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EUROPEAN PATENT APPLICATION

21 Application number: **89309563.8**

51 Int. Cl.⁵: **B 61 D 17/04**
B 61 D 1/02, B 61 D 1/04

22 Date of filing: **20.09.89**

30 Priority: **21.09.88 FI 884317**

43 Date of publication of application:
28.03.90 Bulletin 90/13

84 Designated Contracting States: **DE FR GB IT SE**

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54 **Railway carriage and assembly method therefor.**

57 A railway carriage is assembled by forming a selfsupporting shell (1, 3, 4) and inserting prefabricated units (15) into the shell via an opening (5) left for that purpose. Following insertion and correct positioning of all units required, the opening (5) is closed with a final part (2) of the shell. Services (17, 18) are provided in the shell for subsequent connection to the units (15).

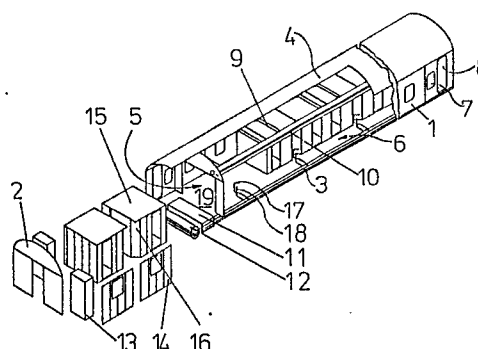


Fig 2

Description

RAILWAY CARRIAGE AND ASSEMBLY METHOD THEREFOR

This invention relates to a method for assembling railway carriages or similar constructions, as referred to in the preamble of claim 1. The invention also relates to railway carriages or the like assembled by using the method.

According to the prior art the assembly of railway carriages or similar constructions normally includes building a framework onto which are attached elements to form an outer shell and, when this is completed, the carriage is provided with its interior fittings including the building of sitting or sleeping cabins, toilets, recreation rooms, catering facilities, etc. inside the shell. The major disadvantage of such a system is that the assembly phase for the interior fittings is slow and difficult in the restricted space available within the shell and requires a high degree of manual work.

As an alternative it is known to build a framework of the carriage and then construct separate units inside the framework from segments or elements. This has the drawback that it is impossible to complete the outside shell of the construction until all the units are in position. This means that there must either be a large number of correct segments and elements for specific units available on site or a strict delivery schedule must be observed. In both cases it will be necessary to integrate two workshops of entirely different character into one production scheme, which is difficult.

One aim of this invention is to provide a method of producing railway carriages or other similar constructions which allows production of the frame, shell, undercarriage and other heavy metal parts of the carriage to a high state of completion and, on the other hand, allows prefabrication of the individual units or compartments, which are required within the shell, independently of the first mentioned production.

These units or compartments can be fully fitted out to serve a variety of purposes e.g. sitting compartments, sleeping cabins, toilet and/or shower compartments, video or children's compartments, or catering facilities.

The invention in its method aspect is defined in the following claim 1 and in terms of a railway carriage or the like in the following claim 6.

By means of the method of the invention all the heavy metal parts of the construction form a separate assembled entity. The only exception is the provision of an opening in the shell which allows the free passage of prefabricated interior units into the shell. When all the required interior units have been fitted inside the shell the opening is closed with an element forming the final portion of the shell structure.

Necessary services such as electric wiring, plumbing and air conditioning piping can be fitted in the shell before the prefabricated units are introduced, although care must be taken not to obstruct the movement path of the units. When the units are in their correct places, these wires and pipes will be

enclosed in intermediate spaces between the shell and the units and can then be connected, for instance in connecting boxes provided for this purpose, to the corresponding service equipment already installed in the units. Thereby the installation of wiring and piping is greatly simplified.

For interconnecting two railway carriages and their technical functions a so-called technical module may be used. This is positioned at the end of one carriage and includes the necessary terminals for attachment to the corresponding services in the adjacent carriage. Such a technical module, together with the corridor connecting the carriages and other equipment, can form a separate unit which may conveniently act as the closing element for the opening into the shell, when said opening is at the end of the carriage.

The bottom structure of the carriage is desirably flat and unobstructed in order that the individual units or compartments may be moved freely and rapidly from the opening in the shell to their correct location in the carriage and secured in their correct location. In one preferred embodiment of the invention the bottom structure of the carriage is fitted with a floor surface of a type which will serve the needs of the different compartment units. This means that the individual compartment units need no floor of their own, which facilitates bringing each compartment unit into its correct location, because moving a compartment unit can be achieved by pushing from inside the compartment unit. This can be a considerable advantage when positioning compartment units close together in the confined space available within the shell.

The invention will now be further described, by way of example, with reference to the accompanying drawings, in which:

Figure 1 is an "exploded" view of the shell of a railway carriage according to a preferred embodiment of the invention,

Figure 2 shows separate units or compartments being moved into the shell,

Figure 3 shows an alternative way of moving units into the shell,

Figure 4 shows a third way of moving units into the shell,

Figure 5 shows a fourth way of moving units into the shell,

Figure 6 shows a variation of the method of Figure 5,

Figure 7 shows a further variation of the method of Figure 5,

Figure 8 shows an individual unit or compartment,

Figure 9 shows a sectioned plan from above of the unit of Figure 8,

Figure 10 shows an "exploded" view of another embodiment of individual unit, and

Figure 11 shows a cross-section through a carriage showing one arrangement for connecting services to a unit located therein.

Figure 1 shows the shell of a railway carriage, made up of side wall elements 1, end walls 2, a base element 3 and a roof element 4. At least one of the end walls 2, which can also be a self-supporting element, acts as the closing element for the opening 5 leading to the interior of the shell, and includes the corridor K. Alternatively one side wall element 1 may act as the closing element for a side opening 6, in which case compartment units can be moved into the shell over the entire length of the side wall. Each side wall element 1 is prefabricated with windows 7 and outer doors 8.

Figure 2 shows an embodiment of the invention in which compartment units are being moved into the shell via the end opening 5. Air conditioning piping 9 and electrical cables 10 are shown - and a low pressure tank 11 and a water tank 12 are connected with the carriage's water/drainage system. These technical services for the carriage are connected to the corresponding systems in the rest of the train by means of a technical unit 13. The service items 9-12 are built in as part of the prefabrication of the elements 1, 3 and 4, being attached to or fabricated in the appropriate elements. Integer 14 in Figure 2 shows an internal wall for attachment to the inside of one of the side wall elements 1.

A prefabricated self-supporting unit 15 shown in Figure 2 comprises a WC-module 16, the electrical, air conditioning and plumbing systems of which are all in-built and are designed to be connected to the corresponding services in the shell after the unit 15 is moved into place and attached to the shell. Also in Figure 2 water pipe connections 17 and low pressure drain connections 18 are shown, which are so arranged that an unimpeded path remains for moving the units inside the shell. The floor of the carriage is marked 19 in Figure 2 and the unit 15 can be attached to the floor 19 which is fixed on the base element 3. When all the units 15 and possibly separate toilet units or modules 16, have been moved inside the shell, attached, and necessary services connected, the opening 5 is closed by the end wall 2.

Figure 3 shows an alternative embodiment wherein instead of an end wall 2 serving to close the shell, a separate self-supporting end element or technical module 20 is used as the closing means. The module 20 is made up from an interior wall construction comprising the technical unit 13 and corridor opening K. This alternative has the advantage over the embodiment shown in Figure 1 that the positioning of the technical unit 13 is independent of the moving of the units 15.

Figure 4 shows an arrangement whereby a unit 15 is being moved into the shell via an opening 6 in one side wall element 1. In this example a closing member 1a is used which completes the side wall element 1 and is fitted with a window 7. The advantage of this arrangement over the alternatives shown in Figures 2 and 3 is that the end portion of the carriage can be completed independently of the movement of the units 15.

Figures 5 and 6 show a unit 15 being lowered into the shell via an opening in the roof construction of the shell. It is possible to move units 15 that have

slightly larger dimensions than normal into the shell via an opening 22, which is then closed by a roof element 21. Alternatively the entire roof can be removed for allowing units to be lowered into place (Figure 6). In this case the dimensions of the available opening 23 will be almost the same as the dimensions of the roof element 4. This is a particularly convenient method of operation if it is necessary to equip the carriage with units which are different from normal sized units 15. As an example reference should be made to unit 15a, which is fitted with an extension wall 15b, by means of which the passenger compartment of the carriage can be divided into different sections.

Figure 7 shows a unit 15 divided into segments 26. In this case the opening 24 can be smaller than the opening 22 in Figure 5 and the closing element 25 will be similarly smaller than the closing element 21.

Figures 8 and 9 illustrate a prefabricated self-supporting bottomless sleeping compartment unit 15 with its WC-module 16. The compartment unit 15 has a front wall E, side walls 5, and back wall T, a bed 27, a table 28 and a wardrobe 29. In the WC-module 16 is a basin 30 and a WC 31, each fitted with its own connections for services.

Figure 10 shows a method of producing a unit 15 from prefabricated elements 16, 32-35. The front wall 35 is provided with an opening fitted with a door 36. The rear wall 34 is provided with a window opening and side walls are provided to bridge between the front and rear walls and the rear wall and the module 16. At the bottom of each wall 33, 34 and 35 is a supporting strip 37. A top wall 32 closes the unit from above. The strip 37 can serve to seal any gap left between a unit and the floor 19, e.g. after the unit has been moved into the precise position required from within the walls 33, 34, 35.

Figure 11 shows how the services of the units 15 can be connected to those of the shell. As an example the air conditioning pipe 9 is shown connected to piping 40 in the shell in the upper part of a carriage 39, and the water pipe 17 and drainage pipe 18 are shown connected to pipes below the floor 19.

The invention is not limited to the embodiments shown, since several other modifications thereof are feasible within the scope of the following claims.

Claims

1. A method for assembling a railway carriage or the like, comprising a frame and a substantially closed shell containing a plurality of compartment units, for example passenger seating or sleeping compartments, toilet and shower compartments, characterised in that the frame as known per se is formed as a self-supporting structure supporting the shell and the compartment units, and that said compartment units (15, 15a, 16) are prefabricated as self-supporting, independently movable compartment units, or segments (26) of such units, and that until the final stage of assembly, the shell is provided with a closable

opening (5, 6, 22, 23, 24) through which said compartment units (15, 15a, 16) or segments (26) can be moved into the shell, and that substantially all the interior structure of the railway carriage or the like is formed by using said compartment units.

2. A method according to claim 1, characterised in that between the compartment units and the shell an intermediate space is left for necessary piping and wiring, a part (40) of which is installed in the shell before installation of the compartment units (15, 16) therein.

3. A method according to claim 1 or 2, characterised in that a technical module (20) used for interconnecting one railway carriage and its functions to the next carriage is used as the closing member for the closable opening (5).

4. A method according to any one of claims 1 to 3, characterised in that the railway carriage or the like is provided with a mainly flat bottom structure (19), to which the compartment units (15, 15a, 16) are attached and along which the units can be moved to their proper place of attachment.

5. A method according to claim 4, characterised in that the bottom structure (19) is provided with a floor surface of a type serving the needs of the compartment units, and that at least a substantial number of the compartment units are made at least substantially without a floor surface of their own.

6. A railway carriage or the like, comprising a frame and a substantially closed shell containing a plurality of compartment units (15, 15a, 16), for example passenger seating or sleeping compartments, toilet and/or shower compartments, characterised in that the frame as known per se is a self-supporting structure supporting the shell and the compartment units, and that said compartment units are prefabricated self-supporting, independently movable compartment units (15, 15a, 16), or segments (26) of such units and that the shell is provided with a closable opening (5, 6, 22, 23, 24) until the final stage of assembly, which opening is dimensioned to allow insertion into the shell of said compartment units (15, 15a, 16) or segments (26), whereby substantially all the interior structure of the railway carriage or the like is formed by using said compartment units.

7. A railway carriage or the like according to claim 6, characterised in that between the compartment units and the shell there is an intermediate space including a portion of the piping and wiring (17, 18, 40) of the carriage.

8. A railway carriage or the like according to claim 6 or 7, characterised in that a technical module (20) including means for interconnecting one carriage and its functions to the next carriage is included in the closing member of the closable opening (5).

9. A railway carriage or the like according to any one of claims 6, 7 or 8, characterised in that it has a substantially flat bottom structure (3), to

which the compartment units (15, 15a, 16) are attached and along which the units can be moved to their proper place of attachment.

10. A railway carriage or the like according to claim 9, characterised in that the bottom structure is provided with a floor surface (19) of a type serving the needs of the compartment units (15, 15a, 16), and that at least a considerable number of the compartment units have an open bottom.

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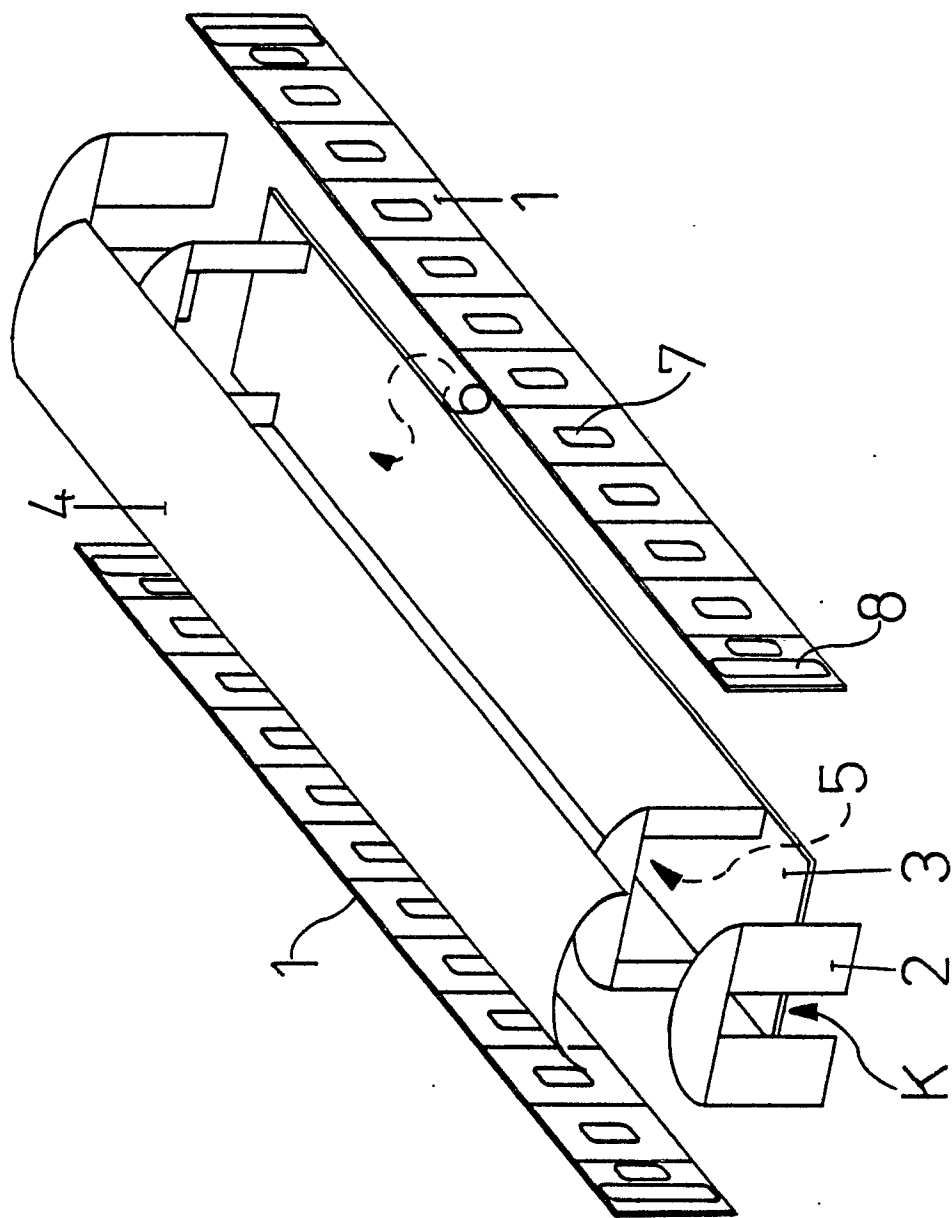
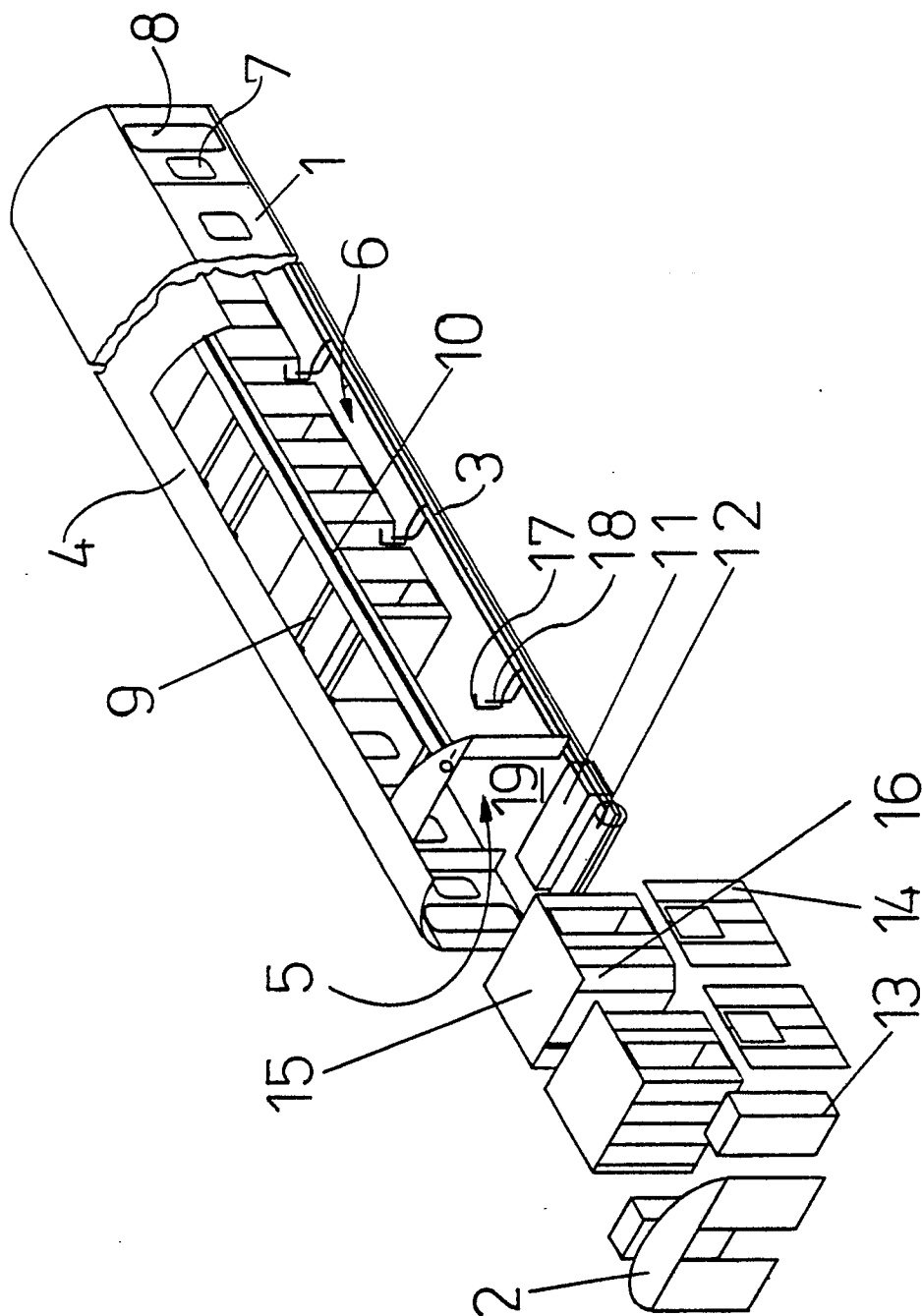


Fig 1



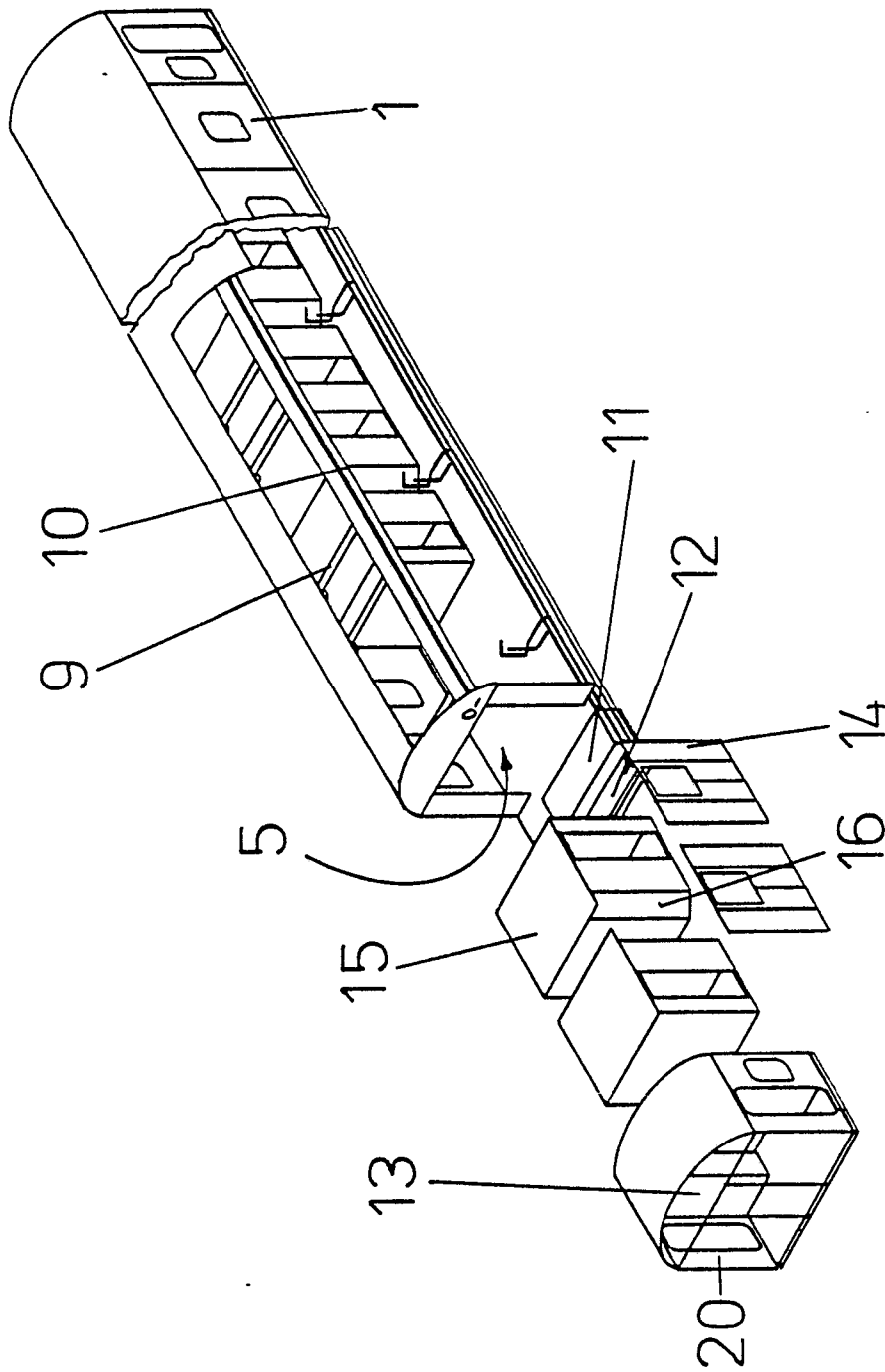


Fig 3

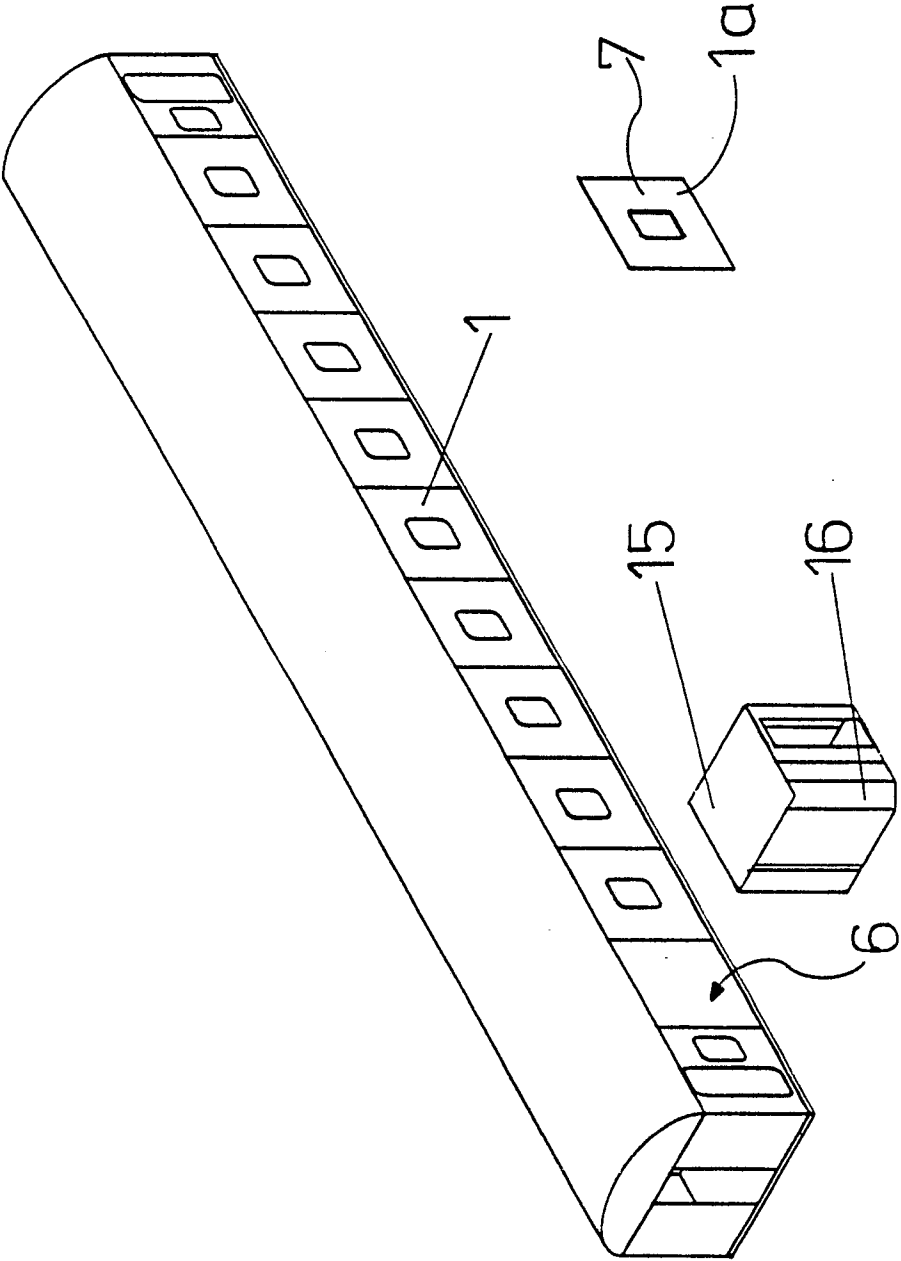


Fig 4

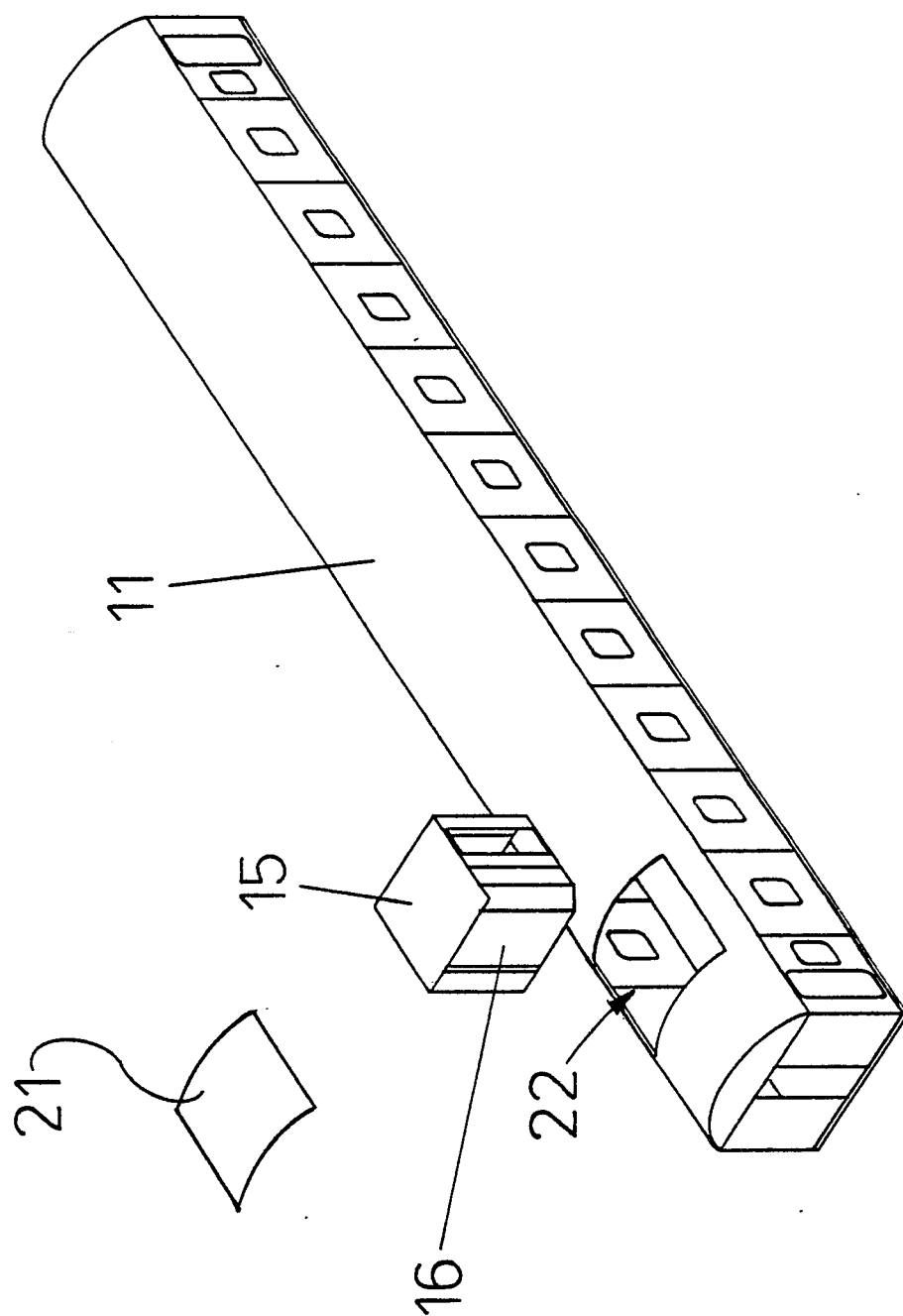


Fig 5

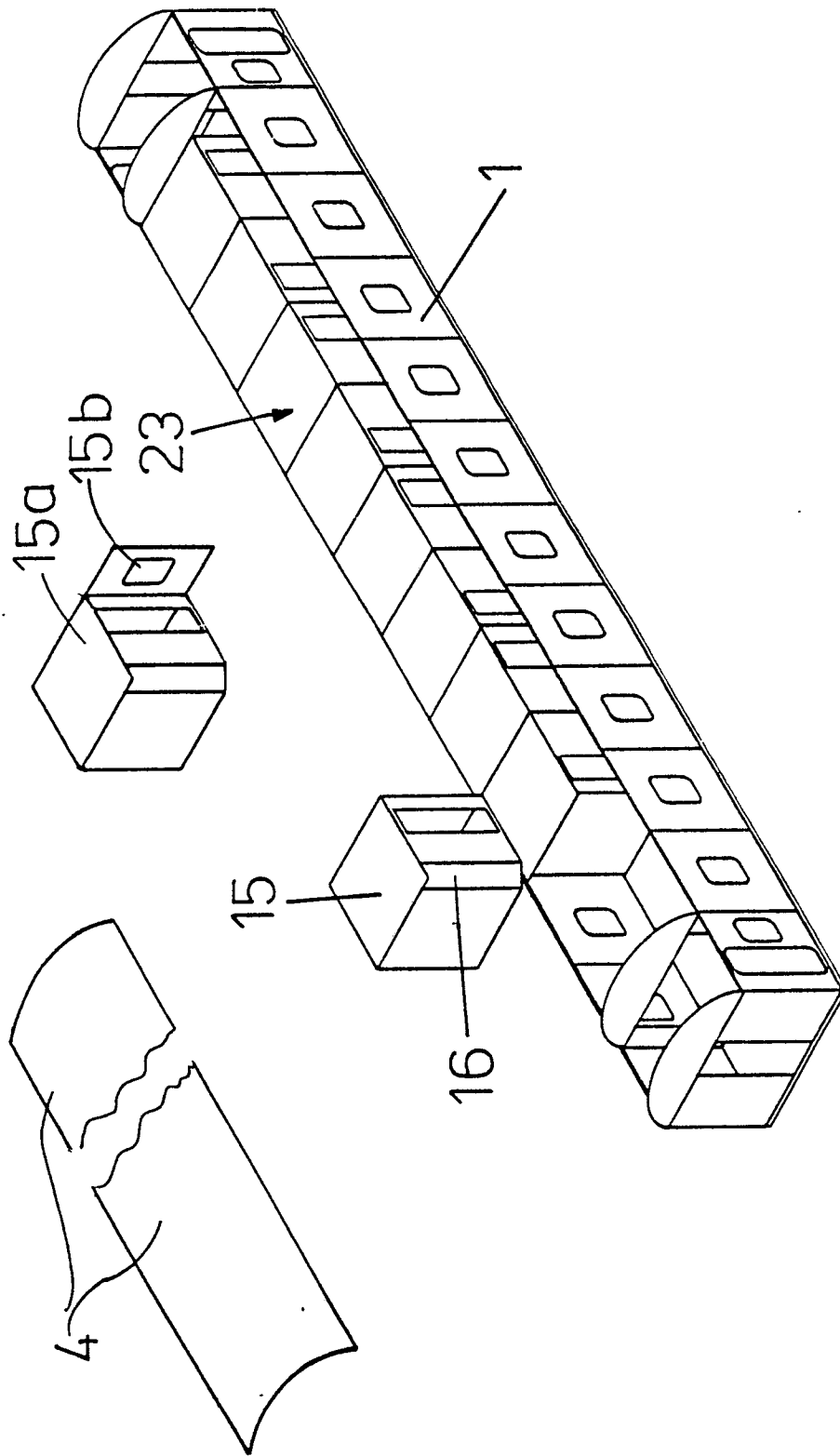


Fig 6

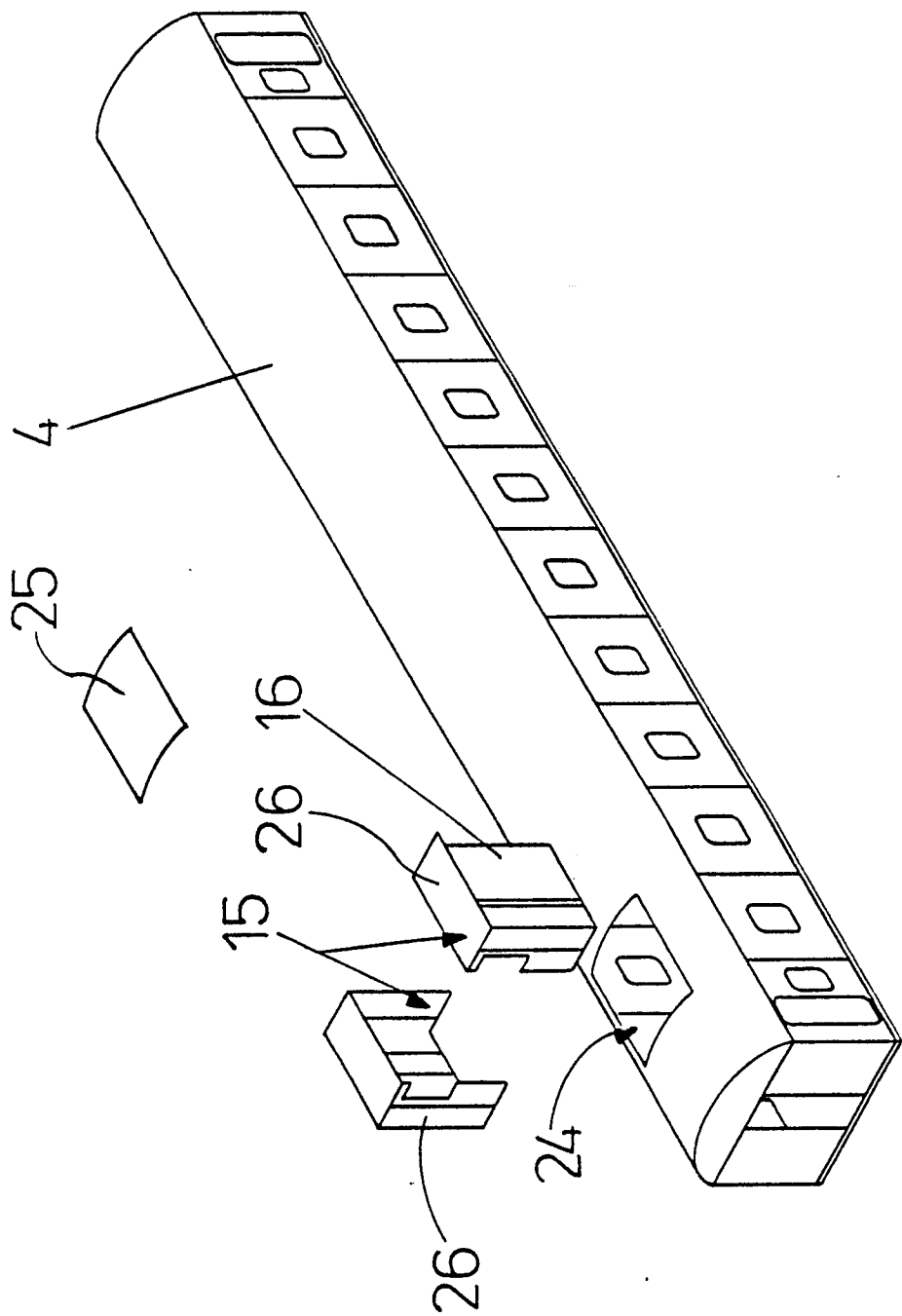


Fig 7

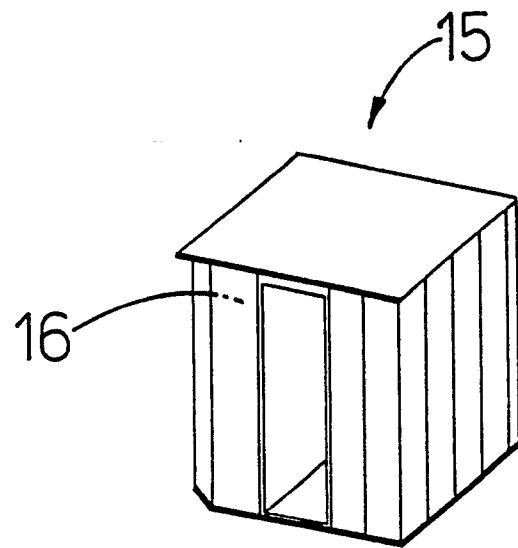


Fig 8

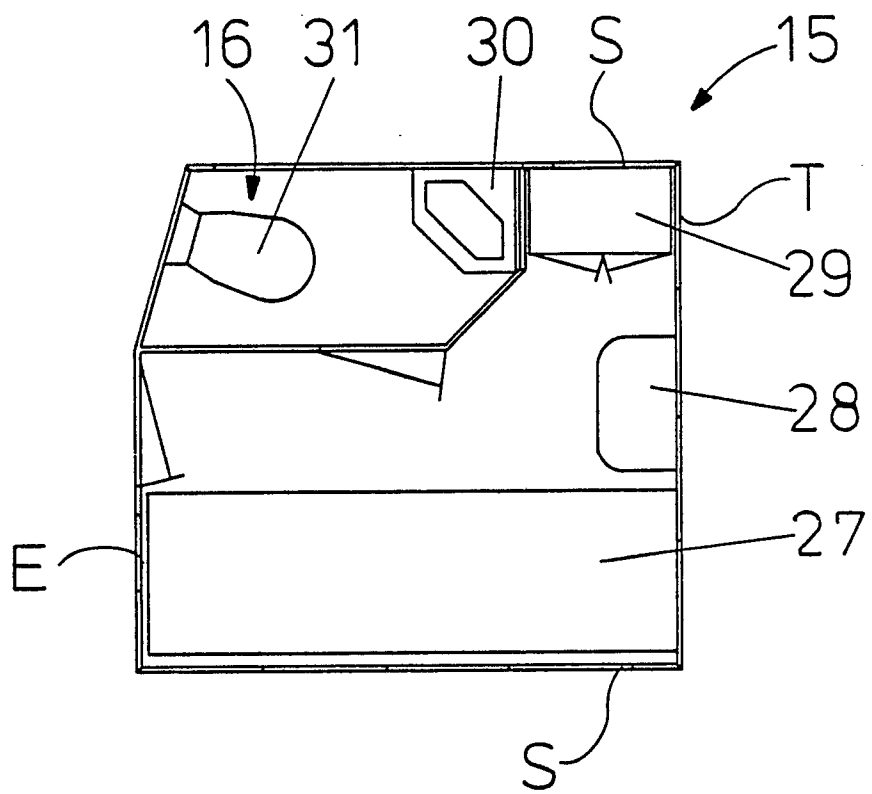


Fig 9

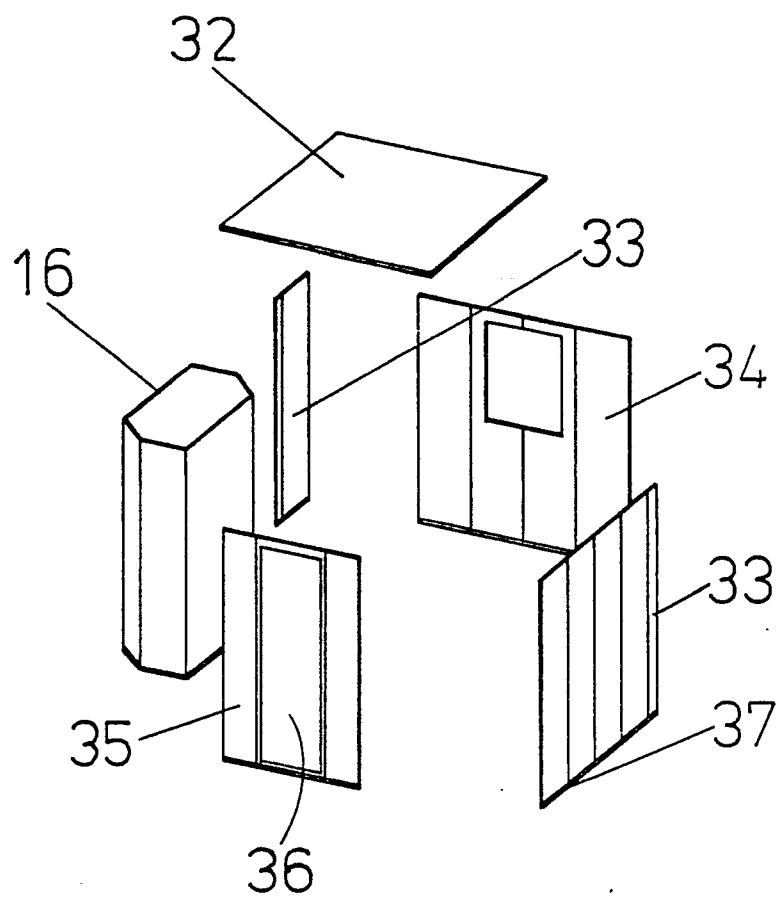


Fig 10

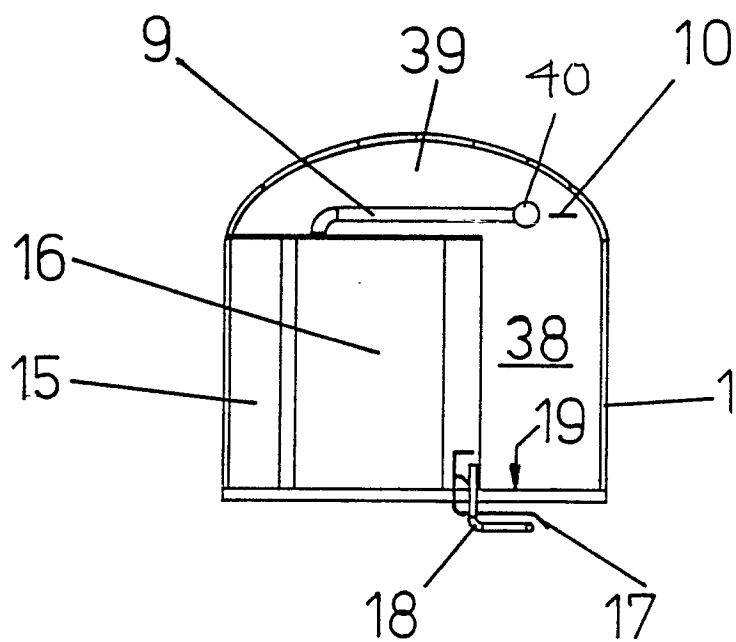


Fig 11