

AUSTRALIA
Patents Act 1952

DECLARATION IN SUPPORT OF A CONVENTION
APPLICATION FOR A PATENT

In support of the Convention Application made for a patent
for an invention entitled:

"FIXATION DEVICE"

I, HELGE LINDHEIM, Director for Industrial Division in Alfsen
Og Gunderson A/S, of Hagaveien 134, N-0980 Oslo 9, Norway

do solemnly and sincerely declare as follows:-

1. I am authorized by ALFSEN & GUNDERSON A/S, the applicant
for the patent to make this declaration on its behalf.

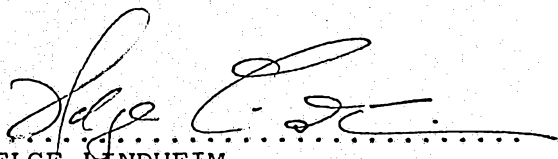
2. The basic application as defined by section 141 of the
Act was made in the Norway on the 16th day of June
1986, by ALFSEN & GUNDERSON A/S.

3. Harald Gunderson, of Amotveien 14, N-0880, Oslo 8,
Norway, is the actual inventor of the invention and the
facts upon which the applicant is entitled to make the
application are as follows:-

The Applicant is the Assignee from the Actual Inventor,
Harald Gunderson.

4. The basic application referred to in paragraph 2 of this
Declaration was the first application made in a
Convention country in respect of the invention the
subject of the application.

Declared at *Oslo*.....this *4TH* day of *MAY*.....1989.


.....
HELGE LINDHEIM

TO: THE COMMISSIONER OF PATENTS.

AUSTRALIA

Patents Act 1952

DECLARATION IN SUPPORT OF A CONVENTION APPLICATION FOR A PATENT

In support of the Convention application made for a patent for an invention entitled:

1. HELGE LINDHEIM, DIRECTOR FOR INDUSTRIAL DIVISION
IN ALFSEN OG GUNDERSON A/S
OF PRIV. ADK.: HAGAVEIEN 134, N-0780 OSLO 9, NORWAY

do solemnly and sincerely declare as follows:-

~~1. I am the applicant for the patent~~

~~(or, in the case of an application by a body corporate)~~

1. I am authorized by ALFSEN & GUNDERSON A/S, the applicant
for the patent to make this declaration on its behalf.

2. The basic application as defined by section 141 of the Act was made in Norway on the
16th day of June, 1986, by Alfsen & Gundersen A/S

~~3. I am the actual inventor of the invention referred to in the basic application.~~

~~(or, where a person other than the inventor is the applicant)~~

3. Harald Gundersen

of Amotveien 14, N-0880, Oslo 8, Norway

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

The Applicant is the Assignee from the Actual Inventor, HARALD GUNDERSON.

4. The basic application referred to in paragraph 2 of this Declaration was the first application made
in a Convention country in respect of the invention the subject of the application.

~~(or, where a request is made under section 142AA of the Patents Act 1952, for
an earlier application made in a Convention country to be disregarded)~~

~~4. (1) The basic application referred to in paragraph 2 of this Declaration was not the first applica-
tion made in a Convention country in respect of the invention the subject of the application.~~

~~(2.) An earlier application in respect of the invention the subject of the application was made in~~

~~on~~

~~(3.) A request has been made to you under section 142AA of the Patents Act 1952 to disregard that
earlier application.~~

~~(Here set out in succeeding sub-paragraphs the facts that show that section 142AA is applicable)~~

Except as stated in this paragraph, the basic application referred to in paragraph 2 of this Declaration
the first application made in a Convention country in respect of the invention the subject of the application.

Declared at Oslo this 18th day of February, 19 88

TO:

THE COMMISSIONER OF PATENTS.

Helge Lindheim
(Signature of Declarant)
for Alfsen og Gundersen

(IMPORTANT - Cross out inapplicable words in above Form.)

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FIXATION DEVICE

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(71) Applicant(s)
ALFSEN & GUNDERSON A/S

(72) Inventor(s)
HARALD GUNDERSON

(74) Attorney or Agent
WRAY & ASSOCIATES

(57) Claim

1. Fixation device for permeable web materials for paper machines, wherein air at a desired temperature and pressure is passed through the web from jets provided in at least one pressure chamber on one side of the web to at least one corresponding suction chamber on the other side of the web, said device comprising an upper structure and a lower structure between which runs the web during operation, wherein a first pressure chamber with a corresponding suction chamber being arranged at the web input of said device, and a second pressure chamber with a corresponding suction chamber being arranged at the web output of said device, and at least one intermediate pressure chamber with a corresponding suction chamber, said pressure chambers being arranged such that each adjacent pressure chamber is located at the opposite side of the web, said jets comprising a front jet and a rear jet arranged in an acute angle to the web and convergent to each other thereby establishing and maintaining an overpressure between the jets and the web, said jets in opposing pressure chambers being adjacent each other and

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arranged such that air is directed past each other so as to substantially prevent air from one pressure chamber penetrating into the adjacent suction chamber, and the upper and lower structures being provided with ducts for an air flow having a desired temperature, thereby avoiding deformations of the upper and lower structures due to temperature influences from the heated air in the fixation process.

PCT

AU-AI-74828/87
WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

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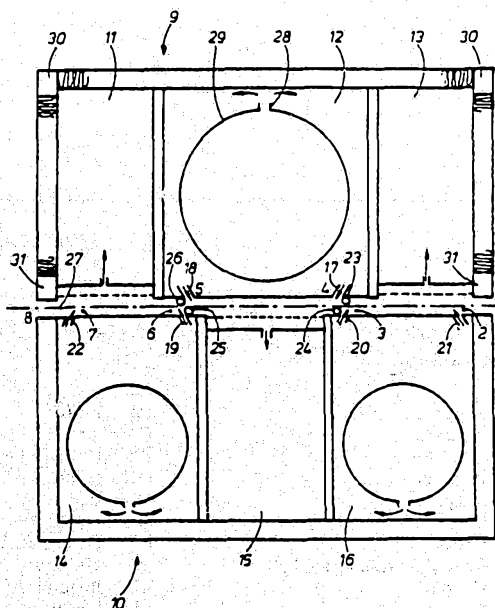
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(21) International Application Number: PCT/NO87/00046 (22) International Filing Date: 11 June 1987 (11.06.87) (31) Priority Application Number: 862395 (32) Priority Date: 16 June 1986 (16.06.86) (33) Priority Country: NO (71) Applicant (for all designated States except US): ALFSEN & GUNDERSON A/S [NO/NO]; Stålverksvn. 1, N-0661 Oslo 6 (NO). (72) Inventor; and (75) Inventor/Applicant (for US only) : GUNDERSON, Harald [NO/NO]; Åmotveien 14, N-0880 Oslo 8 (NO). (74) Agent: TANDBERGS PATENTKONTOR A-S; Uraniborg Terrasse 19, N-0351 Oslo 3 (NO).		(81) Designated States: AT, AT (European patent), AU, BE (European patent), BR, CH, CH (European patent), DE, DE (European patent), FI, FR (European patent), GB (European patent), IT (European patent), JP, KR, NL, NL (European patent), SE, SE (European patent), SU, US. Published With international search report.	
The document contains the amendments made under Section 49 and is correct for printing		A.O.J.P. 11 FEB 1988 AUSTRALIAN 11 JAN 1988 PATENT OFFICE	

(54) Title: FIXATION DEVICE

(57) Abstract

Fixation device for permeable web materials, such as felts and wires for paper machines, where air at controlled temperature and pressure is pressed through the web from jets in at least one pressure chamber (12) on one side of the web, to at least one corresponding suction chamber (15) on the other side of the web, the device thereby comprising an upper structure (9) and a lower structure (10) between which the web is running during operation where a pressure chamber (16) with a corresponding suction chamber (13) being arranged in front of, and a pressure chamber (14) with a corresponding suction chamber (11) being arranged behind, at least one middle pressure chamber (12) with a corresponding suction chamber (15), each pressure chamber (12, 14, 16) being provided with two jets arranged in an acute angle to the web and towards each other, with one front jet (17, 19, 21) and one rear jet (18, 20, 22), thereby establishing and maintaining an overpressure between the jets and the web, jets arranged in opposed pressure chambers and adjacent each other thereby directing air passed each other in such a way that air from one pressure chamber substantially is prevented in penetrating into the adjacent suction chamber, and the upper and lower structures (9, 10) being provided with ducts (30, 31) for an air flow having a controlled temperature, thereby avoiding deformations of the upper structure (9) due to temperature influences from the heated air in the fixation process.



Fixation Device

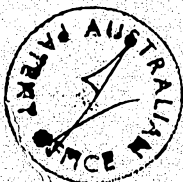
The present invention is related to a fixation device for felts and wires for paper machines.

Felts and wires for paper machines today are produced in widths up to 10 metres and are constructed to withstand extreme environmental conditions, such as high moisture content, high temperature, high pressure, longitudinal tension forces and influence from chemicals.

The felts and the wires, shaped as endless bands, operate at very high speeds in the paper machines, in extreme cases up to 2000 metres per minute. It therefore is important that they possess uniform properties both in the longitudinal as well as in the transversal direction to ensure operation without problems.

One of the processes involved in the production of all types of felts and wires today is heat treatment at a temperature substantially higher than the highest temperature under which the products are used in the paper machines. This heat treatment, the fixation, provides the felts and the wires with thermical stabile properties and desired stretching properties. Additionally the felts and the wires also are treated with chemical solutions to harden at specified temperatures.

To provide the felts and the wires with the desired properties it is important that the same maximum temperature is achieved across the whole width of the felt during the fixation process. Furthermore it is desirable to achieve the same temperature throughout the thickness of the felt and the wire, in other words in the upper and lower surfaces as well as in the middle.



During fixation the felts and the wires, as endless bands, are stretched between two parallel rolls of which at least one is driven in such a way that the felts can be moved through the fixation zone which is arranged parallel to and between the axis of the rolls.

A heating method normally employed in the fixation process is blowing heated air against both sides of the felt. As stated above, it is very important, and necessary, to maintain a constant air temperature across the whole width of the felt or wire. It is, however, insufficient that the temperature of the blown air be constant only across the width as pressure differences may occur in the fixation zone due to small differences in the high air velocity which is necessary to achieve a good heat transfer to the felt. Surrounding air could very easily be drawn into the process by induction, which means that the environmental air is drawn into the fixation zone itself and here mixed with the air having a desired temperature.

The main parameters influencing the result of the fixation process are the temperature of the air penetrating the felt, the amount of air penetration, the velocity of the air through the felt and strongly influencing the aforementioned, the distance between the jets and the felt is of major importance, eg the distance must be uniform along the entire length of the jets. Influencing the distance between the jets and the felt during operation is the behaviour of the upper structure due to the heat influence, which across a length of 10 metres or even more, can lead to a not acceptable distance difference between the middle of the structure and the ends.



Any leakage of surrounding air into the fixation zone will lead to a temperature reduction, and especially local reductions thereby increasing the danger of undesired temperature variations across the surface of the felt. Such air leakage is reduced to a certain extent by the use of sealings at apertures where the felt and the wire is transferred into or out of the heating zone, but a complete elimination so far has been difficult to achieve in practical work. By the fixation device according to the present invention, this problem in the fixation process is avoided in such a way that leakage air from the environment does not affect the conditions in the fixation zone.

In one form the invention resides in a fixation device for permeable web materials for paper machines, wherein air at a desired temperature and pressure is passed through the web from jets provided in at least one pressure chamber on one side of the web to at least one corresponding suction chamber on the other side of the web, said device comprising an upper structure and a lower structure between which runs the web during operation, wherein a first pressure chamber with a corresponding suction chamber being arranged at the web input of said device, and a second pressure chamber with a corresponding suction chamber being arranged at the web output of said device, and at least one intermediate pressure chamber with a corresponding suction chamber, said pressure chambers being arranged such that each adjacent pressure chamber is located at the opposite side of the web, said jets comprising a front jet and a rear jet arranged in an acute angle to the web and convergent to each other thereby establishing and maintaining an overpressure between the jets and the web, said jets in opposing pressure chambers being adjacent each other and



arranged such that air is directed past each other so as to substantially prevent air from one pressure chamber penetrating into the adjacent suction chamber, and the upper and lower structures being provided with ducts for an air flow having a desired temperature, thereby avoiding deformations of the upper and lower structures due to temperature influences from the heated air in the fixation process.

In the drawings Fig. 1 discloses schematically a vertical section in longitudinal direction of the felt, of a fixation device according to the invention, and Fig. 2 and 3 disclose diagrams with the temperature of the felt in the longitudinal direction, of the upper surface of the felt, respectively in the middle of the felt.

Fig. 1 discloses the principal structure of a fixation device according to the invention, comprising an upper structure 9 and a lower structure 10 extending across the total width of the felt or the wire 27, perpendicular to the direction of movement of the felt. The felt is an endless band, whereas only a short segment is disclosed in the Figure.

The upper structure 9 comprises a middle pressure chamber 12 supplied with pressurized air through a slit 28 in a duct 29, arranged in such a way that the air conditions i.e. the temperature and pressure in the lower end of the pressure chamber 12 and especially across the full length of jets 5 and 17 arranged in the chamber, are substantially uniform.

The upper structure 9 is arranged a distance from the lower structure 10, whereby the felt or the wire 27 is transferred between the structures. A middle suction chamber being arranged in the lower structure 10 is



adapted to receive the pressurized air from the middle pressure 12 in the upper structure after the air has passed through the felt 27. From the suction chamber 15 the air is brought to the devices adapted for the conditioning of the air before re-entrance into the pressure chamber 12, when using a closed circuit system.

In the lower structure 10, one pressure chamber is arranged on each side of the middle suction chamber 15, a front pressure chamber 16 and a rear pressure chamber 16. The pressure chambers 14 and 16 are supplied with pressurized air principally in the same manner as the pressure chamber 12, in such a way that the pressure conditions in the upper parts of the pressure chambers 14 and 16 being substantially uniform when entering first and second jets 19 and 22 in the pressure chamber 14 and first and second jets 21 and 20 in the pressure chamber 16.

Front and rear suction chambers 13 and 11' are arranged in the upper structure 9 opposed to the lower pressure chambers on each side of the middle pressure chamber 12. From the suction chambers 11 and 13 the air is guided to devices for reintroduction into the pressure chambers 14 and 16, separately or independently when using a closed circuit system.

The front jet 17 in the middle pressure chamber 12 is arranged on the inside eg towards the middle of the fixation device as such, of the second jet 20 in the lower pressure chamber 16 in such a way that substantially all air from the jet is passed through the felt and into the middle suction chamber 15 whereas the air from the jet 20 in the lower pressure chamber 16 is passed into the front suction chamber 13.



All jets of the pressure chambers are arranged substantially in the front or rear part of the chambers and directed in an acute angle in relation to each other and to the web in such a way that the air from the jets builds up an overpressure between the jets and the felt and is passed through the felt into the opposed suction chamber. In this way the jets 20 and 21 of the front pressure chamber 16 in the lower structure are directing the air into the opposed suction chamber 13 in the upper structure, the jets 17 and 18 in the middle pressure chamber 12 are directing the air into the opposed middle suction chamber 15 and the jets 19 and 22 of the rear pressure chamber 14 are directing the air into the opposed suction chamber 11 in the upper structure.

To furthermore avoid the air coming from the rear jet 20 of the front pressure chamber 16 and from the front jet 19 of the rear pressure chamber 14 in penetrating through the felt into the middle suction chamber 15, a sealing device in the form of a bar 23 is extended across the entire length of the structure arranged in front of the jet 17 thereby substantially closing the gap between the felt and the structure without touching the felt to thereby avoid destruction of the felt surface. The air from the jet 20 is thereby guided on the outside of the bar 23, respectively the air from the jet 19 being guided on the outside of a bar 26 arranged behind the jet 18. Correspondingly, by means of a bar 24 inside the jet 20, and a bar 25 inside the jet 19, air from jets 17 and 18 is guided on the inside of the bars 24 and 25, thereby additionally contributing to avoid air from the front and rear pressure chambers to be brought into the middle air system. The bars 23-26 have such a form and are such arranged such that they do not or just even touch the felt



and substantially close the distance between the felt and the upper, respectively the lower structure 9 and 10.

During operation the environmental air necessary is sucked in together with the felt 27 through the apertures between upper and lower structures 9 and 10, at both their front and rear portions. This environmental air will be taken up by the suction chambers 11 and 13 and therefore will not influence the heat treatment of the felt or the wire.

As disclosed in Fig. 1, the upper structure 9 is provided with a support structure having closed channels 30 in the upper portion and corresponding closed channels 31 in the lower portion. The upper structure naturally also can be provided with further channels for the same purpose. The channels 30, 31 are used for air flow having a controlled temperature thereby ensuring that the upper structure 9 is not being deformed by influence of the heat from the fixation operation. This feature is especially essential for upper structures 9 having a relatively small height and bridging a rather long distance across the felt. The air through the channels 30 and 31 may be taken from one of the pressure chambers or from an auxiliary device.

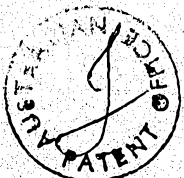
By providing a separate circuit for the air between the middle chambers and a further circuit for the air in the outer chambers, possible separate circuits even for the two outer chambers, a uniform treatment of the felt is ensured during fixation and thereby resulting in a uniform felt. In addition the parameters influencing the air transferred from the individual pressure chambers to the respective suction chambers, as well as the moving speed of the felt, may be controlled by a central computer device.



Tests have been performed with measurement of the temperature in the internal parts of the felt and on the surface of the felt at measuring points 1-8 as disclosed in Fig. 1. The measured values from those tests are disclosed in diagrams Fig. 2 and 3. Nominal temperature of the air was 150°C and the resting time of the felt in the treatment zone was approximately 2 minutes and 15 seconds. The weight of the felt used was 1,03 kilo per m² and the permeability of the felt was 40 metre per minute at 250 Pa.

As disclosed in the diagrams 2 and 3, a very uniform temperature curve was achieved between the measuring points 4 and 6 and the temperature curves in this area approximately are the same on the upper surface of the felt as in the middle of the felt.

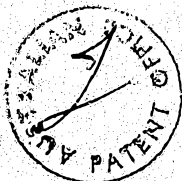
Various other changes and modifications may be made to the embodiment described without departing from the spirit and scope of the invention.



THE CLAIMS defining the invention are as follows:-

1. Fixation device for permeable web materials for paper machines, wherein air at a desired temperature and pressure is passed through the web from jets provided in at least one pressure chamber on one side of the web to at least one corresponding suction chamber on the other side of the web, said device comprising an upper structure and a lower structure between which runs the web during operation, wherein a first pressure chamber with a corresponding suction chamber being arranged at the web input of said device, and a second pressure chamber with a corresponding suction chamber being arranged at the web output of said device, and at least one intermediate pressure chamber with a corresponding suction chamber, said pressure chambers being arranged such that each adjacent pressure chamber is located at the opposite side of the web, said jets comprising a front jet and a rear jet arranged in an acute angle to the web and convergent to each other thereby establishing and maintaining an overpressure between the jets and the web, said jets in opposing pressure chambers being adjacent each other and arranged such that air is directed past each other so as to substantially prevent air from one pressure chamber penetrating into the adjacent suction chamber, and the upper and lower structures being provided with ducts for an air flow having a desired temperature, thereby avoiding deformations of the upper and lower structures due to temperature influences from the heated air in the fixation process.

2. Fixation device according to claim 1, comprising sealing devices extending at least between the jets in opposing pressure chambers adjacent each other, and extending along the length of the pressure-chambers, said



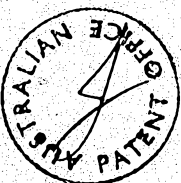
sealing devices being positioned between the web and the intermediate pressure chamber and between the web and the intermediate suction chamber, thereby preventing air from adjacent pressure and suction chambers penetrating into the air system of the intermediate pressure and suction chamber.

3. Fixation device according to anyone of the preceding claims wherein the pressure and temperature of the air from one pressure chamber to its corresponding suction chamber being independently controllable concerning pressure and temperature for the air, from the air flow in adjacent pressure chambers and corresponding suction chambers.

4. Fixation device according to any one of the preceding claims, comprising a duct being provided along the entire length of each pressure chamber, having an outlet for air arranged in an opposite direction to the outlet of the jets in the pressure chamber, such that the air at the input of the jets have uniform temperature and pressure.

5. Fixation device according to claim 1, wherein the upper structure being provided with at least upper and lower ducts for the circulation of air having a desired temperature, thereby avoiding thermal deformations due to the influence of the air transfer between the chambers.

6. Fixation device according to claim 3, wherein the parameters for the air transferred from the individual pressure chambers to the respective suction chambers, as well as the moving speed of the felt, being controlled a central computer device.



7. Fixation device as substantially herein described
with reference to the accompanying drawings.



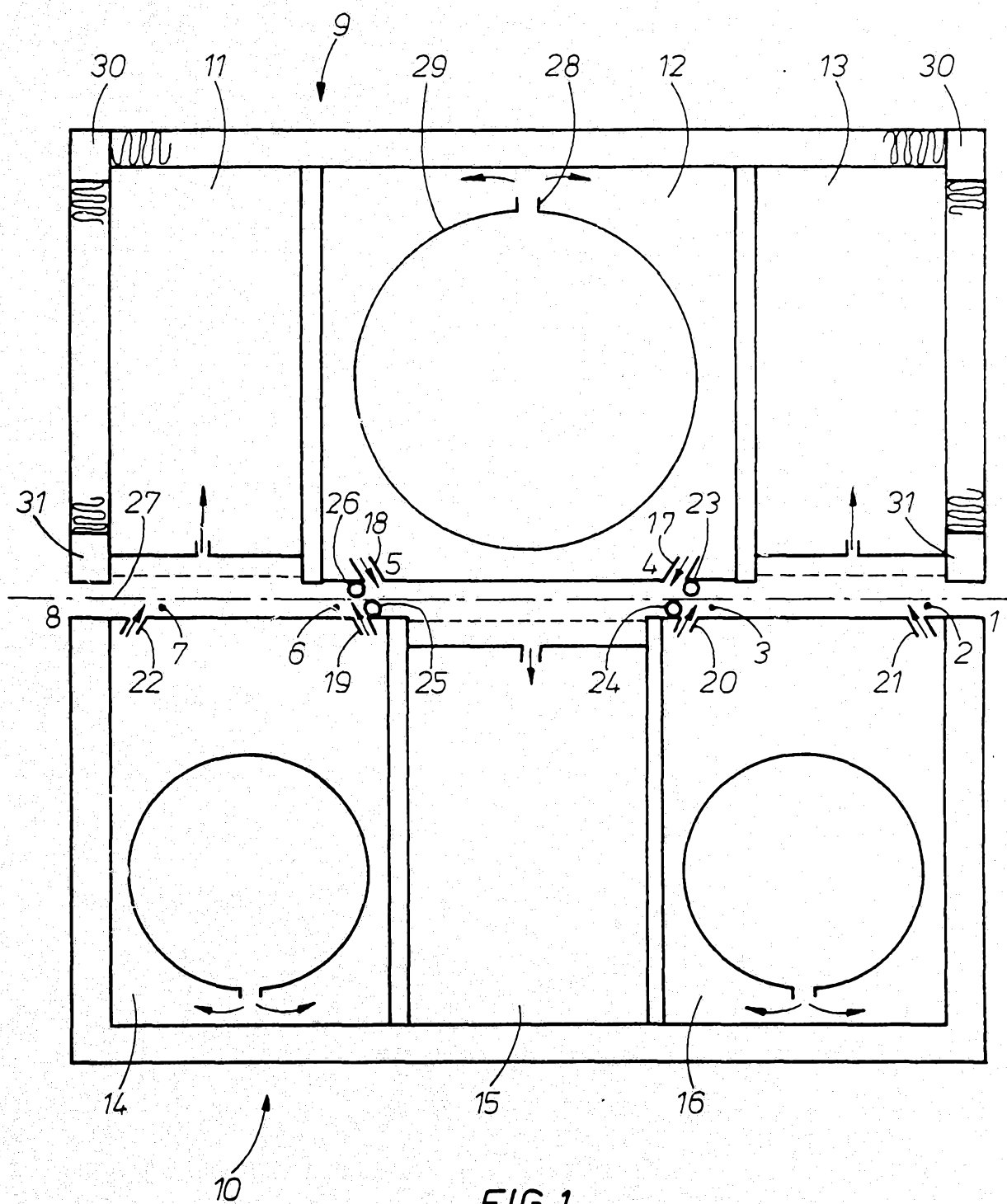


FIG. 1

SUBSTITUTE SHEET

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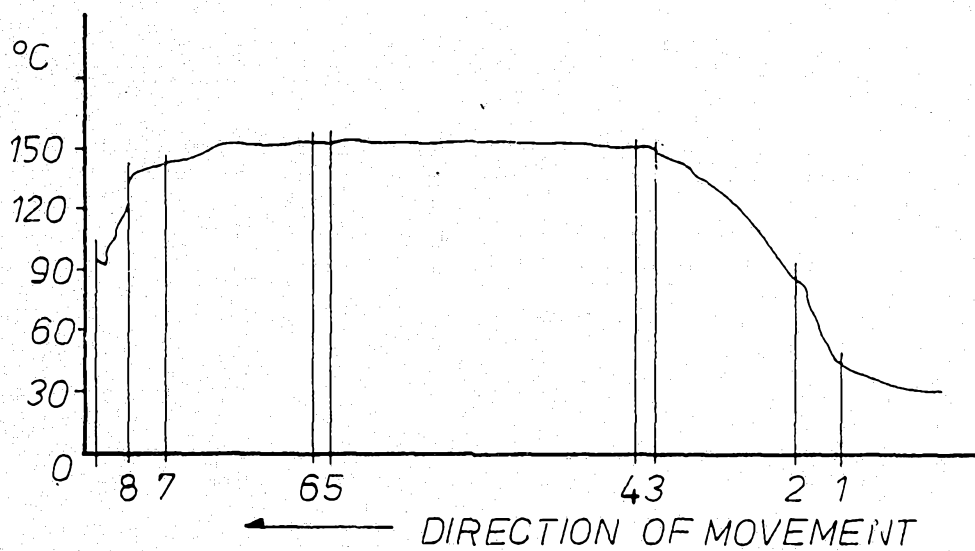


FIG. 2

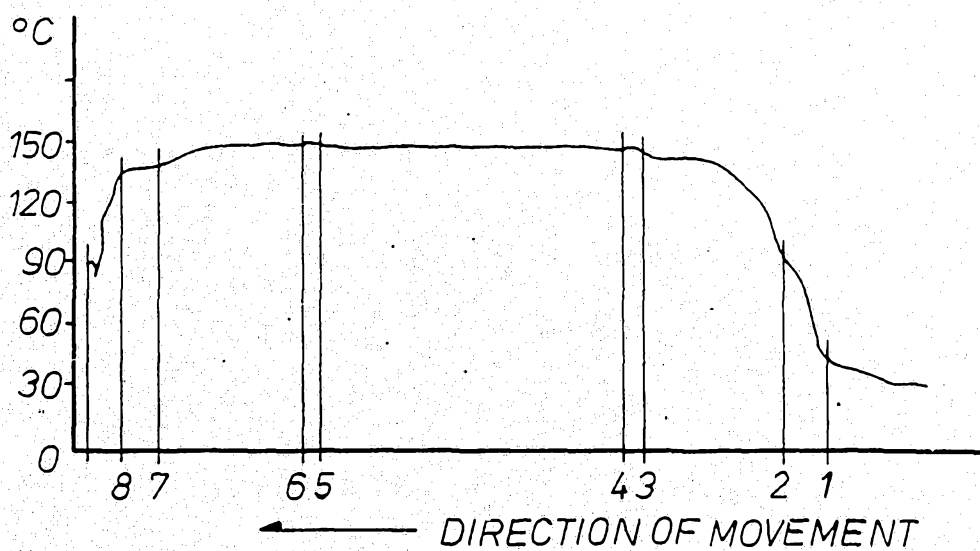
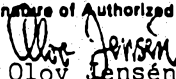


FIG. 3

SUBSTITUTE SHEET

INTERNATIONAL SEARCH REPORT

International Application No PCT/NO87/00046

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) *		
According to International Patent Classification (IPC) or to both National Classification and IPC 4		
D 21 F 1/10, 7/08		
II. FIELDS SEARCHED		
Minimum Documentation Searched 7		
Classification System	Classification Symbols	
IPC	D 06 B 5/00, /02, /08, 19/00; D 21 F 1/10, 7/08	
US C1	34:23, 24, 148, 151, 152, 155, 160	
Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched *		
SE, NO, DK, FI classes as above		
III. DOCUMENTS CONSIDERED TO BE RELEVANT *		
Category *	Citation of Document, 11 with Indication, where appropriate, of the relevant passages 12	Relevant to Claim No. 13
A	US, A, 3 371 427 (PROCTOR & SCHWARTZ, INC) 5 March 1968	1
* Special categories of cited documents: 10 "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier document but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art. "A" document member of the same patent family		
IV. CERTIFICATION		
Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report	
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International Searching Authority	Signature of Authorized Officer	
Swedish Patent Office	 Olov Jensen	