

F. CANCALON.
CONSTRUCTION OF ARMORED CONCRETE FLOORS AND CEILINGS.
APPLICATION FILED OCT. 14, 1912.

1,058,548.

Patented Apr. 8, 1913

5 SHEETS—SHEET 1.

FIG. 1

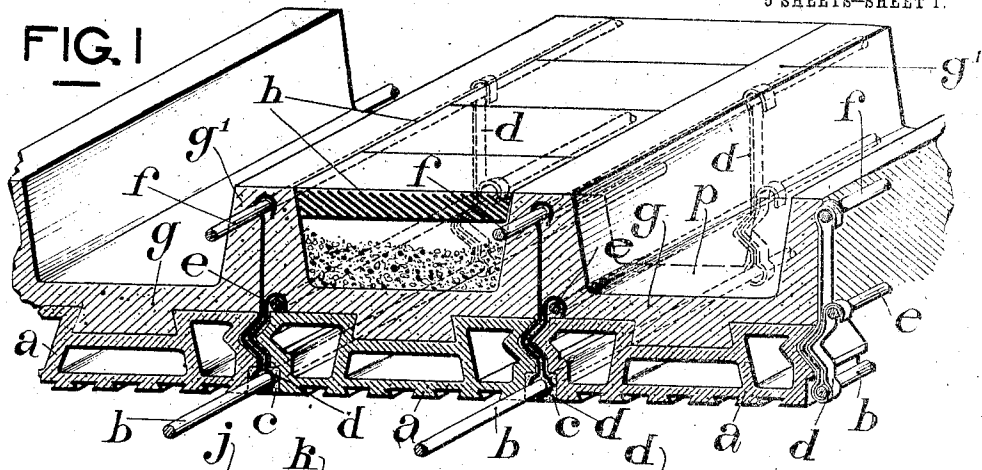


FIG. 2

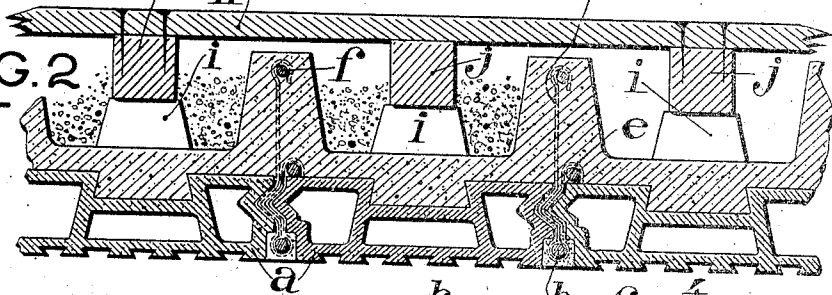


FIG. 3

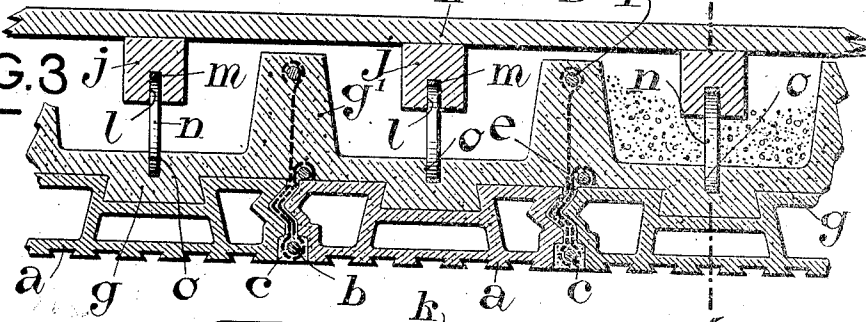
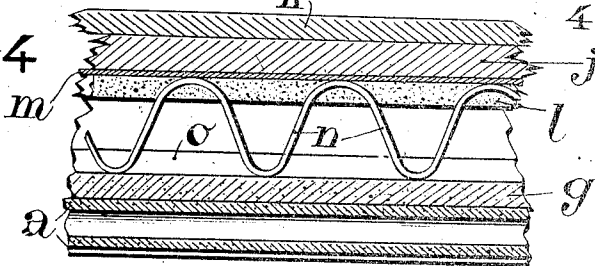


FIG. 4



Witnesses:

Louis Michon
Francois Monon

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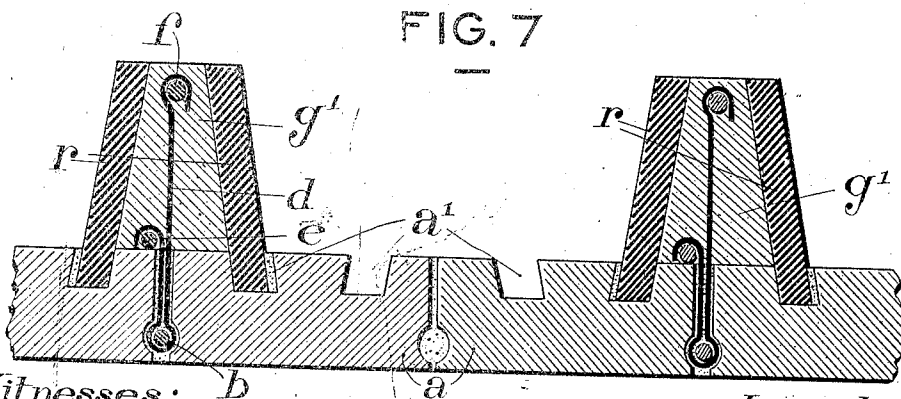
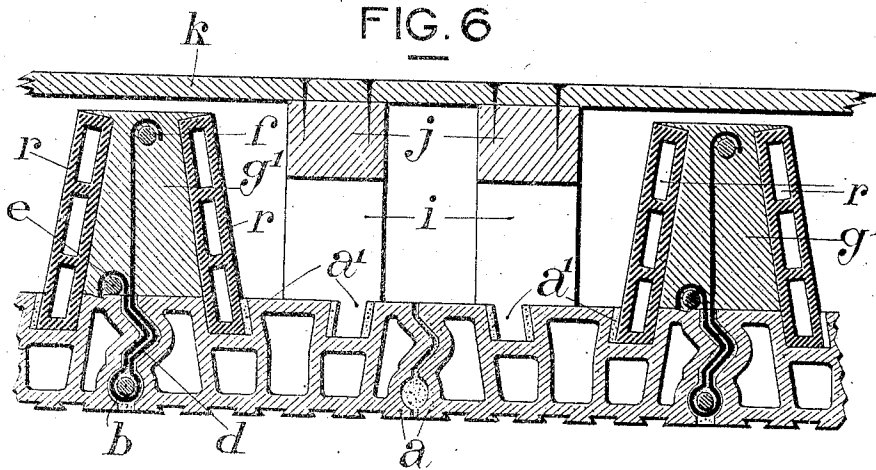
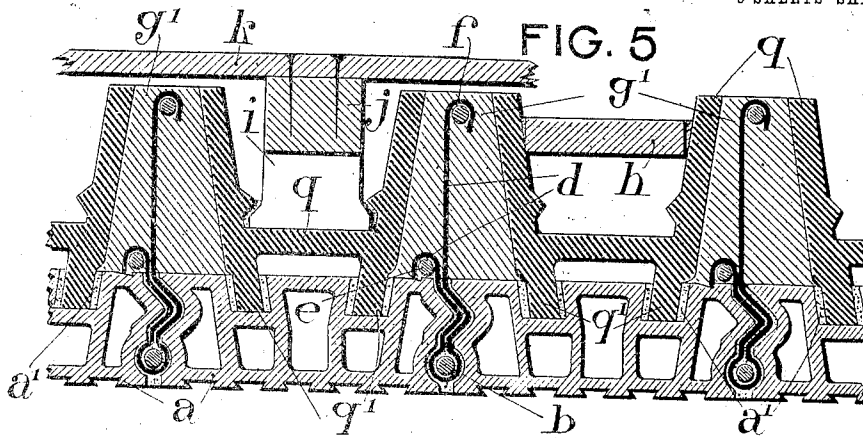
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Witnesses: b

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Francois Monod

Inventor:

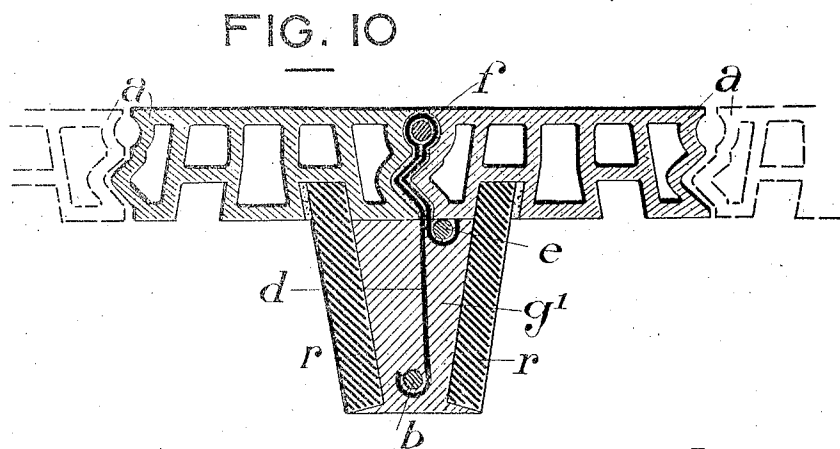
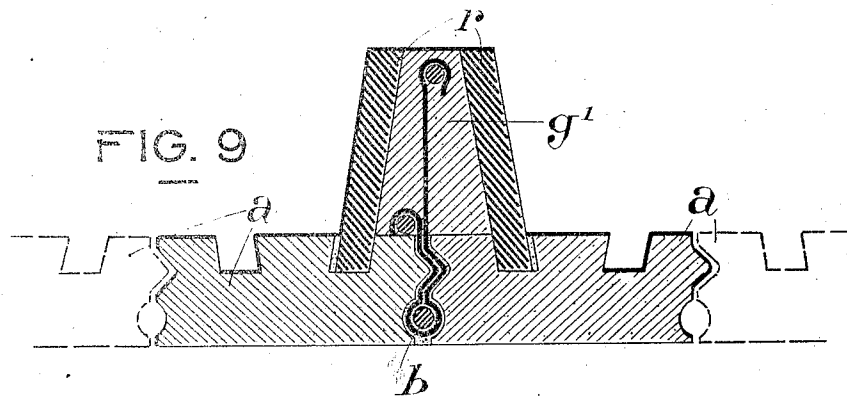
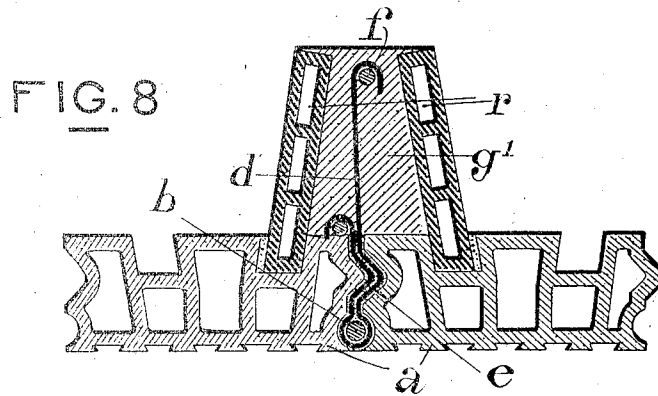
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Witnesses :

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François Monon

Inventor :

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FIG II

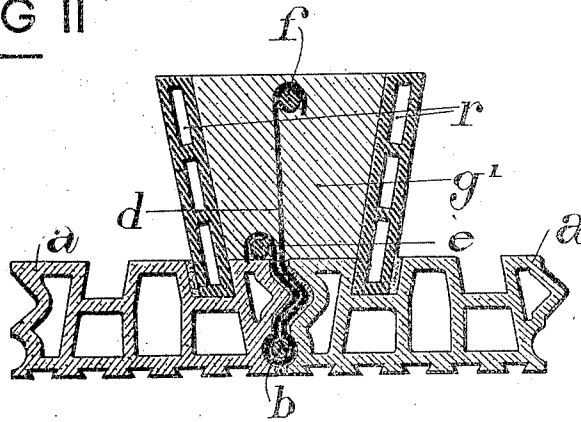


FIG. 12

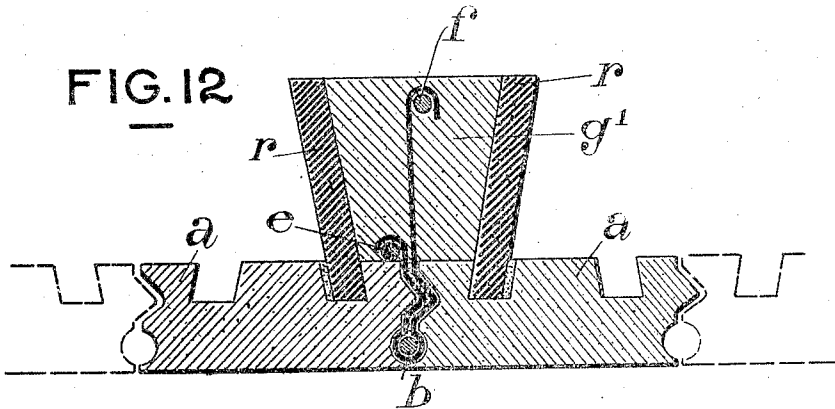
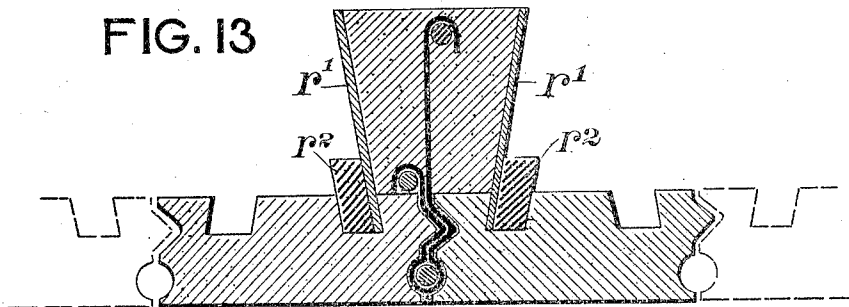


FIG. 13



Witnesses:

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Inventor:

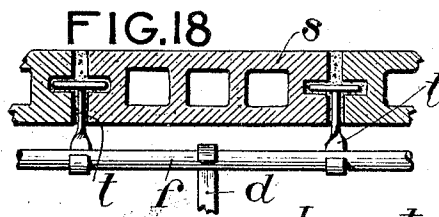
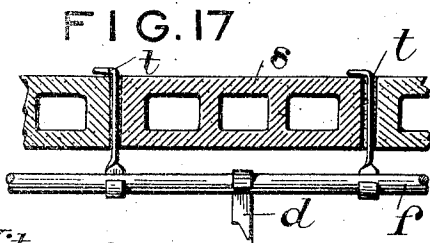
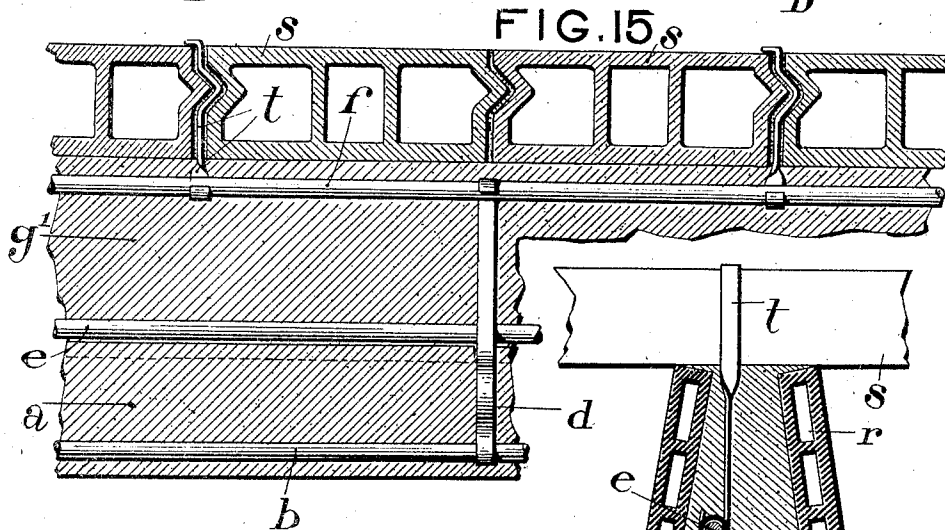
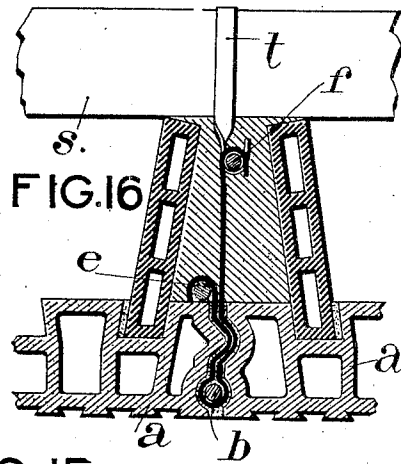
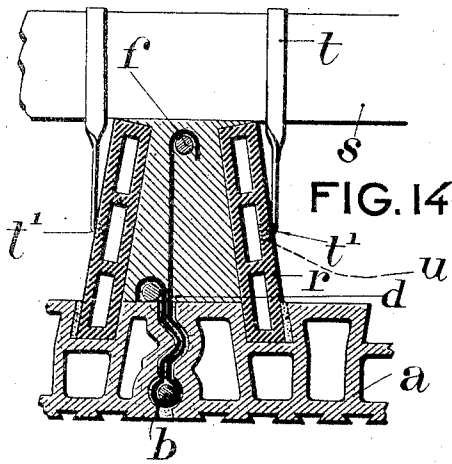
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5 SHEETS-SHEET 5.



Witnesses:

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Inventor:

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UNITED STATES PATENT OFFICE.

FRANÇOIS CANCALON, OF ROANNE, FRANCE.

CONSTRUCTION OF ARMORED-CONCRETE FLOORS AND CEILINGS.

1,058,548.

Specification of Letters Patent.

Patented Apr. 8, 1913.

Application filed October 14, 1912. Serial No. 725,643.

To all whom it may concern:

Be it known that I, FRANÇOIS CANCALON, a citizen of the French Republic, residing at Roanne, Loire, in France, have invented certain new and useful Improvements in the Construction of Armored-Concrete Floors and Ceilings, of which the following is a specification.

This invention relates to improvements in the construction of armored concrete floors and ceilings, and has for its object a floor or ceiling structure composed of plaster and armored cement or concrete; the structure is of great resistance, of less thickness than the usual structures of the kind, while possessing considerable sound deadening properties.

In the annexed drawings, Figure 1 is a perspective view of a structure according to the invention. Figs. 2 and 3 are sectional views of this structure comprising various anti-resonant devices. Fig. 4 is a section on line 4—4 of Fig. 3. Figs. 5, 6 and 7 illustrate various modified structures in section. Figs. 8, 9, 10 are sections of armored joists or beams adapted to be used in the construction of a ceiling or floor. Figs. 11, 12 and 13 are sections of modifications of these beams. Fig. 14 is a cross-section, and Fig. 15 a longitudinal section of a modified construction. Figs. 16 to 19 are sectional views of further modifications of construction.

Referring to Fig. 1, *a a* indicate plaster elements forming, by the juxtaposition of two consecutive elements, a groove or space of sufficiently large section to receive an iron bar *b* constituting part of the lower armor of the structure. The bars *b* are embedded in cement *c* which fills the grooves and connects the elements together. In the joints filled with cement ties *d* are introduced, which support the iron bars *e* engaging in hooks of the short ends of the ties *d*. These iron bars *e* which constitute the central part of the armor are covered with a uniform layer of cement or concrete *g* intended to form the second part of the structure. When this first layer is formed mold members *p* are arranged thereon between which concrete or cement is rammed so as to form beds of a suitable height for placing the iron bars *f* in position, said bars being engaged in upper hooks of the ties *d*. The spaces between the mold members are then filled with cement or concrete so as to cover the upper part of the armature

and after drying and removal of the mold members an upper structure of armored cement is constructed comprising a continuous surface having raised portions or ribs *g*¹. The upper surface of this structure can be rendered uniform by arranging blocks *h* with inclined edges between the various ribs *g*¹, for instance if the structure is to be covered with a layer of asphalt or other like coating. The spaces between the ribs *g*¹ can be lined with sound-proof material such as sawdust, silicious powder or brick dust.

If the structure is to be covered with a flooring, resonance can be considerably reduced by employing devices shown in Figs. 2 to 4. In Fig. 2 suitably spaced beams *i* are arranged between the ribs *g*¹, on which joists *j* rest, the floor boarding *k* being fixed on these joists in the usual manner.

In the construction shown in Figs. 3 and 4, the joists are provided with grooves *l* at the bottom of which is placed an insulating strip *m* of leather, rubber, linoleum or the like material. An undulating band of wood or steel wire *n* is then forced into the groove *l* and is held in position by cement or other suitable setting. The bed of cement or concrete *g* is in this case provided with a groove *o* obtained by fixing a wooden strip on the under side of mold member *p*. The joists are then placed in position so that the lower curves of the bands *n* are engaged in the grooves *o*, the floor boards *k* being then laid on the joists in the usual manner.

The resonance of the structure is considerably reduced by reducing the free space between the flooring and the structure which can be filled in with a sound absorbing substance in the usual manner, but resonance is principally reduced by the arrangement of the joists which rest on supporting-beams or on undulating metal strips which are slightly elastic and insure excellent insulation.

The armored concrete beams or joists can also be made in the factory and put into place as easily as ordinary iron or wooden beams.

In the construction shown in Figs. 5 and 6 the blocks *a* have near their edges two grooves *a*¹ *a*¹, the metal reinforcements being constituted as before described by bars *b*, *e*, *f*, connected by ties *d*. If the armoring is arranged between each joint (Fig. 5) the flooring can be fixed by means of cement elements *q* provided with claws *q*¹ which en-

gage in the grooves a^1 of the blocks and are fixed in position by means of cement. It is sufficient then to fill the spaces between the elements q with cement to cover each armature. The elements q form part of the floor and receive either beams i supporting the joists j on which the floor boards k are nailed, or ordinary blocks h if the floor is to be constituted by paving or cement.

When the structure has only to support slight strains it is sufficient to provide armoring at each second or third row of blocks, when the use of the members q becomes unnecessary and the form of construction shown in Fig. 6 is suitable. In this case bricks r are arranged in the grooves a^1 , being held in place by cement. Cement or concrete is then rammed in at g^1 so as to completely cover the armature and a permanent strengthened rib is obtained composed of a core of cement or concrete inset between two rows of bricks. The flat surfaces of the blocks a separating adjacent ribs can be covered with a layer of cement or remain bare and carry the beams which support the floor.

Clamping of the blocks is not indispensable and may be omitted in certain cases. The ties d are in this case straight as indicated in Fig. 7. The blocks may be solid or hollow.

If it is not required to arrange the metal armatures at the joints of the blocks, it is possible to make at the factory independent armored beams which can easily be transported and placed into position like ordinary wooden beams or iron girders. Thus the beam represented in Fig. 8 is composed of two rows of blocks a separated by the metal armatures previously inserted in cement or concrete g^1 poured in between the bricks r forming a framework. Such beams made beforehand ready for use are arranged juxtaposed in the usual manner. These beams may be arranged either with the rib turned upward as shown in Fig. 9, or downward as shown in Fig. 10, for constructing ceilings with visible joists. In this latter form of construction the lower armature b , arranged between the bricks a , is at the base of the beam.

When the beams are to support very heavy weights the width of their upper surface should be increased. For this purpose the grooves a^1 diverge so that the channel formed by the brick framework r is wider at the top as shown in Figs. 11 and 12. The same arrangement is applicable by substituting for the brick framework r , a framework constructed of boards or sheet metal r^1 as shown in Fig. 13, which is placed in the grooves a^1 which form exact spacing points. After the cement or concrete poured in between said boards is set, the frame is removed and is again available.

In order that the ceiling composed of plaster and armored concrete may resist strains to which it may be subjected, it is necessary that the joists and the actual ceiling, comprising solid or hollow bricks, with crossed joints and with or without longitudinal clamping of the bricks together, should form an integral whole. For this purpose a floor s composed of blocks clamped one in another is arranged on the beams as shown in Figs. 14 and 15 or composed of straight-jointed blocks as in Fig. 18 when the weight to support is small, or grooved blocks as shown in Fig. 17 can be used. In any case this floor is connected to the joists and possibly to the ceiling by cramps t which are either hooked directly on the iron rods f and are embedded at the same time in the concrete of the joist and in the cement of the joint between the bricks s (Figs. 15 and 16), or are fitted by their bent ends t^1 into the holes u formed in the brick framework r^1 (Fig. 14) and filled in with cement.

When straight-jointed blocks are used, as in Fig. 18, the cramps t may be bent over at their upper ends to facilitate construction; or if the blocks are provided with grooves as in Fig. 17 the end of the cramps may be rectangular or T-shaped and are fitted into the said grooves, being embedded in the cement forming the joints between the blocks.

When the upper iron rods f are not required, the cramps t hook directly on to the rods e (Fig. 19) and insure the static solidity of the whole of the construction.

The structure possesses great resistance to pressure. The ceiling or flooring can be constructed simultaneously with the joists or afterward.

What I claim as my invention and desire to secure by Letters Patent of the United States is:—

1. A ceiling comprising in combination a plurality of ceiling members, metal reinforcing elements extending therethrough, a series of concrete rib members, metal reinforcing elements embedded therein in different planes, tie rods embedded in the rib members connecting the reinforcing elements of the rib members to those of the ceiling members, flooring members supported by said rib members, and sound insulating material between the rib members and the flooring members.

2. A ceiling comprising in combination a plurality of ceiling members, said ceiling members having adjacent faces one of which is provided with a groove and the other with a projection engaging in said groove, metal reinforcing elements extending therethrough, a series of concrete rib members, metal reinforcing elements embedded therein in different planes, tie rods embedded in the rib members connecting the reinforcing

elements of the rib members to those of the ceiling members, said tie rods following the contour of the joint between the adjacent faces of said ceiling members, joists disposed
5 between the rib members, resilient supporting devices for said joists, and flooring members carried by said joists.

In witness whereof I have signed this specification in the presence of two witnesses.

FRANÇOIS CANCELON.

Witnesses:

LOUIS MICHON,
FRANÇOIS MONON.