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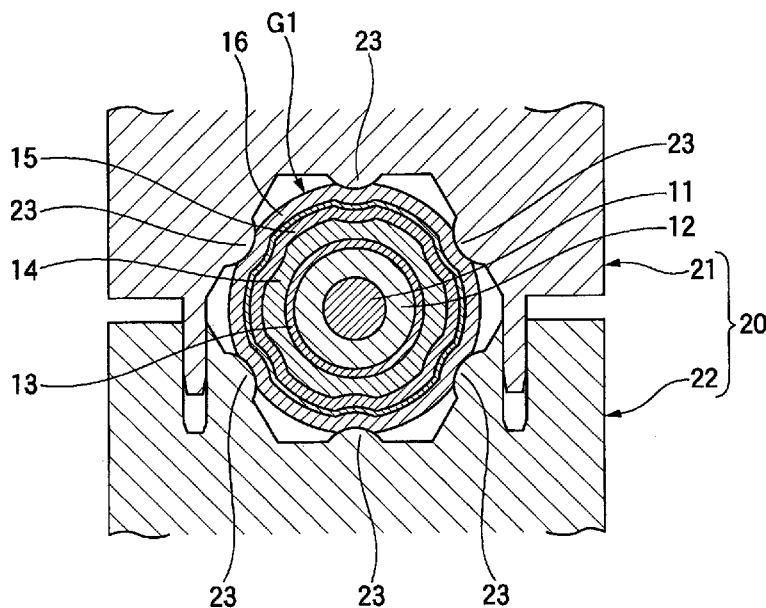
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(54) Title: CRIMPING APPARATUS FOR SHIELDED WIRE AND METHOD FOR END-PROCESSING SHIELDED WIRE

FIG. 6



(57) Abstract: A crimping apparatus for a shielded wire is provided. The shielded wire includes a conductor, an insulator covering the conductor, a braided wire disposed around the insulator, and an insulating sheath covering the braided wire. A shield terminal is circularly arranged on an end of the insulating sheath, the braided wire which is exposed from the end of the insulating sheath is folded to cover an end of the shield terminal, and a shield pipe is circularly arranged on the folded braided wire. The crimping apparatus includes: an upper mold and an lower mold which are provided with projections for contacting three or more points equiangularly dividing an outer peripheral surface of the shield pipe; and a pipe-intrusion preventing member which is provided on alignment surfaces of the molds to prevent a part of the shield pipe from intruding between the alignment surfaces when crimping the shield pipe.

DESCRIPTION

CRIMPING APPARATUS FOR SHIELDED WIRE AND METHOD FOR
END-PROCESSING SHIELDED WIRE

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Technical Field

The present invention relates to a crimping apparatus for a shielded wire in which a braided wire is connected to a shield terminal by crimping at an end of the shielded wire and a method for end-processing the shielded wire.

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Background Art

As a connecting structure of an electrical wire for connecting an end of the electrical wire and a terminal by crimping, the configuration as shown in Fig. 7 is known (see Patent Literature 1, for instance). In Fig. 7, a terminal 1 is formed by a terminal plate 2 and a tubular-shaped sleeve 3 integrally. A periphery of the sleeve 3 is crimped, for example, in a hexagonal shape, in a state where a conductor 5 of an electrical wire 4 is inserted into the sleeve 3, and as a result, the terminal 1 is joined to the conductor 5 of the electrical wire 4. Figs. 8A to 8C show a process for crimping the sleeve 3 and the conductor 5. Using an upper mold 6 and a lower mold 7 of a crimping apparatus shown in Fig. 8A, the sleeve 3 of the terminal 1 is compressed by pinching the sleeve 3 from upper and lower sides as shown in Fig. 8B. Thus, the sleeve 3 is crimped so that the cross-section of the sleeve 3 is formed in a hexagonal shape defined by the upper mold 6

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and the lower mold 7 as shown in Fig. 8C.

Citation List

Patent Literature

5 Patent Literature 1: JP-2001-326053A

Summary of Invention

Technical Problem

Incidentally, in order to firmly crimp the conductor 5 and the sleeve 3,
10 there is a method for concentrating an external force to be applied to a
crimped part by providing projections on the upper mold 6 and the lower
mold 7. Figs. 9 to 12 shows an example in which the crimping method using
the projections is applied to an end-processing structure for crimping and
connecting a braided wire and a shield terminal at an end of a shielded wire.

15 Figs. 9 and 10 show an end-processing structure G4 prior to crimping
and connecting the braided wire and the shield terminal which are to be
crimped. In the end-processing structure G4, a shielded wire S is formed by
a conductor 11, an insulator 12 covering the conductor 11, a braided wire 13
disposed around the insulator 12, and an insulating sheath 14 covering the
20 braided wire 13. A shield terminal 15 is circularly arranged on an end of
the insulating sheath 14. The braided wire 13 which is exposed from the
end of the insulating sheath 14 is folded as shown in Fig. 10 to cover an end
of the shield terminal 15. Further, a shield pipe 16 is circularly arranged on
the folded braided wire 13. The shield pipe 16 is interposed between un
25 upper mold 17 and a lower mold 18 of a crimping apparatus, and the shield

pipe 16 is crimped as described later.

The upper mold 17 of the crimping apparatus includes an upper-mold recess 17a for crimping an upper half of the shield pipe 16. Similarly, the lower mold 18 of the crimping apparatus includes a lower-mold recess 18a for crimping a lower half of the shield pipe 16. The upper-mold recess 17a and the lower-mold recess 18a have three opposite surfaces 17b, 18b each to define a substantial regular hexagon when the upper mold 17 and the lower mold 18 are opposed to be compressed (or crimped). Further, there are respectively provided projections 19 on opposite surfaces located on the center of the opposite surfaces 17b, 18b. The projections 19 project toward the respective opposite directions from the opposite surfaces 17b, 18b and each projection 19 has a semi-sphere shape.

Then, the end-processing structure G4 is interposed, as shown in Fig. 11, between the upper-mold recess 17a of the upper mold 17 and the lower-mold recess 18a of the lower mold 18 at a location where the shield pipe 16 is provided, and the upper mold 17 is lowered in a press-contact direction with respect to the lower mold 18 to start the crimping. In the process of the crimping, first, the projections 19 contact two points of the upper and lower parts on the periphery of the shield pipe 16, and the two points are further compressed concentrically. Thus, the shield pipe 16 is dented in a substantial semi-sphere shape with centering the two points, and the shield terminal 15 and the insulating sheath 14 are also dented in response to the dent of the shield pipe 16. In this way, the shield pipe 16 is crimped in portions compressed and deformed by each projection 19 so that the shield pipe 16 is firmly attached to the conductor 11 via the shield

terminal 15 and the insulating sheath, further via the braided wire 13 and the insulator 12. As a result, the shield terminal 15 is crimped and connected to the braided wire 13 of the shielded wire S.

The end-processing structure G4 of the electrical wire as described
5 above has a problem to be solved as below.

That is, in the crimping process of the shield terminal 15 with respect to the shielded wire S, as shown in Fig. 11, when the two points of the outer peripheral surfaces of the shield pipe 16 starts to be compressed by the respective projections 19 and as the compressive force is added, the shield
10 pipe 16 is deformed between the two points to be extended towards sides of the upper mold recess 17a and the lower mold recess 18a, and portions of the side of the shield pipe 16 disposed between alignment surfaces of the upper mold 17 and the lower mold 18 are intruded between the alignment surfaces while deformed to escape the applied compressive force. Therefore, when
15 the upper mold 17 and the lower mold 18 are opened after crimping, extended parts D intruded as described above protrude as substantial trapezoidal burrs as shown in Figs. 11 and 12. The burr remains to protrude from the side of the shield pipe 16 even after opening the molds as shown in Fig. 12. The burr complicates the assembling the shielded wire S
20 having the shield terminal 15 to a shielded connector (not shown in figure), and can be a factor for damaging the end-processing structure G4.

Further, when performing the mold-crimping by the upper mold 17 and the lower mold 18, the insulator 12 may be excessively collapsed due to crimping two facing sides of an outer peripheral surface of the shield pipe 16.
25 In this case, it may lower the insulating capability of the insulator 12.

The present invention is made in view of the circumstance described above, and an object of the invention is to provide a crimping apparatus for a shielded wire and an end-processing method of the shielded wire which are capable of suppressing the generation of burr on a shield terminal and preventing an insulator of the shielded wire from being excessively collapsed when the shield terminal is crimped and connected to a braided wire using a shield pipe.

Solution to Problem

In order to achieve the object, there is provided a crimping apparatus for a shielded wire including a conductor, an insulator covering the conductor, a braided wire disposed around the insulator, and an insulating sheath covering the braided wire, wherein a shield terminal is circularly arranged on an end of the insulating sheath, the braided wire which is exposed from the end of the insulating sheath is folded to cover an end of the shield terminal, and a shield pipe is circularly arranged on the exposed and folded braided wire, the crimping apparatus comprising: an upper mold and an lower mold which are provided with projections for contacting three or more points equiangularly dividing an outer peripheral surface of the shield pipe; and a pipe-intrusion preventing member which is provided on alignment surfaces of the upper mold and the lower mold to prevent a part of the shield pipe from intruding between the alignment surfaces when the crimping apparatus crimps the shield pipe.

Further, in order to achieve the object, there is provided a method for end-processing a shielded wire including a conductor, an

insulator covering the conductor, a braided wire disposed around the insulator, and an insulating sheath covering the braided wire, wherein a shield terminal is circularly arranged on an end of the insulating sheath, the braided wire which is exposed from the end of the insulating sheath is folded
5 to cover an end of the shield terminal, and a shield pipe is circularly arranged on the exposed and folded braided wire, the method comprising: crimping the shield pipe between an upper mold and an lower mold by projections provided on the upper mold and the lower mold at three or more points equiangularly dividing an outer peripheral surface of the shield pipe;
10 and preventing a part of the shield pipe from intruding between alignment surfaces when crimping the shield pipe by a pipe-intrusion preventing member which is provided on the alignment surfaces of the upper mold and the lower mold.

According to the configuration and the method as described above,
15 when the upper mold and the lower mold open after crimping, burr does not occur on a side of the shield pipe located between the alignment surfaces of the upper mold and the lower mold. As a result, the shield pipe is accurately molded in a desired shape by molding of the upper mold and the lower mold.

20 Further, the crimping apparatus may be configured in that the pipe-intrusion preventing member is formed by a pipe-intrusion preventing projection provided on one of alignment surfaces of the upper mold and the lower mold, and an insertion hole provided on the other of the alignment surfaces, to which the pipe-intrusion preventing projection is inserted when
25 the crimping apparatus crimps the shield pipe.

The crimping apparatus may be configured in that the pipe-intrusion preventing member is provided in two so that recess parts of the upper mold and the lower mold for placing therein the shielded wire when crimping the shield pipe are located between the two pipe-intrusion preventing members.

5 Further, the method for end-processing the shielded wire may be configured in that the pipe-intrusion preventing member is formed by a pipe-intrusion preventing projection provided on one of alignment surfaces of the upper mold and the lower mold and an insertion hole provided on the other of the alignment surfaces, and the method comprises inserting the
10 pipe-intrusion preventing projection into the insertion hole when crimping the shield pipe.

 The method may be configured in that the pipe-intrusion preventing member is provided in two so that recess parts of the upper mold and the lower mold for placing therein the shielded wire when crimping the shield
15 pipe are located between the two pipe-intrusion preventing members.

Advantageous Effects of Invention

 According to the crimping apparatus for the shielded wire of the invention and the method for end-processing the shielded wire of the
20 invention, when the upper mold and the lower mold open after crimping, burr does not occur on a side of the shield pipe located between the alignment surfaces of the upper mold and the lower mold. As a result, the shield pipe is accurately molded in a desired shape by molding of the upper mold and the lower mold.

25 As mentioned above, an aspect of the present invention is described

shortly. Details of the present invention will be further clarified by running through exemplary embodiments of the invention described below with reference to the accompanying drawings.

5 Brief Description of Drawings

Fig. 1 is a perspective view showing an end-processing structure of a shielded wire according to an embodiment of the invention.

Fig. 2 is a vertically cross-sectional view of a main part of the end-processing structure shown in Fig. 1.

10 Fig. 3 is a perspective view showing an end-processing structure of a shielded wire according to another embodiment of the invention.

Fig. 4 is a perspective view showing an end-processing structure of a shielded wire according to still another embodiment of the invention.

Fig. 5 is a vertically cross-sectional view of a crimping apparatus
15 which performs a method for end-processing the shielded wire according to an embodiment of the invention.

Fig. 6 is an explanatory diagram for showing a crimping process of the end-processing structure shown in Fig. 1.

Fig. 7 is a perspective view showing a connecting structure of a
20 conventional wire terminal

Figs. 8A to 8C are explanatory diagrams showing a method for connecting the conventional wire terminal.

Fig. 9 is a perspective view showing an end-processing structure prior to a connection by crimping a braided wire and a shield terminal.

25 Fig. 10 is a vertically cross-sectional view showing the end-processing

structure prior to the connection by crimping the braided wire and the shield terminal.

Fig. 11 is a vertically cross-sectional view showing the end-processing structure just after opening an upper mold and a lower mold.

5 Fig. 12 is a plan view of a crimped shield pipe.

Description of Embodiments

A description is made of an end-processing structure of a shielded wire and an end-processing method according to embodiments of the present invention with reference to Figs. 1 to 6. Fig. 1 is a perspective view showing an end-processing structure of a shielded wire according to an embodiment of the invention. Fig. 2 is a vertically cross-sectional view of a main part of the end-processing structure shown in Fig. 1. Fig. 3 is a perspective view showing an end-processing structure of a shielded wire according to another embodiment of the invention. Fig. 4 is a perspective view showing an end-processing structure of a shielded wire according to still another embodiment of the invention.

A basic structure of an end-processing structure G1 of a shielded wire as shown in Fig. 1 is substantially the same as that described in Fig. 9 and Fig. 10. A shielded wire S includes a conductor 11, an insulator 12 covering the conductor 11, a braided wire 13 disposed around the insulator 12, and an insulating sheath 14 covering the braided wire 13. A shield terminal 15 is circularly arranged on an end of the insulating sheath 14. The braided wire 13 which is exposed from the end of the insulating sheath 14 is folded to cover an end of the shield terminal 15. Further, a shield pipe 16 is

circularly arranged on the folded braided wire 13. The shield pipe 16 is interposed between an upper mold and a lower mold, and the shield pipe 16 is crimped in a polygon more than a triangle, e.g., in a hexagon here as described later.

5 In the end-processing structure G1, the shield pipe 16 interposed between the upper mold and the lower mold of a crimping apparatus is crimped by three projections formed on the upper mold and the lower mold, respectively. That is, one dent F is formed on each of six outer surfaces of the shield pipe 16 which is deformed in a substantial regular hexagonal tube.

10 A forming process of the end-processing structure G1 is described later.

Fig. 2 is a cross-sectional view cutting the end-processing structure G1 which is crimped by the upper mold and the lower mold at a location where the shield pipe 16 is provided. Here, when the shield pipe 16 is crimped by the upper mold and the lower mold of the crimping apparatus, 15 dents F are formed on respective outer surfaces (or on substantial six surfaces) of the shield pipe 16 by projections projected from inner surfaces of an upper-mold recess and a lower-mold recess. By forming the dents F on the shield pipe 16, the braided wire 13, the shield terminal 15 and the insulating sheath 14 located inside the shield pipe 16 are pressed toward the 20 conductor 11, and the end-processing structure G1 having a star-shape as a whole of its cross-section is formed as shown in Fig. 2. In the structure, the shield pipe 16 of the outermost layer is greatly deformed to generate a space H slightly generated between the shield terminal 15 and the shield pipe 16.

In this way, since the shield pipe 16 is crimped via the six projections 25 provided on the upper-mold recess of the upper mold and the lower-mold

recess of the lower mold, a pressing force can be applied equally to the whole of the outer surfaces of the shield pipe 16. Thus, it becomes possible to evade the local deformation occurred by concentrating the pressing force only on a part of the outer surface of the shield pipe 16. As a result, it is possible to evade the deterioration of the insulating capability of the insulator 12 with respect to the conductor 11, which can be occurred by collapsing the insulator 12 to be thinned due to the local deformation. Further, since the contact of the braided wire 13 and the shield terminal 15 is a well-balanced multi-point (six-point) contact by the six projections, inter-electrical connection between these parts is well secured. As compared with the crimping of the shield pipe with two points as conventionally used, the crimping with six points more enhances the inter-binding force among the shield pipe 16, the shield terminal 15, the insulating sheath 14 and the braided wire 13, and the connecting strength of the shield terminal 15 with respect to the shielded wire S is firmly secured.

The above embodiment describes a case where the pressing force can be equally applied to the whole of the outer surfaces of the shield pipe 16 by crimping the shield pipe 16 via six projections provided on the upper mold recess of the upper mold and the lower mold recess of the lower mold.

However, the end-processing structure for the shielded wire according to the invention is not limited to the crimping with six points. Alternatively, the invention may include the configuration in which three or more projections are arranged equiangularly (at regular intervals circumferentially) on the upper mold and the lower mold to support the outer surface of the shield pipe 16 by the three or more points and the shield pipe 16 is crimped while

distributing the pressing force equally.

Fig. 3 shows another end-processing structure G2 of a shielded wire in which the shield pipe 16 is crimped via three projections provided on the upper-mold recess and the lower-mold recess. Fig. 4 shows still another

5 end-processing structure G3 of a shielded wire in which the shield pipe 16 is crimped via four projections provided on the upper-mold recess and the lower-mold recess. In this way, by crimping the shield pipe 16 via three projections or four projections provided on the upper-mold recess and the lower-mold recess, the pressing force can be applied equally to the whole of
10 the outer surfaces of the shield pipe 16. Thus, it becomes possible to evade the local deformation occurred by concentrating the pressing force only on a part of the outer surface of the shield pipe 16. As a result, it is possible to evade the deterioration of the insulating capability of the insulator 12 with respect to the conductor 11, which is occurred by collapsing the insulator 12
15 to be thinned due to the local deformation. Further, since the contact of the braided wire 13 and the shield terminal 15 is a well-balanced multi-point contact by the three projections or the four projections, inter-electrical connection between these parts is well secured. As compared with the crimping of the shield pipe with two points as conventionally used, the
20 crimping with three points or four points more enhances the inter-binding force among the shield pipe 16, the shield terminal 15, the insulating sheath 14 and the braided wire 13, and the connecting strength of the shield terminal 15 with respect to the shielded wire S is firmly secured.

As described above, since the shield pipe 16 is crimped via the six
25 projections provided on the upper-mold recess and the lower-mold recess to

apply the pressing force equally on the whole of the outer surface of the shield pipe 16, it is possible to lower a protrusion height of burr generated on a part of the side of the shield pipe located between the alignment surfaces of the upper mold and the lower mold when the upper mold and the lower mold are opened after crimping. Even so, however, it is considered that burr having a slight height may be generated on the part of the side of the shield pipe. If the slight burr is generated and the part of the shield pipe protrudes outside from a space surrounding by the upper-mold recess and the lower-mold recess, the shield pipe inside the space is not filled in every hole and corner of the upper-mold recess and the lower-mold recess and the gap is occurred between the shield pipe and the upper-mold recess and the lower-mold recess. As a result, the shield pipe is not molded accurately in a desired shape.

The end-processing method of the shielded wire according to the invention, therefore, provides a method for not generating burr on the side of the shield pipe located between the alignment surfaces of the upper mold and the lower mold when the upper mold and the lower mold are opened after crimping. Fig. 5 is a vertically cross-sectional view of the crimping apparatus which performs the method for end-processing the shielded wire according to the embodiment of the invention. Fig. 6 is an explanatory diagram for showing a crimping process of the end-processing structure shown in Fig. 1.

A description is made of a case where the end-processing method of the shielded wire as configured is applied by using a crimping apparatus shown in Fig. 5 and Fig. 6. First, the configuration of the crimping

apparatus 20 is described. The crimping apparatus 20 includes an upper mold 21 and a lower mold 22. The upper mold 21 has an upper-mold recess 21a having a predetermined size for crimping an upper half of the shield pipe 16. The lower mold 22 has a lower-mold recess 22a having a predetermined size for crimping a lower half of the shield pipe 16. The upper-mold recess 21a and the lower-mold recess 22a have three opposite surfaces 21b, 22b each to define a substantial regular hexagon when the upper mold 21 and the lower mold 22 are opposed to be compressed. Further, each one projection 23 projects from a vicinity of the center of the respective opposite surfaces 21b, 22b. The projections 23 project toward the respective opposite directions from the opposite surfaces 21b, 22b and each projection 23 has a semi-sphere shape. Note that the shape of the projection 23 is not limited to the semi-sphere shape. Alternatively, the projection 23 may be formed in a circular arc shape having a cross-section expanded toward the opposite direction, or in a multi-sided pyramid having one top protruded toward the opposite direction. In summary, a part of the opposite surfaces 21b, 22b only has to protrude toward the opposite direction.

Of the alignment surfaces of the upper mold 21 and the lower mold 22, a pipe-intrusion restricting projection 24 having a rod shape or a plate shape constituting a pipe-intrusion restricting member projects vertically from the alignment surface of the upper mold 21 including a top of a hexagonal hole which is continuously defined by the upper-mold recess 21a and the lower-mold recess 22a when crimped. On the other hand, a projection-insertion hole 25, constituting the pipe-intrusion restricting member, into which the pipe-intrusion restricting projection 24 can be

inserted is provided on the alignment surface of the lower mold 22 including a top of the hexagonal hole. The pipe-intrusion restricting projection 24 can be fit into the projection-insertion hole 25 in a closely contact state, and their length is set not to prevent the upper mold 21 and the lower mold 22 from
5 contacting at the alignment surfaces. Alternatively, the pipe-intrusion restricting projection 24 may be provided on the alignment surface of the lower mold 22, and the projection-insertion hole 25 may be provided on the alignment surface of the upper mold 21.

Then, the shield pipe 16 of the end-processing structure G1 prior to
10 crimping is interposed between the upper-mold recess 21a of the upper mold 21 and the lower-mold recess 22a of the lower mold 22 as configured, and the upper mold 21 is relatively lowered in a press-contact direction with respect to the lower mold 22 to start the crimping. In the process of the crimping, first, the projections 23 contact six points of the periphery of the shield pipe
15 16, and the six points are further compressed concentrically. Thus, the shield pipe 16 is dented in a substantial semi-sphere shape with centering the six points, and the braided wire 13 is dented in response to the dent of the shield pipe 16.

Then, as the press by each projection 23 is promoted, the circular arc
20 portions of the shield pipe 16 located between the adjacent projections 23 are deformed to be expanded inside the upper-mold recess 21a and inside the lower-mold recess 22a, and finally ends of the expanded portions contact the opposite surfaces 21b, 22b. Then, the crimping process is terminated when the alignment surfaces of the upper mold 21 and the lower mold 22 closely
25 contact each other (mold-crimped point). In this way, the shield pipe 16 is

crimped in portions compressed and dented by each projection 23 so that the shield pipe 16 is firmly attached to the conductor 11 via the shield terminal 15 and the insulating sheath 14, further via the braided wire 13 and the insulator 12. As a result, the shield terminal 15 is electrically and
5 mechanically connected to and stably held by the braided wire 13.

Next, the function of the pipe-intrusion restricting projection 24 and the projection-insertion hole 25 is described. When the shield pipe 16 is crimped by the upper mold 21 and the lower mold 22 and the pipe-intrusion restricting projection 24 is inserted into the projection-insertion hole 25 in a
10 process for forming the end-processing structure G1, gaps cannot be occurred between the alignment surfaces of the upper mold 21 and the lower mold 22 facing the hexagonal hole defined by the upper-mold recess 21a and the lower-mold recess 22a. Therefore, there are no spaces to generate burrs on the shield pipe 16 which is deformed by receiving the press by the projections
15 23 inside the upper-mold recess 21a and the lower-mold recess 22a.

In the end-processing method of the shielded wire according to the invention, therefore, burr is not generated on the side of the shield pipe located between the alignment surfaces of the upper mold and the lower mold when the upper mold and the lower mold are opened after crimping.
20 As a result, the shield pipe is molded accurately in a desired shape by the mold carried out by the upper mold and the lower mold. Molding the shield pipe 16 in this way completes the end-processing structure G1 in which the shield pipe 16 is equally crimped in its circumferential direction at the six points of the outer surface of the shield pipe 16.

25 As described above, according to the end-processing structure of the

shielded wire of the embodiment, it becomes possible to evade the local deformation occurred by concentrating the pressing force only on a part of the outer surface of the shield pipe 16. As a result, it is possible to evade the deterioration of the insulating capability of the insulator 12 with respect to the conductor, which is occurred by collapsing the insulator 12 to be thinned due to the local deformation. Further, since the contact of the braided wire 13 and the shield terminal 15 is a multi-point contact, inter-electrical connection between these parts is well secured. As compared with the crimping of the shield pipe with two points as conventionally used, the crimping with multi-point more enhances the inter-binding force among the shield pipe 16, the shield terminal 15, the insulating sheath 14 and the braided wire 13, and the connecting strength of the shield terminal 15 with respect to the shielded wire S is firmly secured.

According to the crimping apparatus for the shielded wire of the embodiment and the method for end-processing the shielded wire of the embodiment, when the upper mold 21 and the lower mold 22 open after crimping, burr does not occur on a side of the shield pipe 16 located between the alignment surfaces of the upper mold 21 and the lower mold 22. As a result, the shield pipe 16 is accurately molded in a desired shape by molding of the upper mold 21 and the lower mold 22.

Reference Signs List

11: conductor

12: insulator

13: braided wire

14: insulating sheath

15: shield terminal

16: shield pipe

20: crimping apparatus

5 21: upper mold

22: lower mold

23: projection

24: pipe-intrusion preventing projection (pipe-intrusion preventing member)

10 25: projection-insertion hole (pipe-intrusion preventing member)

CLAIMS

1. A crimping apparatus for a shielded wire including a conductor, an insulator covering the conductor, a braided wire disposed around the insulator, and an insulating sheath covering the braided wire, wherein a shield terminal is circularly arranged on an end of the insulating sheath, the braided wire which is exposed from the end of the insulating sheath is folded to cover an end of the shield terminal, and a shield pipe is circularly arranged on the exposed and folded braided wire, the crimping apparatus comprising:

an upper mold and a lower mold which are provided with projections for contacting three or more points equiangularly dividing an outer peripheral surface of the shield pipe; and

a pipe-intrusion preventing member which is provided on alignment surfaces of the upper mold and the lower mold to prevent a part of the shield pipe from intruding between the alignment surfaces when the crimping apparatus crimps the shield pipe.

2. The crimping apparatus according to claim 1, wherein

the pipe-intrusion preventing member is formed by a pipe-intrusion preventing projection provided on one of alignment surfaces of the upper mold and the lower mold, and an insertion hole provided on the other of the alignment surfaces, to which the pipe-intrusion preventing projection is inserted when the crimping apparatus crimps the shield pipe.

3. The crimping apparatus according to claim 1 or 2, wherein
the pipe-intrusion preventing member is provided in two so that
recess parts of the upper mold and the lower mold for placing therein the
shielded wire when crimping the shield pipe are located between the two
5 pipe-intrusion preventing members.

4. A method for end-processing a shielded wire including a conductor,
an insulator covering the conductor, a braided wire disposed around the
insulator, and an insulating sheath covering the braided wire, wherein a
10 shield terminal is circularly arranged on an end of the insulating sheath, the
braided wire which is exposed from the end of the insulating sheath is folded
to cover an end of the shield terminal, and a shield pipe is circularly
arranged on the exposed and folded braided wire, the method comprising:
crimping the shield pipe between an upper mold and an lower mold
15 by projections provided on the upper mold and the lower mold at three or
more points equiangularly dividing an outer peripheral surface of the shield
pipe; and
preventing a part of the shield pipe from intruding between
alignment surfaces when crimping the shield pipe by a pipe-intrusion
20 preventing member which is provided on the alignment surfaces of the upper
mold and the lower mold.

5. The method according to claim 4, wherein
the pipe-intrusion preventing member is formed by a pipe-intrusion
25 preventing projection provided on one of alignment surfaces of the upper

mold and the lower mold and an insertion hole provided on the other of the alignment surfaces, and

the method comprises inserting the pipe-intrusion preventing projection into the insertion hole when crimping the shield pipe.

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6. The method according to claim 4 or 5, wherein

the pipe-intrusion preventing member is provided in two so that recess parts of the upper mold and the lower mold for placing therein the shielded wire when crimping the shield pipe are located between the two

10 pipe-intrusion preventing members.

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FIG. 1

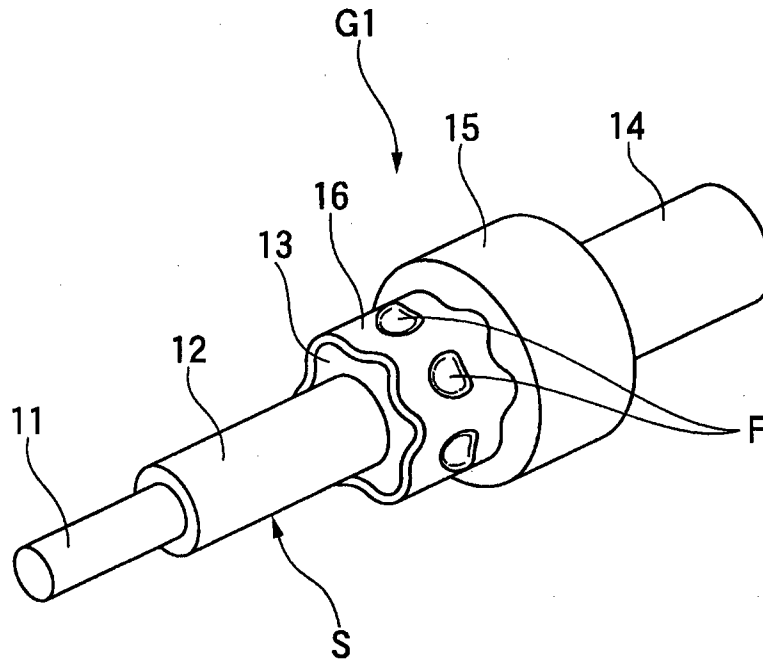
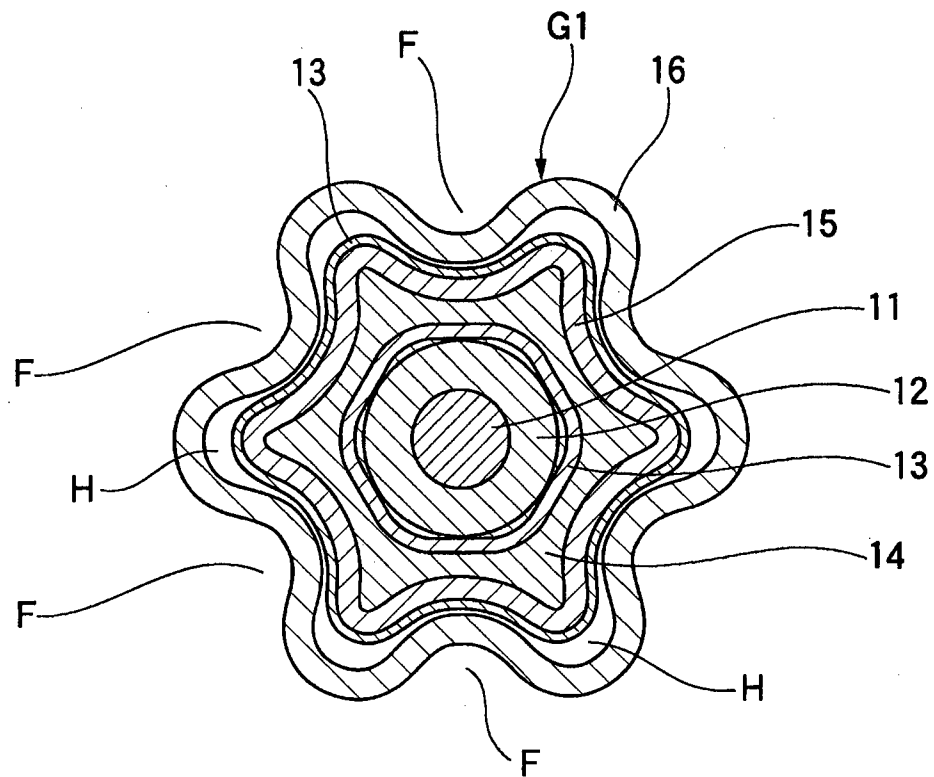


FIG. 2



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FIG.3

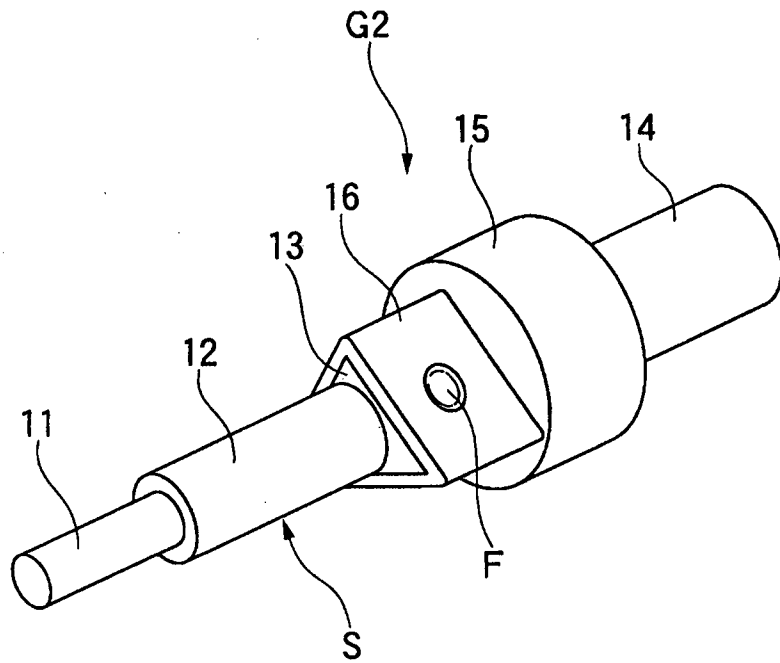
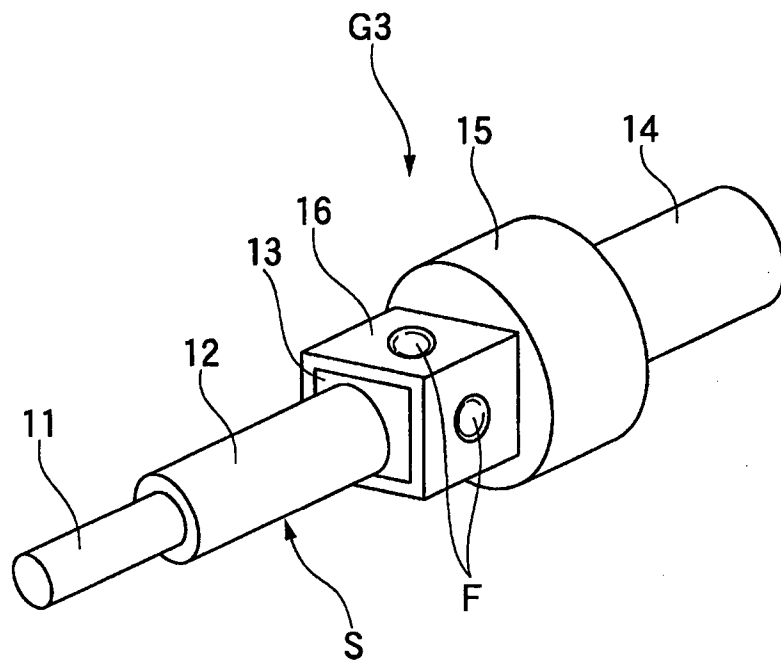


FIG.4



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FIG. 5

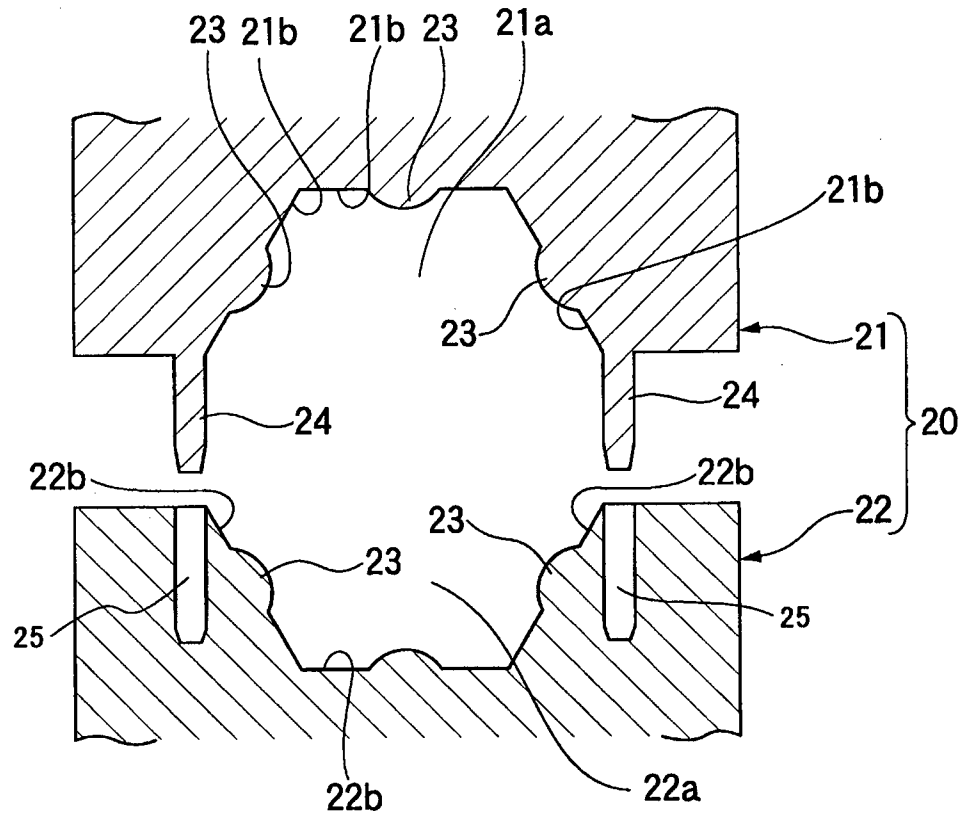
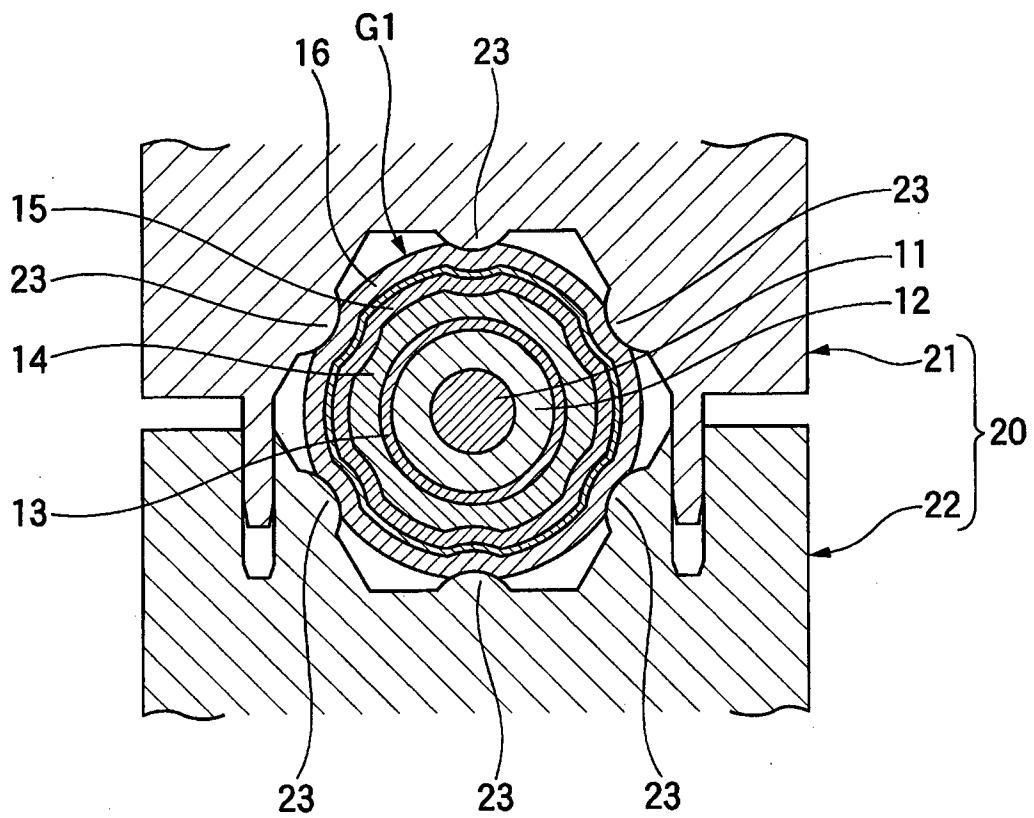


FIG. 6



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FIG.7

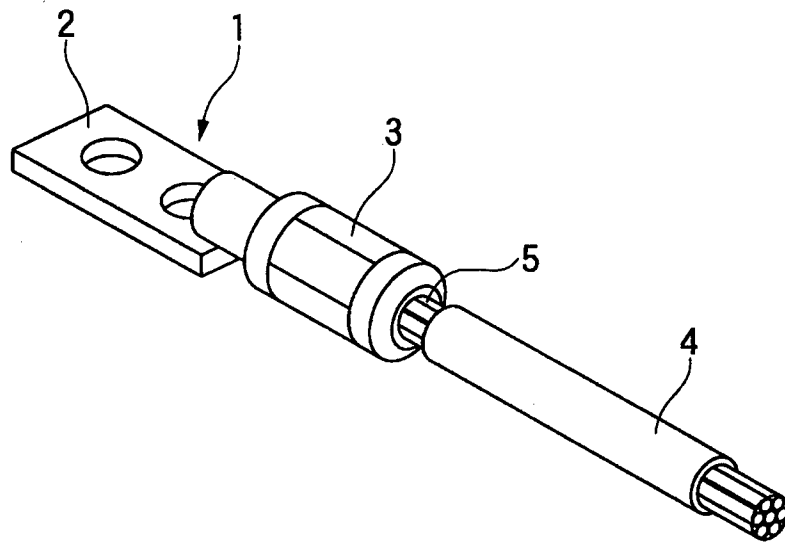
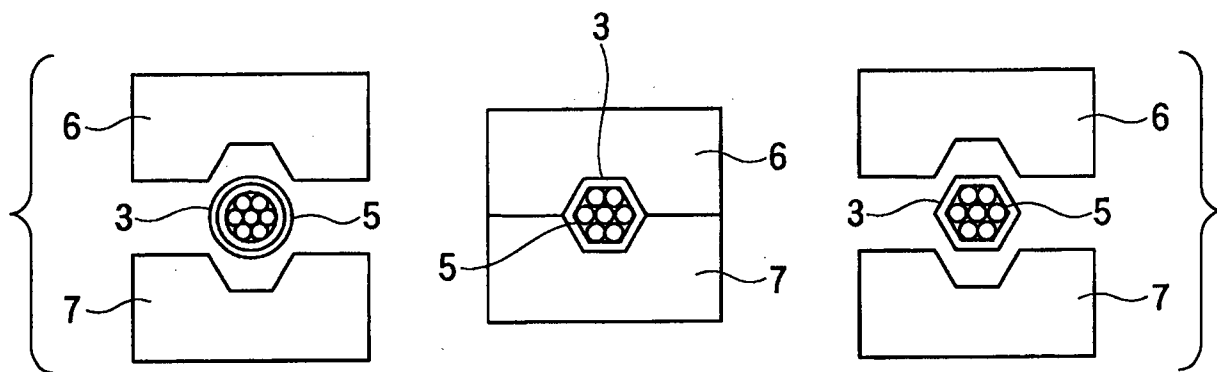


FIG.8A

FIG.8B

FIG.8C



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FIG. 9

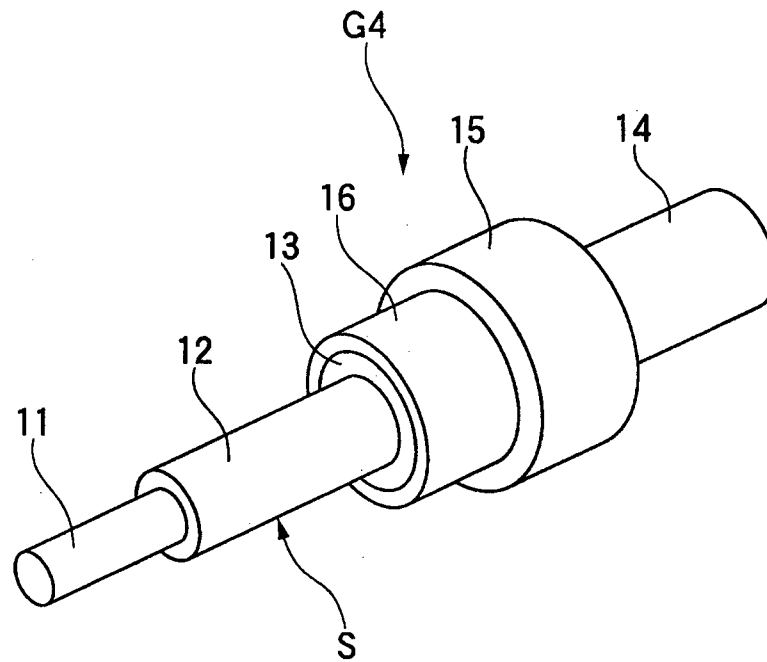
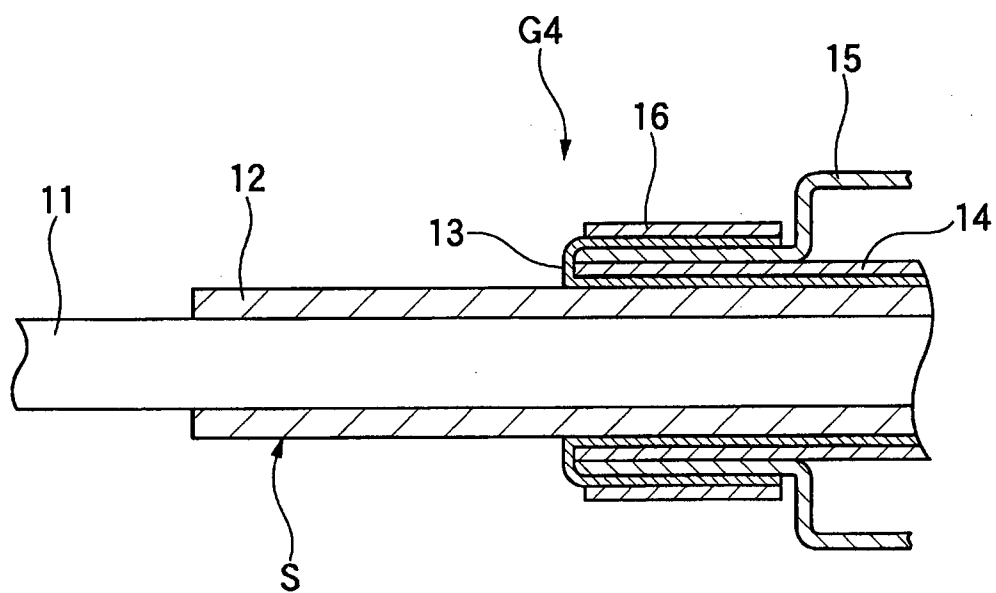


FIG. 10



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FIG.11

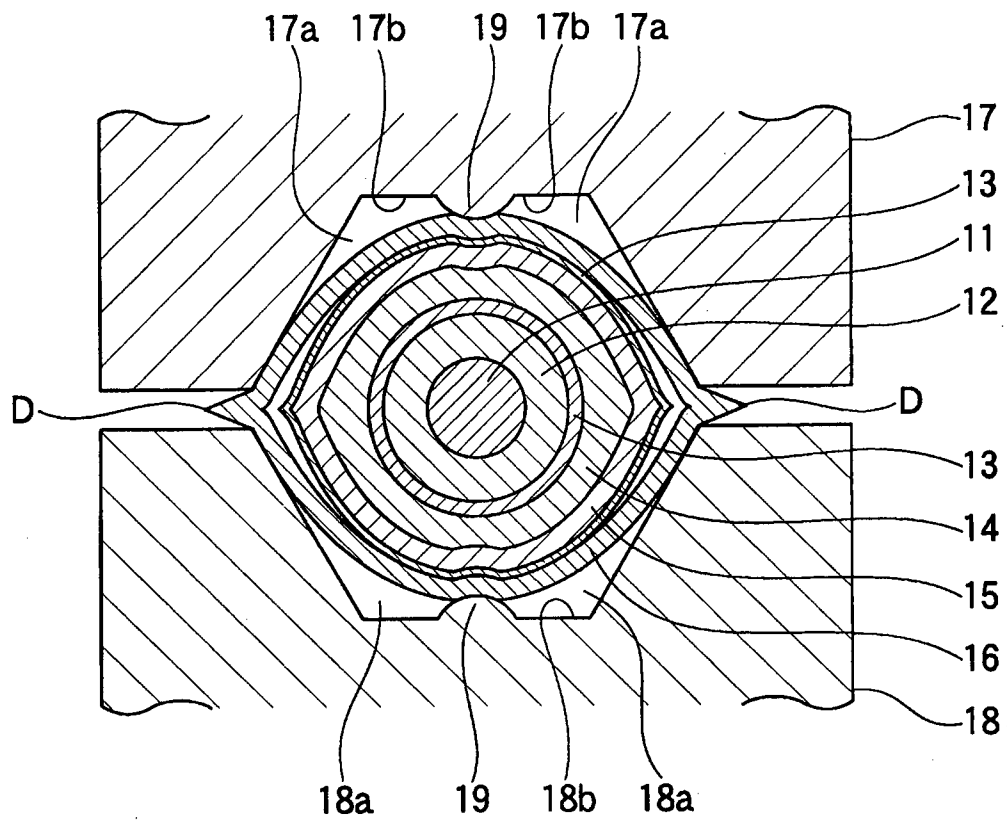
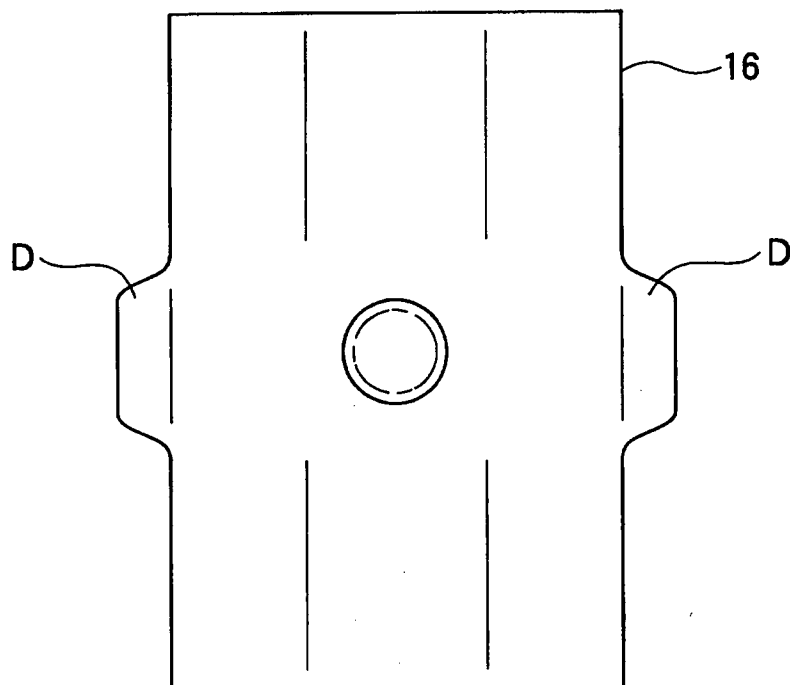


FIG.12



INTERNATIONAL SEARCH REPORT

International application No
PCT/JP2011/053889

A. CLASSIFICATION OF SUBJECT MATTER
INV. H01R4/18 H01R9/05 H01R43/058
ADD.

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
H01R

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 103 43 837 B3 (HARTING AUTOMOTIVE GMBH & CO [DE]) 9 June 2005 (2005-06-09) paragraph [0069]; figures 1-9 paragraph [0075]; claim 1 -----	1-6
A	US 2 965 147 A (HOFFMAN NORMAN E) 20 December 1960 (1960-12-20) claim 1; figures 7-9 -----	1,4
A	GB 1 004 167 A (AMP INC) 8 September 1965 (1965-09-08) claim 1; figures 1-3 -----	1
A	FR 2 865 579 A1 (FRAMATOME CONNECTORS INT [FR]) 29 July 2005 (2005-07-29) page 12, line 8 - line 23; figures 4-6 ----- -/-	1,4



Further documents are listed in the continuation of Box C.



See patent family annex.

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Date of the actual completion of the international search

30 March 2011

Date of mailing of the international search report

06/04/2011

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Jiménez, Jesús

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International application No

PCT/JP2011/053889

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
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INTERNATIONAL SEARCH REPORT

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