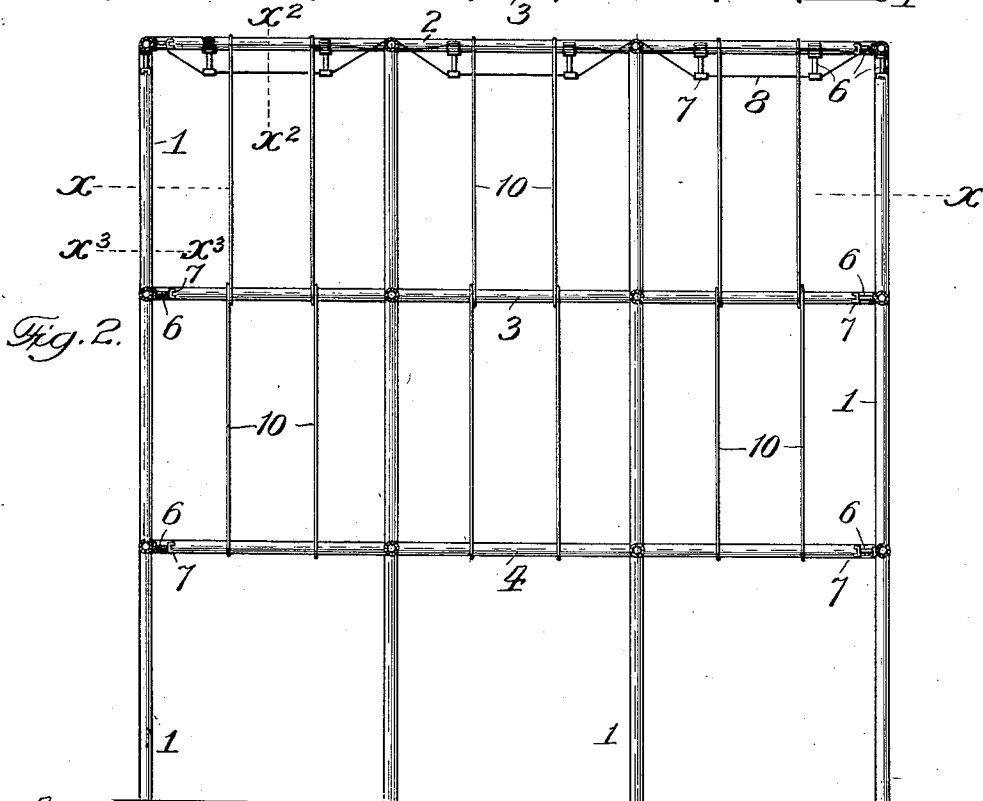
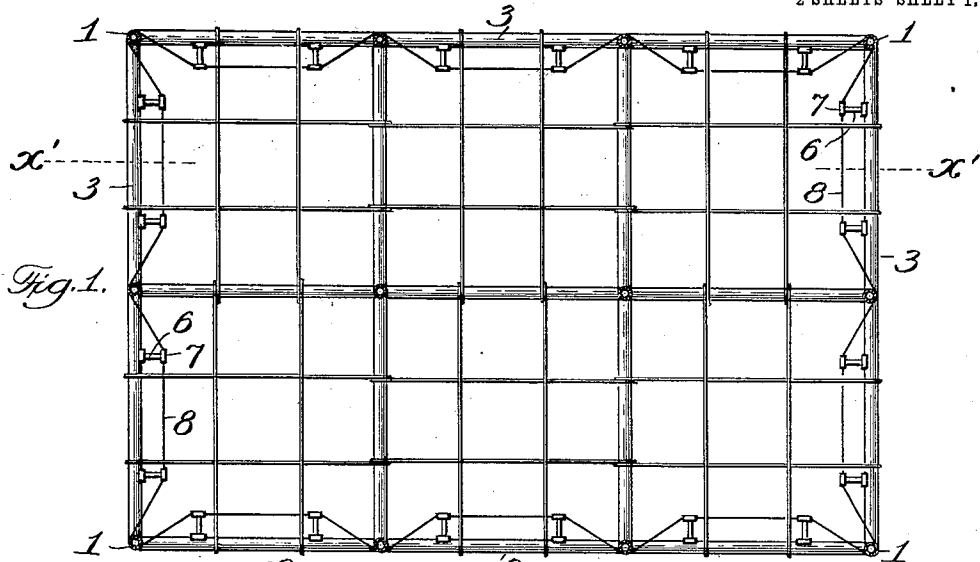


G. M. GRAHAM.
 REINFORCING FRAME FOR CONCRETE STRUCTURES.
 APPLICATION FILED APR. 21, 1909.

1,007,558.

Patented Oct. 31, 1911.

2 SHEETS—SHEET 1.



Attest:
John Enders.
Henry Mos.

Inventor:
George M. Graham.
 by *Robert Burns*
 Attorney

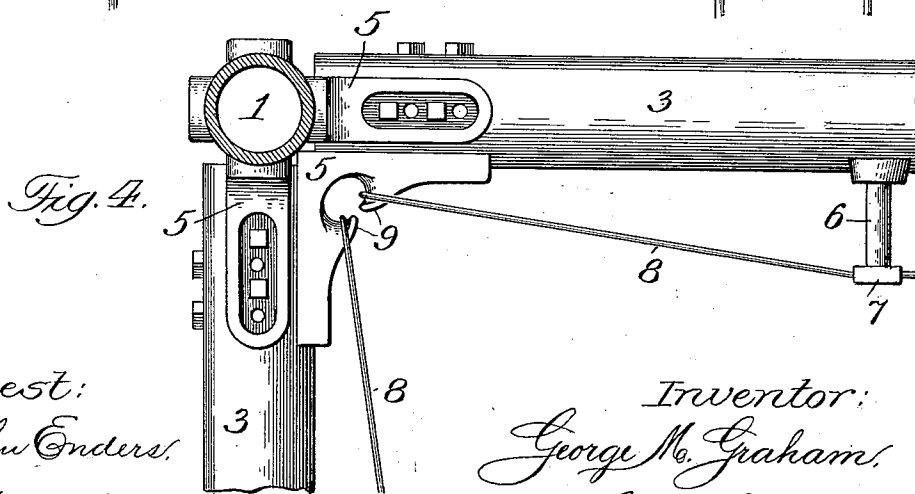
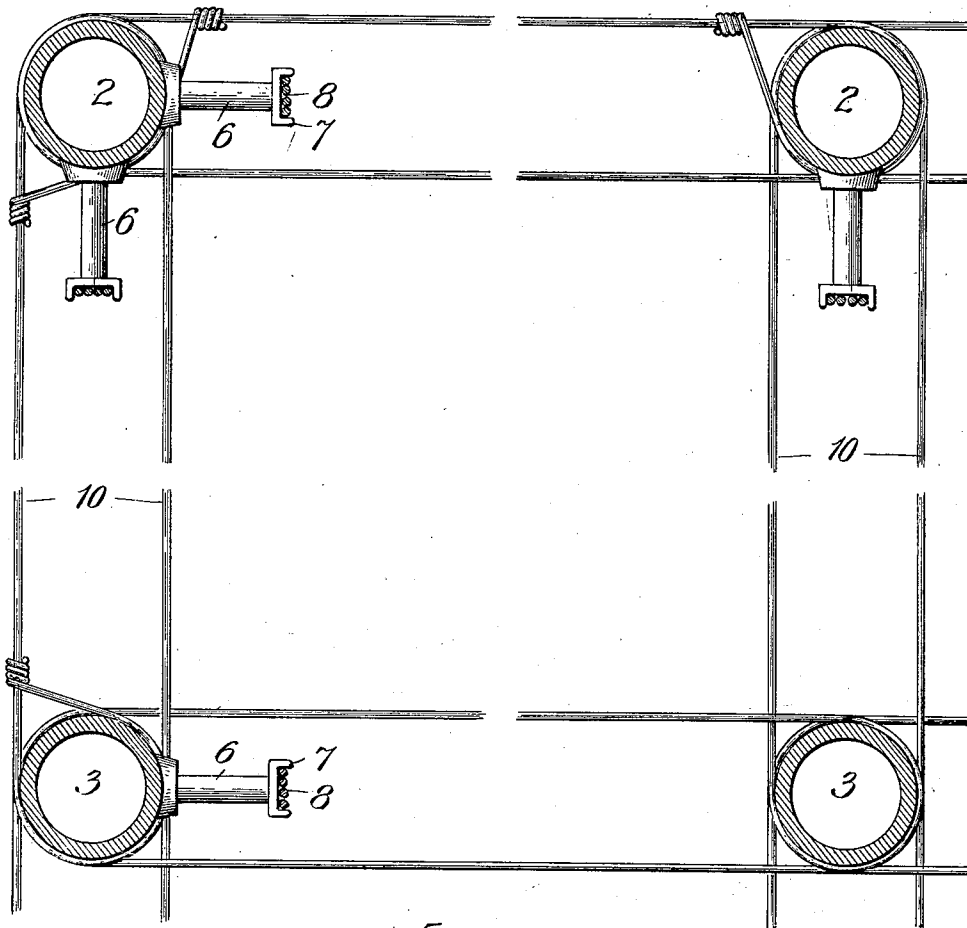
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2 SHEETS—SHEET 2.

Fig. 3.



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UNITED STATES PATENT OFFICE.

GEORGE M. GRAHAM, OF CHICAGO, ILLINOIS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO
SUSPENSION STEEL CONCRETE COMPANY, A CORPORATION OF DELAWARE.

REINFORCING-FRAME FOR CONCRETE STRUCTURES.

1,007,558.

Specification of Letters Patent.

Patented Oct. 31, 1911.

Application filed April 21, 1909. Serial No. 491,344.

To all whom it may concern:

Be it known that I, GEORGE M. GRAHAM, a citizen of the United States of America, and a resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Reinforcing-Frames for Concrete Structures, of which the following is a specification.

This invention relates to reinforcing frames for concrete structures, and has for its object to provide a simple and efficient structural arrangement and combination of the frame parts as a whole, whereby the different members are made to coact with each other in providing a very light and strong structure having maximum rigidity at the points where the greater lateral stresses prevail in the operation of erecting the frame and subsequently applying thereto the concrete mass or body which constitutes the walls, floors, roof, etc., of the structure. And with which a system of construction is attained in which the various intermediate and the lower floor sections are suspended and mainly supported by tension connections from the upper or roof series of beams or girders, for which purpose said upper series of beams are trussed and strengthened to carry the load so imposed. The system affording very effective provisions against the sagging of the frame at different points owing to the varied stresses imposed thereon in applying the wire centers to the different units of the structure, as well as during the application of the concrete mass from which the walls, floors, etc., of the structure are formed, all as will hereinafter more fully appear.

In the accompanying drawings:—Figure 1, is a sectional plan view on line $x-x$, Fig. 2. Fig. 2, is a vertical sectional elevation on line $x'-x'$, Fig. 1. Fig. 3, is an enlarged detail sectional elevation on line x^2-x^2 , Fig. 2. Fig. 4, is an enlarged detail horizontal section on line x^3-x^3 , Fig. 2.

Similar numerals of reference indicate like parts in the different views.

Referring to the drawings, 1 represents the series of vertical posts or columns, and 2, 3 and 4 the upper, intermediate and lower series of horizontal beams or girders, coupled together and to the vertical posts by the series of coupling pieces 5 to form the skeleton frame which supports the wire centers hereinafter described, and the mass of con-

crete which forms the wall, floors, etc., of the structure.

The coupling pieces 5 above referred to, are preferably of the type described in my companion application for Letters Patent, Serial Number 491,343, filed April 21, 1909. And the beams 2, 3 and 4, in some portions of the structure will comprise ordinary round tubes; and in other portions will comprise round tubes having lateral trusses that extend in a horizontal direction, in a vertical direction, or in both directions as hereinafter set forth in detail.

The lateral trusses above referred to will preferably be of the construction set forth in my former Letters Patent No. 919,714, of April 27, 1909, or the same in the modified form set forth in my aforesaid application Serial Number 491,343, and will comprise a pair of lateral studs or queen posts 6 arranged in spaced relation and having end bearings at the side of a round beam or girder, and carrying at their other ends bearing shoes 7 for the rod or wire tension members 8 of the truss, the ends of which tension members are in turn attached by end loops engaging horns 9 formed on the coupling pieces 5 at the meeting points of the angularly disposed members thereof.

In the present improvement the outer or border beams of the upper series 2 of beams or girders will have lateral trusses extending in both vertical and horizontal planes, in order to withstand the vertical stress imposed thereon in the present system by the suspension therefrom of the intermediate and lower floor frames, and the horizontal stress imposed thereon by the skeleton centers and concrete mass which constitute the upper floor or roof of the structure. The intermediate and lower series of beams or girders 3 and 4, will be trussed in a horizontal plane only, in order to sustain the horizontal stress imposed thereon by the skeleton centers and concrete masses which constitute the intermediate and lower floors of the structure.

The suspension means above referred to and by which the beams are connected together will preferably comprise a series of suspension members arranged and formed as follows: 10 are a series of suspension links, usually three in number, and formed by two outer windings and one inner winding of rod metal, extending from one beam

to the next adjacent beam, around said beams, and with the terminals or ends of each rod wrapped around the double outer winding, as shown in Fig. 3, and as more specifically set forth in my companion application for Letters Patent Serial Number 491,345, filed April 21, 1909. Said suspension links will have an evenly separated arrangement along the length of the respective beams, and the scope of the present invention includes the use of any required number of said links, to properly meet the requirements of the various sizes, etc., of structures to which the present construction may be applied.

In the formation of the complete reinforcing frame, it is preferable to use intermediate skeleton centers applied in the same manner as above described in connection with the suspension members 10, and in crossed relation as illustrated in Fig. 4.

Where the building or structure comprises a large number of units, the same construction and arrangement of parts above described will be used, and as illustrative thereof, a plan view of a six unit floor structure is shown in Fig. 1.

Having thus fully described my said invention what I claim as new and desire to secure by Letters Patent, is:—

1. In a reinforced concrete structure, a reinforcing frame comprising in combination, a series of vertical posts, an upper series of horizontal beams, a lower series of horizontal beams, coupling means connecting the posts and beams together, a series of vertical suspension members connecting the upper and lower beams together intermediate their length, and means for vertically reinforcing

the upper series of beams, the upper beams being adapted to take, through the series of suspension members, the downward stress of the load carried by the lower beams.

2. In a reinforced concrete structure, a reinforcing frame comprising in combination, a series of vertical posts, an upper series of horizontal beams, a lower series of horizontal beams, coupling pieces connecting the posts and beams together, and a series of vertical suspension members connecting the upper and lower beams together intermediate their length, and comprising outer and inner windings of rod metal extending from beam to beam with their terminals wrapped around the beams and attached to one of the windings, substantially as set forth.

3. In a reinforced concrete structure, a reinforcing frame comprising in combination, a series of vertical posts, an upper series of horizontal beams, an intermediate series of horizontal beams, a lower series of horizontal beams, coupling pieces connecting the posts and beams together, and a series of vertical suspension members connecting the upper, intermediate and lower beams together intermediate their length, and comprising outer and inner windings of rod metal extending from beam to beam with their terminals wrapped around the beams and attached to one of the windings, substantially as set forth.

Signed at Chicago, Illinois, this 12th day of April, 1909.

GEORGE M. GRAHAM.

Witnesses:

ROBERT BURNS,
L. HOLDEN.