

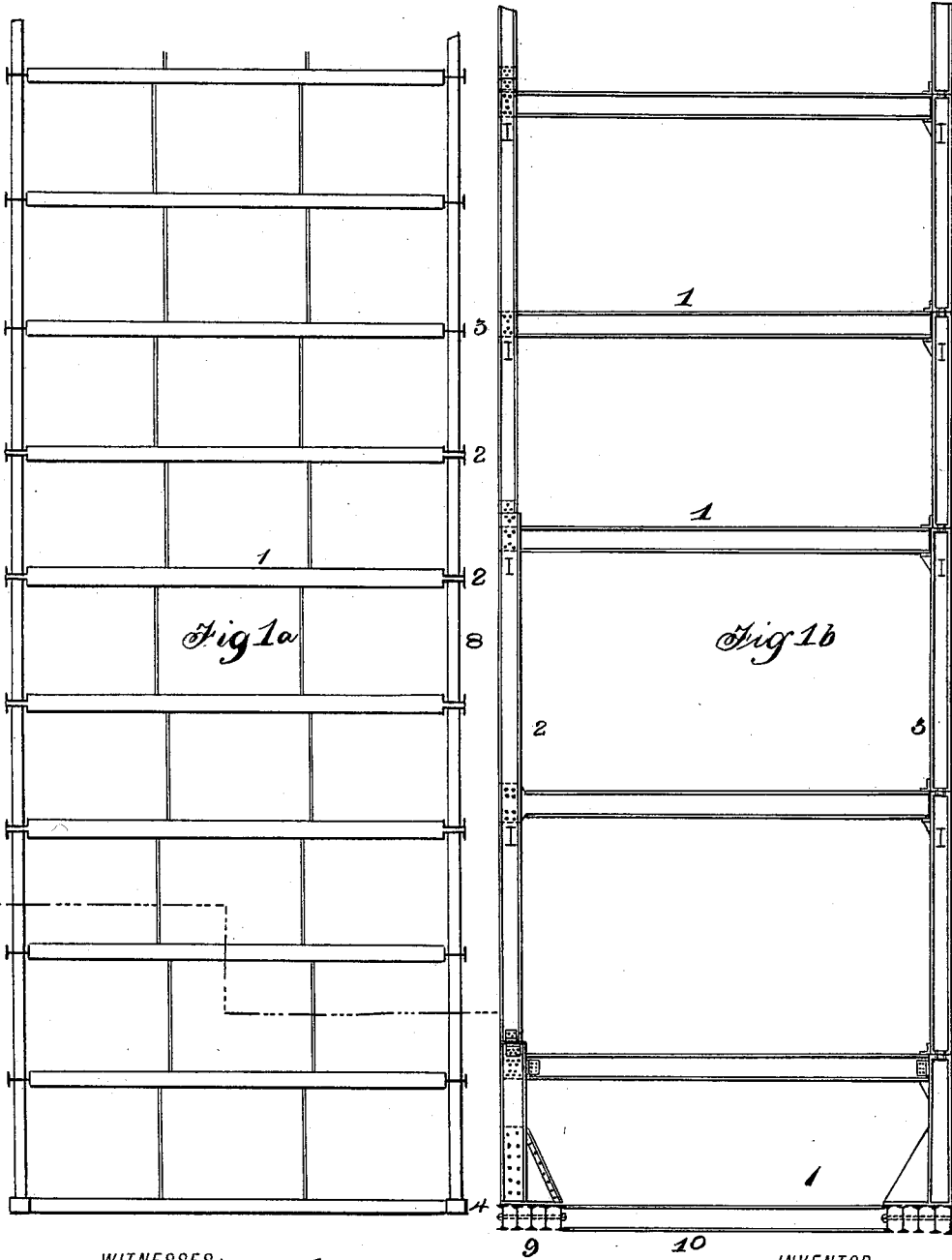
(No Model.)

3 Sheets--Sheet 1.

G. B. WAITE.
CONSTRUCTION OF BUILDINGS.

No. 596,345.

Patented Dec. 28, 1897.



WITNESSES:

Geo. H. Snyder
Arthur Berbold

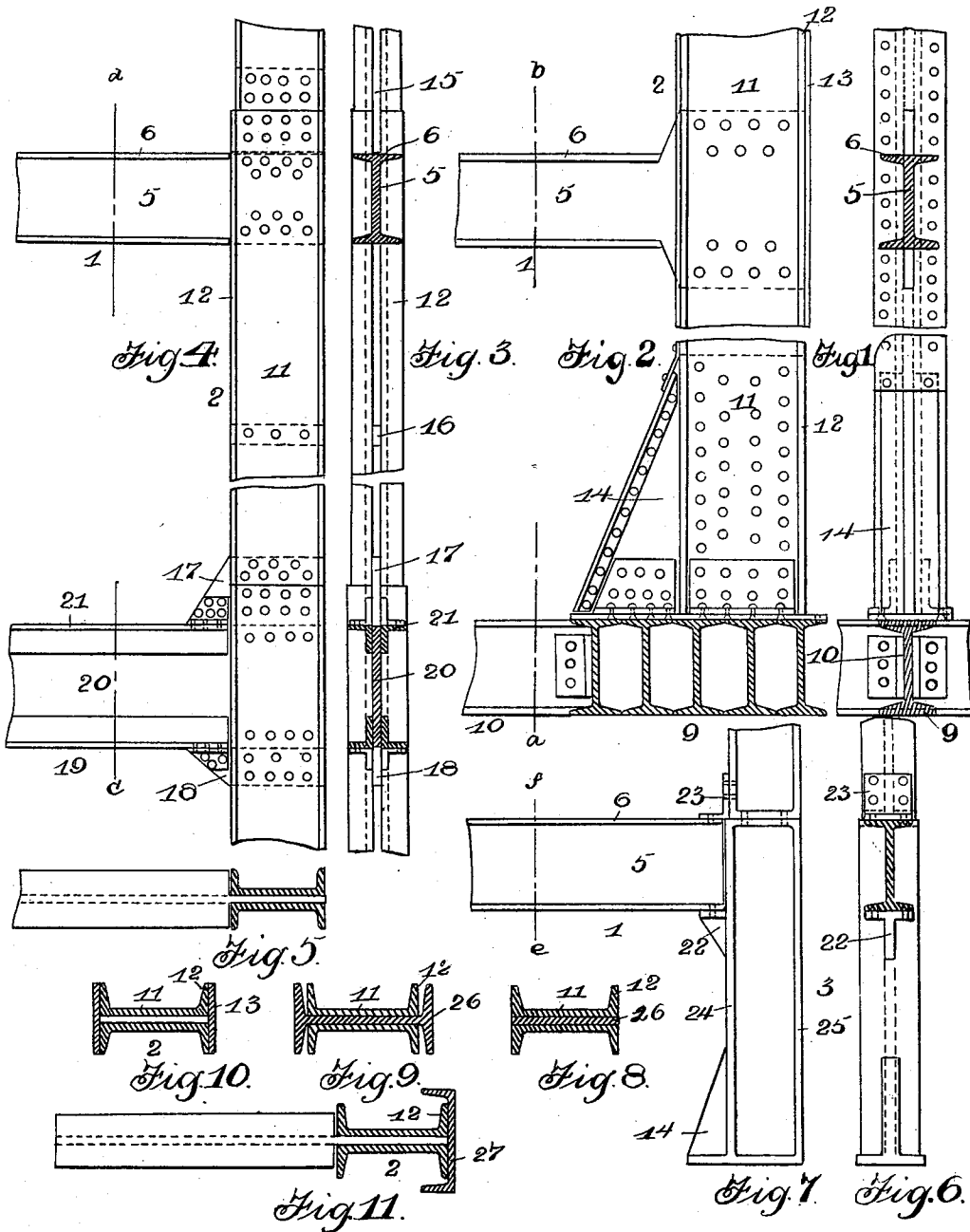
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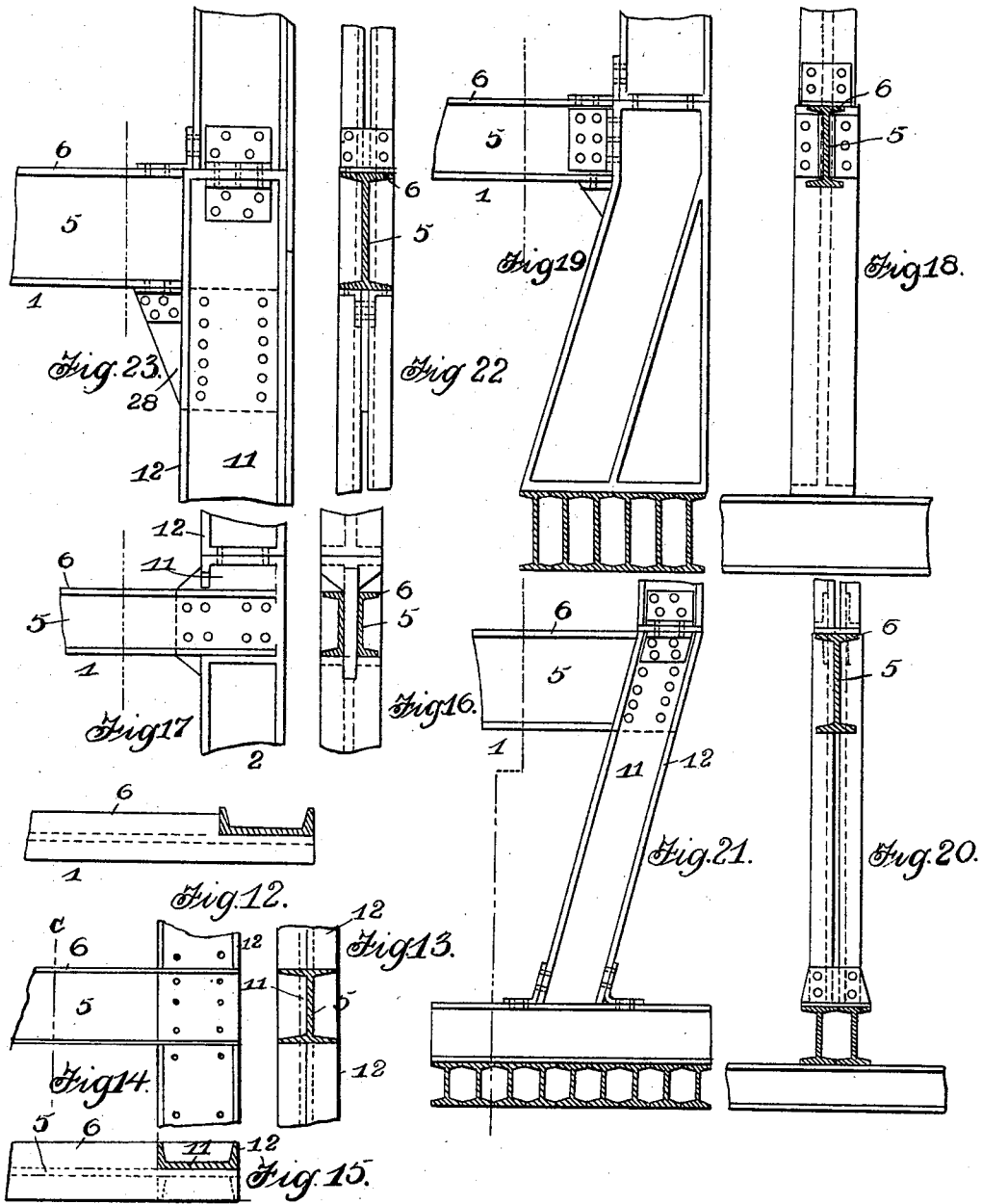
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UNITED STATES PATENT OFFICE.

GUY B. WAITE, OF HOBOKEN, NEW JERSEY.

CONSTRUCTION OF BUILDINGS.

SPECIFICATION forming part of Letters Patent No. 596,345, dated December 28, 1897.

Application filed July 25, 1896. Serial No. 600,460. (No model.)

To all whom it may concern:

Be it known that I, GUY B. WAITE, a citizen of the United States, residing at Hoboken, in the county of Hudson and State of New Jersey, have invented certain new and useful Improvements in the Construction of Buildings; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to figures of reference marked thereon, which form a part of this specification.

My invention relates to a new and improved form of iron-and-stud skeleton construction for buildings, especially adapted to narrow buildings where the supporting-columns are located within the outer walls. In the present systems of construction for such buildings the columns are spaced from twelve to sixteen feet apart and the floor-loads are carried to the columns through a double system of floor members consisting of beams, which take the floor-loads to girders, the latter carrying these loads to the columns. In my system of construction, but a single system of floor members for carrying loads is used, each carrying member of the floor construction extending directly across the building and bearing upon independent columns, each of the floor members and its supporting-columns forming an independent part of the system of construction. The columns are spaced at convenient distances apart to insert fireproof arches between the floor members, which spacing usually ranges from six to eight feet for this kind of construction as now used.

Narrow buildings such as here described when carried to considerable height present difficult engineering problems to make a construction which shall be perfectly rigid and capable of resisting lateral forces to which the building may be subjected, such as wind-pressures, together with the weight of the structure itself, also to properly distribute the resulting loads over the foundations.

My invention is designed to accomplish the desired objects, first, by the use of columns especially designed for lateral strength; second, by the introduction of especial construc-

tions between columns and floor members, giving increased lateral strength to the structure, and having the center of construction near the centers of gravity of the parts connected, thus avoiding eccentricity of bearing when the loads are carried on one side of the column only; third, by placing the columns closely together, so that floor-loads may be carried directly to the columns without transferring the former fore and aft of the building to reach the latter, also so that when the aggregate column-loads reach the foundations they will be more nearly distributed than could otherwise be accomplished. The columns which it is preferable to use in this form of construction have sections which have the greatest strength crosswise of the building and which present simple forms to construct, so that the increase in the number of columns as compared to present systems shall not be objectionable.

In the accompanying drawings, Figure 1^a is a plan, and Fig. 1^b is a section, showing my construction in general application to a narrow building down to a scale of about one-eighth of an inch to one foot. Figs. 1 and 2 represent a typical column and floor-beam connection as preferable to be used in this form of construction and the connection of column-footing to foundation. Figs. 3, 4, and 5 also represent desirable floor-beams and column connections to be used in my construction. Figs. 6 and 7 show the floor-beam resting on the side of a cast-iron column 1, Fig. 1^a, and the footing of the column for bearing on a foundation. Figs. 8, 9, 10, and 11 show various ways of increasing the sectional area of stud-columns 2, Fig. 1^a, besides using different-sized channels with various thicknesses. Fig. 12 shows a column having flanges in one direction only, with floor-beam attached to flat side. Figs. 13, 14, and 15 show a column composed of channels brought tightly together back to back and the attachment to floor-beam and the column. Figs. 16 and 17 show a floor-beam or girder composed of two channels in place of a single beam attached to a cast-iron column especially prepared to permit of a central connection. Figs. 18 and 19 show a foundation cast-iron column directed so as to distribute column-load over foundation-beams and a

connection of the floor-beam with column to take the tension caused by the eccentric column bearing on the foundation. Figs. 20 and 21 show a foundation steel column 2, Fig. 1^a, directed to the center of foundation-beams and the connection of floor-beam with the column to take the tension caused by the inclined direction of the column. Figs. 22 and 23 show the floor-beam carried on a slide-bracket of the column 2, Fig. 1^a, instead of connection as shown in Figs. 1, 2, 3, and 4.

In Figs. 1^a and 1^b floor-beams 1 extend crosswise of the building and rest upon or are attached to columns 2, 3, and 4. Columns 2 are composed of two rolled steel or iron sections known as "channel-irons." Columns 3 are of cast-iron of a general section preferable to be used in this character of construction. Column 4 is the ordinary rectangular cast-iron column.

7 are ordinary tie-rods to keep beams from spreading.

8 are fore and aft wall-beams or guides.

7 and 8 do not form a part of my invention.

9 in Fig. 1^a are foundation-beams now often used in steel building construction.

10 is a cross-beam or strut built between beams 9 to prevent the moving of latter beams due to eccentric loading of columns. (See Figs. 1 and 2.)

In Figs. 1 and 2, 1 represents a floor-beam connected to a column composed of two channels and two flange-plates. (See Fig. 10.) The flanges 6 of floor-beam are here shown as hammered or rolled down flat where passing between the webs 11 of channels composing columns 2. Bolts or rivets passing through webs 11 of channels and 5 of beam bring them into close contact with each other.

14, Figs. 1 and 2, is a footing-bracket formed by continuing the web-plate of the bracket between the web 11 of channels composing column 2 for the purpose of carrying column-load over foundation-beams 9. To prevent the moving of latter beams due to eccentric loading of columns, see Figs. 1 and 2.

In Figs. 3 and 4 flanges 6 of floor-beams are cut off when web 5 of beam passes between webs 11 of channel-iron composing the column. Bolts or rivets passing through the web of beam and column channels bring their surfaces in close contact.

16 are separating-plates inserted at intervals along the webs of channel-iron columns to keep them rigid.

19 shows a floor-beam composed of rolled members riveted together, with web 20 extending between and fastened to web 11 of channels composing columns.

17 and 18 are brackets for stiffening the construction formed by extending web-plate of brackets between and fastened to webs 11 of column.

In Figs. 6 and 7 floor-beam 1 is attached to cast-iron column 3 by resting on side bracket 22 and bolted to top angle 23.

14, Figs. 6 and 7, shows a bracket for distributing column-load over the foundation.

Flange 24 of column 3, Fig. 7, shows an increased thickness of metal to counteract the eccentric load applied to column.

Figs. 8, 9, 10, and 11 show means for increasing the area of the columns in various ways, Fig. 8 by means of a central plate, Fig. 9 by the insertion of an I-beam between the webs and channels composing the simple column, Fig. 10 by cross-plates on the flanges 13 of channels, and Fig. 11 by a third channel 27, riveted to the flanges 12 of channels composing the simple column.

In Fig. 12 web 6 of floor-beam is cut off or hammered flat on one side only, and the flange of the beam is connected to the flange of the channel, as shown in Figs. 3 and 4.

In Figs. 13, 14, and 15 is shown a column composed of channels with web 11 brought in close contact by riveting, and when the floor-beam is to be connected to said column one channel is left off, as shown in Figs. 13 and 15. When the floor-beams join column, one flange 6 of the floor-beam is cut and web 5 is brought in close contact with web 11 of channel-iron by bolts or rivets.

In Figs. 16 and 17 is shown a cast-iron column with provision made to give a central bearing and connection with the floor-beam. Flange 12 of the column is left off where the floor-beam or girder is to connect, and when channels are used for the floor-beams webs 5 of channels bear against web 11 of column and are brought in contact therewith by bolts or rivets.

If an eye-beam be used in place of channel-irons for the floor-beam in Figs. 16 and 17, one flange of the floor-beam will be cast similarly to 6, Fig. 12, and the webs of floor-beam and column be brought in contact with each other by bolting.

In Figs. 18 and 19 the cast-iron column diverges from the point of attachment of the floor-beam 1, so as to distribute its load over the foundation without causing a bending in the column itself due to eccentric footing 14, Fig. 7.

In Figs. 20 and 21 the steel channel-iron column 2, Fig. 1^a, when resting on the foundation, is shown inclined to the center of the foundation in order to economically distribute the loads without the eccentricity of column-footing incidental to 14, Fig. 2. The web 5 of floor-beam 1, Fig. 21, is shown carried between webs 11 of channel-irons and connected therewith by bolts or rivets.

Figs. 22 and 23 show a channel-iron column 2, Fig. 1^a; but instead of web 5 of floor-beam 1 being carried between webs 11 of channels the entire beam stops at the front flanges 12 of the column, and these rest upon brackets 28, formed by an extending plate between and fastened to the webs 11 of the channel-irons composing the column. I do not restrict myself entirely to the use of this form

of construction when the columns are located in the outer walls, as the same system may be applied with advantage to other parts of buildings when columns can be spaced at proper distances apart, and the manner of connecting webs of beams to columns will materially add to the stiffness of the building.

It is not intended that the different illustrations here shown cover all the combinations which can be made with present forms and sections of material, such as will readily suggest themselves to those conversant with steel and iron construction, and may be employed in various ways in the form of construction here set forth.

In the examples of columns given the sections made of rolled shapes present the simplest forms of steel-column construction which fulfil the conditions, (see Figs. 1, 2, 3, and 4,) and in the I-shaped cast-iron columns (see Figs. 6 and 7) the simplest castings and workmanship only are necessary. In connection with this construction it may often be preferred to carry the floor members on one side of the columns, (see Figs. 6, 7, 22, and 23,) in which case provision is introduced for overcoming the eccentricity of such loading by increasing the sectional area of column-flange nearest the bearing. (See Fig. 7.)

Provision is made for the proper distribution of column-loads over foundations when such loads would become eccentric to foundations if columns were carried directly down. This is done by expanding or pointing the column in the direction it is desired to distribute the load (see Figs. 1, 2, 6, 7, 18, 19, 20, and 21) and so connecting the column to the floor member at its top and to the foundation-beams at its foot that the tensile and compressive stresses thus induced will be taken up.

It will be noted that in my improved structure the body portions or webs of the floor members extending across the building are arranged substantially in the same vertical plane as the corresponding portions of the flanged or webbed beams composing the side-line columns. By virtue of this construction I secure maximum stiffness or strength in resisting lateral pressure. It will be further noted that each floor member, together with its connecting side-line columns, comprises, practically, a vertical truss, and that where this arrangement is carried out in consecutive stories such truss-like effect is utilized throughout the same.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent of the United States, is—

1. In metallic framework for high skeleton-constructed buildings comprising several

stories, the combination of flanged or webbed metallic floor members extending across the building from side to side thereof throughout consecutive stories thereof, and flanged or webbed metallic side-line columns, such as flanged beams, I-beams or channel-irons, located at the sides of the building, and having the webs of each of said columns disposed in a vertical plane extending crosswise of the building for stiffening the structure laterally, one of said side columns being placed at each end of each of said floor members and connected directly therewith with their webs substantially in the same vertical plane and forming together therewith practically a continuous vertical truss for resisting lateral pressure upon the structure, the columns which connect and support the ends of the floor members which lie in the same vertical plane themselves constituting practically a continuous column extending vertically throughout consecutive stories of said structure, whereby the floor-load sustained directly by any one floor member is directly sustained by said webbed side-line columns connected therewith, substantially as and for the purpose set forth.

2. In metallic framework for buildings, the combination of webbed metallic floor members having the ends of the webs free from projections and adapted to make close and rigid contact, and adjacent composite columns comprising two sections for supporting said members, the free ends of the webs of said floor members being interposed centrally between the two said sections composing said columns and being fixedly bolted or fastened in close and flat contact therewith, substantially as and for the purpose set forth.

3. In metallic framework for buildings, the combination of a single system of metallic floor members each extending across the building from side to side thereof, and individual columns located at the sides of the building for supporting the respective ends of said floor members, and a set of inclined foundation-columns having their upper ends placed substantially directly beneath the lower ends of said individual columns and their lower ends placed a considerable distance within the side lines of the building for distributing the load upon the foundation, substantially as and for the purpose set forth.

In testimony that I claim the invention set forth above I have hereunto set my hand this 27th day of April, 1896.

GUY B. WAITE.

Witnesses:

OSCAR A. MICHEL,
GEO. H. SNYDER.