Dec. 28, 1937. H. H. BUNKER 2,103,765

SLAB

Filed June 26, 1936

Fig. 1

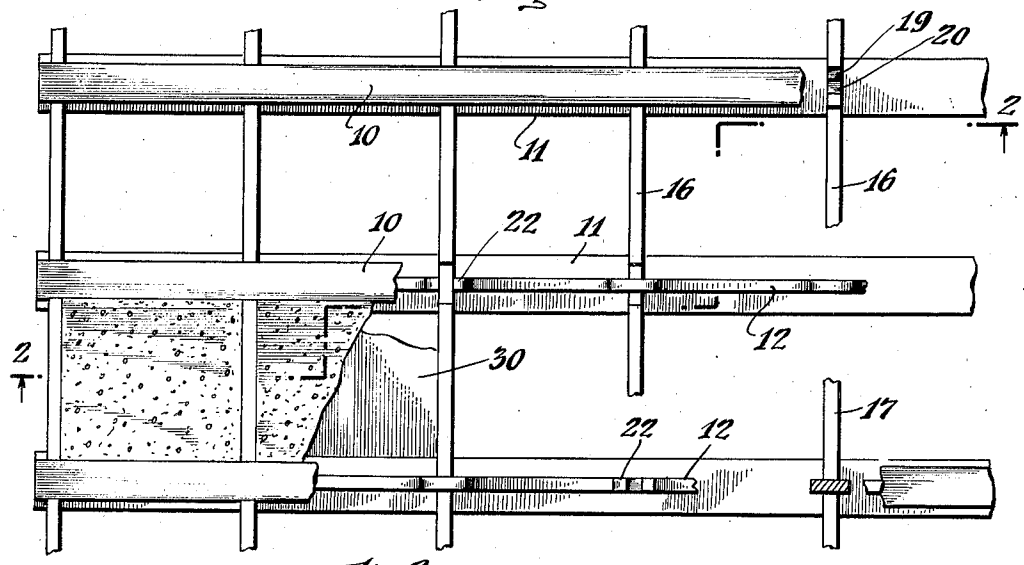


Fig. 2

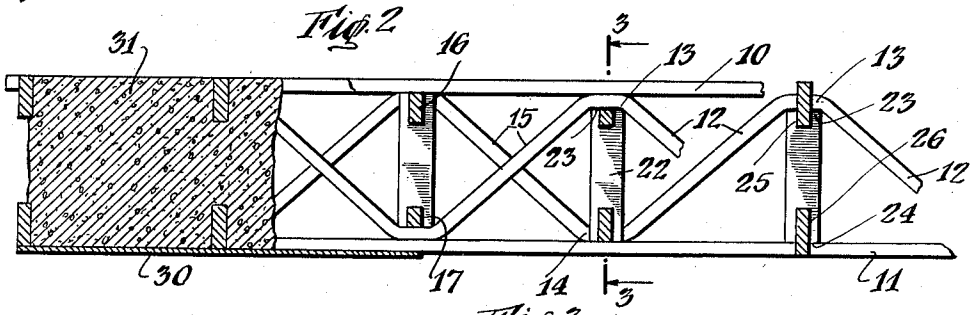


Fig. 3

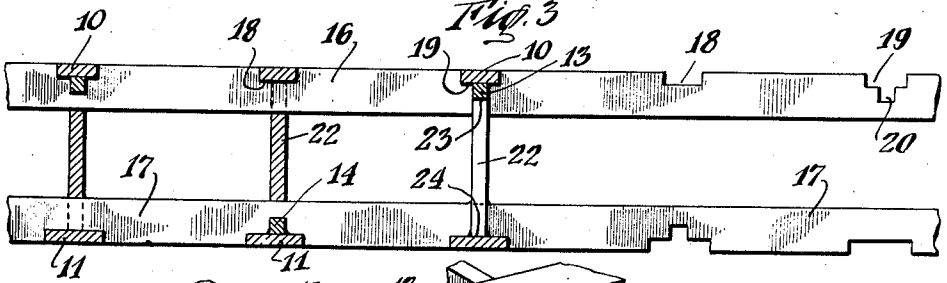
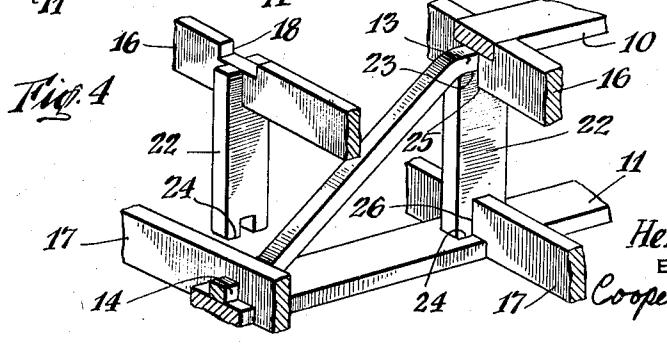


Fig. 4



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SLAB

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4 Claims. (Cl. 72—71)

This invention relates to slabs for roadways and the like, and particularly to metallic framework or skeletons which may be used as part of a concrete-filled slab or as an open slab. Among the objects of the invention is to provide a metallic skeleton structure which can be built in its entirety from common bars and shapes, and which is rigid and relatively light in weight for the load-carrying strength it possesses.

Another object of the invention is to provide a metallic skeleton having built-up longitudinal beam members with each beam member having a web consisting of a bent bar providing alternate bends and diagonal struts, and in which the beam members of the skeleton are so arranged that the diagonal struts in every other beam member lies in the same plane cross-wise of the skeleton so that the diagonal struts in adjacent beams lie in planes inclined to each other.

Another object of the invention is to provide a metallic skeleton having longitudinally-extending beams or truss members which are spaced from each other by a set of bars with each bar individually engaging the upper chords of the beams, and another set of bars with each bar individually engaging the lower chords of the beams.

Further and other objects of the present invention will be hereinafter set forth in the accompanying specification and claims and demonstrated by the drawing which shows by way of illustration a preferred embodiment and the principle of my invention, and what I now consider the best mode in which I have contemplated applying that principle. Other embodiments of the invention employing the same principle may be used and structural changes made as desired by those skilled in the art within the spirit of the appended claims without departing from the present invention.

In the drawing, Fig. 1 is a plan of a steel skeleton employing the principles of my invention and showing, for illustrative purposes, portions broken away and a portion having a filling of cementitious material.

Fig. 2 is a section on line 2—2 of Fig. 1.

Fig. 3 is a section on line 3—3 of Fig. 2.

Fig. 4 is a perspective view showing particularly the manner of joining members entering into the construction of the metallic skeleton, some of the members being shown as detached for illustrative purposes.

The longitudinal beams or truss members consist of parallel bars 10, 11, which form the upper and lower chord members of the beams. They are connected together by bent bars 12. The bent bars 12 have the outside of their loops 13, 14, welded or otherwise attached to the upper and lower bars 10 and 11, respectively, so that each pair of upper and lower bars 10 and 11 and associated bent bar 12 constitutes a single beam or truss member. All the longitudinal beams in a given metallic skeleton are similar to each other, but they are so cut and arranged that the diagonal portions 15 of adjacent longitudinal beams lie in intersecting planes extending across the longitudinal beams and cross-wise of the slab. This results in the staggered appearance illustrated in Fig. 2, whether or not all of the beams within a single skeleton unit end in a straight line across the skeleton.

When the individual longitudinal beams are fabricated in the manner just related, they are assembled in parallel rows and are secured together by two sets of cross-bars 16 and 17 which engage the upper and lower chords of the longitudinal beams, respectively. Each cross-bar is provided with notches 18 and 19 (Fig. 3) which alternate in respect to each other along the bar and are so shaped as to engage the chords of the longitudinal beams. In the present case, the longitudinal bars which form the upper and lower chords of the beams are rectangular in cross-section so the notch 18 is rectangular and has a depth and width commensurate with the depth and width of the longitudinal bar 10. The notch 19 is also dimensioned to engage the bar 10, but it has an additional cut-out portion 20 to accommodate the loop 13 of the bent bar 12. The lower cross-bars 17 are similarly notched and suitably dimensioned for engaging the lower longitudinal bars 11 and the loops 14 of the bent bars 12. I preferably weld the cross-bars 16, 17, to the members they are associated with so as to enable distribution of stresses crosswise of the skeleton and also provide rigid bracing transverse of the slab.

Additional locking of the longitudinal bars, cross-bars and bent bars is obtained by vertical strut members 22 which extend between the upper and lower chords of each longitudinal beam where the loops are located in the bent bars 14, but for certain purposes the vertical struts may be omitted if desired. Every other vertical strut has one end abutting the under side 23 of a bend 13 of the bent bar, and its other end 24 abutting the inside surface of the opposite longitudinal bar so that each vertical strut acts as a stress member in conjunction with the two adjacent diagonal truss members 12. In order that the ends of a vertical strut may abut against the bent bar 14 and longitudinal bar as just explained, each end

must be notched as at 25, 26, to accommodate the cross-bars. Each vertical strut is preferably welded to its associated members at its upper and lower ends.

It will be understood from the nature of the construction that all of the vertical strut members are similarly shaped, but that their upper and lower ends are reversed in respect to each other for adjacent strut members along any one longitudinal beam. This is clearly shown in Fig. 4, wherein the upper end of the right-hand vertical strut engages the under side of the bend 13 in the bent bar 14, and the lower end of the left-hand vertical strut engages the inside of the lower bend 14 of the same bent bar, and these two ends of the struts are similarly notched. The other ends of the same struts are similarly but more deeply notched because of their abutment with the longitudinal bars.

I have illustrated the application of my invention to a metallic skeleton adapted for use in a slab filled with concrete or other cementitious material. When so used it is preferable that the lower longitudinal bar 11 be of heavier construction to obtain greater tensile strength than is necessary for the upper bar 10, but the cross-sectional dimensions of these two bars may be the same, as would preferably be the case if the metallic skeleton were to be used as an open slab without any filling. This is merely a matter of selecting the sections which will provide the strength and position of the neutral axis desired. When filling is employed, a form must be provided for supporting the filling when it is poured, and this form may constitute a temporary mold or a permanent metallic plate 30 secured to the under sides of the lower bars of the longitudinal beams. The skeleton is then in condition to support a concrete filling 31.

I wish it to be understood that the metallic skeleton of my invention may be used for either a filled slab or an open slab, and that when used as a filled slab the nature of the filling material is unimportant except insofar as it may affect the sizes and shapes of the various bars entering into the construction.

What I claim is:

1. A metallic skeleton for a slab comprising longitudinally-extending truss beams and cross-bars, each truss beam having upper and lower chord members in the form of upper and lower bars and a bent bar in between the upper and lower bars with reverse loops at the ends of straight portions forming diagonal truss members, said bent bar being continuous for several loops and having the outside portions of the loops engaging the upper and lower bars, and vertical strut members each having an end abutting the inside of a loop in the bent bar and an end abutting the inside surface of the longitudinal chord member opposite the engaged loop so as to serve as a brace between the upper and lower chords of a truss beam, the alternate vertical strut members being arranged in inverted relation in reference to the intermediate vertical strut members so that all of the upper and lower loops of the bent bar are engaged by the vertical strut members.

2. A metallic skeleton for a slab comprising longitudinally-extending truss beams and cross-bars, each truss beam having upper and lower chord members in the form of upper and lower bars, and a bent bar in between the upper and lower bars of each truss beam, said bent bar having loops engaging the upper and lower bars and portions intermediate the loops extending from the upper to the lower bar, and struts in between the upper and lower chord members opposite loops in the bent bars, each strut being notched at one end for enabling vertical engagement with a cross-bar and a bent bar and at its other end with a cross-bar and longitudinal bar of a chord member so as to serve as a brace between the upper and lower chords of a truss beam.

3. A metallic skeleton for a slab comprising longitudinally-extending truss beams having chords and open webs, said truss beams being arranged parallel to one another and separated from one another by a set of upper cross-bars and a set of lower cross-bars, the cross-bars being arranged in pairs with one cross-bar above the other, the upper cross-bars being notched for engaging the upper chords of the longitudinal truss beams and the lower cross-bars being notched for engaging the lower chords of the longitudinal truss beams, each truss beam having a bent bar in between the upper and lower chords and providing truss members constituting diagonal portions extending from the intersections of the upper cross-bars with the upper chord of the longitudinal truss beam to the intersections of the lower cross-bars with the lower chord of the longitudinal truss beam.

4. A metallic skeleton for a slab comprising longitudinally-extending truss beams arranged parallel to one another and having upper and lower chords separated by an open web, a set of cross-bars for spacing the upper chords of said truss beams and a set of cross-bars for spacing the lower chords of said truss beams, said cross-bars being provided with notches for engaging the upper and lower chords, the web for each of said truss beams comprising a bent bar having a series of loops in engagement with the upper and lower chords with successive loops passing through and engaged by a notch in an upper cross-bar and then by a notch in a lower cross-bar at the intersections of the respective cross-bars with the upper and lower chords of a truss beam.

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