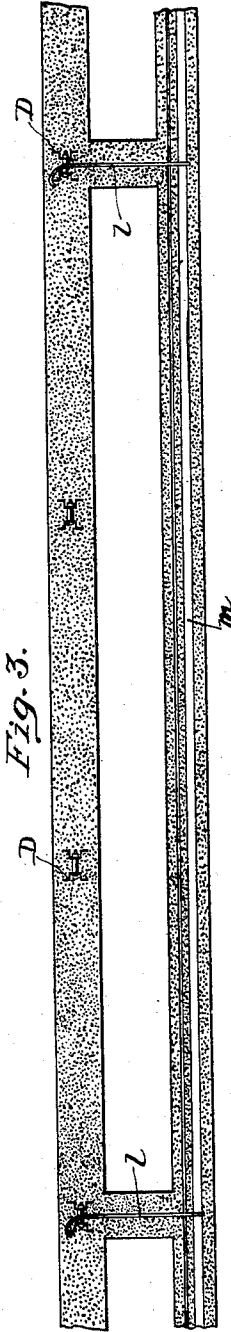
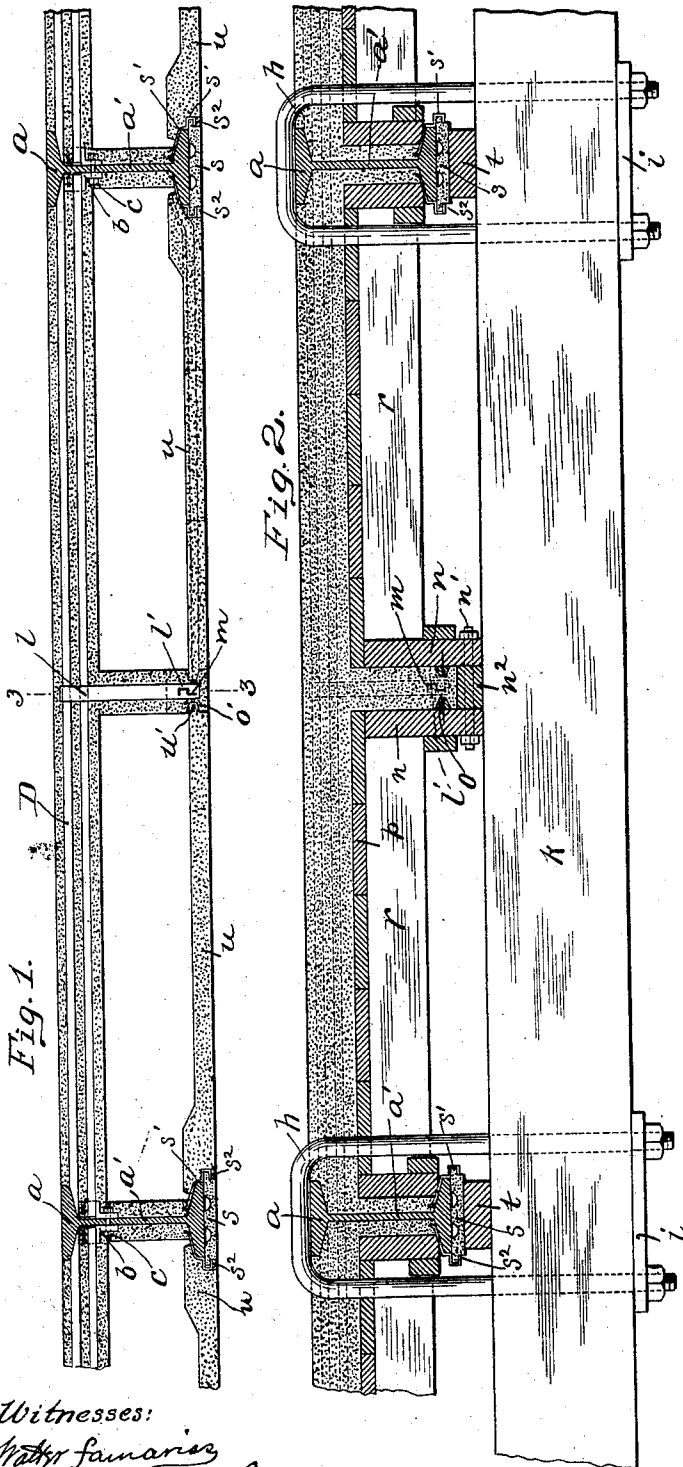


C. A. BALPH.  
FIREPROOF CONSTRUCTION.

(Application filed Apr. 22, 1899.)

(No Model.)

2 Sheets—Sheet 1.



Witnesses:  
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*Charles A. Balph*  
 By *Kay & Totten*  
 Attorneys.

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2 Sheets—Sheet 2.

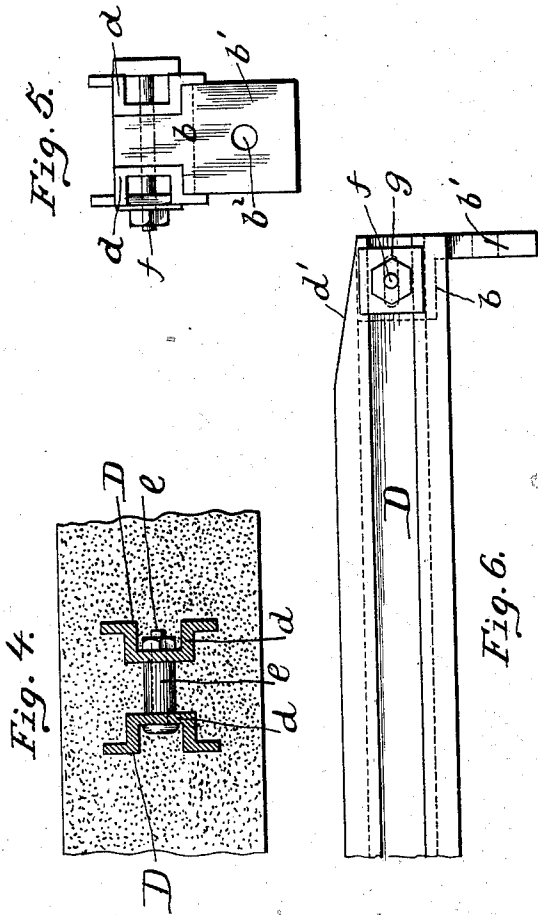
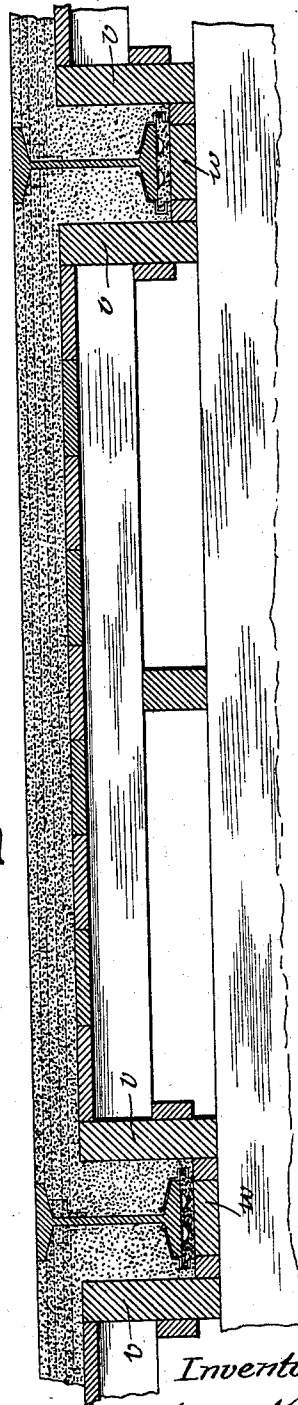


Fig. 7.



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# UNITED STATES PATENT OFFICE.

CHARLES A. BALPH, OF PITTSBURG, PENNSYLVANIA.

## FIREPROOF CONSTRUCTION.

SPECIFICATION forming part of Letters Patent No. 683,426, dated October 1, 1901.

Application filed April 22, 1899. Serial No. 714,138. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES A. BALPH, a resident of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Fireproofing Construction; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to fireproof constructions for buildings, and more particularly to that style of fireproof construction in which plastic concrete is packed around the main beams and around cross-bars connecting said beams, so that when the concrete has hardened a firm and compact fireproof construction is obtained.

The object of my invention is to provide for the rigid support of the concrete between the main beams, as well as to provide a suitable "centering" for use in supporting the plastic concrete during the operation of laying the same.

To these ends my invention comprises the novel features hereinafter set forth and claimed.

To enable others skilled in the art to make and use my invention, I will describe the same more fully, referring to the accompanying drawings, in which—

Figure 1 is a sectional view of a portion of a floor and ceiling construction involving my invention. Fig. 2 is a like view showing the centering in position during the course of construction. Fig. 3 is a section on the line 3 3, Fig. 1. Fig. 4 is an enlarged sectional view of the cross-girders which support the concrete. Fig. 5 is a like view showing the face view of the bracket which supports the cross-girders. Fig. 6 is a side view of a portion of one of the cross-girders and its bracket. Fig. 7 is a modified form of my invention in which no separate ceiling construction is employed.

Like letters indicate like parts in each of the figures.

In the accompanying drawings, the letter *a* represents the main beams, which may be the ordinary steel I-beams used in the construction of fireproof buildings, said I-beams being arranged at proper intervals apart. Secured to the webs *a'* of said I-beams *a* are the brackets *b*, said brackets having the

downwardly-extending plate *b'* with the opening *b<sup>2</sup>* formed therein, through which a bolt *c* passes, said bolt passing through an opening in the web *a'* of the I-beam and acting to secure two brackets to the said web, one on each side thereof. These brackets *b* when in position act as supports for the cross-girders *D*. The cross-girders *D* are made up of the channel-bars *d*, which are connected by the bolts *e*, passing through openings in said channel-bars, a sleeve *e'* encircling the bolt *e* and fixing the space between the said channel-bars *d*. These cross-girders *D* are secured to the brackets *b* by means of the bolts *f*, said bolts passing through slots *g* in the said brackets *b*, whereby allowance is made for the expansion or contraction of the cross-girders *D* longitudinally. The ends of the cross-girders *D* are cut away, as at *d'*, to permit of their passing beneath the upper flanges of the I-beams *a*, so as to bring the upper edges of said girders up in line with the lower edge of the flange. The iron framework is thus put together, the cross-girders *D* being arranged at proper intervals, whereupon the structure is ready to receive the concrete.

In order to provide a support for the concrete during the operation of packing it in its plastic condition around the I-beams *a* and the cross-girders *D*, it is necessary to employ a suitable centering. The centering which I have illustrated forms part of my invention, and I will proceed to describe the same and its operation in connection with the packing of the concrete.

The U-shaped bolts *h* are suspended from the upper flanges of the I-beams *a*, and plates *i* are carried by the said U-bolts, said plates running in the same direction as the I-beams *a*. Supported by the plates *i* are the joists *k*, and the centering proper is built up on said joists.

Where the ceiling construction is to consist of separate slabs which are placed in position and not composed of loose concrete, as in the case of the floor, I suspend from the cross-girders *D* the metal hangers *l*, which are hooked at their upper ends and engage one of the channel-bars *d*. The lower ends of said hangers *l* have the irregular-shaped slots *l'* formed therein, through which a correspondingly-shaped angle-bar *m* passes, said

bar  $m$  being thus supported by means of these hangers  $l$ . Upon the joist  $k$  are supported the wooden beams  $n$ , which are connected by bolts  $n'$ , the space between the beams  $n$  being regulated by the blocks  $n^2$ . Secured to the inner faces of the beams  $n$  are the wedge-shaped strips  $o$ , extending longitudinally of said beams. The platform  $p$  is carried by these beams  $n$  and by means of the beams  $r$ , which rest upon the lower flanges of the I-beams  $a$ .

In order to protect the lower flanges of the I-beams  $a$ , I employ the slabs  $s$ , which are secured to the bottom flanges of the I-beams  $a$  by means of the clips  $s'$ , said clips fitting in notches  $s^2$  in said slabs, and the opposite ends of said clips fitting up over the lower flanges of the beams and acting to hold the slabs in position. Wooden strips  $t$ , supported by the joist  $k$ , act to assist in holding the slabs  $s$  up in position during the packing of the concrete around the webs of the I-beams.

When the centering has been arranged in the manner described and the iron framework has been put together, the concrete in plastic condition is then deposited upon the platform  $p$  of the centering and is packed down thereon until the floor has been formed the proper height or substantially level with the upper flanges of the I-beams, the concrete being packed in and around the cross-girders  $D$ . The construction of the cross-girders  $D$  is such that the concrete enters the seats and recesses formed by the channel-bars  $d$  and is locked therein, so that when the concrete hardens the said girders  $D$  act to support the concrete rigidly in position against the heavy loads which it may be required to bear. The concrete, furthermore, is packed down around the webs of the I-beams, the centering forming a cavity for the reception of this concrete along the webs of the beams, and concrete is also packed down in the cavity formed by the beams  $n$  of the centering, the hangers  $l$  being enveloped by the concrete as well as the angle-bars  $m$ , supported by said hangers.

After the concrete has been laid in the manner above described the centering is removed, leaving the construction in the form shown in Fig. 1, with the exception of the ceiling-slabs, which are afterward placed in position. The wedge-shaped strips  $o$  on the inner faces of the beams  $n$  have formed correspondingly-shaped grooves extending along the concrete which is supported by the angle-bars  $l'$ . The slabs which form the ceiling may be supported in different ways, and I have illustrated in Fig. 1 two of these. In the section of ceiling to the left of the central portion the ceiling is composed of the slabs  $u$ , which have the tongues  $u'$  at one end, adapted to fit within the recesses  $o'$ , formed by the strips  $o$ , the opposite ends of said slabs being formed to correspond with and rest on the lower flanges of the I-beams  $a$  and on the bottom-slabs  $s$ , this end of said

slab being somewhat thicker than the opposite ends to provide for this construction. The ceiling may, therefore, be constructed by laying these slabs in side by side in the manner described, or, if desired, a metal plate, as shown to the right of Fig. 1, may be employed, the plate entering the recess  $o'$  and resting on the lower flange of the beam. Slabs of smaller size may then be placed upon said plates and supported thereby.

It is apparent that after the centering has been removed the recesses  $s^2$ , formed in the bottom slabs  $s$  of the I-beams, will still remain, and these can be readily filled up with concrete after the centering has been removed.

By the above arrangement I obtain a very secure construction for holding the concrete of the floor in position, as well as provide a form of centering which can be quickly erected and quickly removed, such construction providing a central rib between the main I-beams and parallel therewith, so that ceiling-slabs of convenient size may be securely supported in position.

In Fig. 7 I have illustrated the modified form of my invention, in which the floor forms both the floor and ceiling, the centering being constructed so that the bottom flanges of the I-beams are entirely enveloped by the concrete when it is packed down in the recess formed by the centering. In this case no central rib between the adjacent I-beams is employed, as with the case above, where separate ceiling construction was employed. In this construction the beams  $v$  of the centering form the cavity around the I-beam and this cavity when packed with concrete forms a thick body of concrete around the beam, and at the same time the concrete, enveloping, as it does, the clips which support the bottom slab  $w$ , acts to secure said bottom slabs more securely in position.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In fireproof construction, the combination with the main beams, of cross-girders, brackets on said beams, said cross-girders comprising angle-bars connected together, said cross-girders being secured to said brackets, said brackets having slots therein through which the bolts connecting said girders to said brackets pass, and concrete enveloping said girders, substantially as set forth.

2. In fireproof construction, the combination with the main beams, of brackets bolted to the webs of said main beams, cross-girders supported thereby, hangers suspended from said cross-girders, irregular-shaped bars supported by said hangers, and concrete enveloping said girders, hangers and irregular-shaped bars, substantially as set forth.

3. In fireproof construction, the combination with the main beams, cross-girders supported thereby, hangers suspended from said girders, said hangers having irregular-shaped slots therein, bars engaging said slots and co-

incident therewith, and concrete enveloping said girders, hangers and bars, substantially as set forth.

4. In fireproof construction, the combination with the main beams, of a centering suspended therefrom, cross-girders supported by said main beams, hangers suspended from said girders, bars supported by said hangers, projections on said centering adapted to form longitudinal grooves in the concrete enveloping said hangers and bars, substantially as set forth.

5. In fireproof construction, the combination with the main beams, of a centering suspended therefrom, cross-girders supported by said main beams, hangers suspended from said girders, bars supported by said hangers, wedge-shaped projections on said centering

adapted to form longitudinal grooves in the concrete enveloping said hangers and bars, substantially as set forth.

6. In fireproof construction, the combination with the main beams, of cross-girders, concrete enveloping said girders, a concrete rib carried by said girders at right angles thereto, said rib having recesses formed therein and ceiling-slabs engaging said recesses at one end and supported by the main beams at the opposite end, substantially as set forth.

In testimony whereof I, the said CHARLES A. BALPH, have hereunto set my hand.

CHARLES A. BALPH.

Witnesses:

ROBT. D. TOTTEN,  
ROBERT C. TOTTEN.