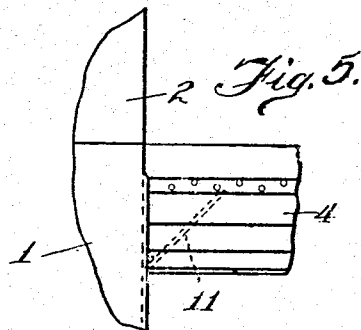
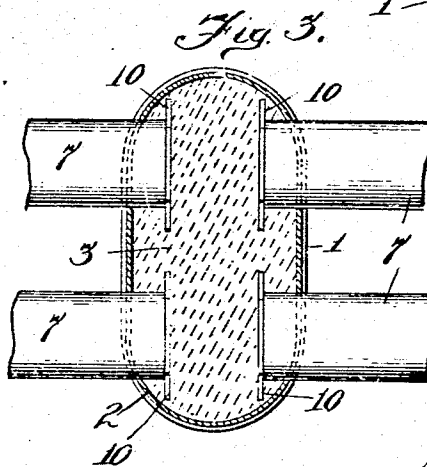
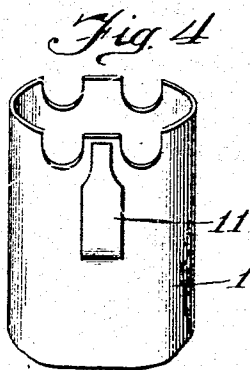
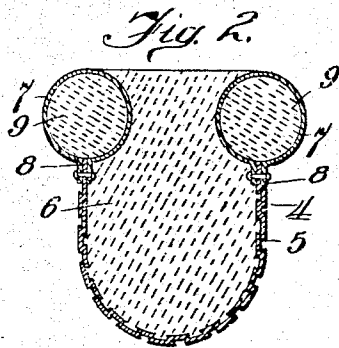
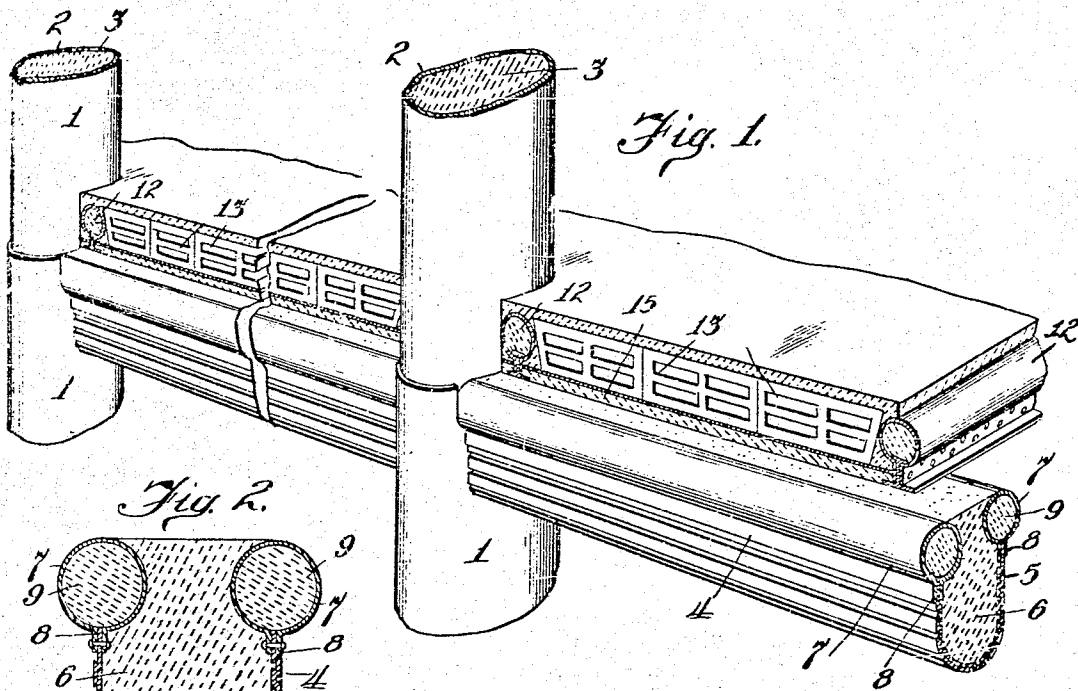


973,814.

Patented Oct. 25, 1910.



Witnesses
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UNITED STATES PATENT OFFICE.

ROY HENRY ROBINSON, OF CHICAGO, ILLINOIS.

COMPOSITE BUILDING-FRAME STRUCTURE.

973,814.

Specification of Letters Patent.

Patented Oct. 25, 1910.

Original application filed January 2, 1908, Serial No. 409,053. Divided and this application filed February 17, 1909. Serial No. 478,489.

To all whom it may concern:

Be it known that I, ROY HENRY ROBINSON, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Composite Building-Frame Structures, of which the following is a specification.

This specification is a division of an application filed by me January 2, 1908, Serial No. 409,053.

This invention relates to composite building frame structures, and more particularly to building frame structures of the character wherein the beams or girders are formed of concrete and metal so combined as to obtain the objects of the invention.

Among the salient objects of the invention are to provide a composite frame member so constructed that the metallic reinforcements constitute forms or retainers to determine the conformation of the cement which combines with the metal reinforcements to form the beam or girder; to provide a construction of the above character in which the trough like container is provided along its lateral edges with hollow metal reinforcements or stiffening members which are themselves provided with a cement filling; to provide a construction in which the ends of the beams or girders are embedded in the cement filling of the columns or pillars and are further interlocked with the latter by novel means secured to the metal parts of the said members; to provide a construction in which the stiffening members of the skeleton metal reinforcements may be filled in with concrete before being set in position and the main body filled in after the beam is erected; to provide a beam or girder of such construction that it is characterized by maximum strength, with low cost and suitable for its intended use; to provide a construction of the above character which may be plastered in or filled by any suitable plaster or cement compound and in general to provide an improved construction of the character referred to.

The invention consists in the matters hereinafter described and more particularly pointed out in the appended claims.

In the drawings Figure 1 is a perspective view showing fragmentary portions of a pair of pillars, fragmentary portions of two adjoining stringers or beams, and portions

of a floor construction superposed upon the beams. Fig. 2 is a cross sectional detail of one of my improved beams or girders. Fig. 3 is a horizontal sectional view through one of my uprights or pillars and showing the manner of embedding the ends of the beams in the cement filling of the uprights. Fig. 4 is an isometrical perspective of the upper end portion of one of the pillars. Fig. 5 is a fragmentary view in side elevation of a portion of one of the uprights, and an end-portion of one of the beams or girders connected therewith.

Referring to the drawings, 1 designates the upright pillars or columns, consisting of an outer tubular shell 2, and a filling of concrete or other cementitious material 3. This pillar is most advantageously made in lengths or sections equal to the distance between the stories of a building; the upper section being arranged to telescope a short distance within the lower section as shown more clearly in Fig. 1. Preferably also these pillars are made of flattened oval form in cross section.

Describing now the main girders or beams 4 which form an important feature of the present invention, each comprises a trough like metal container 5, constituting a combined form and reinforcement which is filled when in position with a filling of concrete 6 which is preferably flush with the upper edges of the container as shown more clearly in Fig. 2. The upper lateral edges of the container 5 are provided with stiffening members 7 which preferably, and as shown, are of tubular form and are united with the edges of the container 5 in any suitable manner, as for example by means of overlapping flanges 8 riveted together.

Preferably, and as shown in the drawing, the trough shaped reinforcements or containers 5, are of inclave-formed metal, so as to facilitate the application and attachment thereto of the plaster or other concrete covering. Inasmuch as these trough shaped containers 5 must ordinarily carry a comparatively heavy load of plaster cement when filled with the latter, the tubular stiffening reinforcements 7 thereof will preferably be provided with a filling of cement 9 and allowed to harden before the beam or girder is erected. This strengthens the beam amply to enable it to support the load of plastic concrete until the latter hardens. It

is understood, of course, that the interior of the container 5 is filled with the concrete or analogous cementitious material after the beam has been placed in position.

5 Referring now to the manner of uniting the beams or girders to the pillars, the ends of the stiffening tubular members 7 extend slightly beyond the end of the container 5 and are inserted in suitable openings in the
10 shell of the pillar and then embedded in the cement filling 3 of the latter. In order to more effectively lock the beams in position, the ends of the stiffening members 7 are provided with outturned flange portions 10
15 which serve to further bond the beams in place. In order to still further unite the transverse beams or girders 4 to the uprights 1, and particularly in order to anchor the lower edges of said beams to the up-
20 rights, I provide the latter with metal arms or anchors 11 which are desirably struck out as integral extensions or tongues from the tubular uprights and arranged to extend obliquely into the lower parts of said
25 beams as shown clearly in Figs. 4 and 5. When the concrete is filled in, these reinforcements 11 obviously constitute anchors which very strongly unite the lower portions of the beams with the pillars, and they
30 also act as trussing reinforcements which to some extent strengthen the mass of concrete.

As shown in Fig. 1 the beams are adapted to support a formless floor construction comprising a series of parallel tubular joists or
35 minor transverse members 12 and interposed tile blocks 13 forming in effect flat arches extending between the joists 12. These joists and arches are preferably supported
40 upon a flooring of concrete 15, but inasmuch as this floor construction forms no part of the present invention it need not be further described in detail.

While I have herein shown a preferred
45 embodiment of my invention it is of course apparent that it may be more or less varied in details of construction without in any manner departing from the spirit thereof.

I claim as my invention:

50 1. A composite beam member comprising a pair of tubular substantially parallel stiffening members, a sheet metal reinforcement having its lateral edges connected to and supported by said tubular members and depending
55 trough-fashion between the latter, a filling of concrete in each of said tubular members, and a filling of concrete occupying the trough-like receptacle formed by said tubular members and sheet metal reinforcement.
60

2. In combination with a pair of uprights, a composite beam member extending between said uprights, comprising a pair of

tubular reinforcements arranged in parallel relation, spaced apart and having their ends
65 interengaged with the respective uprights, a sheet metal reinforcement of trough-shape form in cross section having its lateral edges united with the respective tubular reinforcements and depending between the two, a filling
70 of concrete occupying the interior of the trough-like sheet metal reinforcement and anchoring reinforcements extending from the respective uprights into the concrete filling of the beam member in the lower parts
75 of the latter.

3. A composite beam member comprising a pair of hollow stiffening members, a sheet metal reinforcement having its lateral edges connected to and supported by said hollow
80 stiffening members and depending trough fashion between the latter, a filling of concrete in each of said hollow stiffening members, and a filling of concrete occupying the trough like receptacle formed by said hollow
85 members and sheet metal reinforcement.

4. In combination with a pair of uprights, a composite beam member extending between said uprights and comprising a
90 trough-like container, a filling of concrete within said container, stiffening members upon the upper lateral edges of said container and having their ends extending into the uprights, bonding extensions upon the
95 ends of said stiffening members, and a filling of concrete within said uprights and embedding the ends of said stiffening members.

5. In combination with a pair of uprights, a composite beam member extending between said uprights and comprising a
100 trough-like container, a filling of concrete within said container, stiffening members upon the upper lateral edges of said container and having their ends extending into the uprights, and a filling of concrete within
105 said uprights and embedding the ends of said stiffening members.

6. In combination with a pair of uprights, a composite beam member extending between said uprights, comprising a pair of
110 hollow metal reinforcements spaced apart and having their ends interengaged with the respective uprights, a sheet metal reinforcement of trough shape form in cross section having its lateral edges united with the
115 respective hollow metal reinforcements and depending between the two, a filling of concrete occupying the interior of the trough like sheet metal reinforcement, a filling of concrete in each of said hollow metal reinforcements, and means anchoring the beam
120 to said uprights.

ROY HENRY ROBINSON.

Witnesses:

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