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B. NOVÁK ET AL
BOARDING ELEMENT FOR THE BOARDING OF
IRON-CONCRETE PLATE-CEILINGS

2,965,951

2 Sheets-Sheet 1

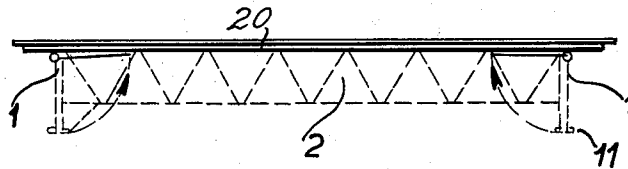


FIG. 2.

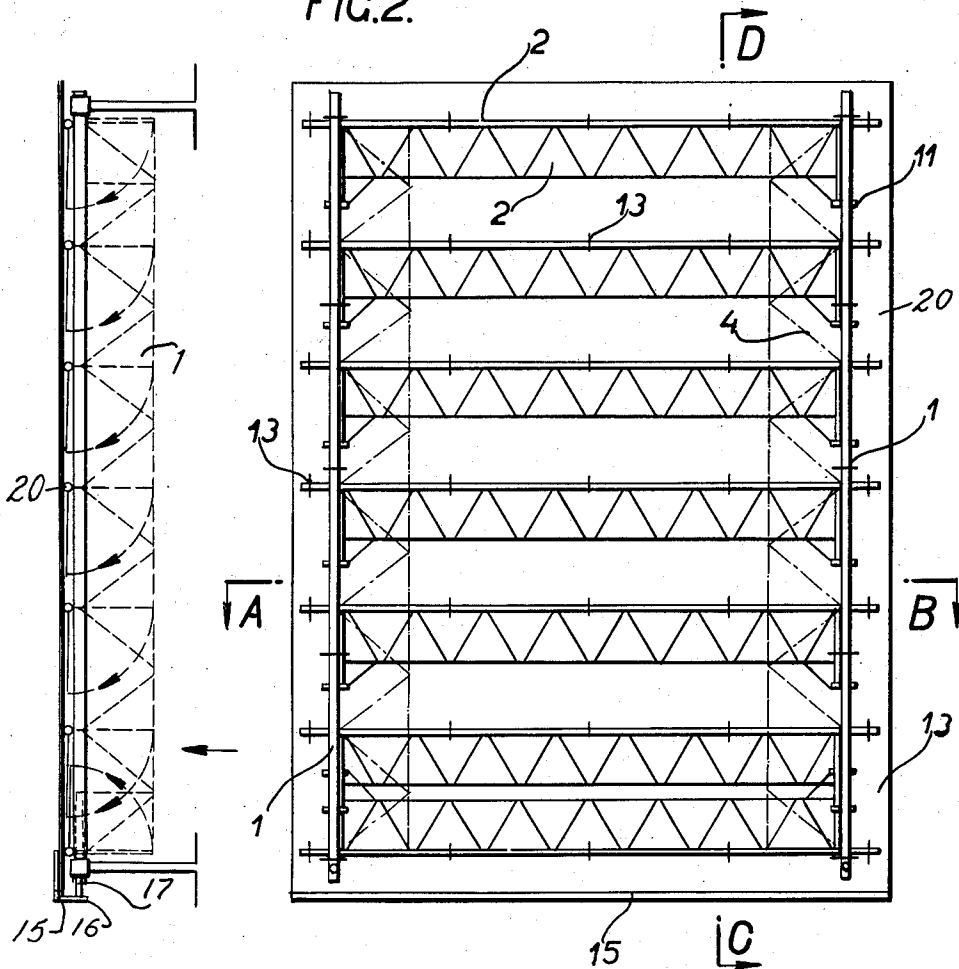


FIG. 1.

FIG. 3.

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2 Sheets-Sheet 2

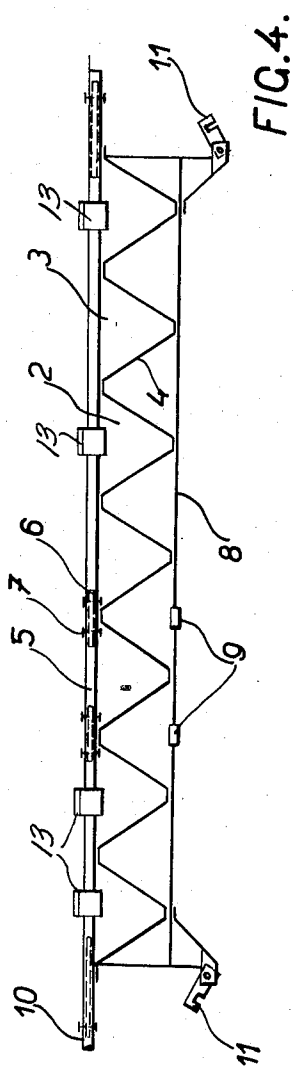


FIG. 4.

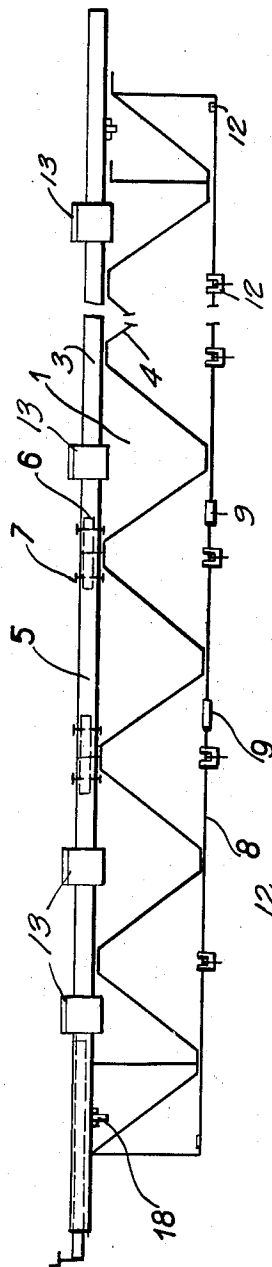


FIG. 5.

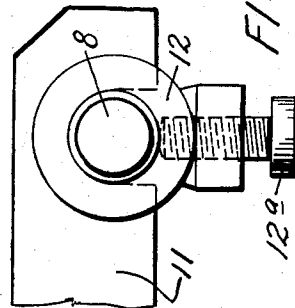


FIG. 6.

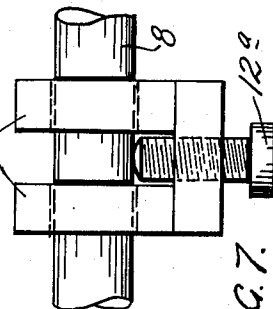


FIG. 7.

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2,965,951

BOARDING ELEMENT FOR THE BOARDING OF IRON-CONCRETE PLATE-CEILINGS

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7 Claims. (Cl. 25—131.5)

The present invention relates to formboards for supporting elevated reinforced concrete slabs forming ceilings and the like during the pouring and curing of such slabs.

The hitherto used supporting system for elevated reinforced concrete slabs consists usually of boards resting on horizontal wood carriers, which are supported by props of various types. The horizontal wooden carriers are replaced by metal carriers, lattice girders or plate girders, the length of which may be changed by telescoping or relatively adjusting longitudinal members thereof. Wood is saved by the use of such girders, but the latter also have some disadvantages, in particular, the difficulty with which they are assembled, their great weight and high initial cost.

The use of water-resistant plywood for the formboards and the method of producing reinforced concrete ceilings as disclosed in our application for United States Letters Patent, Serial No. 769,946, filed October 27, 1958, has led to the development of a formboard assembly with tiltable lattice girders according to the present invention.

By connecting a rigid plate of water-resistant plywood with a system of supporting lattice or truss girders extending at right angles to one another and disposed, during use, in planes perpendicular to that of the plywood plate, a structural member is produced which has a very small weight but a high load carrying capacity.

The accompanying drawings show by way of example, a formboard assembly embodying the invention.

In the drawings:

Fig. 1 is a bottom plan view of the formboard assembly,

Fig. 2 a cross sectional view along the line A—B of Fig. 1;

Fig. 3 is a cross sectional view along the line C—D of Fig. 1,

Fig. 4 is an elevation view of one of the lateral carriers included in the assembly of Fig. 1,

Fig. 5 is an elevational view of one of the longitudinal or main carriers of the assembly of Fig. 1,

Fig. 6 is a detail end view of an element included in the assembly of Fig. 1, and

Fig. 7 is an elevational view of the element of Fig. 6.

The formboard assembly comprises a plate 20 formed of water-resistant plywood to which two main carriers 1, for example, in the form of lattice or truss girders, are permanently secured, and a plurality of transverse carriers 2, also in the form of lattice girders and placed at right angles to the main carriers. The spacing of the transverse carriers 2 is chosen according to the load to be suggested by the formboard assembly.

The upper chords of the lattice girders forming the main carriers 1 and the transverse carriers 2 are made of hollow steel tubes 3. The lower chord and struts of each lattice girder are formed of steel rods 8 and 4, respectively. The length of each of the carriers 1, 2 may be changed, and for this purpose, each of the carriers 1, 2 is divided into two parts which may be connected by an

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extension piece 5 inserted between them. The connection of the piece 5 to the two portions of the top chord 3 is effected by thin-walled tubes 6 telescoping into the tubes 3 and secured by screws. The two portions of lower chord 8, subject to tensile stress, are connected to the corresponding part of extension piece 5 by means of turn-buckle with left and right hand threads engaging correspondingly threaded end portions on the parts of lower chord 8 and on extension piece 5.

Moreover, minor extension of the transverse carriers 2 may be effected by pulling out endtubes 10 which slidably telescope in the tubes 3 at both ends of the transverse carriers 2.

The main carriers 1 and the lateral or transverse carriers 2 are pivotally secured to the underside of plywood plate 20 by means of sleeves 13 slidable on the tube 3 of each carrier and secured to the plate 20 by screws. Thus, each carrier can pivot about its upper chord between an operative position in a vertical plane perpendicular to the plane of plate 20 and a stored position parallel to plate 20. Each of the transverse carriers 2 is secured in the operative vertical plane by hooks 11 (Fig. 4) pivotally mounted at the opposite ends of the bottom chord 8. The hooks 11 are movable to tilted-down positions where the hooks 11 engage the lower chords of the main carriers 1 between double sleeves 12 (Figs. 5, 6 and 7) which are held in adjusted positions along such lower chords corresponding to the spacing of the lateral carrier 2 by means of set screws 12a.

The connection of all of the transverse carriers 2 to the two main carriers 1 by means of the hooks 11 and the double sleeves 12 secures all carriers 1, 2 in vertical planes, thus increasing the rigidity of the assembly, with the result that the latter has a high load carrying capacity, while having a very small weight.

The sleeves 13 make possible the turning of the main carriers 1 and the transverse carriers 2 about the longitudinal axes of their upper chords 3 so that each carrier can be tilted from the plane perpendicular to the formboard or plate 20 into a plane parallel to said plate, as shown in full lines on Figs. 2 and 3.

The formboard assembly described above may be supported by four props, placed below the ends of the main carriers 1. In order to facilitate the installation and removal of the described formboard assembly, the plywood plate 20 is made shorter, by about 5 cm. in both directions, than the concrete ceiling slab to be cast. The gap along the periphery of the formboard or plate 20 is covered by sheet metal strips 15 which overlap the edge portions of plate 20 and have depending flanges 16 along the outer periphery (Fig. 3) for abutment against the peripheral carrying structure of the building.

The strips 15 extending along the transverse and longitudinal edges of plate 20 are supported by tubes 17 and 10, respectively, which are slidable in the end portions of the tubes 3 forming the top chords of the main carriers 1 and transverse carriers 2. By sliding the end-tubes 10 and 17 out, the overall dimensions of the formboard assembly are increased. The slidable tubes 10 and 17 are secured against inadvertent displacement by setscrews 18.

In operation, the carriers 1 and 2 are disposed in planes at right angles to the formboard or plate 20 and secured in this position by hooks 11, whereupon the formboard assembly is lifted to the required height and supported by props or other suitable means. The gaps between the plate 20 and the walls of the room or peripheral structure are covered by the sheet metal strips 15 and the latter are secured by tightening the setscrews 18 engageable with the slidable end-tubes 10 and 17. Then the network of steel reinforcing rods is placed on the formboard 20 and the concrete is poured to form the desired slab. After the

concrete mixture has hardened, the formboard assembly of the ceiling slab is removed by releasing the props and lowering the whole formboard assembly down to lower the floor. The supporting carriers 1 and 2 are then tilted to planes parallel to that of the plate 20. After this tilting operation the thickness of the formboard assembly is only about 12 cm. The folded formboard assembly can then be pulled vertically through a gap left in the cast ceiling slab in the manner disclosed in our application Serial No. 769,946, identified more fully above, whereupon, the formboard assembly is disposed above the cast slab and can be erected above the latter to serve as the formboard for the casting of the next higher concrete slab.

Although a particular embodiment of this invention has been described in detail herein with reference to the accompanying drawings, it is to be understood that the invention is not limited to that precise embodiment, and that various changes and modifications may be effected therein without departing from the scope or spirit of the invention, except as defined in the appended claims.

We claim:

1. A formboard assembly comprising a flat plate, elongated carriers disposed, with the assembly in working condition, below said flat plate, means pivotally connecting said carriers to said plate for swinging between operative positions, where the carriers lie in planes perpendicular to the plane of said flat plate and form a support for the plate, and stored positions, where the carriers lie substantially flat against the underside of said plate to reduce the thickness of the assembly to a minimum and to facilitate handling of the assembly, and means to releasably secure the carriers in their operative positions.

2. A formboard assembly comprising a flat plate presenting opposed side edges and end edges, a pair of main carriers disposed below said flat plate and extending along and adjacent to said side edges, a plurality of transverse carriers also disposed below said flat plate and extending between said main carriers at right angles to the latter, means pivotally connecting said main and transverse carriers to said flat plate for swinging between operative positions, where said carriers lie in planes perpendicular to the plane of said flat plate, and folded positions, where said carriers are substantially flat against the underside of said flat plate to reduce the thickness of the formboard assembly to a minimum, and cooperating latch means on said transverse carriers and on said main carriers releasably engageable when said carriers are in said operative positions to connect said main and transverse carriers to each other and thereby retain said carriers

in said operative positions for giving maximum load carrying support to said flat plate.

3. A formboard assembly as in claim 2; wherein each of said carriers is in the form of a truss girder having elongated top and bottom chord members with connecting struts therebetween, and said means pivotally connecting said carriers to said plate engage said top chord member of each carrier so that the latter is swingable about the longitudinal axis of said top chord member.

4. A formboard assembly as in claim 3; wherein said latch means includes hook members pivotally connected to the opposite ends of said bottom chord member of each of said transverse carriers to swing relative to the latter in the plane of the related transverse carrier and being engageable with the bottom chord members of the adjacent main carriers to hold the latter in said operative positions thereof, and double sleeves on the bottom chord member of each main carrier located to receive the hook members at the adjacent ends of said transverse carriers between said double sleeves so as to hold said transverse carriers in said operative positions.

5. A formboard assembly as in claim 3; wherein the truss girder forming each of said carriers includes two separable parts made up of corresponding portions of said top and bottom chord members and the struts therebetween, and at least one extension piece secured to the adjacent ends of said portions of the top and bottom chord members for varying the length of the related carrier.

6. A formboard assembly as in claim 3; wherein the top chord member of each of said carriers is constituted by a hollow tube; and further comprising extension tubes slidably telescoping in the end portions of said hollow tube forming the top chord member of each carrier, and sheet metal strips carried by the outer ends of said extension tubes and slidably overlapping the edge portions of said flat plate for adjusting the overall dimensions of the formboard assembly.

7. In the formboard assembly according to claim 1, said elongated carriers being formed as lattice girders.

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