COMMONWEALTH of AUSTRALIA 598052

PATENTS ACT 1952

APPLICATION FOR A STANDARD PATENT

I
We **KRONE AKTIENGESELLSCHAFT**
of Beeskowdamm 3-11,
D-1000 Berlin 37,
FEDERAL REPUBLIC OF GERMANY

hereby apply for the grant of a Standard Patent for an invention entitled:

"CUTTING/CLAMPING TERMINAL ELEMENT FOR ELECTRICAL CONDUCTORS"

which is described in the accompanying ~~provisional~~ complete specification.

Details of basic application(s):—

Number	Convention Country	Date
P 36 37 929.8-34	FEDERAL REPUBLIC OF GERMANY	6th November 1986

APPLICATION ACCEPTED AND AMENDMENTS ALLOWED 27.3.90

LODGED AT SUB-OFFICE
- 5 NOV 1987
Melbourne

The address for service is care of DAVIES & COLLISON, Patent Attorneys, of 1 Little Collins Street, Melbourne, in the State of Victoria, Commonwealth of Australia.

Dated this 5th day of November 19 1987

To: THE COMMISSIONER OF PATENTS

H. M. Rimington
.....
(a member of the firm of DAVIES & COLLISON for and on behalf of the Applicant).

Davies & Collison, Melbourne and Canberra.

87-254 87-254

COMMONWEALTH OF AUSTRALIA

PATENTS ACT 1952

DECLARATION IN SUPPORT OF CONVENTION OR NON-CONVENTION APPLICATION FOR A PATENT

Insert title of invention.

In support of the Application made for a patent for an invention entitled: "CUTTING/CLAMPING TERMINAL ELEMENT FOR ELECTRICAL CONDUCTORS"

Insert full name(s) and address(es) of Declarant(s) being the applicant(s) or person(s) authorized to sign on behalf of an applicant company.

~~XX~~ We Manfred Schneider and Dr. Wolff, of KRONE AG, of Beeskowdamm 3-11 D-1000 Berlin 37, FEDERAL REPUBLIC OF GERMANY

Cross out whichever of paragraphs 1(a) or 1(b) does not apply.
1(a) relates to application made by individual(s).
1(b) relates to application made by company; insert name of applicant company.

do solemnly and sincerely declare as follows :-

~~1. (a) I am / We are the applicant for the patent~~

or (b) ~~I am~~ we are authorized by KRONE AG

the applicant for the patent to make this declaration on its ~~their~~ behalf.

Cross out whichever of paragraphs 2(a) or 2(b) does not apply.
2(a) relates to application made by inventor(s).
2(b) relates to application made by company(s) or person(s) who are not inventor(s); insert full name(s) and address(es) of inventors.

~~2. (a) I am / We are the actual inventor of the invention~~

or (b)

Hermann Herfort, of Achenseeweg 75,1000 Berlin 45, Gunter Hegner, of Moränenweg 22, 1000 Berlin 27 Federal Republik of Germany

are ~~is~~ the actual inventors of the invention and the facts upon which the applicant is ~~are~~ entitled to make the application are as follows :-

State manner in which applicant(s) derive title from inventor(s)

employment contract, whereby the applicant would if a patent were granted on an application made by the said inventors be entitled to have the patent assigned to it.

Cross out paragraphs 3 and 4 for non-convention applications. For convention applications insert basic country(s) followed by date(s) and basic applicant(s).

3. The basic application as defined by Section 141 of the Act was ~~were~~ made

in Federal Republic of Germany on the 6 th Nov. 1986

in .... on the ....

by KRONE AG

in .... on the ....

by ....

4. The basic application referred to in paragraph 3 of this Declaration was ~~were~~ the first application made in a Convention country in respect of the invention the subject of the application.

Insert place and date of signature.

Declared at 1 Berlin 37 this 30 st day of Sept.87

Signature of Declarant(s) (no attestation required).

Note: Initial all alterations.

KRONE Aktiengesellschaft

[signature] [signature]

Schneider Dr.Wolff

DAVIES & COLLISON, MELBOURNE and CANBERRA.

(12) PATENT ABRIDGMENT (11) Document No. AU-B-80841/87
(19) AUSTRALIAN PATENT OFFICE (10) Acceptance No. 598052

(54) Title
CUTTING/CLAMPING TERMINAL ELEMENT FOR ELECTRICAL CONDUCTORS

International Patent Classification(s)
(51)[4] H01R 004/24

(21) Application No. : 80841/87 (22) Application Date : 05.11.87

(30) Priority Data

(31) Number	(32) Date	(33) Country
3637929	06.11.86	DE FEDERAL REPUBLIC OF GERMANY

(43) Publication Date : 12.05.88

(44) Publication Date of Accepted Application : 14.06.90

(71) Applicant(s)
KRONE AKTIENGESELLSCHAFT

(72) Inventor(s)
HERMANN HERFORT; GUNTER HEGNER

(74) Attorney or Agent
DAVIES & COLLISON, MELBOURNE

(56) Prior Art Documents
AU 569501 26174/84 H01R 4/24
AU 90962/82 H01R 4/24
US 4527852

(57) Claim

1. A cutting/clamping terminal element for making electrical connection to a conductor, comprising a conductive tongue portion and a spaced pair of conductive legs, the tongue and the conductive legs overlapping at rest so that the tongue extends at least partially between said pair of legs, the arrangement being adapted for resilient movement in a direction to reduce or eliminate the overlap, the edge of the tongue and of each leg adjoining the overlapping portions thereof providing cutting and clamping edges to clamp a conductor inserted between the tongue and the legs at three mutually offset clamping positions, thereby providing said electrical connection.

COMMONWEALTH OF AUSTRALIA

598052

PATENTS ACT 1952

COMPLETE SPECIFICATION

(Original)

FOR OFFICE USE

Class Int. Class

Application Number:
Lodged:

Complete Specification Lodged:
Accepted:
Published:

Priority:

Related Art:

This document contains the amendments made under Section 49 and is correct for printing.

Name of Applicant: **KRONE AKTIENGESELLSCHAFT**

Address of Applicant: of Beeskowdamm 3-11,
D-1000 Berlin 37,
FEDERAL REPUBLIC OF GERMANY

Actual Inventor(s): Hermann **HERFORT**
Gunter **HEGNER**

Address for Service: DAVIES & COLLISON, Patent Attorneys,
1 Little Collins Street, Melbourne, 3000.

Complete specification for the invention entitled:

"CUTTING/CLAMPING TERMINAL ELEMENT FOR ELECTRICAL CONDUCTORS"

The following statement is a full description of this invention, including the best method of performing it known to us :-

Cutting/clamping terminal element
for electrical conductors

The invention relates to a cutting/clamping terminal element for electrical conductors, ~~according to the preamble of claim 1.~~

From DE-PS 21 42 850, a cutting/clamping terminal element ~~of said species~~ with two clamping slots is known. They are limited on the outside by the sharp-edged clamping legs of one elastic metal bracket and on the inside by the edges of a sharp-edged clamping piece. In the position of rest, i.e. without a conductor being inserted into the clamping slot, the clamping legs rest on the outside against the side edges of the clamping piece being bent off to one side. When pressing-in a conductor into the clamping slot, the sharp-edged clamping legs and the sharp-edged clamping piece cut the wire insulation of the conductor through and penetrate the conductive core of the conductor.

Further, another cutting/clamping terminal element is known from DE-GM 82 02 195, said cutting/clamping terminal element comprising clamping legs bent over along a cross axis and surrounding a bent-off centre piece. The cutting edges arranged on the inner side of the clamping legs rest here, too, against the side edges of the centre piece for forming an open clamping slot.

With known cutting/clamping terminal elements, the conductor core is notched at two opposed positions when pressing-in the conductor into the clamping slot, whereby the conductor cross section is considerably reduced at the terminal point, such that even the risk of breakage of the

conductor core exists. Further, it is not possible with the known terminal elements to connect conductors having a very thin conductor core, as its diameter must always be greater than the slot width of the clamping slot. Thus, in particular the connection of wire strands is not possible.

The object of the invention is, therefore, to provide a cutting/clamping terminal element, in use of which the contact connection between terminal element and conductor core is improved, the risk of reduction of the conductor core cross section and the risk of breakage of the conductor core are significantly reduced, and by means of embodiments of which conductors having very small core diameters, in particular wire strands, can be connected.

According to the present invention, there is provided a cutting/clamping terminal element for making electrical connection to a conductor, comprising a conductive tongue portion and a spaced pair of conductive legs, the tongue and the conductive legs overlapping at rest so that the tongue extends at least partially between said pair of legs, the arrangement being adapted for resilient movement in a direction to reduce or eliminate the overlap, the edge of the tongue and of each leg adjoining the overlapping portions thereof providing cutting and clamping edges to clamp a conductor inserted between the tongue and the legs at three mutually offset clamping positions, thereby providing said electrical connection.

In a cutting/clamping terminal element according to an embodiment of the present invention, the cutting edges of the two clamping legs and of the tongue, or clamping piece, surrounded by them are not arranged side by side in one plane, but in three planes staggered with respect to each other, the clamping slot showing no air gap (when viewed in the direction of a conductor clamped thereby) when not in use. The cutting edges of the two clamping legs and of the

clamping piece form in total three cutting positions with respect to the conductor and its insulation, and in particular with respect to the conductor core, said cutting positions being disposed in three different planes, such that a good contact connection between terminal element and conductor core can exist, for which the conductor core cross section will be reduced only slightly at the terminal position, such that there is little risk of breakage of the conductor core.

By means of a cutting/clamping terminal element according to an embodiment of the invention, even conductors having a very thin conductor core diameter, including wire strands, can be connected advantageously.

When inserting a conductor into the clamping slot, the two clamping legs are swung away from the clamping piece, and the conductor is centered with respect to the clamping slot by oblique edges thereof, so as to aid in pressing the conductor correctly into the clamping slot between the clamping piece and the two clamping legs. Hereby, the sharp edges of the two clamping legs cut at two cutting positions and the sharp edge of the clamping piece cuts at another position, through the insulation of the conductor, and contact the conductor core in total three times, such that an improved contact connection can be achieved. In the position of rest, the two clamping legs overlap the clamping piece such that the cutting/clamping element has no open clamping slot, and all three edges can rest against a conductor without an air gap.

In a preferred embodiment, the centre clamping piece is provided with a clamping leg at both side edges and on both its front and rear sid, this being achieved by a metal bracket on the front and rear side of the clamping piece. Hereby, two clamping slots are formed, being each limited by the centre clamping piece and by a respective pair of

clamping legs. Even when connecting two conductors, both conductor cores are, thus, contacted three times.

The sharp edges of the clamping piece and of the clamping legs may be arranged obliquely with respect to each other, their distances from each other being reduced toward an access end of each clamping slot so as to prevent a conductor from slipping out of either clamping slot.

In order to allow manufacture of the cutting/clamping terminal element as economically as possible, the metal bracket arranged on each of the front and rear sides can be formed from one piece of metal. It can be manufactured as a stamped panel provided centrally with two long, narrow V-shaped cuts, adjoining at their open ends with their closed ends directed away from each other to form together a narrow, diamond-shaped aperture. The panel can then be folded through 180° along a central line, transverse to the length of the diamond-shaped aperture, to form the metal bracket providing two pairs of clamping legs.

Further advantageous embodiments of the invention result from the subclaims.

In the following, the invention will be described in more detail, by way of example only, with reference to an embodiment of a cutting/clamping terminal element illustrated in the drawings in which:

Fig. 1 is a perspective view with connected conductor,

Fig. 2 is a perspective view without connected conductor,

Fig. 3 is a front view without the left-side front clamping leg,

Fig. 4 is an enlarged plan view according to Fig. 3,

Fig. 5 is a front view with connected conductor,

Fig. 6 is an enlarged sectional view taken along line A-A of Fig. 5,

Fig. 7 is a front view of the complete cutting/clamping terminal element,

Fig. 8 is a side view according to Fig. 7, and

Fig. 9 is an enlarged sectional representation along line B-B of Fig. 7.

Referring to Figure 1, the cutting/clamping terminal element comprises a clamping piece 4, which is primarily a rectangular basic body 18, and a metal double bracket 1, being designed as a stamped part made from an electrically conductive metal material. The clamping piece 4 bears a central extension 19 directed upward exhibiting on both sides sharp edges 24. At the upper end of the extension 19, an oval cable protection element 20 is arranged, connected to the sharp edges 24 at each side by an oblique, sharp edge 21.

On the front and rear side of the clamping piece 4 and its basic body 18, one-piece metal brackets 7, 8 are respectively arranged forming the metal double bracket 1. The brackets together are designed in their developed projection as basically a rectangular plate having two opposed, adjoining V-shaped cuts 5, the vertices 6 of which are directed away from each other. The plate is folded through about 180° along a central transverse axis 23 to form the two metal brackets 7, 8 of the metal double bracket 1, the two metal brackets 7, 8 then being joined to each other at bending positions 22. The two metal brackets 7, 8 rest against the front and rear sides, respectively, of

the clamping piece 4 with small lateral clearance. The clamping piece 4 is, thus, guided between the two metal brackets 7, 8. The metal double bracket 1 and the basic body 18 of the clamping piece 4 are conductively connected to each other at the bottom (as seen in Figure 1), below the vertex 6 of each V-shaped cut, by means of a spot-welded connection 26.

The metal bracket 7 arranged on the front side of the clamping piece 4 exhibits two clamping legs 2, 12, and the metal bracket 8 arranged on the rear side of the clamping piece 4 exhibits two clamping legs 3, 13. The inner edges of the clamping legs 2, 3; 12, 13 with respect to the brackets 7, 8 are also designed as sharp edges 15. Above these latter sharp edges 15, oblique sharp edges 25 are provided, being opposed to the oblique, sharp edges 21 of the clamping piece 4.

For connecting a conductor 14, it is first inserted in an inlet opening 17 disposed above the oblique, sharp edges 21, 25. The conductor 14 is retained in this position by the cable protection element 20 against slipping-out. By means of a tool (not-shown), the conductor 14 is now pressed into the clamping slot 9 formed between the sharp edges 15, 24.

The pairs of oblique, sharp edges 21, 25, provided on the clamping piece 4 and the clamping legs 2, 3, 12, 13 and being directed towards each other, act to center the conductor 14 and cut the insulation 11 of the conductor 14 at three positions. The clamping legs 2, 3 or 12, 13, respectively, are swung out in spring-type manner. The conductor 14 is now inserted into the clamping slot 9. Here, the conductor core 10 is contacted three times by the sharp edges 15, 24 of the clamping legs 2, 3, 12, 13 and the clamping piece 4, on each side of the clamping piece 4.

The clamping slot 9 defined by the sharp edges 15, 24 is not

parallel sided in use, but formed to have reducing width in the direction of the cable protection element 20, such that the conductor 14 is retained in the clamping slot 9 against slipping-out. Thus, even vibrations will not loosen the clamping connection. An additional fixation (support) for the contacting conductor is not required.

The outer edges of the clamping legs 2, 3; 12, 13 are provided in the area of the transition from the sharp inner edges 25 of each slot 9 to the oblique, sharp edges 15 with blunt-cornered V-shaped cuts 16, in order to allow for a better force distribution from the conductor 14 to the terminal element.

In a further embodiment (not shown), the terminal element consists of the clamping piece and of two individual metal brackets being, in contrast to the first embodiment, not formed by a one-piece metal double bracket. The connection of the two metal brackets with the clamping piece is performed at the lower end of the terminal element by means of a spot-welded connection, and at the upper by means of connection elements, which can be formed also by spot-welded connections, with spacer parts being interposed between the two metal brackets.

List of references

Cutting/clamping terminal element for electrical conductors

1	metal double bracket
2	clamping leg
3	clamping leg
4	clamping piece
5	cuts
6	vertex
7	metal bracket
8	metal bracket
9	clamping slot
10	conductor core
11	insulation
12	clamping leg
13	clamping leg
14	conductor
15	edge
16	cut
17	inlet opening
18	basic body
19	extension
20	cable protection
21	edge
22	bending position
23	cross axis
24	edge
25	edge
26	spot-welded connection

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A cutting/clamping terminal element for making electrical connection to a conductor, comprising a conductive tongue portion and a spaced pair of conductive legs, the tongue and the conductive legs overlapping at rest so that the tongue extends at least partially between said pair of legs, the arrangement being adapted for resilient movement in a direction to reduce or eliminate the overlap, the edge of the tongue and of each leg adjoining the overlapping portions thereof providing cutting and clamping edges to clamp a conductor inserted between the tongue and the legs at three mutually offset clamping positions, thereby providing said electrical connection.

2. A terminal element according to claim 1, wherein said conductive tongue portion is provided with two such pairs of conductive legs, each pair overlapping a respective lateral edge of said tongue portion.

3. A terminal element according to claim 2, wherein a leg from each conductive pair of legs is connected to a leg of the other conductive pair of legs, said connected legs being provided by a substantially U-shaped bracket.

4. A terminal element according to claims 2 and 3, wherein said two pairs of conductive legs are provided by a common piece of conductive material, configured to form a double bracket.

5. A terminal element according to claim 4, wherein the double bracket comprises a piece of material having an elongate aperture, said piece of material being folded through 180° or substantially 180° along a line transverse to the length of said aperture.

6. A terminal element according to any one of the

preceding claims, wherein said tongue and conductive legs are connected conductively to each other at a point remote from an access end of the terminal element for insertion of a conductor between the cutting and clamping edges provided by the element.

7. A terminal element according to claims 3 and 4, wherein the two metal brackets are connected to each other in the region of an access end of the terminal element for insertion of a conductor between the cutting and clamping edges provided by the element, by means of a connecting member.

8. A terminal element according to any one of the preceding claims, wherein, in use, a clamping slot for the conductor, provided between the cutting and clamping edges of the element, exhibits a reducing width in the direction of an access end of the terminal element for insertion of said conductor in said clamping slot, so as to make secure contact to said conductor.

9. A terminal element according to any one of the preceding claims wherein said conductive legs comprise a metal material.

10. A cutting/clamping terminal element substantially as hereinbefore described with reference to the drawings.

DATED this 8th day of March, 1990.

KRONE AKTIENGESELLSCHAFT
By its Patent Attorneys
DAVIES & COLLISON

80 841/87

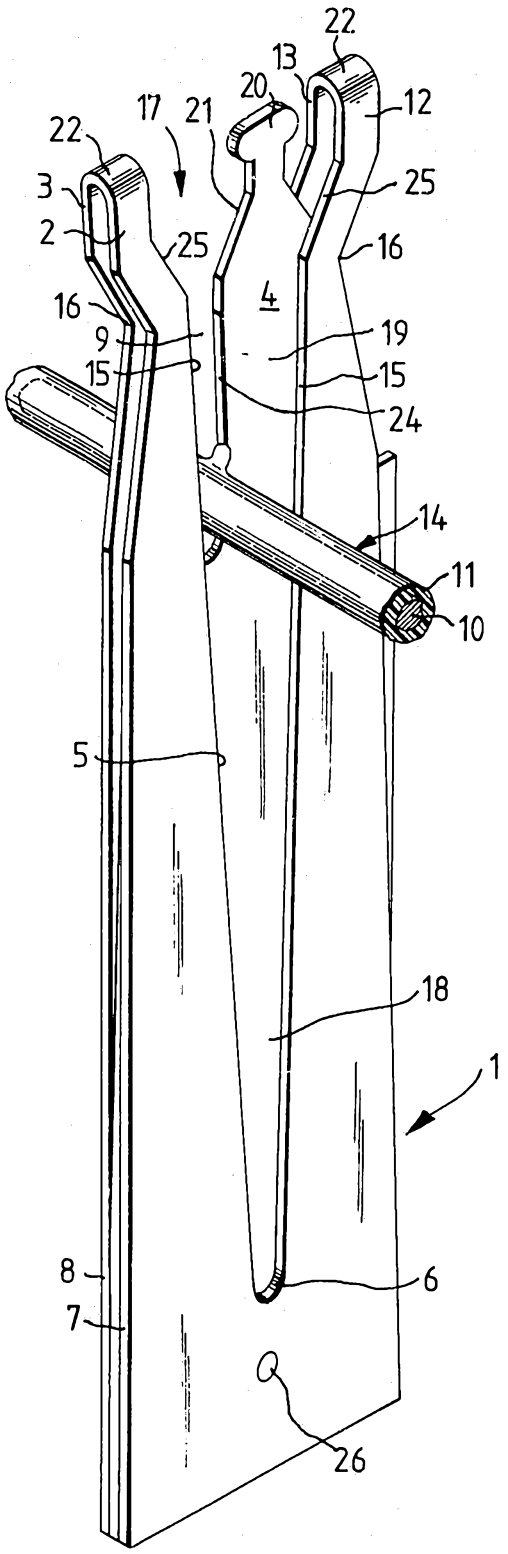

FIG.1

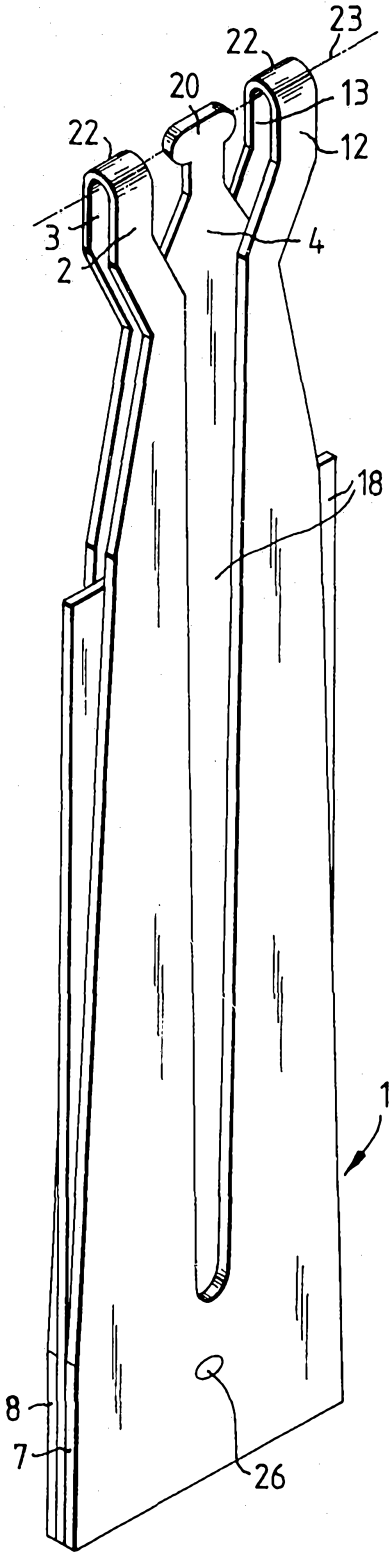

FIG. 2

FIG.3

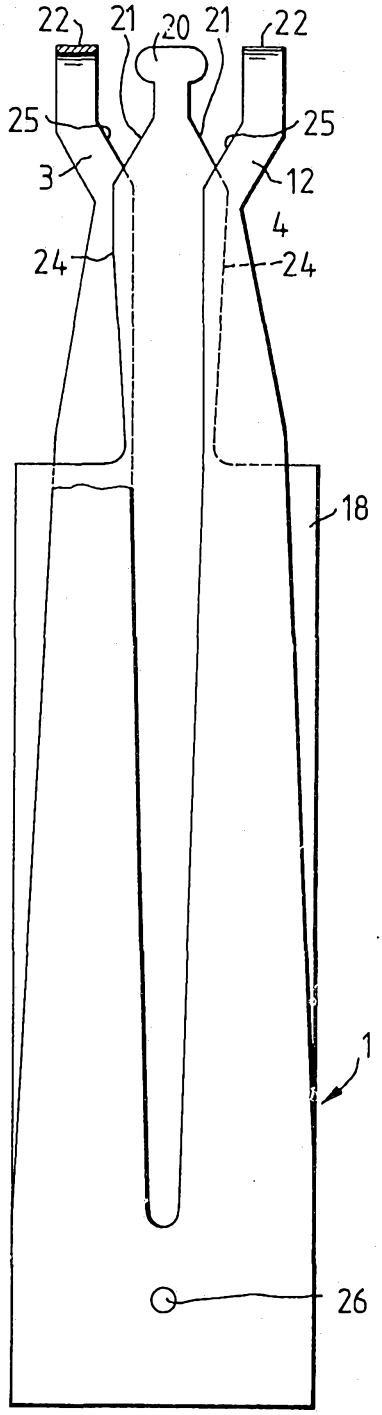

FIG.5

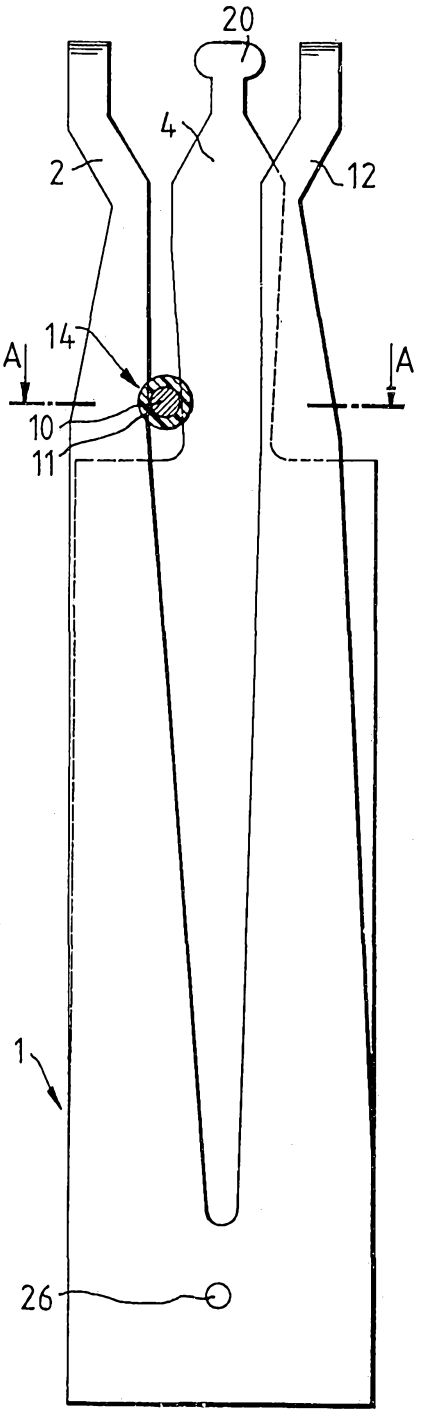

FIG.7

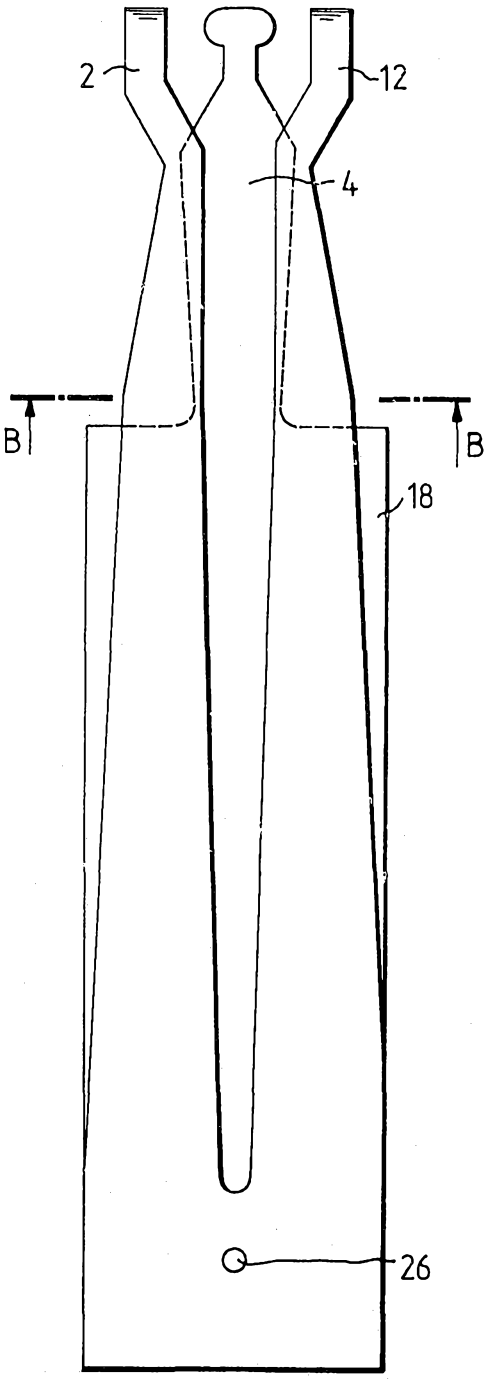

FIG.8

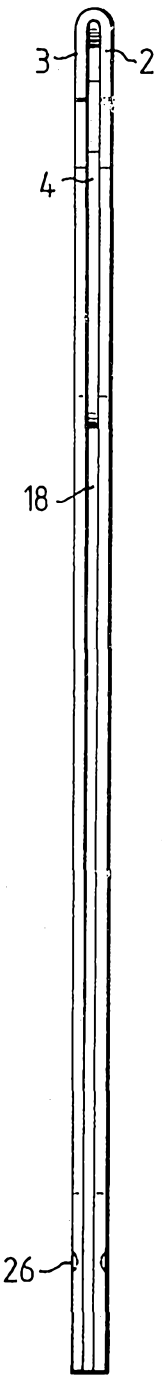

FIG.4

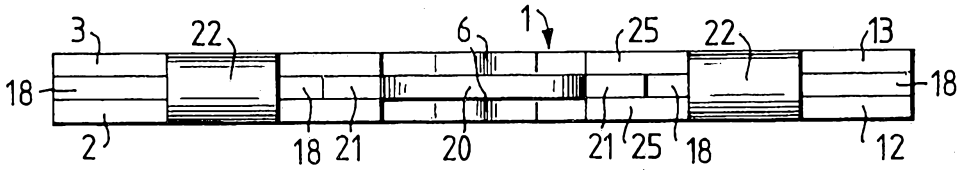

FIG.6

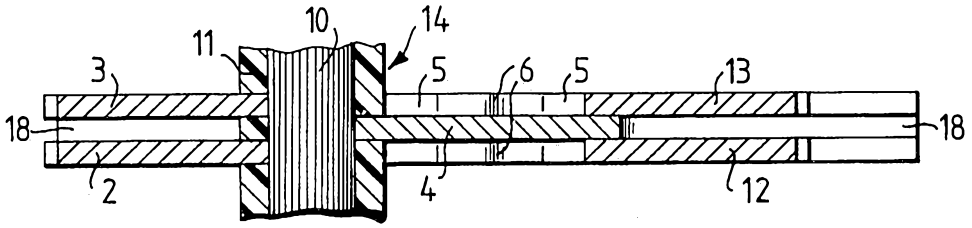

FIG.9