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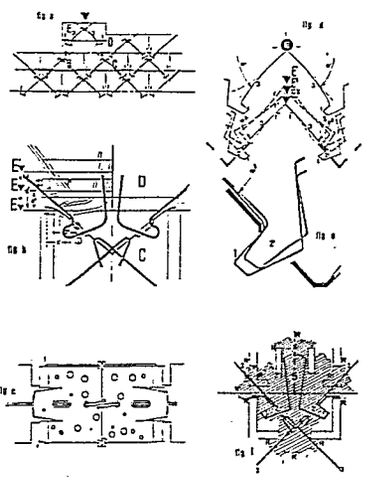
(54) **Prefabricated modular elements for building constructions.**

(57) The invention, object of the present description, specificly concerns the field of industrial production and systemic use of small and large prefabricated modular elements, in civil and industrial building constructions for the composition of vertical, inclined, curved, bearing, self-bearing, composite, antiseismic walls. It comprises a specific metal articulated device, mounted in an appropriate enclosing cavity provided in the prefabricated elements in question, which device, in view of its automatic operation, provides the elements themselves, firstly, with particular features of quick and simple assembly and connection to a wall. Secondly, it provides the assembled walls with characteristics of homogeneity in structure, function and finishing, even as regards the component junctions, which are dry mounted and mechanically locked, together with the network of steel arms which are meshed together and cemented. Thirdly, the automatic mechanical and structural features provide the assembly with a wide flexibility of use, also in terms of compatibility, versatility of assembly, capability of being equipped and serviced.



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Description

PREFABRICATED MODULAR ELEMENTS FOR BUILDING CONSTRUCTION

The present invention relates to particular configurations of prefabricated modular components of small or large size which are provided, within a vertical central cavity, with an articulated metal device enabling a swift and complete combination of bearing, self-bearing, simple, composite, vertical, inclined or curved, antiseismic walls. In particular the higher and lower terminal ends of this articulated device project from the openings of the enclosing cavity and have mechanical differentiated and complementary preformations capable of permitting an automatic positioning and dry connection of each component in its proper modular place of assembly, thus forming structurally and functionally homogeneous finished walls, also at the level of the junctions, which are dry-fastened by the reticulated assembly of the devices which are mechanically engaged during the assembly operations and cemented on site. In the continuous cavity of such walls, a simple or multiple metal mesh is produced in this manner, which provides them with a unique homogenity, even structural, with respect to specific reinforcements and other eventual adjacent structures. Before describing in detail the operation, the features and the objects of the invention, a short background of the state of the art is required on the subject of prefabrication and use of wall components.

In spite of the large number of configurations made available by commercial production, the use of small and large modular components still shows aspects of skill which raise problems in operation, especially due to the various assembling and finishing methods required to provide the assembly, particularly at the junction level, with sufficient features to make it structurally monolithic, antiseismic, homogeneous in performance (insulation, coibentation, finishing), also in combination with other adjacent structures. Often, in order to eliminate possible residual discontinuities, especially at the junctions, an inner coating is made on the prefabricated walls, which does not solve in all cases the problem of "thermal bridges" to a sufficient extent.

In order to solve the above mentioned problems technologically, in the factory, and to provide the production of components with characteristics which better meet the present building requirements, also in terms of quality, flexibility and convenience, the present invention relates to novel configurations of modular prefabricated elements having, in their housing cavity, a particular articulated metal device. Such components can be divided, from the configuration point of view, into small cellular elements, large components, panels, special elements for inclined or curved walls, forms, special pieces, and so on.

It is also possible to integrate with the device of the invention existing types of hollow components; these, however, must be adapted or modified purposely. The basic material of the components, in connection with the requirements of the deisgn, can be brick, concrete, eventually lightened, cellular cement, composite, extruded, formed, wooden, fibercement panels and the like. The junction of the components, dry-assembled, have to ensure the tightness of the finished wall to the required partial or total filling by cement of their cavity by means of battening, padding, or suitable sealing. Dependent on the type of prefabricated building and the specific requirements, the device can be formed by simple or multiple pairs or pair systems of flexible, reticulated steel arms or bars diagonally or orthogonally placed, according to a symmetrical arrangement within a seat in the component, the vertical inner cavity of which has to be continuous, even from element to element after the assembly, along the directions of the metal mesh formed within the cavity. The cavity can also be obtained by spacing out the outer wall from the inner wall by partitions or transversal brackets, the shape, number, placement and characteristics of which have to provide the proper housing and operating seat of the above mentioned device which, when thus mounted, has to be engaged in its upper part to said brackets by the pair, or the symmetrical reticulated system, of arms and in its lower part by action of a pre-stressed devarication of its elements, and has only to adhere elasticly to the appropriate brackets or transversal guides, or other equivalent assembling means. The brackets are indicated in the accompanying drawings with the numeral 4. At the connecting joints of the devices, moreover, the brackets have to form, together with the adjacent walls, the required seat to contain the cement for the connections, indicated with numeral 5 in the accompanying drawings. The arms of the device, indicated with numeral 3, are each provided at the lower end, in symmetric opposition one to the other, with a mechanical preformation for the engagement (hook, tooth, cam), indicated with numeral 1. Additionally, the same arms are provided, at their upper end, with a complementary mechanical preformation (slot, bar, notch), indicated in the drawings with numeral 2, for the engagement with the above mentioned hooks. The above mentioned single or multiple connecting preformations can also be realized as slots or bars, which can be provided with slotted guiding lugs, made of V or U shaped steel plates engaged to the upper end of the joint pertaining to each single or multiple pair of arms, if in a diagonal weave.

In general, all the different configurations and methods of assembly concerning the components, the metal devices and the various modes of use, are to be considered in the following as non-restrictive examples of the present invention, the basic and characterizing principles of which can be construed from the context of the present description and claims, and moreover from the logical and practical coordination thereof with any illustrated or described element.

The present invention consequently is hereinafter

described by practical, functional, and methodological embodiments concerning first a specific configuration and then, in an extensive manner, other configurations.

1) Small components

A particular standard configuration is considered which concerns small, concrete, cellular, modular components, in the continuous vertical cavity of which the present device is mounted. This device is formed by a pair of articulated steel bars in a diagonal symmetrical arrangement with respect to the central vertical axis of each component.

The accompanying sheets of drawings (I), (II°) and (III°) illustrate said configuration of components, in which the devices have opposed toothed lower ends and converging upper ends, engaged with a V-shaped metal plate provided with upper pairs of flexible channel lugs, bevelled in the direction of a respective internal engagement slot.

The two arms, forceably and elasticly divaricated on assembly, can be further elasticly divaricated to a maximum angular opening as allowed by the housing seat. Once mounted forceably, but with ease, onto the component, the device shall have a plate engaged and in any case integral with the enclosing support and arms with flexible lower portions. The hooks or teeth will project beyond the lower cavity by a fixed extent of overlay with respect to the complementary engaging devices, which in a similar way project into the wall from the upper cavity. The enclosing cavity of the components according to the invention will thus form the functional seat of the device and, once assembled, the mould and tight container for the concrete which will partially or totally fill the cavity of the assembly of wall components in accordance with the structural weave of the frame, which in this case is diagonal.

The assembly of the wall components is by offset levels. Figure (a) on sheet (I) shows the initial assemcomponent (E) with respect to a wall (B, C, D). During the succeeding steps of wall assembly, the engagement of the device in question is made automatic by the progressive further approach of the component to the wall, sheet (I), figure (b), precisely from the beginning of the simultaneous elastic contact of the terminal ends of the connecting devices of the opposed components. With reference to the figures of sheets (I° and II°) the operation steps characterizing the automatic assembly of the present devices are carried out as herein below described: first step, positioning; second step, activation of the connection configurations; third step, mechanical engagement and dry fixing of the junctions of the assembled component (E, B, C, D).

First step

Component (E) simultaneously meets, with its pair of protruding hooks, the opposed guiding lugs protruding from the devices of the wall components (B, C), so that the component is self-positioned, with respect to the properly bevelled and inclined lugs, into its proper offset position with the aid of its own weight. In this step the component (E) is at a distance (d′) from the base and none of its hooks, in the position (f′) can be inserted directly into the opposed slots (2, 2′) by reason of the respective side shifts (s′) determined by the intentionally insufficient divarication of the arms.

Second step

The base of the component (E) continues its vertical approach to the base (B, C), while its spring arms are spread apart in view of the engagement of their hooks with the guiding lugs of the opposed devices, the arms being symmetrically and forceably deflected to the near engagement slots (2, 2′).

Consequently, while the difference in level of the component (E) with respect to the wall (B, C) tends to be reduced (from d′ to 0), the shift which separates the hooks from the respective slots (from s′ to 0) tends to be reduced simultaneously.

An intermediate point in this step is illustrated on sheet (I°) where the component (E), having arrived a height (d″) with respect to the base, has its arms symmetrically divaricated into position (f″), under an increased elastic stress (e″) because of the respective hooks shifted in opposite directions towards the respective engagement slots (2, 2′), from which they are separated by a shorter shift (s″) respectively. It is in this elastic step that the double connection device of the component (E) is automatically activated with respect to the antagonist terminals of the wall components (B, C). The elastic resistance to stretching of the steel arms is overcome by the component's own weight and if necessary by an additional induced pressure.

Third step

The component (E) has reached its setting plane (B, C) and the edge (D) of the wall (height d=0), in its precise offset position, while its hooks, forceably stretched by the entire shift (s=0), simultaneously and elasticly spring out into the slots (2, 2′) in the position (f‴), thus realizing the irreversible mechanical engagement with the wall assembly (B, C, D), eventually forced into their seat by percussion. To obtain a consistent locking action of the device on the junctions, it is required that the two arms, springing back after their engagement, still have an angular extent of stretching greater than that of initial assembly. In other words, the angle of the two arms in position (f‴) has to be greater than the angle of the two arms in position (f′). In this manner, the effect of the residual elastic stretching state (e‴) of the arms of the engaged devices, besides making the engagement dynamics irreversable, by dividing itself into various forces which symmetrically interact on the involved elements, produces therein conditions of elastic locking, prestress in the mesh of the devices, and final symmetrical self-positioning.

Figure (e) on sheet (I°) shows how the engagement of a component in the wall is carried out even in the case of geometrical inaccuracy of the respective component or device. To this end the shape of each abutment of hooks is not at a right angle, but suitably curved.

Fourth step

(A) Self-bearing walls.

In the construction of walls having restricted structural functions or being hollow, after the assembly of any course of elements, some operations are required in preparation for the successive course, comprising a filling with cement mortar of small, central, upper half-pockets in the assembled elements (A, B, C, D), each of which is formed by the metal V-shaped plate of the device and by the enclosing seat itself. Such cementation points are indicated in the accompanying drawings with numeral (5). The amount of mortar used to this purpose will be somewhat larger than the volume of the respective seats, so that, compressed by two opposed half-covers of the successively overlaid components (third step), it takes the shape and the volume formed by the plates and the adjacent walls of the lower elements and by the half covers of the upper elements. The examples on sheets (I°), figure (f) and (II°), figure (a) clearly show the type of reinforcement in the enclosed mortar, formed by the particular vertical bends of the hooks. After the enclosed mortar has hardened (fourth step), the connections of the above described third step are definitely welded. Moreover, by effect of the inserts and abutments indicated in (R) on figure (f) on sheet (I°), or other equivalent anchoring and clamping means, the mortar itself plays a binding role by its solidified wedged mass which irreversibly engages and locks the assembled elements, also taking advantage of the dynamic action of the mortar shrinkage during hardening.

This step of course is carried out before, at the same time as, and immediately after, the above described third step.

The presence of the mortar in the connecting pockets does not hinder the normal procedure of the assembly and activation steps as described. Neither dies the mortar interfere with the characteristics of the junctions of the dry assembled components, the edges of which will be eventually closed and sealed with fluid cement binder.

In certain circumstances the mortar might not be required, provided that a previous verification is made.

Fourth step

(B) Bearing walls

In the construction of entire or partial structural walls (partitions, bearing panels, and the like), an insertion has first to be provided, within the continuous cavities of the walls in construction, of all the metal reinforcements required by the static calculations and, secondly, the complete filling of these cavities has to be effected by means of stratified castings of fluid cement concrete. After hardening, the cement concrete performs all the functions previously assigned only to the partial cementation of the connecting junctions (fourth step A), as well as the more properly static functions of unification and structuration of the inner metal mesh (third step) of specific reinforcements, into a single interacting and continuous, bearing, antiseismic, functionally homogenous assembly of the components, as illustrated in the accompanying sheet (III°), figure (b).

It can be understood that the wall junctions, characterized by the dry contact of continuous junctions, will be sealed or closed by means of sealings, so as to avoid a bleeding of the mortar during casting of the fillings.

Fourth step

(C) Prefabricated walls

The operative method described in the preceding fourth step (A) enables, moreover, the prefabrication of large, light, modular panels or entire finished walls.

After hardening of the mortar, these can be assembled on site following the same procedure as described for assembling small modular components, still using the protruding connecting devices, as illustrated on sheets (VI°), figure (g), and (VII°). The general structure (fourth step (B)) will be realized on site by integrating of the metal reinforcements, welding, and total or partial filling of the cavities in the assembled walls by fluid cement concrete.

Fourth step

(D) Composite walls

Figure (b) on sheet (III°) illustrates that, by carry ing out, successively, first the above described fourth step (A) and then the fourth step (B), it is possible to reduce the cement concrete filling to the more stressed areas of the walls only.

Methods, special pieces, configurations, finishing.

It is possible to systematically manufacture, in a single operation, perimetral walls, partitions and floors by using appropriate configurations of modular elements and taking the maximum advantage of the continuity afforded by the metal meshes of the assembled devices. Such continuity can also be realized in correspondence with corners, frame fixtures, expansion joints, such as illustrated on sheets (II° and III°).

At the posing level of the floors, particular modular components can be used, allowing the formation of girders and resting planes of floor panels and allowing the connecting devices to be seated at the same time (sheet III°, figure c).

In this manner, by taking advantage of the immediate bearing capability of the dry assembled walls (fourth step A), after the required provisional works having been carried out and the required reinforcements placed, the casting of cement concrete is carried out in one operation for the floors, the girders, and the filling of cavities in the underlaying walls (fourth step B), and also in the intermediate partitions, with the aid of particular devices, to obtain mesh continuity of the wall connecting devices (sheet III°, figure a). Sheet (IV°), figure (a) illustrates some of the possible configurations of small sized modular components. Figures

(a, b) illustrate the feasibility of very light components which are externally finished, formed of layered insulating composites of an easily variable width and also suitable for forming provisional walls.

Figure (c) shows the practicability of equipping the modular elements with semplified connecting devices by the use of transversal elements for hook engagement (integral trusses) in lieu of the V shaped plates with guide lugs.

Figure (d) illustrates the possibility of further modifications, even in the case of devices having an orthogonal weave.

2) Large components

The large modular wall components, provided with the device of the invention in their vertical cavity, are characterized by the fact that such devices are formed by a plurality of pairs, or systems, of diagonal or vertical reticulated arms, the functional features of which remain in any case unchanged.

The separating trusses or brackets forming the functional and housing seat of the invention device can be engaged to the respective side walls or to the outer wall only. In the first case the inner wall is open along the junctions or cut to permit, after assembly and before the required cement casting, access to the inner cavity of the wall components for placing the required unifying reinforcements, sealing, welding, and side connections at the vertical junctions at the level of the joints of the metal mesh, reliefs, insertion of utilities and the like. In the second case this operational access can be made before a later mounting on the brackets, on site, of the complete inner walls. See the embodiment of configuration on sheet (VI°), figure (a).

Consequently, large prefabricated elements provided with the device of the invention can substantially be considered similar in function to the small components above described, which, as illustrated in fourth step (C) (prefabricated walls), can in fact compose finished, equipped panels, already prepared to be placed onto the wall, in view of their similar multiple system of elementary devices, see figure (g) sheet (VI°).

Sheet (V°), figure (b), similarly to.the configurations illustrated in sheet (I°) figure (a), shows, in a vertical cross-section along a longitudinal axis, the internal structure of a wall made of large panels, (B, C, D) with a panel (E) in the assembling step with respect thereto. These panels are provided with a device having a double system of crossed diagonal arms, the weave and the upper terminals of which (provided with V or U shaped plates) are engaged to the brackets of the support, and the toothed lower terminals of which can be bent under force starting from the second last bracket or truss, by such stretching angle as allowed by the last lower bracket, to which they are elasticly adhering, figure (c). The steps of self-positioning, activation and simultaneous engagement of the lower terminals of the device on the component (E) with respect to the upper terminals of the wall devices, are thus carried out following the same procedure as described in the embodiment concerning the small component (E) (see sheet I° and following). The only non-functional differences involve the size and weight of the component and the fact that the device thereof comprises a reticulated system of a plurality of arm pairs, rather than one arm pair. Consequently, referring to the component (E) on sheet (V°), the self-positioning thereof - first step - the activation of its connecting devices - second step - and the engagement - third step - are carried out for each opposed lower and upper terminal, and for the symmetric system on the whole, according to the example illustrated with reference to the small components.

Fourth step, self-bearing walls.

Once having carried out the third assembly step of the component onto the wall, sheet (V°), figure (a), comprising a simultaneous mechanical engagement of the multiple pairs of lower terminals of the device on the panel (E) to the complementary terminals protruding from the continuous cavity of the underlying wall, immediately effecting the side connections of the reticulated mesh in correspondance with the vertical junctions, and effecting the other inner and outer completing and finishing works, it is possible to mount directly onto each horizontal course of assembled and fittingly reinforced elements, first the floor and then another course of elements, necessarily connecting their inner metal mesh, formed by the engaged assembly of their devices, with the metal reinforcements of adjacent structures, by using the suitable provisional devices and carrying out, in one single operation, both the final casting of the floors and the casting for the cementation of the horizontal course of engagement joints of the devices in question. Sheet (VI°) figures (a, b) shows how the procedure can be repeated for successive levels.

Fourth step - B - Bearing walls.

In the case of prefabricated structural elements (bearing or partially bearing), once the first three assembly steps of each large component have been carried out to the completion of the perimeter and structural partition of a level, it is possible to go on with the floor and then with another course of components, in order to effect in one single operation both the cement casting for the completion of the floors and that for filling the underlying assembled walls, at all times adopting suitable provisional measures of reinforcement, support, making the side connections of the pannels, ensuring the unification and the connection of the different metal reinforcements with the metal mesh of the devices of the assembled components, and finally equipping the continuous cavity of the walls with the required utilities (sheet VI°, figures a, c).

Methods, configurations of large panels, special pieces.

In the preceding description of the assembly steps of large components equipped with the device of the invention, the unique capability has already been put into evidence of producing, in one single operation, the vertical closures, the separations, the inner partitions and also the floors of each level of a

building, not only at the composition level, but also at the level of structure, utilities, finishing and coibentation (fourth step and fourth "B").

The above illustrated sheet (V°) shows in details in a plane and cross section view, the possibility of producing large heterogeneous and composite, finished and coibented, hollow panels, the particular lightness of which is due to their inner metal reinforcement, formed by the double reticulated weave of the device used (transportation, assembly, self-bearing). The drawings also show the possibility of equipping in prefabrication the panel junctions (separation, expansion, connection to other elements) with the pre-arrangement for self-sealing and plastic separation, maintaining the continuity of the mesh connection all the way.

Modifications in the configurations are possible with respect to the above illustrated example of configuration, to the purpose of making use of its special characteristics of operation, performance, structure, function, geometry, in all cases using devices substantially and conceptually conforming to the above illustrated basic features of the invention.

To an exemplificative and non-restrictive purpose, sheet (VI°) shows some of such modifications.

Figure (a) shows in a cross-section view the possibi lity of producing composite, or otherwise structured, light panels of considerable length, the inner wall of which, light and insulated, eventually divided into sub-modular elements, has been fixed onto the brackets of the device (4) purposely pre-fitted, only successively, on site, after having equipped at best the continuous cavity of the walls.

Figure (d) shows further the possibility of integrally connecting to the mesh of the engaged devices the fixtures of the frames, by preformations for the sealing and coibentation of such junctions.

Figure (h) illustrates the feasibility of large panels with the devices in an orthogonal weave.

Figure (g) shows the interesting possibility of producing in prefabrication, as previously described, large finished panels or complete walls, by using the small modular elements previously described and using, for their assembly into a wall, the set of their small devices forming a still composable frame.

Figure (e) illustrates a type of element for sealing the expansion joints.

Extension of the invention, particular aspects, area of application.

The small and large modular prefabricated elements provided with the above described device, shall have been approved by the competent authority as regards characteristics, performance, limits, mode of use, on the basis of calculations, certificates of fitness, official laboratory tests and verifications, and the like.

Should the arms of the metal mesh formed internally to the wall cavity not be completely embedded in the cement castings (partial filling, cementation of the joints only, and the like), they should be appropriately made rust-proof and treated with anticondensing plastic coatings. The same is true for the metal brackets supporting the devices.

By using the prefabricated modular components according to the present invention, having a suitable shape, size and configuration, it is possible to quickly compose inclined walls, retaining and supporting walls, arches, partial vaults, tunnels, dams, definitive moulds, vertical and horizontal channels, even of a circular cross-section, arches, including segmental arches.

Sheet (VII°) illustrates, in an exemplificative and non-restrictive manner, some possible applications of the invention to different types of building construction.

Figure (e) on sheet (VII°) also illustrates the assembling system of large components for a quick construction of buildings, characterized overall by the fact that the various elements of the composition are continuously connected by the metal mesh of the respective engaged devices.

Claims

1. Prefabricated modular component for antiseismic, vertical, inclined or curved walls, characterized by the fact of comprising, enclosed in a central continuous cavity, a device consisting of a pair or a system of pairs, depending on the size, of symmetrically articulated steel bars having a reticulated diagonal or orthogonal weave, the upper and lower terminals of which protrude from said cavity with mechanical complementary preformations capable of enabling, in the usual assembly steps, a precise positioning, an irreversible connection and a reciprocal locking of said components, which, in one single operation, compose finished walls, homogenous in structure and performance, even at the level of junctions, dry-locked by the whole of said engaging devices, which moreover form, in the continuous cavity of the walls, a single simple or multiple metal mesh, which is integrated by means of cementation of the engagement joints, and embedded into seats or composite pockets, when self-bearing walls are involved, or by specific metal reinforcements and complete cement filling, so as to form in said cavity a reinforced continuous piece of reinforced concrete, when bearing walls are involved, said walls, said metal mesh and said cement being able to be systematically made integral also with respect to other eventual adjacent structures.

2. Prefabricated modular components according to claim 1, characterized by the fact that said pieces, brackets or trusses, for the separation and connection of the outer walls of the components with respect to said continuous central cavity thereof, form by configuration, position and shape, the precise housing and functional seat of said device which, once

mounted therein, by means of said pair of arms or said symmetric reticulated system of arms, is engaged at the upper part to said pieces, trusses or brackets, and at its lower part, by reason of a predetermined forced prestressing of its elements, is only elasticly adhering to the guide seats of said basic pieces, trusses or brackets, or other equivalent mechanical means.

3. Prefabricated modular component according to claims 1 and 2, characterized by the fact that in the case of small component configurations, said trusses, pieces or brackets are engaged with the respective side walls of their inner cavity, whereas, in the case of large component configurations, they can be engaged with the respective side walls or only with the inner wall, in the first case the inner wall being provided with openings along the junctions or cut for permitting, after assembly and before the required cement casting, an access to the inner cavity of the components on the wall, for making the required integrating reinforcements, weldings, side connections of said mesh in correspondence with the vertical junctions, the reliefs, the utility insertions and the like, whereas in the second case, said operative access can be produced before mounting the inner final wall on said brackets.

4. Prefabricated modular component according to claims 1, 2 and 3, characterized by the fact that said mechanical preformation of the lower terminals of said device is formed, on the one hand, by their symmetrical set, characterized by elastic adherence of said arms to said brackets or lower trusses, with the possibility of stretching and springing back within a predetermined extension of rotation and, on the other hand, by a tooth or hook provided at the end thereof, characterized by an abutment so bevelled as to compensate eventual inaccuracies and by a residual body formed with successive sides, the first of which has such an inclination and width such as to engage and direct the predetermined stretching of the arms with respect to the complementary outer devices, whereas its further profile ends eventually with a hook, the whole of said pairs or pair systems of symmetrically opposed toothed terminals of each device protruding from the basic opening of the housing cavity by a constant extent of position and simultaneous overlaying.

5. Prefabricated modular components according to claims 1, 2, 3, 4, characterized by the fact that said mechanical preformation of the upper terminals of said device is provided at the level of the upper opening of the central cavity, on one hand, by the complementary and symmetrical set of said arms with respect to the preformations as defined in the preceding claim, and on the other hand by the fact that they comprise an integral simple bar or slot for engagement with the teeth, preferably led by a guide channel-shaped lug, or, particularly in the case of diagonal weave, a metal half-box plate shaped and profiled with a double preformation, simple or multiple, with a channel guide and connecting slots, engaged with the original joint of each pair, simple or multiple, thereof, said terminals also being integrally engaged with the component or the support trusses as defined in the preceding claim 2.

6. Prefabricated modular component according to claims 1, 2, 3, 4, 5, characterized in that each component, either of small or large size, in the first of said assembly steps, performs said self-positioning by direct or offset overlying, when the pair, or pair system, of said lower protruding terminals are simultaneously engaged, before reaching the posing plane, with the protruding opposed terminals, which, in the successive second step, with the increase of said stretching of the elastic arms by the symmetrically deflecting action operated on the mooving toothed system by the engagement preformation as defined in the preceding claim, operate said connection mechanism, which is actuated in the third step, as soon as the posing plane has been reached, by the simultaneous snapping of said hooks or teeth into the engagement bars or slots, which can be enhanced by striking said ends with a hand hammer, said particular shape of the teeth, said symmetrical and simultaneous system of opposed inserts and hooks and the residual force of the previous stretching enabling the assembly to be irreversibly connected, even in the presence of dimensional inaccuracies and also providing the metal mesh thus formed, within the continuous cavity of the walls, with a prestressing state producing, moreover, an elastic locking of the dry assembled joints.

7. Prefabricated modular component according to claims 1, 2, 3, 4, 5, 6, characterized in that the production of walls by small elements comprises a fourth operating step for each course of assembled components, consisting in the filling with excess cement mortar of small half-pockets containing only the engaging preformations of the hooks, as defined in claim 5, so that said mortar, successively compressed and closed by complementary side half-pockets in the component being successively overlaid, takes the shape and volume of the respective containing space and then definitely seals and binds, on hardening, each joint of the engaged devices, cooperating to the wall connection of the assembled elements with its inner mass lockingly solidified therein by dynamic action of the binder shrinking, which is moreover reinforced by the structure itself of the engaged joints, said cement filling involving, by appropriate specific metal reinforcement, the entire continuous cavity in the walls or part thereof having specific structural bearing functions.

8. Prefabricated modular component according to claims 1, 2, 3, 4, 5, 6, 7, characterized by the fact that, in the case of large elements or panels, once said third assembly step of each

component in the wall has been effected, the side welding connection of said mesh in correspondance with the vertical junctions has been effected, the required provisional works have been effected, it is possible to mount directly on each course of assembled elements, first the floors and then another course of vertical elements, and then, once the required metal reinforcements have been placed, to operate in only one operation both the casting of intermediate floors for completion of the structure, and the cement casting, at this level, of the horizontal course of engagement joints of the devices, said cement casting filling the entire cavity of the lower wall, duly reinforced, in the case it has to perform functions of specific structure bearing.

9. Prefabricated modular component according to claims 1, 2, 3, 4, 5, 6, 7, 8, characterized in that, by assembling on prefabrication said small elements as defined in claim 7, it is possible to produce large panels or entire equipped and finished walls, which can still be composed on site as large modular elements equipped with the set of terminals of their small engaged devices.

10. Prefabricated modular component according to claims 1, 2, 3, 4, 5, 6, 7, 8, 9, characterized in that when using said small components as previously claimed in claim 7, it is still possible to carry out the works with continuity, also at the level of the floors, by using appropriate cut elements, still provided with the device, so that the finishing and structural cement casting can be carried out both at the level of the floor and of filling of cavities in the lower walls in one single operation, which is permitted by the immediate self-bearing capability of the dry-assembled walls, eventually with the aid of provisional works.

11. Prefabricated modular components according to claims 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, characterized by the fact that it is possible to carry out the production of bearing or self-bearing finished walls by using said large or small hollow cement elements with eventually insulated inner walls, or by using composite hollow elements of synthetic or heterogenous materials, externally and internally finished, and also provided with such means as to take advantage of the realized continuity of the junctions and the respective elastic locking, as to enable, at the same time of their assembly, the closure by self-compression of the insulations as well as the sealing at the level of the expansion joints, always with continuity of said inner metal mesh.

12. Prefabricated modular component according to claims 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, characterized in that it is possible to provide said connection devices also with various special pieces, half-blocks, linking and finishing components, to produce, in the context of homogenity and continuity of the walls and the inner metal mesh, a single homogenous structural assembly.

13. Prefabricated modular component according to claims 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, characterized in that it is possible to produce, according to the concept defined in the preceding claims, modular components provided with said internal connection device, of particular shapes to enable the composition on site of inclined walls, retaining walls, arches, partial vaults, tunnels, dams, and even segmental arches with horizontal extrados, all with the provision of a suitable structural integration and appropriate provisional measures.

fig a

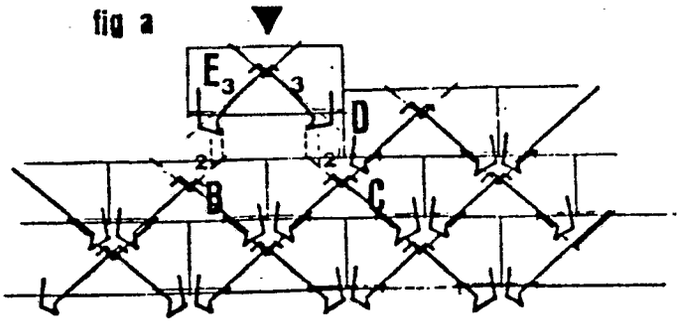
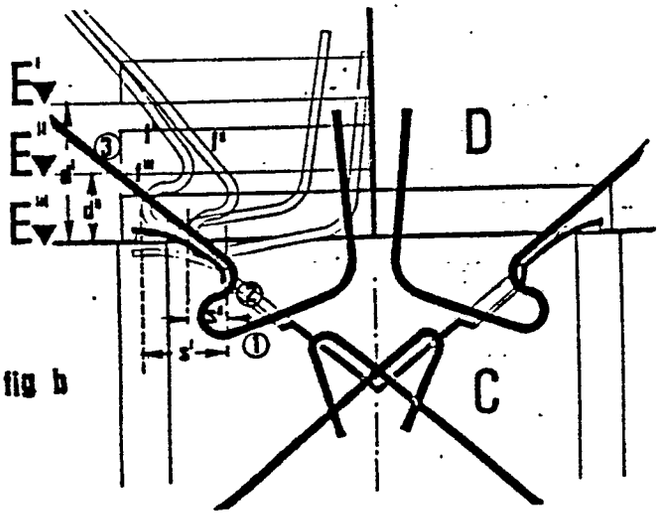


fig b



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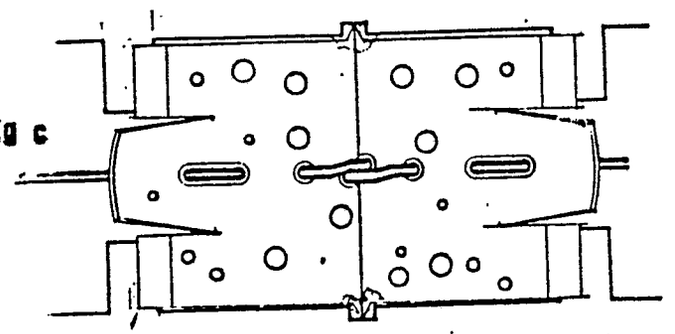


fig d

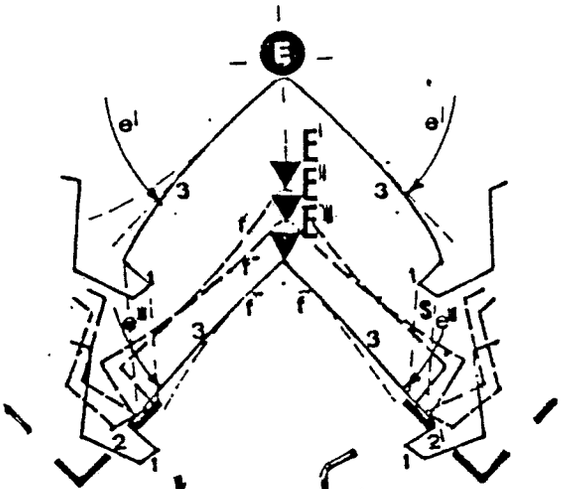
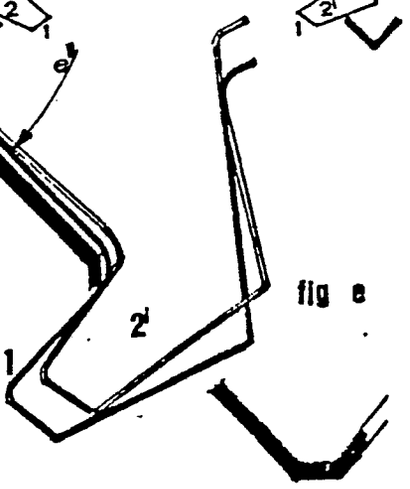


fig e



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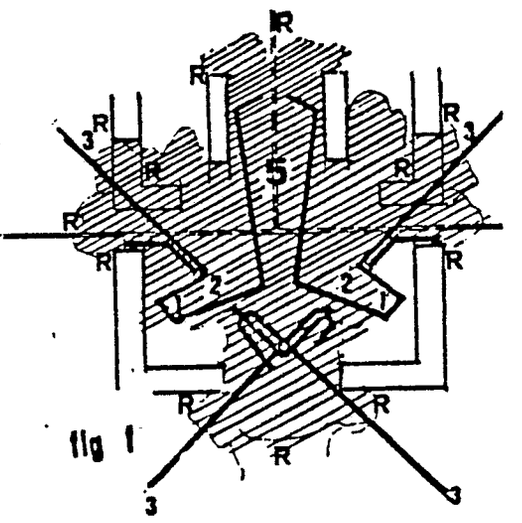
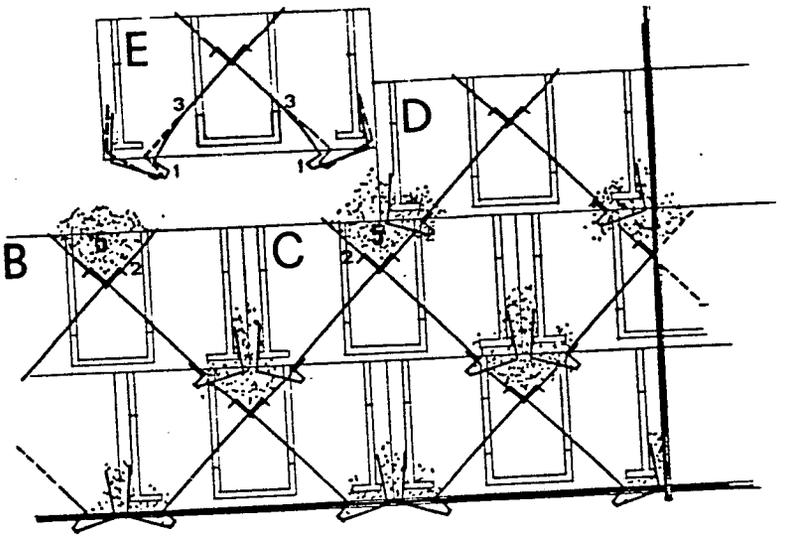


tavola I^a



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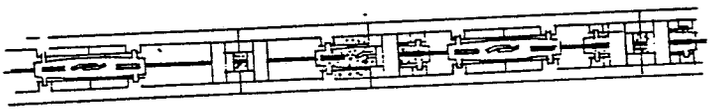

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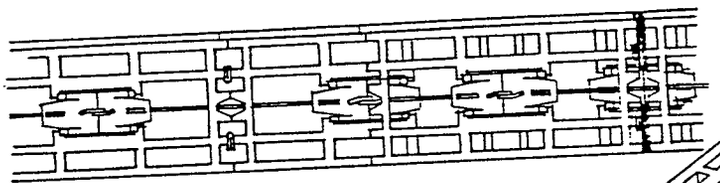

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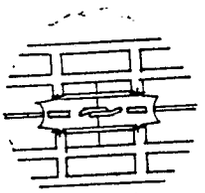
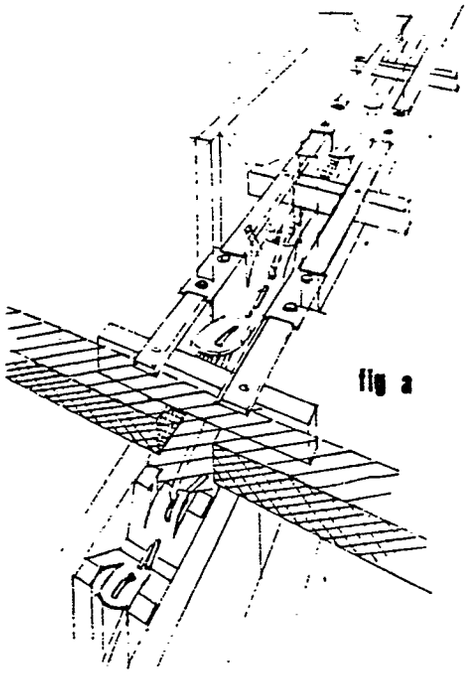


fig e

fig f

tavola II[a]



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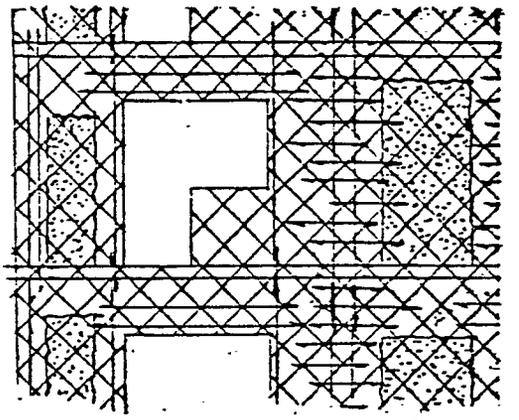

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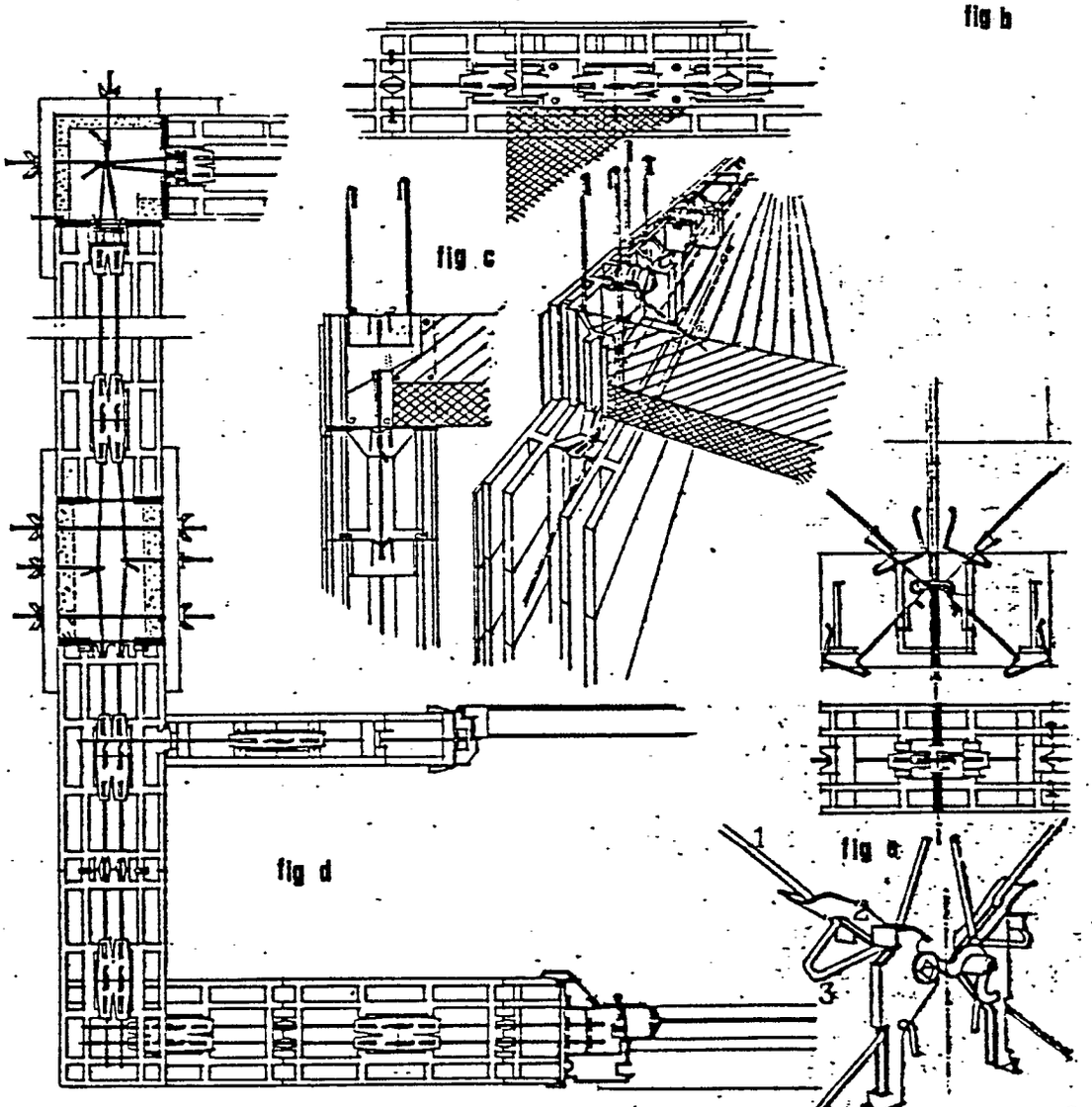
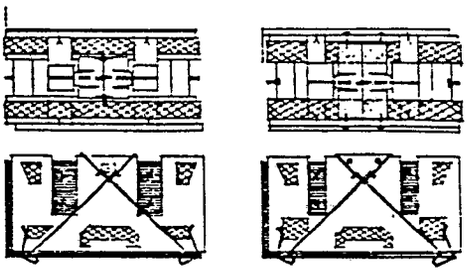


fig c

fig d

fig e

tavola III^a



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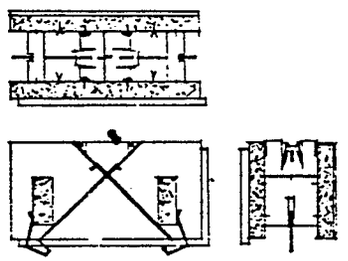

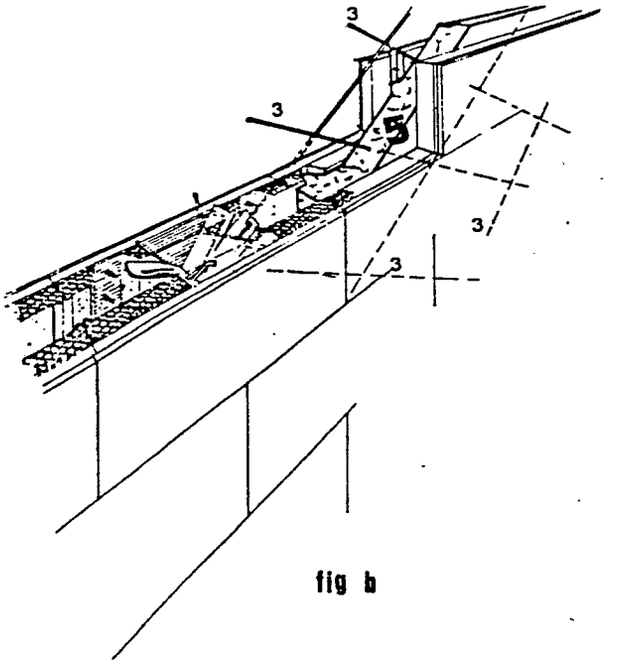

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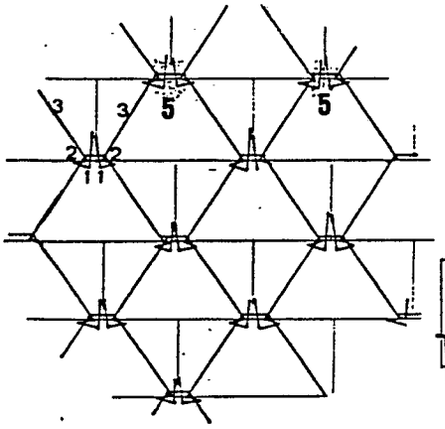

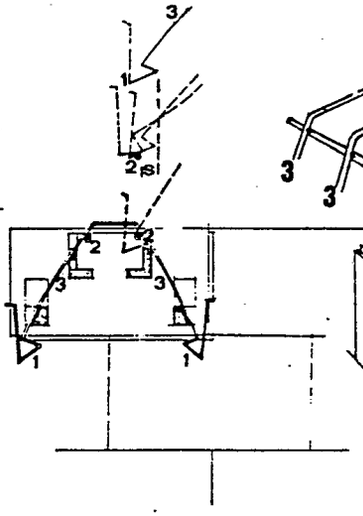

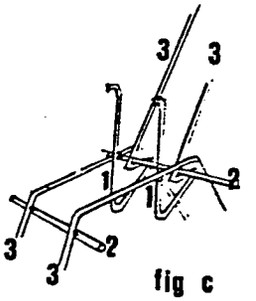

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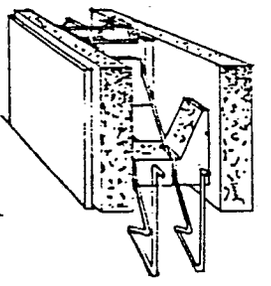

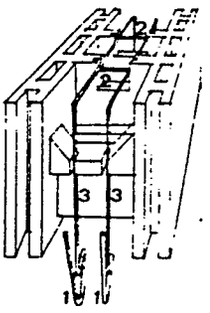

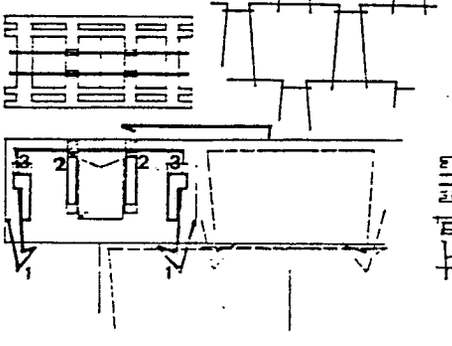

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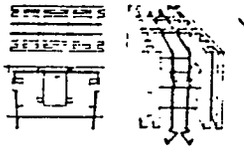


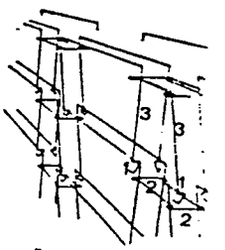


tavola IV[a]

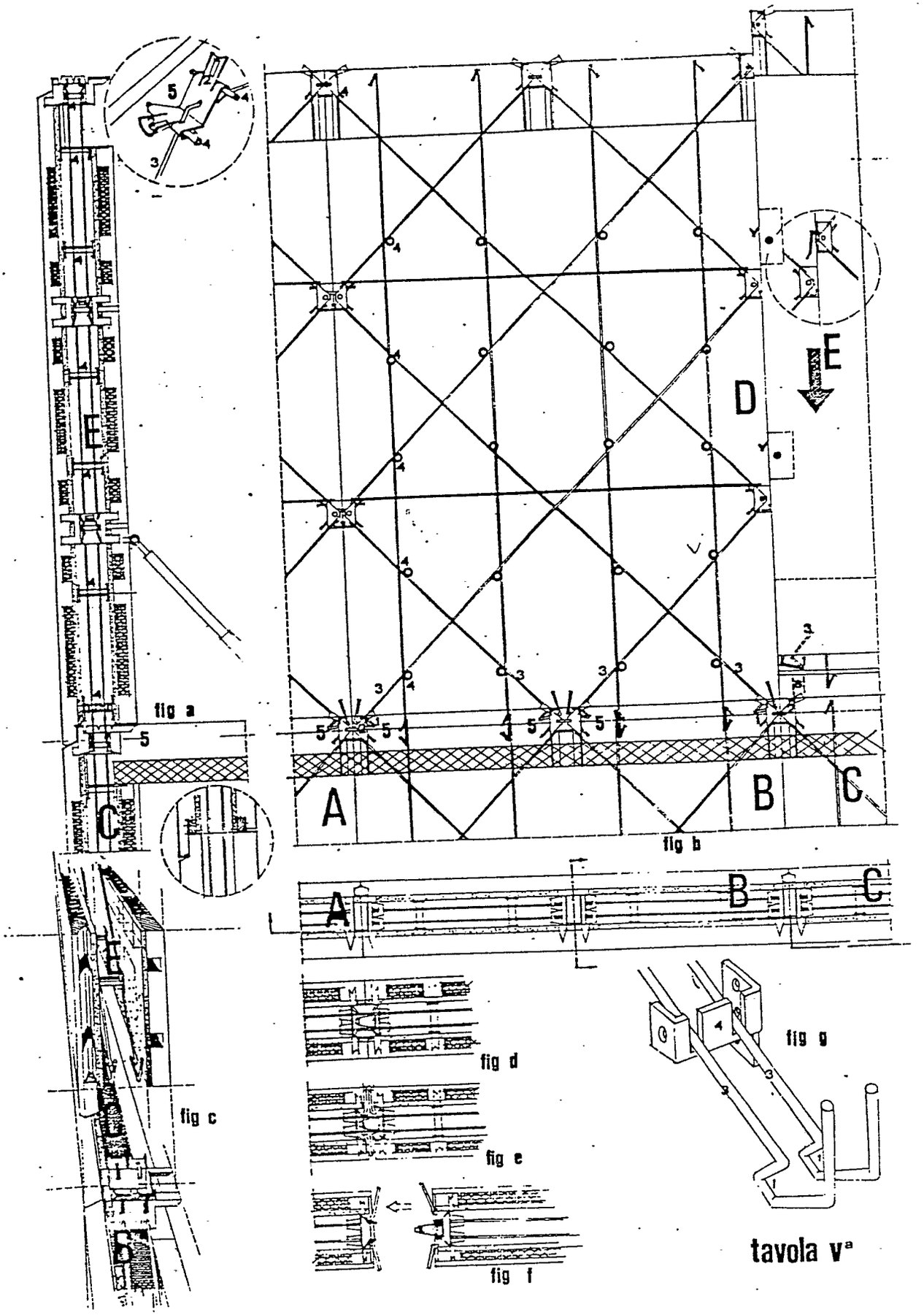
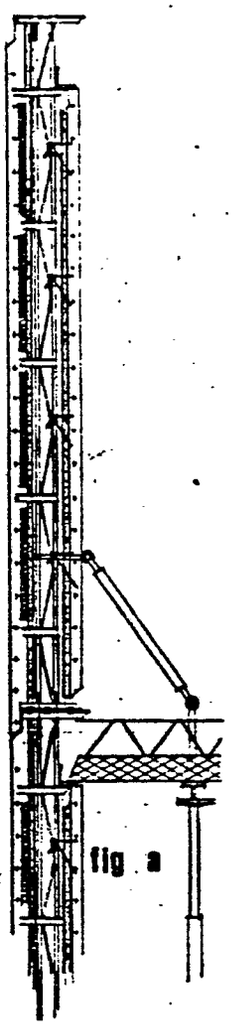


tavola V^{a}



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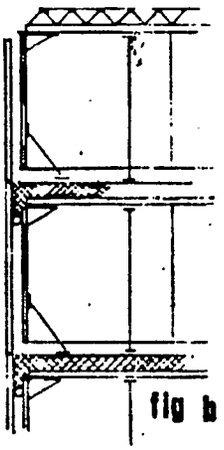

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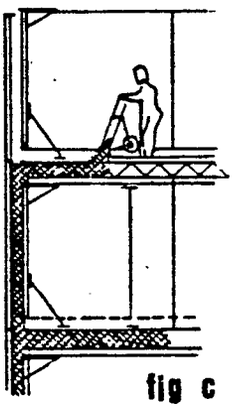

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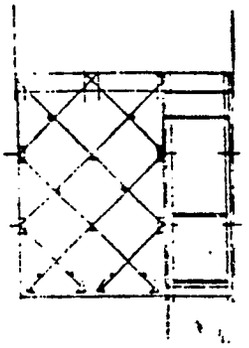

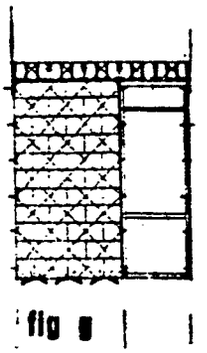

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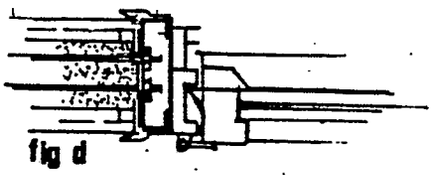

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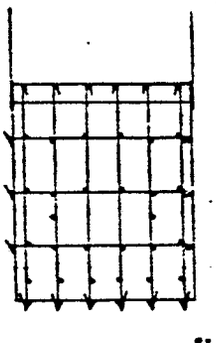


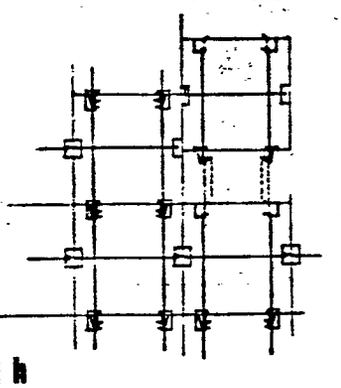
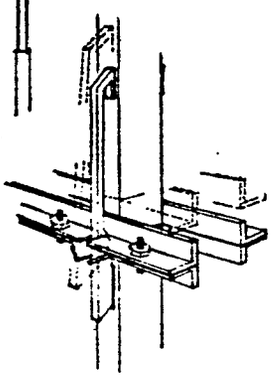
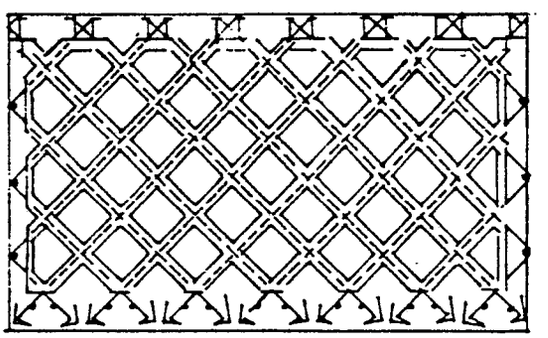


fig h





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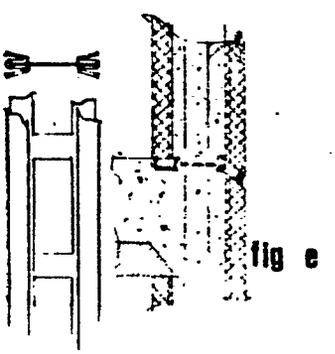
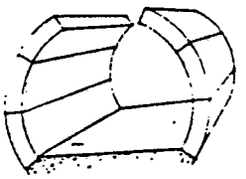


fig e

tavola VI[a]

fig a



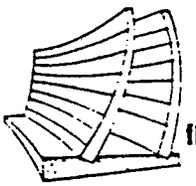
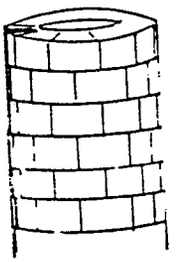


fig b

fig c



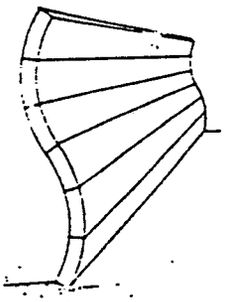
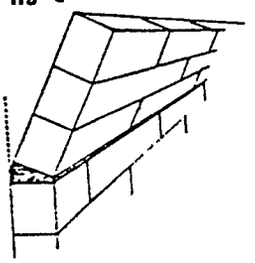
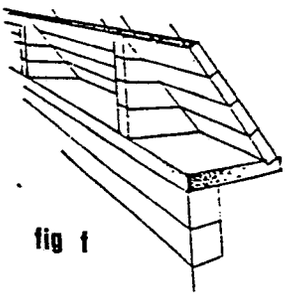


fig e

fig d





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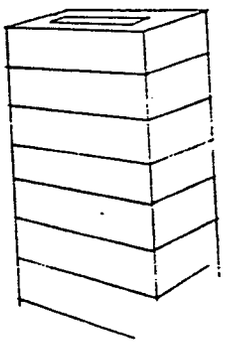
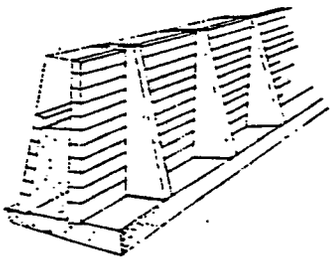


fig i



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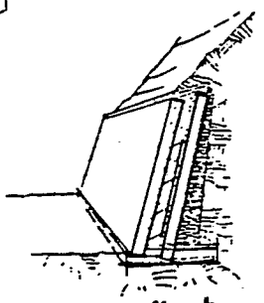

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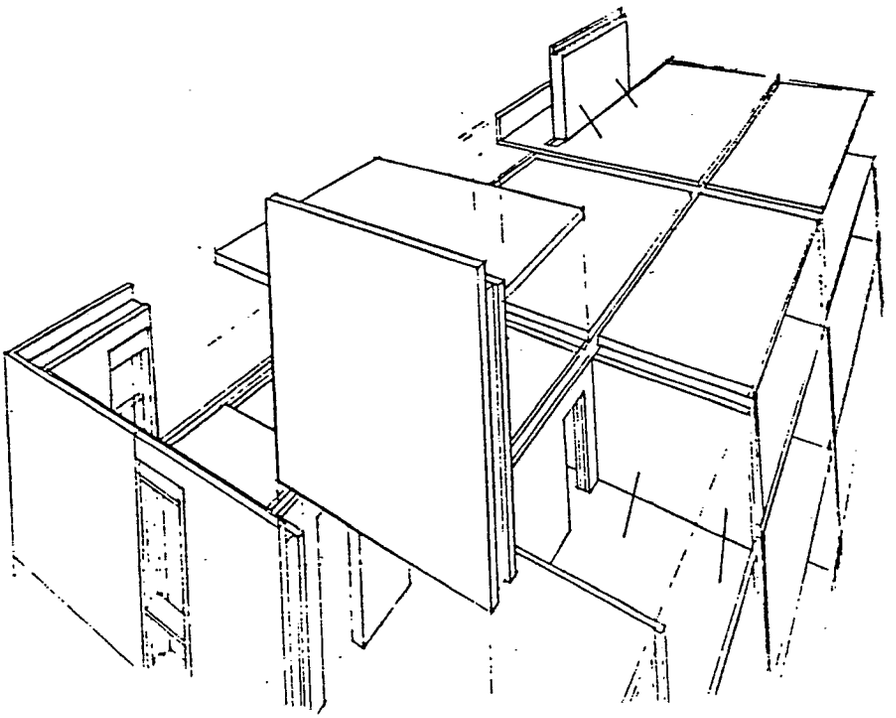

fig l

tavola VII[a]