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(12) # EUROPEAN PATENT SPECIFICATION

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(54) **Construction system for a dwelling together with a dwelling built in this way.**

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DE-A-1 784 978
FR-A- 996 664
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US-A-3 897 662
US-A-4 078 342

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Description

The present invention relates to a construction system for a dwelling, such as a residential dwelling or office, built up from a supporting structure comprising columns, girders, floor sections and facade elements, whereby the columns are arranged at some distance outside the flat facade elements and whereby furthermore specific purpose units such as kitchens, bathrooms, w.c.'s etc. are provided. In actual practice various construction systems are already known which aim at providing a cheap method of building so as to reduce the real estate costs. Although this resulted in some reduction in price, at the same time considerable monotony was introduced so that during building little or no consideration could be given to the purchaser's requirements.

The present invention aims at providing a construction system which on the one hand can lead to a considerable reduction in costs, and which secondly permits a very wide variety of variation, without it being necessary for the builder to keep in stock or to have specially made a large number of different elements. This aim is achieved in accordance with the invention in that the columns are present only on two opposing facade faces of the dwelling, in that each purpose unit is always located between two columns of the same facade face, and thereby at the same time performs the function of facade element, and in that the spacings between the columns appertaining to one and the same facade, together with the width of the floor sections, and the dimensions of the facade elements expressed in one and the same unit of length, result in a number of numerical values which together form terms in a series of the FIBONACCI-type.

The advantage obtained with this construction system is two-fold. Firstly it becomes possible to obtain an independent supporting structure which forms the constructional backbone of the system, the said structure being made up of columns and the floor sections. Right from the outset these elements can be produced without being influenced by the location or the purpose for which they will be subsequently employed. The same applies to the facade elements and the "purpose units" and furthermore to the auxiliary units fastened to the facades. The second advantage is connected with the application of the dimensional system in accordance with a FIBONACCI series, the advantages of which for use in certain applications have already been described in US—A—4 078 342. As a result of employing this dimensional system only a limited number of elements need to be kept in stock, whilst the number of possible combinations is extremely wide and consequently purchasor's requirements can be complied with to a considerable extent.

It is observed that DE—A—1 784 978 discloses a construction system corresponding to the state of the art as described in the opening paragraph of this Specification. The columns at the opposing facade faces are constituted by a number of superimposed inverted U-shaped girders and have a uniform spacing. The facade elements form part of uniform boxes filling up the inner space of the building. There is no relationship in any of the dimensions tending to form a series of the FIBONACCI-type.

It is further observed that FR—A—2 263 359 relates to a construction system based upon the combination of a great number of individual dwelling cells, interconnected by common equipments for the distribution of energy and for the supply and discharge of water. There are no columns or facade elements and the dimensions involved do not show any mutual relationship forming a series of the FIBONACCI-type.

Finally the FR—A—996 664 describes the principle of dimensioning pre-fabricated rectangular elements such that they can be assembled into a building. The dimensions of the individual elements result in a number of numerical values, which together form terms in a series of the FIBONACCI-type. There is no teaching about a construction system comprising columns, girders floor sections and facade elements.

The invention is especially typified in a dwelling obtained using the construction system described above. In such a dwelling each purpose unit is designed as an open box which is fastened between two columns and which is provided with supply pipes and conductors for gas, water and/or electricity, together with a sewage main. The facade consists on one side of the dwelling of a number of spatial facade elements by means of which a kitchen, bathroom, shower area, washroom and the like can be formed. The rest of the facade concerned, together with the remaining facades can be built up from flat facade elements.

The invention will be discussed in greater detail with the aid of a large number of drawings which provide an oversight of the large number of possibilities and of some more detailed projects.

Sheet 1 illustrates in extremely schematic form, in perspective, a dwelling consisting of two storeys in which the construction system is illustrated. The supporting structure comprises a number of columns which are provided with a number of cantilevers which project inwardly level with the floors. A girder with a Z-shaped cross-section for supporting the floor sections, the upper face of which is level with the upper edge of the cantilevers, rests on a pair of adjacent cantilevers. The mutual spacing between the columns is governed by the choice made by the purchasor of the dwelling concerning the arrangement of the house, particularly the dimensions of the purpose units in which the sanitary and other facilities are provided.

Fig. 2 illustrates the possibilities which exist with regard to the purpose units, whereby the various dimensions can be regarded as terms from a FIBONACCI series. The same diagram illustrates a staircase element and a W.C. extending across two storeys.

Concerning Fig. 1 and 2 which have just been mentioned, it can be pointed out that each dwelling rests on two foundation strips which run in parallel and always have the same cross-section. The load-supporting column structure is attached to this foundation. The fact that the columns proceed in parallel and have a fixed cross-section makes it easy to set out the site, check the dimensions and to provide the foundation system. The loading on the foundation strips is fixed, per linear metre, because the span of the floor bays and thus the prescribed loadings are already known. The columns are erected at distances which are governed by the requirements imposed by the site requirements and the wishes of the residents, as already described. The different dimensions are got up in accordance with a series of the FIBONACCI-type. By this means it is possible, employing a minimum number of differing spacings, to obtain a maximum of different sub-divisions, see Fig. 2, together with Fig. 6—9 which will be described in the following. The columns are located beyond the edge of the floor sections so as to permit independent location of the floor elements, columns and facade elements.

The purpose elements shown in Fig. 2 are prefabricated in the factory. It is possible here to employ standard sanitary and piping material, together with standard kitchen units. Pre-fabrication extends up to the assembly and connection of all sub-components such as baths, shower trays etc. and the provision of wall apertures and pipe connections. As a result of the provision of wall apertures, the box-shaped purpose units which are produced otherwise from neutral standard components are provided with a demonstrable function, but if so these can be mounted at any point on the facades between two columns.

The pipes of a purpose unit are provided upon a plate or pipe bulkhead, see Fig. 15. Assembly is undertaken by installing the corresponding bulkhead and fastening the pipes by means of quick release couplings or screwed couplings. If necessary this can also be carried out using hoses. The said pipes are designed for water, gas and sewage purposes. These are always located in the area reserved for this purpose directly underneath the purpose units. Fig. 15 likewise shows that at the side of or inside a technical purpose unit a shaft is provided on the vertical running of pipes and exhaust gases and for ventilation. This is the only point in the system where an aperture is made through a roof, which reduces the risk of leakage.

Fig. 3 illustrates a number of auxiliary units which can be attached to the facade opposite the purpose units. These auxiliary units can consist of a balcony, a bay window, a plant greenhouse, a porch, a corridor and/or staircase, a conservatory, a sun awning, a windshield, a terrace or a gallery. A hybrid solution is also feasible in which one of the facades is made up from purpose units and one or more auxiliary units.

The cupboards for the dwelling are accommodated in a boxed zone which is directed transverse to the floor sections, as can be seen in Fig. 4—7. This boxed zone also contains electrical and heating/ventilation facilities. The zone can be accessed and is exploitable from two sides. In these boxes there is a conductor duct located above door level so that no wall apertures are required. These conductors can be consequently included in the prefabrication stage. As can be seen in Fig. 4 between the boxes there is a conductor space which can be employed for connecting up plug sockets, switches and ventilation apertures.

For the sake of completeness Fig. 8 provides a schematic view of the floor widths to be employed and the construction of these floors from only two different types of floor components of differing widths, the dimensions of which comprise part of the FIBONACCI series which forms the basis of the dwelling concerned. Fig. 9 illustrates a number of embodiments of flat sites with the supporting structure employed here comprising four or five columns. This Fig. 9 illustrates how many variations are feasible in spite of the limited number of basic elements or purpose units which are available in prefabricated form.

Figs. 10 and 11 provide extremely schematic illustrations of fairly compact structures obtained using the system in accordance with the invention, i.e. a complete dwelling which is built up only from prefabricated components whilst retaining a very large range of variations which can be introduced without increasing costs.

A more refined embodiment of the bungalow type is shown in Figs. 12 and 13. Fig. 12 provides a frontal view and a plan view, whilst Fig. 13 provides a more detailed perspective view in combination with a slightly sloping roof construction with ventilation facilities which has been employed. Fig. 14 again illustrates another embodiment of a dwelling consisting of two storeys whereby the top storey is provided with a great deal of balcony space. Fig. 15 provides a cut-away perspective view of a dwelling consisting of two storeys with a detailed representation of the sanitary facilities in the purpose units employed. Fig. 16 illustrates the design of a facade in which a large number of solar shelter elements are provided and where the technical purpose units are located on the rear facade face which is not illustrated.

Claims

1. Construction system for a dwelling, such as a residence or office, built up from a supporting structure comprising columns, girders, floor sections and facade elements, whereby the columns are arranged at some distance outside the flat facade elements and whereby further more specific purpose units such as kitchens, bathrooms, W.C.'s etc. are provided, characterised in that the columns are present only on two opposing facade faces of the dwelling, in that each purpose unit is always located between two columns of the same facade face, and thereby at

the same time performs the function of facade element, and in that the spacings between the columns appertaining to one and the same facade together with the width of the floor sections and the dimensions of the facade elements expressed in one and the same unit of length, result in a number of numerical values which together form terms in a series of the FIBONACCI-type.

2. Dwelling obtained with the construction system according to claim 1, characterised in that each purpose unit is designed as an open box attached between two columns, which is provided with supply pipes for gas, water and/or electricity, together with a sewage pipe.

3. Dwelling according to claim 2, characterised in that the incoming and outgoing pipes are fastened to a supporting plate which is located underneath the corresponding unit and to which the sanitary and other facilities are connected.

4. Dwelling according to claims 2 or 3, characterised in that the columns are provided with cantilevers, projecting towards the inside, which are level with the floors, whereby girders with a Z-shaped cross-section rest on these cantilevers so as to support the floor elements.

5. Dwelling according to any one of claims 2—4, provided internally with cupboards, characterised in that the cupboards are accommodated in a box zone which is transverse to the floor sections, the zone being accessible on two sides and at the same time performing a separating function.

6. Dwelling according to any one of claims 2—5, characterised in that the electrical conductors in the purpose units and in the box zones are located above door height and are incorporated in a collecting duct with branching-off facilities.

7. Dwelling according to any one of claims 2—6, characterised in that a shaft is provided, at the side of or in a technical purpose unit, for the vertical transport of pipes and exhaust gases and for ventilation.

Revendications

1. Système de construction pour maison, par exemple d'habitation ou de bureau, construite à partir d'une structure de support comprenant des colonnes, des poutres, des tronçons de sol et des éléments de façade, de manière que les colonnes soient placées à une certaine distance en dehors des éléments plats de façade et des ensembles spécialisés supplémentaires tels que les cuisines, salles de bains, toilettes, etc. sont réalisés, caractérisé en ce que les colonnes ne sont présentes que sur deux faces de façade de la maison, en ce que chaque ensemble spécialisé est toujours placé entre deux colonnes de la même face de façade et assure ainsi en même temps la fonction d'un élément de façade, et en ce que les espacements entre les colonnes appartenant à une seule et même façade, avec la largeur des tronçons de sol et les dimensions des éléments de façade exprimées en une seule et même unité de longueur, donnent un nombre de valeur numérique qui forme ensemble les termes d'une série de Fibonacci.

2. Maison obtenue à l'aide du système de construction selon la revendication 1, caractérisée en ce que chaque ensemble spécialisé est réalisé sous forme d'un caisson ouvert fixé entre deux colonnes, qui comporte des tuyauteries d'alimentation de gaz, d'eau et/ou d'électricité avec une tuyauterie d'égout.

3. Maison selon la revendication 2, caractérisée en ce que les tuyauteries entrante et sortante sont fixées à une plaque de support placée au-dessous de l'ensemble correspondant et à laquelle sont raccordés les sanitaires et autres installations.

4. Maison selon l'une des revendications 2 et 3, caractérisée en ce que les colonnes ont des éléments en porte à faux, dépassant vers l'intérieur, au niveau des sols si bien que les poutres ayant une section en Z sont en appui sur ces éléments en porte à faux et supportent les éléments de sol.

5. Maison selon l'une quelconque des revendications 2 à 4, comportant à l'intérieur des placards, caractérisée en ce que les placards sont disposés dans une zone en caisson transversale aux tronçons de sol, la zone étant accessible des deux côtés et assurant simultanément une fonction de séparation.

6. Maison selon l'une quelconque des revendications 2 à 5, caractérisée en ce que les conducteurs électriques des ensembles spécialisés et des zones à caissons sont placés au-dessus de la hauteur des portes et sont incorporés à un conduit collecteur ayant des installations de dérivation.

7. Maison selon l'une quelconque des revendications 2 à 6, caractérisée en ce qu'elle comporte une colonne placée sur le côté d'un ensemble spécialisé technique ou dans un tel ensemble et destinée au transport vertical des canalisations et des gaz d'échappement et à la ventilation.

Patentansprüche

1. Baukonstruktion von Küchen, Badezimmer, WC's und sonstige Sonderräume aufweisenden Wohn- und/oder Bürogebäuden, deren tragende Elemente durch Stützen, Träger, Fußbodenteile und Fassadenelemente gebildet werden, wobei die Stützen im Abstand von den ebenen Fassadenelementen vor diesen angeordnet sind, dadurch gekennzeichnet, daß die Stützen nur auf zwei einander entgegengesetzten Fassadenseiten des Gebäudes angeordnet sind und jeder Sonderraum ein zwischen zwei Stützen derselben Fassadenseite angeordnetes Fassadenelement bildet, und daß die Zwischenräume zwischen zwei Stützen derselben Fassadenseite, die Breitenabmessungen der Fußbodenteile und die Abmessungen der Fassadenelemente, in derselben Längeneinheit gemessen, numerische Werte darstellen, die den Werten einer FIBONACCI-Reihe entsprechen.

2. Gemäß der Baukonstruktion nach Anspruch 1 errichtetes Gebäude, dadurch gekennzeichnet, daß die Sonderräume als zwischen je zwei Stüt-

zen angeordnete offene Zellen ausgebildet sind, die Gas-, Wasser- und elektrische Leitungen, sowie eine Abwasserleitung aufweisen.

3. Gebäude nach Anspruch 2, dadurch gekennzeichnet, daß die Zu- und Ableitungen mit einer Trägerplatte verbunden sind, die unterhalb der betreffenden Sonderraumzelle angeordnet ist und an die die sanitären und anderen Leitungen angeschlossen sind.

4. Gebäude nach Anspruch 2 oder 3, dadurch gekennzeichnet, daß die Stützen nach der Innenseite des Gebäudes in der Ebene des Geschoßböden vorspringende Auskragungen aufweisen, wobei ein Z-Profil aufweisende, die Geschoßbödenelemente tragende Träger auf diesen Auskragungen aufliegen.

5. Gebäude nach einem der Ansprüche 2 bis 4 mit inseitig angeordneten Schränken, dadurch gekennzeichnet, daß die Schränke in einem Zellenbereich angeordnet sind, der sich senkrecht zu den Fußbodenteilen erstreckt, wobei diese Zellenbereiche von zwei Seiten zugänglich sind und Trennwände bilden.

6. Gebäude nach einem der Ansprüche 2 bis 5, dadurch gekennzeichnet, daß die in den Sonderräumen und in den Zellenbereichen angeordneten elektrischen Leitungen oberhalb der Türen und als Sammelleitung mit Abzweigdosen verlegt sind.

7. Gebäude nach einem der Ansprüche 2 bis 6, dadurch gekennzeichnet, daß seitlich eines Sonderraums oder in diesem ein Schacht für Steigleitungen sowie für den Gasabzug und die Belüftung vorgesehen ist.

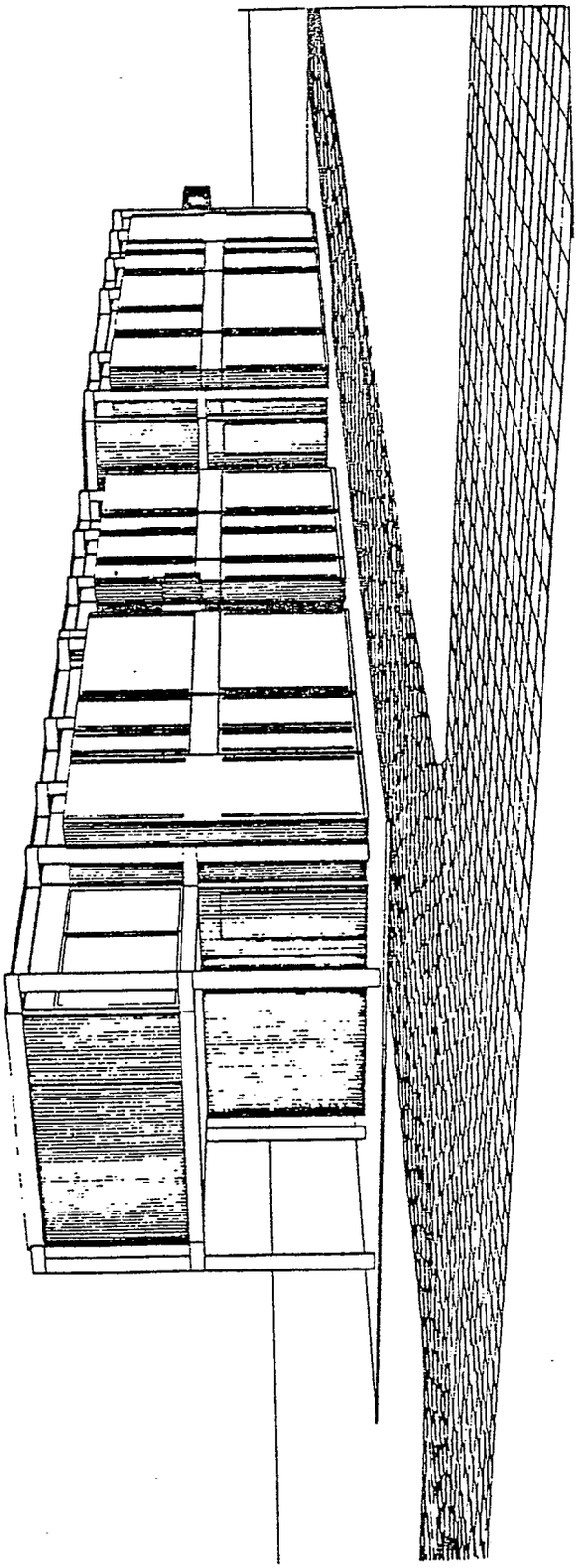

Fig. 1

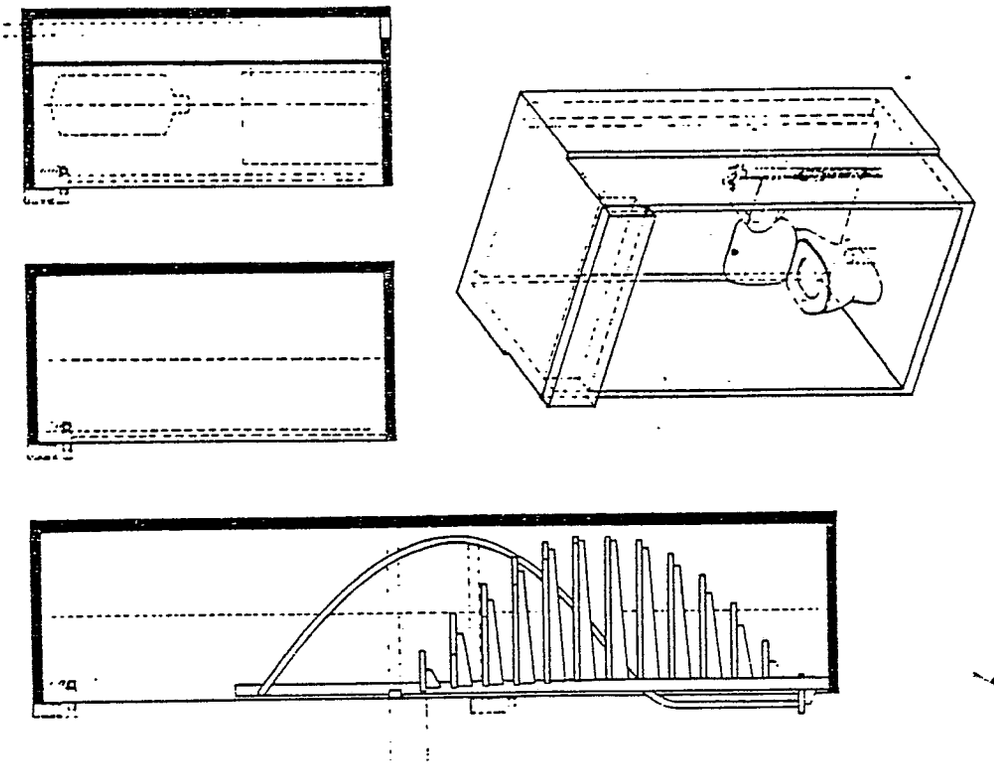

Fig. 2

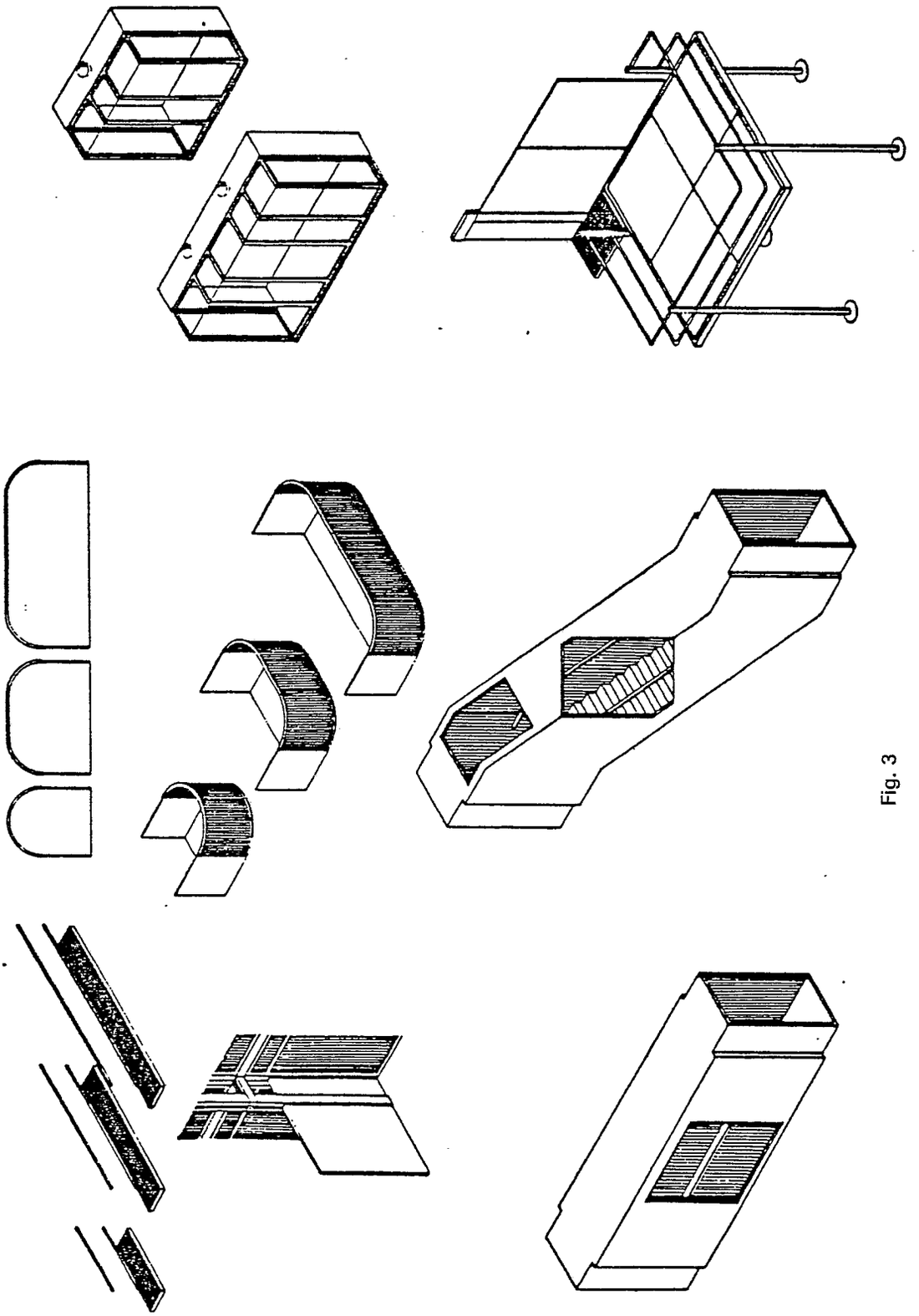

Fig. 3

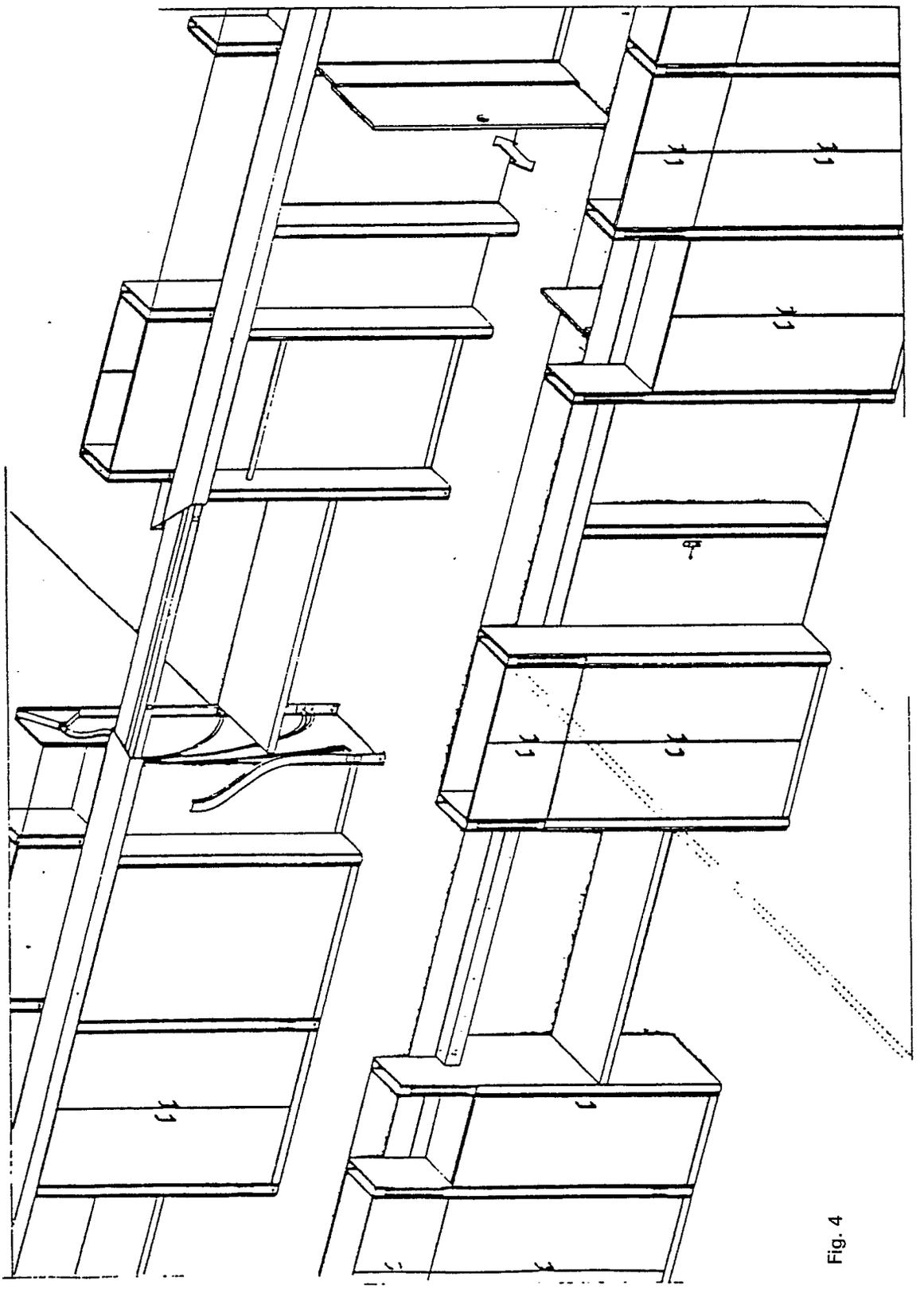

Fig. 4

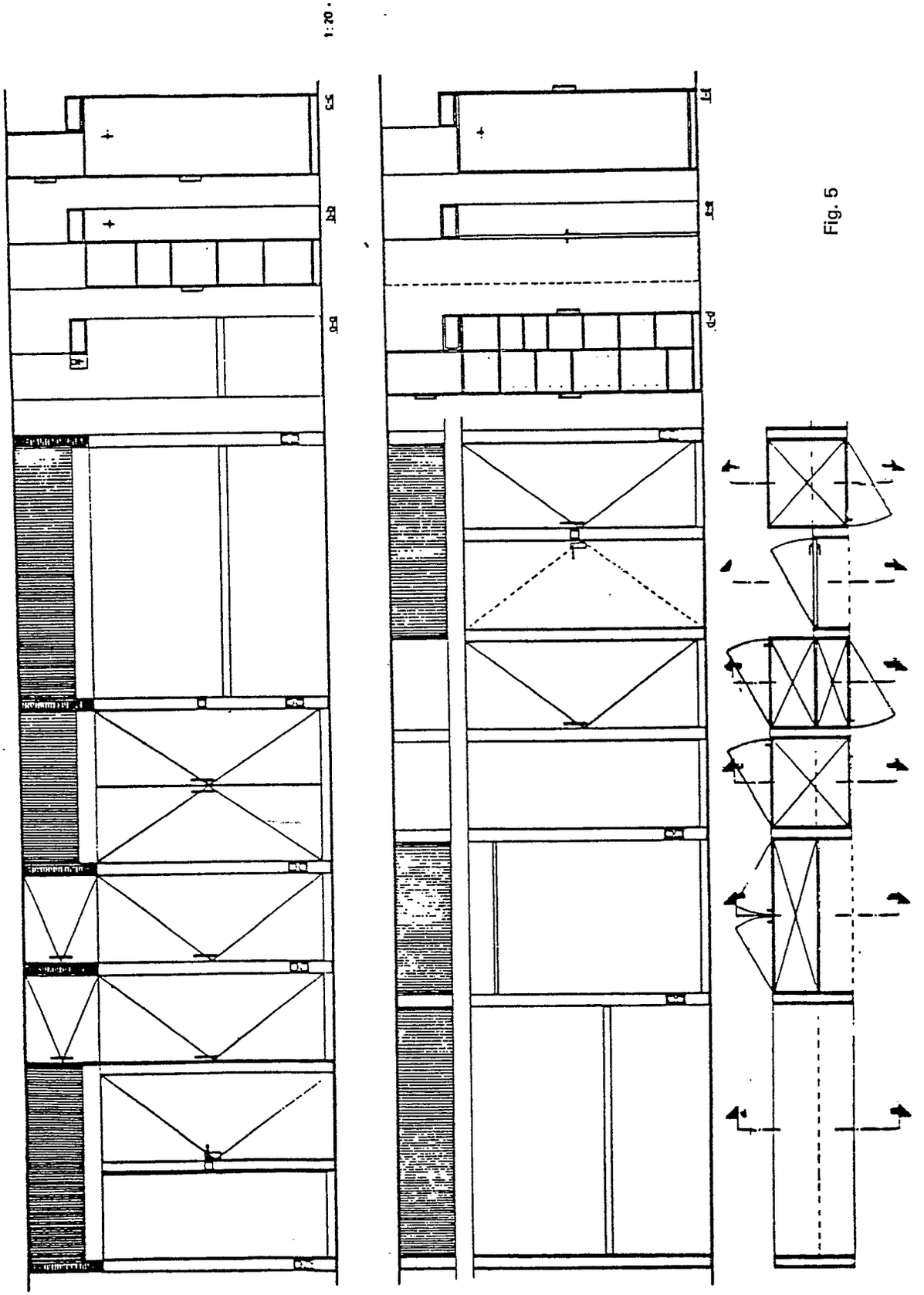

Fig. 5

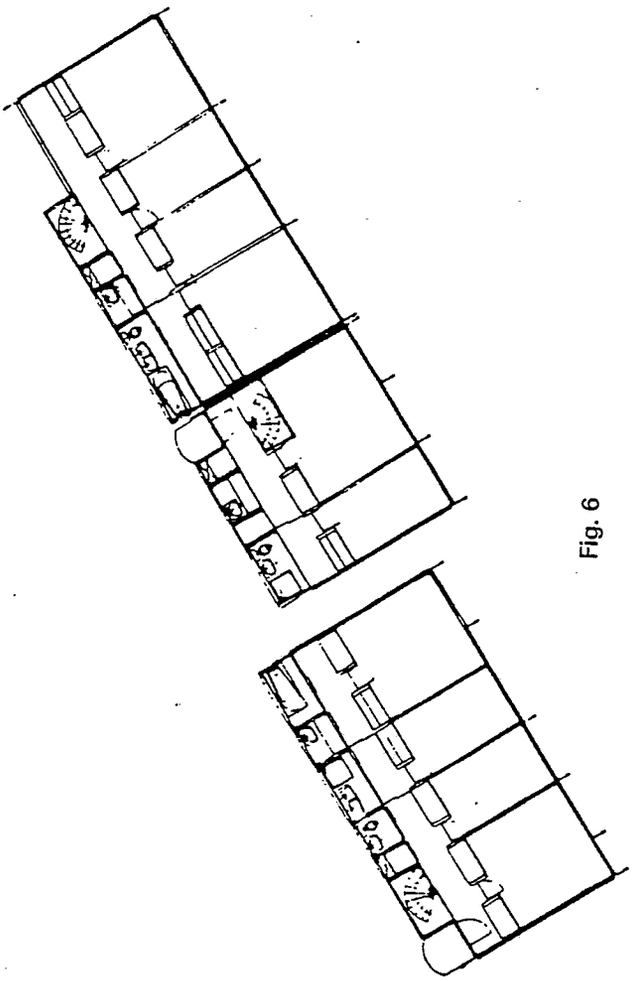

Fig. 6

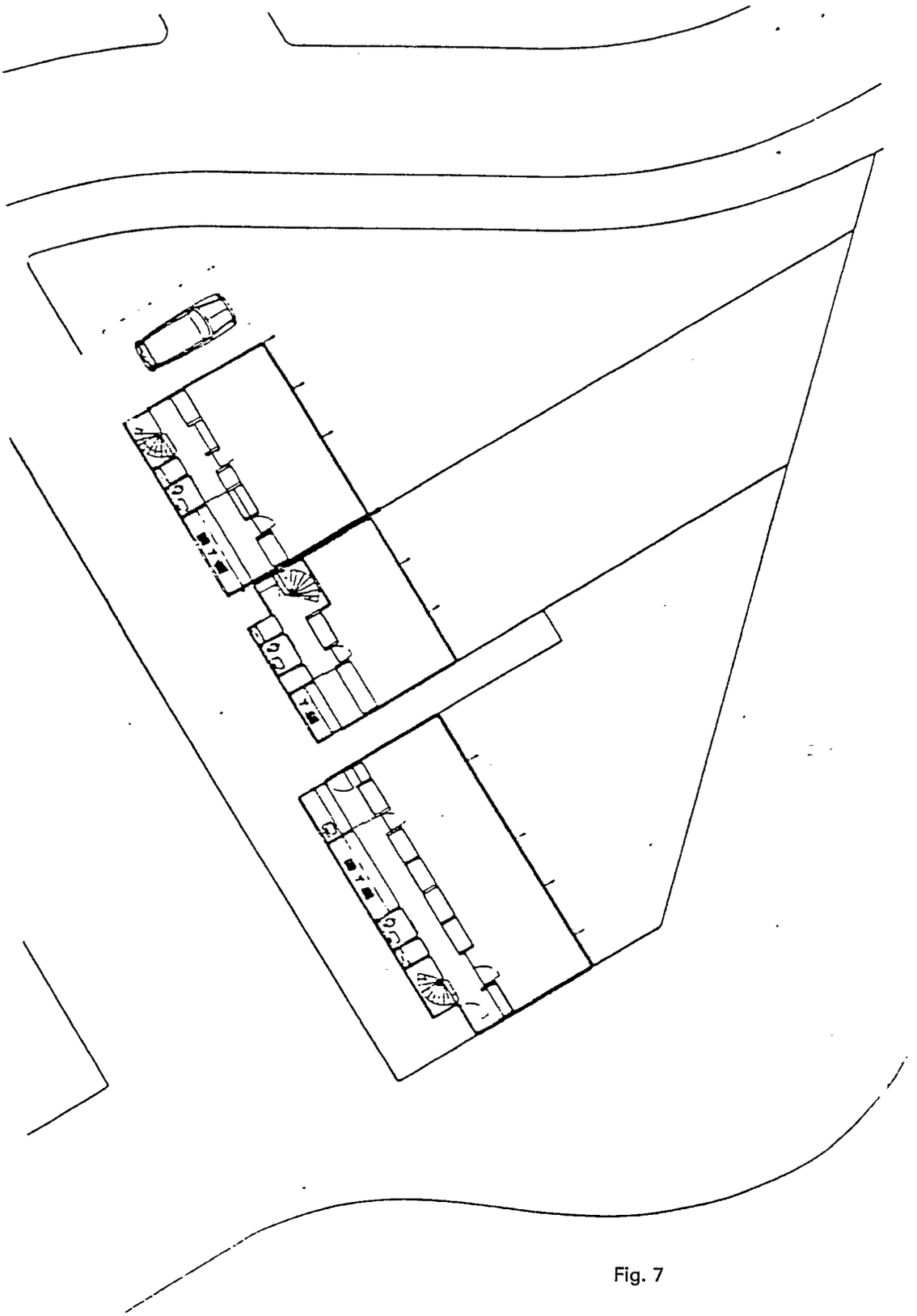

Fig. 7

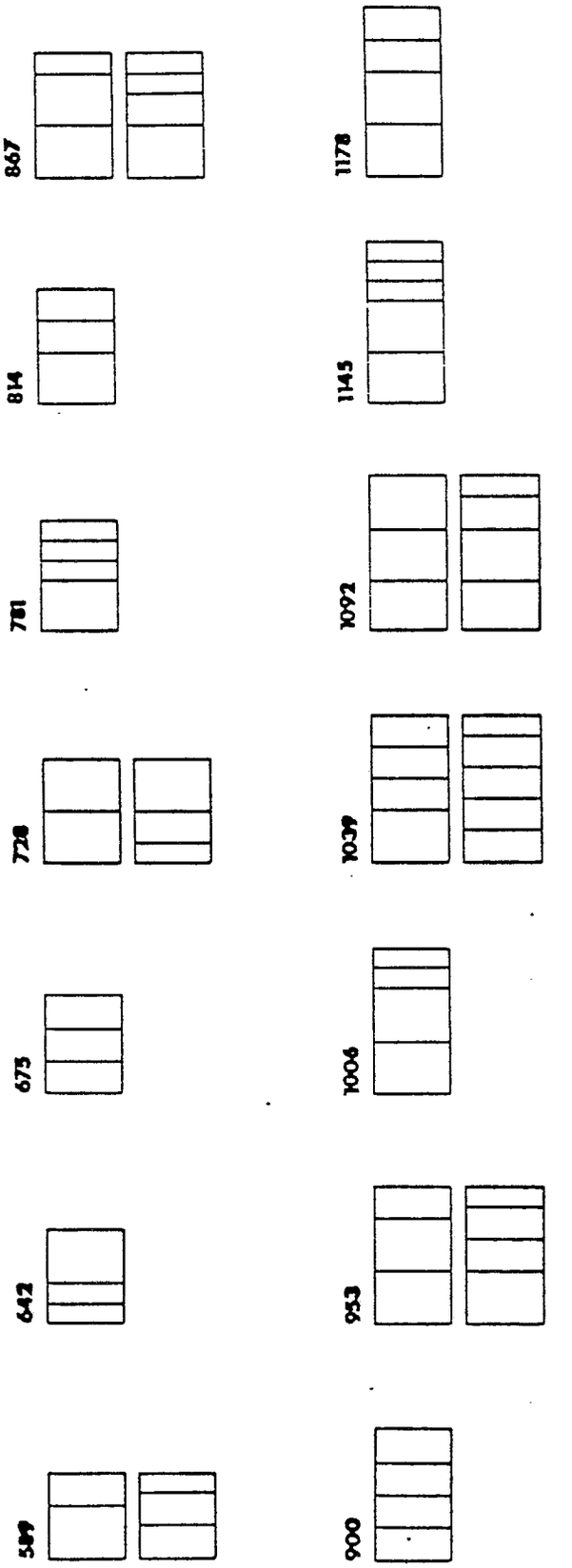

Fig. 8

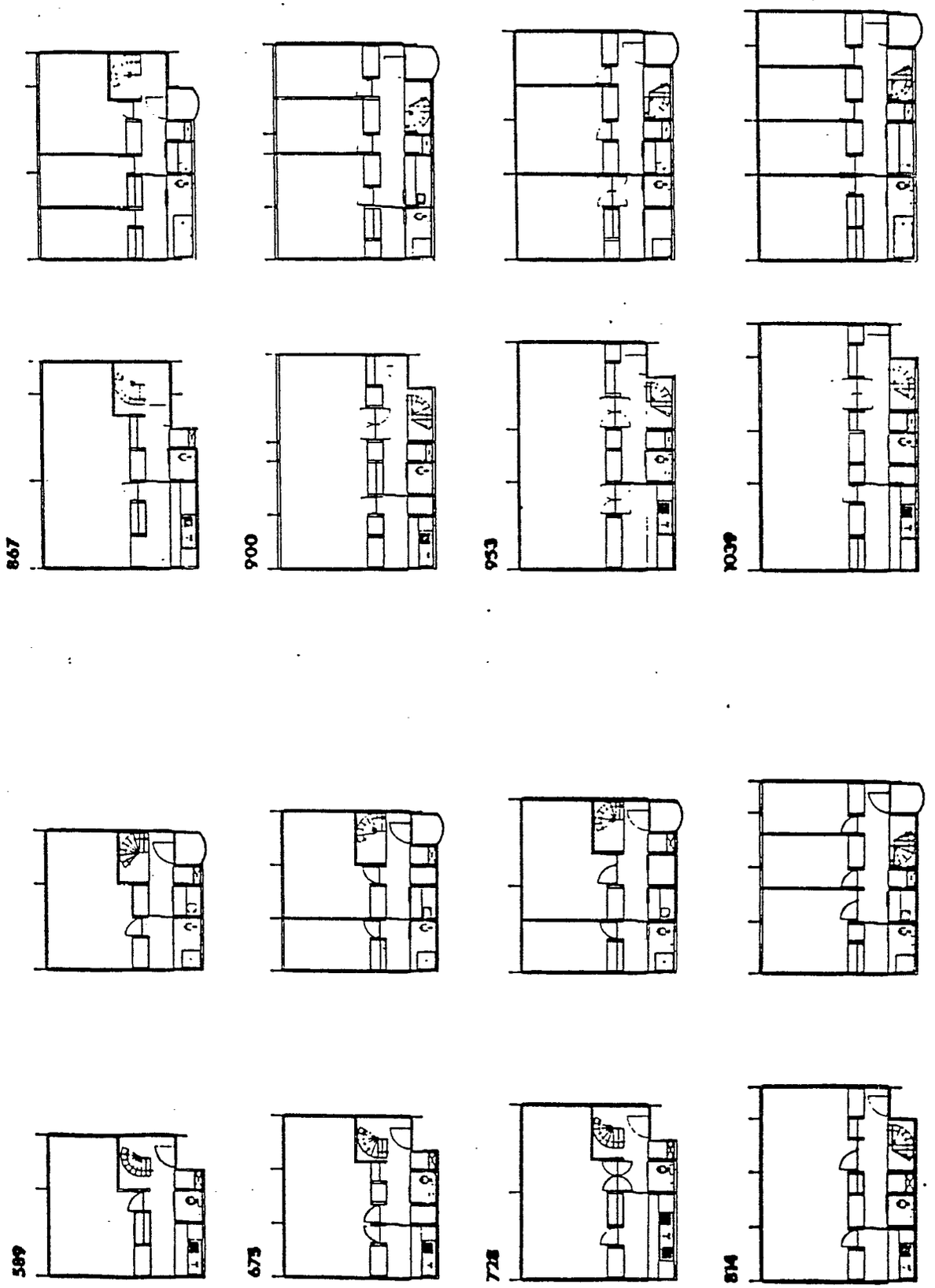

Fig. 9

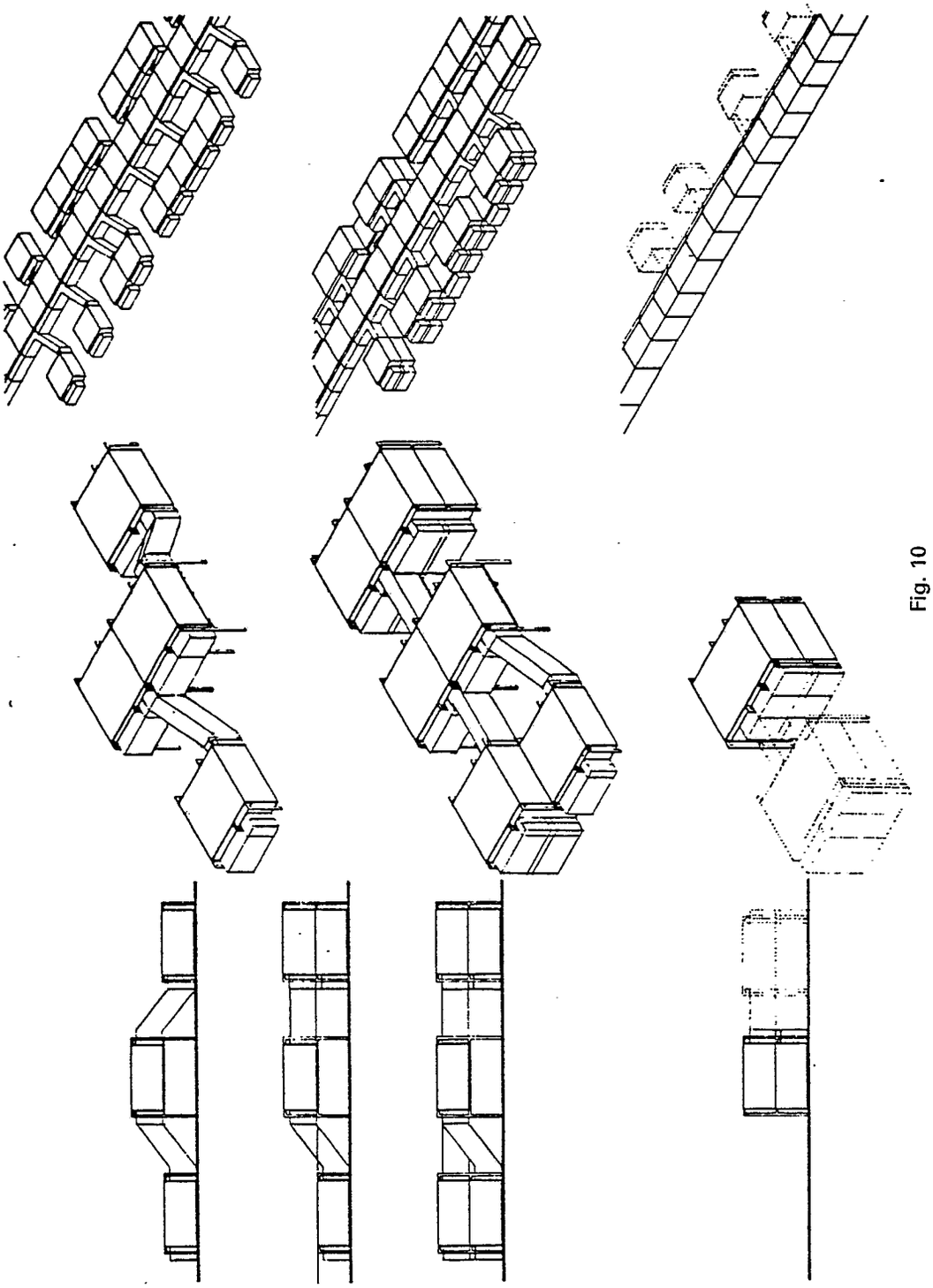

Fig. 10

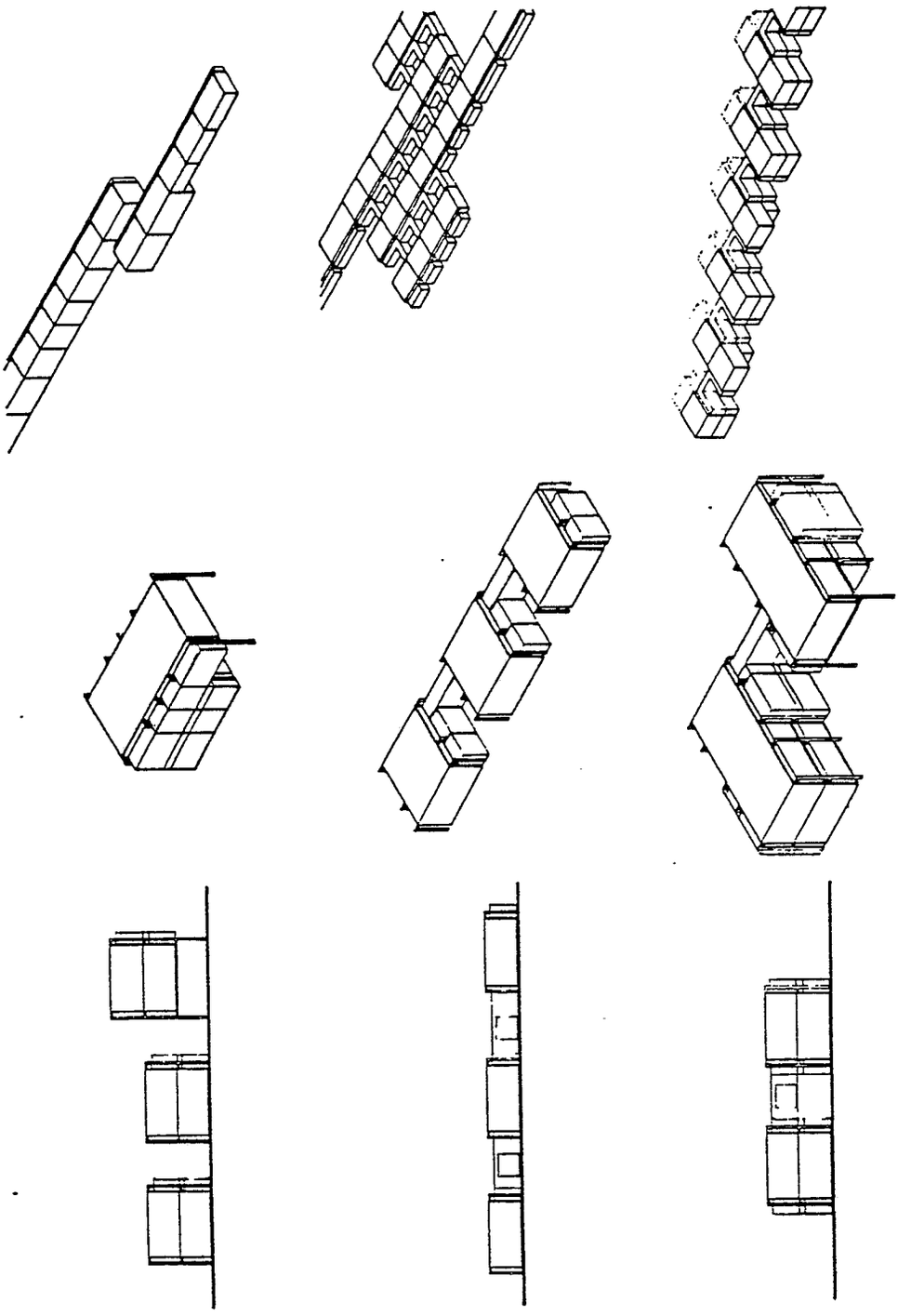

Fig. 11

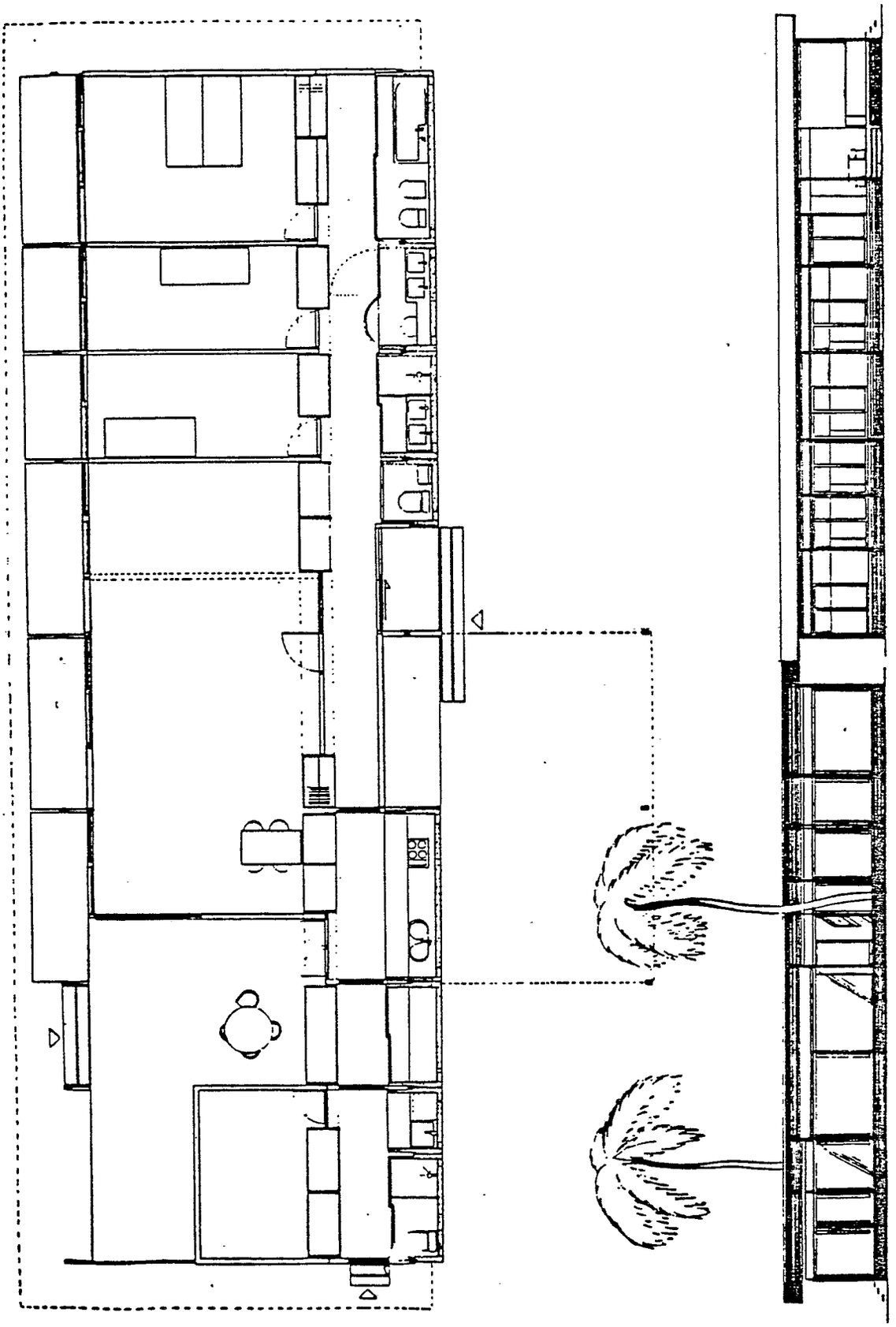

Fig. 12

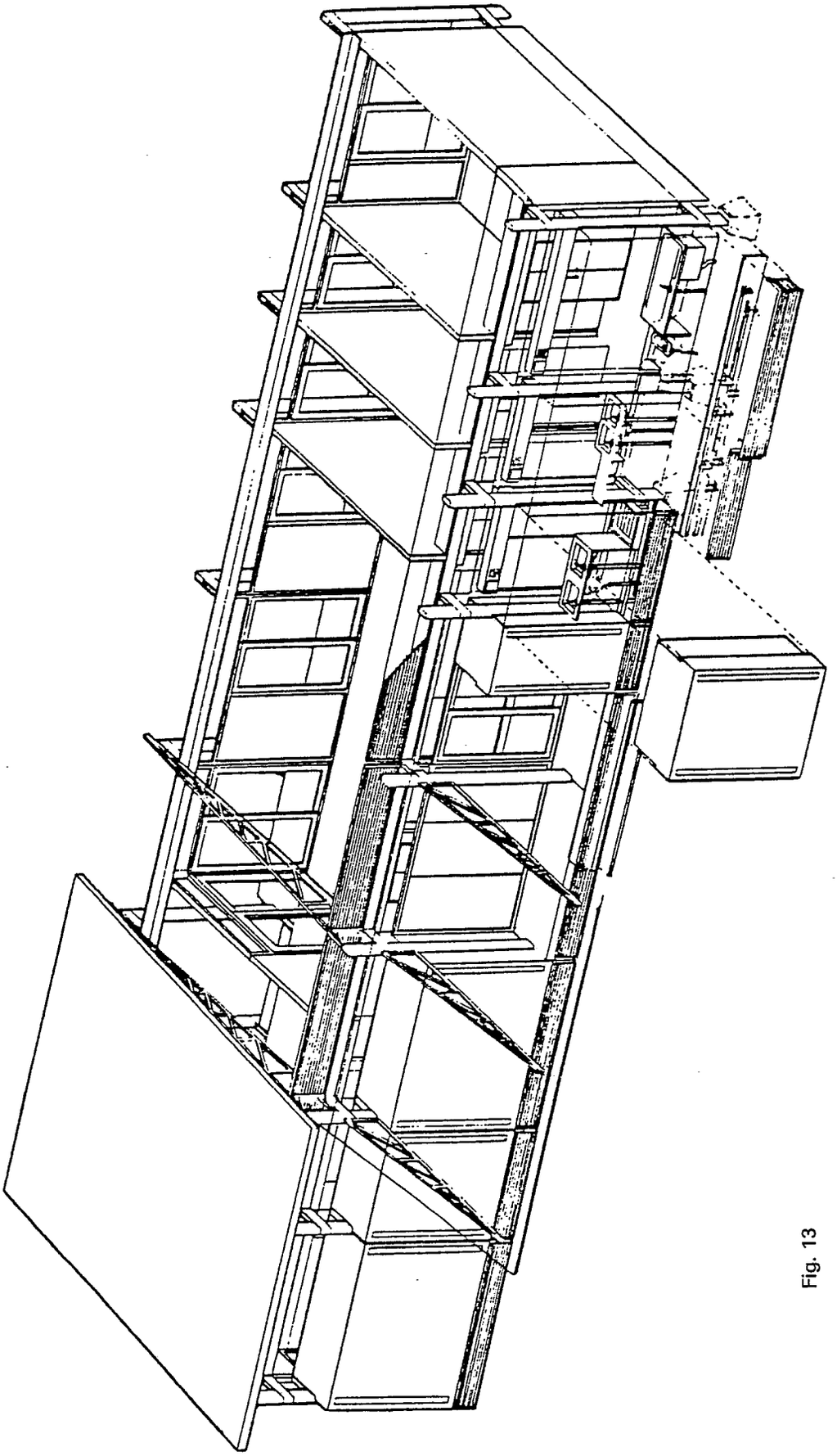

Fig. 13

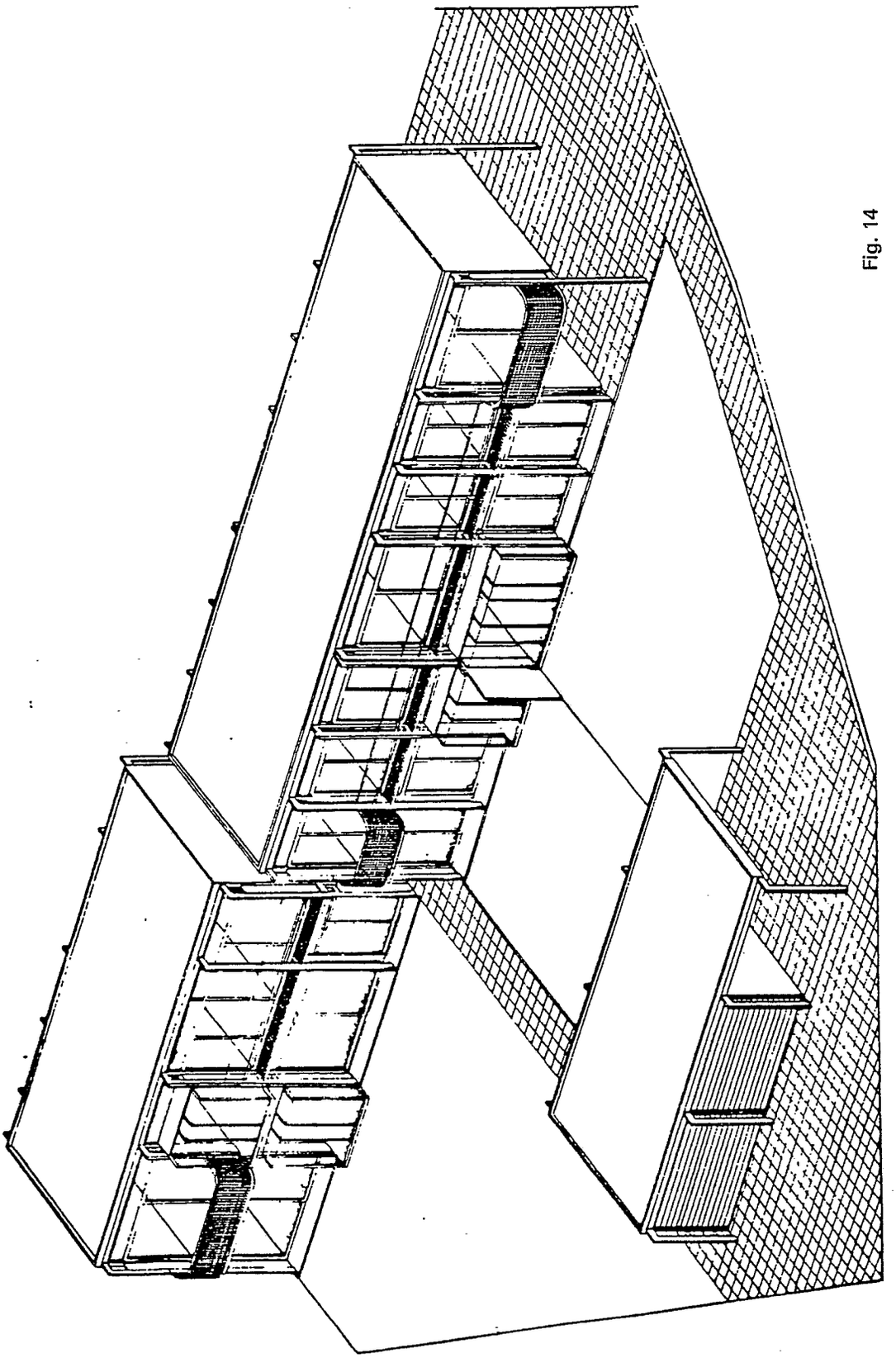

Fig. 14

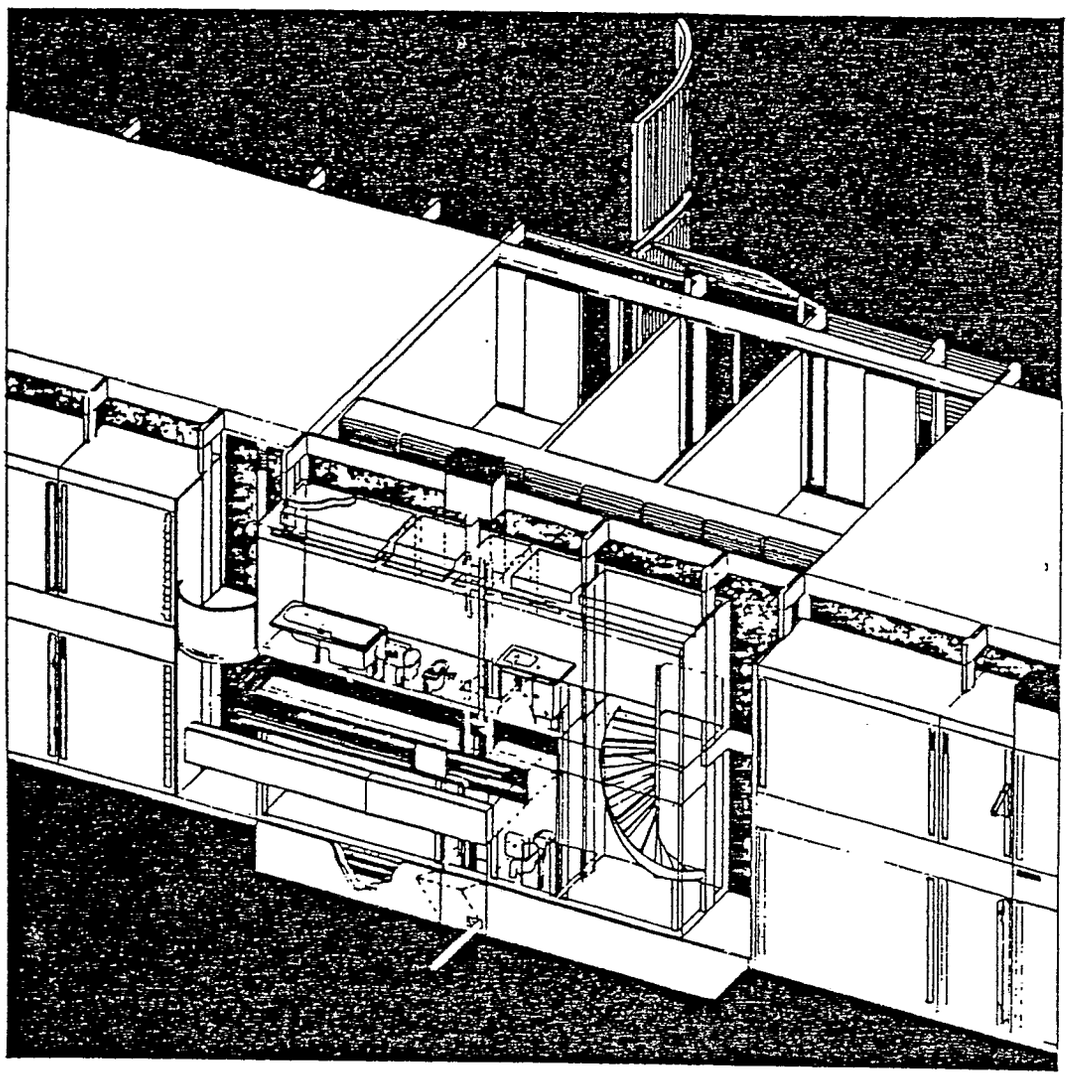

Fig. 15

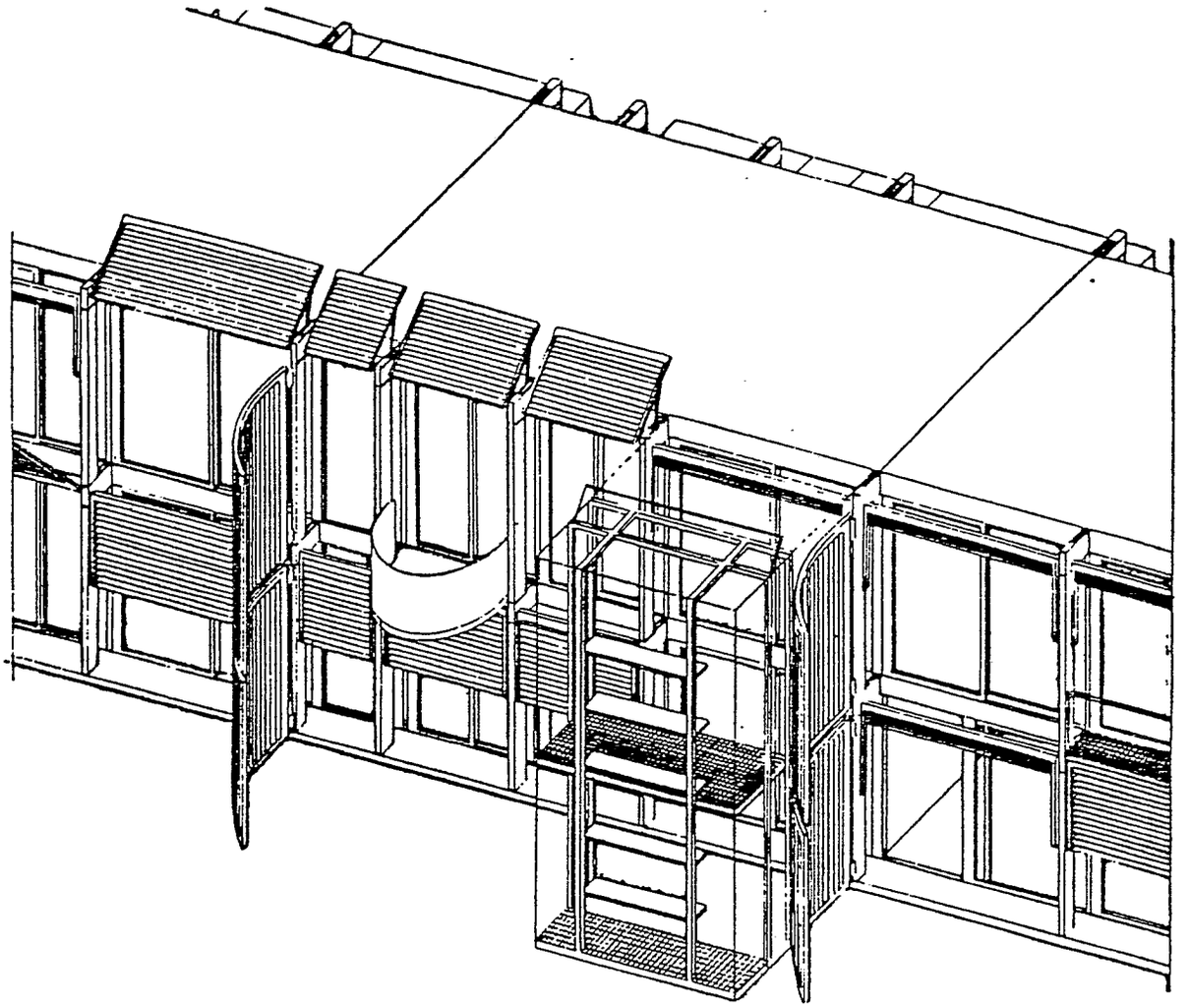

Fig. 16