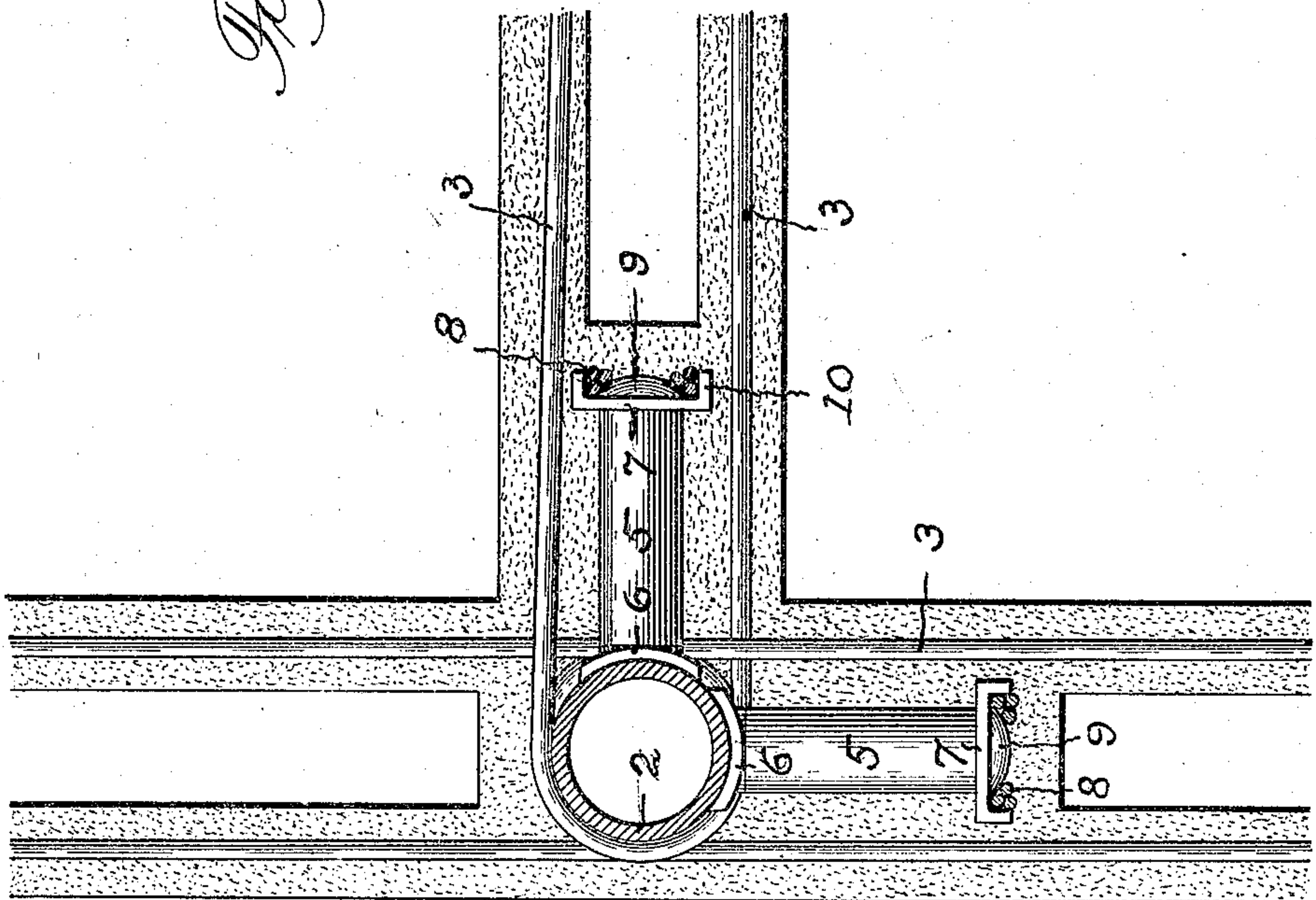
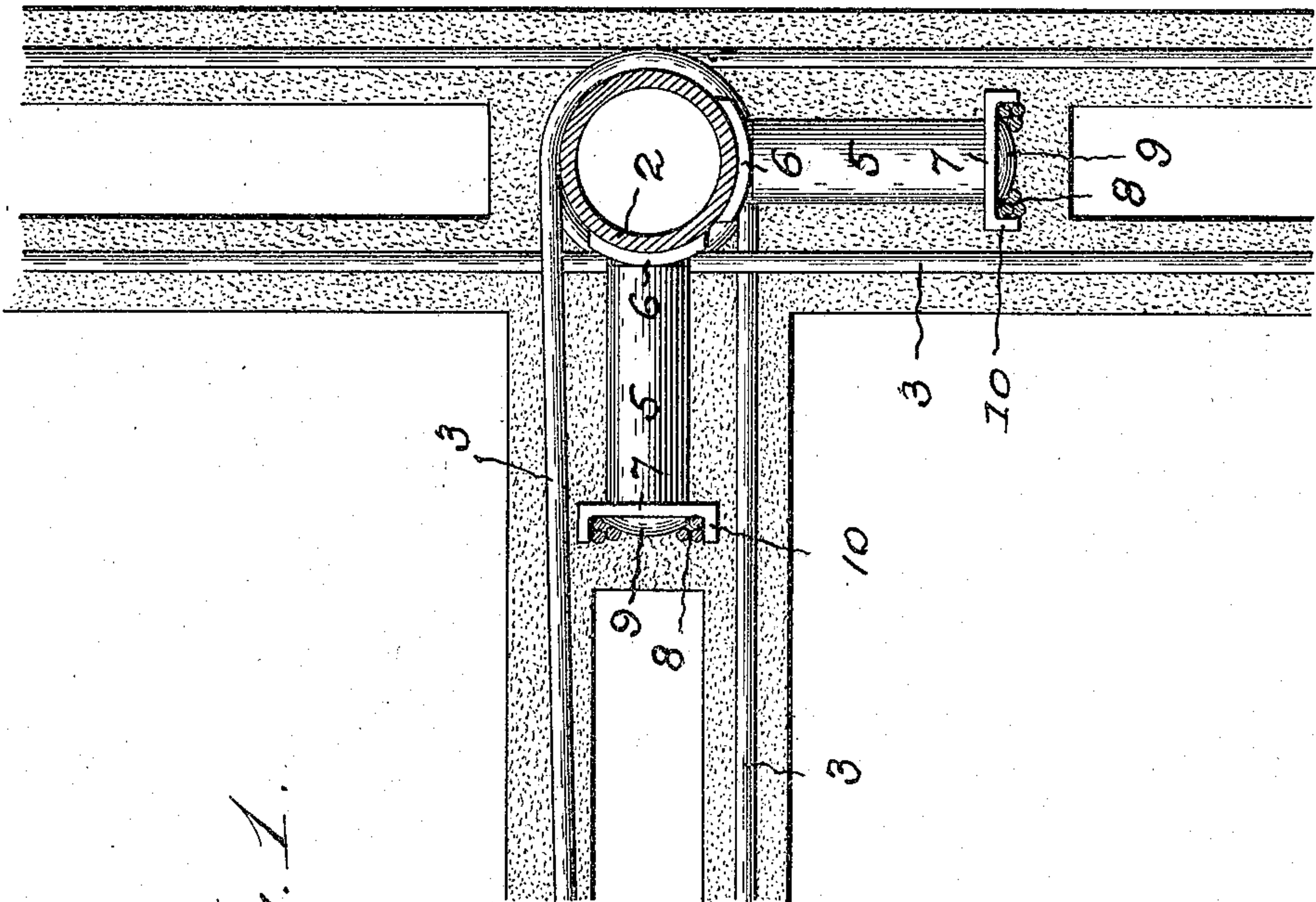


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REINFORCED CONCRETE STRUCTURE.  
APPLICATION FILED MAR. 9, 1908.

919,714.

Patented Apr. 27, 1909.

3 SHEETS—SHEET 1.



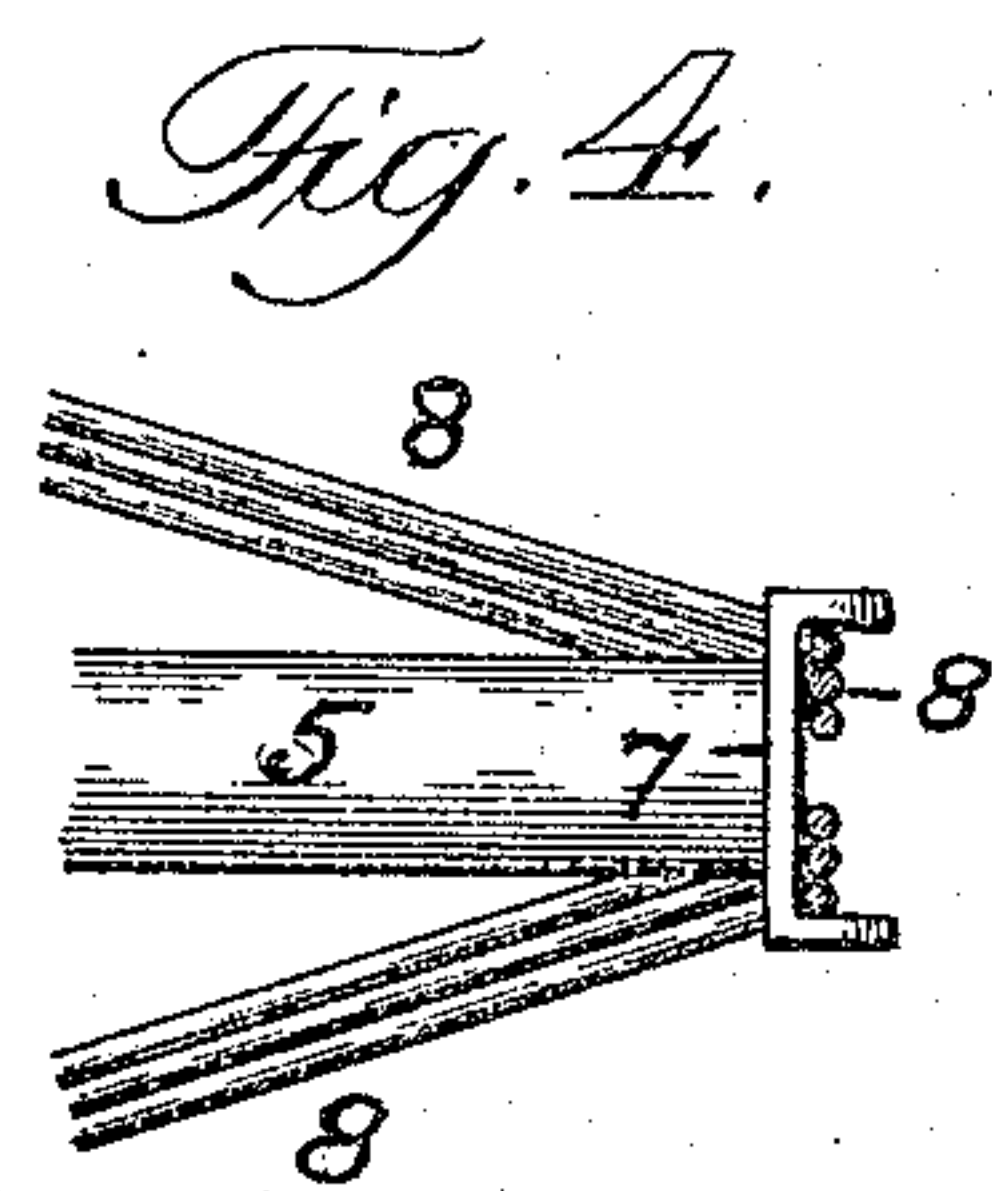
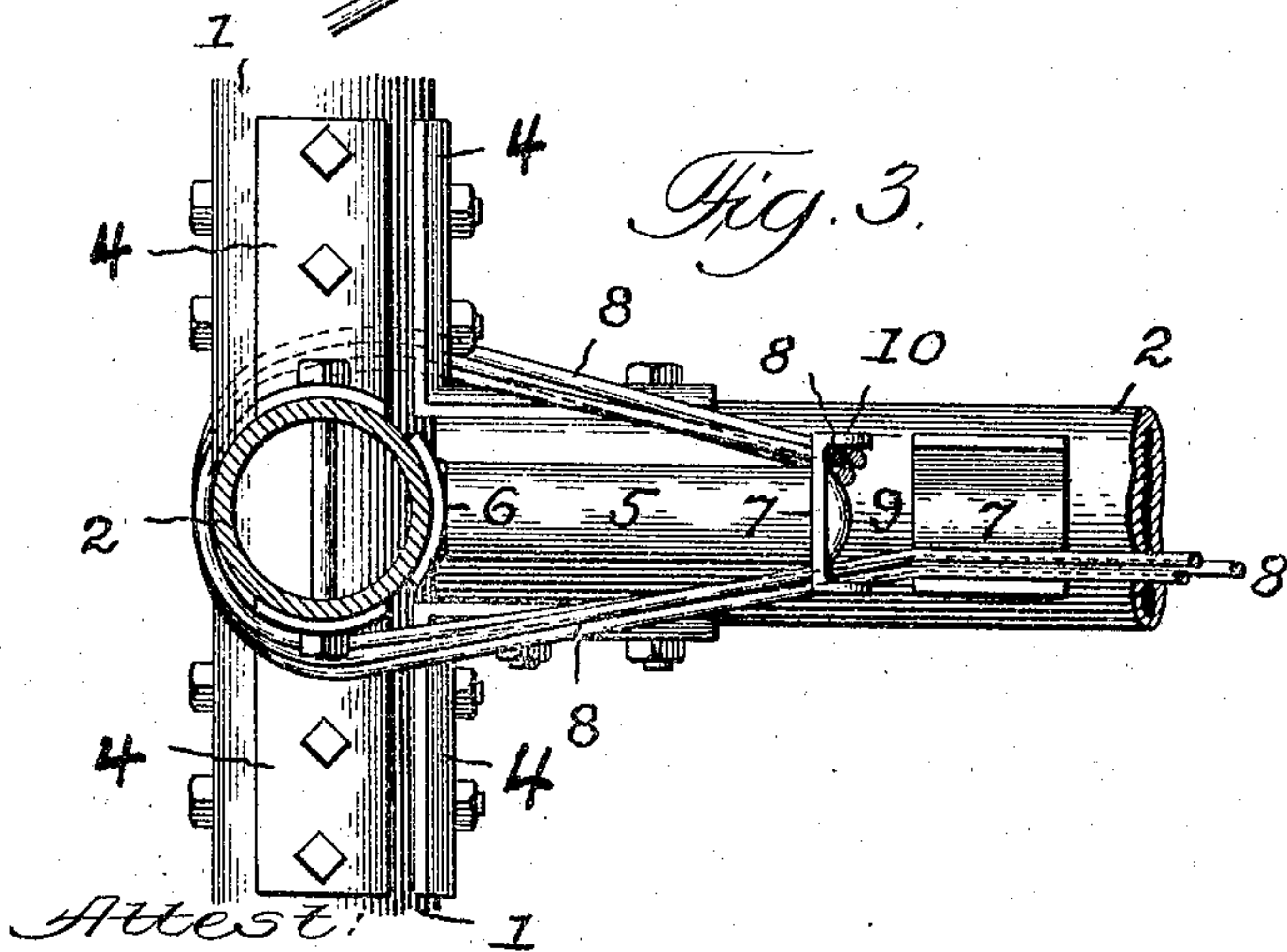
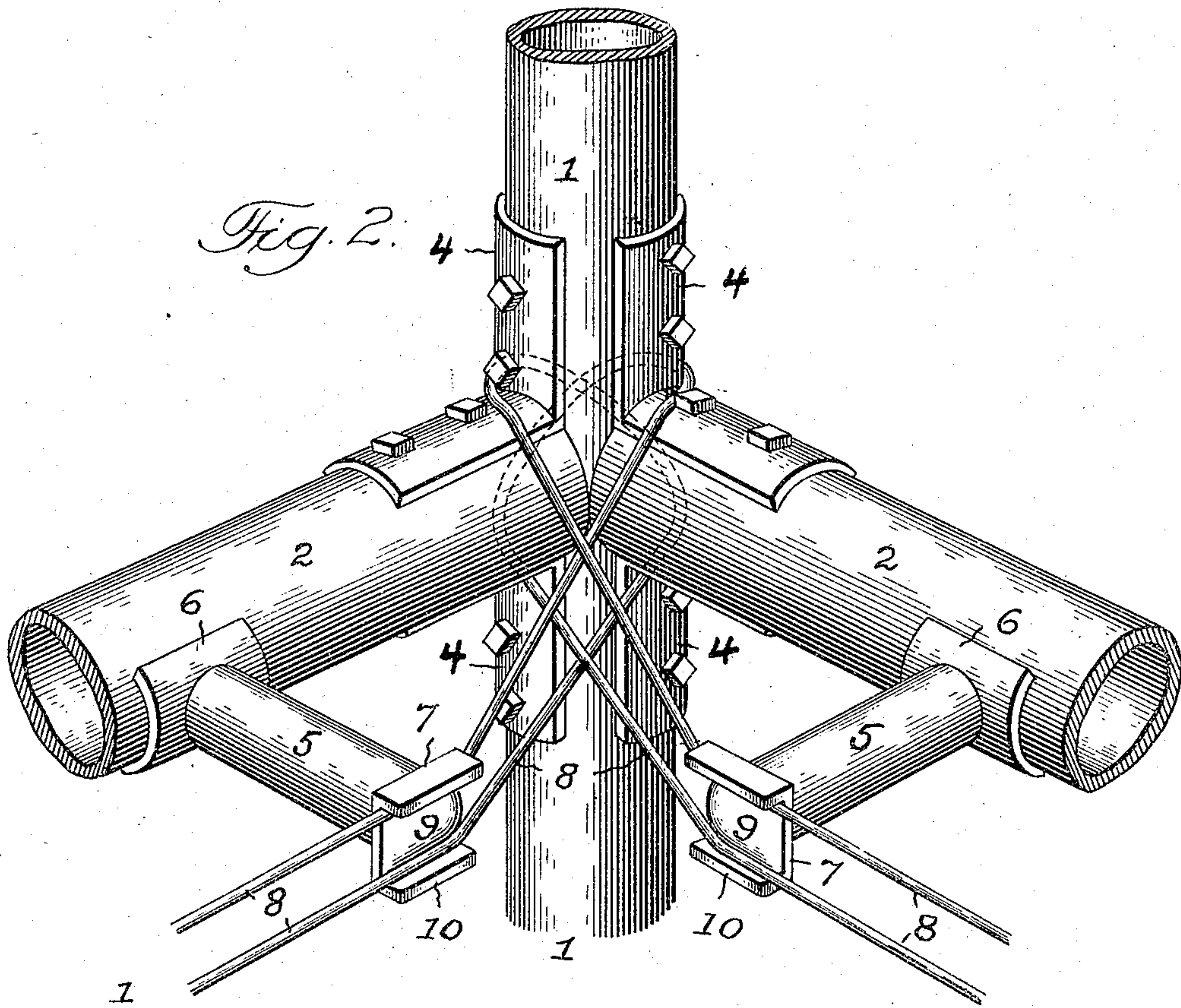
Attest:  
John Enders  
Henry Mos.

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

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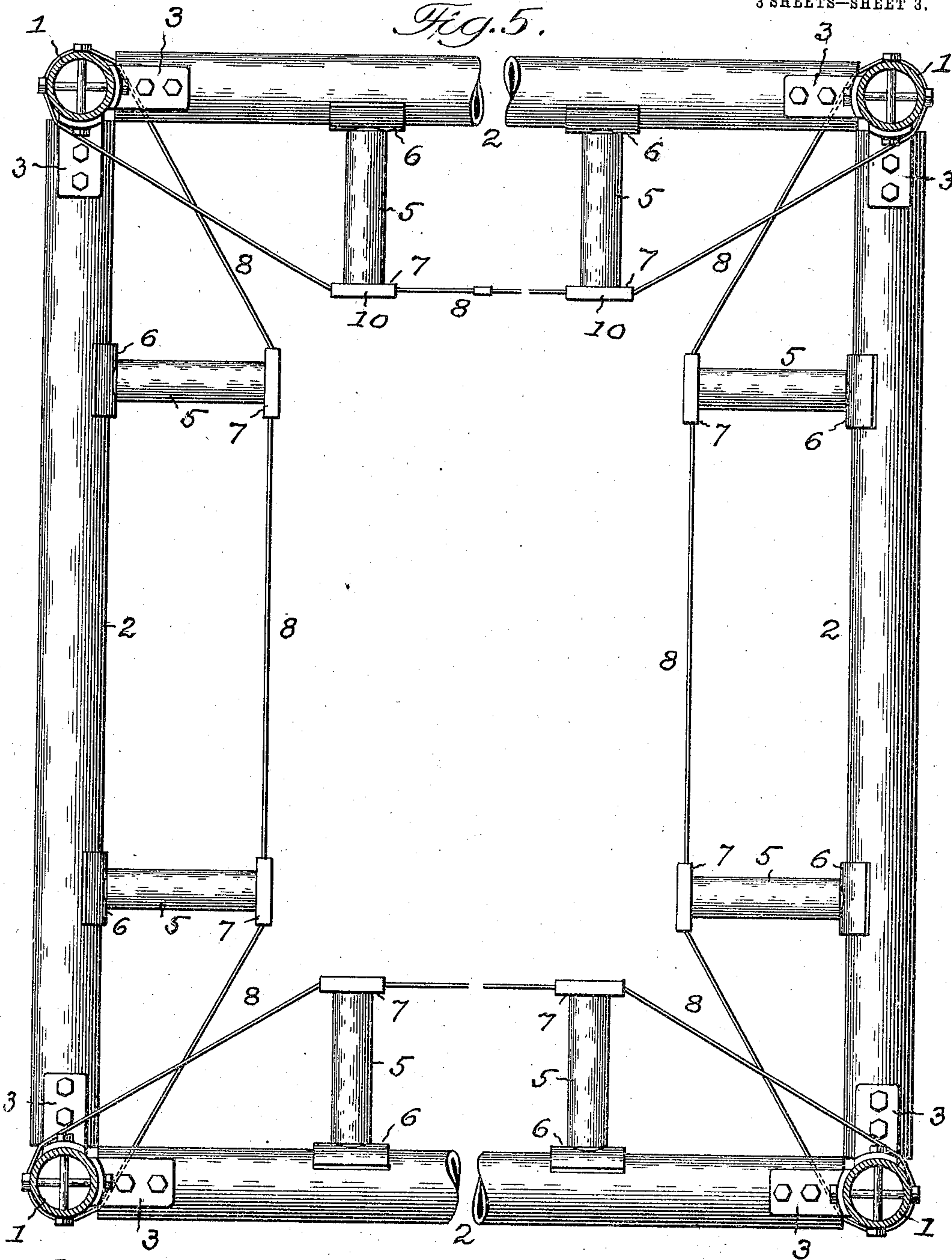


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# UNITED STATES PATENT OFFICE.

GEORGE M. GRAHAM, OF CHICAGO, ILLINOIS, ASSIGNOR TO G. A. EDWARD KOHLER, OF CHICAGO, ILLINOIS.

## REINFORCED CONCRETE STRUCTURE.

No. 919,714.

Specification of Letters Patent.

Patented April 27, 1909.

Application filed March 9, 1908. Serial No. 419,856.

*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 Reinforced Concrete Structures, of which the following is a specification.

This invention relates to that class of skeleton reinforcing frames for reinforced concrete structures, in which a series of wires or rods are applied under tension to the border members of such frame to constitute reinforcing skeleton centers for the concrete mass which forms the body portion of the walls, floors, etc., of the structure. And the present invention has for its object to provide a simple and economical structural arrangement and combination of the skeleton reinforcing frame parts whereby strength is imparted to the frame members to resist lateral stress and deflection due to the tension of the skeleton reinforcing center, and the weight of the concrete mass carried in turn by said center, all as will hereinafter more fully appear.

In the accompanying drawings:—Figure 1, is a detail vertical section of the side walls and floor of a building, with the present improvement applied. Fig. 2, is a detail perspective view of a corner portion of the reinforcing frame. Fig. 3, is a detail vertical section of the same. Fig. 4, is a detail vertical section of a modification. Fig. 5, is a plan view of the skeleton reinforcing frame of a building unit, before the skeleton wire or rod center is applied thereto.

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

Referring to the drawings, 1 represents a series of four columns, constituting the support for a building unit, and to which are secured a series of four horizontal girders 2, in manner hereinafter more particularly described, to constitute the rectangular border frame of such unit. And around which border frame windings 3 of wire in crossed relation are placed under tension to constitute the skeleton reinforcing center of such building unit, as set forth in detail in my prior patent No. 865490 of September 10, 1907.

4 are angle coupling pieces securing the series of girders 2 to the series of columns 1 in manner set forth in detail in my companion

ion application for patent Serial Number 55 419,857 filed March 9, 1908.

With the described type of skeleton reinforcing frame units excessive size and weight in the girders were required to impart sufficient lateral rigidity to resist the excessive lateral strain of the aforesaid windings under tension, as well as the weight of the concrete mass applied to the skeleton center formed by such windings.

With a view to provide a small, light and economical girder adapted to effectively resist the lateral stress above mentioned, the present invention involves a construction as follows:—5 are pairs of lateral struts arranged in spaced relation and provided at their inner ends with curved shoes 6, having bearing upon the curved sides of the girders 2, and capable of longitudinal sliding adjustments thereon for the purpose hereinafter set forth. At their other ends said struts are provided with bearing shoes 7 upon which tension members, now to be described, have bearing to form in connection with said struts, lateral trusses for the series of four girders comprising one of the building units above referred to. 8 are multiple wires or rods constituting the tension members of the truss above referred to. Such wires or rods have bearing upon the shoes 7 of the truss struts 5 and are in parallel relation to the girders; while the end portions of said wires or rods extend diagonally from the shoes 7 to the corner columns 1, and are secured thereto in any suitable manner, preferably by being wrapped around the same.

In the present invention, the multiple wires or rods forming the tension truss members for the four girders of the aforesaid building unit, are formed by a continuous wire or rod rove over the entire series of bearing shoes 7, and around the series of columns 1, with the respective ends of such wires or rods secured together, or to a fixed part of the structure in any usual manner. Such manner of forming the tension members affords a very economical construction, the unsightliness of which is hidden from view by the mass of concrete in which it is embedded. In practice the windings forming such tension members are loosely and evenly applied after which the desired degree of tension in said members is readily attained by driving the struts 5 toward the ends of the girders.



A minor feature of the present invention involves the formation of the bearing shoes 7 with convex faces 9 adapted to deflect the tension members 8 outwardly against the marginal side flanges 10 of said shoes, to impose a separated relation on the two groups of wires which together constitute the tension member of an individual girder.

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

1. In a reinforcing frame for concrete structures, the combination of a series of four columns constituting the corners of a building unit, a series of four girders secured thereto, a series of four trusses for said girders comprising lateral struts having bearing against said girders and projecting toward the center of the building unit and a series of tension members secured to the columns and having bearing on the outer ends of said struts, said tension members being continuous around the frame, and windings of wires around and between opposed girders to constitute the skeleton center of the building unit.

2. In a reinforcing frame for concrete structures, the combination of a series of four columns constituting the corners of a building unit, a series of four girders secured thereto, a series of four trusses for said girders comprising lateral struts having bearing against said girders and projecting toward the center of the building unit and a multiple series of wires or rods secured to the columns and having bearing on the outer ends of said struts, said series of wires or rods being continuous around the frame, and windings of wire around and between opposed girders to constitute the skeleton center of the building unit.

3. In a reinforcing frame for concrete structures, the combination of a series of four columns constituting the corners of a building unit, a series of four girders secured thereto, a series of four trusses for said girders comprising lateral struts having bearing against said girders in a longitudinally adjustable manner and projecting toward the center of the building unit and a series of tension members secured to the columns and having bearing on the outer ends of said struts said tension members being continuous around the frame, and windings of wire around and between opposed girders to constitute the skeleton center of the building unit.

4. In a reinforcing frame for concrete structures, the combination of a series of four columns constituting the corners of a building unit, a series of four girders secured thereto, a series of four trusses for said girders comprising lateral struts having bearing against said girders in a longitudinally adjustable manner and projecting toward the

center of the building unit and a multiple series of wires or rods secured to the columns and having bearing on the outer ends of said struts, said series of wires or rods being continuous around the frame, and windings of wire around and between opposed girders to constitute the skeleton center of the building unit.

5. In a reinforcing frame for concrete structures, the combination of a series of four columns constituting the corners of a building unit, a series of four girders secured thereto, a series of four trusses for said girders comprising lateral struts having bearing against said girders and projecting toward the center of the building unit and a series of tension members wound around the columns and having bearing on the outer ends of said struts, said tension members being continuous around the frame, and windings of wires around and between opposed girders to constitute the skeleton center of the building unit.

6. In a reinforcing frame for concrete structures, the combination of a series of four columns constituting the corners of a building unit, a series of four girders secured thereto, a series of four trusses for said girders comprising lateral struts having bearing against said girders and projecting toward the center of the building unit and a multiple series of wires or rods wound around the columns and having bearing on the outer ends of said struts, said series of wires or rods being continuous around the frame, and windings of wires around and between opposed girders to constitute the skeleton center of the building unit.

7. In a reinforcing frame for concrete structures, the combination of a series of four columns constituting the corners of a building unit, a series of four girders secured thereto, a series of four trusses for said girders comprising lateral struts having bearing against said girders in a longitudinally adjustable manner and projecting toward the center of the building unit and a series of tension members wound around the columns and having bearing on the outer ends of said struts, said tension members being continuous around the frame, and windings of wire around and between opposed girders to constitute the skeleton center of the building unit.

8. In a reinforcing frame for concrete structures, the combination of a series of four columns constituting the corners of a building unit, a series of four girders secured thereto, a series of four trusses for said girders comprising lateral struts having bearing against said girders in a longitudinally adjustable manner and projecting toward the center of the building unit and a multiple series of wires or rods wound around the columns and having bearing on the outer ends of



said struts, said series of wires or rods being continuous around the frame, and windings of wire around and between opposed girders to constitute the skeleton center of the building unit.

9. In a reinforcing frame for concrete structures, the combination of end columns, a girder extending between the same, and a truss for said girder comprising lateral struts having bearing against said girder and provided with shoes on the outer ends of the struts and having convex bearing faces and marginal flanges extending outwardly away from the struts and in the same direction in which the bearing surface is convexed, and a multiple series of wires or rods secured to the columns and having bearing on the outer ends of said struts.

10. In a reinforcing frame for concrete structures, the combination of end columns, a girder extending between the same, and a truss for said girder comprising lateral struts having bearing against said girder in a longitudinally adjustable manner and provided with shoes on the outer ends of the struts and having convex bearing faces and marginal flanges extending outwardly away from the struts and in the same direction in which the bearing surface is convexed and a multiple series of wires or rods secured to the columns and having bearing on the outer ends of said struts.

11. In a reinforcing frame for concrete

structures, the combination of end columns, a girder extending between the same, and a truss for said girder comprising lateral struts having bearing against said girder and provided with shoes on the outer ends of the struts and having convex bearing faces and marginal flanges extending outwardly away from the struts and in the same direction in which the bearing surface is convexed, and a multiple series of wires or rods wound around the columns and having bearing on the outer ends of said struts.

12. In a reinforcing frame for concrete structures, the combination of end columns, a girder extending between the same, and a truss for said girder comprising lateral struts having bearing against said girder in a longitudinally adjustable manner and provided with shoes on the outer ends of the struts and having convex bearing faces and marginal flanges extending outwardly away from the struts and in the same direction in which the bearing surface is convexed and a multiple series of wires or rods wound around the columns and having bearing on the outer ends of said struts.

Signed at Chicago, Illinois this 29th day of February 1908.

GEORGE M. GRAHAM.

Witnesses:

ROBERT BURNS,  
HENRY ULOE.