(No Model.) 2 Sheets—Sheet 1.

# J. S. ADAMS.

## SKELETON TOWER.

No. 297,337. Patented Apr. 22, 1884.

Fig. 1.

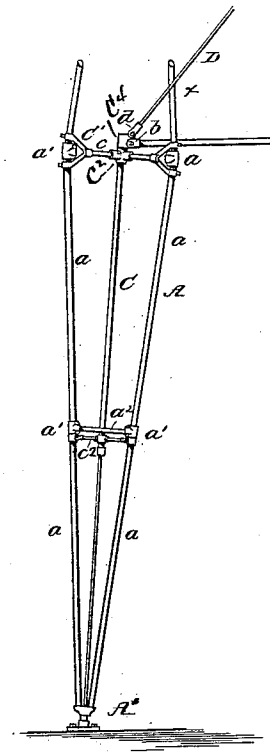
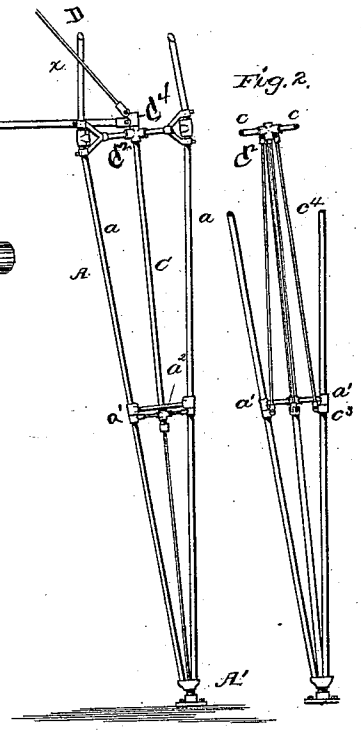



Fig. 2.



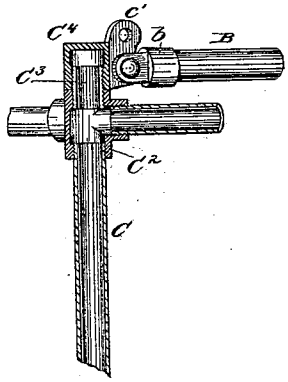




Fig. 5.

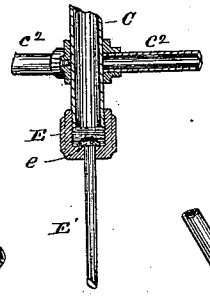



Fig. 3.

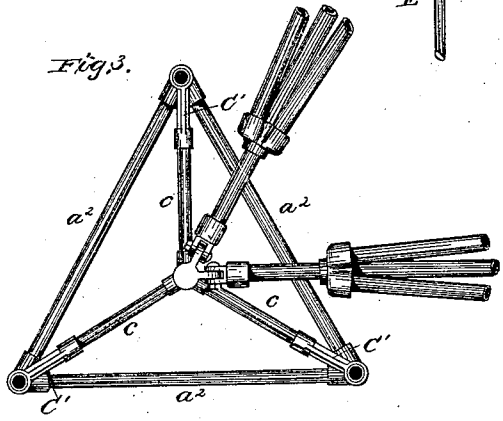
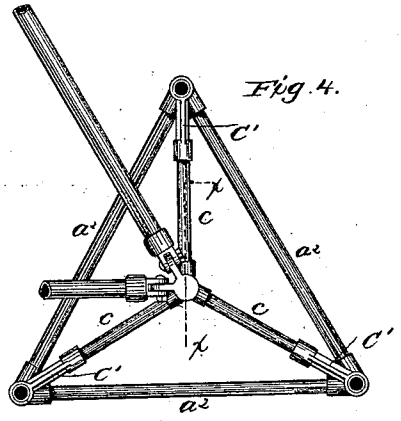



Fig. 4.




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(No Model.) 2 Sheets—Sheet 2.

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## SKELETON TOWER.

No. 297,337. Patented Apr. 22, 1884.

Fig. 6.

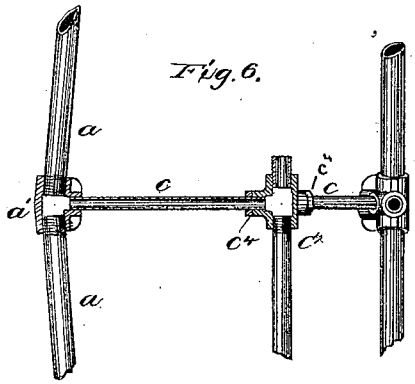



Fig. 7.

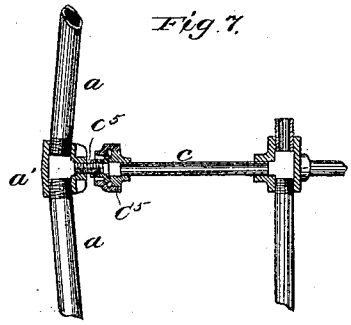



Fig. 8.

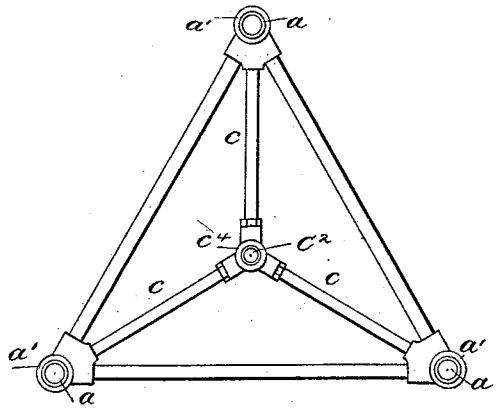
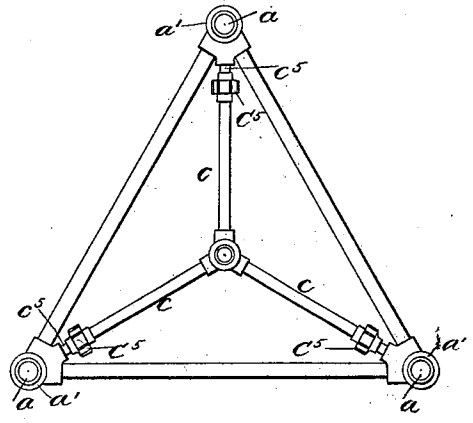



Fig. 9.




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# UNITED STATES PATENT OFFICE.

JOHN S. ADAMS, OF ELGIN, ILLINOIS, ASSIGNOR TO THE DETROIT IRON TOWER COMPANY, OF DETROIT, MICHIGAN.

## SKELETON TOWER.

SPECIFICATION forming part of Letters Patent No. 297,337, dated April 22, 1884.

Application filed May 31, 1883. Renewed March 17, 1884. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN S. ADAMS, of Elgin, in the county of Kane and State of Illinois, have invented certain new and useful Improvements in Skeleton Iron Towers; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to the class of skeleton iron towers in which the uprights, or the lowermost section of such uprights, are themselves of a composite skeleton order of structure.

The object of the invention is to provide in such members of the tower means for attaching the braces or girts thereto between the ends and in the axis of said upright members, so that the resulting strain will be more uniformly distributed throughout all parts of said members and additional strength thereby given to the tower.

The invention is herein illustrated in connection with composite base-sections of a tower in which horizontal girts join the middle point of said upright sections, and in which the lowermost diagonal braces of the tower have the same points of attachment as the girts, instead of running to the lower extremities of the uprights, in order to afford unobstructed passage beneath the tower. The invention is, however, adapted to other than the lowermost tower-sections when the uprights thereof are of the composite order referred to, and when it is desired to connect girts or braces therewith between the ends of said upright sections.

In the drawings, Figure 1 is a fragmentary view, in side elevation, of the base of a skeleton iron tower in which the lowermost sections of the uprights are of the compound structure herein referred to, and in which the horizontal girt and diagonal brace are connected to the middle of said base-uprights by means of the devices which are the subject of this invention. Fig. 2 is a modification in some respects of the construction shown in Fig. 1. Fig. 3 is a horizontal section of the compound uprights, taken immediately above the point of attachment provided for the girts and braces. Fig. 4 is a view similar to that of Fig. 3, the only difference being that the girts themselves are of simple instead of compound construction. Fig. 5 is a vertical section through the axial point of attachment in the compound member, taken in the plane of *x x*, Fig. 4. Fig. 6 is a view partly in vertical section of a modified construction, in which the object is to make use of the same couplings which unite the sub-members of the compound upright for the attachment of the radial ties which support the axial connection, instead of using separate couplings, as shown in Figs. 1, 3, and 4. Fig. 7 is a modified construction having the same object in view. Figs. 8 and 9 are plan views of the radial ties and their connections, corresponding, respectively, with those shown in Figs. 6 and 7.

A A are compound sections of the tower-uprights. Said compound sections consist of upright sub-members *a a*, coupled together by suitable connections, *a'*, and made to converge at the opposite ends of the compound section, where they are secured in terminal castings, A' A'.

$a^2$ are horizontal girts or ties located in the sides of the compound upright, certain of said girts being removed in Fig. 1, for the purpose of revealing the radial braces which support the axial attachment, constituting a feature of the present invention.

In Fig. 1, C is a center post arranged in the axis of the compound upright A, and supported by radial ties or braces *c*, connected with the sub-members *a*, or with the couplings *a'*, in any suitable manner. In Figs. 1, 3, and 4 the ties *c* are connected with said sub-members *a* by means of cast-yokes C', branched and apertured to admit the sub-members above and below the couplings *a'*, as best shown in Fig. 1.

$C^2$ is a coupling, which is threaded to the top of the center post, C, and is branched and threaded to admit the several ties *c*. In the upper end of the coupling $C^2$, as shown in Fig. 5, is fitted a threaded nipple, $C^3$, and to this nipple is applied the threaded cap $C^4$, having lugs *c'*, to afford the desired attachment for the horizontal girts B and the diagonal braces D

by means of suitable bolts and clevises, *b* and *d*, or other proper devices. Said center post, C, is preferably made to extend to the base-casting A′, with which it is connected in any suitable manner, in order that the upward strain of the diagonal braces D, when tightened, shall be communicated to said base-casting, and shall not fall wholly upon the ties *c* and yokes C′. The center post, C, is usually further supported by radial ties $c^2$, connecting it with the sub-members *a* at any point or points below the middle of the upright, and usually at those points where the sub-members *a* are joined with each other by couplings and girts.

In connecting the axial attachment with the base-casting I prefer to employ the devices shown in Figs. 1 and 5, in which the pipe-section or post C terminates at the bottom in a cap, E, through which is inserted a bolt or rod, E′, having a round head, *e*, within said cap, and adapted to enter the bore of the pipe C, as seen in Fig. 5, the lower end of said rod E′ being threaded to fit a tapped opening in the base-casting A′. By this means the vertical tension may be modified or adjusted readily after all other connections and adjustments have been made. The rod E′ may obviously extend to the coupling $C^2$, if prefered, said coupling being constructed or provided with a cap on its lower end corresponding with E, Fig. 5, to support the head of the bolt.

Instead of employing a single post C, reaching to the base-casting A′, the construction shown in Fig. 2 may be used, wherein tie-braces or legs $c^1$, corresponding in number with the number of sides in the compound structure A, descend and diverge from the axial point of attachment to be supported to lower points on the sub-members *a*, where they may connect with the latter—as, for example, by couplings $c^3$, placed immediately beneath the couplings *a*′, which unite adjacent sections of the sub-members *a*. By means of either of these constructions an attachment is afforded in the axis of the compound upright A for the girts B and for the diagonal braces D, so that the strain imparted by said girts or diagonals falls more equally upon all the sub-members or parts of the compound uprights than would be the case if said girts and diagonals were attached to either one of the said sub-members directly.

In order to avoid the use of the yokes C′ and to connect the radial ties *c* directly with the couplings *a*′, the devices shown in Figs. 6 to 9, inclusive, may be employed. In these figures it is contemplated that the center post or other axial attachment shall be inserted after the compound upright is otherwise completed. In Figs. 6 and 8 the radial ties *c* are threaded into the couplings *a*′, room being provided between the adjacent sub-members *a a*, as shown in Fig. 6, to allow the ties *c* to be run into the coupling *a*′ far enough to admit the introduction of the central coupling, $C^2$, after which the said ties *c* are retracted from the couplings *a*′, and are let into the branches of said coupling $C^2$. A nut, $c^4$, is applied to each of the ties *c*, arranged to bear against the end of each of the several branches of the coupling $C^2$, by which the coupling $C^2$ is brought into proper central position in the compound upright, and by which said ties (now becoming more properly struts) are given appropriate tension. In Figs. 7 and 9 the ties *c* are made in two parts, the shorter of which, as shown in these figures, consists of a nipple, $c^5$, adapted to be run into the coupling *a*′ between the adjacent ends of the sub-members *a*, as clearly shown in Fig. 7, and the parts of the ties are united by a union joint, $C^5$, of any suitable construction.

If desired, the cap $C^4$ and the nipple $C^3$, Fig. 5, may be dispensed with by constructing the lugs *c*′ directly on the coupling $C^2$. The invention is, of course, applicable to compound members A having any number of sides and located in any position in the tower.

I claim as my invention—

1. In a skeleton iron tower, the combination, with the compound member A, of a part located and duly supported in the axis of said member, and between the ends thereof, and adapted for the attachment of a girt or brace, substantially as described.

2. In a skeleton iron tower, the combination, with the sub-members *a* of the compound member A, of radial sub-members *c*, and a coupling supported thereby, for the attachment of a girt or brace, substantially as described.

3. In combination with the compound upright A and diagonal brace D, the converging sub-members *c*, means for connecting said members with the diagonal brace, and means for resisting the upward strain of said diagonal brace upon the sub-members *c*, substantially as described.

4. In combination with the upright A and diagonal brace D, the converging sub-members *c* and a center-post, C, connected with the base-casting A′, substantially as described.

5. In combination with the compound upright A, the converging sub-members *c*, center post, C, coupling $C^2$, and cap $C^4$, the latter constructed to afford attachment for the girt and diagonal, substantially as described.

6. In combination with the sub-members *a* and coupling *a*′, Fig. 6, the central coupling, $C^2$, the threaded brace *c*, and nuts $c^4$, substantially as and for the purpose set forth.

7. In a compound member, A, the combination, with the centrally-supported coupling for a brace or girt, of a cap, E, and a headed bolt, E′, threaded into the base-casting, substantially as described.

In testimony that I claim the foregoing as my invention I affix my signature in presence of two witnesses.

JOHN S. ADAMS.

Witnesses:
GEO. R. DUNHAM,
JAMES TODD.