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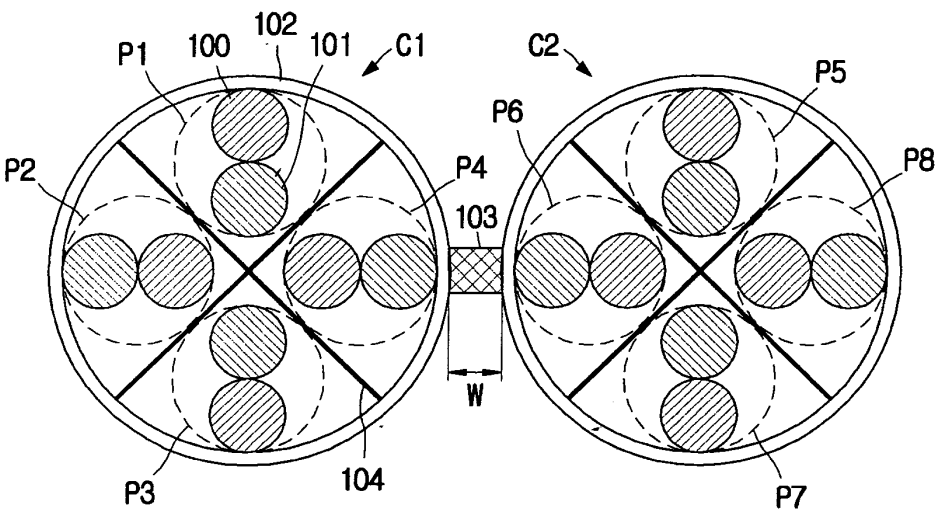
(54) A UTP cable assembly having means for preventing cross talk

(57) Disclosed is an unshielded twisted pair (UTP) cable assembly having a structure capable of preventing cross talk between wire pairs to improve its transmission properties. The UTP cable includes at least two UTP cables, in each of which wire pairs, each having two insulator-coated wires twisted in a spiral manner, are aggregated in a sheath; and a web member interposed between the UTP cables to interconnect the adjacent UTP cables and keep a space between the adjacent UTP cables, wherein the web member has a width of 0.2 mm to 2.0 mm. This UTP cable assembly may prevent cross talk among wire pairs to maintain its transmission properties stably.

FIG. 3



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Description

BACKGROUND OF THE INVENTION

Field of the Invention

[0001] The present invention relates to an unshielded twisted pair (UTP) cable assembly, and specifically a UTP cable assembly having a structure capable of preventing cross talk between wire pairs to improve its transmission property.

Description of the Related Art

[0002] The UTP cable is an unshielded twisted pair widely used to construct a communication network such as LAN, which includes wire pairs (P), each having two insulator-coated wires 10, 11 twisted in a spiral manner as shown in Fig. 1. In common cases, at least two cables C are assembled as a bundle as shown in Fig. 2.

[0003] However, a conventional bundle-type UTP cable has a disadvantage of inducing alien cross talk that an electromagnetic field induced in wires of each single UTP cable gives electromagnetic influences on other adjacent UTP cables due to its structure that adjacent cables are contacted with each other.

[0004] As for such alien cross talk, its regulation scopes and specific regulated values are limited in Article 3.3.11 of IEC61156-5, Multicore and symmetrical pair/quad cables for digital communications- Part 5: Symmetrical pair/quad cables with transmission characteristics up to 600MHz-Horizontal floor wiring- Sectional specification.

[0005] In addition, a conventional UTP cable assembly has a problem that the inherent pitch arranged in of a cable pair at opposite locations or the aggregated pitch of twisted wire pairs are designed to have the same length in each UTP cable, so the alien cross talk between the UTP cables becomes worse. In particular, a UTP cable arranged in the center of the cable assembly is severely electromagnetically affected from other cables in all directions, and such a severe electromagnetical influence acts as a noise in the signal transmission system, eventually causing a communication disorder.

SUMMARY OF THE INVENTION

[0006] Therefore, the present invention is designed to solve the problems of the prior art, and it is an object of the present invention to provide a UTP cable assembly having a structure capable of preventing the generation of cross talk between internal wire pairs of the UTP cable, adjacent to each other.

[0007] It is another object of the present invention to provide a UTP cable assembly satisfying pitch conditions of wire pairs capable of inhibiting generation of cross talk.

[0008] In order to accomplish the above object, the present invention provides a UTP (Unshielded Twisted Pair) cable assembly, which includes at least two UTP cables, in each of which wire pairs, each having two insulator-coated wires twisted in a spiral manner, are aggregated in a sheath; and a web member interposed between the UTP cables to interconnect the adjacent UTP cables and keep a space between the adjacent UTP cables, wherein the web member has a width of 0.2 mm to 2.0 mm.

[0009] A width of the web member functions to minimize cross talk between the UTP cables and to keep an optimum space therebetween. At this time, if the web member has an extremely small width, it is difficult to dismantle the UTP cable assembly, causing damage of the cables, while, if the web member has an extremely large width, it is difficult to keep an optimum space between the UTP cables. Accordingly, The width of the web member may be preferably set to the range of 0.2 mm to 2.0 mm, more preferably 0.8 mm to 1.2 mm.

[0010] In the UTP cables, the wire pair has a minimum pitch value of about 8 mm and a maximum pitch value of about 20 mm to satisfy cross talk property and other properties in the 4-pair single UTP cable. And the pitch values of the remaining two wire pairs in the 4-pair single UTP cable are further determined within the range between the maximum and minimum pitch values. Pitch combinations among four wire pairs in the single UTP cable determined as above thus satisfy electric properties of each single UTP cable.

[0011] Each single UTP cable should satisfy electric properties even if a web member is interposed between the UTP cables to keep a space between at least two UTP cables. At this time, the wire pairs arranged in corresponding locations in the UTP cables preferably have different pitch values. In addition, the difference of the pitch values between the corresponding wire pairs preferably has a value of 0.2 mm or more.

[0012] In the sheath of the UTP cable, four wire pairs may be aggregated. In this case, the difference of pitches between the four wire pairs is preferably 0.5 mm to 7.5 mm, more preferably 1.0 mm to 7.0 mm.

[0013] In the present invention, in case at least four UTP cables are connected in series, respective pitches of wire pairs in an odd number group or in an even number group have the same length, respectively.

[0014] Additionally, a cross filler may be further inserted in the sheath of the UTP cable in a length direction to isolate the wire pairs from each other.

[0015] In addition, the web member is made of polyvinyl chloride (PVC) or low smoke zero halogen (LSZH) materials.

The UTP cable assembly according to another embodiment of the present invention includes at least two UTP cables, in each of which wire pairs, each having two insulator-coated wires twisted in a spiral manner, are aggregated in a sheath; and a web member interposed between the UTP cables to interconnect the adjacent UTP cables and keep a space between the UTP cables and having a width of 0.2 mm to 2.0 mm, wherein the wire

pairs in each UTP cable are twisted at regular aggregation pitches, and aggregation pitches of the adjacent UTP cable have different lengths. In this case, the aggregation pitch is preferably 50 mm to 200 mm, more preferably 70 mm to 150 mm.

[0016] In case at least four UTP cables are connected in series, aggregation pitches of wire pairs in an odd number group or in an even number group preferably have the same length, respectively.

[0017] Additionally, a cross filler may be further inserted in the sheath of the UTP cable in a length direction to isolate the wire pairs from each other.

[0018] In addition, the web member is preferably made of polyvinyl chloride (PVC) or low smoke zero halogen (LSZH) materials, with its width of 0.2 mm to 2.0 mm, more preferably 0.8 mm to 1.2 mm.

BRIEF DESCRIPTION OF THE DRAWINGS

[0019] Other objects and aspects of the present invention will become apparent from the following description of embodiments with reference to the accompanying drawing in which:

Fig. 1 is a perspective view showing a conventional wire pair provided in a UTP cable;

Fig. 2 is a cross sectional view showing a bundle-type UTP cable according to the prior art;

Fig. 3 is a cross sectional view showing a UTP cable assembly according to one embodiment of the present invention;

Fig. 4 is a cross sectional view showing a UTP cable assembly according to another embodiment of the present invention; and

Fig. 5 is a graph showing the regulated values of alien cross talk according to IEC61156-5 and measurement values of the UTP cable assembly according to the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

[0020] Hereinafter, preferred embodiments of the present invention will be described in detail referring to the accompanying drawings. Prior to the description, it should be understood that the terms used in the specification and appended claims should not be construed as limited to general and dictionary meanings, but interpreted based on the meanings and concepts corresponding to technical aspects of the present invention on the basis of the principle that the inventor is allowed to define terms appropriately for the best explanation. Therefore, the description proposed herein is just a preferable example for the purpose of illustrations only, not intended to limit the scope of the invention, so it should be understood that other equivalents and modifications could be made thereto without departing from the spirit and scope of the invention.

[0021] Fig. 3 is a cross sectional view showing a UTP cable assembly according to one embodiment of the present invention.

[0022] Referring to Fig. 3, the UTP cable assembly according to one embodiment of the present invention includes at least two UTP cables C1, C2, each having a plurality of wire pairs P1 to P8 therein, and a web member 103 interposed between adjacent UTP cables C1, C2.

[0023] In Fig. 3, the order of the wire pairs P1 to P8 shows in each single UTP cable P1~P4 and P5~P8 that P1 and P5 correspond to the shortest pitches and P4 and P8 correspond to the longest pitches, respectively. And, the order of their lengths is applied to every single UTP cable identically.

[0024] The UTP cable C1, C2 is configured so that a plurality of wire pairs P1 to P8, each having two insulator-coated wires 100 and 101 twisted in a spiral manner, are aggregated in a sheath 102.

[0025] The web member 103 is interposed between the UTP cables C1, C2 to connect the adjacent UTP cables C1, C2 to each other. The web member 103 also keeps a space between the UTP cables C1, C2 so as to prevent alien cross talk. The web member 103 has a web structure easily torn to facilitate dismantling operation of the cable, and is preferably formed of polyvinyl chloride (PVC) or low smoke zero halogen (LSZH) materials. The shape of the web member 103 may be variously modified, not limited to one shown in the figures. The width W of the web member 103 may be preferably set to 0.2 mm to 2.0 mm, more preferably 0.8 mm to 1.2 mm, to keep an optimum space between the UTP cables C1, C2 and also to minimize the cross talk.

[0026] In the UTP cables C1, C2 interconnected via the web member 103 interposed therebetween, the pitches of wire pairs arranged at the corresponding positions like P1 and P5, or P4 and P8, preferably have different lengths to minimize an electromagnetic interaction between the pairs. At this time, the difference of pitches between the corresponding wire pairs is preferably maintained to 0.2 mm or larger to prevent the electromagnetic interaction.

[0027] In the sheath 102 of the UTP cables C1, C2, four wire pairs are aggregated. In this case, the difference of pitches between the wire pairs is preferably maintained in the range of 0.5 mm to 7.5 mm, more preferably 1.0 mm to 7.0 mm, to minimize the electromagnetic interaction. Here, the number of wire pairs is not limited to this embodiment but may be variously modified.

[0028] Additionally, a cross filler 104 is inserted in a length direction in the UTP cable C1, C2 having four wire pairs so as to isolate the wire pairs from each other and prevent the cross talk between the pairs. The cross filler 104 is provided with 4 bulkheads crossing with each other so as to bar interaction between the wire pairs.

[0029] In addition, in case at least four UTP cables are connected in series, the aggregation pitches of wire pairs in an odd number group or in an even number group preferably have same length.

[0030] In another embodiment of the present inven-

tion, the wire pairs in the UTP cables C1, C2 may be aggregated with being twisted with each other at regular aggregation pitches. That is to say, the UTP cable C1 is configured so that the wire pairs P1 to P4 are spirally twisted with each other at regular aggregation pitches, and the UTP cable C2 is configured so that the wire pairs P5 to P8 are spirally twisted with each other at regular aggregation pitches. Here, the aggregation pitches of the UTP cables C1 and C2 preferably have different lengths to prevent the cross talk between the wire pairs. It is because that the electromagnetic interaction is inversely proportional to the distance between the wires. If the aggregation pitches of the wire pairs are identical to each other, the space between the corresponding pairs of the respective UTP cables are kept regularly, which may maximize influence of the alien cross talk between the pairs. In this case, the aggregation pitches of the UTP cables C1, C2 may be set in the range of 50 mm to 200 mm, more preferably 70 mm to 150 mm, for more effective prevention-of the cross talk.

[0031] The web member is interposed between the UTP cables to connect the adjacent UTP cables to each other, and simultaneously to prevent alien cross talk with keeping a space between the UTP cables. Also, the web member has a web structure easily torn to facilitate dismantling operation of the cable, and is preferably formed of polyvinyl chloride (PVC) or low smoke zero halogen (LSZH) materials. The shape of the web member may be variously modified, not limited to one shown in the figures. The width W of the web member 103 may be preferably set to 0.2 mm to 2.0 mm, more preferably 0.8 mm to 1.2 mm, to keep an optimum space between the UTP cables and also to minimize the cross talk.

[0032] Fig. 4 shows an embodiment where four UTP cables C1 to C4 are connected in series. If at least 4 UTP cables are connected in series as shown in Fig. 4, respective pitches and aggregation pitches of the wire pairs in an odd number cable group (see C 1 and C3) or in an even number cable group (see C2 and C4) have the same lengths, while the pitches in adjacent cable groups preferably have different lengths to prevent the cross talk between the wire pairs P1 to P16.

[0033] Fig. 5 shows an embodiment to which conditions for keeping a regular space between UTP cables and conditions for optimizing their pitches as mentioned above are applied. In Fig. 5, a regulated value P20 of the alien cross talk regulated in IEC61156-5 and a measurement value of each cable are depicted.

[0034] In the UTP cable assembly of the present invention as mentioned above, UTP cables are interconnected with an optimum space by means of the web member 103, so the wire pairs of adjacent UTP cables are not electromagnetically affected from each other and therefore the alien cross talk is prevented.

[0035] In the UTP cables, the electromagnetic interaction is also minimized among wire pairs and therefore the cross talk is effectively prevented since respective pitches of wire pairs arranged at corresponding positions or aggregation pitches of the adjacent UTP cables are formed to have different lengths.

[0036] The present invention has been described in detail. However, it should be understood that the detailed description and specific examples, while indicating preferred embodiments of the invention, are given by way of illustration only, since various changes and modifications within the spirit and scope of the invention will become apparent to those skilled in the art from this detailed description.

APPLICABILITY TO THE INDUSTRY

[0037] As been described above, the present invention may prevent the generation of alien cross talk between wire pairs and allow manufacture of standardized UTP cable assemblies because a space between the UTP cables may be kept optimally.

[0038] In particular, the present invention ensures easy dismantling of cables under construction since UTP cables keep a constant space by means of a web structure that is easily torn.

[0039] Also, the present invention may provide a UTP cable assembly having optimized pitch conditions to minimize electromagnetic interaction between wire pairs.

[0040] The present invention as mentioned above may be very usefully used for a 10-gigabit transmission network as a signal transmission system of a communication cable using copper, which requires prevention of alien cross talk.

Claims

1. A UTP (Unshielded Twisted Pair) cable assembly, comprising;
   at least two UTP cables, in each of which wire pairs, each having two insulator-coated wires twisted in a spiral manner, are aggregated in a sheath; and
   a web member interposed between the UTP cables to interconnect the adjacent UTP cables and keep a space between the adjacent UTP cables,
   wherein the web member has a width of 0.2 mm to 2.0 mm.

2. The UTP cable assembly according to the claim 1, wherein the web member has a width of 0.8 mm to 1.2 mm.

3. The UTP cable assembly according to claims 1 or 2, wherein among the wire pairs arranged at corresponding positions in the UTP cables, at least one wire pair has different pitch values.

4. The UTP cable assembly according to the claim 3, wherein a difference of the pitch values of the wire pairs arranged at corresponding positions is at least 0.2 mm.

5. The UTP cable assembly according to the claim 3, wherein, among a plurality of wire pairs aggregated in a single UTP cable, a wire pair having the shortest pitch value and a wire pair having the longest pitch value are arranged adjacently.

6. The UTP cable assembly according to the claim 5, wherein four wire pairs are aggregated in the sheath of the UTP cable.

7. The UTP cable assembly according to the claim 6, wherein the difference of pitches between the four wire pairs is 0.5 mm to 7.5 mm.

8. The UTP cable assembly according to the claim 7, wherein the difference of pitches between the four wire pairs is 1.0 mm to 7.0 mm.

9. The UTP cable assembly according to the claim 3, wherein, in case at least four UTP cables are connected in series, respective pitches of wire pairs in an odd number group or in an even number group have the same length, respectively.

10. The UTP cable assembly according to the claim 3, further comprising:

a cross filler inserted in the sheath of the UTP cable in a length direction to isolate the wire pairs from each other.

11. The UTP cable assembly according to the claim 1, wherein the web member is made of polyvinyl chloride (PVC) or low smoke zero halogen (LSZH) materials.

12. A UTP cable assembly, comprising;
at least two UTP cables, in each of which wire pairs, each having two insulator-coated wires twisted in a spiral manner, are aggregated in a sheath; and
a web member interposed between the UTP cables to interconnect the adjacent UTP cables and keep a space between the UTP cables and having a width of 0.2 mm to 2.0 mm,
wherein the wire pairs in each UTP cable are twisted at regular aggregation pitches, and aggregation pitches of the adjacent UTP cable have different lengths.

13. The UTP cable assembly according to the claim 12, wherein the web member has a width of 0.8 mm to 1.2 mm.

14. The UTP cable assembly according to claim 12 or 13, wherein the aggregation pitch has a length of 50 mm to 200 mm.

15. The UTP cable assembly according to the claim 14, wherein the aggregation pitch has a length of 70 mm to 150 mm.

16. The UTP cable assembly according to the claim 12, wherein, in case at least four UTP cables are connected in series, aggregation pitches of wire pairs in an odd number group or in an even number group have the same length, respectively.

17. The UTP cable assembly according to the claim 12, further comprising:

a cross filler inserted in the sheath of the UTP cable in a length direction to isolate the wire pairs from each other.

18. The UTP cable assembly according to the claim 12, wherein the web member is made of polyvinyl chloride (PVC) or low smoke zero halogen (LSZH) materials.

FIG. 1
(PRIOR ART)

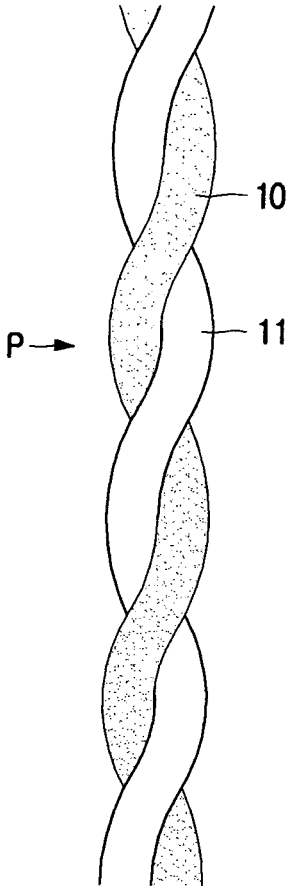


FIG. 2
(PRIOR ART)

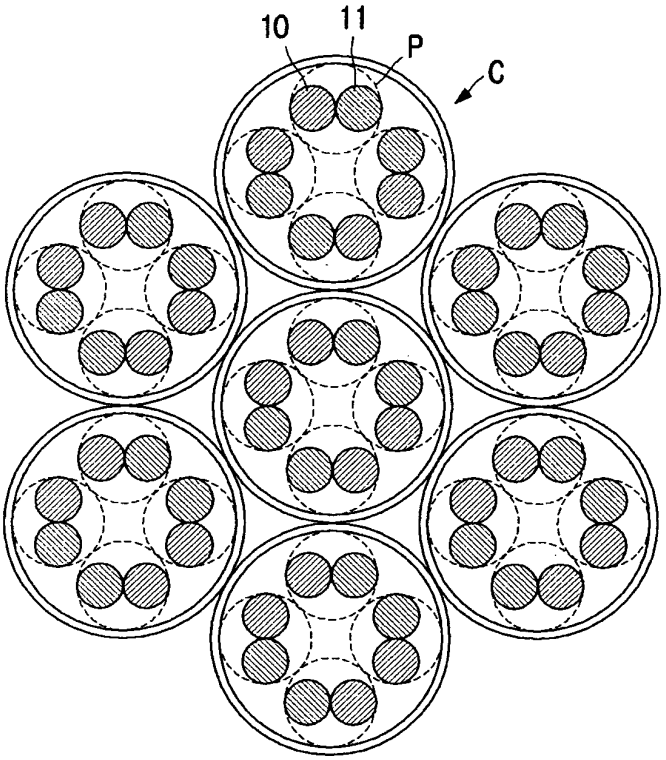


FIG. 3

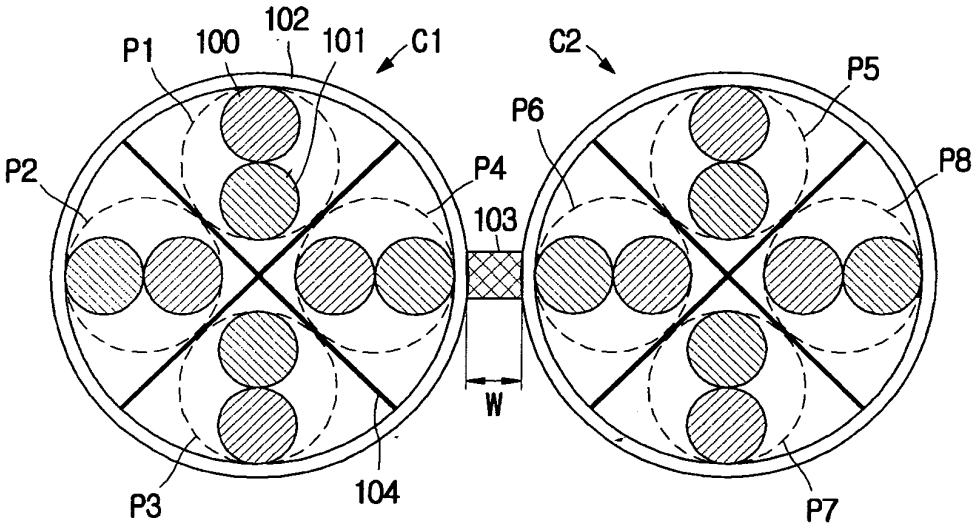


FIG. 4

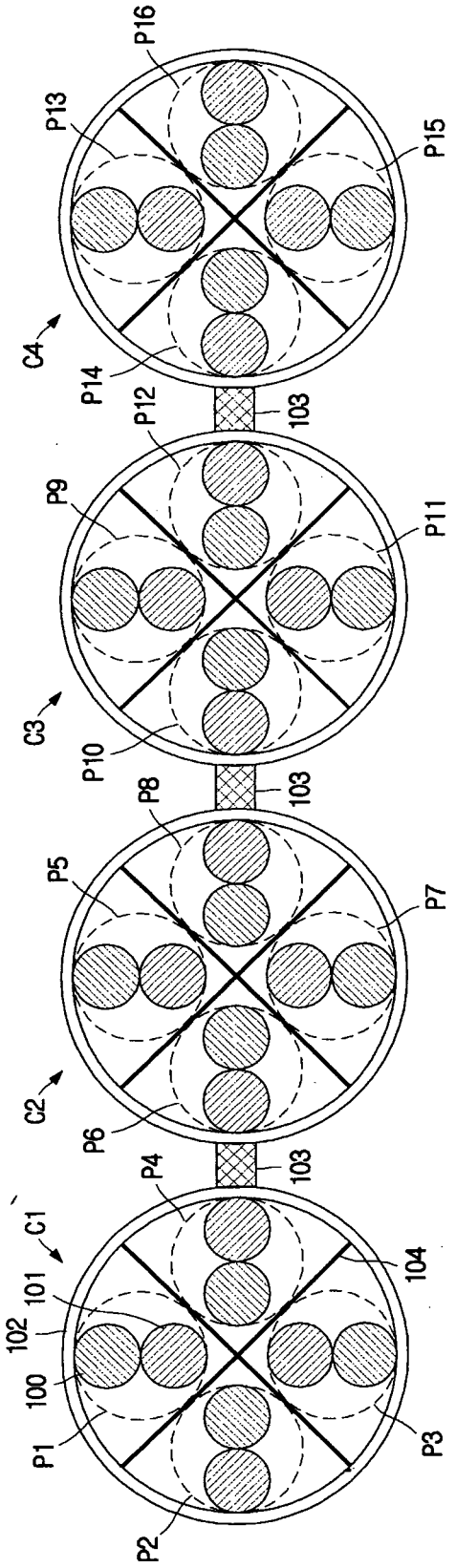
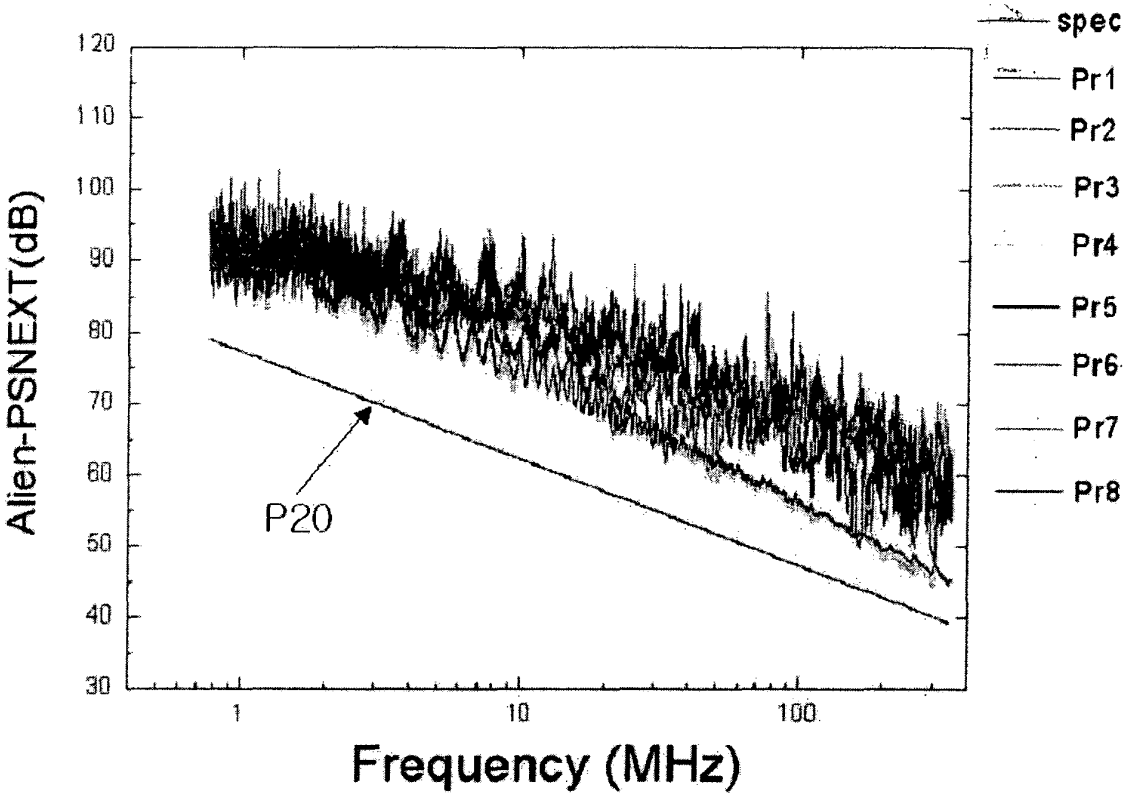

P16
P13
P15
C4
P14
P12
103
P9
P11
C3
P10
P8
103
P5
P7
C2
P6
P4
103
C1
104
101
102
100
P1
P3
P2

FIG. 5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