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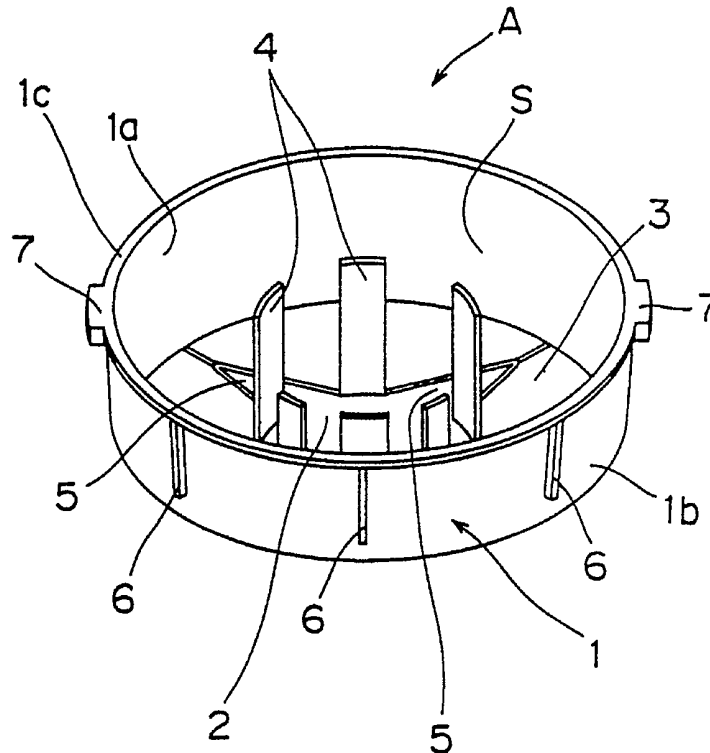
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United Kingdom**

(54) **Stackable container for a bundle of electric wire**

(57) A stackable container for a bundle of electric wire (P) wound in a loop shape and from which electric wire can be drawn has a circular base with a non-circular central hole 2, a tapered outer wall 1 with a greater top diameter than bottom diameter and external ribs 6 extending downwards from the top edge 1c to locate the container on the top 1c of the next lower stacked container and is formed with core pieces 4 around the central hole. The triangular extensions 5 of the hole 2 accommodate the ends of the core pieces 4 of a container stacked below.

**FIG. 1**



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FIG. 1

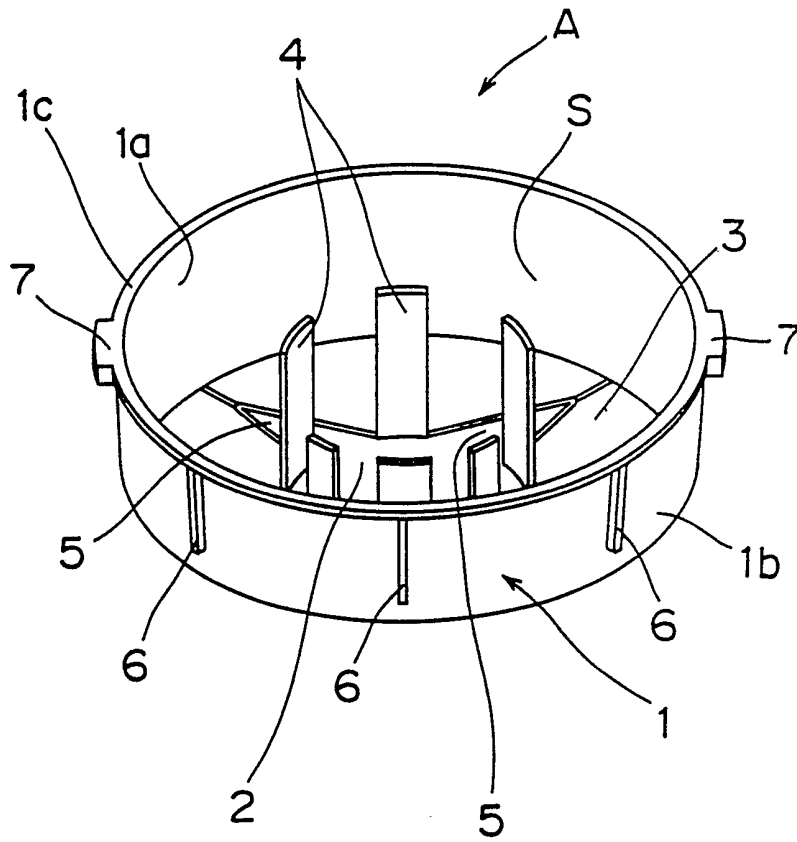


FIG. 2

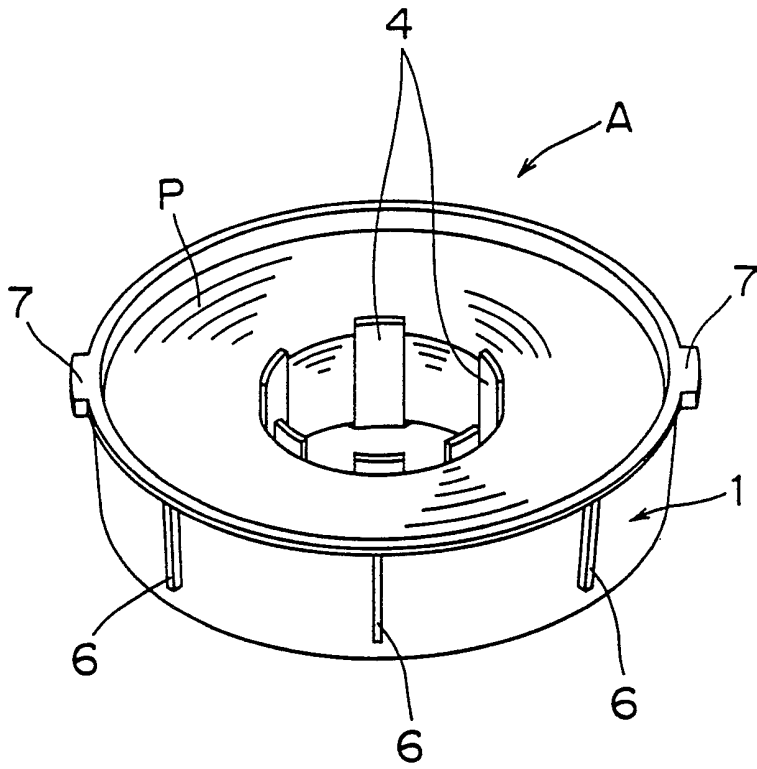


FIG. 3

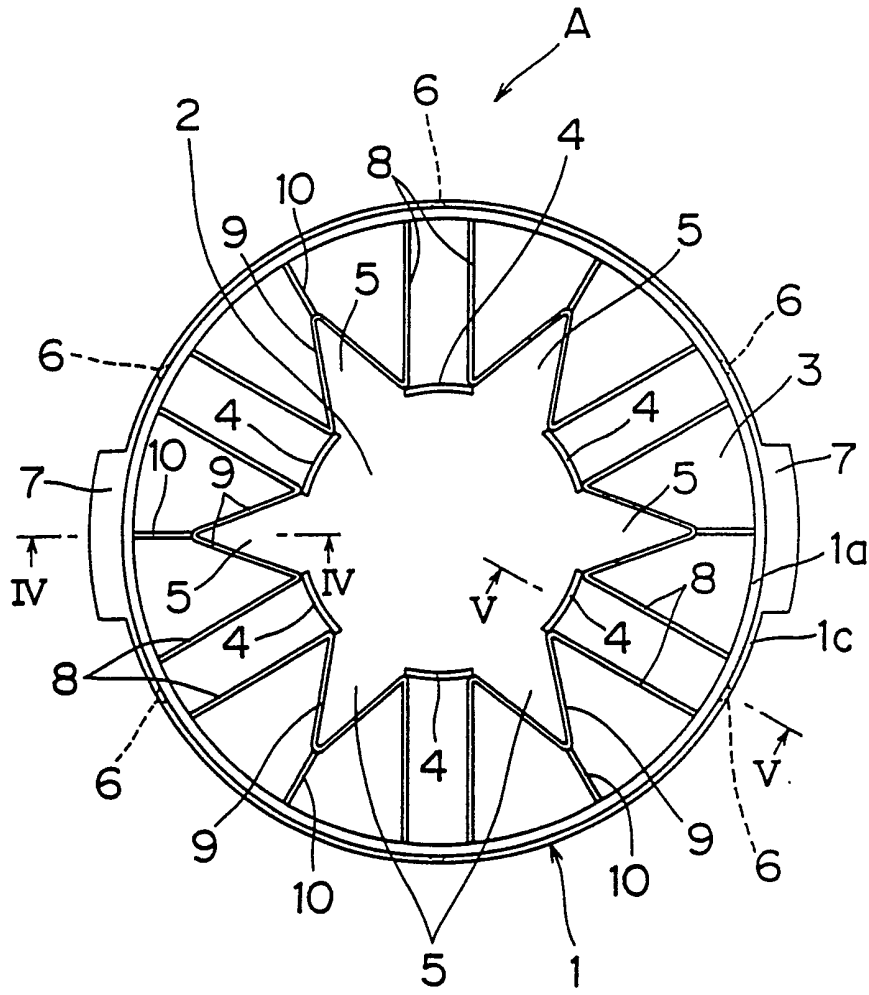


FIG. 4

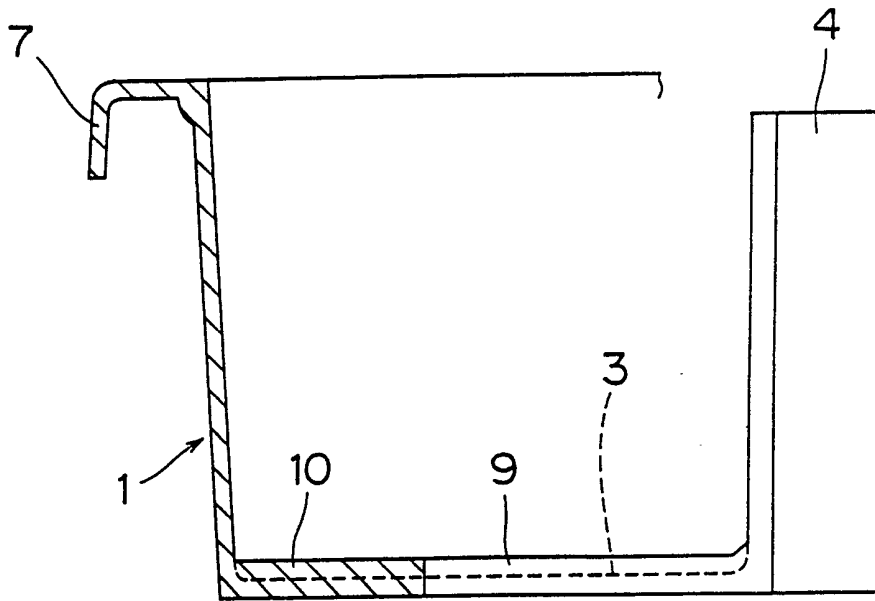


FIG. 5

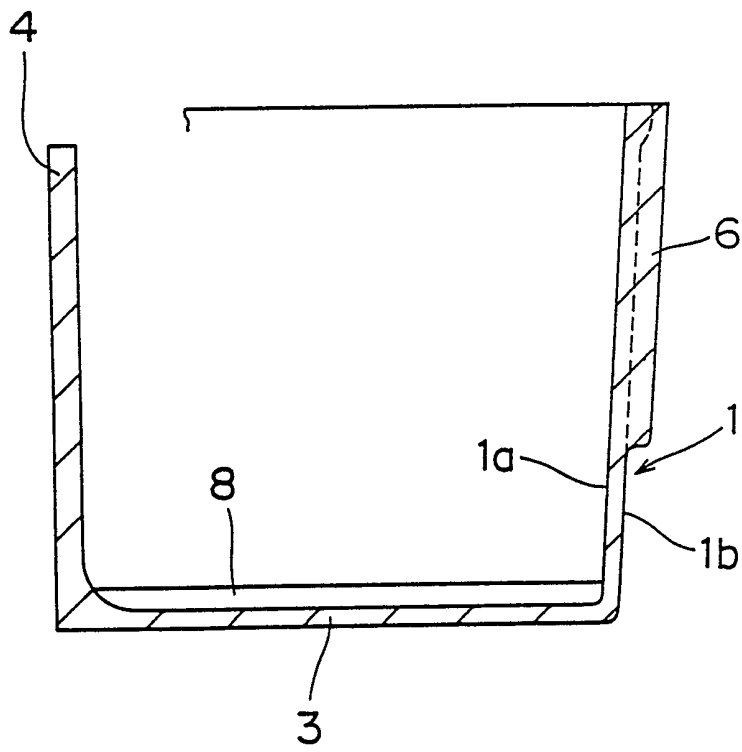


FIG. 6

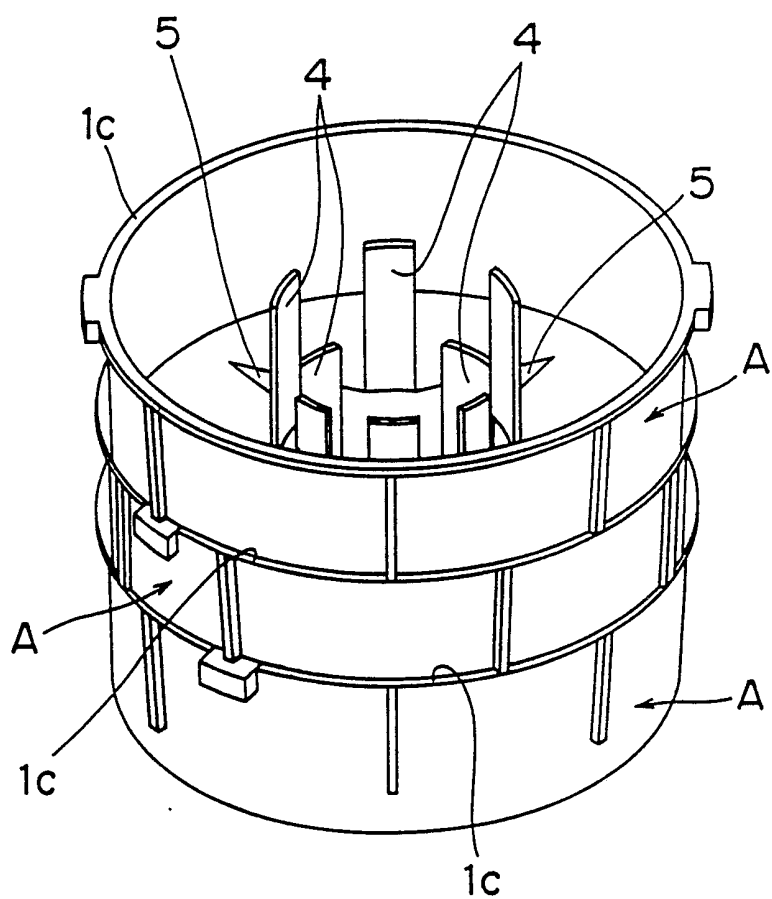


FIG. 7

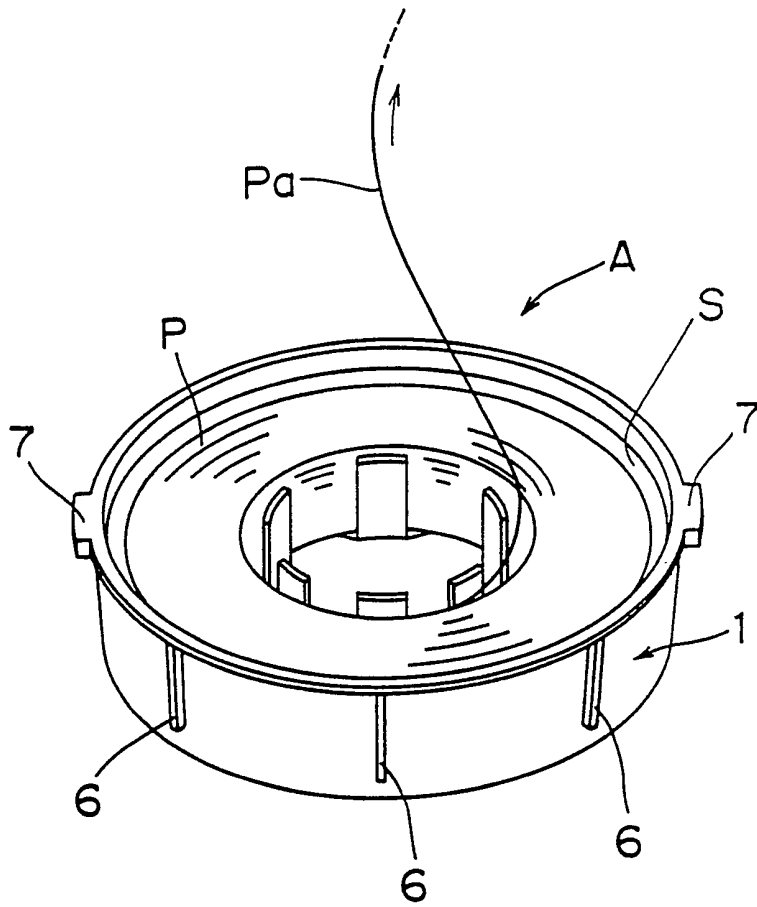




FIG. 8A PRIOR ART

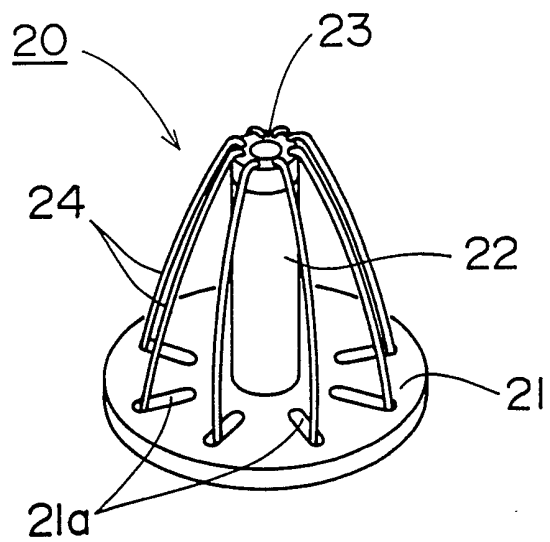
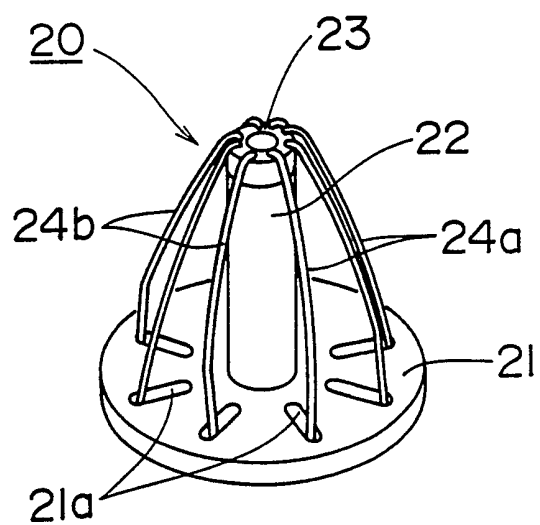


FIG. 8B PRIOR ART



- 1 -

DESCRIPTIONCONTAINER FOR A BUNDLE OF ELECTRIC WIRE

The present invention relates to a container for a bundle of electric wire for storing and conveying a bundle of electric wire used for manufacturing, for example, a wiring harness for an automobile.

In a manufacturing line of a wiring harness for an automobile, an electric wire feeding apparatus has been conventionally used for drawing an electric wire from a bundle of electric wire and feeding the same for the succeeding process (the terminal crimping process for cutting the electric wire to predetermined lengths and crimping predetermined terminals in both ends of the cut electric wire).

As an electric wire feeding apparatus for feeding electric wire from a bundle of electric wire, there is provided an electric wire feeding apparatus 20 comprising a circular seat 21, a support 22 fixed to the centre of the seat 21, an engaging ring 23 fixed to an upper end surface of the support 22, and a plurality of substantially straight elastic guide bars 24 having their upper ends engaged with the engaging ring 23 and having their lower ends respectively engaged with radial grooves 21a provided for

the seat 21, as shown in Fig. 8A (see Japanese Utility Model Examined Publication No. 15886/1990). In addition, the above described Publication also discloses an electric wire feeding apparatus 20 in which substantially straight elastic guide bars 24a and elastic guide bars 24b each having a bent portion are alternately provided, as shown in Fig. 8B. The electric wire feeding apparatuses 20 are so adapted as to insert a center hole of a bundle of electric wire in a loop shape from upper ends of the guide bars 24, 24a and 24b along the guide bars 24, 24a and 24b and unwind the bundle of electric wire from the side of the center hole of the bundle of electric wire to draw the electric wire while preventing the bundle of electric wire from losing its shape on outer peripheral surfaces of the guide bars 24, 24a and 24b.

Furthermore, a variety of electric wires are used. Bundles of electric wire which are the same in type, diameter and color of electric wire are stored on a shelf or the like in a state where they are stacked in several stages with them being bare in order that they can be easily identified and can be efficiently contained, and a desired bundle of electric wire is taken out and mounted on the above described electric wire feeding apparatus 20 in use.

However, the bundles of electric wire are stored in a state where they are stacked with them being bare as

described above and are conveyed with them being bare, to circulate the bundles of electric wire in the manufacturing field. Accordingly, the bundle of electric wire loses its shape and the electric wire located inside of the bundle is loosened during storage and conveyance.

Particularly when the bundles of electric wire are conveyed in a state where they are stacked in several stages with them being bare, the bundle of electric wire is liable to lose its shape.

Furthermore, the bundle of electric wire used halfway in a state where it is mounted on the electric wire feeding apparatus 20 and remaining by a certain length (the remaining bundle of electric wire) is removed from the electric wire feeding apparatus 20 and stored again on a shelf or the like with it being bare. Particularly in this case, however, the bundle of electric wire is liable to lose its shape and the electric wire located inside of the bundle is liable to be made loosened.

If electric wires are fed using such a bundle of electric wire which loses its shape, for example, the electric wires drawn from the electric wire feeding apparatus 20 are tangled, for example, resulting in insufficient feeding. The insufficient feeding causes the manufacturing line to be frequently stopped, to decrease the operating efficiency of the line. In addition, the bundle

of electric wire loses its shape, resulting in a habit of winding of the electric wire. The habit of winding of the electric wire causes the incidence of insufficient crimping of a terminal to be higher.

The present invention has been made in view of such a technical background and has for an object to provide a electric wire bundle container suitable for storage and conveyance in the manufacturing field of a wiring harness.

In accordance with the present invention, there is provided a container for containing a bundle of electric wire wound in a loop shape and having a predetermined inner perimeter and a predetermined outer perimeter, comprising:

a base having a circular outer edge whose diameter is greater than or equal to the diameter of the outer perimeter of the bundle of electric wire so that said bundle of electric wire can be mounted thereon and having a centre hole formed in the centre of a portion surrounded by the outer edge;

a core extending upward from an edge of the centre hole of said base for holding an inner peripheral portion of said bundle of electric wire; and

an outer cylinder extending upward from the outer edge of said base, having the shape of a cylinder opening upward, and surrounding said core with predetermined spacing, an annular electric wire bundle containing space being formed between the outer cylinder and the core, the outer cylinder having a predetermined depth and being so adapted that the diameter in its lower portion is smaller than that in its upper portion so that a plurality of electric wire bundle containers can be stacked in upper and lower stages with the bundle of electric wire container therein.

A bundle-of-electric wire container according to the present invention comprises a base having a center hole in its center and having a circular outer edge, a core extending upward from an edge of the center hole of the base, and an outer cylinder extending upward from the outer edge of the base, an annular electric wire bundle containing space being formed between the core and the outer cylinder. Therefore, a bundle of electric wire can be stored and conveyed with it being contained in the bundle-of-electric wire containing space. The outer cylinder can prevent an unnecessary force from being applied to the bundle of electric wire which is being stored and conveyed from the outside. Since an inner peripheral portion of the bundle of electric wire is held by the core, the bundle of electric wire does not lose its shape from the inside.

The outer cylinder may be so adapted that the diameter in its lower portion is smaller than that in its upper portion and has a predetermined depth. Accordingly, it is possible to store and convey bundle-of-electric wire containers in a state where they are stacked in a plurality of stages by fitting the outer cylinders to each other.

Furthermore, the upper surface of the outer cylinder may be open. When the electric wire is taken out, therefore, it is possible to easily draw the electric wire upward from the bundle of electric wire contained in the electric wire bundle containing space.

According to a preferred embodiment of the present invention, a fitting depth regulating projection is formed on an outer peripheral surface of the outer cylinder. When electric wire bundle containers are stacked in a plurality of stages, the regulating projection abuts against an upper edge of the outer cylinder in the lower stage to regulate the depth at which the outer cylinders in the upper and lower stages are fitted to each other. Accordingly, the depth at which the outer cylinders in the upper and lower stages are fitted to each other can be held with high precision, thereby to make it possible to prevent the base of the container in the upper stage from pressing the bundle of electric wire contained in the container in the lower stage uselessly. In addition, the position of the

electric wire bundle containers stacked in a plurality of stages is corrected to enter a straight state. Even if the electric wire bundle containers are stacked in a lot of stages, therefore, it is possible to stack them stably and without shaking.

It is preferable that the fitting depth regulating projection is a rib projected into the outer peripheral surface of the outer cylinder. This rib is preferably a rib extending downward from the upper edge of the outer cylinder and having a smaller height than that of the outer cylinder. In addition, it is preferable that a plurality of ribs are formed with approximately equal spacing in the circumferential direction of the outer cylinder.

Furthermore, the core may be a cylindrical member so provided as to extend upward in the center of the base, or may include a plurality of core pieces provided with equal spacing in the circumferential direction of the center hole and extending upward from the edge of the center hole.

If the core comprises the plurality of core pieces, it is preferable that grooves into which upper portions of the core pieces in the lower stage can be inserted are formed in the base in the upper stage when the electric wire bundle containers are stacked in a plurality of stages.

by way of example only, a specific embodiment of the present invention will now be described, with reference to the accompanying drawings, in which:-



Fig. 1 is a schematic perspective view showing an electric wire bundle container according to one embodiment of the present invention;

Fig. 2 is a schematic perspective view showing the electric wire bundle container of Fig. 1 containing a bundle of electric wire;

Fig. 3 is a plan view electric wire bundle container of Fig. 1;

Fig. 4 is a cross sectional view taken along a line VI - VI shown in Fig. 3;

Fig. 5 is a cross sectional view taken along a line V - V shown in Fig. 3;

Fig. 6 is a schematic perspective view showing a plurality of electric wire bundle containers of Fig. 1 which are stacked in a plurality of stages;

Fig. 7 is a schematic perspective view showing the electric wire bundle container of Fig. 1 at the time of drawing electric wire; and

Figs. 8A and 8B are schematic perspective views showing two conventional electric wire feeding apparatuses respectively.

Fig. 1 is a schematic perspective view showing a state where a container for an electric wire bundle according to one embodiment of the present invention is empty, Fig. 2 is a schematic perspective view showing the container in a state where an electric wire bundle is contained, and Fig.3 is a plan view showing the container. Referring to Figs. 1 and 2, this electric wire bundle container A (hereinafter referred to as "container A") is constituted by a tub-shaped product integrally formed of synthetic resin and has an annular electric wire bundle containing space S for containing a bundle of electric wire P wound in a loop shape.

The container A comprises an outer cylinder 1 opening upward, a base 3 having a center hole 2 concentric with the outer cylinder 1 formed therein, a plurality of core pieces 4 extending with equal spacing in the circumferential direction upward from an edge of the center hole 2 and constituting a core, grooves 5 in a substantially triangular shape each provided between the adjacent core pieces 4 and radially extending in a state where it connects with the center hole 2, a plurality of fitting depth regulating ribs 6 serving as fitting depth regulating projections formed with equal spacing in the circumferential direction on an outer peripheral surface 1b of the outer cylinder 1, and a pair of handgrips 7 formed in opposed positions of an upper

edge of the outer cylinder 1 and extending radially outward.

Referring now to Fig. 1 and Fig. 4 which is a cross sectional view taken along a line IV - IV shown in Fig. 3, the outer cylinder 1 has such a depth that in a case where  
5 containers A are stacked in a plurality of stages in a state where a bundle of electric wire P is contained, the base 3 of the container A in the upper stage is not strongly pressed against the bundle of electric wire contained in the container A in the lower stage, for example, a depth of  
10 approximately 100 mm, and the outer peripheral surface 1b of the outer cylinder 1 is inclined at such an angle of inclination (for example, approximately 4 to 5°) that the diameter in its lower portion is smaller than that in its upper portion. The angle of inclination makes it possible  
15 to smoothly introduce the base 3 of the container A in the upper stage into the outer cylinder 1 of the container A in the lower stage when the containers A are stacked in a plurality of upper and lower stages.

Referring now to Fig. 3, the base 3 is provided with  
20 reinforcing ribs 8 extending radially outward from ends in the circumferential direction of the core pieces 4, reinforcing ribs 9 along outer edges of the grooves 5, and reinforcing ribs 10 extending radially outward from innermost portions of the grooves 5.

25 The above described annular electric wire bundle

containing space S is formed between the core pieces 4 and  
an inner peripheral surface 1a of the outer cylinder 1. As  
shown in Fig. 2, a bundle of electric wire P wound in a loop  
shape is contained in the electric wire bundle containing  
5 space S. The groove 5 is set to such dimensions that it can  
receive the core piece 4 in a lower stage when a plurality of  
containers A are stacked in a plurality of stages, as shown  
in Fig. 6.

Referring to Figs. 1 and 6 and Fig. 5 which is a cross  
10 sectional view taken along a line V - V shown in Fig. 3, the  
fitting depth regulating ribs 6 abut against an upper edge  
1c of the outer cylinder 1 in the lower stage when the  
containers A are stacked in a plurality of stages, thereby  
to regulate the depth at which the outer cylinders 1 in the  
15 upper and lower stages are fitted to each other. The outer  
peripheral surface 1b of the outer cylinder 1 in the upper  
stage almost coincides with the inner peripheral surface 1a  
of the outer cylinder 1 in the lower stage in a state where  
the fitting depth regulating ribs 6 abut against the upper  
20 edge 1c of the outer cylinder 1 in the lower stage, thereby  
to make it possible to stack the containers A in the upper  
and lower stages stably without shaking.

Referring to  
Fig. 4, the handgrip 7 is in an inverted L shape in cross  
section, on which human fingers are put in carrying the  
25 container A.

Description is now made of a method of circulating a bundle of electric wire from storage to feeding of electric wire using the container A. When the bundle of electric wire P is stored and conveyed, the bundle of electric wire P is first contained in the annular electric wire bundle containing space S formed between the inner peripheral surface 1a of the outer cylinder 1 and the core pieces 4, to store and convey the bundle of electric wire P. If the containers A each containing the bundle of electric wire P are stacked in a plurality of stages, the circumferential positions of the containers A in the upper and lower stages are shifted, to stack the containers A in a state where the core pieces 4 in the lower stage are projected upward through the grooves 5 in the upper stage, as shown in Fig. 6. In this stacked state, the fitting depth regulating ribs 6 on the outer peripheral surface 1b of the outer cylinder 1 in the upper stage abut against the upper edge 1c of the outer cylinder 1 in the lower stage, thereby to regulate the depth at which the outer cylinders 1 in the upper and lower stages are fitted to each other to such a depth that the base 3 of the container A in an upper stage does not press the bundle of electric wire P contained in the container A in a lower stage uselessly. In addition, if the present invention is applied to an electric wire feeding apparatus (not shown) to draw electric wire, an electric wire Pa is

drawn upward in such a manner that the bundle of electric wire P contained in the electric wire bundle containing space S is unwound in a state where the container A is mounted in a predetermined position, as shown in Fig. 7.

5           According to the present embodiment, several containers A are prepared for each type of electric wires, and the container A containing the bundle of electric wire P is used as one unit for storage, conveyance and feeding of electric wire (modularized), thereby to make it possible to  
10 prevent the bundle of electric wire P from losing its shape, for example, from the storage to the feeding of electric wire through the conveyance. Moreover, the containers A can be stacked in a plurality of stages, thereby to make it possible to store and convey the bundle of electric wires P  
15 very efficiently. The containers A can be directly utilized in feeding the electric wires, thereby to make it possible to replace the containers A smoothly. The bundle of electric wire P can be prevented from losing its shape, for example, during storage and conveyance as  
20 described above, thereby to make it possible to feed the electric wire satisfactorily without being tangled, for example, even in feeding the electric wire. As a result, it is possible to prevent an inferior product from being manufactured as well as prevent unnecessary stop of the  
25 electric wire feeding apparatus to improve the operating

efficiency of the manufacturing line.

Furthermore, the depth at which the outer cylinders 1 in the upper and lower stages are fitted to each other can be regulated with high precision by the fitting depth regulating ribs 6 when the containers A are stacked in a plurality of stages, thereby to make it possible to reliably prevent the base 3 of the container A in the upper stage from pressing the bundle of electric wire P contained in the container A in the lower stage and make it possible to reliably prevent the bundle of electric wire P from losing its shape. In addition, the position of the container A is forced to enter a straight state by the above described abutment of the fitting depth regulating ribs 6, thereby to make it possible to stack the containers A stably and without shaking<sup>l</sup> even in several stages to stably convey the stacked containers A.

Furthermore, the container A can be easily carried in a stable position with human fingers being put on the pair of handgrips 7, whereby the bundle of electric wire P contained therein does not lose its shape during carrying of the container A.

Additionally, the core pieces 4 in the lower stage can be projected upward through the groove 5 in the upper stage by shifting the circumferential positions of the containers A in the upper and lower stages at the time of stacking the

containers A, thereby not to regulate the depth at which the containers A in the upper and lower stages are fitted to each other by interference between the core pieces 4.

5 The present invention is not limited to the above described embodiment. For example, if a bundle of electric wire is stored in a container A for a long time, an antioxidant (for example, a dehumidifying agent) may be contained in a state where a dedicated cover is mounted on the container A to almost seal the inside of the container  
10 A, thereby to make it possible to restrain the occurrence of the degradation of the electric wire during storage.

Although the present invention has been described and illustrated in detail, it is clearly understood that the  
15 same is by way of illustration and example only and is not to be taken by way of limitation.

20

25



1. A container for containing a bundle of electric wire wound in a loop shape and having a predetermined inner perimeter and a predetermined outer perimeter, comprising:

a base having a circular outer edge whose diameter is greater than or equal to the diameter of the outer perimeter of the bundle of electric wire so that said bundle of electric wire can be mounted thereon and having a centre hole formed in the centre of a portion surrounded by the outer edge;

a core extending upward from an edge of the centre hole of said base for holding an inner peripheral portion of said bundle of electric wire;  
and

an outer cylinder extending upward from the outer edge of said base, having the shape of a cylinder opening upward, and surrounding said core with predetermined spacing, an annular electric wire bundle containing space being formed between the outer cylinder and the core, the outer cylinder having a predetermined depth and being so adapted that the diameter in its lower portion is smaller than that in its upper portion so that a plurality of electric wire bundle containers can be stacked in upper and lower

stages with the bundle of electric wire contained therein.

2. An electric wire bundle container as claimed in claim 1, further comprising

fitting depth regulating means adapted to abut against an upper edge of the outer cylinder of a lower stage for regulating the depth at which the outer cylinders in the upper and lower stages are fitted to each other when the electric wire bundle containers are stacked in a plurality of stages formed on an outer peripheral surface of the outer cylinder.

3. An electric wire bundle container as claimed in claim 2, wherein

said fitting depth regulating means comprises a plurality of ribs projected into the outer peripheral surface of said outer cylinder.

4. An electric wire bundle container as claimed in claim 3, wherein

the plurality of ribs extend downward from an upper edge of the outer cylinder, have a height smaller than the height of the outer cylinder, and are formed with approximately equal spacing in the circumferential direction of the outer cylinder.

5. An electric wire bundle container as claimed in any of claims 1 to 4, wherein

said core comprises a plurality of core pieces

provided with equal spacing in the circumferential direction of said centre hole and extending upward from the edge of the centre hole.

6. An electric wire bundle container as claimed in claim 5, wherein

the height of each of said core pieces is made approximately equal to the height of the outer cylinder.

7. An electric wire bundle container as claimed in claim 5 or claim 6, wherein

said base comprises grooves which are substantially triangular in plane shape each formed between said core pieces and extending radially outward from the centre hole in a state where it connects with the centre hole,

said groove being set to such dimensions that it can receive the core piece in the lower stage when a plurality of electric wire bundle containers are stacked in a plurality of stages.

8. An electric wire bundle container as claimed in claim 7, wherein

ribs for reinforcing the base are formed in predetermined positions on said base.

9. An electric wire bundle container as claimed in any of claim 1 to 8, wherein

a pair of handgrips the container project in

opposed positions space apart from each other by approximately 180° in the upper edge of the outer peripheral surface of said outer cylinder.

10. An electric wire bundle container as claimed in any of claims 1 to 9, wherein

said bundle of electric wire container is integrally formed of synthetic resin.

11. An electric wire bundle container, substantially as herein described, with reference to, and as illustrated in, Figs. 1 to 7 of the accompanying drawings.

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**Relevant Technical Fields**

- (i) UK Cl (Ed.M)      B8M (MGP)
- (ii) Int Cl (Ed.5)    B65H

Search Examiner  
 M J DAVEY

Date of completion of Search  
 AUGUST 1994

**Databases** (see below)

(i) UK Patent Office collections of GB, EP, WO and US patent specifications.

Documents considered relevant following a search in respect of Claims :-  
 1 TO 11

(ii) ONLINE DATABASE: WPI

**Categories of documents**

- X:** Document indicating lack of novelty or of inventive step.
- Y:** Document indicating lack of inventive step if combined with one or more other documents of the same category.
- A:** Document indicating technological background and/or state of the art.
- P:** Document published on or after the declared priority date but before the filing date of the present application.
- E:** Patent document published on or after, but with priority date earlier than, the filing date of the present application.
- &:** Member of the same patent family; corresponding document.

Category	Identity of document and relevant passages	Relevant to claim(s)
X	GB 2240761 A (RUTHERFORD) see in particular the real device 2 therein in Figure 3	1, 10
X	US 5062580 (MEAGHER) see cover 12 which is adapted for stacking while containing a bundle of wire	1, 10

**Databases:**The UK Patent Office database comprises classified collections of GB, EP, WO and US patent specifications as outlined periodically in the Official Journal (Patents). The on-line databases considered for search are also listed periodically in the Official Journal (Patents).