaced discontinuous arrangement.
4. A cable jacket according to claim 3, wherein

each of said conductive segments is formed of one of aluminum, copper, or ferrite.
5. A cable, comprising:

at least one twisted pair of insulated conductors;

an outer jacket enclosing said at least one twisted pair of insulated conductors, said outer jacket being formed of a jacket material, said jacket material being insulative; and

at least one conducting segment embedded in said outer jacket,

wherein the cable does not include a barrier layer or shield enclosed by said outer jacket.

6. A cable according to claim 5, further comprising
a plurality of conductive segments embedded in said outer jacket that are disposed in a spaced discontinuous arrangement.
7. A cable according to claim 6, wherein
each of said conductive segments is formed of one of aluminum, copper, or ferrite.
8. A cable according to claim 5, further comprising
a plurality of twisted pairs of conductors enclosed by said outer jacket.
9. A cable according to claim 8, further comprising
a separator disposed between said plurality of twisted pairs of conductors.
10. A cable assembly, comprising:
a plurality of cables, said plurality of cables being bundled together, each of said plurality of cables including:
 - at least one twisted pair of insulated conductors,
 - an outer jacket enclosing said at least one twisted pair of insulated conductors,
 - said jacket being formed of a jacket material, said jacket material being insulative, and
 - at least one conductive segment embedded in said outer jacket,wherein none of the cables includes a barrier layer or shield enclosed by said outer jacket.

11. A cable assembly according to claim 10, further comprising
a plurality of conductive segments embedded in said outer jacket of each cable that are
disposed in a spaced discontinuous arrangement.
12. A cable assembly according to claim 10, further comprising
a plurality of twisted pairs of conductors enclosed by said outer jacket of each of said
plurality of cables.
13. A cable assembly according to claim 12, further comprising
a separator disposed between said plurality of twisted pairs of conductors.
14. A cable assembly according to claim 10, further comprising
a second outer jacket enclosing said plurality of cables.
15. A method for making a cable jacket, comprising the steps of:
providing at least one shielding tape having a substrate formed of a substrate material,
said substrate including at least one conductive segment;
inserting the at least one shielding tape between first and second jacket layers of the cable
jacket, each of said first and second jacket layers being formed of a jacket material; and
co-extruding the at least one shielding tape with the first and second jacket layers,
wherein the substrate material of the at least one shielding tape and the jacket material of the first
and second jacket layers are the same such that during the co-extrusion step, the substrate and

first and second jacket layers bond together into a single layer wherein the at least one conductive segment is embedded in the single layer.

16. A method according to claim 15, further comprising the step of providing a plurality of shielding tapes, each shielding tape having a substrate formed of a substrate material, and each substrate including a plurality of conductive segments in a spaced discontinuous arrangement;

inserting the plurality of shielding tapes between the first and second jacket layers of the cable jacket; and

co-extruding the plurality of shielding tapes with the first and second jacket layers, wherein the substrate material of the shielding tapes and the jacket material of the first and second jacket layers are the same such that during the co-extrusion step, the substrates and first and second jacket layers are bonded together.

17. A method according to claim 15, wherein said substrate includes a plurality of conductive segments positioned in a spaced discontinuous arrangement.

18. A method according to claim 16, wherein the position of the conductive segments is the same before and after the co-extrusion step.

19. A method according to claim 16, further comprising the step of bonding said conductive segments to said shielding tape by adhesive, heat pressing, or laser ablation.
20. A method according to claim 16, further comprising the step of spraying conductive particles onto said shielding tape to form said conductive segments.
21. A method according to claim 16, further comprising the step of embedding said conductive particles in said shielding tape.

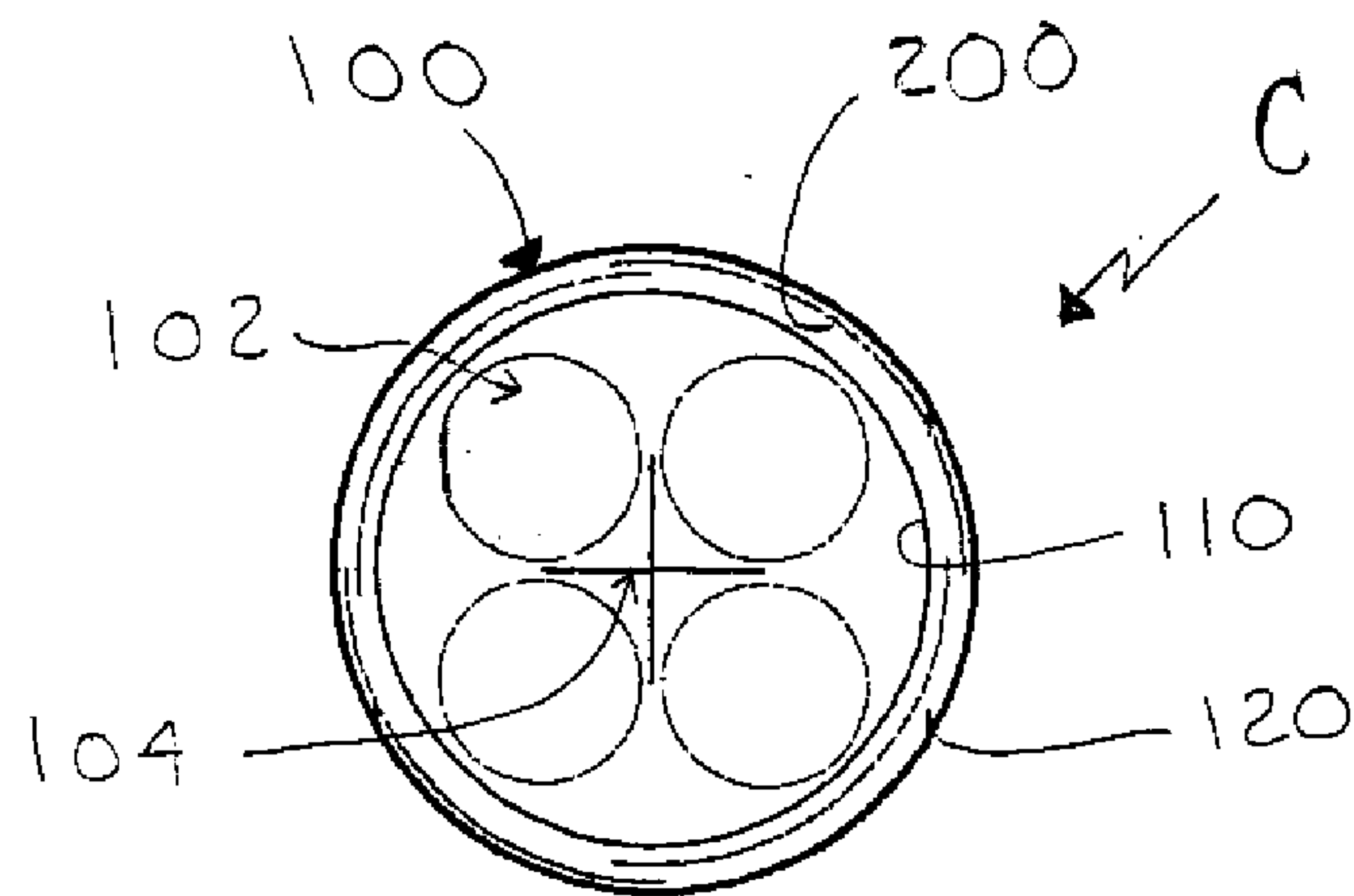


FIG. 1

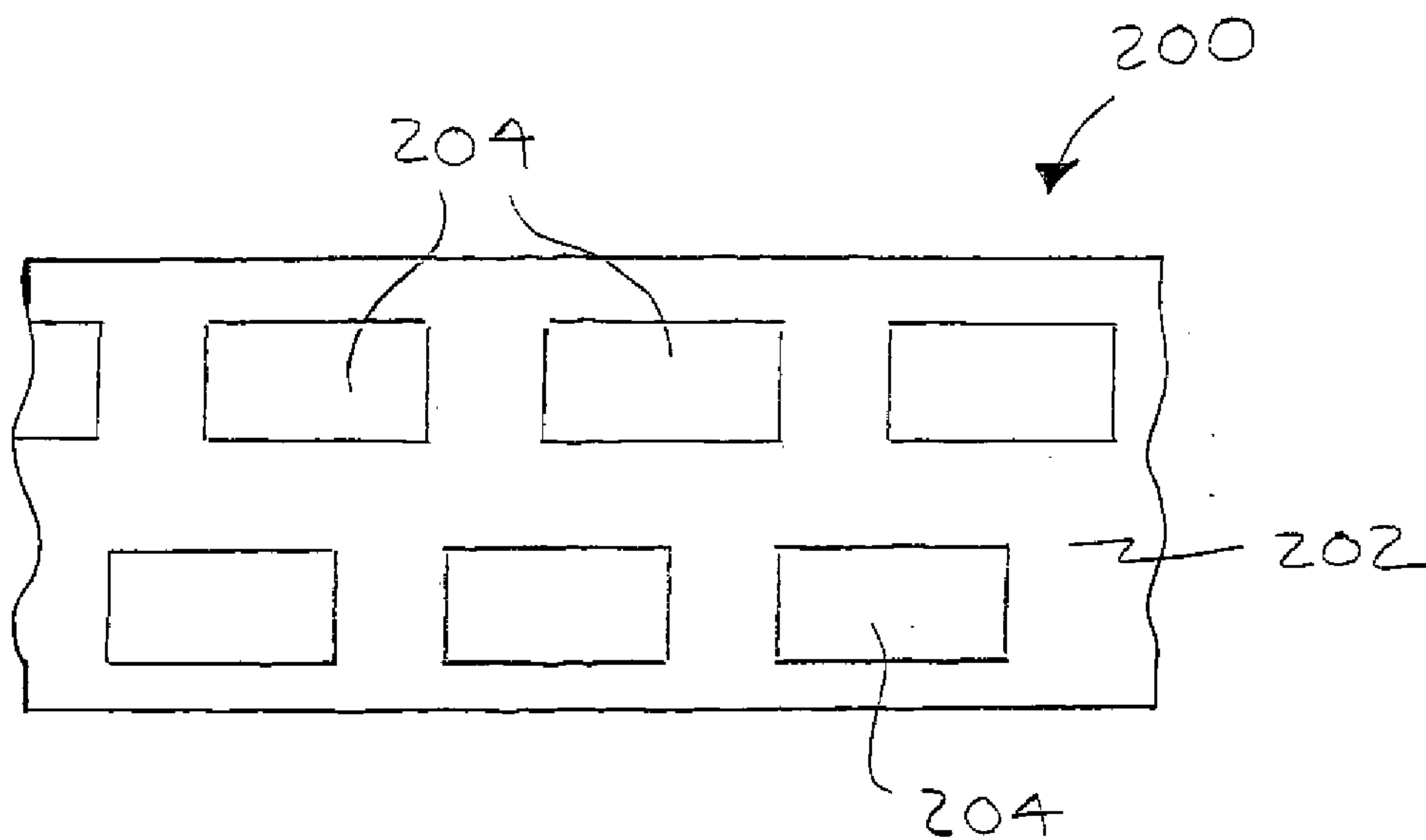


FIG. 2

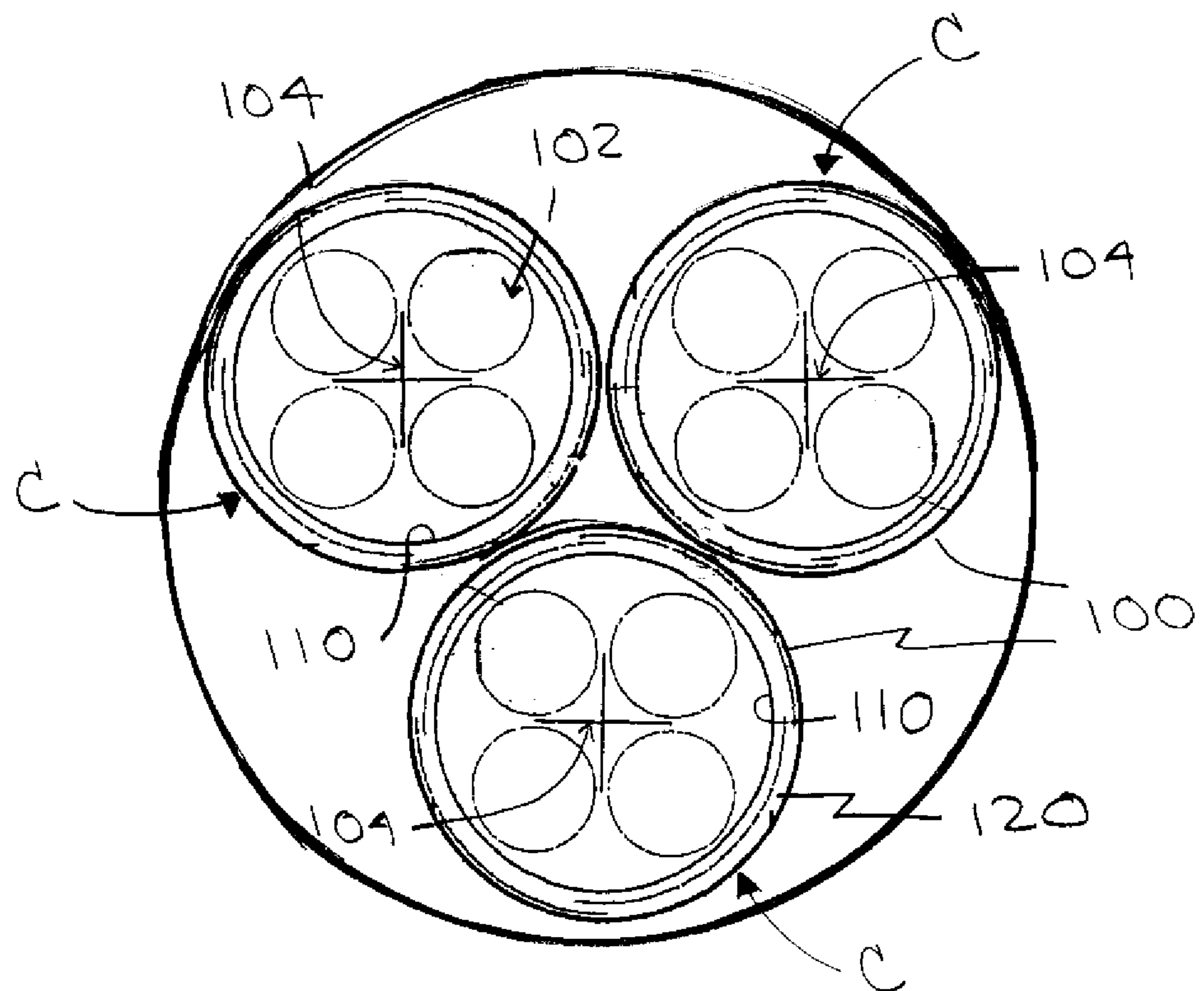


FIG. 3

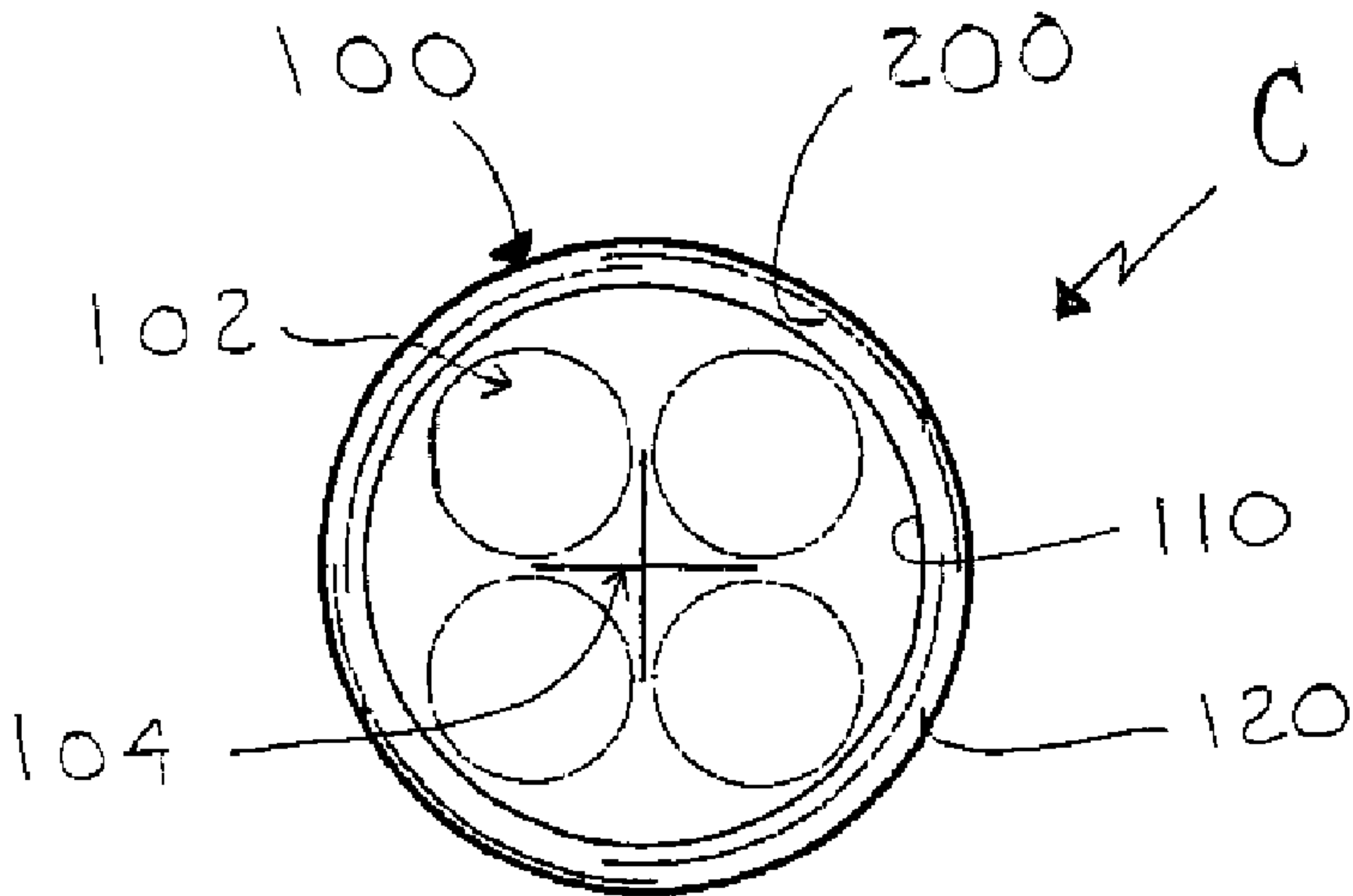


FIG. 1