March 26, 1935. F. SCHLAGINTWEIT 1,995,585

REENFORCED CONCRETE CONSTRUCTION

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Fig. 4.

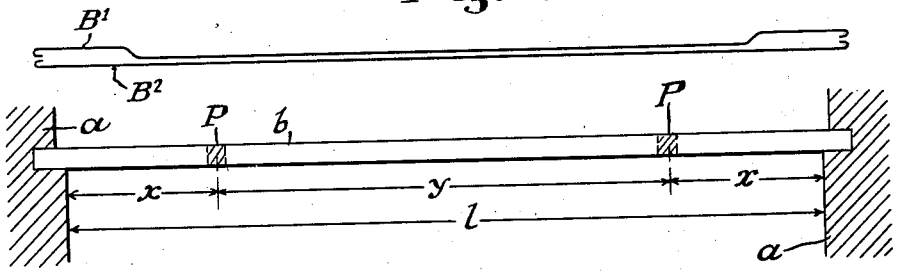


Fig. 1.

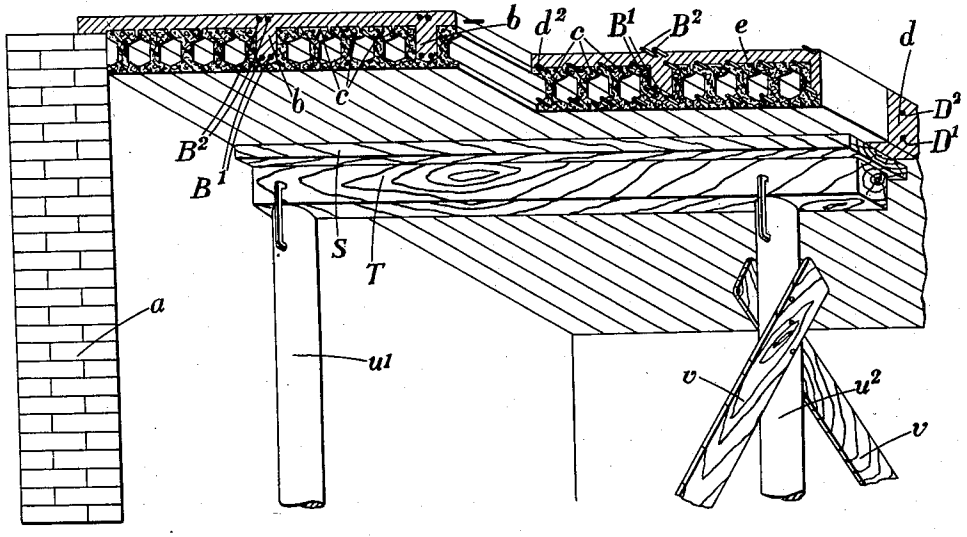
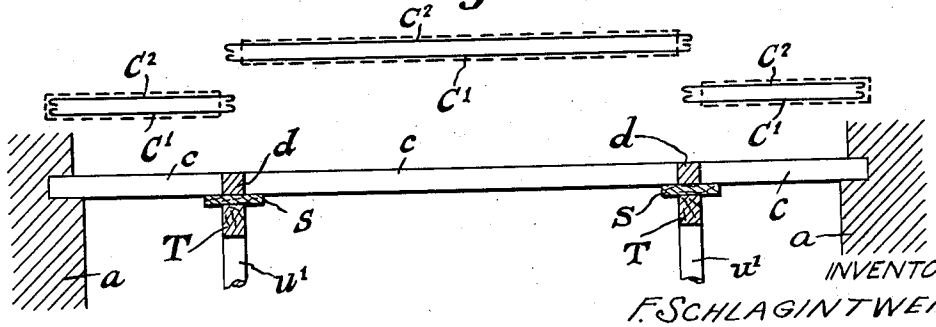


Fig. 5.



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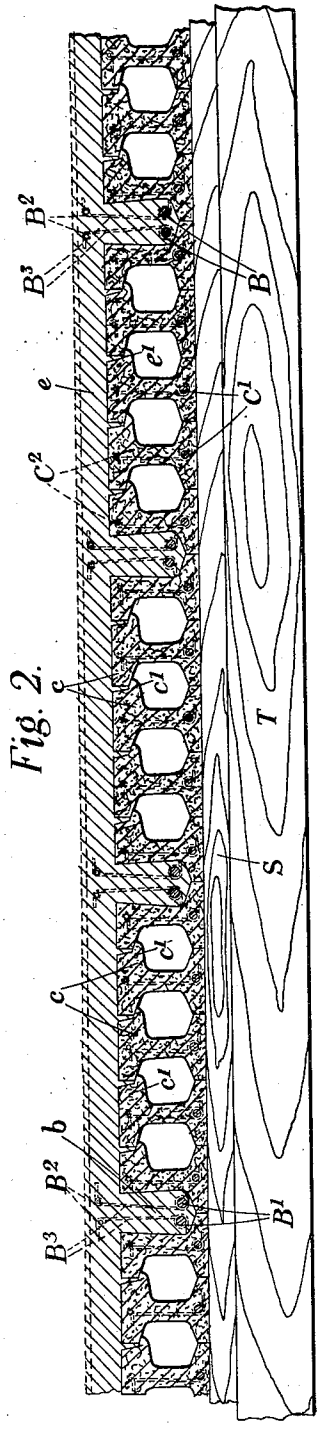


Fig. 2.

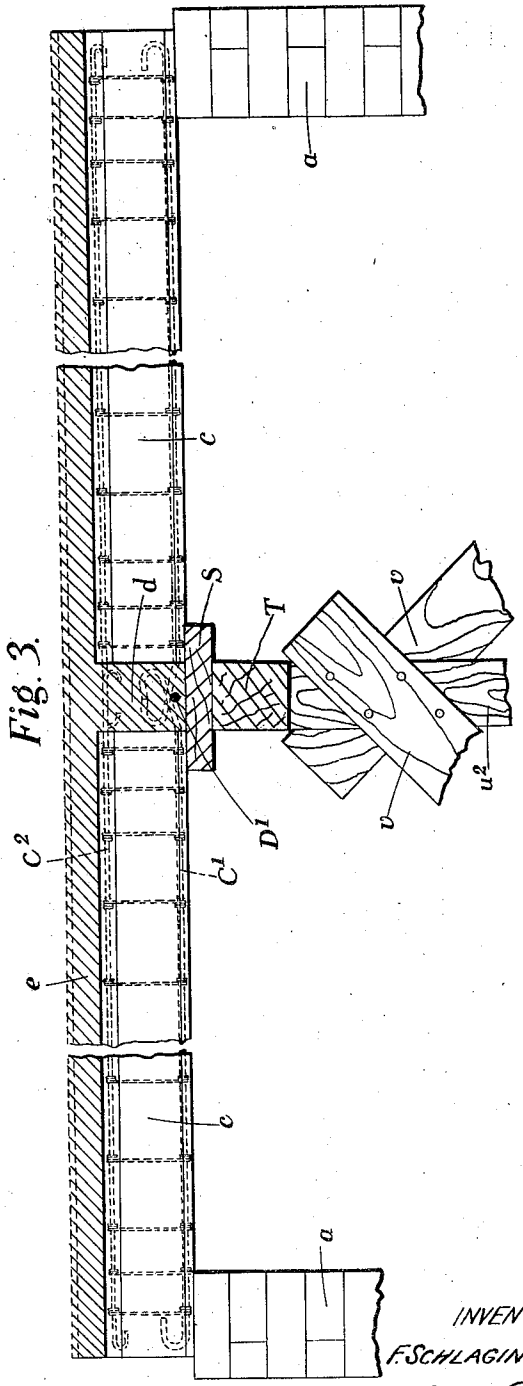


Fig. 3.

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Patented Mar. 26, 1935

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UNITED STATES PATENT OFFICE

1,995,585

REENFORCED CONCRETE CONSTRUCTION

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Application May 10, 1932, Serial No. 610,429
In Great Britain July 7, 1931

7 Claims. (Cl. 72—66)

The invention relates to reenforced concrete floors or similar horizontal slab structures of the type in which a series of main reenforced concrete beams are cast above and/or between filling members which themselves may be beams; to save confusion the latter beams will hereinafter be referred to as filling joists.

The object of the invention is to provide a construction of this type which, particularly when the span is large, is considerably simplified and the cost substantially reduced, while as compared with the known types of construction, the dimensions and weight, with the same load capacity, are reduced.

In the construction according to the invention filling joists between the main beams are constituted by pre-cast reinforced concrete joists placed parallel to them and supported by means of transverse or secondary beams interconnecting the main beams. By this means the load on the panels which are formed by the filling joists is not transmitted directly to the main beams, but indirectly by the transverse secondary beams. With the use of transverse beams, arranged near the ends of the main beams supported by the wall, a reduced bending moment is set up in the main beams.

An exceptionally simple construction and placing of the transverse beams is rendered possible according to the invention by the fact that each transverse beam is moulded between the front ends of the girders serving as fillings which are to be supported, while the ends of the reenforcements of these girders project into the space serving for the accommodation of the transverse beams. The joists serving as fillings accordingly come in contact at their front ends with the sides of the transverse joist and are rigidly connected with the latter.

In a further development of the invention the filling joists are so formed that they support one another laterally throughout their length and that the joist adjacent the main joists serve simultaneously as falsework for the main joists. Especially suitable as fillings are pre-cast reenforced concrete joists of I cross-section, the flanges of which are provided with rib-shaped projections serving for reciprocal support.

The construction of a floor assembled according to this new system can be carried out considerably more quickly and more simply than hitherto. The preferred method of construction is such that the joists serving as fillings between the main joists are, during the construction of the transverse beams, supported by their ends on the temporary scaffolding for the transverse beams. Apart from this temporary scaffolding which forms the lower mould for the transverse beams, no other falsework whatsoever is required in the construction of a floor.

In the accompanying drawings which illustrate the invention,

Fig. 1 represents a diagrammatic view from below, and a cross-section parallel to one of the transverse beams, of the floor and the scaffolding and falsework parts required for one construction according to the invention.

Fig. 2 is a cross-section, on a larger scale, of the floor parallel to the transverse joist, the falsework for the transverse joist being shown in side elevation.

Fig. 3 shows a cross-section of the floor and of the falsework scaffolding, parallel to the main beams.

Fig. 4 is a diagrammatic view illustrating the manner in which the main beams span from support to support, the reenforcement for these beams being shown in the upper part of this figure.

Fig. 5 is a diagrammatic view showing the preferred arrangement of the filling joists and transverse beams in relation to the whole span, the separate filling joists and their reenforcement being shown in the upper part of the figure.

The floor illustrated consists of the longitudinal or main beams *b* cast in situ at certain distances apart and supported on the wall *a*, filling joists *c*, one transverse beam *d* and a continuous upper layer *e* of concrete or cement. The filling joists *c* consists of pre-cast reenforced concrete girders having a double-T-shaped cross-section, the lower symmetrical flanges of which lie close together, while the upper flanges are each provided with a rib-shaped projection c^1 on one side for purposes of reciprocal support. In the case of the filling joists *c* which bear against the main beams *b*, the flange half-sections which face each other are omitted, so that these joists form the falsework for the main beams *b*. B^1, B^2 and B^3 are the metal reenforcements for the main beams *b*. The tension and compression rods B^1, B^2 extend over the entire length of the main beams.

The sets of parallel filling joists *c* are arranged as shown in Figs. 1 and 3 parallel to the main beams *b*. These sets of filling joists *c* are arranged so that the space between the front sides facing each other is such as to enable the transverse beam *d* to be moulded between them. For the moulding of the transverse beams *d* all that is necessary is the lower falsework or centering S, which is carried by a scaffolding T, u^1, u^2, *v*.

On this falsework the ends of the girders *c* which face each other are supported. Simultaneously the main beams *b* are also moulded in the channel-shaped spaces between the adjacent joists *c*. After the main beams and the transverse beams, and where necessary the upper concrete layer *e*, have set, the falsework together with the accessory scaffolding is removed. No additional falsework or scaffolding is required for the construction of the floor.

The tension and compression reenforcing rods C^1, C^2 of the filling joists *c*, are extended beyond the front ends of these girders facing each other, and the ends of these rods are bent so that they can be anchored in the transverse beam *d* moulded between these front ends as shown in Fig. 3. D^1 and D^2 are the tensioning and compression reenforcing rods of the transverse beam *d*.

The joists *c* serving as fillings are supported at their outer ends on the wall *a*, as are also the main beams *b*.

Referring now to Figs. 4 and 5 of the drawings, the most economical arrangement is one in which the centre span *y* of the filling joists is considerably greater than the end spans *x*.

Suppose that *w* is the total load per foot length for a width of floor equal to the distance between successive main beams *b*.

The load reaction P transmitted as a "point" load to each main beam by the transverse beams will be

$$\frac{wx}{2}$$

from the end filling joists and

$$\frac{wy}{2}$$

from the centre filling joists i. e.

$$\frac{w}{2}(x+y)$$

and the maximum bending moment on the main beam will be Px.

If $x=\frac{1}{4}$ and $y=\frac{1}{2}$,

$$P=\frac{3wl}{8}$$

and the maximum bending moment on the main beam will be

$$\frac{3wl^2}{32},$$

whereas with the usual construction the maximum bending moment on the main beam will be

$$\frac{wl^2}{8}.$$

I claim:—

1. A reenforced concrete floor structure consisting of a series of reenforced concrete filling joists of I cross-section arranged parallel to each other, pairs of said joists at intervals having facing upper flanges absent, reenforcement placed in the spaces so formed and concrete cast in said spaces and above said filling joists.

2. A reenforced concrete floor structure consisting of a series of reenforced concrete filling joists of I cross-section arranged parallel to each other, with top flanges formed on one side with ledges on which rest the flanges of adjacent beams so preventing relative vertical movement between one filling joist and its neighbour, pairs of said joists at intervals having facing upper flanges absent, reenforcement placed in the spaces so formed and concrete cast in said spaces and above said filling joists.

3. A reenforced concrete floor structure comprising main reenforced concrete beams spanning from support, reenforced concrete filling joists of I-cross-section parallel to said main beams and constituting the formwork therefor, said filling joists being in three lengths across the whole span, spaces between the facing ends of said filling joists and two reenforced concrete transverse beams cast in said spaces interconnecting said main beams and transmitting thereto the load reaction from said filling joists.

4. A reenforced concrete floor structure comprising main reenforced concrete beams spanning from support, reenforced concrete filling joists of I-cross-section parallel to said main beams and constituting the formwork therefor, said filling joists being in short lengths, spaces between the facing ends of said filling joists, reenforcement projecting from the ends of said filling joists into said spaces and reenforced concrete transverse beams cast in said spaces interconnecting said main beams and transmitting thereto the load reactions from said filling joists.

5. A reenforced concrete floor structure comprising reenforced concrete filling joists of I cross section having the top flanges of facing joists absent at intervals, main reenforced concrete beams parallel to said filling joists and cast at intervals between pairs of said filling joists where said top flanges are absent, and transverse beams interconnecting said main beams and transmitting thereto the load reactions from said filling joists, said transverse beams being placed at distances apart greater than the distance of either of them from the main beam.

6. A reenforced concrete floor structure comprising reenforced concrete filling joists of I cross section having the top flanges of facing joists absent at intervals, main reenforced concrete beams parallel to said filling joists and cast at intervals between pairs of said filling joists where said top flanges are absent, and two transverse beams interconnecting with said main beams at approximately ¼ and ¾ span and transmitting thereto the load reactions from said filling joists.

7. A reenforced concrete floor structure comprising precast reenforced concrete filling joists of I cross-section with top flanges formed on one side with ledges on which rest the flanges of the adjacent beams so preventing relating vertical movement between one filling joist and its neighbor, said filling joists being formed at intervals with facing upper faces absent, main reenforced concrete beams parallel to said precast reenforced concrete filling joists of I cross-section and cast at intervals between said pairs of said precast reenforced concrete filling joists of I cross-section having facing upper flanges absent, and transverse beams interconnecting said main beams and transmitting thereto the load reactions from said precast reenforced concrete filling joists of I cross-section.

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