F. 36167 - GEH

AUSTRALIA

Patents Act 1952

Form 1
Regulation 9

APPLICATION FOR A STANDARD PATENT

604270

~~I~~/We VALOR HEATING LIMITED,
a British Company,

of Riverside House, Corney Road, Chiswick, London W4 2SL
ENGLAND

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

"IMPROVEMENTS RELATING TO GAS FIRES"

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

For a Convention application — details of basic application(s) —

NUMBER	COUNTRY	DATE OF APPLICATION
8627216	UNITED KINGDOM	14th November, 1986

APPLICATION ACCEPTED AND AMENDMENTS ALLOWED 17-9-92

Our ~~My~~ address for service is COLLISON & CO., Patent Attorneys, 117 King William Street, Adelaide, South Australia, 5000.

Dated this 12th day of November ,19 87.

VALOR HEATING LIMITED,
By their Patent Attorneys,
COLLISON & CO.

(Signature)

G.E. HABEL

PATENT OFFICE PATENT OFFICE PATENT OFFICE
ONE HUNDRED DOLLARS FIVE DOLLARS

LODGED AT SUB-OFFICE
12 NOV 1987
Adelaide

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MAIL OFFICER

To:

THE COMMISSIONER OF PATENTS

This form must be accompanied by either a provisional specification (Form 9 and true copy) or by a complete specification (Form 10 and true copy).

‡ 56908

(CONVENTION—Company)

DHS/P046831 AU

FORM 8—REGULATION 12 (2)

COMMONWEALTH OF AUSTRALIA

PATENTS ACT, 1952-1973

DECLARATION IN SUPPORT OF A CONVENTION APPLICATION FOR A PATENT

In support of the Convention Application No. 81145/87 made by (a) VALOR HEATING LIMITED

(hereinafter referred to as "Applicant") for a patent for an invention entitled:

(b) "Improvements relating to gas fires"

I, (c) Brian George Boffey
Commercial Director
of (d) 145A Vicarage Road, Wollaston, Stourbridge, West Midlands

do solemnly and sincerely declare as follows:

1. I am authorised by Applicant to make this declaration on its behalf.

2. The basic Application(s) as defined by section 141 of the Act was/~~were~~ made in (e) UNITED KINGDOM on the 14th day of November 1986.
on the day of 19
by (f) VALOR HEATING LIMITED

3 (g) MARTIN LESLIE SMITH, PETER WRIGHT, DONALD WHITEHOUSE, CHARLES MORAN, ALAN VICTOR HINTON, and ALAN CONSTABLE, of 42 Gunner Lane, Rubery, Birmingham, B45 9EX, England; 208 Penns Lane, Wylde Green, Sutton Coldfield, West Midlands, England; ~~of~~ 41 Parkhall Crescent, Castle Bromwich, Birmingham, B36 9SG, England; 10 Arundel Road, Short Heath, Willenhall, West Midlands, WV12 5TW; 51 Delamere Road, Hall Green, Birmingham B28 0EP, England; and 139 Station Road, Coleshill, Warwickshire, England; respectively ~~is~~/are the actual Inventor(s) of the invention and the facts upon which Applicant is entitled to make the Application are as follows:

Applicant is the Assignee of the said Inventor(s).

4. The basic Application(s) referred to in paragraph 2 of this Declaration was/~~were~~ the first Application(s) made in a Convention country in respect of the invention, the subject of the Application.

DECLARED at Valor Heating Limited, Birmingham, England

this 16th day of November 1987

(h) .....
(Signature of Declarant)

To THE COMMISSIONER OF PATENTS.

(a) Here insert (in full) Name of Company.

(b) Here insert Title of Invention.

(c) and (d) Here insert Full Name and Address of Company Official authorised to make declaration.

(e) Here insert Basic Country or Countries followed by date or dates of Basic Application(s).

(f) Here insert Full Name(s) of Applicant(s) in Basic Country.

(g) Here insert (in full) Name and Address of actual Inventor or Inventors.

(h) Personal Signature of Declarant (c) (no seal, witness or legalisation).

(12) PATENT ABRIDGMENT (11) Document No. AU-B-81145/87
(19) AUSTRALIAN PATENT OFFICE (10) Acceptance No. 604270

(54) Title
IMPROVEMENTS RELATING TO GAS FIRES

International Patent Classification(s)
(51)[4] **F28D 001/00** **F24C 003/00** **F28F 001/00**

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8627216	**14.11.86**	**GB UNITED KINGDOM**

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(71) Applicant(s)
VALOR HEATING LIMITED

(72) Inventor(s)
MARTIN LESLIE SMITH; PETER WRIGHT; DONALD WHITEHOUSE; CHARLES MORAN; ALAN VICTOR HINTON; ALAN CONSTABLE

(74) Attorney or Agent
COLLISON & CO, 117 King William Street, ADELAIDE SA 5000

(57) Claim

1. A gas fire comprising at least one heat exchanger in the form of a hollow tubular element made of a thermally conducting material, the tubular element having a generally cylindrical configuration with a flattened transverse cross-section and extending across a path for convection air in the fire to thus provide a passage for gaseous combustion products passing to a flue from the fire, the hollow tubular element being arranged so that its reduced transverse dimension is, in use, presented to the flow of convection air along said path.

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Form 10

Patents Act 1952—1969

COMPLETE SPECIFICATION

(ORIGINAL)

FOR OFFICE USE: 604270

Class Int. Class

Application Number :
Lodged :

Complete Application No. ;
Specification Lodged :
Published :

Priority:

Related art:

TO BE COMPLETED BY APPLICANT

Name of Applicant: VALOR HEATING LIMITED

Address of Applicant: Riverside House, Corney Road,
Chiswick, LONDON W4 2SL
ENGLAND

Actual Inventors: MARTIN LESLIE SMITH,
PETER WRIGHT,
DONALD WHITEHOUSE,
CHARLES MORAN,
ALAN VICTOR HINTON,
ALAN CONSTABLE

Address for Service: COLLISON & CO., Patent Attorneys, 117 King William Street, Adelaide, South Australia, 5000.

Complete Specification for the invention entitled: "IMPROVEMENTS RELATING TO GAS FIRES"

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

DESCRIPTION

The present invention relates to a gas fire.

In particular, the present invention relates to a gas fire incorporating a heat exchanger for use in transferring heat from the gaseous products of combustion in the gas fire to a passage through the fire for convection air. In certain such gas fires, the heat exchanger is of a complex and expensive construction providing a tortuous path for both the convection air and the combustion products so that the air gains the maximum exposure to surfaces heated by the combustion products.

The aim of the present invention is to provide a gas fire with a simple heat exchanger which is relatively cheap to manufacture whilst being efficient in operation.

According to the present invention there is provided a gas fire comprising at least one heat exchanger in the form of a hollow tubular element made of a thermally conducting material, the tubular element having a generally cylindrical configuration with a flattened transverse cross-section and extending across a path for convection air in the fire to thus provide a passage for gaseous combustion products passing to a flue from the fire, the hollow tubular element being arranged so that its reduced transverse dimension is, in use, presented to the flow of convection air along said path.

It is envisaged that the hollow tubular element may be formed by extrusion and cut into the desired lengths. Alternatively, however, the tubular element may be fabricated or die cast.

By virtue of the fact that the or each heat exchanger is formed by a hollow tubular element which is partially flattened to present an oval transverse cross-section, i.e. a lozenge-shaped cross-section, the surface area available for heat transfer is maximised whilst reducing the resistance to convection air flow; the narrow section preferably facing into the air flow. If desired, one or more fins may project from the outer surface of the tubular element to further enhance heat transfer, e.g. a fin can project from each end of the flattened transverse cross-section.



A number of these generally cylindrical heat exchanger elements are positioned between the walls defining a convection air passage through a gas fire, with the passage through each element interconnecting the front of the fire with an appropriate flue. Thus, hot combustion products pass through the elements and convection air passes over the outside of the elements with the fins, if provided, scrubbing i.e. imparting turbulence, to the air flow to enhance heat transfer. If desired, fins may be provided on the inside wall of the tubular element defining said passage, to thus improve heat transfer.

As an alternative to securing the heat exchanger element between the walls defining a convection air passage, part of one of the walls may be formed by casting with the tubular elements cast integrally therewith. The precast wall section may also include a multi-fin facia for use in radiating heat from the front of the fire.

The present invention will now be further described, by way of example, with reference to the accompanying drawings, in which:-

Fig. 1 is a perspective view of a known heat exchanger;

Fig. 2 is a cross-sectional view through part of a gas fire incorporating a number of the known heat exchangers shown in Fig. 1;

Fig. 3 is a rear perspective view of the fire shown in Fig. 2;

Fig. 4 is a perspective view of another known heat exchanger;

Fig. 5 is a perspective view of a precast section of a wall of the convection air passage including integrally cast known heat exchanger elements as per Fig. 4;

Fig. 6 is a perspective view of an embodiment of heat exchanger for use in the present invention; and

Fig. 7 is a schematic illustration of the preferred relative arrangement of the heat exchangers of Fig. 6, in a gas fire.



The gas fire constructed according to the present invention and illustrated in Figs. 1, 2 and 3 of the accompanying drawings, comprises a known hollow generally cylindrical heat exchanger element 1 made of aluminium, with three groups 3 of three generally radially projecting fins 5 which extend axially of the element 1. The heat exchanger element 1 is formed by extrusion, the extrusion being cut to the desired length and the end regions machined to form axial extensions 7 for use in sealingly mounting the element 1 in a gas fire as shown in Fig. 2 of the accompanying drawings.

As seen in Fig. 2, a number of the elements 1 are in use located in the top part of a fire 9, between the walls 11 and 13 defining a convection air passage 15. The elements 1 each connect the upper region 17 of the front of the fire 9 with the rear region 19 of the fire which is in use sealingly connected with a flue (not shown). Thus, in use the hot combustion products pass through the heat exchanger elements 1 to the flue, the convection air being moved over the outside of the heat exchanger elements 1 and scrubbed by the fins 15 to enhance heat transfer.

Whilst the elements 1 are described hereabove as being made by the extrusion of aluminium, any suitable thermally conductive material can be alternatively used, as can any suitable method of manufacture, e.g. fabrication or die casting.

An alternative known construction of heat exchanger is illustrated in Figs. 4 and 5 of the accompanying drawings. This heat exchanger comprises a hollow generally cylindrical element 21 with a number of axially spaced apart, circumferentially extending fins 23 projecting generally radially outwardly from the outside surface thereof. As shown in Fig. 5, these heat exchangers (Fig. 4) can be integrally formed, e.g. by casting, as part of the convection air passage wall 13 - see Fig. 1 between points 'X' and 'Y' - this section of wall being provided with a front facia portion 25 carrying a number of fins 27 for radiating conducted heat from the front of the fire. Alternatively, the heat exchanger of Fig. 1 can be formed as part of the wall section X-Y.

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A preferred embodiment of heat exchanger for use in the present invention is shown in Figs. 6 and 7 of the accompanying drawings, the heat exchanger comprising a tubular element 25 which is partially flattened and thus has a generally oval or lozenge-shaped transverse cross-section. These heat exchanger elements 25 are arranged in a gas fire such as shown in part in Fig. 1, with the heat exchanger elements relatively positioned as shown in Fig. 7, with the narrow cross-section being presented to the air flow. In this way the surface area available for heat transfer is maximised whilst the resistance to air flow is minimised. Fins 28, as shown in dashed lines, can be provided one at each end region of the flattened transverse cross-section, to increase surface area and further enhance heat transfer. Alternatively any number of fins can be provided in any desired configuration and arrangement.

In any of the heat exchangers 25 described hereabove heat transfer can be further enhanced by the provision of fins 27 on the inside wall of the passage through the heat exchangers, said fins extending generally radially inwardly and axially of the passage. Again, any desired number, configuration and/or arrangement of fins 27 can be selected.

The present invention thus provides a gas fire incorporating an efficient heat exchanger which is both simple and inexpensive to manufacture.

PATENT OFFICE LAW

CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A gas fire comprising at least one heat exchanger in the form of a hollow tubular element made of a thermally conducting material, the tubular element having a generally cylindrical configuration with a flattened transverse cross-section and extending across a path for convection air in the fire to thus provide a passage for gaseous combustion products passing to a flue from the fire, the hollow tubular element being arranged so that its reduced transverse dimension is, in use, presented to the flow of convection air along said path.

2. A gas fire as claimed in claim 1, in which a number of fins project outwardly from the hollow tubular element, each fin extending axially of said hollow tubular element.

3. A gas fire as claimed in claim 1 or 2 in which the hollow tubular element is formed by extrusion.

4. A gas fire as claimed in any one of claims 1, 2 and 3, in which a fin projects outwardly from each end region of the partially flattened hollow tubular element, each fin extending axially of the hollow tubular element.

5. aA gas fire as claimed in any one of the preceding claims, in which fins are provided on the inside wall of the tubular element defining the said passage for gaseous combustion products.

6. A gas fire constructed and arranged substantially as hereinbefore described, by way of example, with reference to and as illustrated in the accompanying drawings.

DATED this 12th day of September 1990.

VALOR HEATING LIMITED
By their Patent Attorneys
COLLISON & CO.



Fig 2

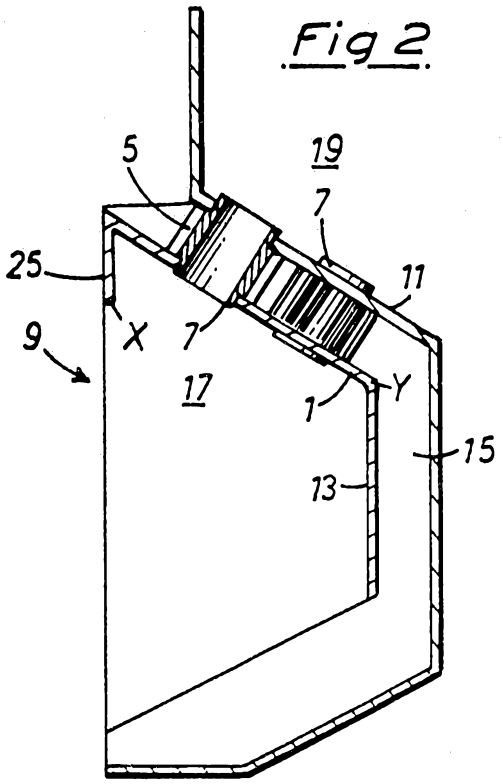
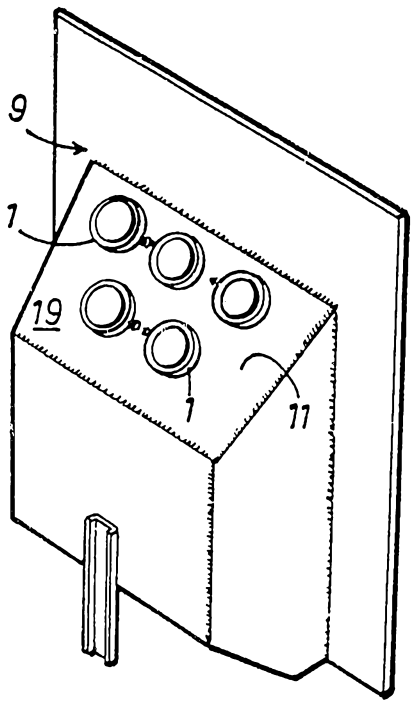


Fig 3



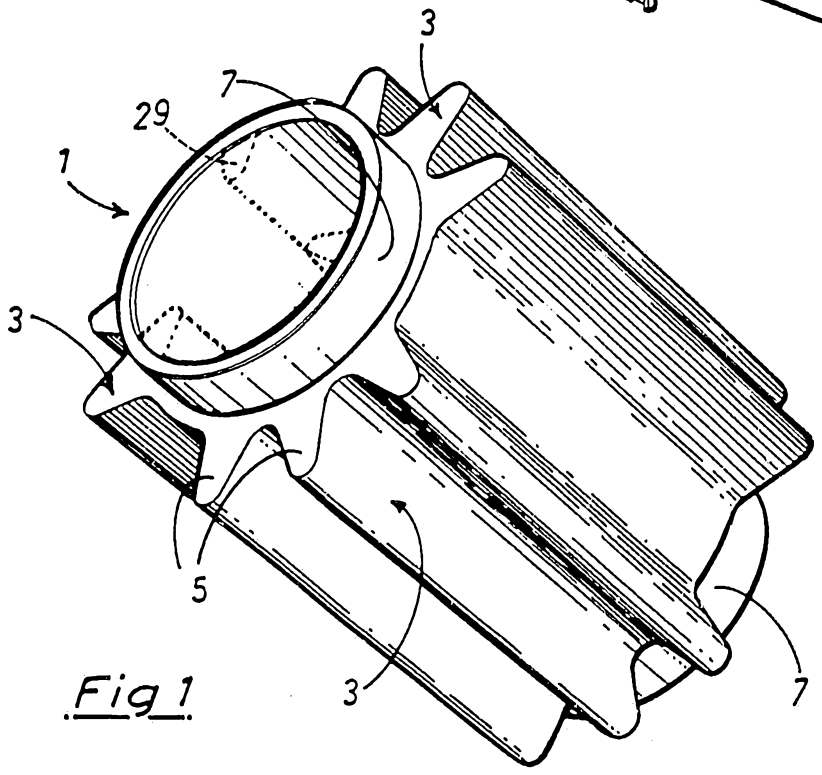


Fig 1

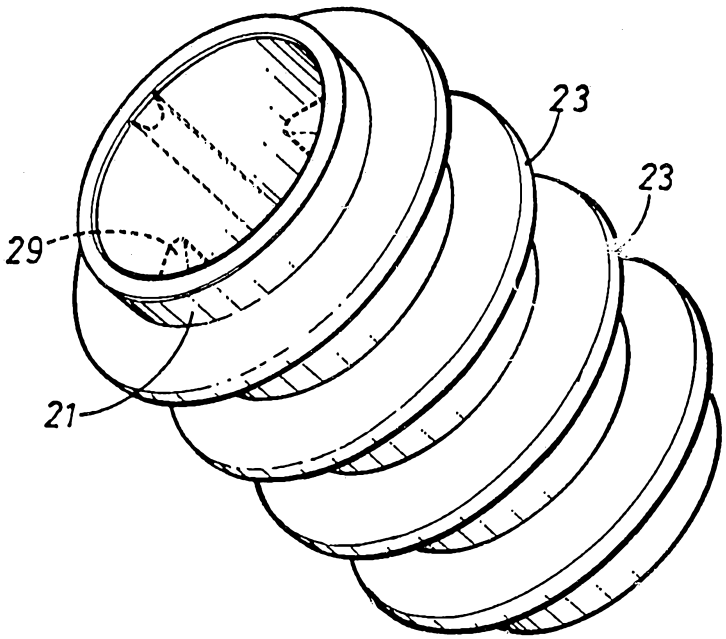


Fig 4

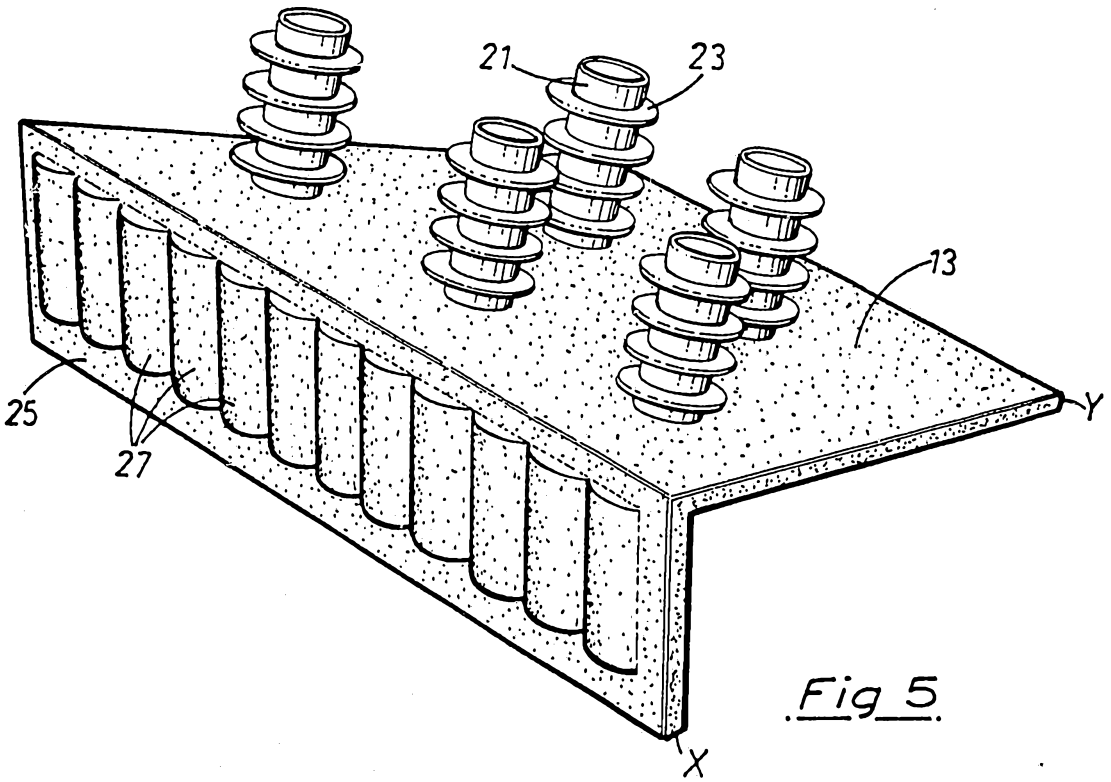


Fig 5

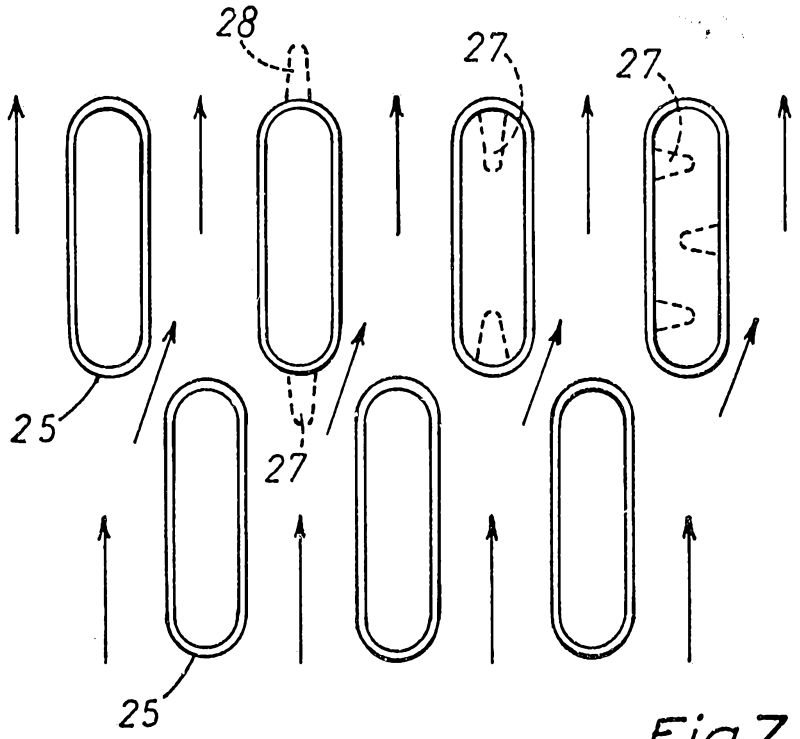


Fig 7.

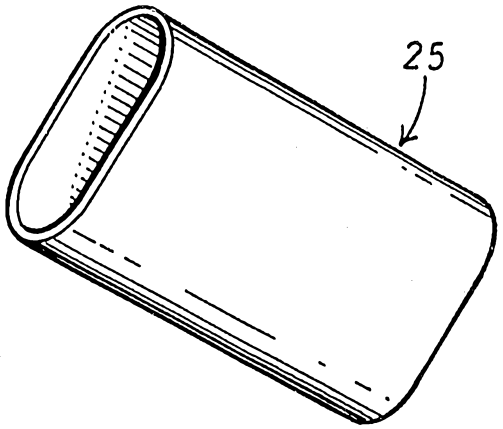


Fig 6.