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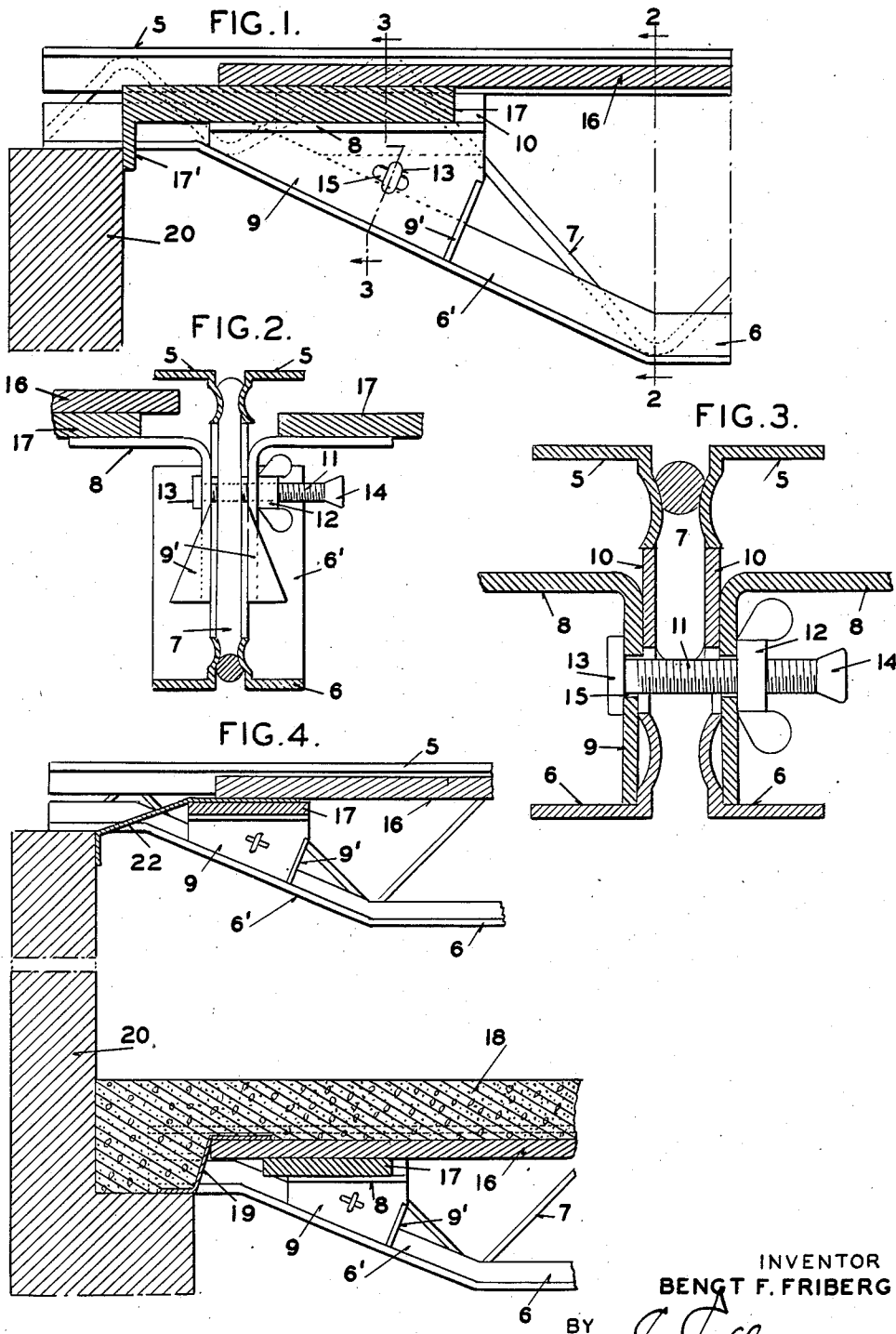
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MEANS FOR FORMING CONCRETE FLOORS

Filed March 14, 1940

2 Sheets-Sheet 1



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FIG. 5

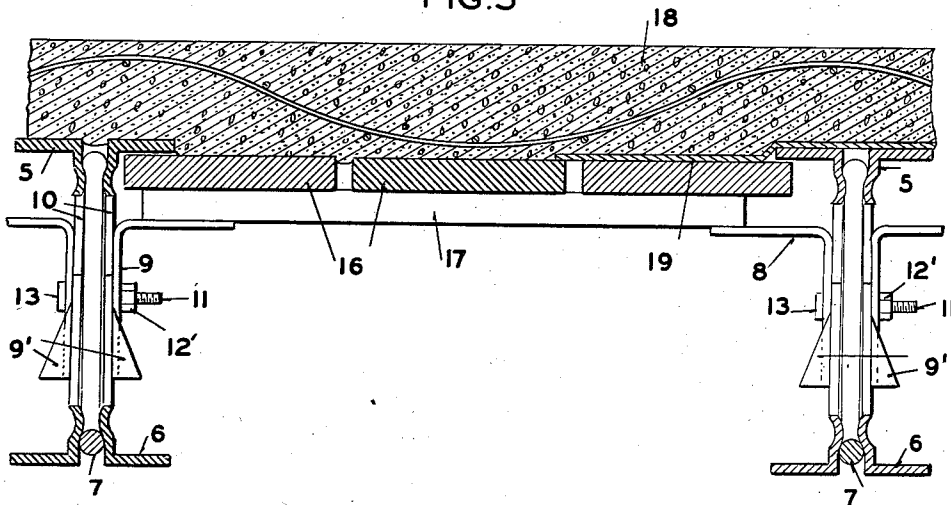


FIG. 6.

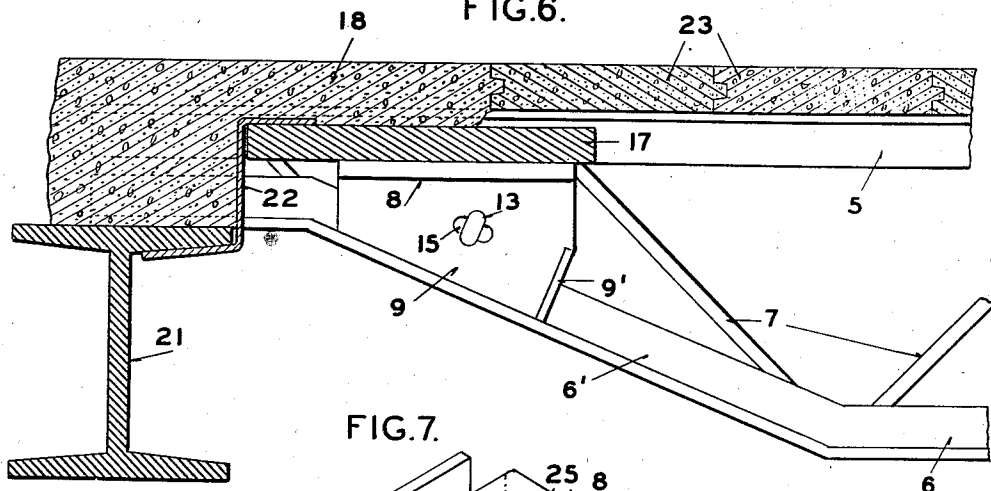
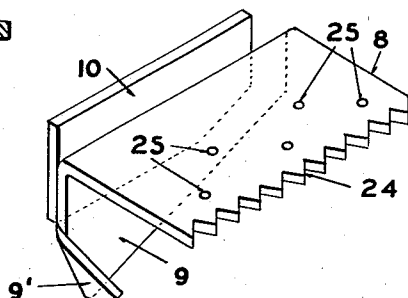


FIG. 7.



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SUPPORTING MEANS FOR FORMING
CONCRETE FLOORS

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12 Claims. (Cl. 25—131.5)

My invention relates to means for forming floors of the type which consist of a slab of concrete supported on the top chords of steel joists. In constructing floors of this type it is necessary to provide means between the joists to support the slab while it is being poured. My invention is specifically adapted for use in connection with a system in which form boards are employed for this purpose.

One object of my invention is to provide improved means for forming the concrete top slabs over joists, such means employing lumber in commercial sizes for the "forms" and including supporting means for the forms which are easily applied to the joists and removable therefrom together with the forms for reuse.

Another object of my invention is to so construct and correlate the parts as to permit adjustment in spacing the joists within wide limits as well as adjustment to varying spans. This permits the use of form boards of one length for different lengths of spans within the limits customarily encountered and results in a form system which gives firm support to the concrete, is easily applied to and removed from the joists, and prevents waste of material.

In the accompanying drawings, which illustrate one embodiment of my invention Figure 1 is a side elevation; Figure 2 is a section taken on the line 2—2 of Figure 1; Figure 3 is an enlarged section taken on the line 3—3 of Figure 1; Figure 4 is a semi-diagrammatic longitudinal section showing the method of employing the support; Figure 5 is a semi-diagrammatic transverse section; Figure 6 is a longitudinal section showing the use of pre-formed slabs; and Figure 7 is a perspective view of one of the angle plate supports.

The joists supporting the floor slab each comprises a top chord formed of two angle bars 5, a bottom chord formed of two angle bars 6 and a web formed by a bar 7 bent in zigzag form and having its bends welded between the angle bars forming the chords to provide diagonal struts. The bottom chord of the joist is provided with an inclined portion 6' adjacent each end to reduce the depth of the end and so form a seat portion to rest upon a wall ledge or other rest.

The removable support comprises a pair of angle plates each comprising a horizontal wing 8 and a vertical wing 9. The lower edge of wing 9 is inclined at the same angle as the part 6' of the bottom chord and seats against the horizontal flange thereof as shown in Figures 1 and 3. A corner of the vertical plate of the angle

plate is bent over at an angle of 90 degrees to provide a toe 9' for hammering the support into and out of place conveniently. A filler plate 10 is either formed integral with the angle plate or welded thereto to form a unitary part thereof. The upper edge of the plate abuts the lower edge of the vertical flange of the angle bar 5 of the top chord. Holding the two angle plates in position against opposite sides of the joist is a bolt 11 engaged by a nut 12. The nut may be a wing nut as shown in Figures 2 and 3 or a hexagonal nut as shown in Figure 5. The nut may be replaced by an equivalent clamping or wedging device to hold the angle plate against the side of the joist. Formed on the inner end of the bolt is a T-head 13 and the outer end may be provided with a flattened part 14. If the flattened part 14 is employed, either the head or the flattened portion is formed after the bolt has been inserted through one of the angle plates and the nut threaded on the bolt. In this way the bolt and nut are permanently secured to one of the angle plates and cannot become lost. The other angle plate of the pair is provided with a slot 15 for the passage of the T-head 13. In applying the support to the joist the pair of angle plates are positioned at opposite sides thereof with the upper edges of the fillers 10 in contact with the lower edges of the vertical flanges of the top chord and the lower edges of wings 9 in contact with the horizontal flanges of the bottom chord. The T-head is now inserted through the slot 15 and turned at right angles thereto. On tightening the nut, the support is clamped firmly in place, the wings 9 contacting the vertical flanges of the bottom chord and the fillers 10 contacting web 7.

The parts are so proportioned that the distance between the wings 8 and the horizontal flanges of the top chord is equal to or slightly greater than the combined thickness of form chords 16 and a transverse board or cleat 17 upon which the ends of the form boards rest. The concrete slab 18, a portion of which is shown in Figures 4 and 5, is poured upon the top chords 5 and the form boards 16. Building paper 19 may be interposed between the slab and its support, as shown in Figure 5, to prevent entrance of the concrete into crevices such as spaces between the form boards and between the angle bars of the top chord. At the ends of the joists where they are supported by a wall 20 (Figures 1 and 4) or a beam 21 (Fig. 6), the spreader or cleat may be extended into abutting relation with the support so that the cleats themselves provide any

adjustment necessary for variation in span length. In such case the spreader may be provided with a downwardly extending lip 17' (Fig. 1). This variation may also be provided by a bent steel apron 22 extending to the support. Some forms of such aprons are shown in Figures 4 and 6.

In Figure 4 I have shown how form boards of the same length may be utilized in successive floors of a building in which the length of span varies due to the offset in the wall 20. It will be understood that the space between the edge of the spreader or the ends of the form boards and the wall may be bridged by building paper which I have found may be procured of sufficient stiffness to support the poured concrete for a distance of from eight to ten inches or by the apron or extended cleat.

Figure 5 shows how my construction may accommodate different lengths of spreaders and varying widths of form boards. It will be evident that the wings 8 extending a considerable distance beyond the horizontal flanges of the top chord will permit the use of spreaders of varying lengths. Further, as the form boards may extend under the horizontal flanges of the top chord a greater or lesser distance, boards of appreciably varying width may be employed.

The wings 8 extending a distance beyond the horizontal flanges of the top chord angles will permit the use of spreaders of constant lengths with joists of considerable variation in spacing. The fillers 10 of the angle plates fit against the lower edges of the vertical flanges of the top chord angles, in order to permit easy removal of the supports upon construction of the top slab. If these fillers 10 extended on the side of the vertical legs of the top chord angles they may get pinched between form boards and the steel joists, as the form boards swell due to water absorption under the wet concrete. The supports would then be very difficult to remove without undue delay, which difficulty is eliminated by spacing the supports vertically to the under edge of the top chord angles.

In construction the two angle plates are first applied to the sides of the joists and tightened in place firmly. The vertical fillers 10 space the supports automatically for the required thickness of the wood cleats and form boards supported by them. The wood cleats may be cut to approximate length fitting between the joists and dropped in place. The outside edge of wings 8 may be serrated, as shown at 24 in Figure 7, to permit nailing of this wood cleat so that it cannot shift lengthwise or sideways, or nail holes 25 may be employed for this purpose. The form boards 16 are thereafter placed in the same direction as the joists on top of the wood cleats, and are supported by the cleats. The double arrangement of wood supports permits a considerable variation in length of form boards for different spans. The form boards extend underneath the horizontal flanges of the top chord angles, permitting variation in spacing, and by the use of different combinations of standard wood sizes, any joist spacing may be accommodated. If necessary, a stiff building paper is laid in between the form boards and the joist supports, or between the wood cleats and the joist supports, and the concrete is deposited in a continuous mass over these forms and over the joists. After the concrete has set, the nut 12 is loosened, and the angle plates hammered out of position, after which the wood cleat 17 is dropped and the form boards

16 removed directly. All materials may thereafter be reused without waste as the forms and all connections are made with the least amount of labor for nailing and assembly.

As the form boards extend under the horizontal flanges of the top chord angles, the joists top chord will be effectively stiffened sidewise by the concrete top slab after it is in place. The bond between a steel top chord and the concrete on top will be most effective, as the concrete is deposited directly on the steel and the steel surface may be left unpainted for a most satisfactory bonding between the steel and concrete. As the concrete under side after removal of the forms duplicates the smooth upper surface of the form board and extends flush with the lower face of the horizontal flanges of the top chord, a lower floor surface of pleasing appearance is obtained.

While I have illustrated my invention as used in connection with steel open web joists, it may be used with other forms of joists such as concrete or solid web steel joists as the hold of bolt 13 is sufficient to support the forms by friction against the sides of the joists.

In Figures 4 and 6 I have shown my system used in connection with a concrete top slab poured in place but it may be used in connection with pre-cast top slab members 23, as shown in Figure 6. In this case the supports 8 and wood spreader 17 serve to bridge a distance of varying dimensions between the pre-cast top slab and the support, the concrete 18 directly over the support being poured in the field.

Having fully described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:

1. Means for forming concrete floors in structures including joists anchored at their ends, said means comprising spaced apart supports carried by said joists a short distance from their ends, said supports being detachable from the joists without disturbing the anchorage of the latter, and cleats carried on the supports to provide adjustable forms at the ends of the joists.

2. Means for forming concrete floors in structures including joists anchored at their ends, said means comprising spaced apart supports carried by said joists a short distance from their ends, said supports being detachable from the joists without disturbing the anchorage of the latter, cleats carried by the supports, and form boards carried on the cleats, said cleats providing adjustable means for varying the length of the form boards.

3. Means for forming concrete floors in structures including joists comprising top and bottom chords, said means comprising spaced apart supports carried by said joists, said supports being detachably carried on the bottom chords and having lateral ledges positioned below the top chords, and cleats carried by the ledges of the supports to provide adjustable forms at the ends of the joists.

4. Means for forming concrete floors in structures including joists comprising top and bottom chords, said means comprising spaced apart supports carried by said joists, said supports being detachably carried on the bottom chords and having lateral ledges positioned below the top chords, cleats carried by the ledges of the support, and form boards supported on the cleats.

5. Means for forming concrete floors in structures including joists comprising top and bottom chords formed of angle bars, said means comprising spaced apart supports carried by the

joists, said supports being detachably carried by the bottom chords and positioned against the vertical edges of the top chords, and cleats carried by the supports to provide adjustable forms at the ends of the joists.

6. Means for forming concrete floors in structures including joists comprising top and bottom chords formed of angle bars, said means comprising spaced apart supports carried by the joists, said supports being detachably carried by the bottom chords and positioned against the vertical edges of the top chords, cleats carried by the supports, and form boards supported on the cleats.

7. Means for forming concrete floors in structures including a joist comprising top and bottom chords, the bottom chord having an inclined portion adjacent its end, said means comprising a support engaging the inclined portion of the bottom chord and abutting the top chord, a horizontal wing carried by the support a substantial distance below the top chord, means for clamping the support against the side of the joists, and a cleat carried on the wing to provide a form at the end of the joist.

8. Means for forming concrete floors in structures including a joist comprising top and bottom chords, the bottom chord having an inclined portion adjacent its end, said means comprising a support engaging the inclined portion of the bottom chord and abutting the top chord, a driving toe for wedging the support between the chords or removing the same, a horizontal wing carried by the support a substantial distance below the top chord, and means for clamping the support against the side of the joist.

9. Means for forming concrete floors in structures including a joist comprising top and bottom chords and a web, said means comprising

a pair of angle plates positioned one at each side of the joist, a clamping bolt for the plates extending through the web, a nut on said bolt, horizontal wings carried by the angle plates a substantial distance below the top chord, and means carried by said wings to provide pouring forms.

10. Means for forming concrete floors in structures including a joist comprising top and bottom chords each formed of a pair of angle bars and a web extending between the chords, said means comprising a pair of angle plates arranged one at each side of the joist, each of said angle plates engaging with an angle bar of the bottom chord, a filler plate carried by each angle plate and forming an offset engaging the lower edge of a vertical flange of an angle bar of the top chord, clamping means for the angle plates extending through the web, and means carried by the horizontal wings of the angle plates to provide pouring forms.

11. Means for forming concrete floors in structures said means including joists comprising top and bottom chords, each bottom chord having an inclined portion adjacent its end, said means comprising a support engaging said inclined portion, means for clamping the support against the side of the joist, a form carried by the support, and a downwardly extending lip on the form providing concrete retaining means.

12. Means for forming concrete floors in structures including joists, said means comprising spaced apart supports carried by the joists, said supports being provided with horizontal wings, the wings being provided with recesses, cleats carried by the supports, and means engaging the cleats and the recesses in the wings to prevent shifting of the cleats.

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