May 20, 1958 H. J. LUSUM 2,835,358

FORM CARRIER AND FORM SKELETON CONSTRUCTED THEREWITH

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Fig. 1

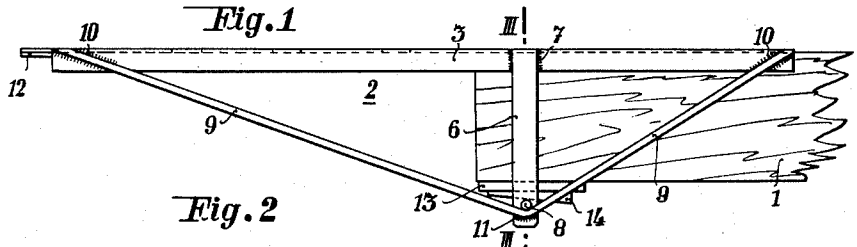


Fig. 2

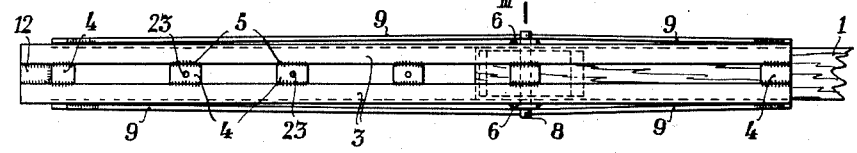


Fig. 3

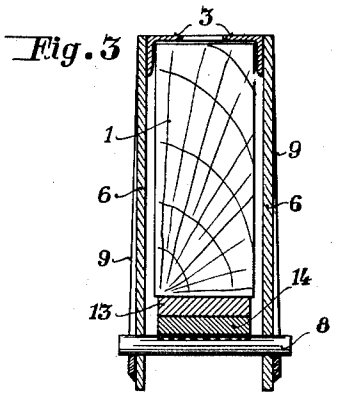


Fig. 6

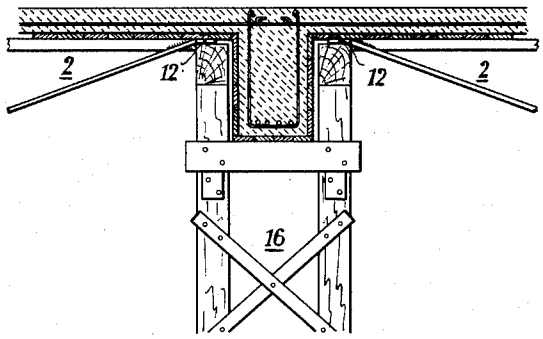


Fig. 4

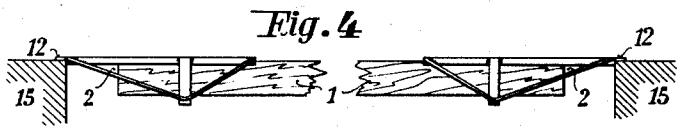
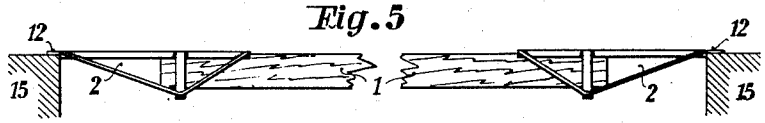


Fig. 5



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Fig. 7

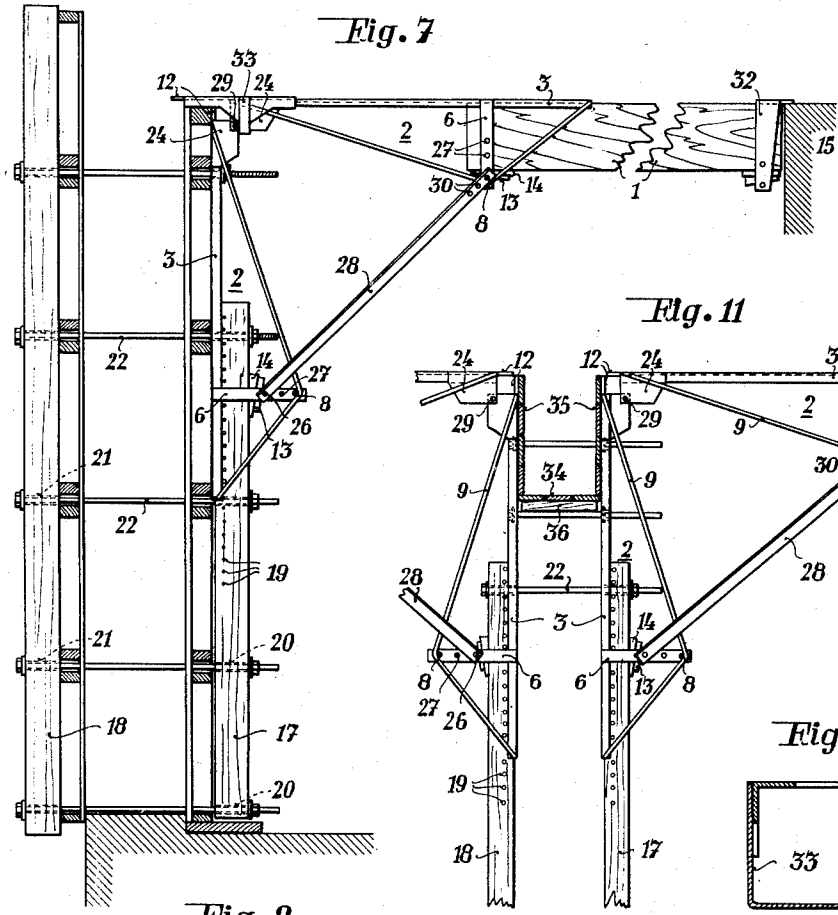


Fig. 11

Fig. 10

Fig. 8

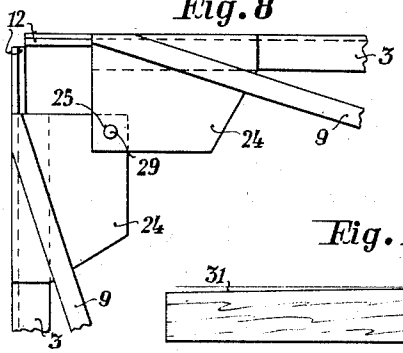


Fig. 9

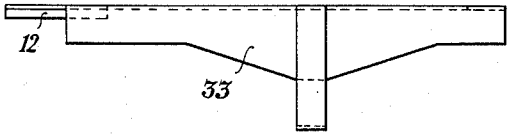
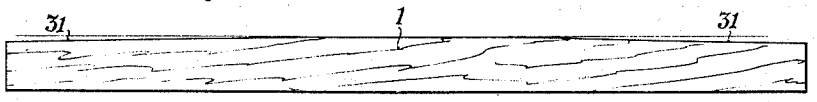


Fig. 12



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FORM CARRIER AND FORM SKELETON CONSTRUCTED THEREWITH

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Application August 28, 1952, Serial No. 306,811

5 Claims. (Cl. 189—36)

The invention relates to a form carrier for the construction of reinforced concrete floors of buildings, and to a form skeleton constructed with such form carriers, for the construction of concrete walls, reinforced concrete columns, reinforced concrete floors, supporting beams, etc.

All-steel form carriers are known already, which consist of parallel built-up beams butt-jointed in the upper boom and connected by turnbuckles in the lower boom. In this known form carriers an adaptation to different spans is achieved thereby that differently long carrier elements are supplied, which are to be assembled corresponding to the desired span. In these known carriers the supporting elements can be adjusted only to a small extent. For this reason such carriers have the disadvantage that their length can be adjusted only to a limited extent, and moreover, that they are relatively heavy and very expensive, too.

Moreover, form carriers consisting of a timber beam are known, which has passed on each end thereof an extension piece projecting over the said end and consisting of a channel rail extending along the top of the timber beam, and of a strap fixed to the rail and embracing the underside of the wooden beam. This construction of the form carrier makes it possible to suspend them between walls in such a manner that they can be removed after the floors have been constructed. In this case, too, the extension pieces can be displaced only to a very small extent.

It is an object of the invention to provide a form carrier which while simple in structure permits of a much greater adjustment. According to the invention this is achieved in that the channel rail is braced to the strap by means of bracing members and the extension piece is constructed for being clamped to the timber beam, for adaptation to different spans.

It is another object of the invention to provide in the erection of form skeletons using the aforedescribed form carriers for economies in working time, expense of timber, wire, and nails. As compared with the previously employed method of manufacturing the form, using round timber standards for the floors and similar braces for the walls, these elements are omitted entirely, as well as the conventional connections of the standards with crossing boards, the posts below the standards, the wedges, pegs, and the nails and wires required to fasten said parts. The crosspieces for the floors and supporting beams, and the standards for the walls and columns are replaced by the form skeleton, which may be used easily between one hundred and two hundred times, whereas the usual forms are suitable for only three to five uses.

This is achieved according to the invention in that the form skeleton consists of floor beams and vertical standards which constitute form carriers according to the invention at least at the mutually adjacent ends, and the extension pieces of which are interconnected to form a frame having rigid corners. This connection is suitably

effected in that the extension pieces are interconnected at their free ends by means of a connecting bolt passed through registering bores in the extension pieces, and by a diagonal member. The latter may be fixed in bores of the extension pieces by means of bolts, screws, or the like. For easier displacement, the extension pieces are fixed to the floor beams and standards by means of wedges, in the manner known per se, the wedges bearing on the one hand against the standards and floor beams and on the other hand against the bolts or the like serving for the connection to the diagonal members. By means of the form skeleton constructed according to the invention, forms for walls or ceilings for any normal heights, between two to four meters, or spans between two and six meters can be provided. For larger heights and spans, a single support or a reinforced construction of the form skeleton may be provided.

Examples of the invention are shown schematically in the drawing.

Fig. 1 is a side view showing a part of a form carrier constructed according to the invention.

Fig. 2 is a top plan view corresponding to Fig. 1,

Fig. 3 is a sectional view taken along line III—III of Fig. 1 on a larger scale.

Figs. 4 and 5 show the use of a form carrier in the case of different spans,

Fig. 6 shows the use of the form carriers with a central support.

Fig. 7 shows a form skeleton for the construction of a floor and of a wall adjacent thereto.

Fig. 8 shows a detail on a larger scale.

Figs. 9 and 10 are an elevation and cross-sectional view, respectively, showing an additional bearing shoe,

Fig. 11 shows the application of the form skeleton for the construction of a supporting beam, and

Fig. 12 is a side view showing a floor beam used in the form skeleton constructed according to the invention.

The form carrier has a central timber beam **1**, which carries at either end an extension piece **2**. Each of these extension pieces has at its top two angle irons **3**, about 1.5 meters long, which are welded to each other at both ends and between them by means of straps **4**. **5** are the welding seams. Approximately in the middle third two downwardly extending flat steel straps **6** are welded to the vertical flanges of the angles **3**. **7** again designates welding seams. These two straps **6** have bores at their lower ends and a round steel bar **8** is passed through said bores to connect them. The two vertical flanges of the angle irons **3** have welded to them on either side a flat steel member **9**, which is bent in the shape of a V and serves for bracing; it connects the two ends of the angle irons 3 and embraces the round iron bar 8. **10** and **11** are again welding seams. Thus the rail formed by the two angle irons **3** is braced. Moreover, a bearing plate **12** is welded to the outer end of each extension piece **2**.

Figs. 1, 4 and 5 show that the extension pieces **2** are passed on the timber beam **1**. Thereafter an iron plate **13** is placed below the beam **1** and a wedge **14** is driven between that plate **13** and the round bar **8**; thus the extension piece **2** is clamped to the beam **1** in the desired position. Figs. 4 and 5 show that the length of the part of the extension pieces **2** protruding over the ends of the timber beam **1** can thus be adjusted over a wide range. In Figs. 4 and 5, **15** designates the walls on which the bearing plates **12** of the extension pieces **2** may be placed.

If the spans are too wide—generally trams longer than 4 meters will not be used, which are sufficient for spans up to 6 meters—central supports **16** are employed in the conventional manner, as indicated in Fig. 6. In that case

the bearing plates 12 of the extension pieces 2 are placed simply on these central supports instead of on the wall 15.

A form carrier for a span up to 6 meters weighs about 80 kg. It may be used for all spans between 4 and 6 meters. For smaller spans a shorter beam must be used. E. g., a beam 2 meters long will suffice for spans between 3 and 4 meters.

The form carrier constructed according to the invention may be used for any desired floor construction of reinforced concrete, either only for the floor beams or in a form skeleton for the construction of a wall and a floor, as is shown in Fig 7. For the form for the wall, inner standards 17 and outer standards 18 are used, to which the form boards are fixed in the usual manner. The inner standards 17 consist of square timber about 18 cm. x 14 cm. in cross section, and having a length of two meters or more. At their upper end they have a number of bores 19, parallel to the wall, and bores 20 at right angles thereto distributed throughout their length, with corresponding bores 21 in the outer standards 18. Connecting screws 22 may be passed through the bores 20 and 21 to hold the two form walls together. In this case the outer standards 18 are somewhat longer than the inner standards 17, e. g., they may be three meters long if the inner standards 17 are two meters long. The top end of each inner standard 17 is provided again with an extension piece 2, the straps 4 of which have bores 23 through which the connecting screws 22 may be stuck to connect the form standards at the walls or supporting beams. If desired the connecting screws and straps may be used as supports for the bottom members of forms for supporting beams (see Fig. 11). Two gusset plates 24 are welded to the bearing plate 12 of the extension piece 2 and carry a bore 25 each. Several bores 27 are provided in the straps 6.

For the attachment to a vertical standard 17 or a floor beam 1, the extension piece is passed on that square timber and a bolt 26 is passed through one of the two bores 27 in the straps 6, corresponding to the thickness of the vertical standard. Suitably this bolt has at one end a handle and at the other a safety nose. Thereafter the iron plate 13, serving for face distribution is pushed below the bolt 26, and the hardwood wedge 14 is driven between that plate and the standard 17 or the floor beam 1, to wedge the extension piece 2 to the standard 17 or the floor beam 1. Thereafter the extension pieces of the floor beam and of the standard are interconnected by means of angle braces 28 by passing bolts 29 through the bores 25 of the two gusset plates 24 and the braces 28, to form together with the wall standards and the floor beam a frame having rigid corners. To allow for the length and thickness of the vertical standards, several bores 30 are provided at least at one of the two ends of the angle braces 28. To prevent a mutual interference between the gusset plates of the two extension pieces to be connected to each other, one of said gusset plates may be offset inwardly or outwardly by the thickness of the plates; alternatively one gusset plate may be welded to the inside of the angles 3 the other in the plane of the flange of that angle.

Normally the floor beam 1 has a cross section of about 10 cm. x 26 cm. and is four meters long. At 31 it tapers in the shape of a wedge towards the ends from both sides over a length of about 1.50 meters to achieve a camber in the unloaded condition (see Fig. 12). That taper serves for compensating the deflection resulting from the load. Thus the beam with its two extension pieces forms before being loaded approximately a segment arc at its upper side, so that a horizontal ceiling is provided by the deflection effected by the load.

In Fig. 7 a non-adjustable extension piece 32 is shown at the right-hand end of the floor beam, to enable the construction of forms for spans of two to three meters, or, where a tram of two or four meters and a normal extension piece is used, of forms of four to five meters

span, so that further economies are enabled owing to the reduced cost of the smaller extension piece.

The invention further enables making the forms for the walls prior to those for the floor. To this end an additional bearing shoe 33, shown in Figs. 7, 9 and 10, is provided, which prolongs the bearing member 12 by the thickness of the form panel.

Fig. 11 shows the application of the invention for the construction of a supporting beam. 34 designates the bottom of the form for the supporting beam, 35 designates the two form walls, and 36 are shims for height equalization. In other respects the procedure is the same as in the construction of walls.

The invention can be used not only in connection with timber beams but also as carriers of metal such as rails.

I claim:

1. In a form skeleton having a horizontal member, a vertical member, each of said members having an end portion adjacent to an end portion of the other member, an extension piece connected to and protruding over each of said adjacent end portions with a jib portion defining a bore, the bores in the jib portions of extension pieces connected to adjacent end portions being in register, said extension piece comprising a channel rail extending along one side, and a strap fixed to said rail and embracing the other side of the end portion to which it is connected, and V-shaped bracing means connecting the strap to the rail, and means connecting the extension pieces connected to said adjacent end portions to form a rigid corner, said last-mentioned means comprising a connecting bolt extending through said registering bores and a diagonal member connected to said extension pieces.

2. In a form skeleton having a horizontal member, a vertical member, each of said members having an end portion adjacent to an end portion of the other member, an extension piece connected to and protruding over each of said adjacent end portions with a jib portion defining a bore, the bores in the jib portions of extension pieces connected to adjacent end portions being in register, each extension piece defining additional bores and comprising a channel rail extending along one side and a strap fixed to said rail and embracing the other side of the end portion to which it is connected, and V-shaped bracing means connecting the strap to the rail, and means connecting the extension pieces connected to said adjacent end portions to form a rigid corner, said last-mentioned means comprising a connecting bolt extending through said registering bores, a diagonal member, and fastening means passed through said additional bores and connecting said diagonal member to said extension pieces.

3. The form of claim 2, in which said fastening means comprise bolts.

4. The form of claim 2, in which said fastening means comprise screws.

5. In a form skeleton having a horizontal member, a vertical member, each of said members having an end portion adjacent to an end portion of the other member, an extension piece connected to and protruding over each of said adjacent end portions with a jib portion defining a bore, the bores in the jib portions of extension pieces connected to adjacent end portions being in register, each extension piece defining additional bores and comprising a channel rail extending along one side and a strap fixed to said rail and embracing the other side of the end portion to which it is connected, and V-shaped bracing means connecting the strap to the rail, means connecting the extension pieces connected to said adjacent end portions to form a rigid corner, said last-mentioned means comprising a connecting bolt extending through said registering bores, a diagonal member, and fastening means passed through said additional bores and connecting said diagonal member to said extension pieces, said fastening means extending adjacent to said end portion having connected thereto the extension piece that defines the additional bores through which the fastening means is passed, and a wedge inserted

between the fastening means and the adjacent end portion to fix said extension piece to said end portion.

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