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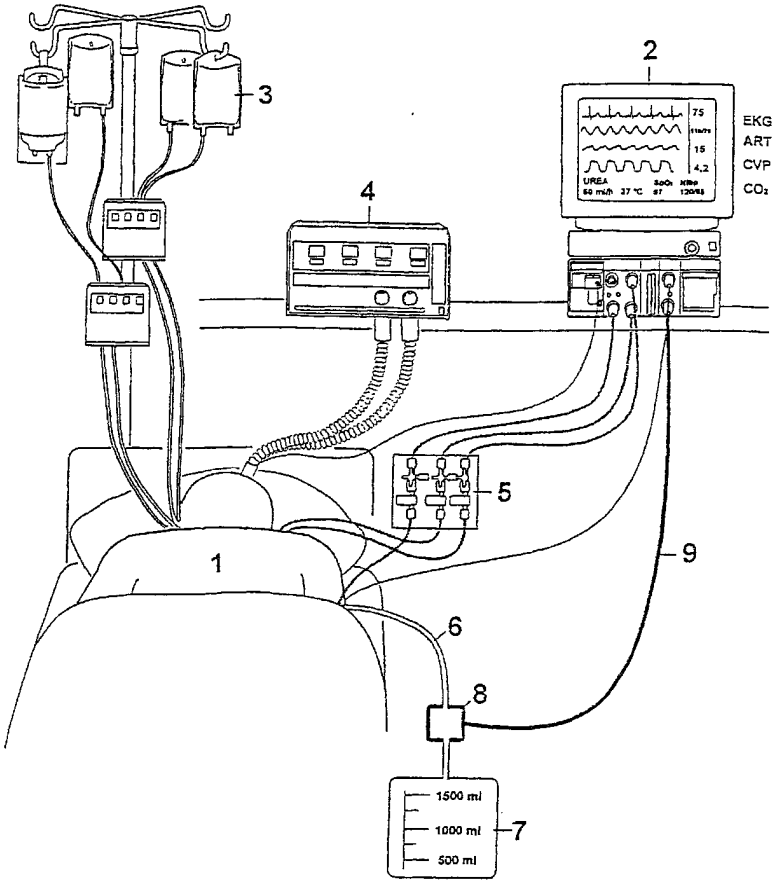
(54) Title: ARRANGEMENT FOR PATIENT MONITOR



(57) Abstract: The invention relates to an arrangement for a patient monitor arranged to measure one or more parameters from a patient from other than urine or the urinary tract. To improve the ergonomics of patient monitoring work, the arrangement comprises a sensor (8) that is arranged between a patient urinary tract catheter (6) and a urine collection container (7) or the like and that is arranged to measure at least the flow or volume of the patient's urine output, and means (9) for conveying the data measured to the patient monitor (2).

IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

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ARRANGEMENT FOR PATIENT MONITOR

The invention relates to an arrangement for a patient monitor arranged to perform one or more parameters on a patient from other than urine or the urinary tract.

For example in anaesthetic and intensive care, it is vital to continuously monitor a patient's condition, wherefore a special patient monitor is used for monitoring the patient's condition, the monitor measuring different parameters from the patient, e.g. EKG, NIBP, oxygen saturation, respiratory gases and invasive pressures etc. The number of parameters to be measured may depend on for example the situation at hand etc.

In addition to the above measurements, particularly in anaesthetic and intensive care it is important to follow, not only the above parameters, but also kidney function. In monitoring kidney function, hourly diuresis is important, since it expresses not only the reserves of the circulatory organs, but also the sufficiency of fluid treatment. The information should be given as uptake-with-respect-to-time, i.e. ml/5 min, ml/15 min, ml/30 min and ml/h, including cumulative uptake.

In presently used arrangements, the parameters used in patient monitoring are monitored by means of a patient monitor. However, for example urine is presently measured completely manually, whereby a nurse ocularly estimates the patient's urine output ml/h from an hourly urine collection container. In practice, the arrangement is laborious, since hospital personnel spend a lot of time in determining the amount of hourly urine.

Instead of manual measurement, urine can be measured more technically by the use of a special urine measurement device, in which hourly urine circulates through the device and the device measures the patient's hourly urine. For example US 5,891,051 discloses such a device. The device disclosed in US 5,891,051 is a separate monitor that cannot be connected to a larger monitoring unit. The device can also be used to register a patient's core temperature by the use of a special catheter provided with a sensor.

In present arrangements, urine flows along a catheter to an hourly urine collection container having a volume of about 500 ml. Once an hour, the hospital personnel have to empty the urine collection container into a larger urine collection bag. At present, the information is either manually added to a patient data system or the information is written down in the patient's medical records (anaesthesia or intensive care form). The drawbacks include e.g. hu-

man factors, i.e. erroneous notes, forgetting etc. Further problems are caused by the trouble related to manual processing of the material, e.g. input of data in the system etc. It should be noted that the different patient-related measures very often have to be taken in a very pressing and stressful situation, which in itself is prone to cause human errors.

The object of the invention is to provide an arrangement that eliminates known prior art drawbacks. This is achieved with the arrangement of the invention, which is characterized in that the arrangement comprises a sensor arranged between a patient urinary tract catheter and a urine collection container or the like and arranged to measure at least the flow or volume of the patient's urine output, and means for conveying the data measured to the patient monitor.

The advantage of the invention is particularly that urine measurement, which previously caused extra work, can be monitored as one parameter in addition to other parameters. A special object of the invention is to achieve transfer of a signal obtained from urine measurement without manual input in the same monitor that monitors one or more measuring parameters from other than urine or the urinary tract. A further object is to display the urine measuring result on the display of the monitor simultaneously with some other parameter. Thus, no separate devices are required for measuring urine. This is of essential importance in practice, since intensive care units and operating theatres nowadays comprise such a high number of separate medical devices and related tubes and cables as to stress the tolerance of the medical staff to the utmost. The solution of the invention also ergonomically improves the medical staff's work compared with prior art, since utilization of the invention allows patients to be monitored entirely by means of the patient monitor, which facilitates work, since all necessary information is available on the patient monitor.

In the following, the invention will be described in detail by means of embodiments shown in the accompanying drawing, in which

Figure 1 schematically shows the arrangement of the invention in a patient care situation,

Figure 2 schematically shows a first embodiment of the arrangement of the invention,

Figure 3 schematically shows a second embodiment of the arrangement of the invention,

Figure 4 schematically shows a third embodiment of the arrangement of the invention, and

Figure 5 schematically shows a fourth embodiment of the arrangement of the invention.

Figure 1 schematically shows the arrangement of the invention in a patient care situation. In Figure 1, reference 1 denotes a patient. In Figure 1, reference 2 denotes a patient monitor arranged to measure different patient parameters, such as EKG, NIBP, oxygen saturation, respiratory gases, invasive pressures etc. The structure and use of a patient monitor are known per se to a person skilled in the art; hence, they are not explained in detail herein.

In Figure 1, reference 3 denotes infusion bags connected to the patient. Reference 4 denotes a respirator and reference 5 an invasive pressure set. Said components are shown to indicate the number of tubes sometimes connected to a patient.

In Figure 1, reference 6 denotes a urinary tract catheter, by means of which the patient's urine flows to a urine collection container 7. In accordance with the essential idea of the invention, the arrangement comprises a sensor 8 arranged between the patient urinary tract catheter 6 and the urine collection container 7 or the like. The sensor 8 is arranged to measure the flow or volume of the patient's 1 urine output. The sensor 8 can also be arranged to measure the momentary urine flow and/or the volume cumulated in a unit of time. Furthermore, the sensor can be arranged to measure urine temperature. The arrangement further comprises means for conveying the data measured to the patient monitor 2. The means 9 may be for example suitable conductors for transferring the data in electronic form to the patient monitor.

The essential advantage of the invention is that it enables routine urine measurement monitoring as one parameter in addition to other parameters without need for a separate device to measure this parameter. The arrangement of the invention substantially improves the ergonomics of work related to patient monitoring compared with the prior art. In practice, this is very important, since the number of different devices and the tubes and cables connected thereto is so high for example in operating theatres that it even causes risky situations etc., as was stated before. Separate devices, cables and tubes connected thereto sometimes also cause trouble when a patient is being moved. Such a situation arises easily for example when for some reason a patient has to be moved fast from one place to another, whereby a

separate device may be forgot due to the hurry. Such forgetfulness may cause for example a loose device to fall from a support surface onto the floor, which always causes extra work and checks and, in the worst case, the device may be damaged and has to be replaced etc.

It is also essential to the invention that a conventional normal urinary tract catheter can be used as the urinary tract catheter; hence, no special catheter type is needed.

There are many ways to implement the sensor 8 arranged between the urinary tract catheter 6 and the urine collection container 7 or the like. Figure 2 shows a first embodiment. In Figure 2, the same references have the same significance as in Figure 1. The exemplary embodiment shown in Figure 2 is a flow sensor 8a based on heat transfer. Reference 10 denotes a temperature 1 measuring sensor, reference 11 a heater and reference 12 temperature 2 measurement.

Figure 3 shows a second exemplary embodiment, which is a sensor 8b based on ultrasound. Reference 13 denotes input of a signal in a transmitter and reference 14 output of the signal from a receiver.

Figure 4 shows an exemplary embodiment using a sensor 8c based on a turbine. Reference 15 shows input of power to the sensor measuring the speed of rotation of the turbine and reference 16 an output signal from the sensor.

Figure 5 shows an exemplary embodiment using a sensor 8d based on a pressure difference. The pressure difference caused by a flow resistance installed inside a tube is measured between the points denoted by references 17 and 18.

The operation and structure of the sensors described above are known per se to a person skilled in the art; hence, they are not described in detail herein. In the embodiments of Figures 3 to 5, the sensor used to measure temperature can be placed for example as shown in Figure 2; e.g. sensor 10, at a suitable point so that urine temperature and flow data are measured at substantially the same point.

The urine temperature measured by means of sensor 8, 8a, 8b, 8c, 8d can also be used to calculate core temperature, which is important for example in drowning cases and burns. It is to be noted that the invention also allows the core temperature to be obtained without a special catheter provided with a sensor.

The above exemplary embodiments are in no way intended to restrict the invention, but the invention can be freely modified within the scope of the claims. Accordingly, it is apparent that the arrangement of the invention and its details do not necessarily have to be as described above, but other solutions are also feasible. After measurement, instead of a urine collection container, the patient's urine output can be conveyed to another container or alternatively poured down the drain if no other measurements are performed on the urine. The invention also allows measurement data to be obtained as a function of time, which was not successful previously when urine was conventionally measured for example manually.

CLAIMS

1. An arrangement for a patient monitor (2) arranged to measure one or more parameters from a patient (1) from other than urine or the urinary tract, **characterized** in that the arrangement comprises a sensor (8, 8a, 8b, 8c, 8d) arranged between a patient urinary tract catheter (6) and a urine collection container (7) or the like and arranged to measure at least the flow or volume of the patient's urine output, and means (9) for conveying the data measured to the patient monitor (2).

2. An arrangement as claimed in claim 1, **characterized** in that the sensor (8, 8a, 8b, 8c, 8d) is arranged to measure also urine temperature.

3. An arrangement as claimed in claim 1 or 2, **characterized** in that the sensor comprises a flow sensor (8a) based on heat transfer.

4. An arrangement as claimed in claim 1 or 2, **characterized** in that the sensor comprises a flow sensor (8b) based on ultrasound.

5. An arrangement as claimed in claim 1 or 2, **characterized** in that the sensor comprises a flow sensor (8c) based on a turbine.

6. An arrangement as claimed in claim 1 or 2, **characterized** in that the sensor comprises a flow sensor (8d) based on a pressure difference.

7. An arrangement as claimed in claim 2, **characterized** in that the arrangement is arranged to calculate the patient's core temperature by means of the information obtained from the urine temperature measurement.

8. An arrangement as claimed in any one of claims 1 to 7, **characterized** in that the sensor (8) is arranged to measure the momentary urine flow and/or the volume cumulated in a unit of time.

9. An arrangement as claimed in any one of claims 1 to 8, **characterized** in that the patient monitor (2) is arranged to measure the patient's EKG, NIBP, oxygen saturation and respiratory gases.

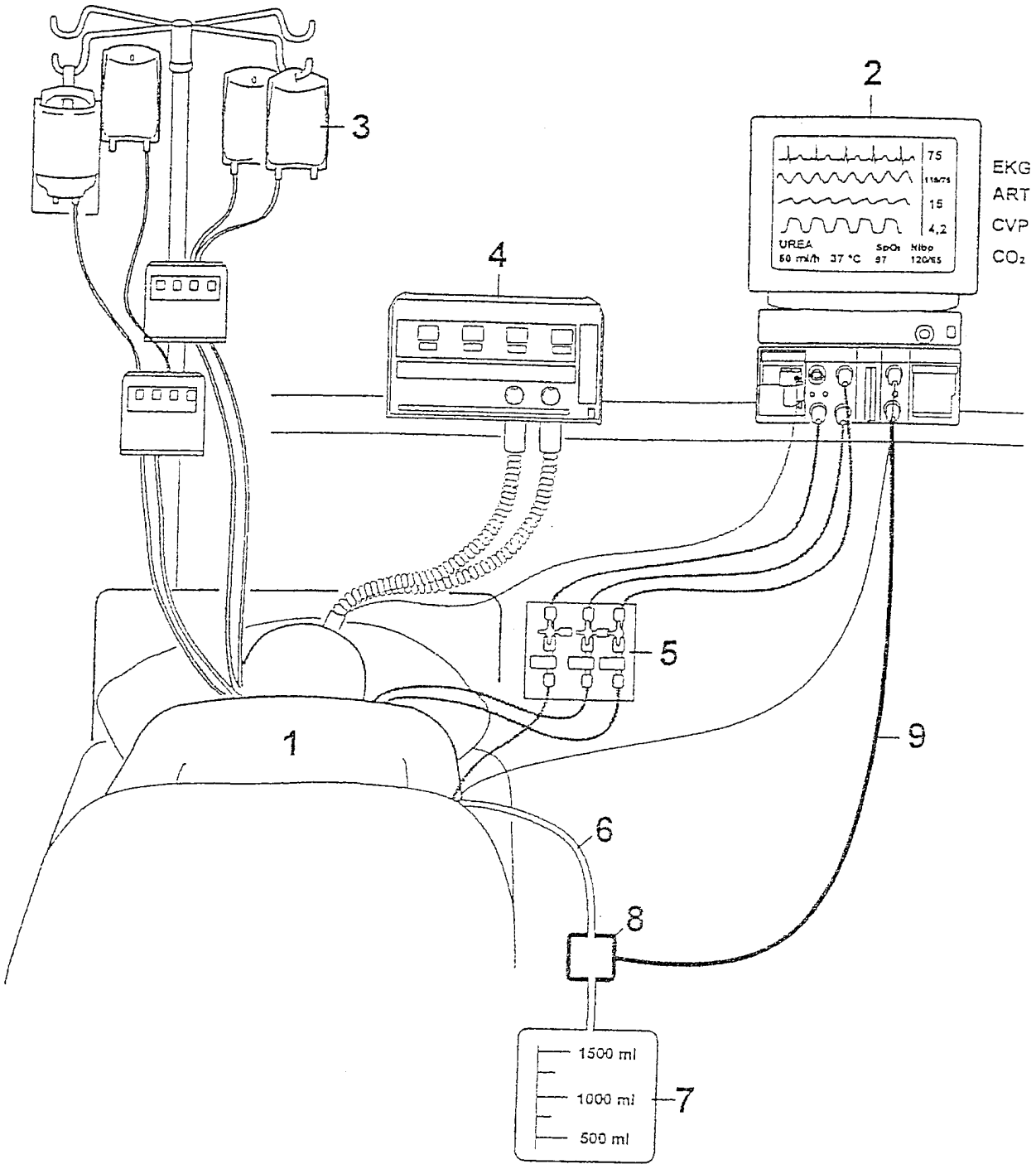

FIG. 1

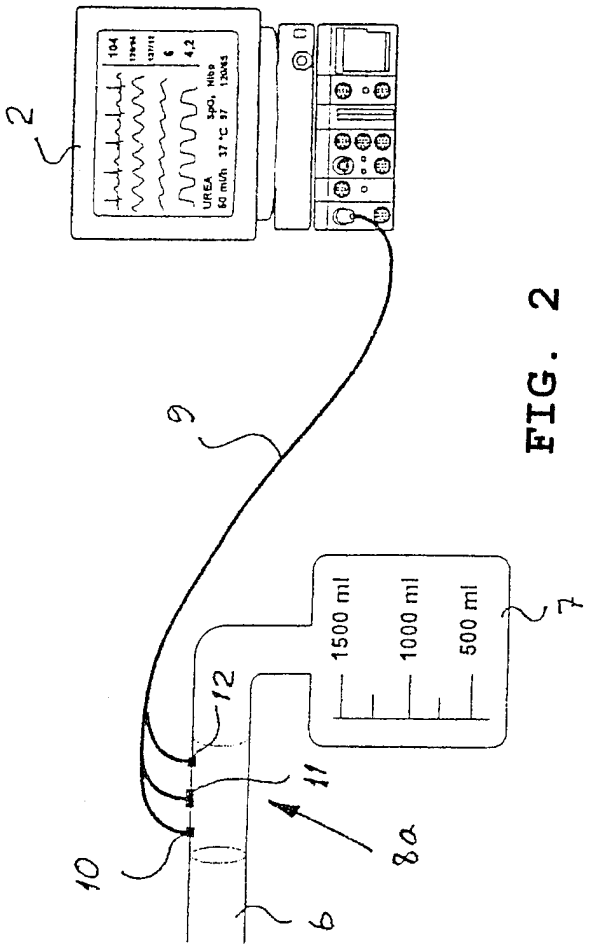
2
9
1500 ml
1000 ml
500 ml
7
12
11
10
8a
6

FIG. 2

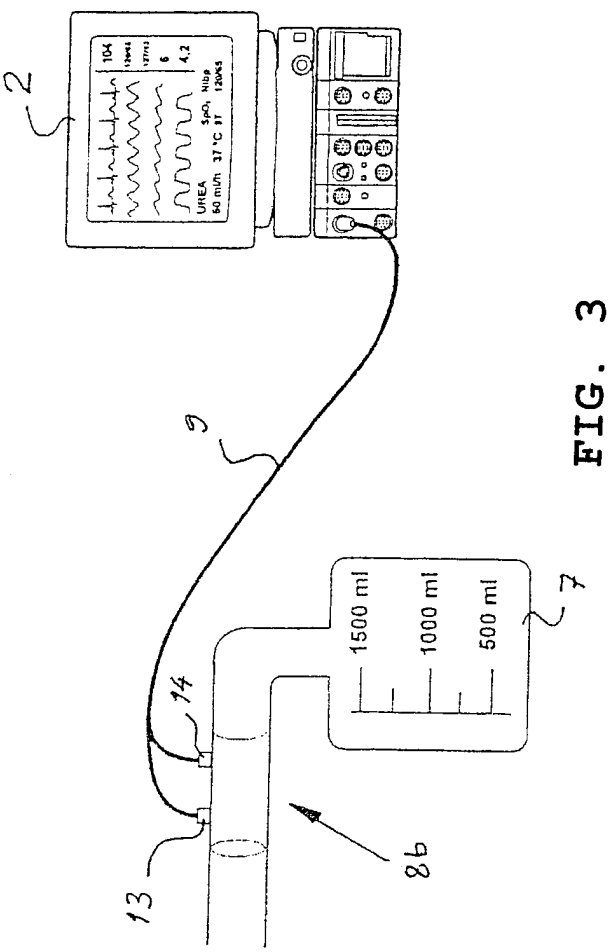
2
9
1500 ml
1000 ml
500 ml
7
14
13
8b

FIG. 3

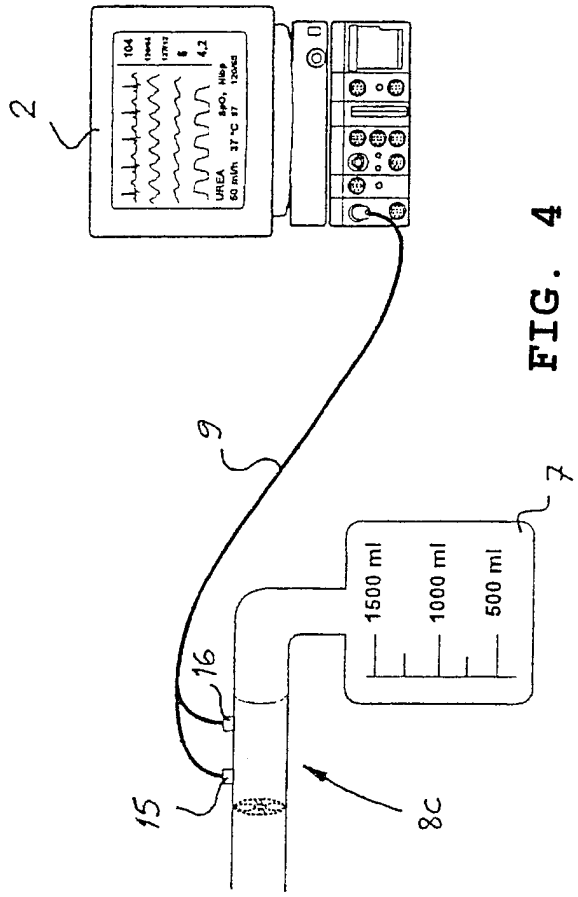
2
9
7
1500 ml
1000 ml
500 ml
16
15
8c

FIG. 4

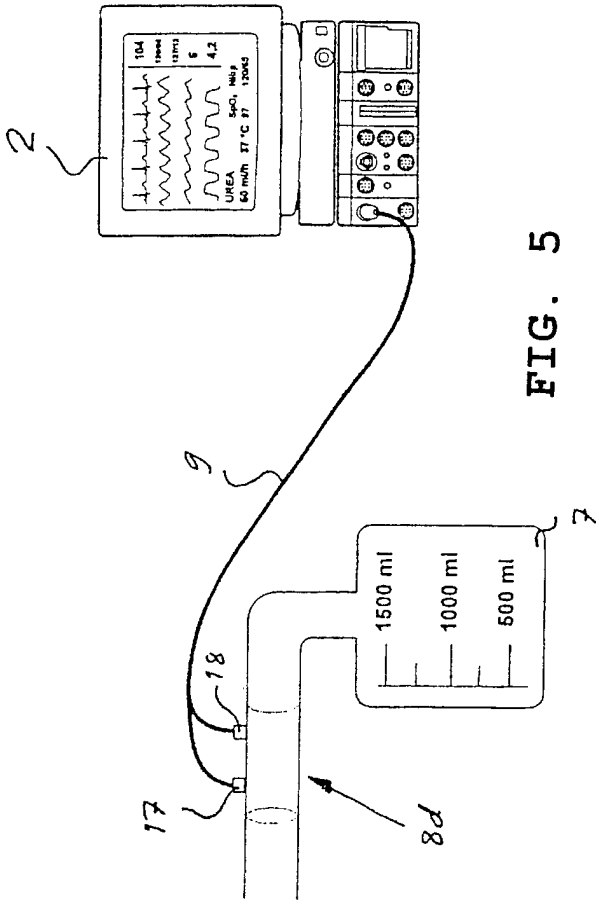
2
9
7
1500 ml
1000 ml
500 ml
18
17
8d

FIG. 5

INTERNATIONAL SEARCH REPORT

International application No.
PCT/FI 01/00147

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: A61B 5/20, A61B 5/00
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: A61B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 4343316 A (CHRIS A. JESPERSEN), 10 August 1982 (10.08.82), column 1, line 5 - line 8; column 1, line 42 - line 46; column 3, line 9 - column 4, line 59, figure 1 --	1-9
A	US 4532936 A (ERIC G. LEVEEN ET AL), 6 August 1985 (06.08.85), column 1, line 5 - line 9; column 3, line 33 - column 4, line 44, figure 1 --	1-9
A	US 4735777 A (YASUHIRO MITSUI ET AL), 5 April 1988 (05.04.88), claim 1 -- --------	1-9

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent 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 when the document is taken alone
"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
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
19 June 2001	21 -06- 2001
Name and mailing address of the ISA Swedish Patent Office Box 5055, S-102 42 STOCKHOLM Facsimile No. +46 8 666 02 86	Authorized officer Bengt Christensson/MP Telephone No. +46 8 782 25 00

INTERNATIONAL SEARCH REPORT

Information on patent family members

28/05/01

International application No.
PCT/FI 01/00147

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 4343316 A	10/08/82	AU 7064381 A	19/11/81
		BR 8103076 A	09/02/82
		CA 1146770 A	24/05/83
		DE 3118158 A	13/05/82
		ES 502246 A	01/10/82
		ES 8300012 A	01/01/83
		FR 2482451 A	20/11/81
		GB 2076163 A,B	25/11/81
		IT 1137017 B	03/09/86
		IT 8121671 D	00/00/00
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		NL 8102297 A	16/12/81
		SE 8102583 A	17/11/81
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		DE 3270764 D	00/00/00
		EP 0073156 A,B	02/03/83
		JP 58046960 A	18/03/83
US 4735777 A	05/04/88	JP 62000858 A	06/01/87

专利名称(译)	病人监护仪的安排		
公开(公告)号	EP1178754A1	公开(公告)日	2002-02-13
申请号	EP2001909868	申请日	2001-02-15
申请(专利权)人(译)	INSTRUMENTARIUM CORPORATION		
当前申请(专利权)人(译)	INSTRUMENTARIUM CORPORATION		
[标]发明人	SARAJARVI MALLA		
发明人	SARAJÄRVI, MALLA		
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CPC分类号	A61B5/201 A61B5/14507 A61B5/208		
优先权	2000000356 2000-02-17 FI		
外部链接	Espacenet		

摘要(译)

本发明涉及一种用于患者监视器的装置，该装置被布置成测量来自除尿液或泌尿道之外的患者的一个或多个参数。为了改善患者监测工作的人体工程学，该装置包括传感器（8），该传感器布置在患者尿路导管（6）和尿液收集容器（7）等之间并且布置成至少测量流量或者患者尿量的体积，以及用于将测量的数据传送到患者监测器（2）的装置（9）。