

No. 865,488.

PATENTED SEPT. 10, 1907.

G. M. GRAHAM.
BUILDING GIRDER AND COLUMN.

APPLICATION FILED DEC. 27, 1906.

2 SHEETS—SHEET 1.

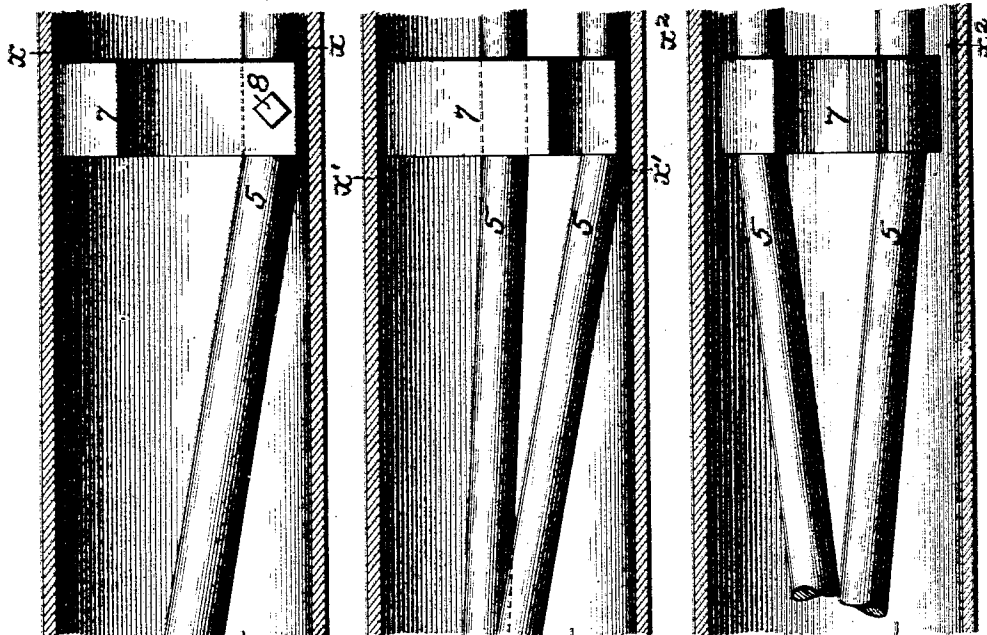
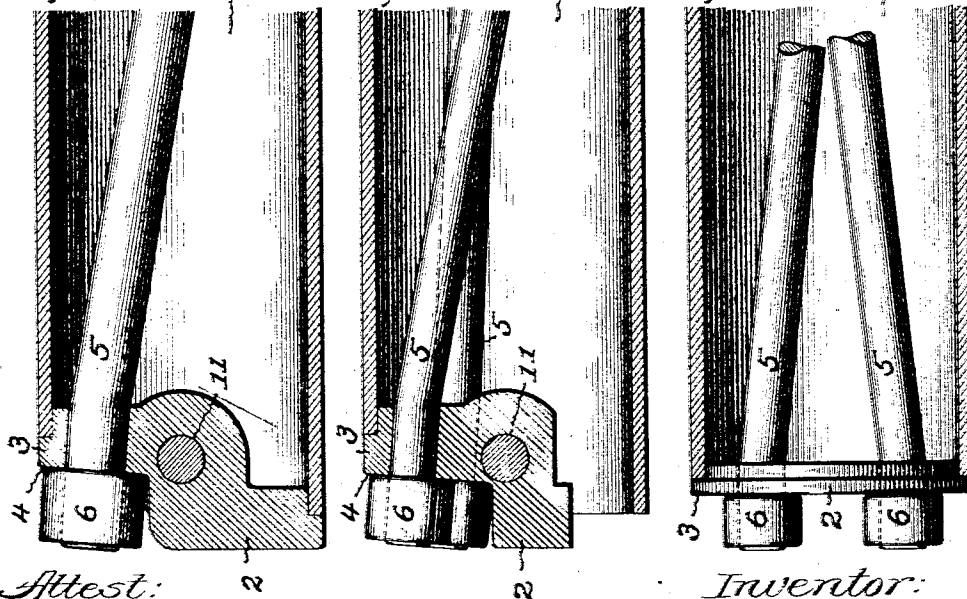


Fig. 1.

Fig. 2.

Fig. 3.



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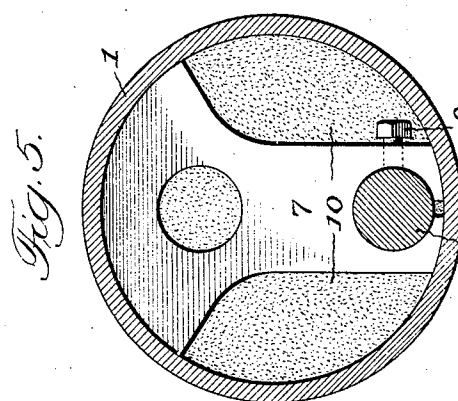
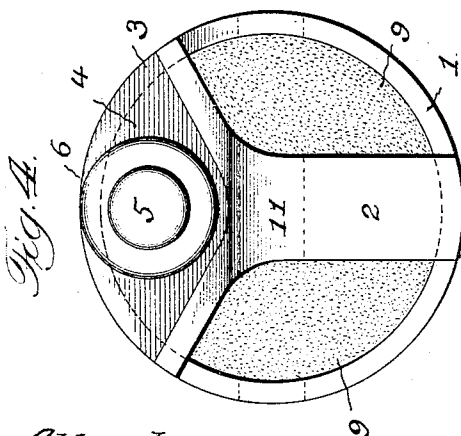
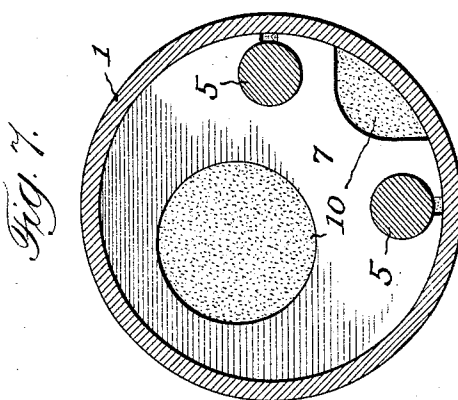
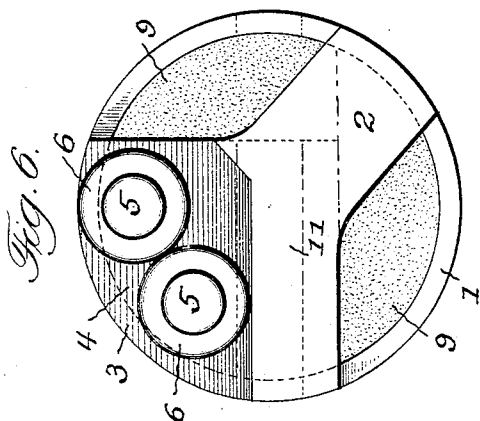
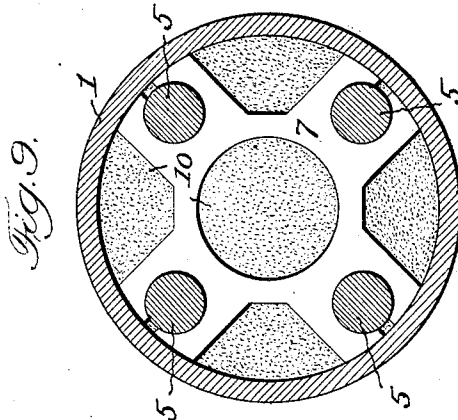
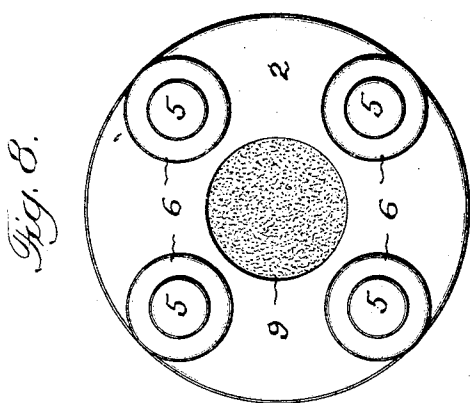
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2 SHEETS—SHEET 2.



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UNITED STATES PATENT OFFICE.

GEORGE M. GRAHAM, OF CHICAGO, ILLINOIS, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO G. A. EDWARD KOHLER, OF CHICAGO, ILLINOIS.

BUILDING GIRDER AND COLUMN.

No. 865,488

Specification of Letters Patent.

Patented Sept. 10, 1907.

Application filed December 27, 1906. Serial No. 349,682.

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 Building Girders and Columns, of which the following is a specification.

This invention relates to that type of tubular building girders and columns having a plain exterior in which bracing means is arranged in the interior of the article to strengthen the same against lateral strains and flexure; and the present improvement has for its object to provide a simple and efficient structural arrangement and combination of the bracing members wholly within the interior of the girder or column whereby a maximum degree of strength is attained with a minimum amount of material, and with which the exterior of the girder or column from end to end is left of an even and plain form adapted for easy and substantial attachment to the fittings by which said girders and columns are connected to other members of the metal reinforce frame of concrete building structures and the like, all as will hereinafter more fully appear.

In the accompanying drawings:—Figures 1, 2 and 3 are detail longitudinal sections, illustrating respectively the primary, intermediate and the more complex forms of the present invention. Figs. 4, 6 and 8, are end elevations of the constructions shown in Figs. 1, 2 and 3 respectively. Figs. 5, 7 and 9 are transverse sections on line $x-x$; $x'-x'$ and x^2-x^2 Figs. 1, 2 and 3 respectively.

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

Referring to the drawings, 1 represents the tubular body or shell of the girder or column, usually circular in cross-section and preferably formed from a section of wrought metal tubing of the required length and diameter.

2, are end heads fitting the respective ends of the tubular bore of the body or shell 1, and provided with annular flanges 3, which have bearing against the ends of the body or shell 1. Such heads may be of the plate form shown in Fig. 3, but for many locations, each of said heads will be formed with an offset 4 at one side for the reception of the screwnuts of the tension member hereinafter described, and with such construction each end of the body or shell 1 will be formed with a corresponding offset, as shown more particularly in Figs. 1 and 2.

5, are one or more tension rods or members extending from end to end of the shell 1, and provided at their respective ends with heads or nuts 6, by means of which bearings are had against the outer end faces of the afore-

said end heads; said nuts 6 preferably occupy the before described offset 4, of the end heads.

7, are strut pieces or collars arranged within the bore of the girder or column, near the mid-length of the same, and preferably arranged so that a diagonal position will be imposed on the respective end portions of the tension rods or members 5. Such strut pieces fit the bore of the girder or column, and are provided with suitable orifices for the passage of the tension rods or members 5, and may be attached thereto by set screws 8, to prevent independent movement between the parts.

A material part of the present invention consists in the connection of the respective ends of the tension rods 5 to the end heads near the margins thereof, and the deflection of said tension rods in a diagonal direction across the longitudinal axis of the girder or column to near the margin of an intermediate strut 7, as shown; such arrangement affording a maximum bracing effect with a minimum amount of material.

9, are a series of apertures through the end heads 2; and 10 are similar apertures in the strut pieces or collars 7, for the convenient introduction of a filling of concrete into the interior of the girder or column when the same is desired and with a view to afford greater lateral strength, as well as to provide greater resistance against lateral flexure when exposed to fire.

11, are transverse orifices formed in the end heads 2, and in the portions of the body or shell 1 adjacent to said heads, such orifices are intended to afford passages for the bolts by which the ends of the girder or column are held in place in the fittings which connect a girder or column with adjacent members of the reinforced metal frame of a concrete building structure, as fully set forth in my companion applications for Letters Patent Serial Numbers 349,683 and 349,684 filed of even date herewith.

The scope of the present invention includes the use of a single tension rod or member 5, or a multiplicity of the same within a girder or column, as well as the positioning of said tension rods or members with relation to each other, as the judgment of the constructor may direct as best subserving the functions of the present invention.

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

1. The combination of a main shell, heads arranged at each end of the same, and one or more tension members arranged within said shell and extending diagonally across the longitudinal axis thereof and connected to said heads near the margins thereof substantially, as set forth.

2. The combination of a main shell, heads arranged at each end of the same, one or more tension members ar-

- 5 ranged within said shell and extending diagonally across the longitudinal axis thereof and connected to said heads, near the margins thereof and a strut arranged within the shell intermediate of its length and adapted to maintain said tension member or members in the diagonal relation aforesaid, substantially as set forth.
- 10 3. The combination of a main shell, apertured heads arranged at each end of the same, and one or more tension members arranged within said shell and extending diagonally across the longitudinal axis thereof and connected to said heads, near the margins thereof substantially as set forth.
- 15 4. The combination of a main shell, apertured heads arranged at each end of the same, one or more tension members arranged within said shell and extending diagonally across the longitudinal axis thereof and connected to said heads, near the margins thereof and an apertured strut arranged within said shell intermediate its length and adapted to maintain said tension member or members in the diagonal relation aforesaid, substantially as set forth.
- 20 5. The combination of a main shell, offset heads arranged at each end of the same, and one or more tension

members arranged within said shell and connected to said heads by nuts or heads occupying the offset portions of the heads aforesaid, substantially as set forth. 25

6. The combination of a main shell, offset heads arranged at each end of the same, and one or more tension members arranged diagonally within said shell and connected to said heads by nuts or heads occupying the offset portions of the heads aforesaid, substantially as set forth. 30

7. The combination of a main shell, offset heads arranged at each end of the same, one or more tension members arranged within said shell and connected to said heads by nuts or heads occupying the offset portions of the heads aforesaid, and a strut arranged within the shell and adapted to a diagonal position upon said tension member or members, substantially as set forth. 35

Signed at Chicago, Illinois, this 19th day of December, 1906.

GEORGE M. GRAHAM.

Witnesses:

ROBERT BURNS,
HENRY MOE.