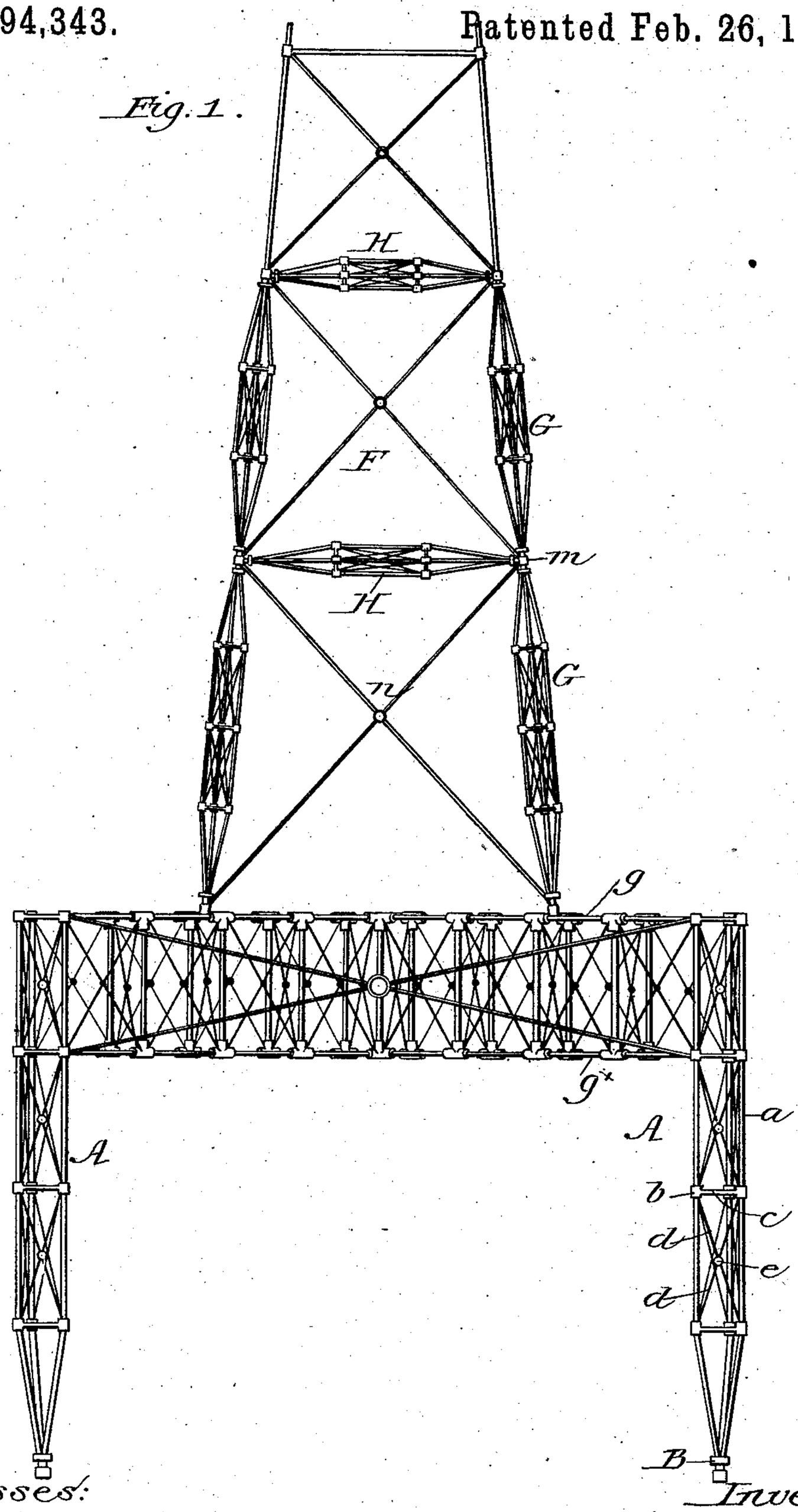
(No Model.) 3 Sheets—Sheet 1.

J. S. ADAMS.

TOWER.

No. 294,343. Patented Feb. 26, 1884.

Fig. 1.



Witnesses:
Frank S. Blanchard.
Jacob Porum.

Inventor
John S. Adams
By Jno. G. Elliott
Attorney.

(No Model.) 3 Sheets—Sheet 2.

J. S. ADAMS.

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Fig. 2.

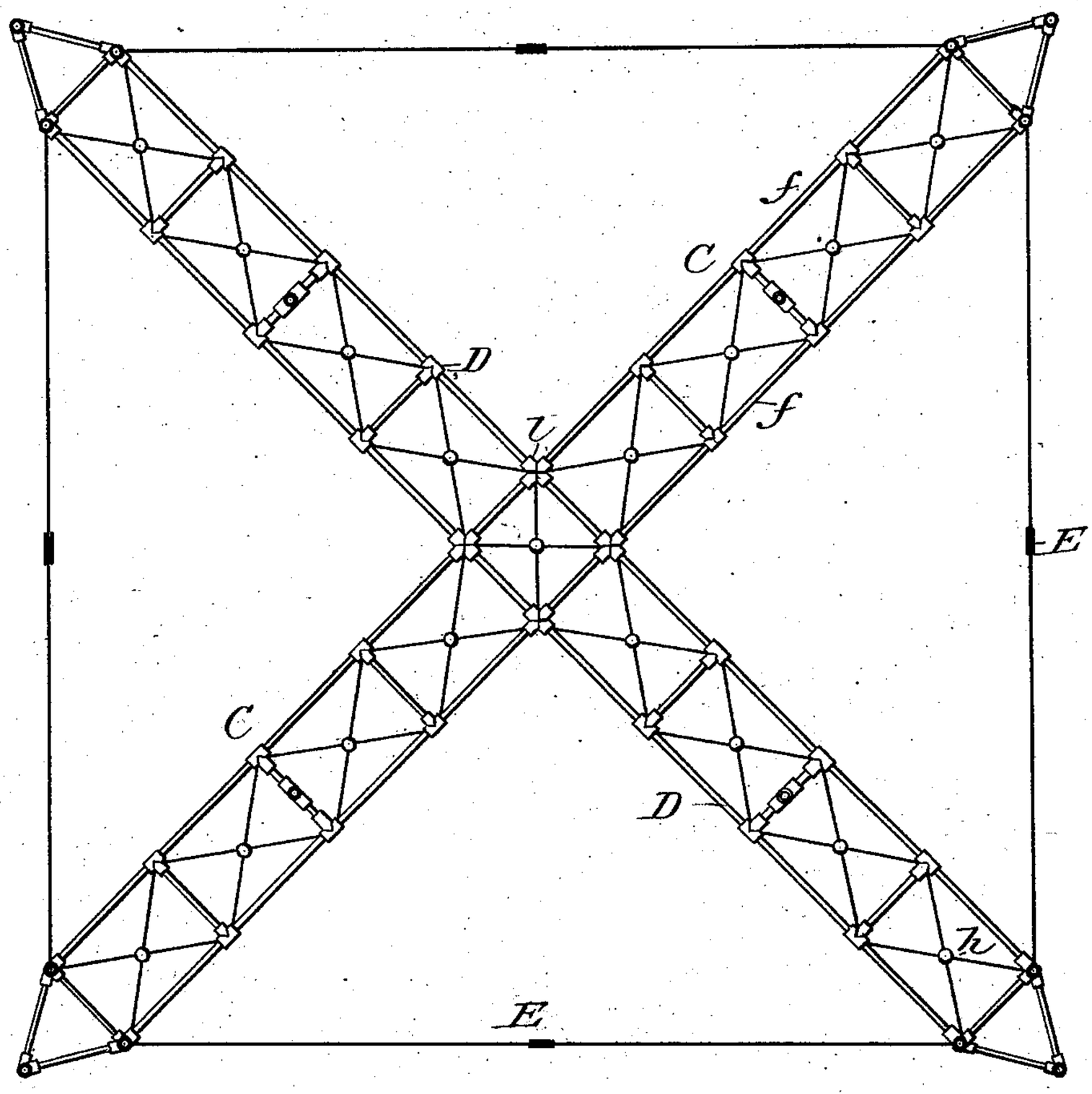


Fig. 3.

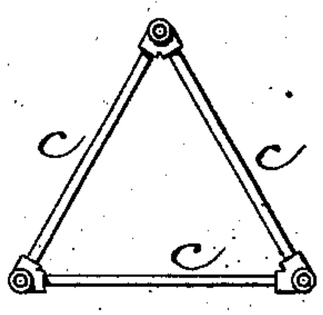


Fig. 4.

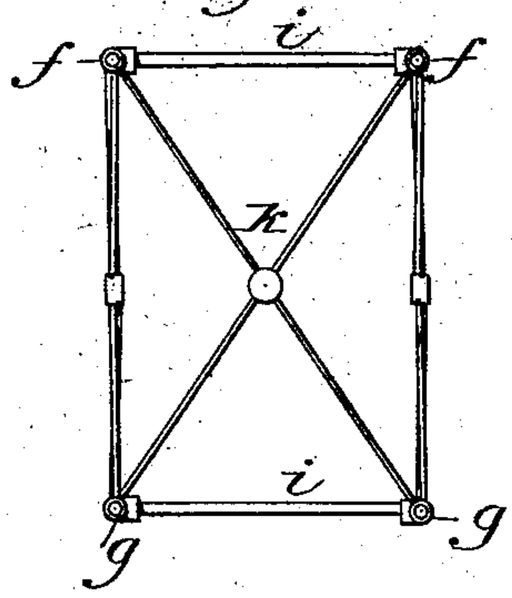
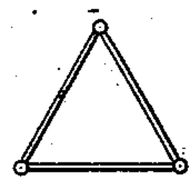


Fig. 5.



Witnesses:

Frank S. Blanchard.

Jacob Lorum.

Inventor:

John S. Adams.

By Jno. G. Elliott
Attorney.

(No Model.) 3 Sheets—Sheet 3.

J. S. ADAMS.

TOWER.

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Fig. 6.

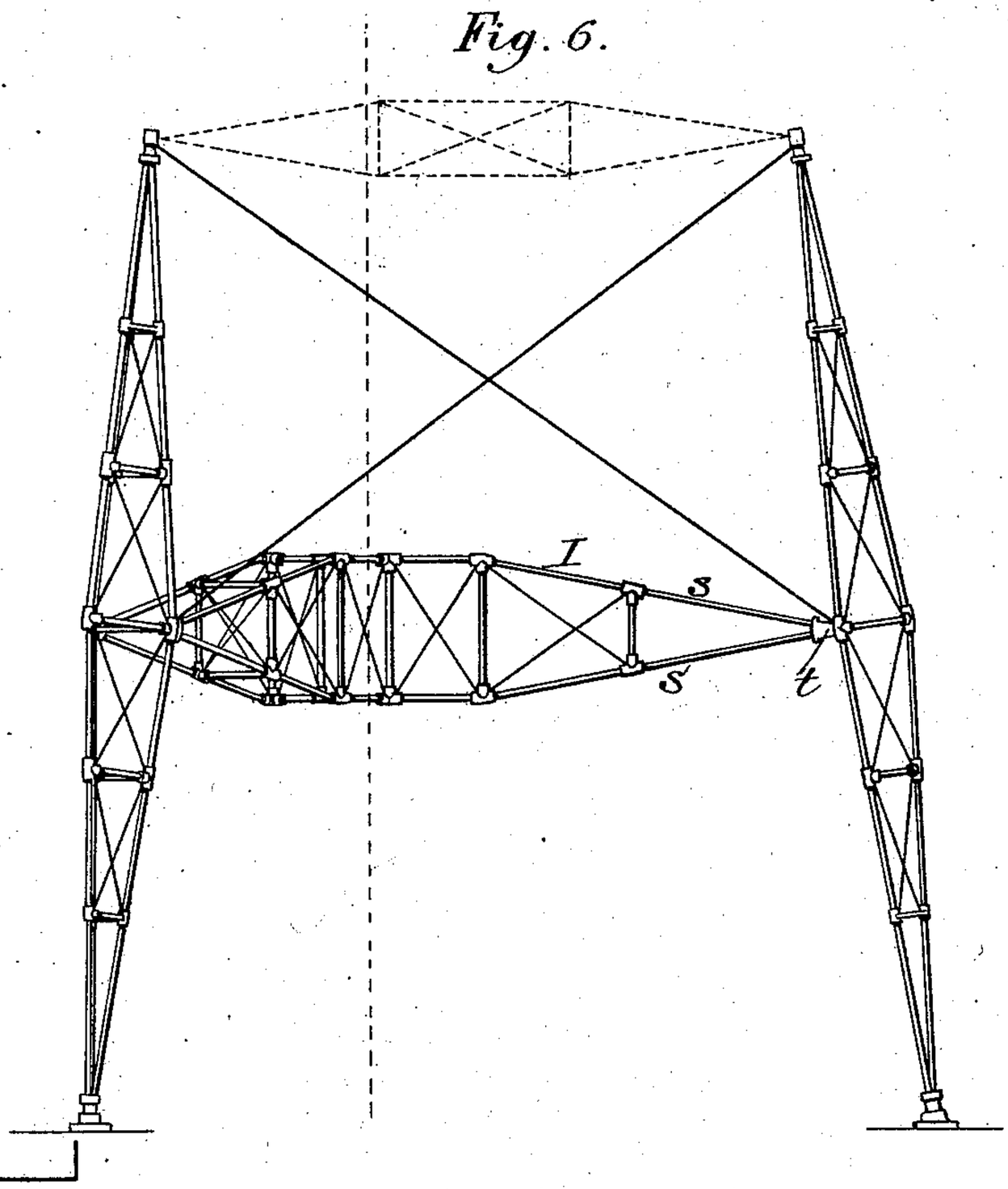
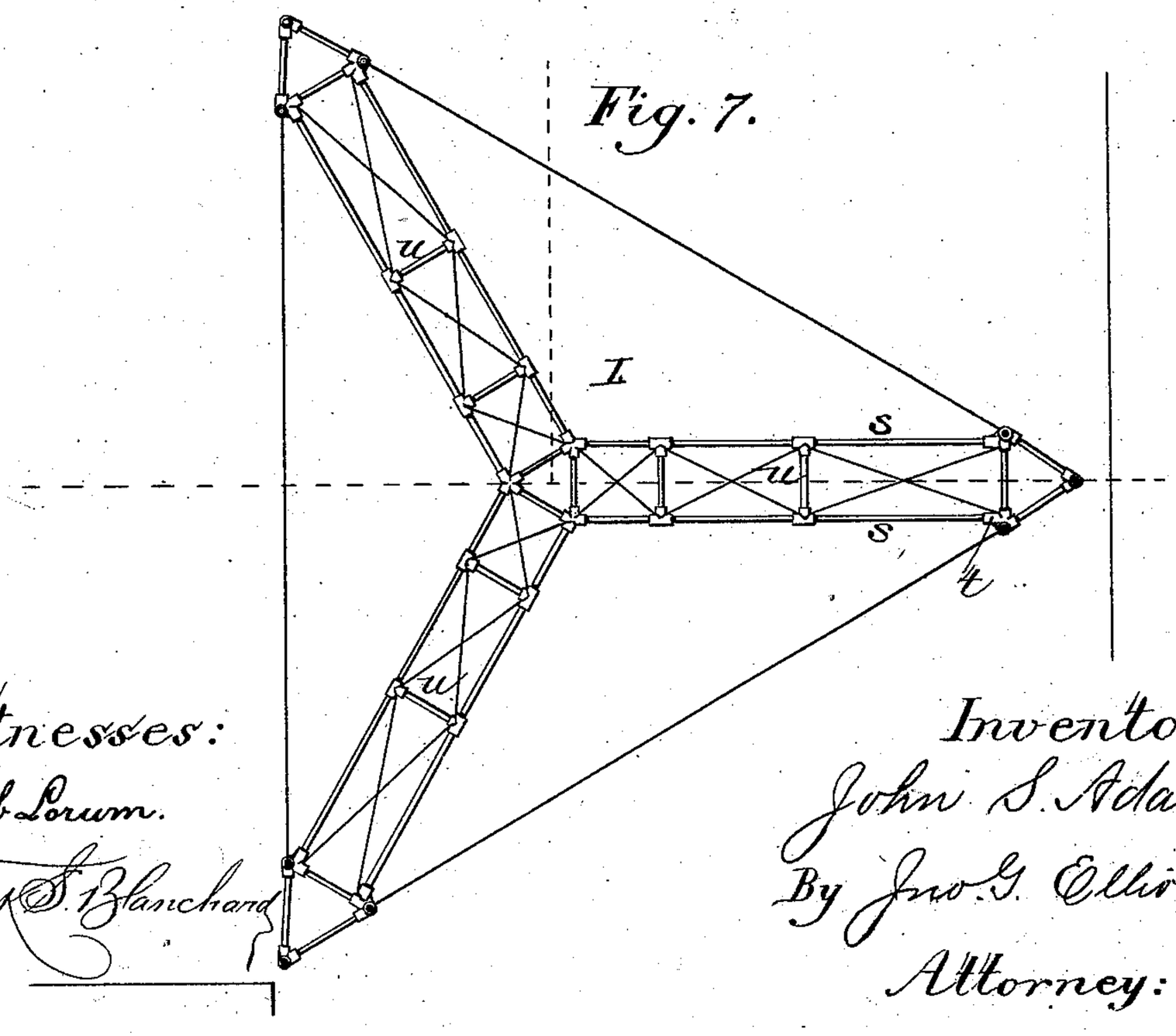


Fig. 7.



Witnesses:
Jacob Lorum.
Frank S. Blanchard

Inventor:
John S. Adams
By Jno. G. Elliott
Attorney:

UNITED STATES PATENT OFFICE.

JOHN S. ADAMS, OF ELGIN, ILLINOIS.

TOWER.

SPECIFICATION forming part of Letters Patent No. 294,343, dated February 26, 1884.

Application filed August 7, 1882. (No model.)

To all whom it may concern:

Be it known that I, JOHN S. ADAMS, a citizen of the United States, residing in Elgin, county of Kane, and State of Illinois, have invented certain new and useful Improvements in Towers, of which the following is a specification.

My invention relates to improvements in skeleton towers constructed of tubing and rods joined by suitable couplings, which towers are particularly adapted, owing to their openness, for elevating electric lights, but which are also adapted for light-houses and for supporting windmills and for signaling purposes.

The objects of my invention are to provide a tower constructed of light tubing and rods, which, when elevated to a great height, may be rendered correspondingly rigid without materially destroying its skeleton-like form; to provide such a tower with a correspondingly-rigid and skeleton-like base adapted to support the tower above the carriage-way of a street, and particularly over the intersections of streets, which support shall not obstruct the street or sidewalk, or, alone or with the tower, present an unsightly appearance or obstruct the light from electric lamps supported by the tower. I attain these objects by devices illustrated in the accompanying drawings, in which—

Figure 1 represents a side elevation of a quadrangular tower and base-support embodying my invention; Fig. 2, a top plan view of the base-support, showing more particularly the trussed bridging supporting the tower above the carriage-way of the street; Fig. 3, a cross-section through one of the uprights of the base-support of the tower; Fig. 4, a similar view through one section of the bridging; Fig. 5, a similar view through one of the tower standards or struts; Fig. 6, a perspective of a triangular tower, showing the adaptation of my invention thereto; and Fig. 7, a top plan view of the bridging of the same.

Similar letters of reference indicate the same parts in the several figures of the drawings.

To arrive at a realization of the importance of my present invention before entering upon a detail description thereof, it may be well to direct attention to the tower shown in my patent of February 6, 1877, and afterward to the adaptation of this particular construction of tower when adapted for electric-light purposes, as shown and described in applications now about to be patented to me. In the patented tower each upright consists of sections of tubing, jointed together in single and continuous lengths, the several uprights being connected by horizontal struts, and intersecting diagonal braces arranged between the uprights, the purpose of such construction being the production of a skeleton tower, of a minimum amount of metal consistent with rigidity, strength, and durability, for supporting windmills, which are usually elevated at a very moderate height as compared with that required for electric lights when employed for street-lighting purposes. In the first of the applications referred to no material change is made in the tower structure proper, except that of leaving open the top of the tower to enable electric lights to pass through the top when elevated; but in the second application these uprights and the struts are shown and described substantially the same as in the present application, but are not claimed.

As before intimated, it is not only desirable that towers for electric lights should be of skeleton form, and as open as possible to avoid obstructing the light, but of a very much greater height than is required for other purposes—as, for instance, windmill-towers are very rarely built over a hundred to a hundred and fifty feet in height, while electric-light towers should be from two to five hundred feet in height, and to provide such a tower this invention is particularly designed.

Referring to Figs. 1 and 2, the base-support therein shown is provided with four vertical uprights, A, adapted to span a street or to rest upon each corner of intersecting streets, which uprights are composed of parallel sections of tubing *a*, termed "chords," arranged at the corners of a triangle, except the lower section of the upright, which section has its chords converging downwardly to the anchorage B, which may be of any suitable construction. With the understanding that the tube-sections are from five to ten feet in length, it will be understood that the particular purpose for converging the lower section of the standard is principally to avoid as much as

possible an obstruction from this lower portion of the standard to vehicles or to individuals when the uprights are set at or on the edge of a sidewalk. Each adjacent section of the chords is joined by a V-coupling, *b*, to which in turn are secured horizontal tubular struts *c*, (see Fig. 3,) and between and connecting each strut are two diagonally-intersecting rods divided at their centers of length and screw-threaded into a ring or plate, *e*, whereby they are made adjustable like the struts, to increase or diminish their tension upon the uprights. By this construction it will be seen that the uprights have the desired skeleton appearance, and at the same time embrace the strongest trussed form known—namely, that of a triangle. These uprights are of a sufficient height to elevate the lower end of their top section some twenty or more feet above the carriage-way, and are so arranged that their diagonally-opposite faces shall be parallel with each other to provide for attachment of the parallel chords of the bridging to each of the four opposing chords of the uprights.

C and D represent the diagonal and intersecting bridging forming the base-support of the tower, which bridging is composed of sections of tubing forming two upper parallel chords, *f f*, coupled to the respective upper ends of the chords of the standards, and two lower parallel chords, *g g*, coupled at the lower end of the chords of the upper section of the standards, the four chords of the bridging taken together forming the outline of a quadrangle and each chord of the quadrangle being connected with the adjacent chords by diagonal rods *h*, similar in every respect to those of the uprights, and attached to couplings holding horizontal braces *i* of tubing, connecting each of the two upper and lower chords, respectively. Internal diagonally-intersecting rods, *k*, (see Fig. 4,) may be employed between each horizontal strut for trussing this bridge structure, which structure has its intersections joined by four-way couplings *l*, but in other respects is of uniform construction.

To render the structure composed by the uprights and bridging additionally rigid, and to prevent any possibility of its becoming twisted or distorted, long diagonally intersecting rods or tubes E, similar to those above described, are employed on the four sides of the quadrangle formed by the standards, and are secured to the upper and lower end of the top section of the standards at these corners.

F represents a tower, the inclined standards of which are composed of tubing, and having its two lower standard-sections trussed, as hereinafter described, while the upper standard-sections are each composed of single tubes joined to the trussed sections. Each section G of the lower portion of these standards is composed of three chords arranged at the corners of a triangle connected by horizontal struts and diagonal chords in precisely the same manner as the uprights of the base, and only differ therefrom in that the chords at both ends of each section converge and are coupled with the adjacent section and with the upper struts of the bridging by couplings *m*, which couplings where joining the sections also join horizontal struts H, constructed precisely in the same manner as the uprights of the tower, adjustable diagonal braces *n* being employed on the sides of the tower in the same manner and for the same purpose as in former structures referred to.

Trussing the several parts of my structure in the manner described enables me to construct a base-support capable of supporting the weight of an exceedingly high tower without the employment of a heavy cumbersome structure which would not only disfigure and shade the street, but seriously obstruct the rays of light from the electric lamps mounted on the tower; and, also, to construct a tower which shall have all the elements of strength, together with openness or skeleton-like form, and which will present less resisting-surface to the wind than if constructed of any other form embodying the same strength and rigidity; and in this connection it may be added that as the tubes, rods, and a portion of the couplings are common articles of merchandise, and always in stock, it will be understood that the cost of building such a structure involves comparatively small expense over a similar structure in which numerous angle-irons and novel forms of castings would be required, and that it requires a less amount of metal for given strength than would be involved by any other form.

In Figs. 6 and 7 is shown a tower embodying my invention, which tower is triangular in cross-section, and is particularly adapted to be employed in open spaces, or where one of two streets running at right angles terminates in the other, as indicated by the full lines at the corners of the tower in Fig. 7, the intention being to support two of the uprights at the respective corners of the streets, and the third upright on the opposite side of the continuous street. This triangular tower has its uprights and struts constructed in the same manner as before described, but its bridging I is composed of three members of the same length and angle, joined at the center of the tower, so that the joined ends of these members form a triangle having a common center with the tower, and the two outer sections of these members have their respective upper and lower chords, *s s*, converging toward the uprights of the tower, where they are joined by a coupling, *t*. By thus converging the upper and lower chords of these members no extra couplings are required, and the strains of the members are centered upon the couplings joining the girts and uprights of the tower, and are furthermore given a form best adapted to withstand crushing or compressing strains.

While I have shown the uprights of a tri-

angular tower as inclined from the ground up, it is obvious that when the span of the streets is greater than the cross-section of the base of the tower should be the bridging may be supported on vertical uprights, and the tower-base be supported on the struts of the bridging in the same manner as shown in Fig. 1, though of course it is desirable that the tower should be so supported as to have a common center with the bridging, which end may be attained by supporting the uprights of the tower on the girts *u u*, respectively. (See Fig. 7.) This bridging in either structure is adapted and is intended to be employed as a walk for the attendant to reach the center of the tower at an elevation above the carriage-way, for the purpose of manipulating a lamp-carriage supporting electric lamps, and for supplying fresh carbons to lamps or otherwise attending to them when said lamps are raised and lowered through the center of the tower, as shown in my applications already referred to, though of course the bridging in Fig. 6 has the additional function of trussing and bracing the tower proper.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. A tower each upright of which is in sections, said sections being composed of several trussed chords converging toward their extremity, substantially as described.

2. A tower each upright of which consists of several sections, said sections being respectively composed of several trussed chords converging at their extremities, and each section being joined to the adjacent section by a single coupling, substantially as described.

3. A tower the uprights and struts of which are each respectively composed of several trussed chords, said uprights and struts being connected with each other by screw-threaded couplings, substantially as described.

4. A tower each upright of which is in sections composed of several trussed and tubular chords, screw-threaded at their extremities, and each section coupled with the adjacent section or sections, substantially as described.

5. The combination of a bridging supported above a carriage-way with a skeleton tower consisting of two or more sections, the uprights of which rest upon and are supported by said bridging, the base of said tower being less than the area covered by said bridging, substantially as described.

6. The combination, with a tower, of a bridging supported above a carriage-way and composed of several members intersecting with each other and having a common center with the tower at their points of intersection, substantially as described.

7. The combination, with a tower, of a base-support elevating the tower above a carriage-way, the uprights of which support are each composed of several trussed chords, substantially as described.

8. In base-supports elevating towers above a carriage-way, the combination, with uprights, each composed of several trussed chords, of a bridging, likewise composed of several trussed chords, substantially as described.

9. The combination, with a tower, of a base-support elevating the tower above a carriage-way, the uprights of which supports are each composed of several trussed tubular chords, substantially as described.

10. In base-supports elevating towers above a carriage-way, the combination, with uprights, each composed of several trussed tubular chords, of a bridging, likewise composed of several trussed tubular chords, substantially as described.

JOHN S. ADAMS.

Witnesses:
JNO. G. ELLIOTT,
W. W. ELLIOTT.