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(54) **Shuttering for the fabrication of two-slab panels.**

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Description

This invention concerns shuttering for the fabrication of two-slab panels.

To be more specific, the invention deals with shuttering which is employed in a co-ordinated manner to make composite building structures which consist substantially of electrically welded mesh incorporated in castings of cemented conglomerate and which are anchored together with suitable trelliswork so as to form structures with plane-parallel slabs separated by hollow spaces that can be filled advantageously for given purposes with thermally insulating and/or sound absorbing materials.

This invention refers in particular to shuttering characterised by new structural and practical solutions.

Double slabs are known as also are diverse devices and means to make them. In the known art there is, for instance, an application for a patent IT 19741 A/77 in the name of Sartorio which describes a device and procedures for fabricating and applying constructional building elements. Said building elements are made substantially with an automatic device working with a continuous cycle and comprising a movable surface, equipped with lateral forming rings, on which said building elements are formed.

This automatic device involves many drawbacks. One of them lies in the fact that the movement itself hinders the performance of the operations to be carried out in making the building elements.

A further drawback is that the manufacture of several elements on one single working surface can lead to interference in the various operations or tasks to be done on said surface. Moreover, said patent does not indicate all the functional elements required.

In patent application IT 23223 A/77, also in the name of Sartorio, some improvements to the preceding patent are described.

The purpose of said improvements is to make the double slabs by immersing both a mesh suitable for embodying the core of the slab and also spacer elements in a mass of cemented material already deposited on the movable working surface but not yet solidified.

This device requires a very fluid cemented mass to enable the mesh and spacer elements to be immersed therein and reveals many drawbacks and shortcomings which make it difficult to apply.

Patent application IT 25325 A/77, once again in the name of Sartorio, has been put forward, wherein a system is substantially envisaged for bonding together neighbouring two-slab panels; a special panel is also visualised which resumes substantially an old patent IT 713072 in the name of Sartorio.

There is also patent application IT 27620 A/78 in the name of Sartorio wherein the manufacture of slabs is envisaged with a system of cross-wise supports cooperating with sound absorbing elements. This procedure is difficult to carry out in that it foresees the use of elements cooperating with the spacer trelliswork and providing special formations which do not permit easy applications on building sites; moreover, said patent envisages solutions which are substantially impractical in the light of normal working methods.

Another type of shuttering is disclosed in DE-OS 2611843 which consists of a bottom plate for casting one concrete slab in which is encased the metal mesh and trelliswork projecting therefrom and a top frame provided with support legs which is placed on top of, and separated from the bottom plate.

According to DE-A 2611843, for casting the top slab, the top frame is provided with a removable bottom consisting of a plurality of boards arranged longitudinally between the trelliswork which project therefrom in the spaces provided between the boards.

Said boards are kept in place by a number of traverse bars terminally suspended from the edge of the top frame.

After casting the bottom slab and arranging the metal reinforcement, the top frame is placed on top thereon and the removable bottom is constructed from the longitudinal boards and the traverse bars. The top frame is then ready for casting the top concrete slab.

For removing the finished two-slab panel, one has to dismantle the top shuttering by first removing the bottom thereof piece by piece, then lifting the top frame and finally pulling the two-slab panel out of the lower plate.

It is obvious that the shuttering proposed in DE—A—2611843 requires a laborious and lengthy assembling and dismantling operations which are simply incompatible with today's urge to increase productivity.

There is also patent application IT 83345 A.78 in the name of the present author, which describes a device for the embodiment of double slabs made by vertical removal of the upper shuttering suitable for forming the second slab.

This device is especially restrictive if it is used in working surroundings of small dimensions.

There is also another European patent application No 0049692 which was submitted in the name of the present author and refers to a procedure and the relative device for making double slabs.

This earlier invention envisages an embodying solution which is simple and at the same time very effective.

It requires, however, the employment of supporting structures which need careful controls, and also requires specific structures which are hard to adapt to existing structures.

The purpose of the present invention is to embody a device for fabricating two-slab panels

which is simple and effective which requires no lengthy and laborious setting-up and dismantling operations.

Furthermore, said device must be able to be embodied by using existing structures already employed in the fabrication of simple slabs.

A further purpose of the invention is to embody a device which does not require excessive controls or maintenance work but which ensures excellent performance at the same time.

Lastly, a purpose of this invention is to embody a device which ensure the parallelism of, or a possible preset angle of inclination between, the flat slabs constituting the moulded panel, and also the ability to repeat the operations within very narrow limits of tolerances.

Yet another purpose is to embody a simple and effective device for removing the shuttering.

The invention is embodied, therefore, in shuttering for the fabrication of two-slab panels, whereby the double slabs consist of two layers of vibrated, cemented conglomerated material incorporating electrically welded metallic mesh cores and linked together with flat trelliswork so as to form panels for building work, whereby there can be insulating or non-conducting means in the double slab, said shuttering being characterised by comprising in coordinated cooperation with a surface for moulding single slabs:

- shuttering means for moulding the second surface, said shuttering means being provided with longitudinal slits and at least one removable end plate means terminally and transversally anchored to said shuttering means, and
- composite spacer means located between said shuttering means and said surface moulding the single slabs;
- whereby there are included support elements to carry said composite spacer means, said support element being arranged on said surface moulding the single slab;
- and whereby there are means cooperating with independent means to withdraw the shuttering means from the moulded panel,

Hereinafter we shall give, as a non-restrictive example, a description of a preferential embodiment of the invention, at the same time referring to the tables, wherein:

Fig. 1 gives a diagrammatic exploded view in which are shown the shuttering and the composite spacer means;

Fig. 2 shows diagrammatically the shuttering installed during the phase of formation of the second slab;

Fig. 3 gives a diagram of a spacer means component in orthographic projection;

Fig. 4 shows a partial section through the shuttering means;

Fig. 5 shows a table for the removal of the formwork, in a plan view.

In the figures the same parts or parts performing the same functions bear the same reference numbers.

Fig. 1 shows a surface for forming flat slabs 10, to which is fitted a second surface 110 consisting of shuttering means 16 such, according to the invention, as to make the whole suitable for forming the double slabs, said surface 110 forming the bottom surface of shuttering means 16 being provided with a plurality of longitudinal slits 23 and at least one removable end plate means 19. The shuttering 16 and end plate means 19 are generally preassembled in advance.

The surface for forming flat slabs 10 is a normal surface known in itself and already available with manufacturers of single slabs.

In particular, the forming surface 10 is installed rigidly on a supporting structure 11 cooperating with vibrating means 21 or other means suitable for the purpose.

The forming surface 10 has fixed 120 and movable 20 side panels able to be positioned as desired for delimiting and conforming the perimeter of a single slab.

The single, or first, of the two slabs forming a double slab is made on said forming surface 10 in a known manner, care being taken to prearrange and position the necessary flat trellises.

According to the invention removable support elements 15 are put on the edges of said forming surface 10.

Said support elements 15 can cooperate with suitable means of the right size for quick or automatic positioning, or else can be already fixed, or at least caused to be fixed temporally, to the surface 10.

The support elements 15 comprise two stems 17 which are advantageously threaded and to which it is possible to fit one or more components 112 of composite spacer means 12 (illustrated in Fig. 3) so as to obtain the required height of the empty space between the two slabs.

One of the advantages of the use of removable support elements 15 is that the distance between the centerlines of the various composite spacer means 12 provided on each support element 15 is registered and carefully determined in advance in a workshop so as to offer precise centering of the spacer means 12 and between the corresponding threaded holes in the upper shuttering.

A second advantage is the fact that it offers a simple operation for removing the composite spacer means (2) when necessary.

Each component 112 of said composite spacer means 12 can include knurled areas to facilitate handling, and also possible holes 24 (or like means) where the required motive force can be applied that is necessary for the proper engagement of said means 12.

The components 112 of composite spacer means 12 have various heights so that, in combination with each other, they can be adapted to various requirements; they also comprise male 14 and female 13 coupling means, preferably threaded.

The male coupling means 14 of the spacer means components 112 are located at the top thereof and serve in our example to position the shuttering means 16.

More specifically each composite spacer means 12 consists of a plurality of components 112 of substantially different heights, arrangeable in columns, each component 112 being provided with a threaded hole 13 on one side and a thread stem 14 on the opposite side, whereby the threaded stem 14 of one component engages the threaded hole 13 of the next component in the column and the threaded hole 13 of the bottom component 112 of a column being engaged by the threaded stem 17 provided on the removable support means 15 while the threaded stem 14 of the top component 112 of a column engages a threaded hole 18 provided in the shuttering means 16.

The shuttering means 16 consists of a plurality of tubular or C-shaped elements 116 of which the upper side constitutes the moulding surface for the second slab.

The shuttering means 16 form with end plate means 19 a rectangular mould having a bottom 110 provided as previously mentioned with longitudinal slits 23.

Said slits 23 serve for the passage of the flat, trelliswork forming distancing uprights of the double slab.

Each slit 23 is closed temporarily by elastic means 123, so that said elastic means, in the example rubber strips, do not allow the cemented conglomerate to pass through said spaces 23.

The shuttering means 16 can also be equipped for the passage and distribution of steam; in this case holes 216 are envisaged for proper distribution of steam so as to improve the action of drying and curing the product.

The end plate means 19 is terminally and transversally connected to the shuttering means 16.

Said plate means 19 can be connected mutually with bolts pins 119 or other removable means, which facilitate the rapid removal of said end plate means 19.

In practice the top shuttering 16 has only one removable end plate means 19 at one end thereof, the rest forming one solid unit.

Fixed and movable side panels 20—120 lie on the shuttering surface 110.

When the lower layer of the double slab has been moulded on the forming surface 10, the shuttering surface 110 is installed, the mesh (Fig. 2) is put on said shuttering surface 110, care being taken to anchor it to the flat trelliswork means, and the concrete is then cast.

The casting is levelled and is perhaps vibrated.

When the desired degree of compaction of the casting has been obtained, the shuttering 16 and, therewith, the double slab made are lifted, suitable crane lifting means being used for the purpose and being able to be hooked to the rings 22 of the shuttering means 16.

Next, steps are taken to put said double slab on a table 25 that withdraws it from its mould, and in the meanwhile the forming surface 10 can be used again.

On said withdrawal table 25 are supporting surfaces 27 and fixture pins 26.

The fixture pins 26 cooperate with the holes 18 of the end plate 19 which, for this reason, is now disconnected from the shuttering means 16.

A winch 29 is then connected to the free end of shuttering 16.

When the winch 29 is made to operate, the shuttering 16 without end plate 19 is withdrawn from the double slab, which is held by the supporting surfaces 27.

The shuttering runs on upholding means 30, which may consist of a bed of rollers.

The table 25 that withdraws the mould can be manifold according to the invention.

We have described here a preferential embodiment of the invention together with some variants, but other variants are possible; thus it is possible to change shapes and sizes, and each threaded stem 17 can have a separate support formed differently; it is also possible to visualise that the support elements 15 and, in substance, the composite spacer means 12 are arranged lengthwise on the side edges of the fixed mould 10 and, therefore, that the holes 18 of the shuttering 16 are machined laterally so as to cooperate with said composite spacer means 12.

Claims

1. Shuttering for the fabrication of two-slab panels, whereby the double slabs consist of two layers of vibrated, cemented conglomerate materials incorporating cores of electrically welded metallic mesh and coupled together and spaced apart by advantageously flat trelliswork so as to constitute panels for building purposes, whereby in the double slab there can be insulating and/or non-conducting means, said shuttering being characterized by comprising in coordinated cooperation with a surface (10) to form single slabs:—

—shuttering means (16) to form the second surface (110), said shuttering means being provided with longitudinal slits (23), and at least one removable end plate means (19) terminally and transversally anchored to said shuttering means (16), and

—composite spacer means (12) located

between said shuttering means (16) and said surface (10) to form single slabs
— whereby support elements (15) carrying said composite spacer means (12) are arranged on said surface 10 moulding the single slab;
— and means (18), cooperating with independent means (25) for withdrawing the shuttering means (16) from the moulded panel.

2. Shuttering for the fabrication of two-slab panels, as in Claim 1, characterized by the fact that the shuttering means (16) has elastic means (123) arranged to cover slits (23) and withhold conglomerate and to provide a passage for advantageously flat trelliswork.

3. Shuttering for the fabrication of two-slab panels, as in Claims 1 and 2, characterised by the fact that the end plate means (19) of shuttering means (16) is provided with holes (18) for positioning purposes and ring means (22) for lifting purpose.

4. Shuttering for the fabrication of two-slab panels, as in claim 1 and in one or the other of the claims thereafter, characterized by the fact that the shuttering means (16) are positioned on composite spacer means (12) provided with removable support means (15) removably fixed to the surface (10) moulding the single slab.

5. Shuttering for the fabrication of two-slab panels as in Claim 1 and in one or the other of the claims thereafter characterized by the fact that said composite spacer means (12) consists of a plurality of components (112) of substantially different heights, arrangeable in columns, each component (112) being provided with a threaded hole (13), on one side and a threaded stem (14) on the opposite side, whereby the threaded stem (14) of one component engages the threaded hole (13) of the next component in the column, the threaded hole of the bottom component (112) of the column being engaged by a threaded stem (17) provided with a removable support means (15), while the threaded stem (14) of the top component 112 of the same column engages a threaded hole (18) provided in the shuttering means (16).

6. Shuttering for the fabrication of two-slab panels, as in Claim 1 and in one or another of the claims thereafter, characterized by the fact that the means for withdrawing the shuttering means (16) from the double slabs thus made include a withdrawal table (25) which comprises in mutual cooperation and coordination:

— pin means (26) to withhold end plate (19);
— support means (27) to support and hold the double slab;
— sliding and sustaining means (28—30) to sustain shuttering means (16), disconnected from the end plate means (19), and
— winch means (29) for the lengthwise withdrawal of shuttering means (16).

Revendications

1. Coffrage pour la fabrication de panneaux á deux dalles, dans lequel les deux dalles sont composées de deux couches de matiére agglomérée cimentée et vibrée, qui renferment des âmes en grillage métallique soudé électriquement et sont accouplées et maintenues espacées par des treillis avantageusement plats de manière à constituer des panneaux pour la bâtiment et de sorte que des moyens isolants et/ou non conducteurs peuvent être logés dans la double dalle, ledit coffrage étant caractérisé en ce qu'il comprend, en coopération coordonnée avec une surface (10) permettant de former des dalles simples:—

— des moyens de coffrage (16) pour la formation de la deuxième surface (110), lesdits moyens de coffrage étant munis de fentes longitudinales (23) et d'au moins un moyen (19) formant plaque d'extrémité amovible ancré auxdits moyens de coffrage (16) en position terminale et transversale; et
— des moyens entretoises composites (12) placés entre lesdits moyens de coffrage (16) et ladite surface (10) servant à former des dalles simples,
— Des éléments supports (15), montés sur ladite surface (10) de moulage de la dalle simple et qui supportent lesdits moyens entretoises composites (12); et
— des moyens (18) coopérant avec des moyens indépendants (25) pour séparer les moyens de coffrage (16) du panneau moulé.

2. Coffrage pour la fabrication de panneaux à deux dalles selon la revendication 1, caractérisé par la fait que les moyens de coffrage (16) possèdent des moyens élastiques (123) disposés pour couvrir les fentes (23) et retenir le conglomérat pour donner passage à un treillis avantageusement plat.

3. Coffrage pour la fabrication de panneaux à deux dalles selon les revendications 1 et 2, caractérisé par le fait que le moyen (16) formant plaque d'extrémité des moyens de coffrage (16) est muni de trous (18) destinés au positionnement et de moyens formant anneaux (22) destinés au levage.

4. Coffrage pour la fabrication de panneaux à deux dalles selon la revendication 1 et l'une ou l'autre des revendications suivantes, caractérisé par le fait que les moyens de coffrage (16) sont positionnés sur des moyens entretoises composites (12) munis de moyens supports amovibles (15) qui son fixés de facon amovible à la surface (10) de moulage de la dalle simple.

5. Coffrage pour la fabrication de panneaux à deux dalles selon la revendication 1 et l'une ou l'autre des revendications suivantes, caractérisé par le fait que lesdits moyens entretoises composites (12) sont constitués par une pluralité de composants (112) de hauteurs sensi-

blement différentes, pouvant être disposés en colonnes, chaque composant (112) étant muni d'un trou fileté (13) d'un côté et d'une tige filetée (14) sur le côté opposé, la tige filetée (14) d'un composant coopérant avec le trou fileté (13) du composant suivant de la même colonne, le trou fileté de composant intérieur (112) de la colonne étant en prise avec une tige filetée (17) prévue dans les moyens supports amovibles (15) tandis que la tige filefe (14) du composant supérieur (112) de la même colonne est en prise avec un trou fileté (18) prévu dans les moyens de coffrage (16).

6. Coffrage pour la fabrication de panneaux à deux dalles selon la revendication 1 et l'une ou l'autre des revendications suivantes, caractérisé par la fait que les moyens servant à séparer les moyens de coffrage (16) des doubles dalles ainsi fabriquées comprennant des moyens d'extraction (25) qui comprennent, en position de coopération et coordination mutuelle:

— des moyens (26) formant tige servant à retenir une plaque d'extrémité (19);
— des moyens supports (27) servant à supporter et retenir la double dalle;
— des moyens de glissement et de soutien (28, 30) destinés à soutenir les moyens de coffrage (16), désaccouplés du moyen (19) formant plaque d'extrémité, et des moyens (29) formant treuil prévus pour l'extraction longitudinale des moyens de coffrage (16).

Patentansprüche

1. Schalung für die Herstellung von aus zwei Tafeln bestehenden Platten, wobei die beiden Tafeln aus zwei Schichten von gerüttelten, gebundenen und konglomerierten Materialien bestehen und Kerne aus elektrisch verschweißten metallischen Gittern enthalten sowie durch ein vorzugsweise flaches Gitterwerk im Abstant voneinander gehalten sind, damit Platten für Bauzwecke gebildet werden, wobei in der Doppeltafel Isolier- und/oder nicht leitende Mittel angeordnet sein können, dadurch gekennzeichnet, daß in aufeinander abgestimmter Zusammenarbeit mit einer Fläche (10) zur Bildung von Einzeltafeln vorgesehen sind:

— Schalungsmittel (16) zur Bildung der zweiten Fläche (110), wobei diese Schalungsmittel mit länglichen Schlitzen (23) versehen sind und mindestens eine abnehmbare Endplatte (19) aufweisen, die abschließend und quer an den Schalungsmitteln (16) verankert ist, und
— zusammengesetzte Abstandsmittel (12), die zwischen den Schalungsmitteln (16) und der Fläche (10) zur bildung der Einzeltafeln angeordnet sind,
— wobei Stützelemente (15), die die zusammengesetzten Abstandsmittel (12) tragen, auf der Fläche (10) zur Bildung der Einzeltafeln angeordnet sind;
— und Mittel (18), die mit selbstständigen Mitteln (25) zum Abziehen der Schalungsmittel (16) von der geformten Tafel zusammenwirken.

2. Schalung nach Anspruch 1 dadurch gekennzeichnet, daß die Schalungsmittel (16) elastische Mittel (123) zur Abdeckung der Schlitze (23) aufweisen, wodurch Konglomerat zurückgehalten und ein Durchtritt für das vorzugsweise flache Gitterwerk erreicht wird.

3. Schalung nach den Ansprüchen 1 und 2 dadurch gekennzeichnet, daß die Endplatte (19) der Schalungsmittel (16) für Positionierungszwecke mit Öffnungen und für Hebezwecke mit Ösen (22) versehen sind.

4. Schalung nach einem der Ansprüche 1 bis 3 dadurch gekennzeichnet, daß die Schalungsmittel (16) an zusammengesetzten Abstandsmitteln (12) positioniert sind, die mit abnehmbaren Stüzelementen (15) versehen sind, die abnehmbar auf der Fläche (10) für die Formung der Einzeltafel befestigt sind.

5. Schalung nach einem der vorstehenden Ansprüche dadurch gekennzeichnet, daß suzammengesetzten Abstandsmittel (12) aus einer Mehrzahl von Teilen (112) im Wesentlichen verschiedener Höhe bestehen, die in Reihen anzuordnen sind, wobei jeder Teil (112) an einer Seite mit einer Gewindebohrung (13) und an der gegenüberliegenden Seite mit einem Gewindezapfen (14) versehen ist, wobei der Gewindezapfen (14) eines Teiles mit der Gewindebohrung (13) des nächsten Teiles in der Reihe zusammenarbeitet und die Gewindebohrung (13) des Bodenteiles (112) der Reihe mit dem auf den abnehmbaren Stützelementen (15) vorgesehenen Gewindezapfen (17) verschraubt ist, wogegen der Gewindezapfen (14) des obersten Teiles (112) der Reihe in eine auf den Schalungsmitteln (16) vorgesehene Gewindebohrung (18) eingeschraubt ist.

6. Schalung nach einem der vorstehenden Ansprüche dadurch gekennzeichnet, dass die mittel sum abziehen der schalungsmittel (26) von der doppeltafel einen auszugtisch (25) aufweisen, der enthaelt bzw. zusammenarbeitet mit:

— zapfen (26) zum zurueckhalten der endplatte (19),
— tragmittel (27) zum tragen und halten der doppeltafel,
— gleit-und stuetzmittel (28, 30) zur abstuetzung der von der endplatte (19) geloesten schalungsmittel (16), sowie
— windenmittel (29) fuer das abziehen der schalungsmittel (16) der laenge nach.

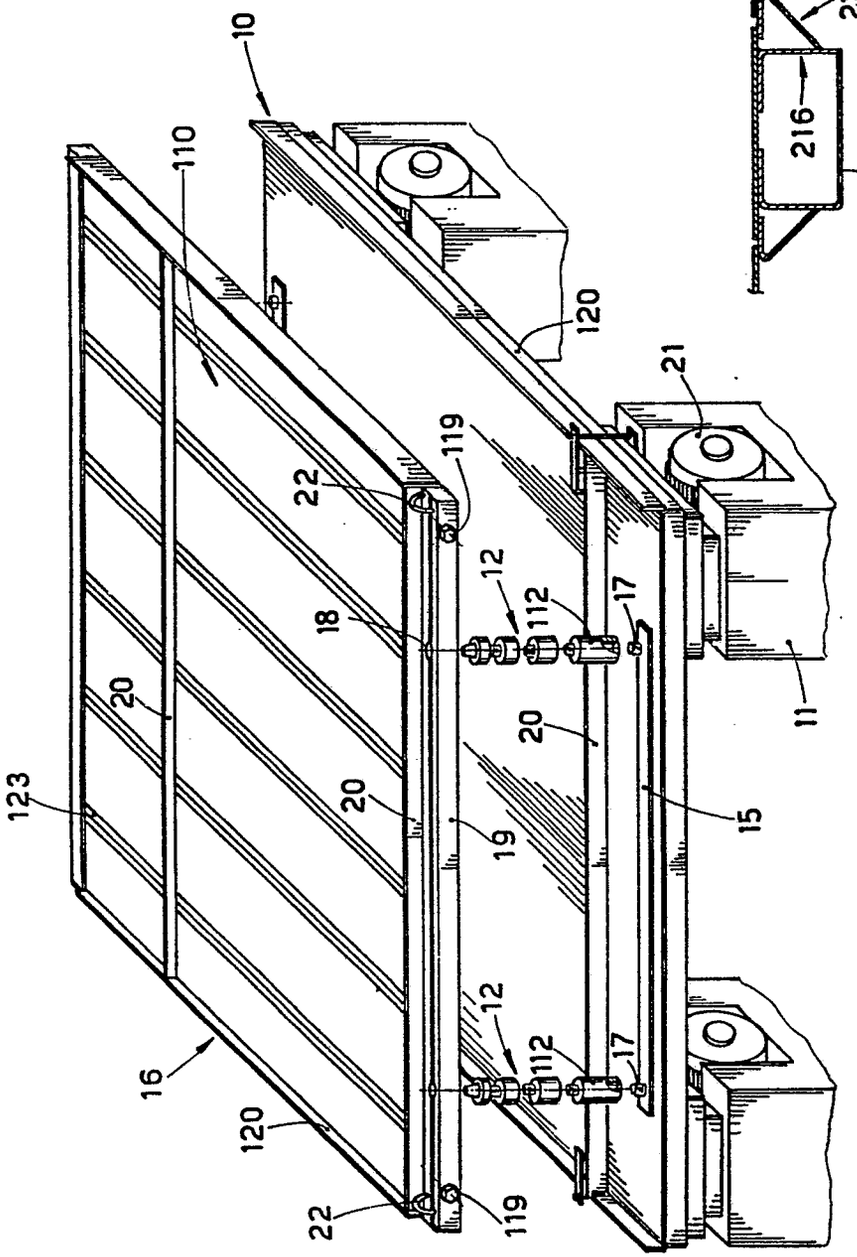
10
110
120
21
119
22
12
112
17
18
20
123
19
15
11
16
22
119
120

fig.1

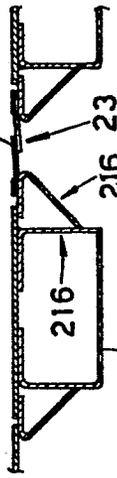
123
23
16
216
216
116

fig.4

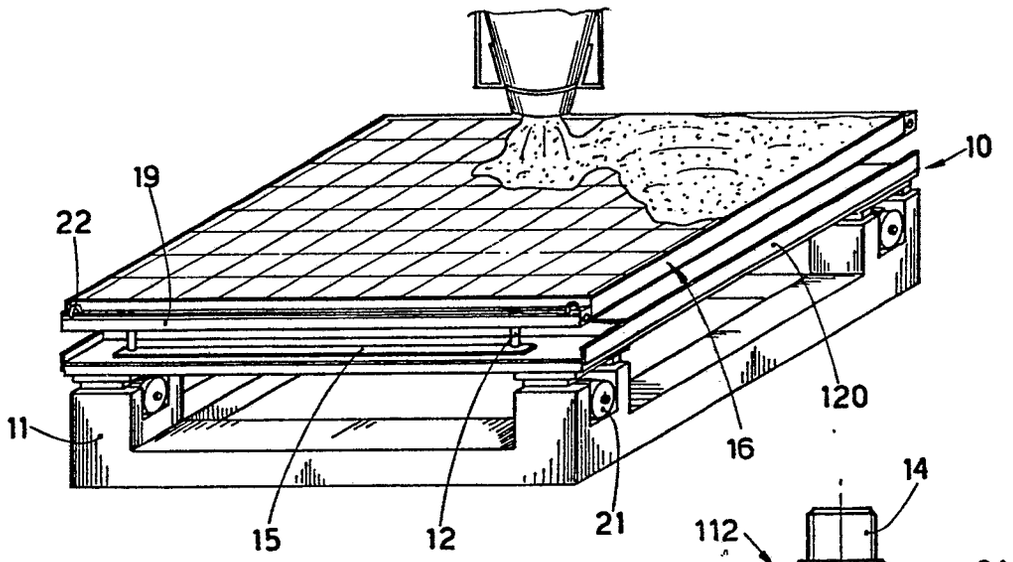

fig.2

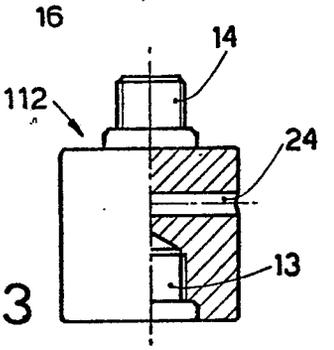

fig.3

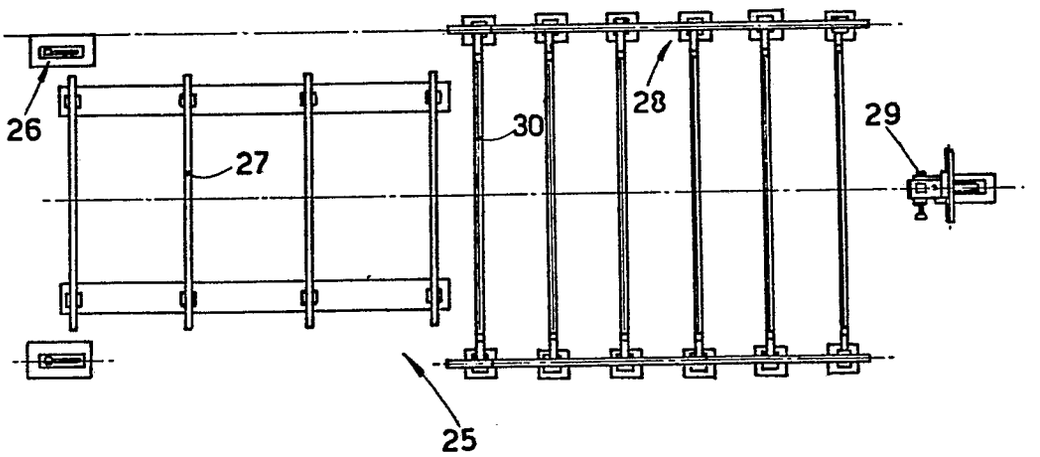

fig. 5