AMENDED



P/00/001
Section 29

AUSTRALIA
Patents Act 1990

# PATENT REQUEST : STANDARD PATENT

We, being the persons identified below as the Applicant, request the grant of a Standard Patent to the persons identified below as the Nominated Persons, for an invention described in the accompanying complete specification.

**Applicant(s) and Nominated Person(s):** ABX

**Address:** PARC EUROMEDECINE
128, RUE DU CADUCEE
F-34184 MONTPELLIER
FRANCE

**Invention Title:** DEVICE FOR CLEANING A NEEDLE FOR SAMPLING A LIQUID FROM A CLOSED FLASK

**Name(s) of Actual Inventor(s):** ROGER LE COMTE; GUILHEM COUDERC
HENRI CHAMPSEX

**Address for Service:** GRIFFITH HACK & CO
509 ST KILDA ROAD
MELBOURNE VIC 3004

**Attorney Code:** HA

**BASIC CONVENTION APPLICATION DETAILS**

| Application No | Country | Country Code | Date of Application |
|---|---|---|---|
| 93 08671 | FRANCE | FR | 15 July 1993 |

Drawing number recommended to accompany the abstract: 1

DATED THIS 25TH DAY OF AUGUST 1994

ABX

GRIFFITH HACK & CO.

Patent Attorney for and
on behalf of the Applicant

683885

BP/00/008
Section 29(1)
Regulation 3.1(2)

AUSTRALIA
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# NOTICE OF ENTITLEMENT

We ABX

of PARC EUROMEDECINE
128, RUE DU CADUCEE
B.P. 7290
FR 34184 MONTPELLIER CEDEX 4
FRANCE

being the applicant in respect of an application for a patent for an invention entitled DEVICE FOR CLEANING A NEEDLE FOR SAMPLING A LIQUID FROM A CLOSED FLASK (Application No. 67383/94), state the following:

1. The nominated person has, for the following reasons, gained entitlement from the actual inventor:

   THE APPLICANT AND NOMINATED PERSON WOULD BE ENTITLED TO HAVE ASSIGNED TO IT A PATENT GRANTED TO THE ACTUAL INVENTORS IN RESPECT OF THE INVENTION.

2. The nominated person has, for the following reasons, gained entitlement from the basic applicant listed on the patent request:

   THE APPLICANT AND NOMINATED PERSON IS THE BASIC APPLICANT

3. The basic application listed on the request form is the first application made in a Convention country in respect of the invention.

DATE: 1 September 1997

ABX
GRIFFITH HACK
MELBOURNE OFFICE

C. R. J. STRICKLAND
Patent Attorney for and
on behalf of the applicant(s)

SPECIFIED PATENT REQUEST
LODGED 26/6/94


P/00/001
Section 29

AUSTRALIA
Patents Act 1990

# PATENT REQUEST : STANDARD PATENT

I/We, being the person(s) identified below as the Applicant(s), request the grant of a Standard Patent to the person(s) identified below as the Nominated Person(s), for an invention described in the accompanying complete specification.

**Applicant(s) and Nominated Person(s):** ABX S.A.

**Address:** PARC EUROMEDECINE
128, RUE DU CADUCEE
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FRANCE

**Invention Title:** DEVICE FOR CLEANING A NEEDLE FOR SAMPLING A LIQUID FROM A CLOSED FLASK

**Name(s) of Actual Inventor(s):** ROGER LE COMTE; GUILHEM COUDERC
HENRI CHAMPSEX

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**Attorney Code:** HA

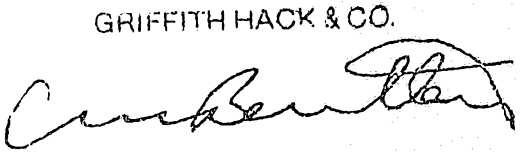
**BASIC CONVENTION APPLICATION DETAILS**

| Application No: | Country: | Application Date: |
|---|---|---|
| 93 08671 | FR | 15 July 1993 |

Drawing number recommended to accompany the abstract: 1

DATED: 12 July 1994
ABX S.A.

GRIFFITH HACK & CO.



M057784 120794

Patent Attorney for and
on behalf of the Applicant

AU9467383

(12) PATENT ABRIDGMENT (11) Document No. AU-B-67383/94
(19) AUSTRALIAN PATENT OFFICE (10) Acceptance No. 683885

(54) Title
DEVICE FOR CLEANING A NEEDLE FOR SAMPLING A LIQUID FROM A CLOSED FLASK

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(56) Prior Art Documents
AU 51840/93
US 4624148
US 3991627

(57) Claim

1. In a fluid sampling apparatus for sampling a liquid from a flask closed by a bung, wherein the apparatus has a sampling needle, a piercing needle for piercing the bung, the sampling needle passing through the piercing needle, and a support bracket, a device for cleaning the sampling needle comprising a mobile mechanism upon which the sampling needle is mounted for moving downward to ensure the sampling of liquid from the flask, and a guide member for guiding the sample needle, said guide member being mounted below the mobile mechanism on the support bracket, and said guide member having at least one opening and at least one conduit for venting air and for distributing a liquid to rinse the interior of the piercing needle and being a percussion head through which a bore extends, the piercing needle being fixed within said bore, and wherein the piercing needle has an orifice through which the inside of the piercing needle communicates with the outside via said at least one conduit.

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**COMPLETE SPECIFICATION**

**STANDARD PATENT**

**Applicant:**

ABX S.A.

**Invention Title:**

DEVICE FOR CLEANING A NEEDLE FOR SAMPLING A LIQUID FROM A CLOSED FLASK

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

# Device for cleaning a needle for sampling a liquid from a closed flask

The invention relates to a device for cleaning a needle for sampling a liquid from a closed flask and, more particularly for taking blood samples in a blood analysis apparatus, and the invention essentially relates to a cleaning mechanism associated with a member for guiding the sampling needle.

There exist automatic blood analysis apparatus that enable parameters, such as the number of white blood corpuscles and red blood corpuscles, the amount of haemoglobin, etc., to be determined from a blood sample. For this purpose, blood samples have to be taken from a flask and then transferred to one or more small recipients on the apparatus, where they are subjected to the appropriate measurements. To sample the blood from a flask closed by a bung, there is known the solution of piercing the said bung using a needle which then dips into the liquid, and of drawing in the desired amount of blood through the said needle. This operation is also carried out both on flasks the closing bungs of which are at the top and on inverted flasks the bungs of which are on the lower portion. Suitable mechanisms are, of course, used to move either the needle or the flask in order pierce the bung. To be able to sample a very precise quantity of blood and then distribute it to the measuring unit or units, it is necessary to use, in all cases, a sampling valve mounted on the sampling tube, between the needle and the analyzers properly speaking. This sampling valve, particularly for the very small amounts of blood that it is wished to sample, is a component that has to be meticulously designed and is thus costly and difficult to adjust. In addition, it has to undergo rinsing between each sampling operation, at the same time as the needle is rinsed out. The rinsing is, moreover, often carried out by passing

the mobile needle through a fixed rinsing case, or again, by means of a rinsing case that slides over a fixed sampling needle, as described in FR A 2 606 885 in the name of the Applicant. The aforementioned sampling valve is a necessity on existing apparatus insofar as, in blood sample flasks, there is often a slight positive air pressure or a slight negative air pressure inside the flask in relation to ambient air If one wished to dispense with the use of the sampling alve, and still be able to sample exactly the intended amount of blood, the flasks for sampling would always have to be under constant pressure conditions, which is far from being the case.

The Applicant has found a solution to this problem which enables it to dispense with the use of this sampling valve and which, at the same time, facilitates the operation of rinsing the sampling needle.

Accordingly, in a fluid sampling apparatus for sampling a liquid from a flask closed by a bung, wherein the apparatus has a sampling needle, a piercing needle for piercing the bung, the sampling needle passing through the piercing needle, and a support bracket, there is provided by the present invention a device for cleaning the sampling needle comprising a mobile mechanism upon which the sampling needle is mounted for moving downward to ensure the sampling of liquid from the flask, and a guide member for guiding the sample needle, the guide member being mounted below the mobile mechanism on the support bracket, and the guide member having at least one opening and at least one conduit for venting air and for distributing a liquid to rinse the interior of the piercing needle and being a percussion head through which a bore extends, the piercing needle being fixed within the bore, and wherein the piercing needle has an orifice through which the inside of the piercing needle communicates with the outside via said at least one conduit.

Preferably the mobile mechanism ensuring the displacement of the sampling needle is a slide capable of

being moved vertically along two guide columns.

Preferably the sampling needle is open at its end via a cylindrical opening.

The cleaning device further comprises at least one seal mounted on a top of the percussion head to provide sealing between the sampling needle and the piercing needle.

Further characteristics and advantages of the invention will emerge from the following description of exemplary embodiments of the invention, wherein reference is made to the annexed drawings, wherein:

Figure 1 is a vertical cross-sectional view of a first variant of the device;

Figure 2 is a larger scale cross-sectional view of the piercing needle and of the sampling needle;

Figures 3 and 4 are vertical face and profile cross sections, respectively, of another variant of the invention;

Figures 5 and 6 are larger sale vertical cross sections, face and profile respectively, of the base of the dilution vessel;

Figures 7 and 8 are vertical cross sections, face and profile respectively, of another variant of the dilution vessel.

Figure 1 shows bracket 1 serving to support the device, the bracket being designed for integration at the front of a sampling and analyzing apparatus. Bracket 1 is capable of being displaced laterally in the apparatus over dilution,

rinsing or metering vessels, not shown. This bracket has the general shape of a shell, the height of which is greater than the width and which opens outwards, the back forming wall of which serves to support a motor 2 which rotates a serrated gear having a horizontal axis. Via an endless belt 4 that loops back round a lazy pully, which belt extends over the entire height of the bracket, the motor causes a slide 5 to be displaced along two guide columns 6 which extend vertically between an upper horizontal edge portion 7 and a lower horizontal edge portion 8 of bracket 1. For this purpose, the rear portion of the slide bears a clip 9 which clamps onto one of the vertical lengths of belt 4. On the lower edge portion 8 of the bracket is mounted a percussion head 10, which is thus a piece that is fixed in relation to the apparatus. The said percussion head, which can be seen more clearly in figure 2, takes the form of a small housing pierced through its centre by a vertical shaft 11 which passes completely through it, which shaft also communicates with the outside via a small horizontal conduit 12 provided in the percussion head. Inside the shaft is fixed a piercing needle 13 having an inside diameter D which extends downwards below bracket 1. A lateral orifice is provided on the piercing needle, opposite conduit 12 to cause the latter to communicate with the inside of the needle. The lower end of the latter is open, as shown in figure 2, through a bevelled orifice 14. Alternatively, other end piece profiles could be chosen, for instance a straight orifice.

To slide 5 is fixed a piece 15 for attaching a sampling needle 16 having an outside diameter d slightly smaller than the inside diameter D of piercing needle 13. Sampling needle 16 extends vertically below the slide, over a length approximately equal to the height of the bracket and coaxially to the piercing needle. The end opening of the sampling needle is cylindrical. Tightness between sampling needle 16 and piercing needle 13 is ensured by an O ring 25

mounted on the top of the percussion head 10.

In figure 1, slide 5 has been shown as substantially half way up its travel path. The end 17 of sampling needle 16 then projects slightly from bevelled orifice 14 of piercing needle 13. It will be appreciated that, with the slide in top position, the sampling needle retracts inside the piercing needle, with its tip located at the top of the percussion head. When it is in bottom position, on the other hand, the sampling needle projects well beneath the end of the piercing needle. The difference between the diameters D and d of the two needles enables the one to slide easily within the other with a small clearance. Percussion head 10 constitutes a guide member for the sampling needle. The open top of sampling needle 16 is connected by a flexible tube 19 to an analysis recipient of the apparatus.

At the start of the sampling operation, bracket 1 supporting percussion head 10 and slide 5 is positioned above a flask of sample placed in a receptacle, not shown, with the bung facing upwards, below fixed piercing needle 13. Slide 5 is then in top position. The flask, moved by a suitable mobile mechanism, is displaced upwards and its bung is pierced by the piercing needle, without the orifice of the latter dipping into the liquid in the flask. Alternatively, the flask could be fixed and the entire bracket 1 could move down towards the flask to pierce its bung. As soon as it is pierced, the air contained in the flask can communicate with the outside via needle 13 and conduit 12. This venting to ambient air removes any positive air pressure or negative air pressure that there may be in the flask. Sampling can then be carried out. Motor 2 causes slide 5 to to be lowered with the help of serrated belt 4; sampling needle 16 descends inside fixed piercing needle 13 until it dips down to the bottom of the flask. Then, the blood is drawn up through the end of the needle. As pressure conditions are constant, the desired amount of blood is sampled precisely, the blood being

immobilized inside the needle. The motor then causes the needle to return upwards. Then, the mobile mechanism moves the flask downwards to ensure that its plug is de-perforated. Bracket 1 then moves sideways in the apparatus over dilution, rinsing or metering vessels. The percussion assembly is thus fixed in relation to the blood tube during the piercing operation, but is displaced during subsequent operations.

During this displacement phase, bracket 1 is positioned over a dilution vessel. Then, a liquid is distributed via conduit 12 or, advantageously, via a second conduit, also emerging in piercing needle 13, in order to rinse out the blood at the O ring 25 and along the inner wall of needle 13. This residual blood does not form part of the quantity proportioned and must therefore be removed before the first dilution operation. Diluent is then distributed inside the sampling needle to expel the proportioned blood content from the needle and mix it with a proportioned quantity of diluent in order to effect a dilution according to a known ratio.

We shall now describe another variant of the invention, illustrated in figures 3 to 6, in which the same reference numbers are used for the elements already described.

This variant differs from the first one essentially in that the percussion head is replaced by a dilution vessel generally designated by reference number 20. This vessel is also fixed to the lower edge portion 8 of bracket 1. Piercing needle 13 is held inside a plug 21 mounted below the vessel. It communicates, via a vertical guide hole 22 provided in the base of the vessel, with the inner chamber 23, the bottom of which has a conical profile. On its upper portion, the vessel is closed by a plug 24. Seals 25 are provided between the vessel and lower plug 21, in particular at the top of the piercing needle to ensure tightness between the latter and the sampling needle. It will be noted that, in this variant, sampling needle 16 differs from the preceding one in that its lower end terminates in a closed tip 17, but it has, a little

higher up, two small lateral orifices 18, as can be seen more precisely in figure 5. On the other hand, guide hole 22 communicates with the outside via an opening 29 provided in the body of the vessel, an opening which emerges substantially half way up the hole and which can be connected to a vessel discharge conduit. A little lower, in the plug and piercing needle 13 emerges another opening 26 for venting to ambient air or rinsing.

After the flask has been pierced by piercing needle 13, its venting to ambient air is ensured by opening 26 in communication with the outside. Then, as in the previous case, motor 2 causes sampling needle 16, end 17 of which was immobilized at the top of plug 21, as can be seen more clearly in figure 5, to descend. The needle, coaxial to chamber 21, descends through vertical hole 22 and then through the inside of piercing needle 13 before dipping down to the bottom of the flask. The small quantity of blood desired is drawn into needle 16, and then the latter rises back up to a top position, in which side holes 18 of the needle (which can be seen in figure 5) are immobilized at the base of chamber 23. Similarly, as in the case of the first variant, the mobile mechanism moves the flask downwards to cause its bung to be de-perforated. Then, bracket 1 is positioned above a rinsing vessel, or again, a rinsing vessel is placed beneath the bracket, thus avoiding its lateral translation. The liquid is distributed via conduit 26 or, advantageously, via a second conduit emerging in piercing needle 13. Via the conduit connecting to the top of the needle is then injected a diluent, in the direction opposite to that of the previous suction operation. The thrust of the diluent has the effect of causing the blood retained in the needle to flow back towards the vessel 20 via the said lateral orifices 18. Dilution thus takes place in the vessel. Then, it is evacuated via opening 29, thanks to the pressure in the vessel or the negative pressure applied to this

opening. Needle 13 is flushed by injecting liquid into opening 26. For its part, sampling needle 16 is cleaned externally by rubbing against a seal 25, while the inside has been cleaned by the diluent.

One of the advantages of such a dilution vessel is that it is made in one piece and serves as a member for guiding the needle at the same time as it ensures its cleaning.

Figures 7 and 8 illustrate another variant of such a dilution vessel, which differs from the preceding one in particular in the profile of inner chamber 23. In this figure, the same pieces as in those of the variant represented in figures 3 and 4 bear the same reference numbers. It will be noted that the bottom of the vessel in the shape of a V is hollowed to form a flat alveole 30 through the centre of which sampling needle 16 passes before reaching the guide hole. This alveole is designed for measuring the haemoglobin using optical density. It will be noted that the dilution vessel advantageously has at least one spectrophotometry measuring system.

On the side of chamber 23 are provided lateral orifices 27 and 28 serving to position a metering member, for example an electronic ruby and electrode device.

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. In a fluid sampling apparatus for sampling a liquid from a flask closed by a bung, wherein the apparatus has a sampling needle, a piercing needle for piercing the bung, the sampling needle passing through the piercing needle, and a support bracket, a device for cleaning the sampling needle comprising a mobile mechanism upon which the sampling needle is mounted for moving downward to ensure the sampling of liquid from the flask, and a guide member for guiding the sample needle, said guide member being mounted below the mobile mechanism on the support bracket, and said guide member having at least one opening and at least one conduit for venting air and for distributing a liquid to rinse the interior of the piercing needle and being a percussion head through which a bore extends, the piercing needle being fixed within said bore, and wherein the piercing needle has an orifice through which the inside of the piercing needle communicates with the outside via said at least one conduit.

2. Cleaning device according to claim 1, characterized in that the mobile mechanism ensuring the displacement of the sampling needle is a slide capable of being moved vertically along two guide columns.

3. The device according to claim 1, characterized in that the sampling needle is open at its end via a cylindrical opening.

4. The device according to claim 1, further comprising at least one seal mounted on a top of the percussion head to provide sealing between the sampling needle and the piercing needle.

Dated this 1st day of September 1997
ABX S.A.
By their Patent Attorneys
GRIFFITH HACK
Fellows Institute of Patent
Attorneys of Australia

Device for cleaning a needle for sampling a liquid from a closed flask


## ABSTRACT OF THE DISCLOSURE

A displaceable needle (16) for sampling the liquid from the flask is mounted on a slide (5) that is mobile vertically in relation to a support bracket (1) integrated in the sampling apparatus. The sampling needle passes through a percussion head (10) mounted on the base of the bracket and to which is connected a piercing needle. A conduit (12) for rinsing places the percussion head in communication with the outside.

Application to blood sampling in a haematological analysis apparatus.


Figure 1.

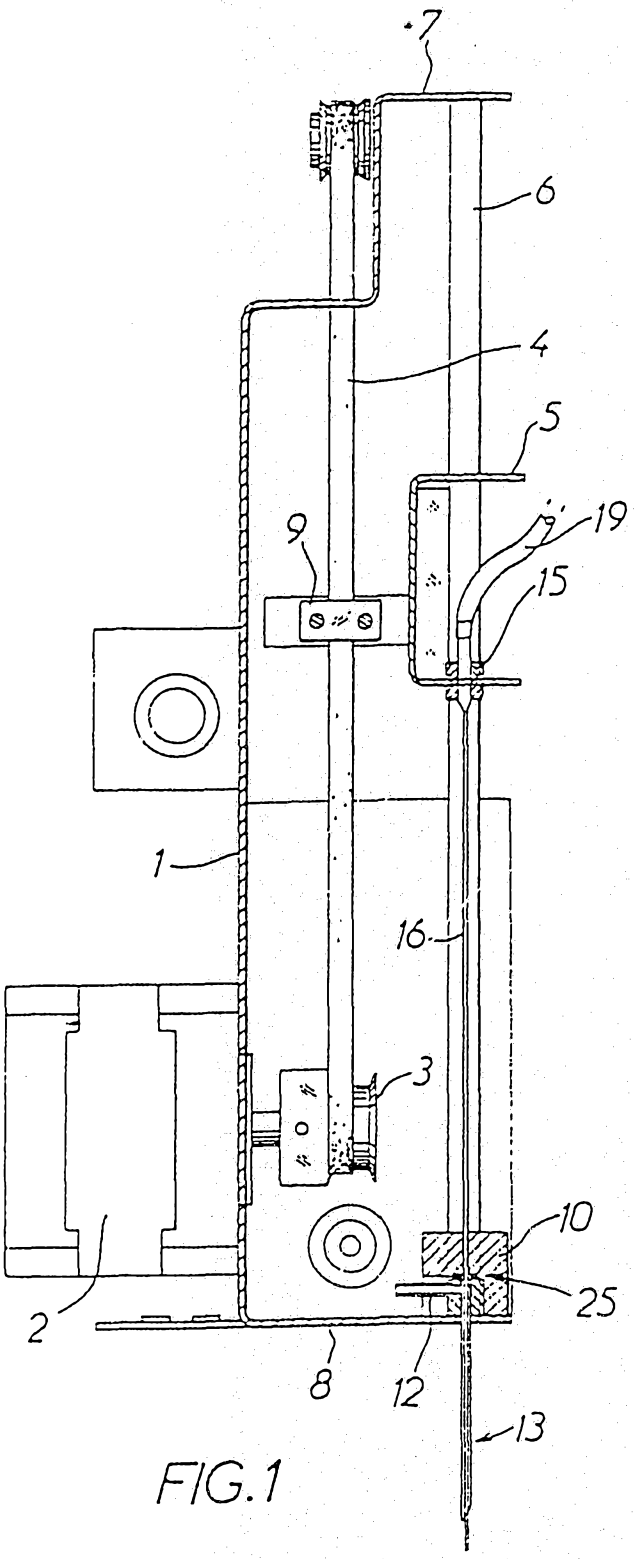


FIG. 1

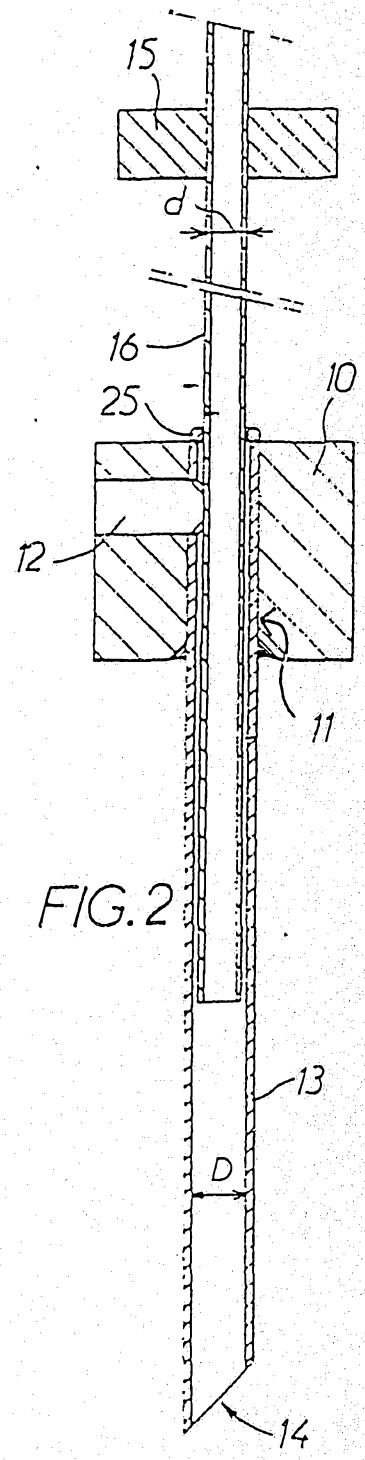


FIG. 2

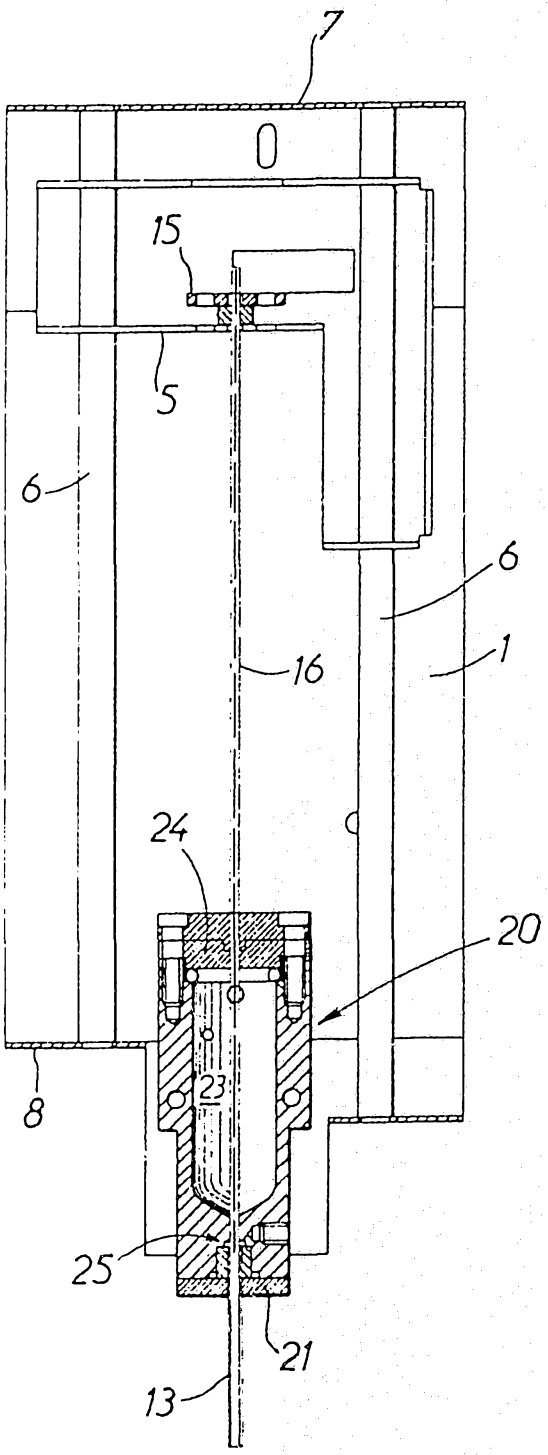


FIG. 3

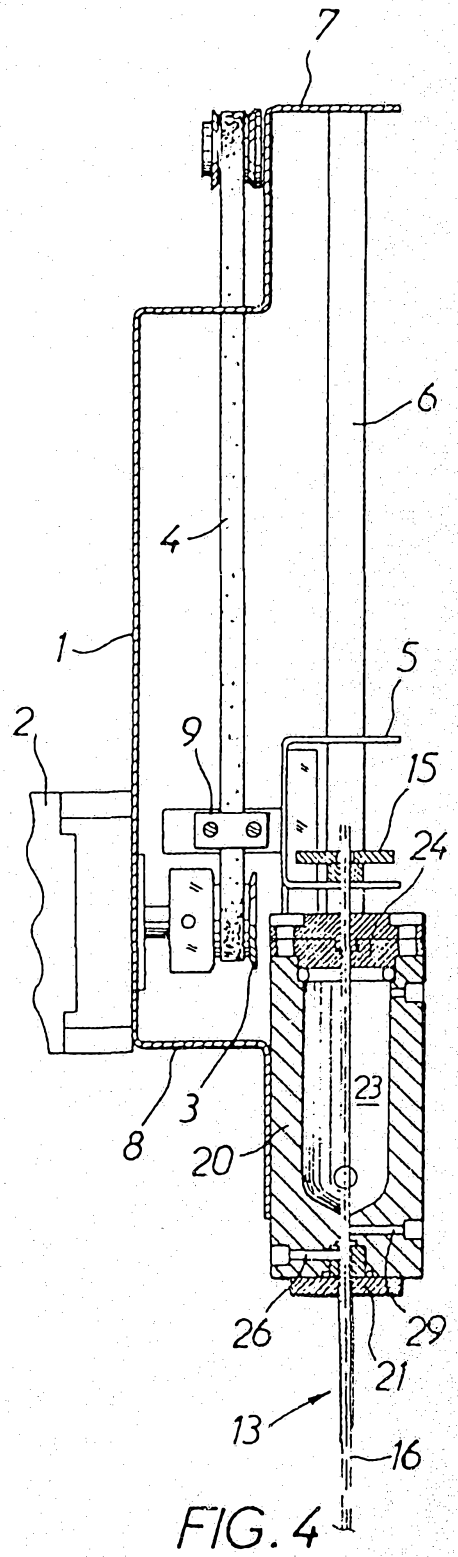


FIG. 4

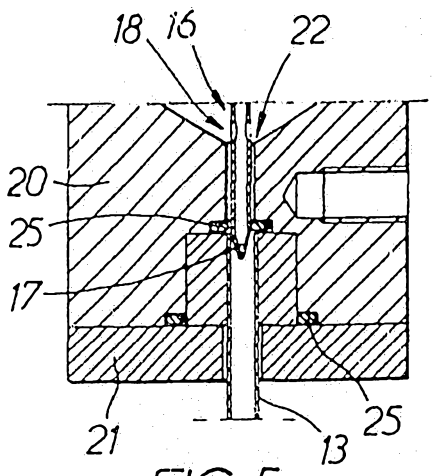


FIG. 5

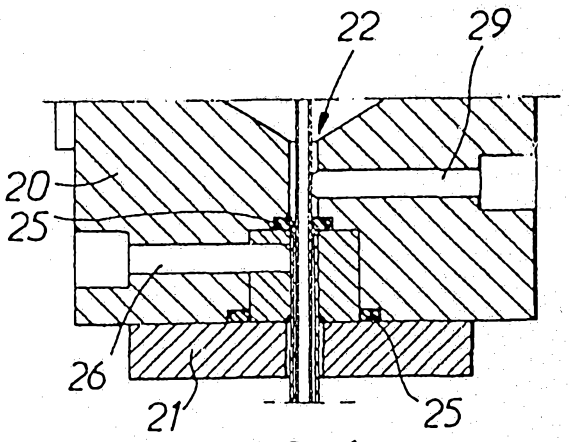


FIG. 6

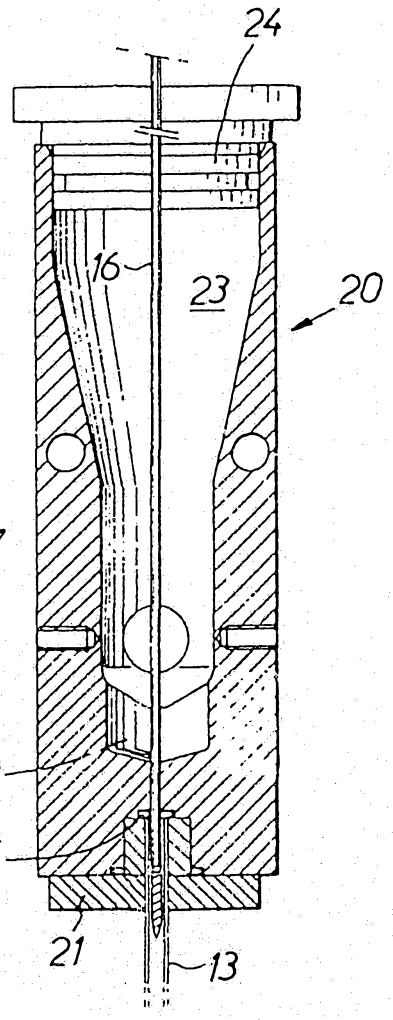


FIG. 7

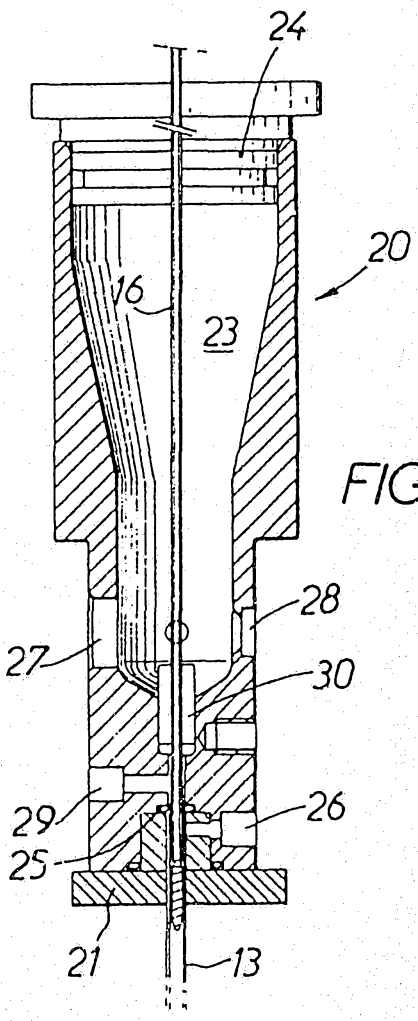


FIG. 8