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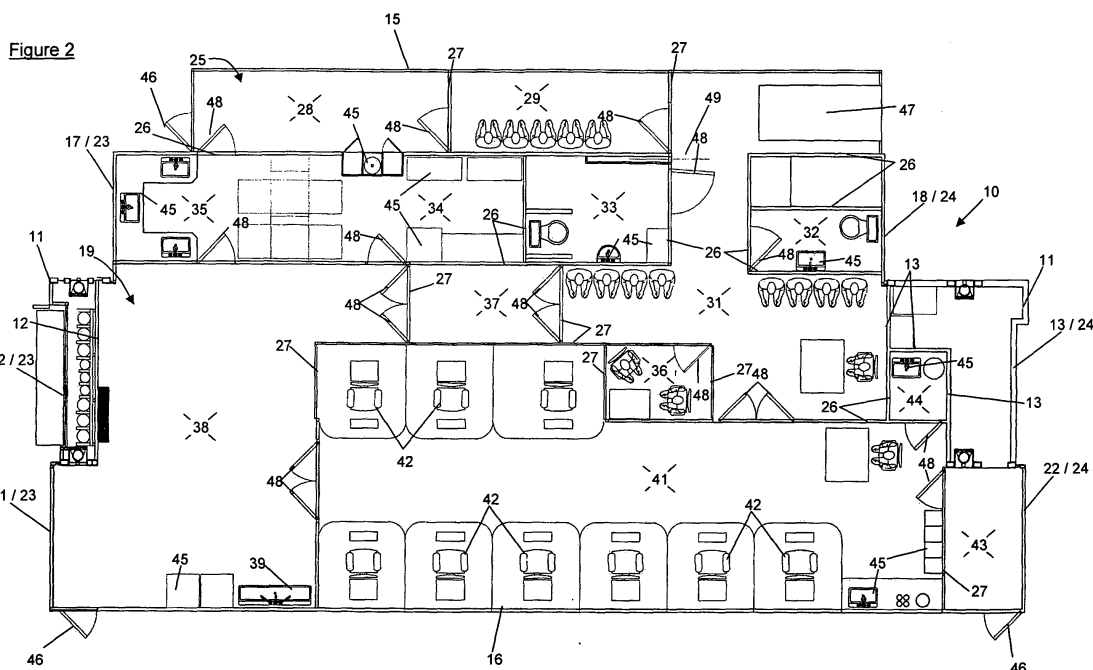
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(54) **Transportable medical facility**

(57) A transportable medical facility (10) is convertible between a compacted condition for transport on a low loading trailer (51), and an expanded, freestanding condition for use. The transportable medical facility (10) comprises a base structure (11), a roof structure (14) and a pair of external side walls (15, 16) which together define an internal working area (19) when the facility (10) is in

its expanded condition. Internal walls (26, 27) divide the internal working area (19) into a procedure room (38), a recovery ward (41) and other rooms such as an entrance lobby (28), a main waiting room (29), a sub waiting room (31), a staff lavatory (32), a patient lavatory (33), clean and dirty utility rooms (34, 35), a consultation room (36), a pre-procedural lobby (37), a patient changing room (43) a further dirty utility room (44) for the recovery ward (41).



Description

[0001] This invention relates to a transportable medical facility. In particular, it relates to a transportable medical facility having a procedure room and recovery ward in the same unit.

[0002] The use of mobile surgical units has developed considerably in recent years. This growth has been due partly to increases in the availability and accessibility of routine procedures and elective surgery, whilst political pressure to reduce hospital waiting lists may also be a contributory factor.

[0003] Typically, mobile surgical units are housed in a specially adapted trailer of an articulated heavy goods vehicle (HGV). The HGV can be driven to the desired location, e.g. adjacent a door of a hospital, where the mobile surgical unit can be deployed into its operational condition. This deployment often involves expanding the sides of the trailer so as to create an internal working area having a total width somewhat greater than that of the trailer when in transit. Within this working area will usually be defined an operating theatre or procedure room, often accompanied by rudimentary pre- and post-procedural induction and recovery areas. The trailer will often be provided with ramps or walkways to enable the internal working area to be directly connected to the door of the hospital, and/or to other mobile surgical units.

[0004] Because such mobile surgical units are built upon the chassis of the adapted trailer, there is a limit to the extent to which the sides of the trailer can be expanded, and thus a limit to the central body width of the internal working area. This means that the total floor area available within the internal working area within such mobile surgical units is unavoidably somewhat restricted.

[0005] As a result of this limited space, the construction of known mobile surgical units have inevitably concentrated on providing the required space and facilities for the procedure room and its associated auxiliary areas such as clean and dirty utility rooms, but at the expense of the pre- and post-procedural areas. In particular, the post-procedural recovery areas provided in known mobile surgical units are generally capable of accommodating only one or two beds for recovering patients.

[0006] This substantially reduces the usefulness of the unit, since the rate at which patients are processed through the unit will be determined by the time spent by the one or two patients in the recovery area. Thus, the entire throughput of patients is slowed by the recovery area only being able to accommodate one or two patients. Additionally, the limited available space prevents the recovery area in known mobile surgical units from incorporating many of the facilities and equipment found in recovery wards in hospital buildings.

[0007] Previous attempts to address this problem have involved either connecting the mobile surgical unit to a hospital building, and utilising the recovery wards therein; or providing a first mobile surgical unit comprising a procedure room and connecting said first mobile surgical

unit to a second mobile surgical unit comprising a recovery ward. The former approach is generally undesirable since a shortage of available bed space within a hospital may be a major factor in the waiting lists which the mobile surgical unit is intended to alleviate. The latter approach is clearly expensive and inefficient since it requires the use of two mobile surgical units rather than one, and hence will also take longer to assemble and disassemble. It is believed that, until now, no successful attempt has been made to incorporate a full recovery ward into a mobile surgical unit also housing a procedure room.

[0008] The present invention seeks to combine a procedure room and a recovery ward in a single transportable medical facility. The present invention further seeks to provide a transportable medical facility capable of being utilised as a stand-alone unit without the need for connection to a hospital building or a further temporary surgical facility.

[0009] The term "transportable" as used herein refers to a facility adapted to be transported from one location to another atop a low loader trailer of an HGV, but which is independent of the trailer chassis, and is deployed to stand freely of the trailer when in use. The term "transportable medical facility" as used with reference to the present invention is thus to be understood as distinct from the term "mobile surgical unit" as used with reference to the prior art, the latter term referring to a unit built on the chassis of an HGV trailer.

[0010] The present invention has been developed for particular use for internal examination procedures such as endoscopy and for elective surgery such as laser eye surgery. It will nevertheless be understood that the present invention may be utilised for all kinds of surgical procedure whether invasive or non-invasive, and the term "procedure room" as used herein should be construed accordingly to include operating theatres, as well as examination rooms and the like.

[0011] The term "recovery ward" as used herein is defined for the purposes of the present invention as housing a minimum of four beds for patients, as distinct from the one or two bed "recovery areas" of the prior art.

[0012] According to the present invention there is provided a transportable medical facility, convertible between a compacted condition for transport on a low loading trailer, and an expanded, free-standing condition for use, said transportable medical facility comprising:

- a base structure, a roof structure and a pair of external side walls which, when said facility is in its expanded condition, define an internal working area; and
- internal walls which, when said facility is in its expanded condition, define a plurality of rooms within said working area, comprising at least a procedure room and a recovery ward.

[0013] The recovery ward is capable of accommodating, in increasing order of preference, at least four, five,

six, seven, eight or nine beds for patients. The recovery ward is preferably also fully equipped with a full range of facilities as would be found in a recovery ward in a hospital building.

[0014] The plurality of rooms defined within the working area when the facility is in its expanded condition preferably further comprises a main waiting room, a sub waiting room and optionally one or more supplementary rooms selected from clean and dirty utility rooms, a consultation room, staff and patient changing rooms, staff and patient lavatories and one or more lobbies. Most preferably, each of the aforementioned rooms is provided within the working area. It is particularly preferred, and indeed required by some health regulations, that a lobby be located between the procedure room and the waiting rooms.

[0015] In a currently preferred embodiment of transportable medical facility according to the present invention, the rooms are arranged such that the main waiting room is adjacent the sub waiting room, the sub waiting room is adjacent the procedure room and the recovery ward, and the procedure room is adjacent the recovery ward, and access doors are provided in the internal walls between each said pair of adjacent rooms. In this way, a patient may be processed sequentially through the main and sub waiting rooms, into the procedure room and through to the recovery ward.

[0016] In order to enable deployment of the facility from its low loader trailer to its free-standing position, and vice versa, the base structure is preferably provided with a plurality of hydraulic lifting legs. These lift the facility clear of the trailer, which can then be towed away. The hydraulic lifting legs then gently lower the facility into position on the ground. The reverse operation is carried out when removing the facility from a site. The base structure is preferably further provided, at spaced reinforced locations, with a plurality of adjustable feet, adapted to support the facility in a level position when deployed. Most preferably, ten such adjustable feet are provided.

[0017] In order to enable conversion of the transportable medical facility between its compacted and its expanded conditions, one or preferably both, external side walls are mounted on a pair of hydraulic rams for movement in a direction perpendicular to the longitudinal axis of the facility. The external side walls thus move outwards from the facility during deployment of the facility into its expanded condition, and back inwards during retraction of the facility into its compacted condition. Each of the base structure and the roof structure are preferably formed with one or more fold lines parallel to the longitudinal axis of the facility.

[0018] It is envisaged that deployment of the transportable medical facility from its compacted condition on a low loader trailer to its expanded, free-standing condition will be achieved in substantially 1 hour and 10 minutes.

[0019] The transportable medical facility of the present invention may be constructed in a range of different sizes, depending on the surgical application for which it is in-

tended. In a currently preferred embodiment, the facility is constructed with an overall length of substantially 18 m, a height of substantially 3.25 m, and a width of substantially 3.5 m in its compacted condition, increasing to substantially 8.33 m when in its expanded condition.

[0020] The ratio of the total floor area within the internal working area when the facility is in its expanded condition relative to the total floor area within the facility when in its compacted condition is preferably at least 2:1 and most preferably substantially 2.38:1. The ratio of the width of the facility when in its expanded condition relative to its width when in its compacted condition is preferably also at least 2:1 and most preferably substantially 2.38:1. Similarly, the ratio of the total volume of the facility when in its expanded condition relative to its volume when in its compacted condition is preferably also at least 2:1 and most preferably substantially 2.38:1.

[0021] The roof structure preferably has one or more air ducts formed therein, in communication with the ambient via inlet and outlet vents and with the internal working area via internal vents. The ducts preferably house one or more air conditioning and/or purifying elements including, pre-filters, High Efficiency Particulate Air (HEPA) filters and fans arranged to drive circulation of the air through the ducts and the internal working area.

[0022] In order that the present invention may be more fully understood, preferred embodiments thereof will now be described in detail with reference to the accompanying drawings, in which:

Figure 1 shows a cross-sectional plan view of a preferred embodiment of transportable medical facility according to the present invention, when in its compacted condition for transit;

Figure 2 shows a cross-sectional plan view of the transportable medical facility of Figure 1, when deployed for use in its expanded condition;

Figure 3 shows a three-dimensional perspective cross-sectional view of the transportable medical facility of Figures 1 and 2, when deployed for use in its expanded condition;

Figure 4 shows the transportable medical facility of Figures 1 to 3 in its compacted condition for transit, in the process of being deployed from a low loader trailer of an HGV;

Figure 5 shows a perspective external view from a first end of the transportable medical facility of Figures 1 to 4, when deployed for use in its expanded condition; and

Figure 6 shows a perspective external view of a second end of the transportable medical facility of Figures 1 to 5, when deployed for use in its expanded condition.

[0023] Referring first to Figure 1, a transportable medical facility, generally indicated 10, according to a preferred embodiment of the present invention is shown in its compacted condition for transit. The facility 10 com-

prises a base structure 11 having first and second up-standing portions 12, 13, one at each end of the facility 10; a roof 14 (not shown in Figure 1); and first and second external side walls 15, 16. For ease of representation, the transportable medical facility 10 is shown in Figure 1 with the roof 14 removed.

[0024] The side walls 15, 16 are adapted to move in and out of the facility 10, relative to the static base structure 11, so as to effect conversion of the facility 10 between its expanded and compacted conditions. The first side wall 15 is provided with first and second end wall portions 17, 18 which, when the facility 10 is in its compacted condition, lie respectively alongside the inner faces of the first and second end upstanding portions 12, 13 of the base structure 11. Similarly, the second side wall 16 is provided with first and second end wall portions 21, 22 which, when the facility 10 is in its compacted condition, lie respectively alongside the outer faces of the first and second upstanding portions 12, 13 of the base structure 11.

[0025] Referring now to Figure 2, this shows the transportable medical facility 10 deployed in its expanded condition for use. The side walls 15, 16 are now displaced to either side of the facility 10, thus greatly increasing the internal working area, generally indicated 19, within the facility 10. As can be seen, the first end wall portions 17, 21 of the external side walls 15, 16 combine with the first end upstanding portion 12 of the base structure 11 to form a first external end wall 23 of the facility 10. Similarly, the second end wall portions 18, 22 of the external side walls 15, 16 combine with the second end upstanding portion 13 of the base structure 11 to form a second external end wall 24 of the facility 10.

[0026] The internal working area 19 is defined between the external side walls 15, 16 and the external end walls 23, 24. An auxiliary section, generally indicated 25, is formed as a further extension of the working area 19 adjacent the first external side wall 15. The working area 19 is sub-divided into various different rooms by a number of fixed primary internal walls 26, which remain in position when the facility 10 is in both its expanded and compacted conditions, and a number of removable or collapsible secondary internal walls 27, which are placed in position only when the facility 10 is in its expanded condition. When the facility 10 is in its compacted condition, as described above with reference to Figure 1, the secondary internal walls 27 are partially removed by means of removable sections or collapsed by means of a telescopic or sliding arrangement.

[0027] As can be seen from Figure 2, the primary and secondary internal walls 26, 27 divide the internal working area 19 into the following rooms: an entrance lobby 28; a main waiting room 29; a sub waiting room 31; a staff lavatory 32; a patient lavatory 33 with access for disabled people; a clean utility and store room 34; a dirty utility room 35; a consultation room 36; a pre-procedural lobby 37; a procedure room 38 incorporating a scrub station 39; a recovery ward 41 having capacity for a total of

nine beds 42 for patients; a patient changing room 43; and further dirty utility room 44 for the recovery ward 41.

[0028] The entrance lobby 28, staff lavatory 32, patient lavatory 33, clean and dirty utility rooms 34, 35, procedure room 38, recovery ward 41 and recovery dirty utility room 44 are each fitted with appropriate storage units, sinks, lockers, cupboards, fridges etc. 45.

[0029] The facility 10 is provided with external doors 46 to provide both routine and emergency access and egress to and from the internal working area 19, and a ramp 47 is also provided to enable wheelchair and trolley-bed access. Internal doors 48 are provided in the internal walls 26, 27 between adjacent rooms, and a set of automatic sliding doors 49 are provided at the entrance to the sub waiting room 31.

[0030] A typical sequence of processing a patient through the transportable medical facility 10 will now be described with reference to Figure 3. The patient enters the facility 10 through the external door 46, as indicated by arrow *a*, and passes through the entrance lobby 28 to reach the main waiting room 29 as indicated by arrow *b*. Alternatively, if wheelchair access is required, the patient may enter the facility 10 via the ramp 47 as indicated by arrow *c* and reach the main waiting room 29 by following the route indicated by arrow *d*.

[0031] The patient registers in the main waiting room 29 and remains there until called to the sub waiting room 31 which is reached by following the route indicated by arrows *e* and *f*, passing through the automatic sliding doors 49. From the sub waiting room 31, the patient is called into the consultation room 36, as indicated by arrow *g* to discuss his or her treatment with the medical staff, following which the patient returns to the sub waiting room 31. Depending on the nature of the procedure for which the facility 10 is being used, the patient may either then proceed directly for treatment or may require induction or pre-treatment.

[0032] Where no pre-treatment or induction is required, the patient is taken from the sub waiting room 31 through the pre-procedural lobby 37, as indicated by arrow *h*, and then into the procedure room 38, as indicated by arrow *i*. Following treatment, the patient is then taken to the recovery ward 41, as indicated by arrow *j*.

[0033] If pre-treatment or induction is required, the patient is taken from the sub waiting room 31 into the recovery ward 41 as indicated by arrow *k*. The pre-treatment is then carried out in the recovery ward 41, following which the patient is taken directly into the procedure room 38, as indicated by arrow *l*, before being returned to the recovery ward 41 following treatment.

[0034] Once the patient has recovered sufficiently to leave the transportable medical facility 10, he or she returns from the recovery ward 41 to the sub waiting room 31, as indicated by arrow *m*, and passes through the automatic sliding doors 49, as indicated by arrow *n*. From here, the patient passes through the main waiting room 29 and entrance lobby 28 to exit via the external door 46, following the route indicated by arrows *d*, *o* and *p*. Alter-

natively, if the patient is in a wheelchair or trolley bed, exit from the facility 10 may be achieved by means of the ramp 47, as indicated by arrow *q*.

[0035] Referring now to Figure 4, this shows the transportable medical facility 10, when in its compacted condition for transit as described above with reference to Figure 1, in the process of being deployed from a low loader trailer 51 of a heavy goods vehicle (HGV) 52. As can be seen, the facility 10 is deployed from the trailer 51 by means of hydraulic lifting legs 53 which extend downwardly from the base structure 11 of the facility 10 to contact the ground 54. After making contact with the ground 54, the hydraulic lifting legs 53 continue to extend, lifting the facility 10 clear of the low loader trailer 51. The HGV 52 can then tow the trailer 51 away, leaving the facility 10 to be lowered into position by withdrawing the legs 52 back into the base structure 11. The facility 10 can then be levelled and converted into its expanded condition ready for use

[0036] Referring now to Figures 5 and 6, these show an external view of the transportable medical facility 10 in use in its expanded condition. As can be seen, the first end wall portions 17, 21 of the external side walls 15, 16 are now combined with the first end upstanding portion 12 of the base structure 11 to form a first external end wall 23 of the facility 10. Similarly, the second end wall portions 18, 22 of the external side walls 15, 16 are now combined with the second end upstanding portion 13 of the base structure 11 to form a second external end wall 24 of the facility 10. Figures 5 and 6 also show the roof structure 14 overlying the facility 10.

Claims

1. A transportable medical facility, convertible between a compacted condition for transport on a low loading trailer, and an expanded, free-standing condition for use, said transportable medical facility comprising:
 - a base structure, a roof structure and a pair of external side walls which, when said facility is in its expanded condition, define an internal working area; and
 - internal walls which, when said facility is in its expanded condition, define a plurality of rooms within said working area, comprising at least a procedure room and a recovery ward.
2. A transportable medical facility as claimed in claim 1, wherein said recovery ward is capable of accommodating at least four, and preferably nine beds for patients.
3. A transportable medical facility as claimed in any of the preceding claims, wherein the plurality of rooms defined within the working area when the facility is

in its expanded condition further comprises a main waiting room, a sub waiting room and optionally one or more supplementary rooms selected from clean and dirty utility rooms, a consultation room, staff and patient changing rooms, staff and patient lavatories and one or more lobbies.

4. A transportable medical facility as claimed in claim 3, wherein the plurality of rooms defined within the internal working area are arranged such that the main waiting room is adjacent the sub waiting room, the sub waiting room is adjacent the procedure room and the recovery ward, and the procedure room is adjacent the recovery ward, and wherein access doors are provided in the internal walls between each said pair of adjacent rooms, such that in use a patient may be processed sequentially through the main and sub waiting rooms, the procedure room and the recovery ward.
5. A transportable medical facility as claimed in any of the preceding claims, wherein one or both external side walls are mounted on a pair of hydraulic rams to enable conversion of said facility between its compacted and its expanded conditions by movement of said one or both external side walls in a direction perpendicular to the longitudinal axis of the facility.
6. A transportable medical facility as claimed in any of the preceding claims, wherein the base structure is provided with from hydraulic lifting legs to enable deployment of said facility from its low loader trailer to its free-standing position, and vice versa.
7. A transportable medical facility as claimed in any of the preceding claims, wherein the base structure is further provided, at spaced reinforced locations, with a plurality of adjustable feet, adapted to support said facility in a level position when deployed in its expanded condition.
8. A transportable medical facility as claimed in any of the preceding claims, wherein the ratio of the total floor area within the internal working area when the facility is in its expanded condition relative to the total floor area within the facility when in its compacted condition is at least 2:1 and preferably substantially 2.38:1.
9. A transportable medical facility as claimed in any of the preceding claims, wherein the roof structure has one or more air ducts formed therein, in communication with the ambient via inlet and outlet vents and with the internal working area via internal vents, and wherein said ducts house one or more air conditioning and/or purifying elements selected from pre-filters, High Efficiency Particulate Air filters and fans arranged to drive circulation of the air through the

ducts and the internal working area.

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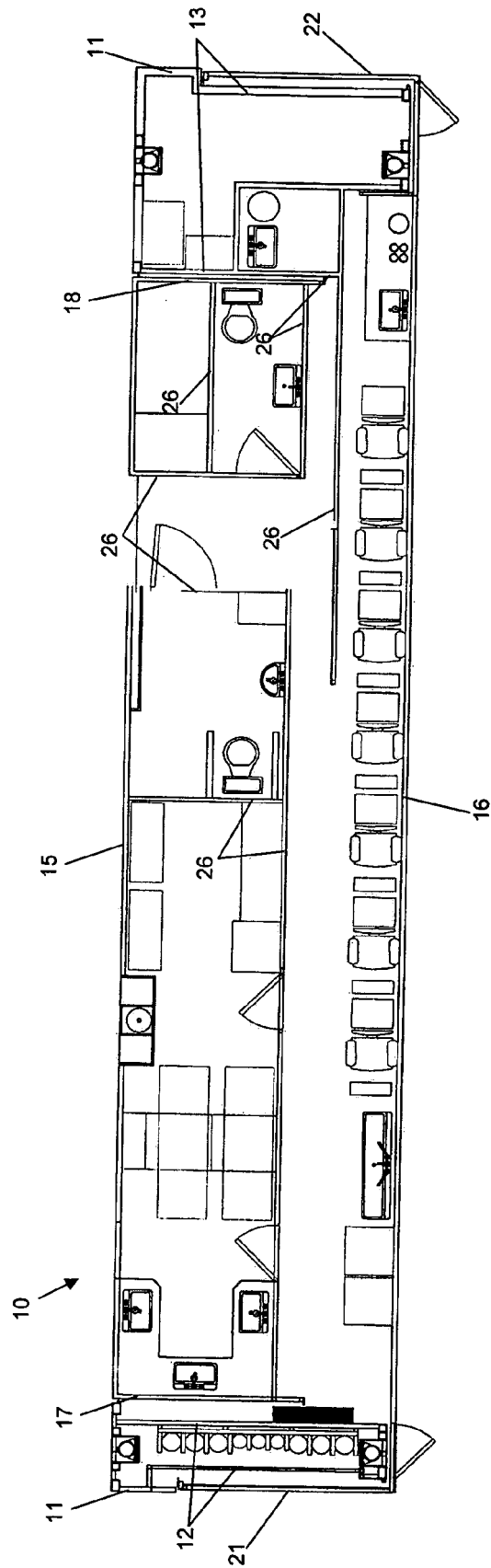
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Figure 1



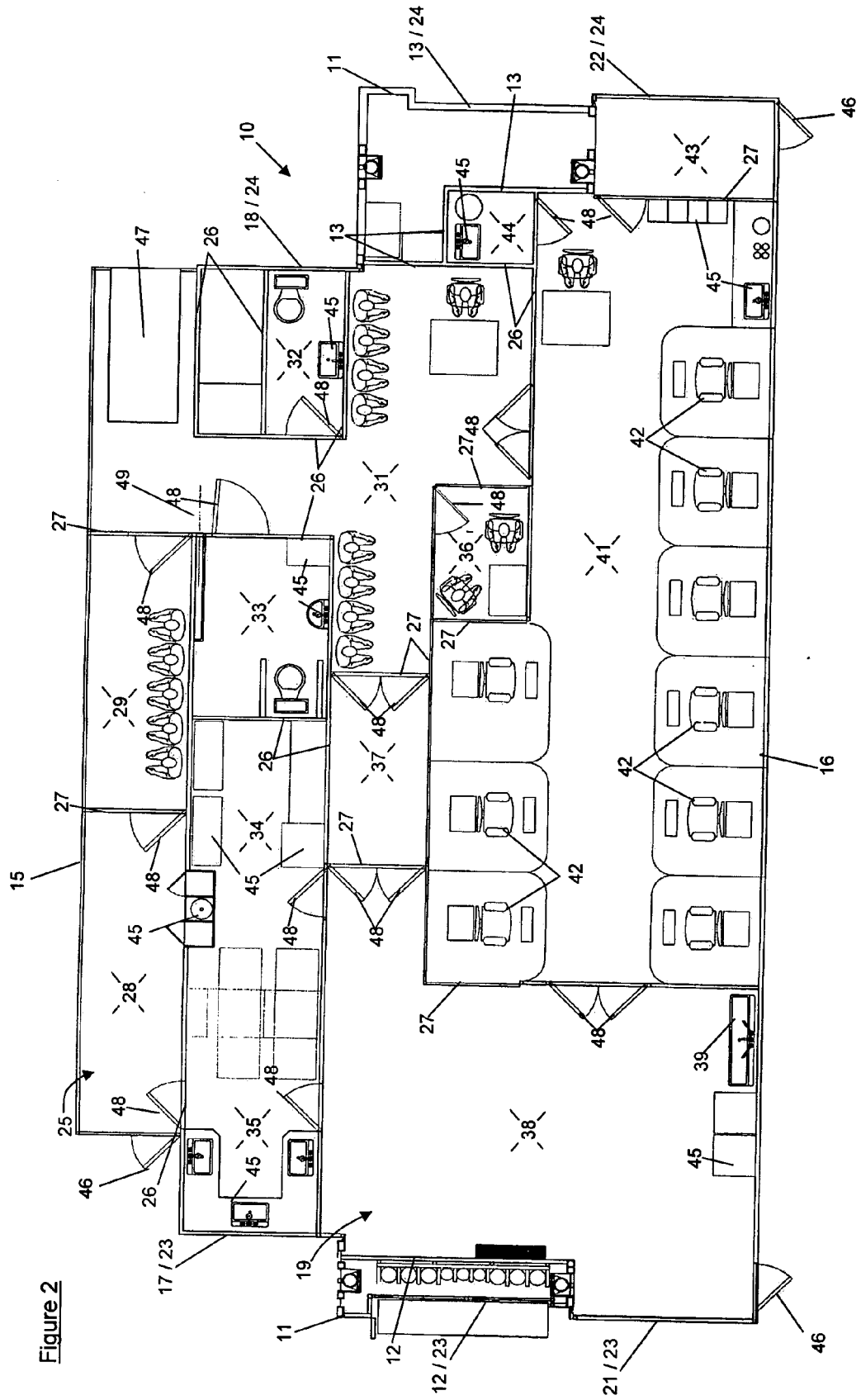


Figure 2

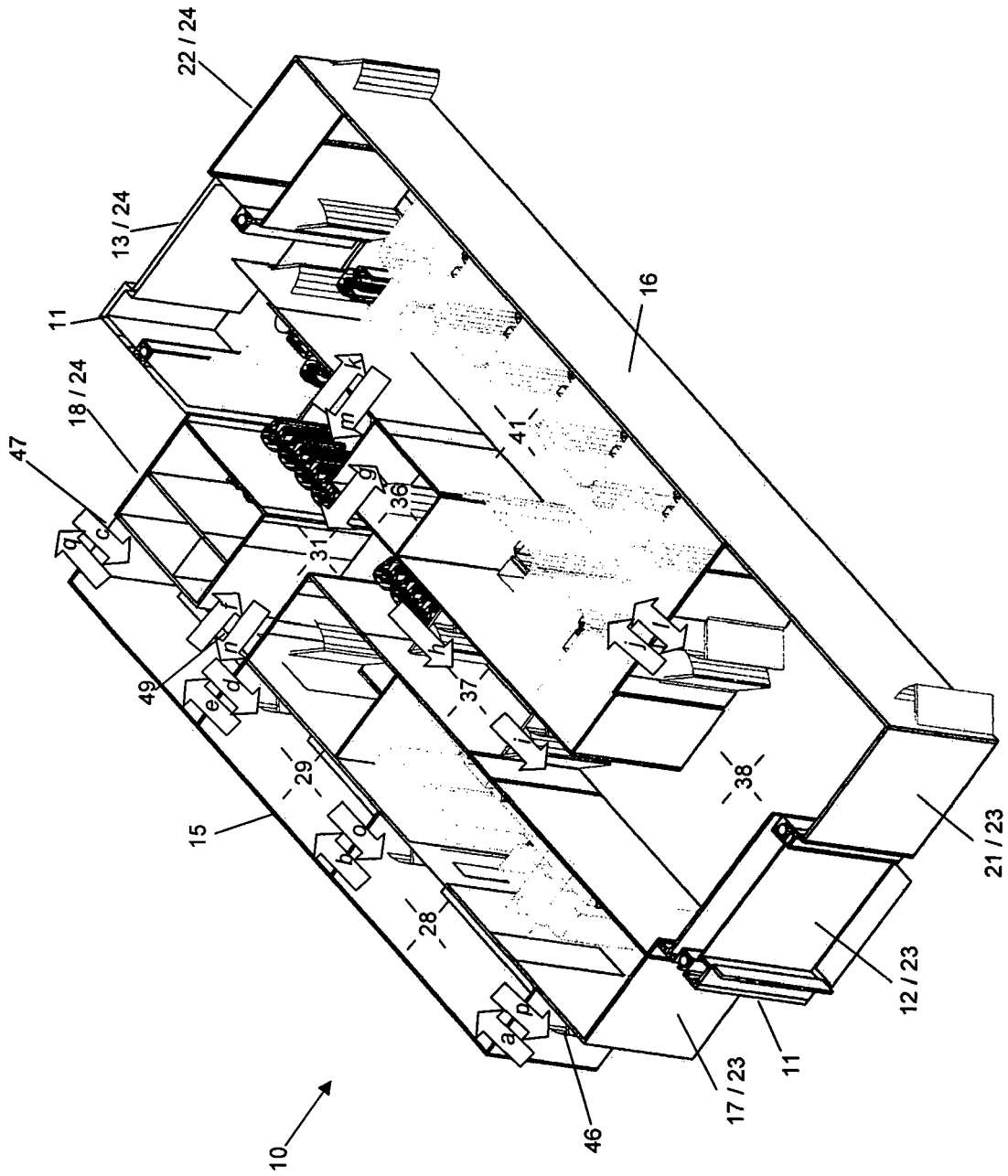


Figure 3

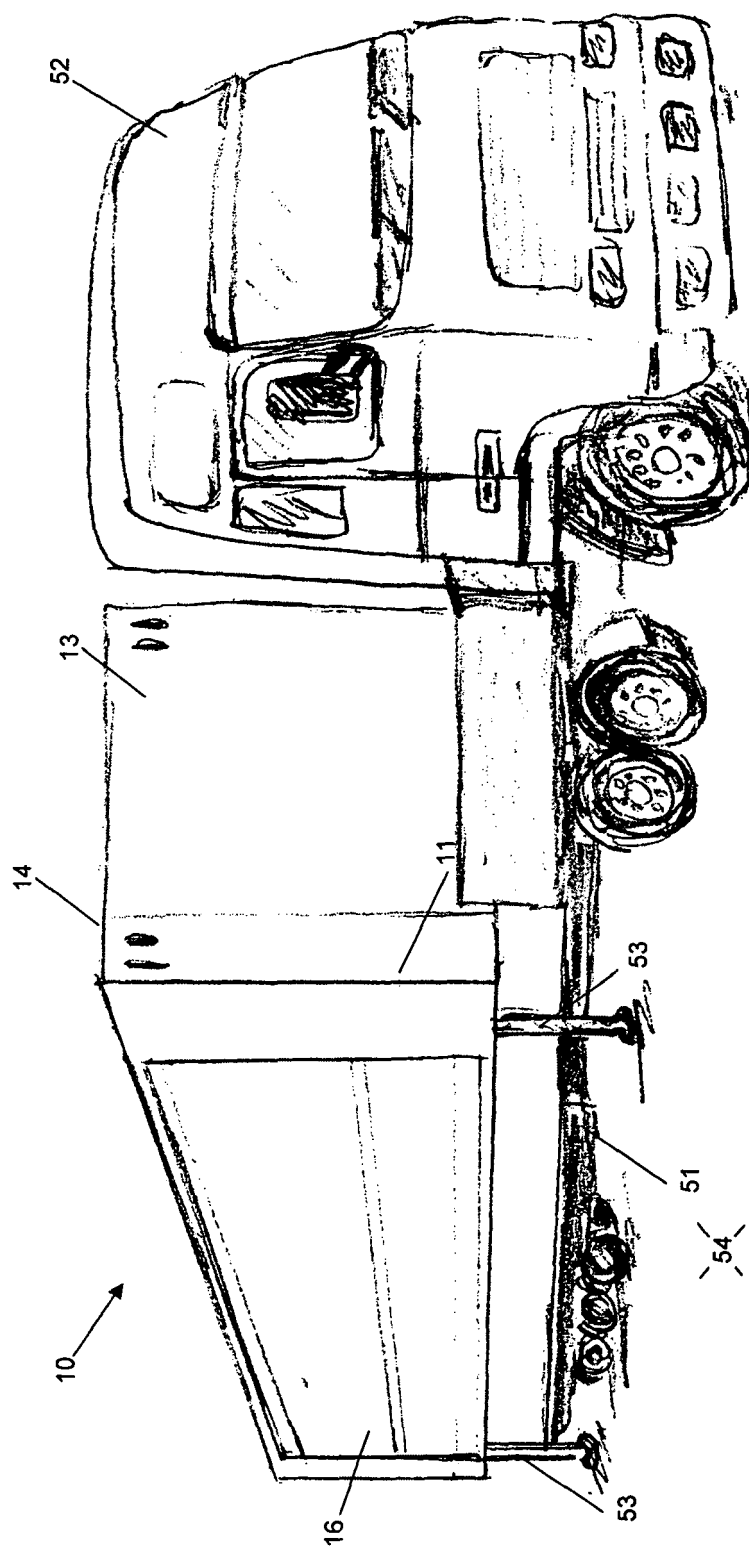


Figure 4

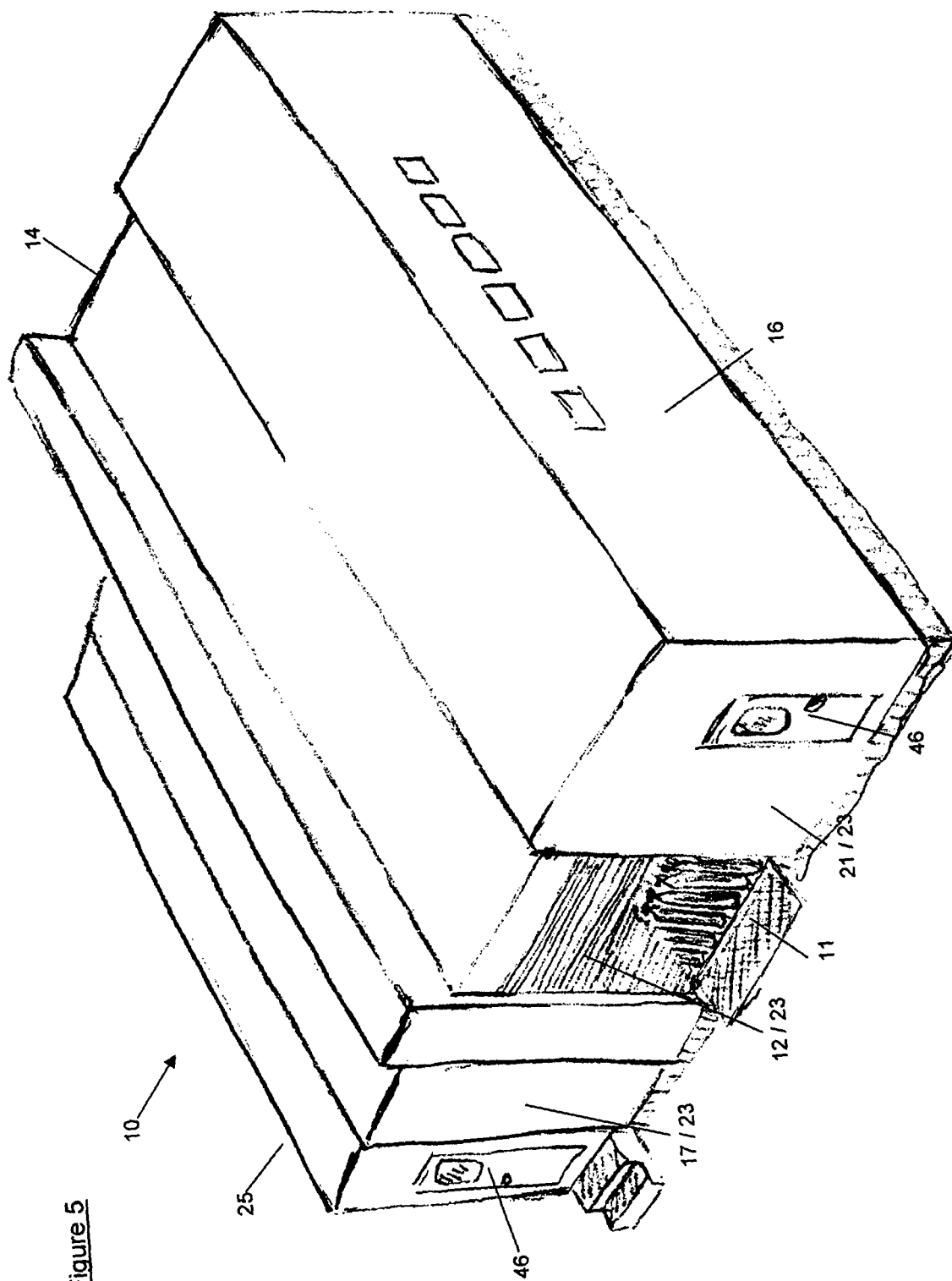


Figure 5

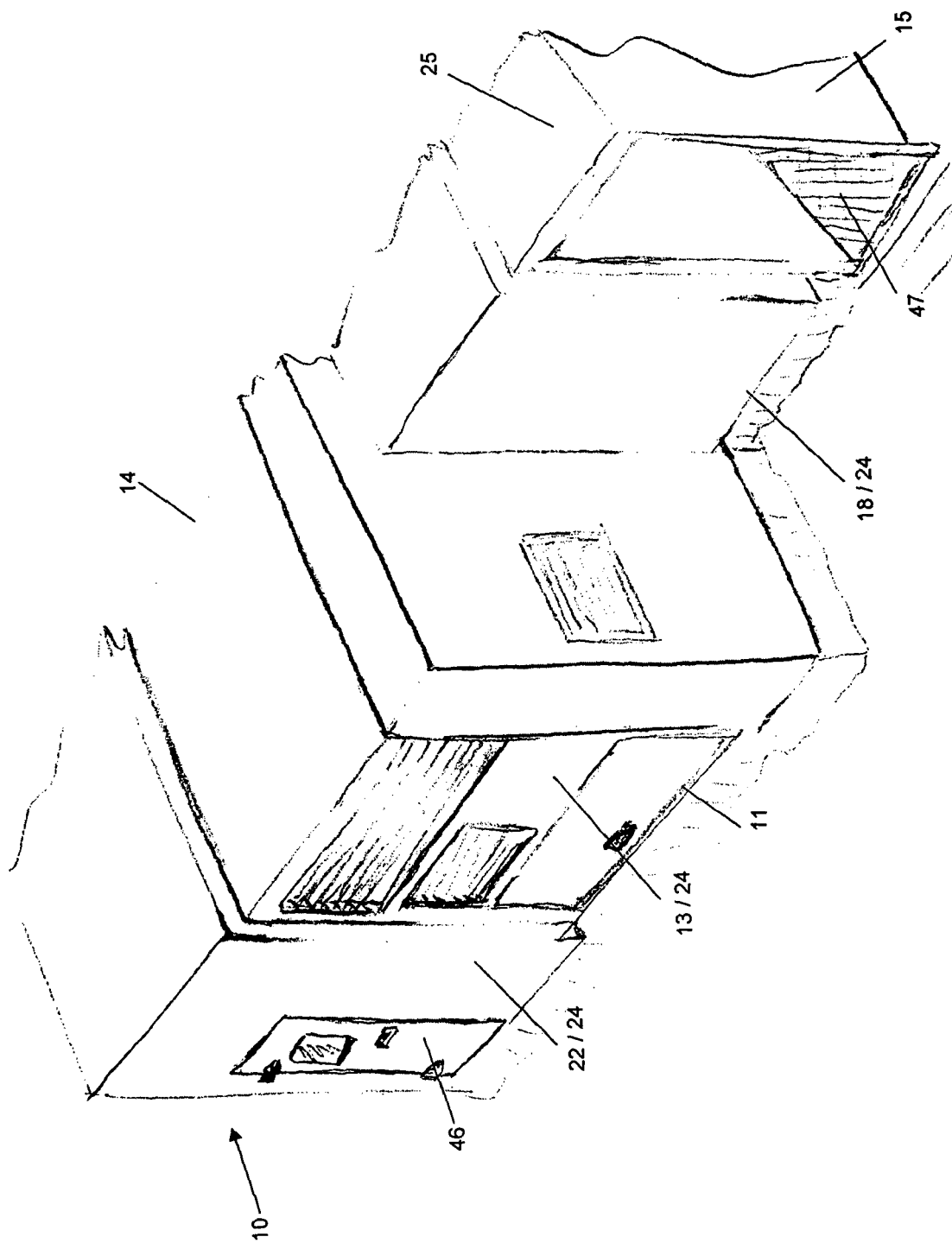


Figure 6



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 05 07 6734

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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			TECHNICAL FIELDS SEARCHED (IPC)
			E04H E04B A61G
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 7 December 2005	Examiner Clasing, M
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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EPO FORM 1503 (03.82 (P04C01))

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 05 07 6734

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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