(12) UK Patent Application (19) GB (11) 2 451 694 (13) A

(43) Date of A Publication 11.02.2009

(21) Application No: 0715615.1

(22) Date of Filing: 10.08.2007

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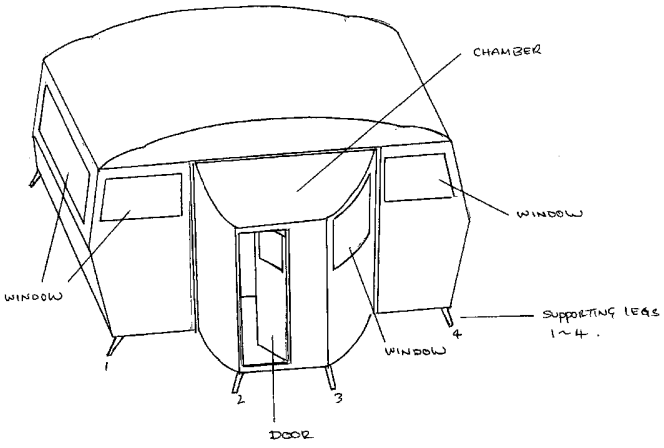
(51) INT CL:
B60P 3/34 (2006.01) ***E04B 1/346*** (2006.01)

(56) Documents Cited:
GB 0704832 A **GB 0397982 A**
WO 2002/060745 A1 **WO 1996/030229 A1**
US 6053551 A **US 2552691 A**

(58) Field of Search:
UK CL (Edition X) **B7B**
INT CL **B60P, E04B**
Other: **WPI, EPODOC**

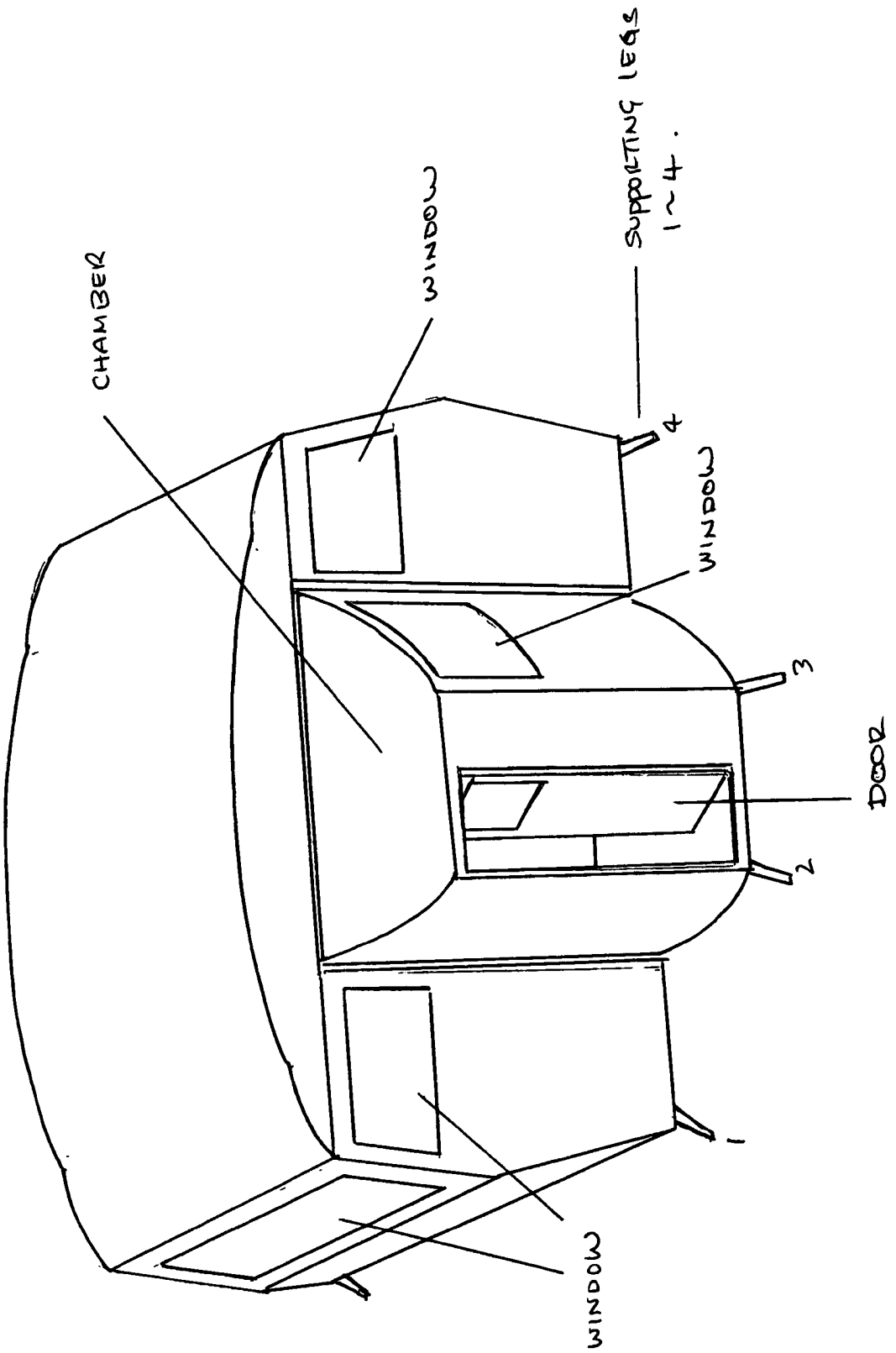
(54) Abstract Title: **Expanding caravan**

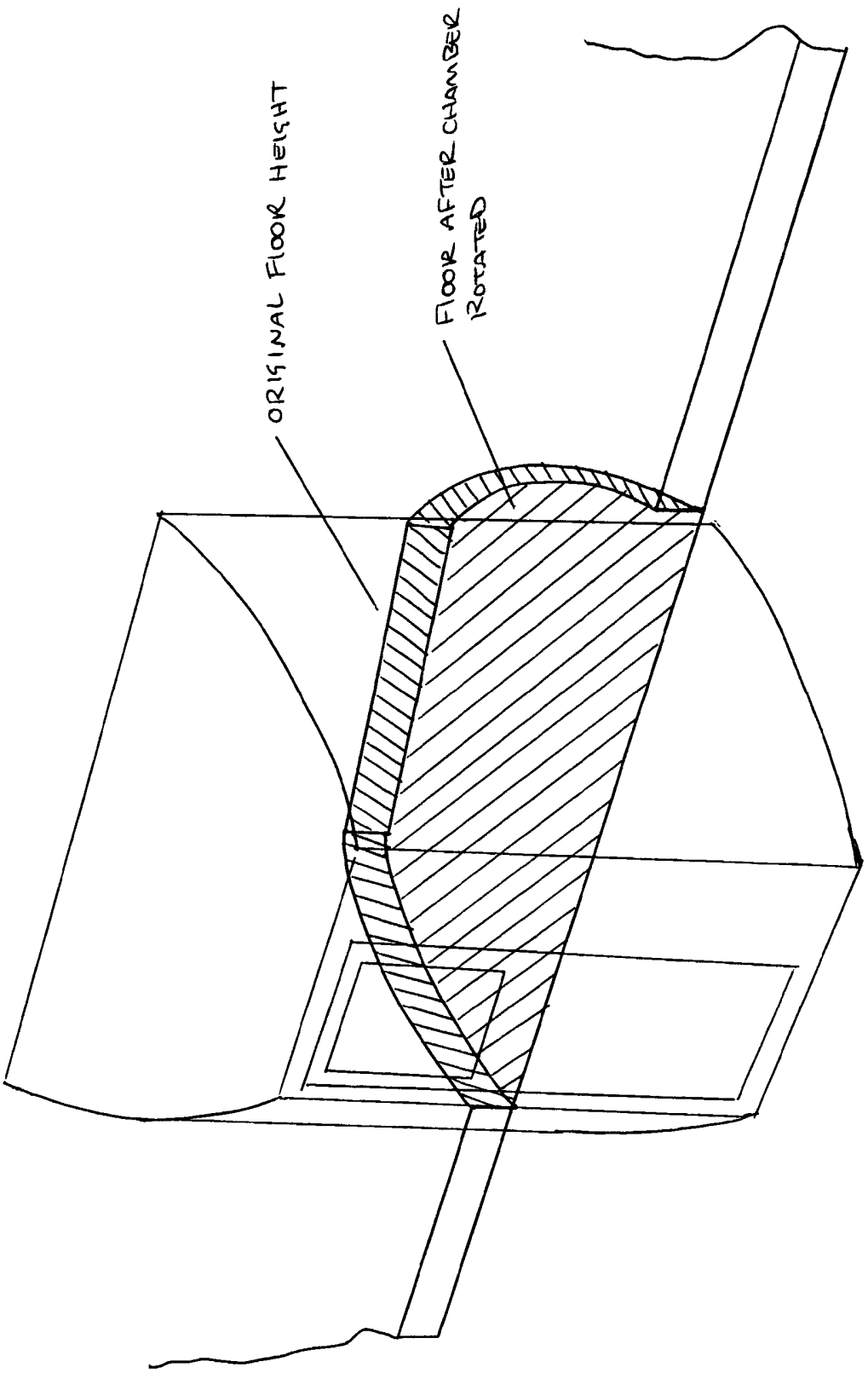
(57) Expanding caravan, combining single or multiple internal rotating chambers, these when rotated through 180 degrees or some intermediate angle will increase the available living space without increasing the host caravan "foot-print" when in the contracted condition. The internal chamber has three distinct conditions, contracted (figure 7), transition (figure 8) and expanded. The transitory state is possible through the inclusion of a single or multiple vertically mounted pivot or pivot points comprising one or a pair of axles (figures 3 and 4). The chamber moves through an arc around these pivot[s], supported by a series of under floor mounted rollers (figure 5) and an associated under floor guide plate[s]. When the chamber is in its contracted condition it occupies recesses (figure 2) built into the floor and ceiling of the caravan. The expanding caravan would perform as a standard caravan with the chamber contracted, in its expanded condition additional living space would be available. A weatherproof seal (figure 6) may be provided between the caravan and the rotating chamber, and the chamber may be rotated manually or by means of an electric motor.

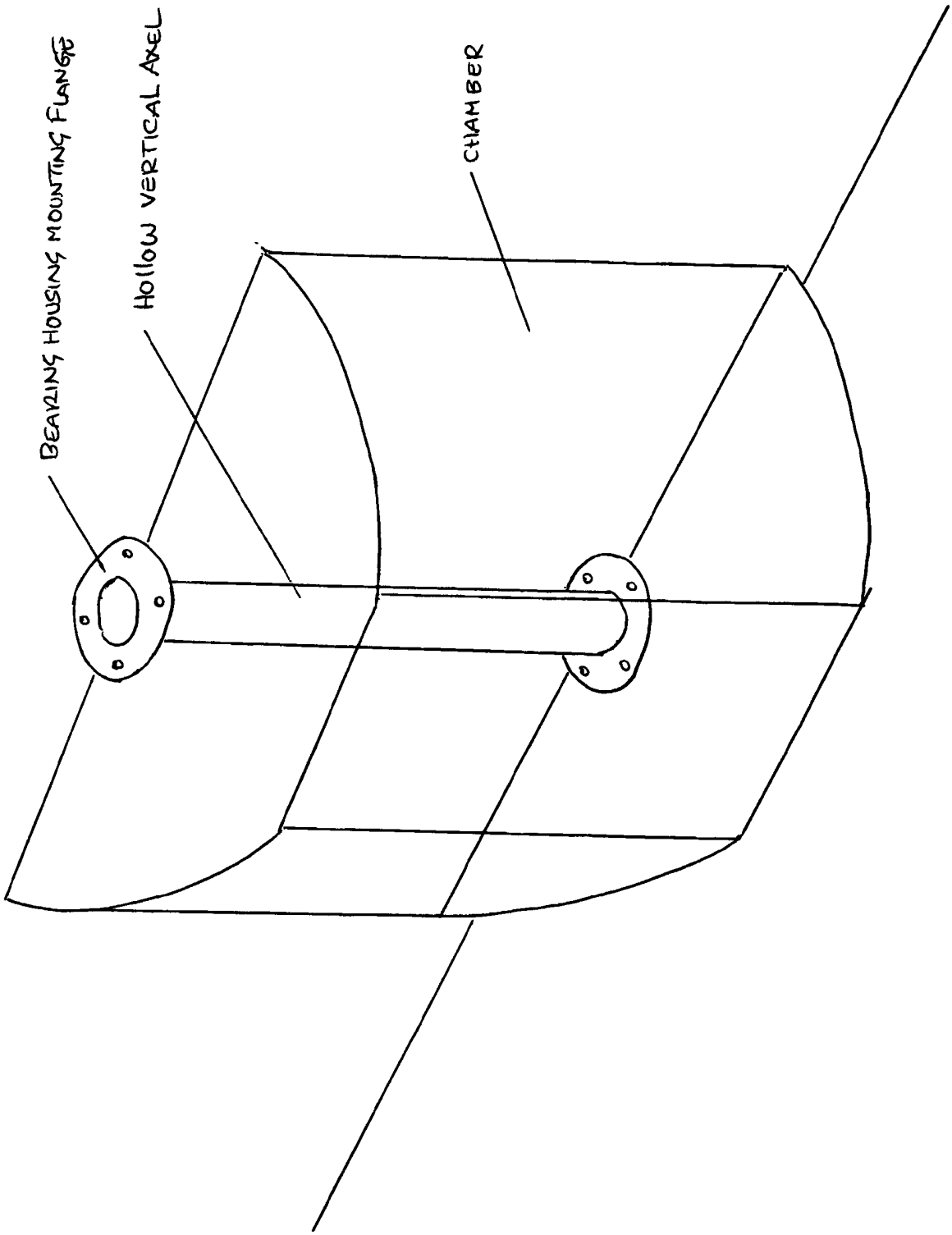


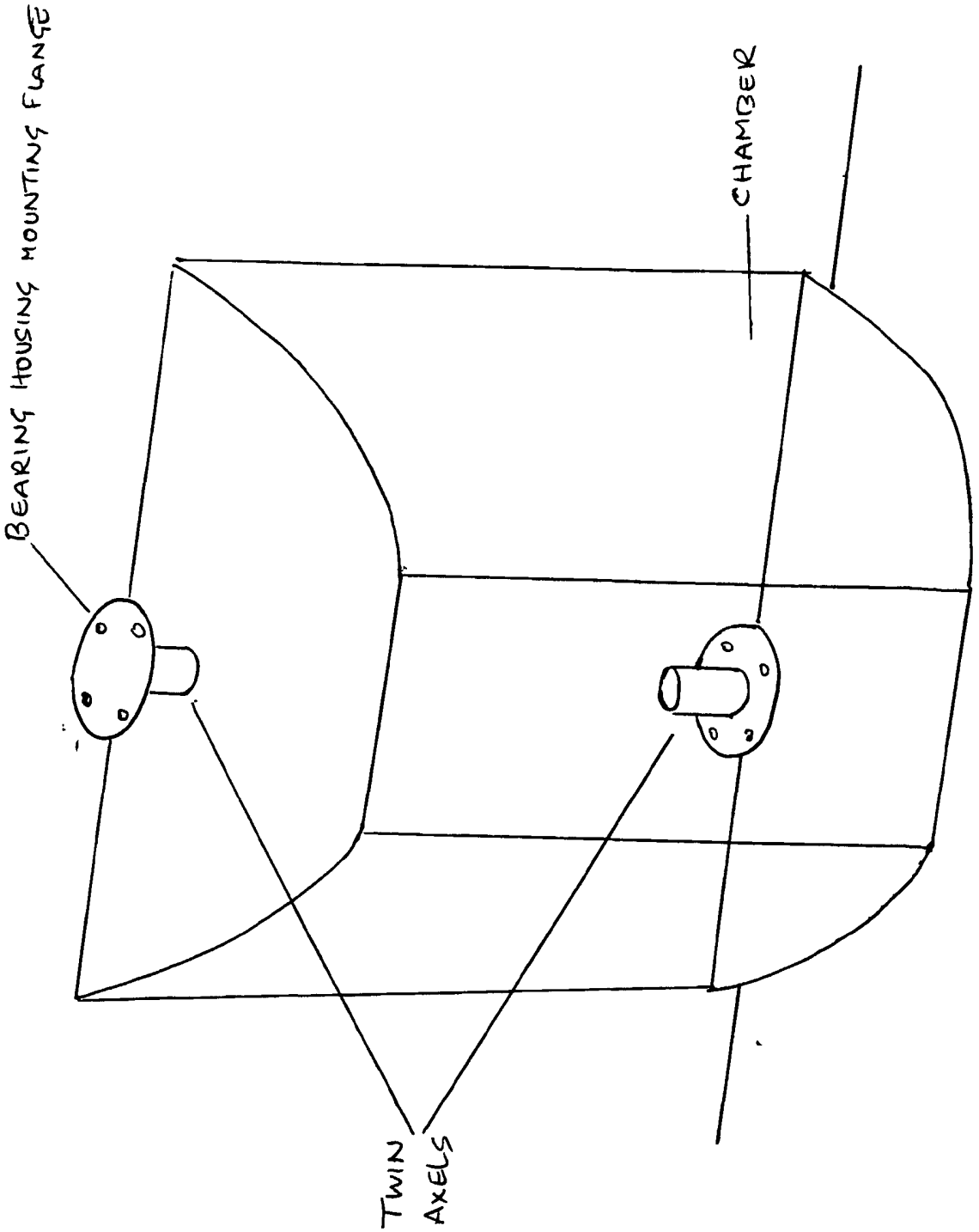
GB 2 451 694 A

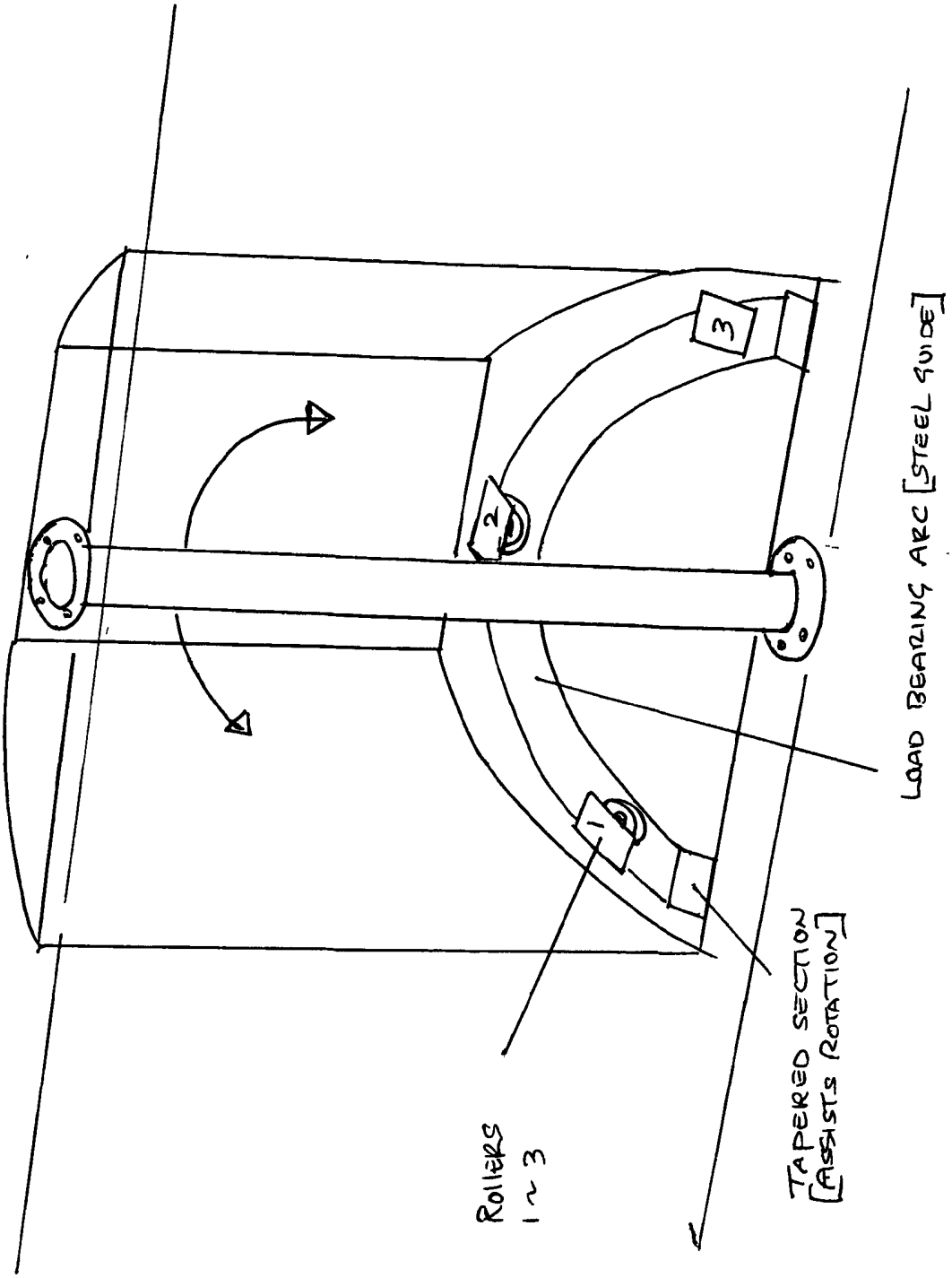
The reference to figure 10 of the drawings in the printed pecification are to be treated as omitted under Section 15(2) or (3) of the Patents Act 1977

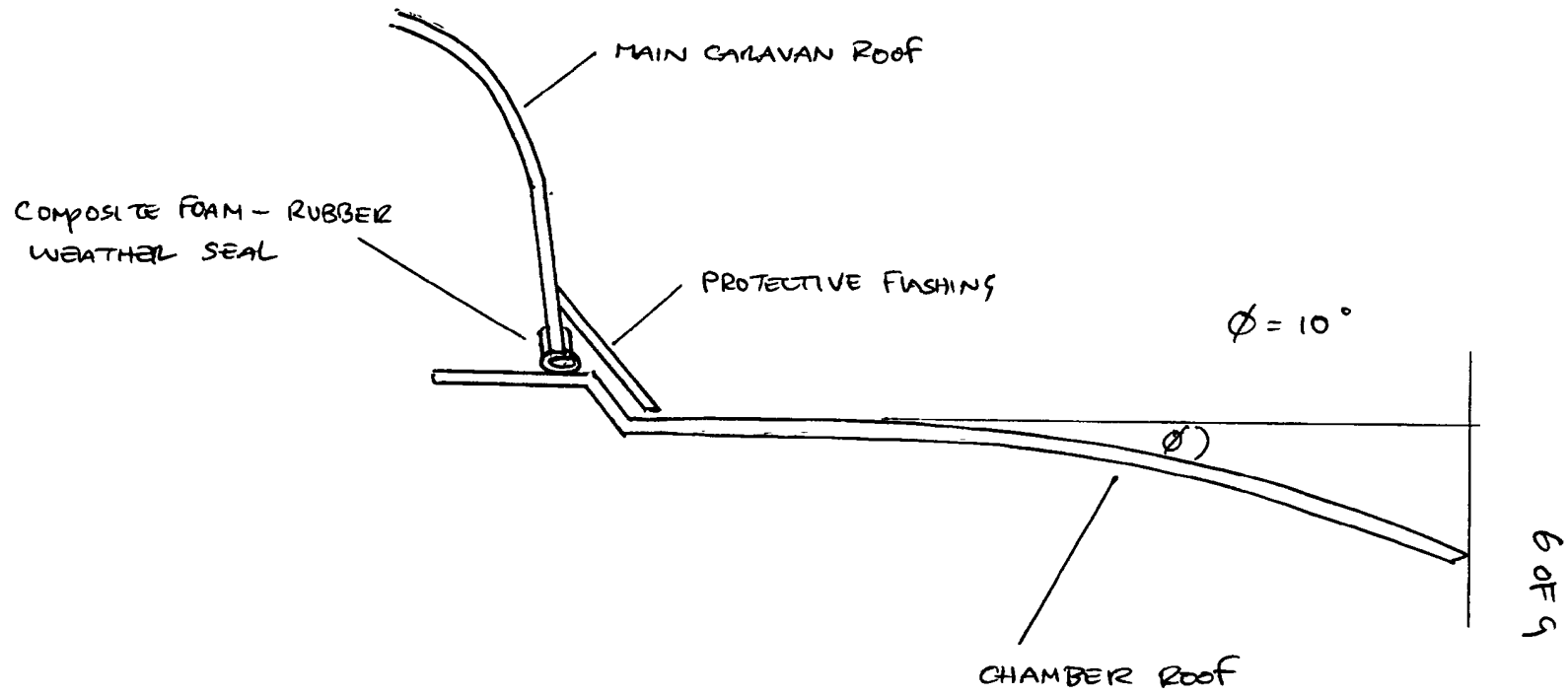

CHAMBER
WINDOW
SUPPORTING LEGS
1~4.
4
WINDOW
3
DOOR
2
1
WINDOW

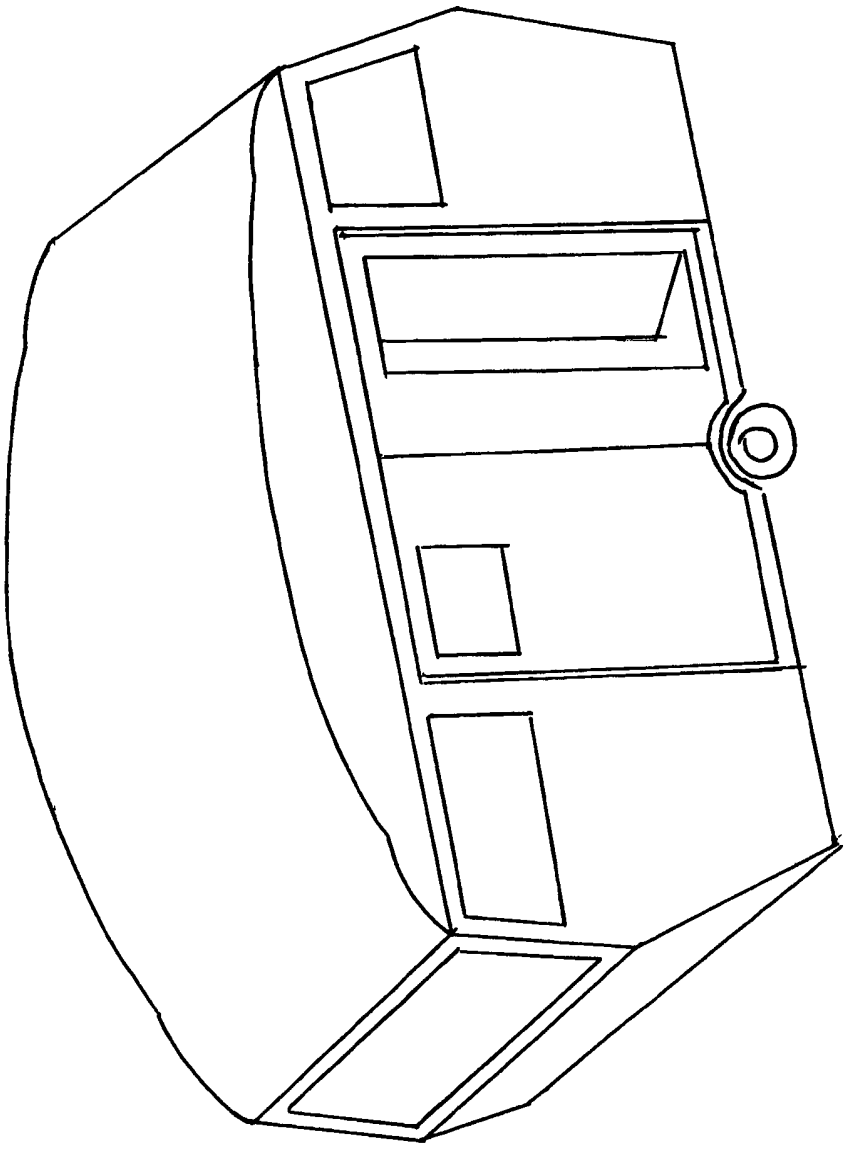

ORIGINAL FLOOR HEIGHT
FLOOR AFTER CHAMBER ROTATED

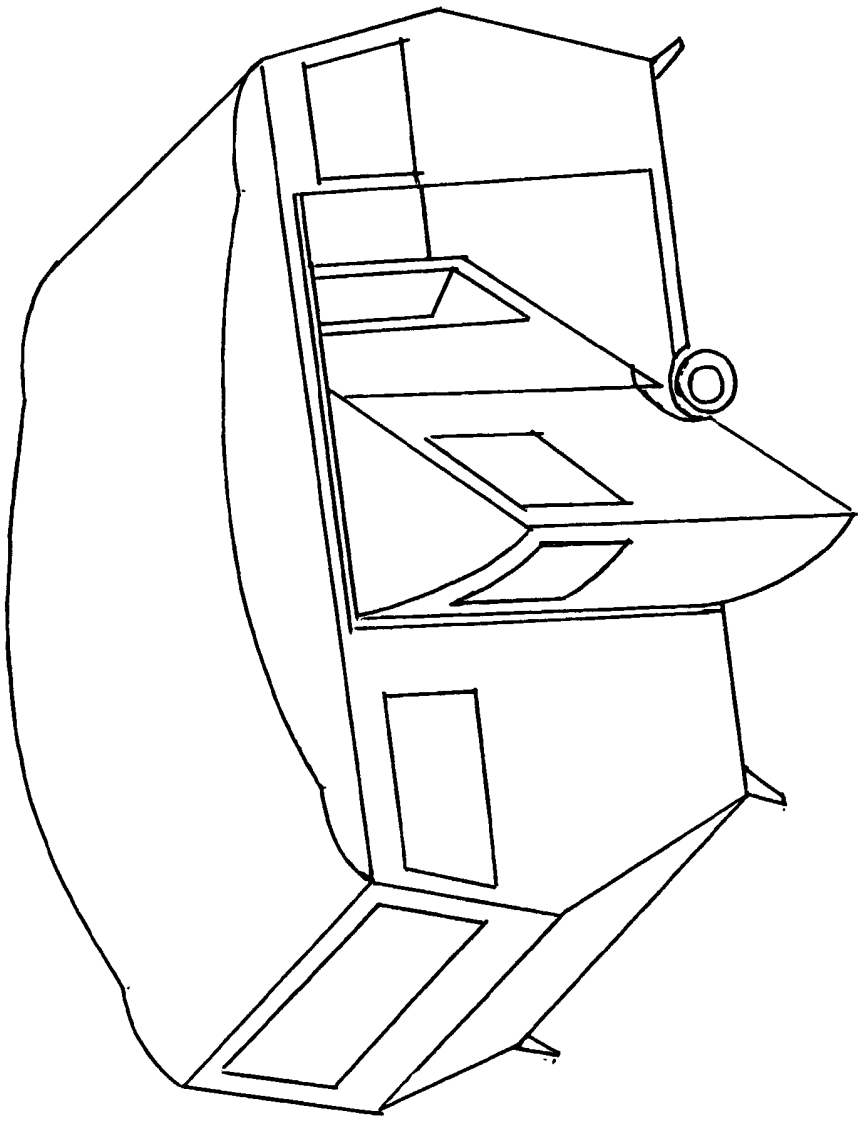

BEARING HOUSING MOUNTING FLANGE
HOLLOW VERTICAL AXEL
CHAMBER

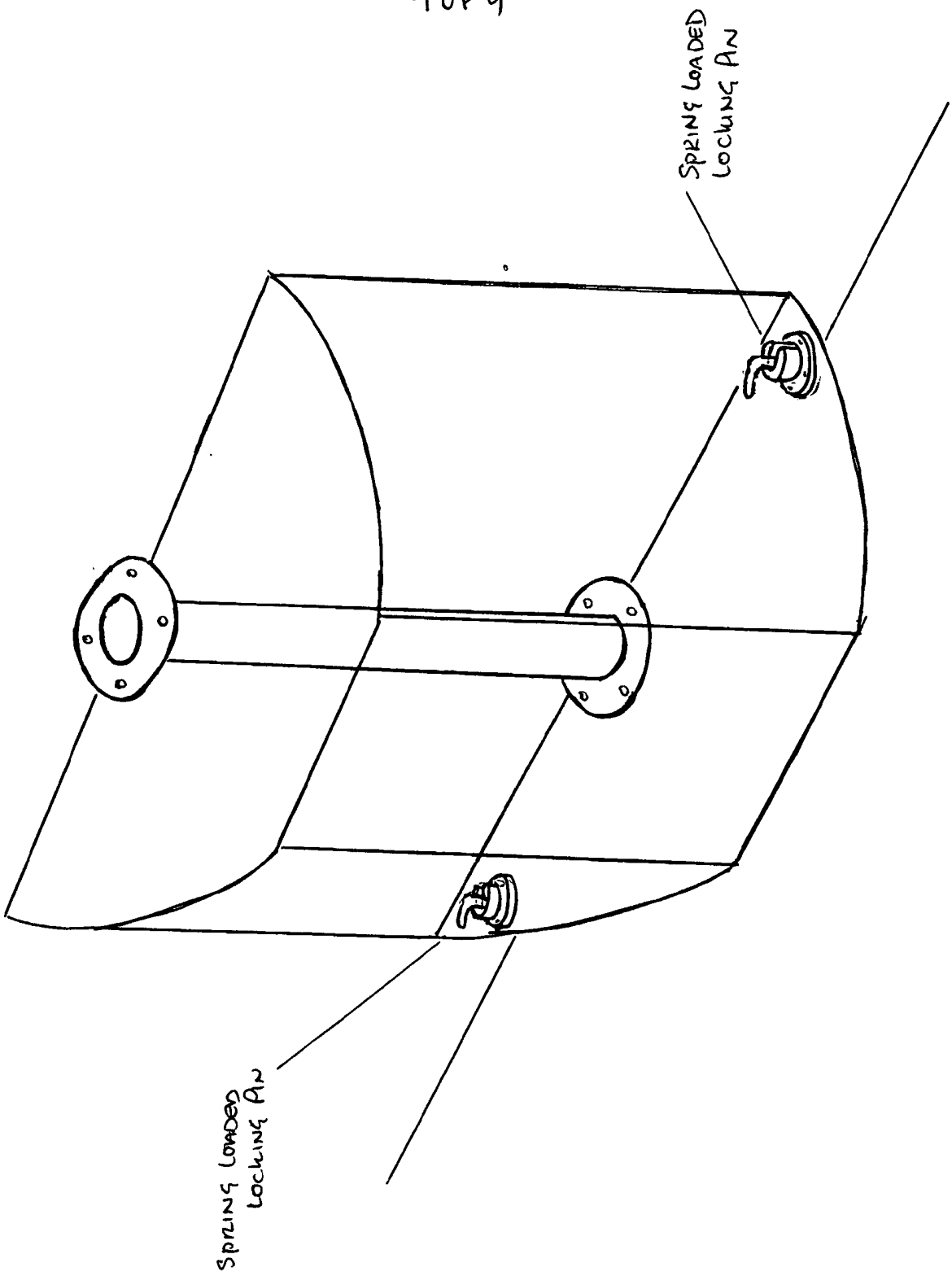

BEARING HOUSING MOUNTING FLANGE
CHAMBER
TWIN AXELS


3
2
1
LOAD BEARING ARC [STEEL GUIDE]
TAPERED SECTION [ASSISTS ROTATION]
Rollers 1~3


MAIN CARAVAN ROOF
COMPOSITE FOAM - RUBBER WEATHER SEAL
PROTECTIVE FLASHING
$\phi = 10°$
ϕ)
CHAMBER ROOF






SPRING LOADED LOCKING PIN
SPRING LOADED LOCKING PIN

2451694

Expanding caravan.

Background.

This invention introduces an expanding caravan. Traditionally, caravan's et al are regulated with regard to their maximum size and shape by rules and regulations governing vehicles that may be towed on public roads.
This new invention provides a rapid method of expanding the volume of a caravan or mobile home, whilst keeping within the legal constraints governing the external dimensions of such equipment.

Statement of invention.

The essential features of this invention relate to the inclusion of a rotating "chamber" or chambers employed to increase the living and or storage area of a caravan or mobile home.
The invention employs a single or multiple, vertically mounted axel[s] around which the "chamber"[s] rotates. The caravan etc would have an expanded, transition and contracted condition.
The "chamber" when in its contracted position [inside the caravan] enables the caravan to function in a conventional manner without additional internal restriction.
When rotated into its expanded [parked] position the "chamber" increases the available volume of the living-storage area.
The "chamber" could incorporate a toilet, shower facilities or additional internal storage space.
The "chamber" is completely weather proofed, with a roof sloping away from the main caravan body, this conforming to the design criteria employed in the construction of the host caravan. The interfaces between "chamber" and host caravan feature a protective fascia and a composite "foam-rubber" weather strip to provide a weather proof internal environment.
The underside of the "chamber" floor has incorporated a series of rollers to redistribute internal static and dynamic loads, also assisting with the smooth operation when in transition from it's contracted to expanded state, these rollers move through an arc across a guide plate situated in the host caravan floor.

Once the "chamber" is deployed outside the host caravan, a series of legs are retracted to redistribute the static and dynamic loads when in this position.
The "chamber" will have 2 operating positions, one inside the host caravan and one outside the host caravan. For each option the "chamber" would be rotated through 180 degrees laterally. Once in either of these two positions sprung locking pins would be permitted to slide into female ports designed to lock the "chamber" in the correct position.
Caravans or mobile homes incorporating this invention, could, dependant upon available space have single or multiple chambers.
The "chamber" ["chambers] would be deployed manually or automatically through the inclusion of electric geared motors or some other suitable drive mechanism.

Advantages.

The advantages of this invention are as follows.

#1:Increases the available volume of a caravan or mobile home without increasing the original "foot-print".

#2:Increases the available living/storage space without the requirement for a removable annex.

#3: The host caravan – mobile home can function normally with the "chamber" deployed [outside the caravan] or in its home position [inside the caravan], when in transit.

#4: Existing "expanding" caravans and mobile homes often feature a "chamber"/module that is deployed through the use of mechanical slides. These are prone to "sticking & jamming" through contamination and uneven internal loads. This then impacts negatively upon the ability to both deploy and pack away the expanding "chamber"/module.

As this new invention has only a single pivot point and is designed such that contamination cannot enter any [slides or similar such device], contamination will have zero impact on the free movement of the "chamber".

#5: Due to the simplicity of the new invention, maintenance will be less of a problem than when comparing to the existing sliding type inventions.

#5: Ease of deployment, it is envisaged that the "chamber" would be deployed in seconds.

Description. Expanding caravan.

An example of the invention will now be described by referring to the accompanying drawings.

The drawings accompanying this description are identified as follows.

- 1of 10 caravan with chamber deployed.
- 2 of 10 existing caravan floor detail with chamber expanded.
- 3 of 10 drawing of chamber central pivoting axel.
- 4 of 10 drawing of chamber with twin pivoting axels.
- 5 of 10 drawing showing chamber supporting rollers.
- 6 of 10 drawing showing chamber weather proofing detail.
- 7 of 10 drawing showing chamber in its contracted state.
- 8 of 10 drawing showing chamber in transition. [In between its contracted and expanded states].
- 9 of 10 drawing showing chamber locking pins.
- 10 of 10 composite photographs of invention scale model.

The expanding caravan is constructed with a galvanized steel chassis onto which a frame work of lighter aluminium or plated mild steel tubing is attached. To this "sub-assembly" an external skin of sheet aluminium or plastic composite is added, thus forming the external caravan shell. The internal wall lining, ceiling, floors, storage, and enclosures are fabricated from a combination of pressed wood fibre composite and or plastic preformed panels.

This invention is constructed in the same manner as the host caravan. The "chamber" has a tubular steel or aluminium sub-frame to which aluminium or composite panels are added. The entire external surface of the "chamber" is clad in identical panels to those used in the construction of the main caravan. The paint adopted for the chamber external surface would need to be the same colour or complimentary to the main caravan shell.

When viewed from above [see dwg 1 of 10] the "chamber" has a semi-circular appearance. Access to the "chamber" is gained through doors installed on both the curved and flat vertical surfaces. Both these doors are of equal size and construction to the existing "external" doors as installed on a conventional caravan.

Both the curved and flat vertical surfaces also have included a single "external" type window. Additional windows could be included; these would also need to be specified for "external" performance.

The "chamber" floor when in its home position [inside caravan] would be at the same level as the existing caravan floor. Once the chamber is rotated, and is in its expanded condition [see dwg 1 of 10] the semi-circular floor space vacated by the "chamber" would be at a reduced height to the surrounding caravan floor [see dwg 2 of 10].
The "chamber" rotating would also create a similar condition within the ceiling of the caravan. Both the upper and lower "voids-resseses" are created when the "chamber" is external to the body of the caravan, these have an aluminium or composite flashing installed to exclude the gap created.
Equipment installed within the "chamber" would be compliant with current caravan fixtures and fittings.

The "chamber[s]" rotates around a single or pair of vertically mounted axel[s]. The axel dimensions would be sized relative to the envisaged static and dynamic loads likely to be encountered during the course of normal operations. Each end of the axel would be mounted in a suitable sealed bearing and bearing housing [see dwg 3 & 4 of 10].
The upper bearing housing would be attached to a strengthened cross member forming part of the existing caravan roof structure, like wise the lower bearing housing would be attached to a similar structure below the floor.
The underside of the "chamber" floor would have incorporated 3 or more free spinning rollers,[see dwg 5 of 10] when the "chamber" is contracted these rollers would be responsible for relieving the central axel of static and dynamic loads imposed through normal use. When expanding the caravan, these rollers rotate over a load bearing "arc" shaped piece of steel plate built into the main caravan floor. The external edges of this guide plate would be tapered down at an angle 30 degrees to assist the rollers when pushing the "chamber" back into the caravan [see dwg 5 of 10].
Note: When the "chamber" is in its contracted position the rollers will support the majority of applied load, when the "chamber" is in its expanded condition the additional adjustable external legs [see dwg 1 of 10] would support the majority of the applied load.

The integrity of the interface between the "chamber" and the main caravan body is maintained through the inclusion of a flashing and composite "foam – rubber" weather seal [see dwg 6 of 10].

The roof of the "chamber" has a fall of 10 degrees from the top of the straight section to the top of the vertical curved section. [see dwg 6 of 10].

The "chamber" has three operating states, contracted [see dwg 7 of 10], transition [see dwg 8 of 10] and expanded [see dwg 1 of 10]. In either the contracted and expanded states the chamber is locked into position by two spring loaded pins. These are situated at each end of the straight section at floor level [see dwg 9 of 10]. To rotate the "chamber" each pin is pulled up and locked out of the way, the "chamber" is then rotated into its new position and the pins lowered into there mating holes. Note: To expand the "chamber" rotate it clockwise through 180 degrees, to contract the "chamber" rotate it anti-clockwise through 180 degrees.

The final drawing [10 of 10] introduces a series of photographs of a scale model of this invention.

Electrical services enter the "chamber" through a flexible conduit that is routed through the caravan floor and then through the hollow central axel.

Claims.

1. Relates to an expanding caravan consisting of a host caravan, which includes a roof, floor, and four non-uniform sides, one of, or several of which are designed to accommodate an additional chamber or [chambers], the additional chamber [chambers] have three states, contracted, transition and expanded, the chamber or [chambers] when in the contracted state are housed in internal floor and ceiling recesses integral to the host caravan, the transitory state refers to the condition when the additional chamber is between its contracted and expanded conditions, when in its expanded condition the caravan will have additional living [storage] space available, the chamber is rotated through 180 degrees between its contracted and expanded states; this is facilitated through the inclusion of a single or multiple load bearing axels and associated pairs of bearing assemblies, assisted through the addition of multiple rollers moving across an under floor guide plate utilising lowered leading and trailing edges, under normal operating conditions the chamber would not be left in its transitory state, however if circumstances dictate this would be possible.

2. Relates to ceiling and floor recesses identified in claim 1, designed to accommodate the chamber in its contracted condition.

3. Relates to the inclusion of rollers identified in claim 1, situated under the chamber floor, used to assist with the chamber free rotation, also reducing the impact of torsion loads.

4. Relates to the inclusion of an internal roller guide plate in claim 1, with lowered leading and trailing edges to assist with ease of operation.

5. Relates to the inclusion of single or multiple load bearing axels and associated bearing assemblies in claim 1, required for rotation of chamber.

6. Relates to the inclusion of an additional drive [mechanical or electrical] or combined hybrid device included to assist with the chamber deployment.

7. Relates to the interface between the chamber and main caravan body and the inclusion of a protective flashing and composite rubber-foam weather seal employed to achieve a weather proof seal.

8. Relates to the external roof curvature of the additional chamber.

9. Relates to the twin spring loaded locking mechanisms employed to retain the chamber in its expanded or contracted condition.

Intellectual Property Office

For Creativity and Innovation

10

Application No: GB0715615.1 **Examiner:** Peter Gardiner

Claims searched: 1 to 9 **Date of search:** 3 October 2007

Patents Act 1977: Search Report under Section 17

Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance
A	-	GB 397982 A (BISHOP) See the whole document, in particular the expansion unit a rotating through 180° about a^2.
A	-	US 6053551 A (BLONDEAU) See the swing-out section 17 in particular.
A	-	WO 02/060745 A1 (FERREN) See the expansion module 100.
A	-	WO 96/30229 A1 (DESMAISONS) See the expansion units at the rear of the caravan.
A	-	US 2552691 A (SAUNDERS-KNOX-GORE) See the rotating inner body 1.
A	-	GB 704832 A (BERKELEY) See the expansion unit 1 at the rear of the caravan.

Categories:

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC^X :

B7B

Worldwide search of patent documents classified in the following areas of the IPC

B60P; E04B

The following online and other databases have been used in the preparation of this search report

WPI, EPODOC

International Classification:

11

Subclass	Subgroup	Valid From
B60P	0003/34	01/01/2006
E04B	0001/346	01/01/2006