N. F. AMBURSEN.

APPARATUS FOR CONSTRUCTING CONCRETE FLOORS.

APPLICATION FILED JAN. 7, 1918.

1,289,069.

Patented Dec. 31, 1918.

3 SHEETS—SHEET 1.

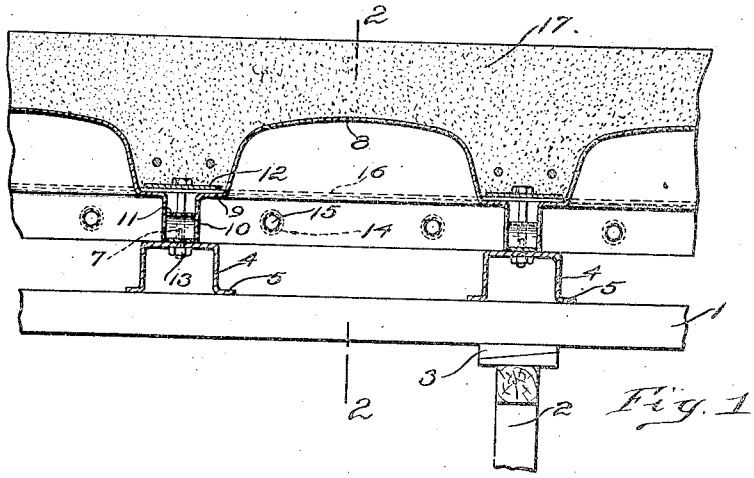


Fig. 1

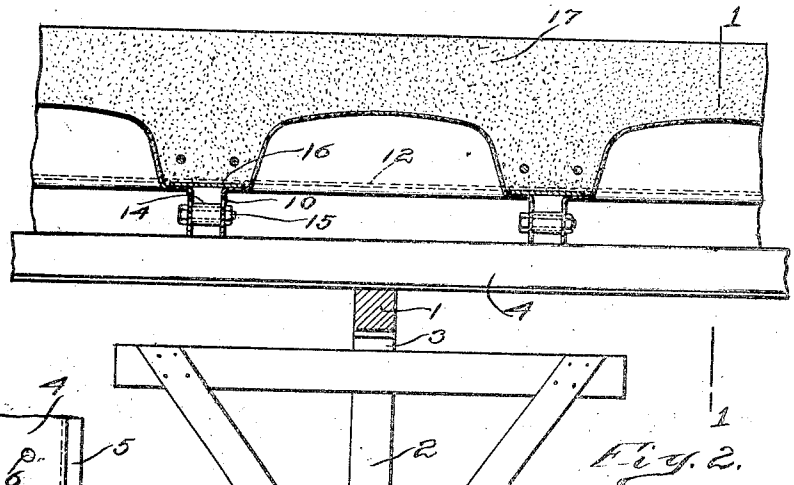


Fig. 2.

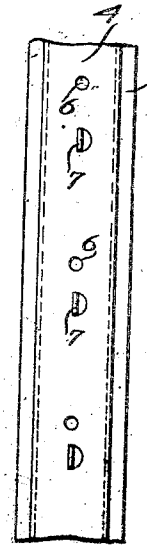
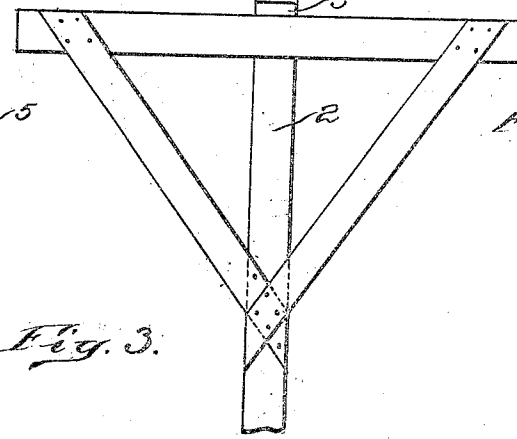


Fig. 3.



Inventor:
Nils F. Amburseen
By Geo. K. Woodworth
Atty.

N. F. AMBURSEN.

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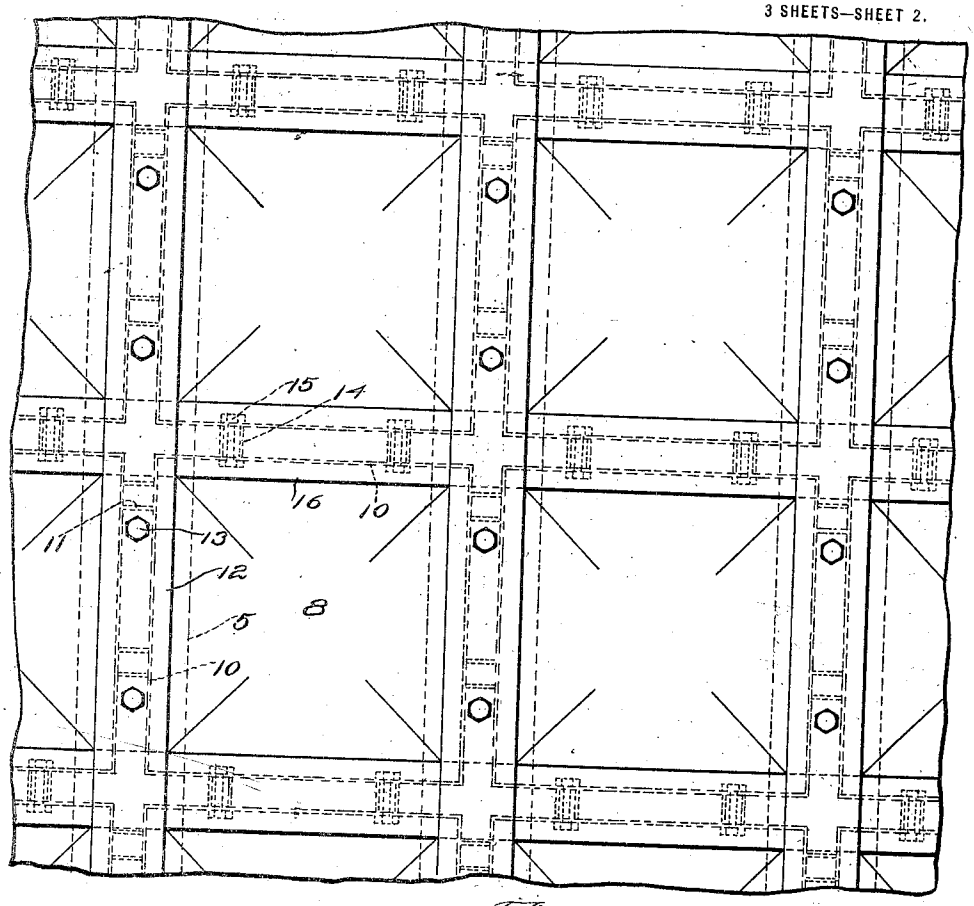


Fig. 4.

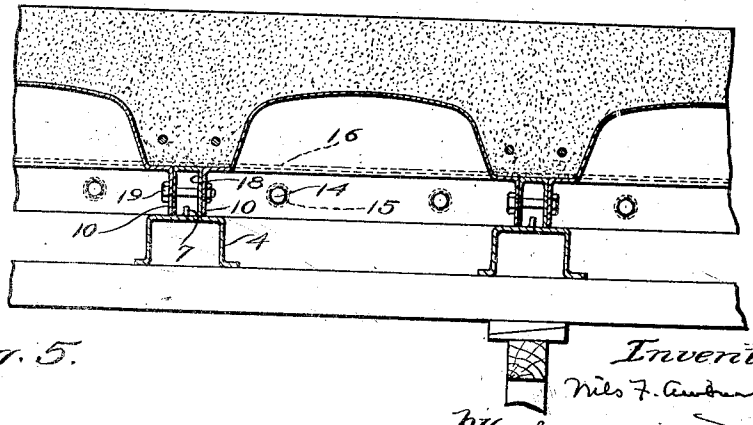


Fig. 5.

Inventor:
Nils F. Ambursen
by Geo. K. Woodworth
Att'y.

N. F. AMBURSEN.

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3 SHEETS—SHEET 3.

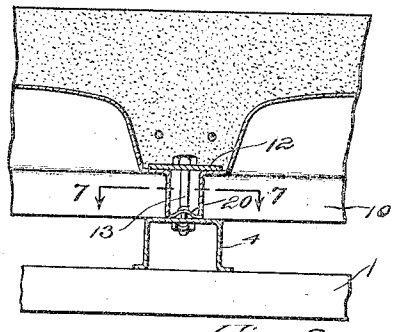


Fig. 8.

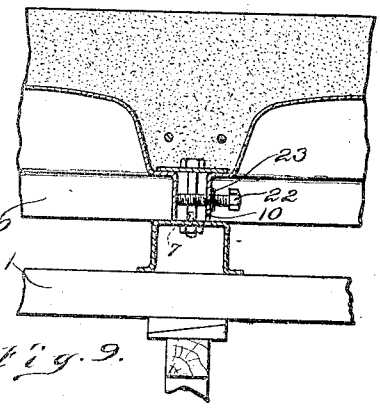


Fig. 9.

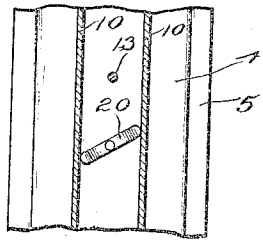


Fig. 7.

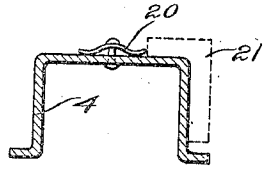


Fig. 6.

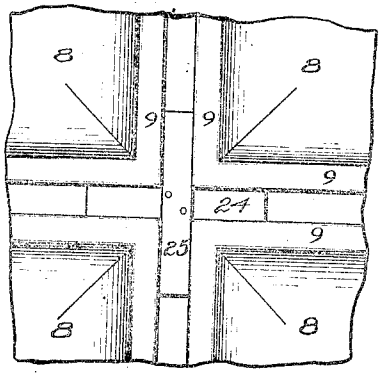


Fig. 10.

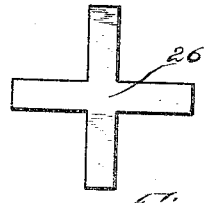


Fig. 12.

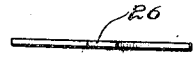


Fig. 13.

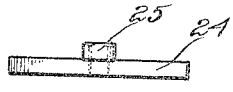


Fig. 11

Inventor:
Nils F. Amburseen
by Geo. H. Woodworth
Atty.

UNITED STATES PATENT OFFICE.

NILS FREDERICK AMBURSEN, OF NEWTON HIGHLANDS, MASSACHUSETTS, ASSIGNOR TO THE UNI-FORM COMPANY, OF BOSTON, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS.

APPARATUS FOR CONSTRUCTING CONCRETE FLOORS.

1,289,069. Specification of Letters Patent. Patented Dec. 31, 1918.

Application filed January 7, 1918. Serial No. 210,605.

To all whom it may concern:

Be it known that I, NILS FREDERICK AMBURSEN, a citizen of the United States, and a resident of Newton Highlands, in the county of Middlesex and State of Massachusetts, have invented a new and useful Improvement in Apparatus for Constructing Concrete Floors, of which the following is a specification.

In the construction of reinforced concrete floors by means of forms such as described in my application Serial No. 189,447 filed September 4, 1917 it is necessary to arrange said forms so that the end beam boxes of a panel are over the supporting columns. As the columns are arbitrarily placed it is essential that means be provided for adjustably spacing the several forms making up a panel in order that forms of standard size may be employed. For example, the size of the building may require that the columns be placed 22 feet between centers in which case the forms if square would have to be 2.2 feet on a side if ten of them were employed to bridge the space between a pair of columns. This particular construction would therefore require a form of special size, and in fact it may be said, generally speaking, that no two constructions would require forms of the same size. In order to overcome this limitation and use standard forms which preferably are 2 feet square at their lower edges I arrange matters so that the forms may be spaced apart and the difference between the separation of the columns and the combined length of the number of forms necessary to make up the panel may be taken up by such spacing. For instance, if the distance between the centers of a pair of columns is 22 feet and the forms are 2 feet on a side at their lower edges, ten forms will be used to a side of a panel and the difference between the separation of the columns and the combined length of ten forms, viz., 2 feet will be taken up by spacing each form about .2 foot from its adjacent form.

To this end my invention comprises laterally-spaced concrete-form support-members, preferably inverted channel-irons, and dome-shaped sheet-metal concrete forms which span the space between each pair of support-members and have the lower edges of two opposite sides resting thereon, together with means for adjustably spacing the forms. The lower edges of the domes extend horizontally outwardly and terminate in downturned lips, the spacing means preferably being placed between the downturned lips of each pair of adjacent forms. Fillers such as metallic plates are placed on the horizontal outward extensions of the lower edges of each adjacent pair of domes to bridge the gaps between the latter and preferably means are employed for clamping said fillers to said extensions. The fillers and the sides of each pair of adjacent domes form the longitudinal and transverse beam-boxes so that the floor beams may be reduced in depth without weakening the molded structure thereby effecting a saving in the material required to make a floor of given strength.

My invention further comprises the parts and combinations of parts set forth in the appended claims.

Illustrative embodiments of my invention are shown in the drawings which accompany and form a part of this specification wherein,—

Figure 1 is a transverse section taken on the line 1—1 of Fig. 2 of an apparatus for constructing concrete floors embodying one form of my invention. Fig. 2 is a longitudinal section taken on the line 2—2 of Fig. 1. Fig. 3 is a plan view of one type of concrete-form support-member. Fig. 4 is a plan view of my improved apparatus before the concrete has been poured. Fig. 5 is a transverse section of a modification. Fig. 6 is a transverse section of a concrete-form support-member showing a modified spacer. Fig. 7 is a section taken on the line 7—7 of Fig. 8 and showing in plan view the spacer illustrated in Fig. 6. Fig. 8 is a transverse section illustrating the use of the spacer shown in Figs. 6 and 7. Fig. 9 is a transverse section of another form of spacer that may be employed. Fig. 10 is a plan view showing still another modification. Fig. 11 is an elevation of the spacing device shown in Fig. 10. Fig. 12 is a plan view of another spacing device, and Fig. 13 is an elevation of the spacer shown in Fig. 12.

In the drawings which I have selected to illustrate the principle of my invention 1 represents one of a number of stringers which are supported upon the posts 2 at

suitable intervals apart, wedges 3 being employed to adjust the height of said stringers. Arranged transversely of the stringers and supported thereby are concrete-form support-members 4, 4 herein shown as inverted iron channels which may have laterally extending feet 5, 5 to afford a larger bearing surface. It will be understood of course that in lieu of the support-members illustrated in the drawings I may use ordinary channel-irons such as shown in my application above referred to, said channels being placed with their flanges on the stringers. The support-members are apertured at suitable intervals as shown at 6, 6 to receive bolts and preferably they are provided with upstanding lugs 7, 7 which may be formed by punching as shown in Fig. 3, said lugs preventing the lower edges of the domes from sliding off the support-members before the mold is completed.

Bridging the spaces between each adjacent pair of channels are domes 8, all four sides of which are formed with outwardly extending horizontal portions 9 which terminate in down-turned lips or flanges 10.

Interposed between each adjacent pair of lips 10 is a spacing member, of which I shall describe several forms. In Figs. 1 and 2 the spacing member is shown as a section of pipe 11, and bridging the gap between each adjacent pair of domes is a filler member which in the present instance I have shown as a metal plate 12 resting on the horizontal extensions 9. Bolts 13 passing through the respective apertures 6 of the channels and through apertures in the plates 12 serve to clamp the elements together. Similar pipe sections 14 are interposed between the flanges 10 of the other two sides of each dome and the dome adjacent thereto and bolts 15 passing through said pipe sections and coöperating with said flanges serve to couple the domes together. Filler plates 16 rest on the horizontal extensions of each adjacent pair of domes and run at right angles to the plates 12, the former being preferably placed under the latter as indicated in Figs. 1 and 2 so that the bolts 13 will clamp all the parts tightly together.

In forming the mold above described the operator first ascertains the distance between the centers of a pair of columns, determines the number of forms necessary to span said distance and then prepares spacers such as the pipe sections 11 of such length that the combined length of all the spacers will equal the difference between the separation of the columns and the combined length of the forms necessary to make up a panel. In this way the end beam-boxes may always be arranged over a column or the capitol thereof.

When the concrete indicated at 17 has hardened the forms and their support-members may be removed after the nuts on the bolts 13 and 15 are unscrewed, or by means of the apparatus shown in my co-pending application, Serial No. 188,689 filed August 28, 1917 the forms may be removed without waiting until the concrete has become thoroughly hardened.

In the modification shown in Fig. 5 I dispense with the spacers for the longitudinal beam-boxes and with the longitudinal filler plates 12 by employing a combined spacer and filler shown in the present instance as an inverted channel 18, in which case a bolt 19 may be employed for clamping said channel 18 and the flanges 10 of an adjacent pair of domes together. In this case the transverse filler plates 16 must of course be employed to bridge the gaps between the other two sides of each pair of domes and form the bottom of each transverse beam-box. In this case the length of the combined spacers and fillers 18 is determined in the same way as above set forth in connection with Figs. 1 to 4 inclusive.

Another device which may be used to space the domes apart is shown in Figs. 6, 7 and 8 as a spring 20 swiveled to the upper face of the channel 4 and arranged to be moved about its pivot to determine the separation between the flanges 10, 10 of a pair of adjacent domes. When this separation has been determined the operator preferably will prepare a gage such as indicated in dotted lines at 21 and placing vertical edge thereof against the flange of the channel, drive the spring member 20 about its pivot with a hammer until the end thereof touches the end of the horizontal side of the gage. In this case as before the transverse filler plates 12 are employed to bridge the gaps between each pair of adjacent domes and the bolts 13 are used to clamp the elements together. As shown in Fig. 9 a bolt 22 may be threaded through the flange 10 which preferably is reinforced by a metallic block 23 which may be electrically welded thereto and thereby determine the separation between a pair of adjacent domes.

Instead of using separate spacers for the portions of the domes which make up the transverse and longitudinal beam-boxes as above described I may use a single device for both. Such a device is shown in Figs. 10 and 11 as consisting of a cross having arms 24, 25 nailed or suitably fastened together, said device being placed at the juncture of four domes and its arms lying respectively in the two beam-boxes with one of them resting on the support-member 4.

As shown in Figs. 12 and 13 a one-piece metallic cross 26 may be used in place of the device shown in Figs. 10 and 11.

It will be readily apparent that various other modifications may be made in the apparatus above specifically described and therefore I desire it to be understood that I

do not limit myself thereto but having described several illustrative embodiments of my invention what I claim and desire to secure by Letters Patent is:

1. Apparatus for constructing concrete floors, comprising in combination laterally-spaced concrete-form support-members, dome-shaped forms each having the lower edges of two opposite sides resting on a pair of said support-members, the lower edges of each form extending horizontally outwardly and terminating in down-turned lips, means separating the lips of each form from the lips of the forms adjacent thereto, and plates resting on the horizontal outward extensions of said lower edges and bridging the gaps between each pair of adjacent forms.

2. Apparatus for constructing concrete floors, comprising in combination laterally-spaced concrete-form support-members, dome-shaped forms each having the lower edges of two opposite sides resting on a pair of said support-members, the lower edges of each form extending horizontally outwardly and terminating in down-turned lips, means separating the lips of each form from the lips of the forms adjacent thereto, plates resting on the horizontal outward extensions of said lower edges and bridging the gaps between each pair of adjacent forms, and means clamping said plates to said horizontal extensions.

3. In an apparatus for constructing concrete floors, a concrete-form support-member having lugs projecting upwardly at intervals from its upper surface.

4. Apparatus for constructing concrete floors, comprising in combination laterally-spaced concrete-form support-members, dome-shaped concrete forms each having the lower edges of two opposite sides resting on a pair of said support-members, the lower edges of each form extending horizontally outwardly and terminating in down-turned lips, spacing members resting on said support-members and separating the lips of each form from the lips of the forms adjacent thereto, a plate resting on the horizontal extensions of said lower edges and bridging the gap between each pair of adjacent forms, and bolts coöperating with said plate and said concrete-form support-members.

5. Apparatus for constructing concrete floors, comprising in combination laterally-spaced concrete-form support-members, dome-shaped concrete forms each having the lower edges of two opposite sides resting on a pair of said support-members, the lower edges of each form extending horizontally outwardly and terminating in down-turned lips, means separating the lips of each form from the lips of the forms adjacent thereto, and bolts coöperating with the down-turned lips of each pair of adjacent forms.

6. Apparatus for constructing concrete floors, comprising in combination laterally-spaced concrete-form support-members, dome-shaped concrete forms each having the lower edges of two opposite sides resting on a pair of said support-members, and means between each pair of adjacent forms for spacing the same and bridging the gaps therebetween.

7. Apparatus for constructing concrete floors, comprising in combination laterally-spaced concrete-form support-members, dome-shaped concrete forms each having the lower edges of two opposite sides resting on a pair of said support-members, and a cruciform member resting on a support-member at the juncture of four concrete-forms and having its arms arranged between each pair of adjacent forms, respectively.

8. In an apparatus for constructing concrete floors, a concrete-form support-member, and a spacing-member pivotally connected to the upper surface thereof.

9. Apparatus for constructing concrete floors, comprising in combination laterally-spaced concrete-form support-members, dome-shaped concrete-forms each having the lower edges of two opposite sides resting on a pair of said support-members, means for temporarily securing said edges of said forms to said support-members, the lower edges of the other two sides extending horizontally outwardly and terminating in down-turned lips, said lips being spaced from the corresopnding lips of the adjacent forms, and plates resting on the horizontal outward extensions of the lower edges of the last mentioned sides and bridging the gaps between each pair of adjacent forms.

In testimony whereof, I have hereunto subscribed my name this 31st day of December, 1917.

NILS FREDERICK AMBURSEN.