Oct. 18, 1932. H. L. WELLS 1,883,192

CONCRETE FLOOR CONSTRUCTION

Filed Nov. 19, 1929 2 Sheets-Sheet 1

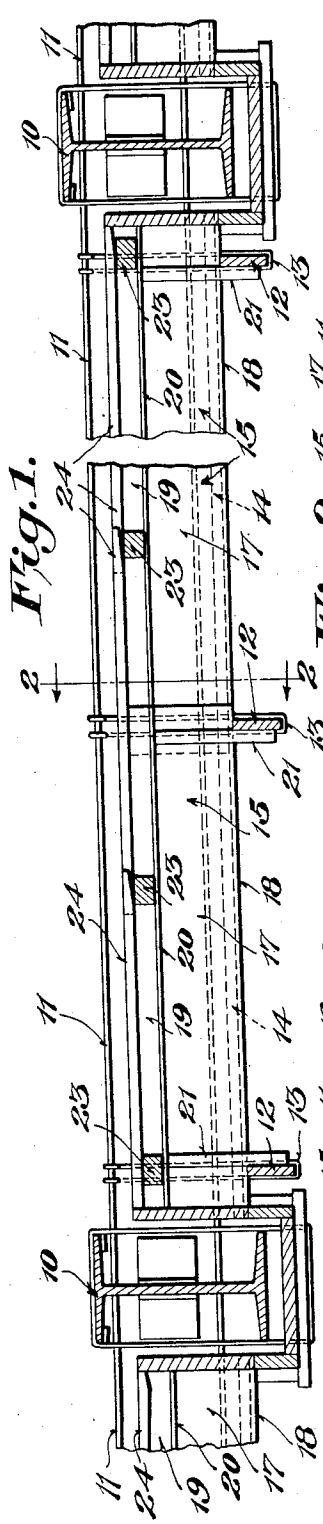


Fig. 1.

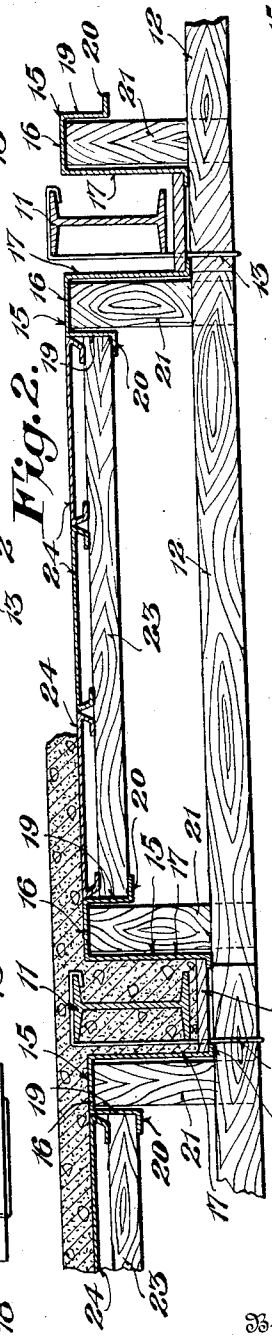


Fig. 2.

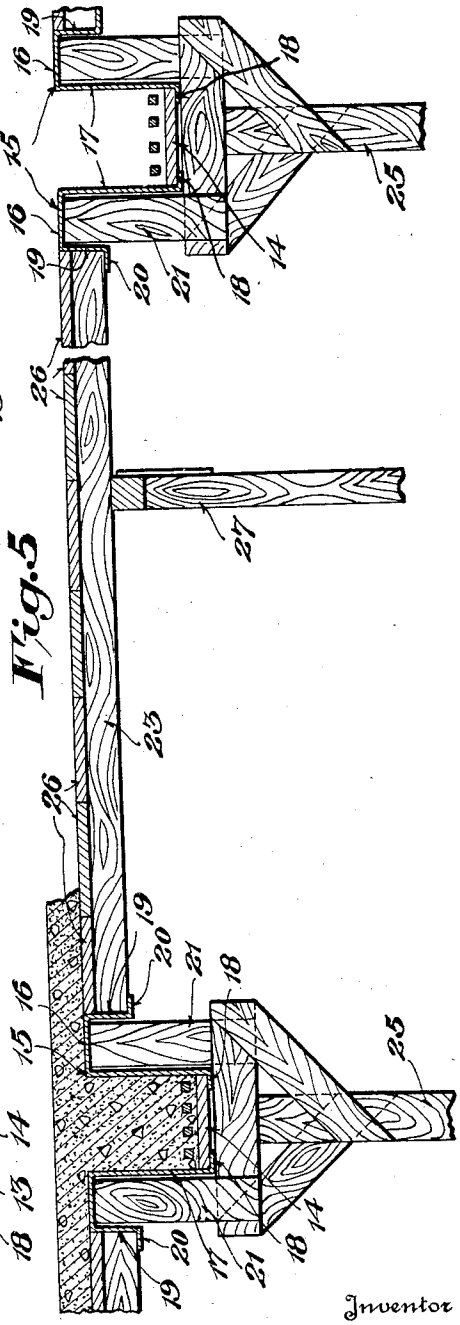


Fig. 5

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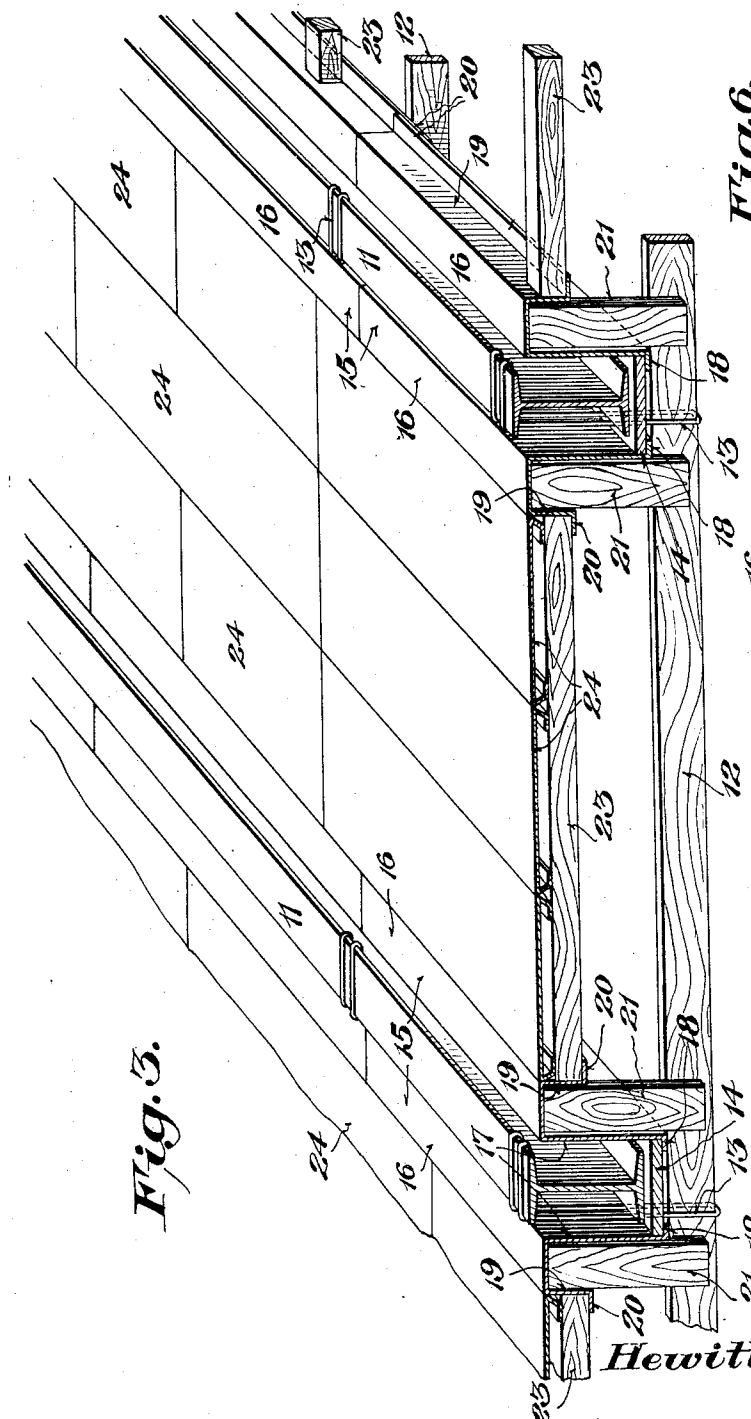


Fig. 5.

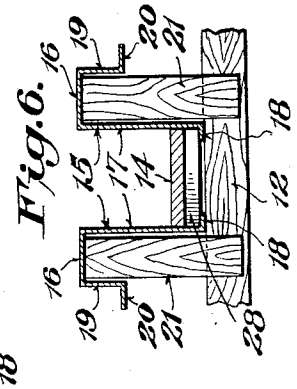


Fig. 6.

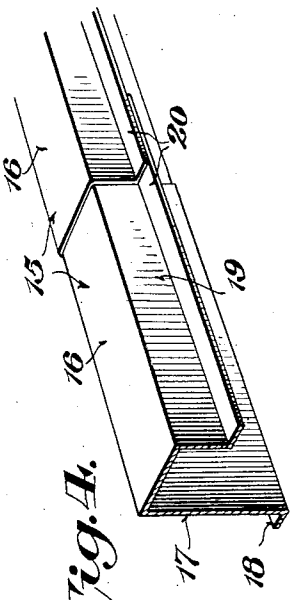


Fig. 4.

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UNITED STATES PATENT OFFICE

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CONCRETE FLOOR CONSTRUCTION

Application filed November 19, 1929. Serial No. 408,342.

This invention relates to an improvement in concrete floor construction, and particularly to the method of erecting and removing the temporary forms.

There are many systems of floor construction on the market which meet the requirements more or less satisfactorily. The most commonly used system of concrete floor construction, consists in a framework of structural steel members, fire proofed with concrete and short-span solid concrete slabs supported by the beams. In a typical layout of this floor system, the beams frame into girders at the third point and the girders in turn are carried by the supporting columns. This system has been extensively used primarily on account of its low cost and light dead-weight.

In the construction of floors of this character it is the custom to use forms made of wood to cast the concrete slabs and beams. These wood forms are one of the largest items of expense due to the waste of the material when removed after the setting of the concrete. A considerable proportion of the lumber is unsuitable for reuse in constructing further form work for remaining floors or in the erection of floors in other buildings. Furthermore, there is the great expense entailed in the employment of labor in the erection of these wood forms. The salvage value of wood forms has been found to be very low even when the form sections are carefully removed. When stripped from hardened concrete the pieces bind and are partly damaged, distorted and full of nails, therefore the expense in sorting and preparing the lumber for further use in erecting forms is almost as great as the cost of new material.

An object of the present invention is to overcome these objections and to provide means for the erection of floors more economically by providing beam forms of steel arranged on opposite sides of the structural steel beams supported beneath by false work such as stringers or T-heads. Arranged between the adjacent steel beam forms and supported thereby are wood joists suitably spaced apart, and supported on these wood joists are flat steel forms or wood sheathing which lie in the same plane with the tops or upper surfaces of the steel beam forms, and upon which the concrete is poured. In pouring the concrete upon these flat forms or sheathing and between the steel beam forms located on opposite sides of structural steel beams, the steel frame is embedded and thoroughly encased in the concrete including the bottom flanges, and therefore adequately fire proofed.

Another object of this invention is to employ these structural beam forms in connection with the flat steel forms or wooden sheathing in the construction of reinforced concrete floors and beams. In this form of construction the beam forms are supported on T-heads 25 of temporary shores or props instead of suspending the form work from the structural steel beams which in this instance would be omitted.

The steel beam forms are made extensible by permitting of an overlap between the adjacent or adjoining ends so that they can be adjusted with respect to the length of the span between the girders. These steel forms by arranging them adjacent to the vertical sides of the steel beams eliminates much of the usual fabrication and framing customary with wooden form work. After the concrete has set, the stringer or T-heads 25, whichever may be employed, can be released and the steel forms removed as well as the flat steel forms or sheathing and may be again reassembled on upper floors. Forms manufactured of steel sheets can be used over a long period of time. The maintenance cost is low and their use greatly lessens the cost and eliminates the waste so prevalent with wooden form work.

The invention consists of certain other novel features of construction and combination of parts which will be hereafter described and pointed out in the claims.

In the accompanying drawings:

Figure 1 is a vertical longitudinal sectional view through a typical floor slab showing the supporting girders;

Figure 2 is a vertical cross-sectional view on the line 2—2 of Figure 1;

Figure 3 is a detail perspective view in

cross-section of the invention as illustrated in Figures 1 and 2;

Figure 4 is a detail perspective view of the metal beam forms arranged in overlapped relation;

Figure 5 is a transverse vertical sectional view similar to Figure 2 of a slightly modified arrangement; and

Figure 6 is a detail sectional view showing filler blocks supported by the beam forms for elevating the soffit boards.

Referring to Fig. 1, the girders 10, 10 support and have framed thereinto the spaced apart structural steel beams 11, 11 which are riveted thereto.

The procedure in the method of construction consists first in the erection of the structural steel frame, Figs. 1, 2 and 3. From the steel beams 11 are suspended wood stringers 12, 12 from hangers 13, 13. These stringers 12 are suspended a distance below the bottom flange of the steel beams 11 to allow the placing of the soffit boards 14, 14 in spaced relation with respect to the bottom flanges of the steel beams.

Arranged along both sides of each of the steel beams 11 are the steel beam forms 15, 15. These steel beam forms 15 are constructed somewhat in the shape of an inverted U or channel, one side 17 of which has an outwardly turned flange 18 at its base which projects beneath the soffit board 14 and is supported on the stringer 12 while the opposite side 19 is of less depth and extends a fixed distance from the top or upper portion 16 of the form. It is provided with an outwardly turned flange 20. The sides 17 with their flanges 18 of the two beam forms 15 are arranged on opposite sides of the steel beams 11 and form a support for the outer longitudinal edges of the soffit board 14.

The beam forms are held in upright position upon the stringers 12 by means of bucks 21, 21 which are short wooden blocks secured to the stringers 12 by nails or other suitable fastening. The upper ends of these bucks 21 are in contact with the underside of the horizontal surface 16 of the steel beam forms 15 and transfer the load of the slab directly to the stringers 12 which in turn are hung or supported by the wire hangers 13 carried by the steel beams 11.

Interposed between the spaced apart steel beams 11 and forms 15 are wooden joists 23 which are supported on the flanges 20 of the sides 19 of the steel forms 15. These joists 23 are spaced at suitable distance apart along the beam form flanges 20 and are of a size suitable for supporting thereupon, as illustrated in Figs. 2 and 3, the flat metal forms 24, 24 or wood deck forms 26 Fig. 5. These flat metal forms 24 are arranged with respect to each other upon the wood joists 23 to fill the space intervening between the adjacent beam forms 15.

Reference is made to Patents Nos. 1,445,374, issued February 15, 1923 and 1,533,960, issued April 14, 1925, covering the design of steel forms 24, used to cast the concrete floor slabs, as illustrated in Fig. 3.

It is to be noted as indicated in Figs. 2 and 5 that the depth of the sides 19 is sufficient to receive these wood joists so that the top surfaces of the metal forms 24 or wood sheathing 26 will be in the same plane with the upper surface of the beam forms 15.

These steel beam forms 15 are illustrated as being approximately of a height equal to the height of the steel beams 11 herein disclosed. However, the side 17 extends below the flanges of the steel beams 11, the purpose being to form a support with a flange 18 for a soffit board 14. The height of the beam forms 15 varies to suit the depth of the beam stem. To eliminate the necessity of employing a number of various depths of steel beam forms required for construction work of this character for the various sizes of steel beams, the steel beam forms of the depth shown may be utilized, as the side 17 can be made to suit a group of various lesser depth beams by filling in between the soffit board 24 and the flange 18 of the sides 17 with blocks 28. The blocks so interposed between the flanges 18 of the adjacent forms 15 and soffit boards 24 support and elevate the latter in its correct position in relation to the bottom flange of the beam 11.

These beam forms 15 may be constructed of lightweight steel sheets which may be easily handled, arranged and supported along the sides of the beams. They are capable of adjustment with respect to each other, and can be assembled in numbers to suit any length of span. The short side 19 affords with its flange 20 the necessary support for the wood joists and the flat metal forms or sheathing which is employed to form the slab in the space intervening between the beams.

It is to be understood as illustrated in Fig. 4, that these beam forms 15 are so manufactured that they may overlap. One end of each form being of a slightly smaller width than the opposite end to permit the forms to overlap whereby a series may be arranged with respect to each other to extend the full length of the steel beams. This overlapping feature is also possible with flat forms 24 so that they may be set upon the wood joists 23 and arranged thereon to suit any length required. The steel beam forms 15 may be made in various standard lengths so that with the assembling of several of these forms they can be adapted to the length or space between the supporting girders 10.

In Fig. 5, the steel forms 15 are arranged in the same spaced relation, as illustrated in Figs. 2 and 3 with respect to the joists 11; but in this arrangement the steel beam forms, and framework are positioned for the pour-

ing of reenforced concrete beams and floor slabs. The steel forms 15 are supported by T-heads 25, instead of the stringers 12, and the bucks 21 are attached to the T-heads 25 for affording the necessary support for the beam forms. Mounted upon the wood joists 23 is sheathing 26, 26 instead of the metal forms 24, thus illustrating that wooden sheathing may also be employed between the beams to form the slab. As is illustrated in this figure, the distance between the beams may be greater than that illustrated in Figs. 2 and 3 for structural steel framing. When this distance is of considerable length additional supports such as 27 may be used to give the necessary rigidity to the wood joists 23 and the flat metal forms 24 or wooden sheathing 26 that may be employed in the construction of the floors.

After the concrete has set a sufficient length of time, and it is desired to remove the forms and supporting false work for reuse on other floors or in other buildings the wire hangers are cut or the T-heads taken from under the concrete beams which releases the balance of the form work. In the removal of these steel form units and supporting false work from the formed concrete construction there is little damage or loss of material such as in wood form construction.

It is believed to be perfectly evident from the foregoing that with this system applied both to structural steel frame and reenforced concrete construction the form work can be erected and removed more readily, with less waste and less material than under the present method of construction in general use, and with a great saving in labor and material.

Having described my invention what I claim as new and desire to secure by Letters Patent is:

1. Means for forming a concrete floor, comprising a metal form constructed from a metal plate by bending to form a top and sides bent downwardly from the top, the sides being of different depths, one side forming the wall of a mold, and the side of lesser depth being bent at its lower edge to form a seat to support a system of slab forms, a supporting means interposed between the sides of the metal form and engaging the top thereof for maintaining the metal form in position.

2. Means for forming a concrete floor, comprising a metal form constructed from a metal plate by bending to form a top and sides extending downwardly from the top, one side forming the wall of a mold, and the other side provided with a seat to support a system of slab forms, a supporting means interposed between the sides of the metal form and engaging the top thereof for maintaining the metal form in position.

HEWITT L. WELLS.