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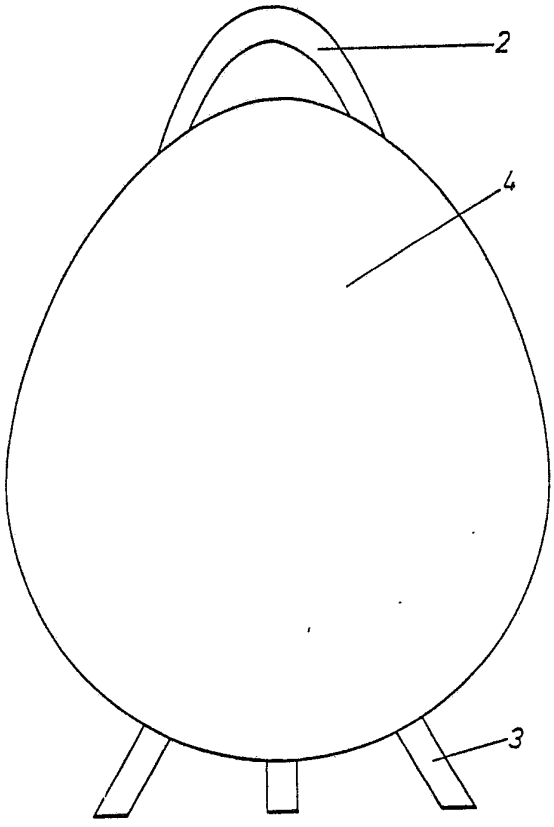
(54) Title: HEAT STORAGE DEVICE FOR OIL OR GAS FURNACES

(57) Abstract

In order to improve the efficiency of an ordinary household gas or oil furnace, a heat storage device is placed directly in the combustion chamber of the boiler. The device (4) is made of cast iron and is provided with a support base (5) making the device take a slightly rewardly inclining position in the combustion chamber, and a holder or lifting device (1) at the upper end of the device. The device is placed directly in the flame at a distance of 5-15 cm from the burner head so that the device reaches a temperature of 150-350°C. The highest degree of efficiency is obtained during the weak heating seasons, i.e. spring, summer, and autumn, when a doubling of the dead periods of the furnace can be obtained.



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HEAT STORAGE DEVICE FOR OIL OR GAS FURNACES

The invention relates to a heat storage device for an oil or gas furnace. Ordinary household oil or gas furnaces normally operate as start/stop furnaces with dead periods. During the periods when the furnace is operating, the heat emitted from the burner will accumulate in the walls of the boiler and in the amount of water in the boiler. When the amount of heat accumulated during the dead periods of the furnace is distributed in the heating plant or has disappeared as losses e.g. due to natural draught from the chimney, the boiler thermostat of the furnace will start the furnace so as to produce more heat.

It is possible to extend the dead periods by placing an additional heat storage unit in or by the boiler. From the specification to US patent no. 2,858,781 there is known a heat storage unit to be placed in a heater furnace where said units consist of a container wherein there is placed a suitable heat retaining medium such as small pieces of iron, sand, concrete or similar substances that can stand the temperatures. The heat storage unit according to the American patent is used in a hot-air central heating plant to equalize the hot-air supply.

As disclosed in claim 1, the heat storage device according to the present invention is adapted to be placed directly in the combustion chamber of the furnace so that it touches the flame, and the device is designed as a solid metal block. It is thus possible to use the heat storage device very efficiently since it takes up heat directly from the heat source,

ie. the furnace flame, so that the storage device reaches a high temperature and thus a large heat content.

By producing the heat storage device of cast iron as disclosed in claim 2, there is obtained a metal device made of a material not forming oxide scale. Many other types of metal form oxide scale when strongly heated, said oxide scale forming an insulating layer on the device.

The device is designed as a body of revolution as disclosed in claim 3. It is thereby possible for the flame to circumvent the device and therefore the device will not impede the flow in the boiler chamber. On the contrary there is obtained an improved heat emission effect to the boiler wall as the flame is forced closer towards the boiler wall.

To place the heat storage device in a simple manner in the combustion chamber of a boiler, it can be designed with a support base as disclosed in claim 4. The support base moreover forms part of the heat storage device and the strong base means that the device will stand securely and firmly in the furnace.

It is also possible to provide a device not having a support base with support legs welded thereon as disclosed in claim 5 so that by using different lenghts of legs it is possible in a simple manner to adopt the device to different types of boilers.

It may be practical to provide the up-turned part of the device with a lifting device so that it is easier

to take out and to place the quite heavy device in the combustion chamber of the boiler.

The support base of the device can be designed as disclosed in claim 7, whereby the device shaped as a body of revolution can be positioned so as to incline slightly rearwardly away from the flame. Improved flow conditions in the combustion chamber are thereby obtained.

The invention will be further described in the following with reference to the drawings, wherein

Fig. 1 is a cross-section of a heat storage device according to the invention made of cast iron and having an inclining support base,

Fig. 2 is a cross-section of a heat storage device according to the invention made of cast iron having an inclining support base and a lifting device on the upturned part, and

Fig. 3 is a cross-section of a heat storage device according to the invention being substantially egg-shaped and having support legs and a lifting hook welded thereon.

Fig. 1 of the drawings shows a heat storage device 4 of cast iron weighing about 12 kg. The device is provided with a base 5 moulded at the same time as the device and forming an integral part thereof. Fig. 2 shows a similar device but provided with a carrying or lifting device 1 at the top so that it is easier

to catch hold of the device e.g. when it is to be placed in the combustion chamber of a boiler. The device shown in Fig. 2 weighs from about 12 kg to about 20 kg.

Fig. 3 shows a somewhat different embodiment of the invention, the device having the shape of a flattened ball or an egg. The device 4 is provided with three support legs 3 and an eye 2 welded thereon, by which eye 2 it is possible to lift the device. This embodiment weighs about 23 kg and has a maximum diameter of about 18 cm and a minimum diameter of about 16 cm.

The heat storage device according to the invention is placed directly in the combustion chamber of the boiler so that the device stands at a distance of 5-15 cm from the burner head. The device has the shape of a body of revolution, eg. ball-shaped, flattened ball-shaped, egg-shaped or a similar shape so that the flame substantially circumvents the device. The device reaches a temperature of 150-350°C in an ordinary household furnace and this means that the dead period of the furnace is substantially doubled on account of the thermal energy accumulated in the device. At the same time, the flame is directed closer to the boiler wall and can therefore in an improved an more efficient manner emit its heat to the boiler.

For a number of reasons the device preferably has a round shape. First, many boilers are provided with rather small doors so that it is difficult to place eg. a cylindrical device in the combustion chamber. Secondly, a ball has the greatest mass in relation to

surface compared with other shapes so that more even heat emission from the device is obtained during the dead periods. Thirdly, a round shape gives a favourable flow pattern so that the flame can circumvent the device and not flash back towards the burner.

The device can have support legs or a base which can suitably be designed so that the device inclines somewhat rearwardly away from the burner for further improving flow conditions.

The heat storage device operates most effectively during the weak heating seasons, ie. spring, summer and autumn, when a doubling of the dead period of the furnace can be obtained by using a device according to the invention. During the weak heating seasons ordinary oil or gas furnaces do not normally operate very effeciently because the boiler is in fact overdimensioned at these times of year. By using the device according to the invention, there is obtained a substantial improvement in efficiency since the combustion chamber is not nearly cooled to so low temperatures due to the heat accumulated in the device. During the heating season proper, ie. in winter, there is also obtained a certain improvement in effeciency but not to the same extent as is experienced during the weak heating seasons.

The device is made of metal, preferably of cast iron, which does not form oxide scale when heated to 150-350°C. The metals forming oxide scale are not particularly applicable since the oxide scale works as an insulating layer on the device. Other metals not forming oxide scale and which can stand the tempera-

tures of an oil or gas flame in a boiler can also be used.

PATENT CLAIMS

1. Heat storage device for oil or gas furnaces, c h a r a c t e r i z e d i n that the device (4) is a solid metal block placed in the combustion chamber of the furnace so that it is touched by the furnace flame.

2. Heat storage device according to claim 1, c h a r a c t e r i z e d in that the device (4) is made of cast iron.

3. Heat storage device according to claims 1-2, c h a r a c t e r i z e d i n that the device (4) has the shape of a body of revolution, preferably of a ball or a compressed ball.

4. Heat storage device according to claims 1-3, c h a r a c t e r i z e d i n that the device (4) is provided with a support base (5) formed integrally with the device and made of the same material.

5. Heat storage device according to claims 1-3, c h a r a c t e r i z e d i n that the device (4) is provided with support legs welded thereon.

6. Heat storage device according to claims 1-5, c h a r a c t e r i z e d i n that the device (4) is provided with a lifting device (1,2) fixed on the up-turned part of the device.

7. Heat storage device according to claims 4 or 5, c h a r a c t e r i z e d i n that the support base or leg (3,5) is so designed that the device stands at a slightly inclining position in the combustion chamber.

1

Fig. 1

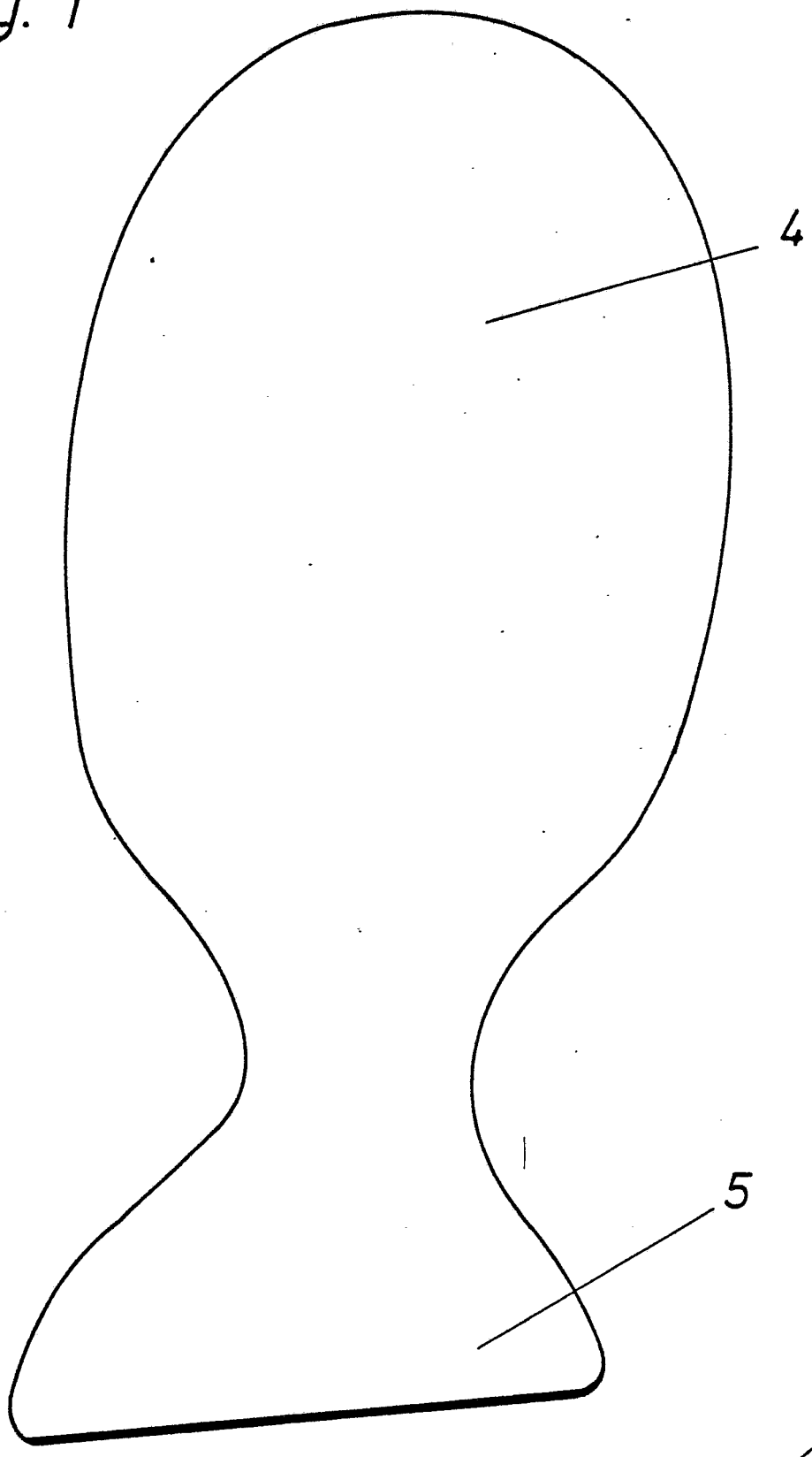

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Fig. 2

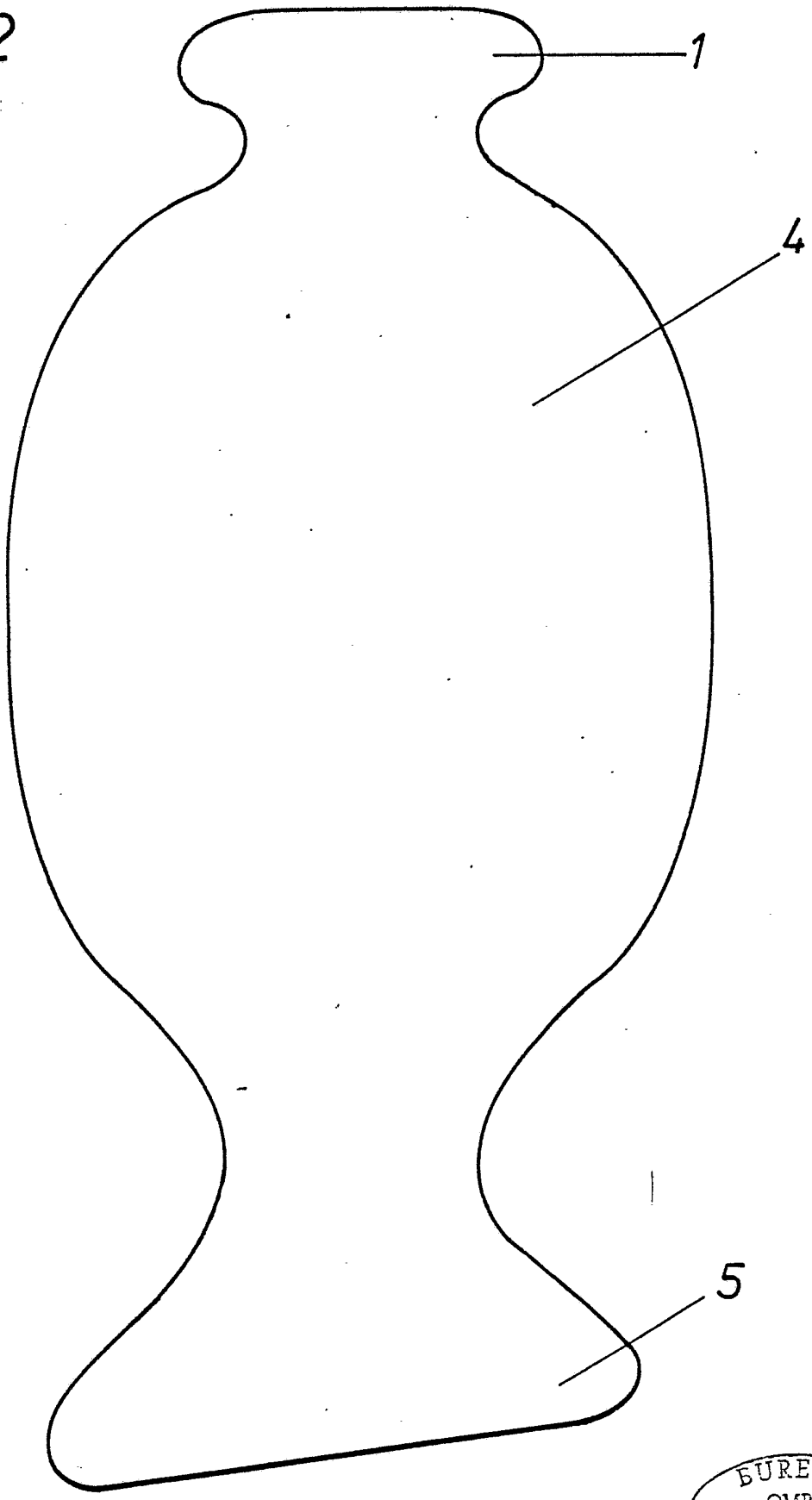
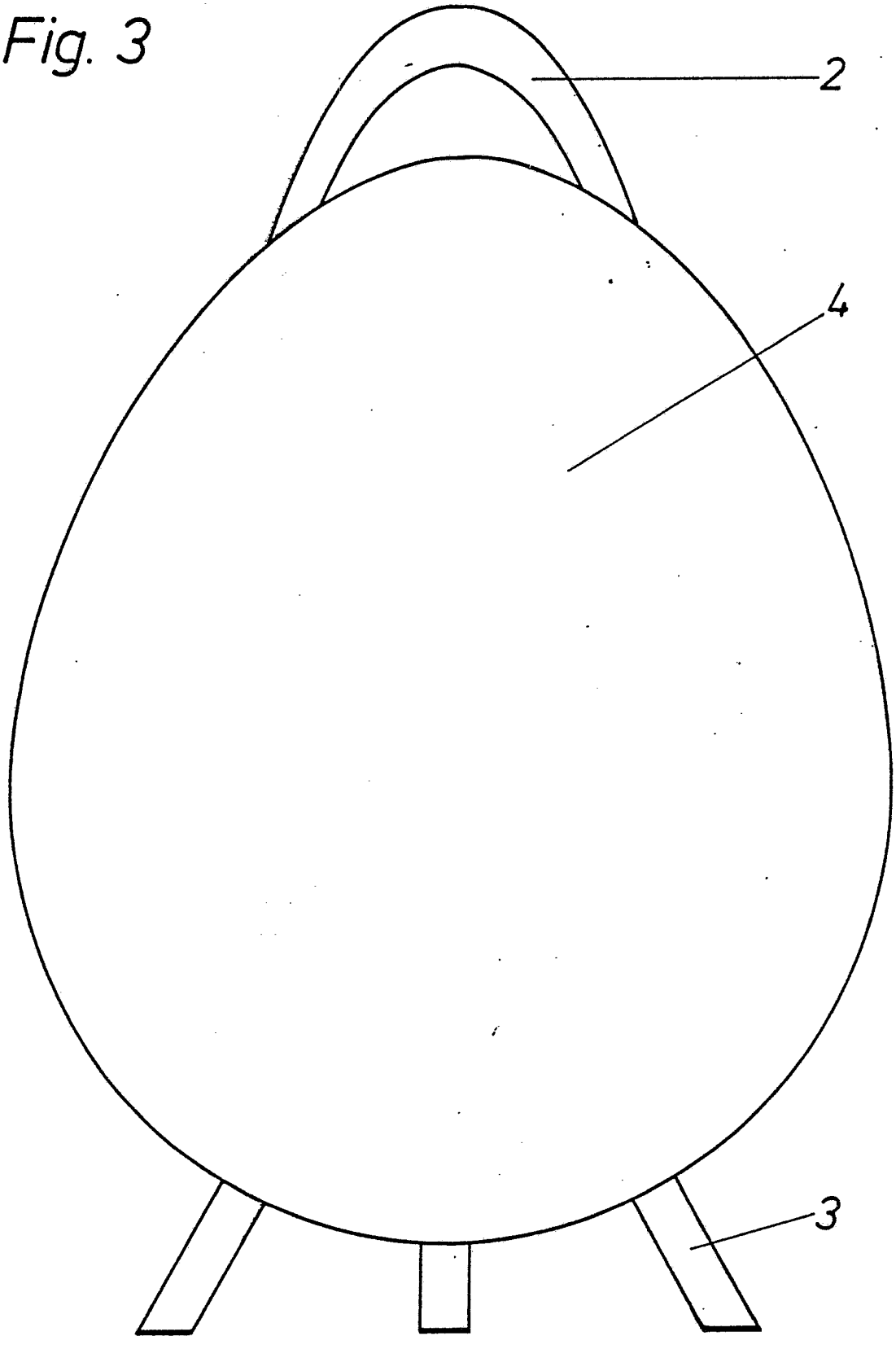


Fig. 3



INTERNATIONAL SEARCH REPORT

International Application No PCT/DK83/00002

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) [3]

According to International Patent Classification (IPC) or to both National Classification and IPC 3

F 24 H 7/00, 9/18, F 23 M 9/06

II. FIELDS SEARCHED

Minimum Documentation Searched [4]

Classification System	Classification Symbols
IPC 3	F 24 H 7/00-7/06, 9/18, F 23 M 3/00-3/22, 9/00-9/10
US Cl	126:298, 375, 400; 110:97

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched [5]

SE, NO, DK, FI classes as above

III. DOCUMENTS CONSIDERED TO BE RELEVANT [14]

Category *	Citation of Document, [16] with indication, where appropriate, of the relevant passages [17]	Relevant to Claim No. [18]
A	SE, B, 393 447 (S R LJUNG) 9 May 1977 & DE, B2, 2 519 972	
X	SE, B, 408 728 (S A NILSSON) 2 July 1979	1, 5
A	WO, A1, 81/01603 (A PEDERSEN) 11 June 1981	
A	US, A, 2 858 781 (A M HEXDALL) 4 November 1958	
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IV. CERTIFICATION

Date of the Actual Completion of the International Search [2]	Date of Mailing of this International Search Report [2]
1983-03-17	1983 -03- 29
International Searching Authority [1]	**Signature of Authorized Officer [20]**
Swedish Patent Office	Pontus Nelander

III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)

Category *	Citation of Document, [16] with indication, where appropriate, of the relevant passages [17]	Relevant to Claim No [18]
X	DE, A1, 2 440 451 (W HÜBELMANN) 4 March 1976	1, 2
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