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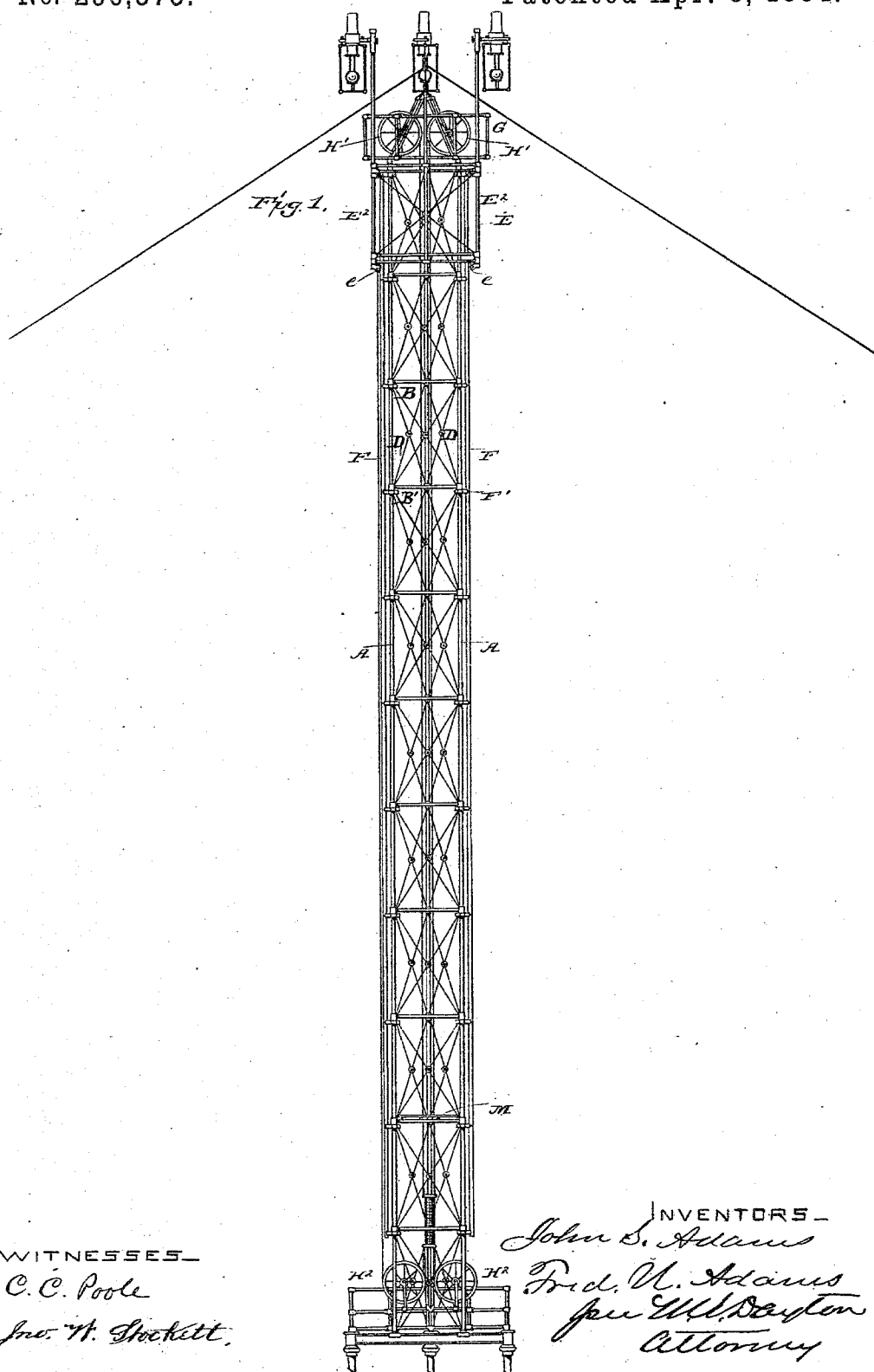
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J. S. & F. U. ADAMS.

TOWER.

No. 296,375.

Patented Apr. 8, 1884.



WITNESSES—

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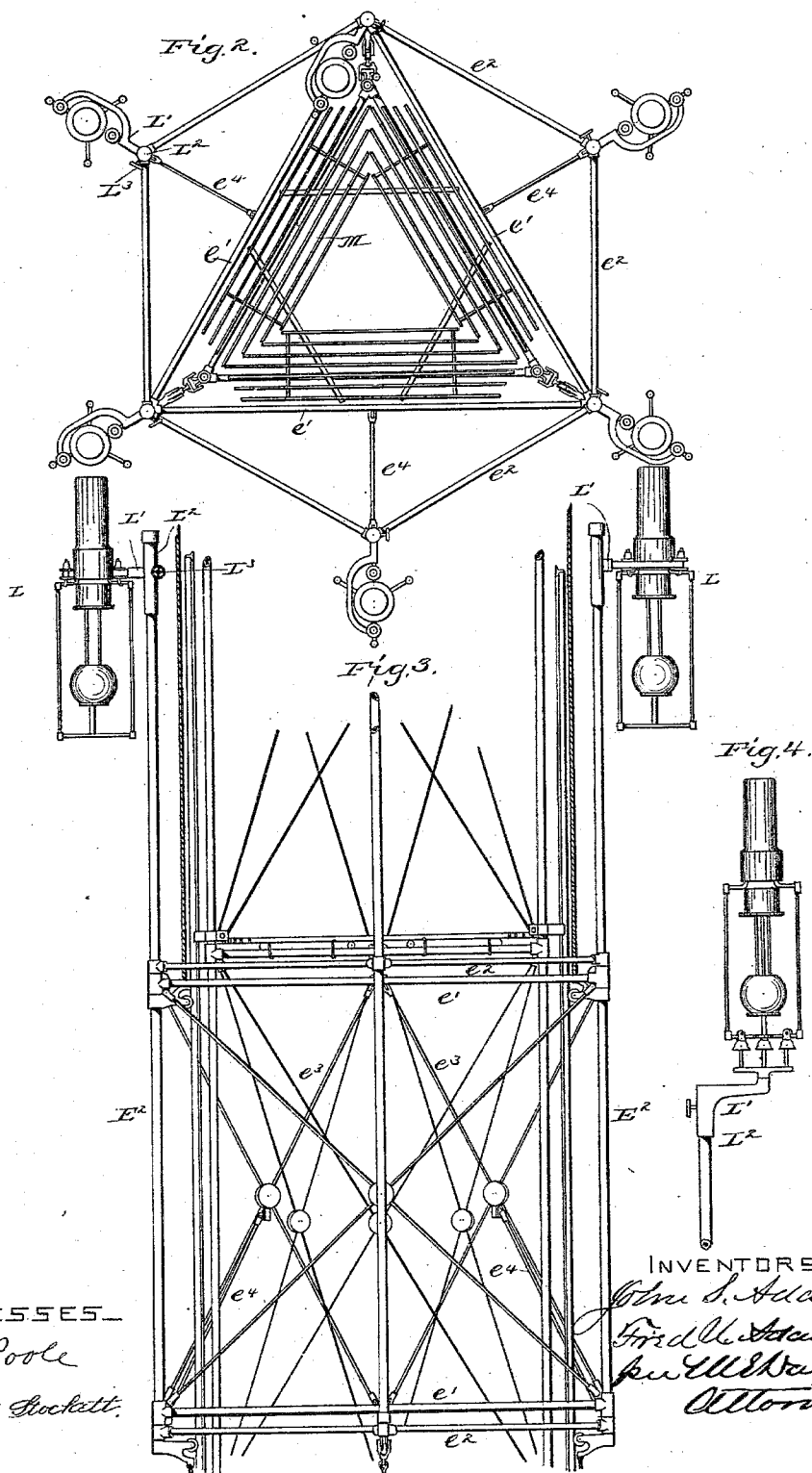
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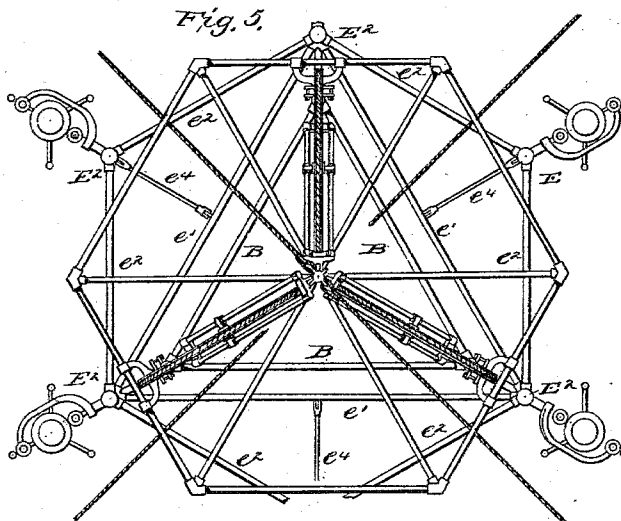
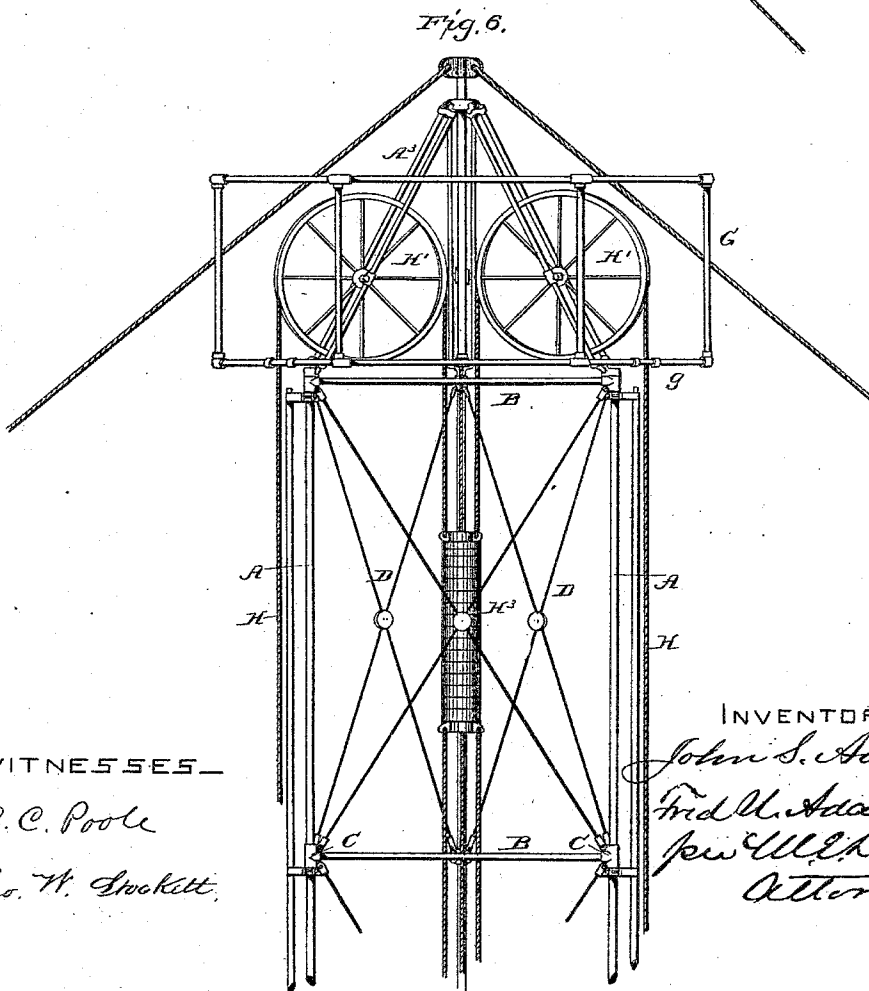
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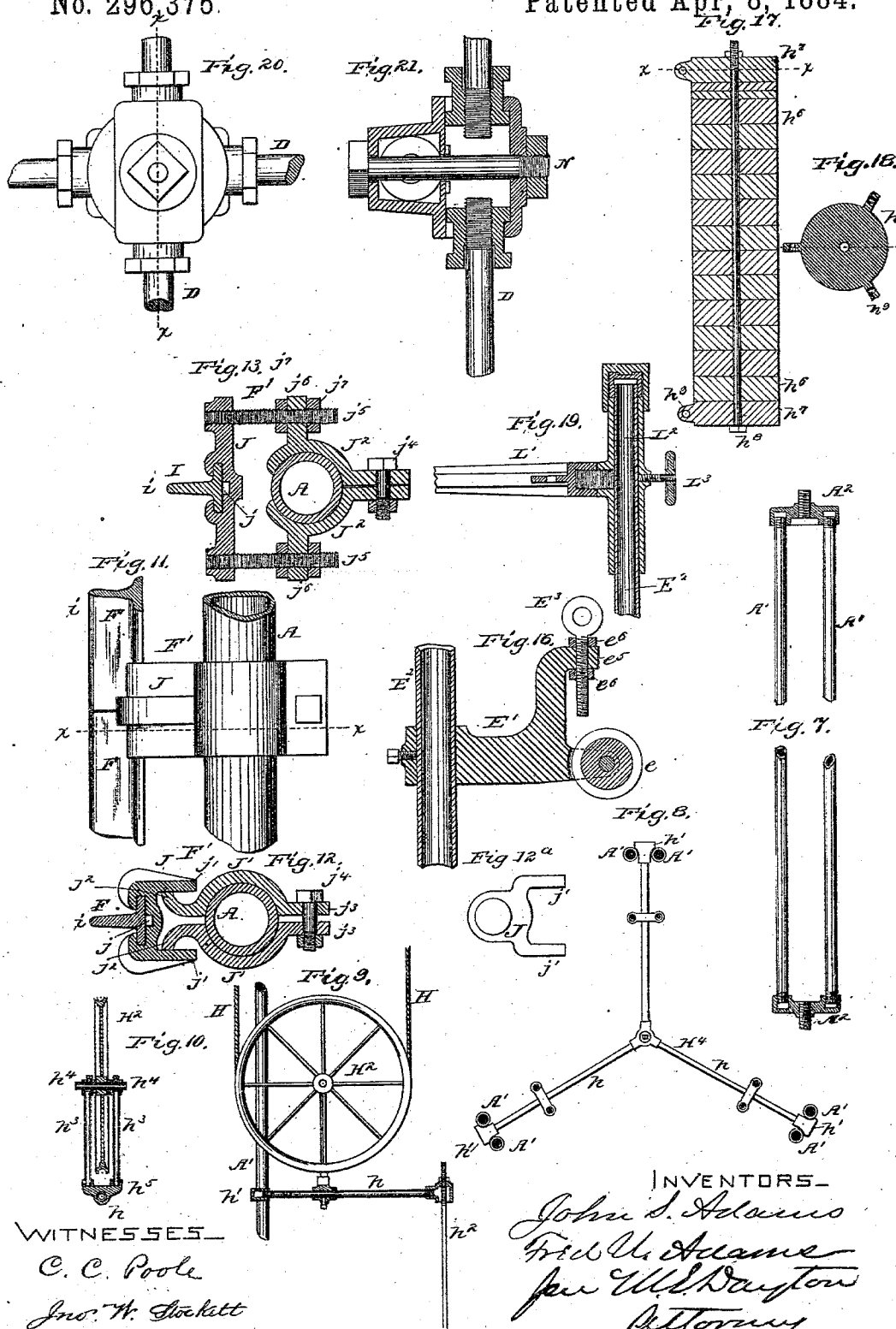
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Fig. 22.

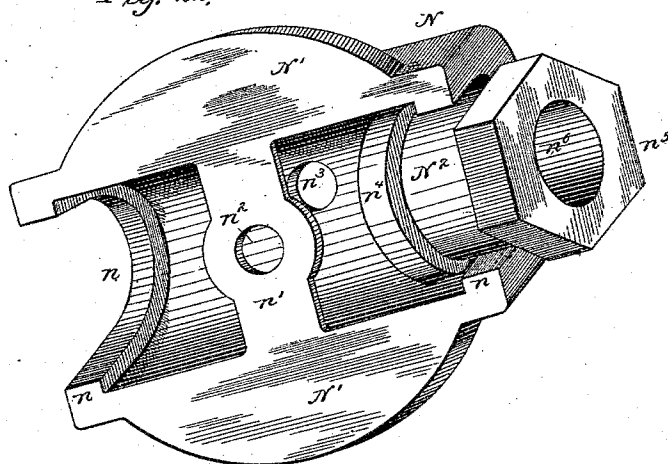


Fig. 14.

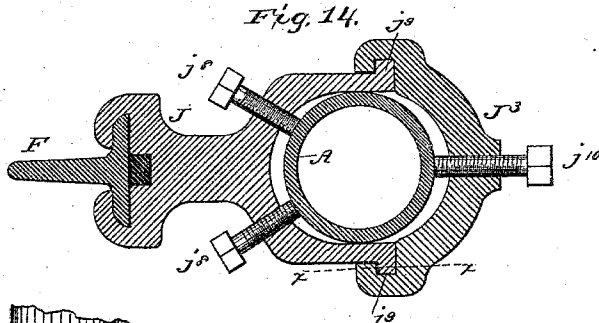
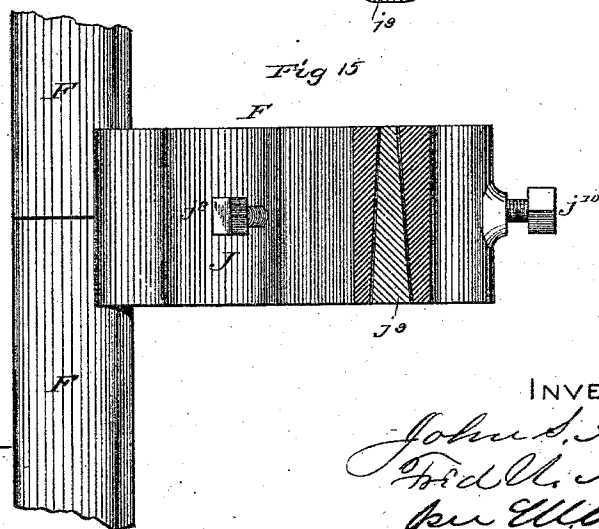


Fig 15



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UNITED STATES PATENT OFFICE.

JOHN S. ADAMS AND FREDERICK U. ADAMS, OF ELGIN, ILLINOIS.

TOWER.

SPECIFICATION forming part of Letters Patent No. 296,375, dated April 8, 1884.

Application filed May 31, 1883. (No model.)

To all whom it may concern:

Be it known that we, JOHN S. ADAMS and FREDERICK U. ADAMS, of Elgin, in the county of Kane and State of Illinois, have invented certain new and useful Improvements in Towers; and we 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, primarily, to the combination, with a prismatic tower, of a lamp carriage or elevator constructed to rise and fall exteriorly to the said tower, endless ropes passing over pulleys at bottom and top, and a counter-weight attached to said ropes, whereby said carriage and lamps are counterbalanced.

It also relates to features of construction whereby the lamps may be rotated or swung upon their support, so as to bring them into convenient reach of the attendant standing within the tower.

It also relates to novel features of construction in the couplings by which the diagonal braces of a tower are connected at their points of intersection; and it further relates to numerous details of construction that will be hereinafter fully pointed out and claimed.

The tower is, of course, prismatic in form or of uniform dimensions throughout its height, and it is guyed from the extreme top. As here shown, it is of triangular form in section.

The tower herein contemplated is intended, primarily, for the support of electric or similar lamps, usually at considerable elevations. As fully set forth in other specifications, the tower is preferably constructed of tubular iron, in order to insure combined lightness and strength, being commonly erected in sections corresponding with the usual merchantable lengths of pipe, or equal divisions thereof, and the uprights being properly joined to each other by couplings connected by cross-girts and diagonal braces, as amply shown in the several figures of the drawings.

Figure 1 is an elevation of a tower provided with exterior ways or guides, and of a lamp-carriage surrounding the tower, together with hoisting mechanism, all embodying our herein-

described invention. Fig. 2 is a horizontal section of the tower enlarged, and showing the lamp-carriage in top view or lowered to a position below said section. Fig. 3 is an enlarged view in side elevation of the lamp-carriage, together with a fragment of the tower within the same. Fig. 4 shows a modification of the bracket, which immediately sustains one of the lamps. Fig. 5 is a plan view of the tower and of the lamp-carriage raised to the extreme top of the tower. Fig. 6 is a fragmentary view of the tower, showing the top thereof in side elevation, the carriage being lowered out of sight. Fig. 7 is an elevation and partial section of the lower tower uprights, as constructed in duplex form to afford room for the hoisting-rope pulleys, located at the bottom and in the angles of the tower. Fig. 8 is a plan view of a radial frame, to which the lower pulleys for the hoisting-ropes are attached. Fig. 9 is a side elevation of one of the lower pulleys and its connections, the latter in partial section. Fig. 10 is an axial section of one of the lower pulleys and its immediate connections. Fig. 11 is a side elevation of a bracket by which the guides for the lamp-carriage are supported from the adjacent tower-uprights, said figure containing fragments of one of the guides and uprights. Fig. 12 is a horizontal section through *xx* of Fig. 11. Fig. 12^a is a second form of rail seat or chair adapted to support a cylindric guide-rail and suited to take the place of the seat *J* in Fig. 12. Fig. 13 is a horizontal section of a second form of removable and adjustable support for the cab-guides. Fig. 14 is a horizontal section of still another form of support for the carriage-guides. Fig. 15 is a view, mainly in side elevation, of the matters shown in Fig. 14, and showing a section thereof through the line *xx* of Fig. 14. Fig. 16 is a vertical section of one of the brackets attached to the lamp-carriage for the support of the wheels, which run on the guides, and for the attachment of the hoisting-ropes. Fig. 17 is a vertical section of a counter-weight connected in the endless hoisting-ropes and composed of a number of disks united by a central bolt. Fig. 18 is a horizontal section of one of the terminal plates or disks of said weight, as through *xx* of Fig. 17. Fig. 19 is a detail in vertical section, showing a proposed

mode of attaching the lamp-brackets to the carriage-uprights. Fig. 20 is a view in side elevation of an improved construction in the couplings or locking-plates for joining the diagonal braces of a tower at their point of intersection. Fig. 21 is a section through xx of Fig. 20. Fig. 22 is a perspective view enlarged of one of the locking-plates of Figs. 20 and 21.

10 A A are parallel tower-uprights, B B are the horizontal girts, and D D are diagonal braces, C C being the couplings of any approved construction, by which adjacent sections of the uprights A are joined, and which also usually
15 give attachment to the horizontal girts and diagonal braces. The tower, as here shown, is sectionally triangular in form and equilateral, but may be of any other form of prism desired, albeit the triangular form is, on many
20 accounts, preferable.

The letter E may be used to designate the lamp-carriage as a whole. Said carriage is constructed to surround the tower, and, like the tower, is of open skeleton form, being
25 made, preferably, of tubular iron.

F F are fixed guides or ways attached to the tower-uprights by brackets F'; and e are wheels fitted to the guides F and attached to brackets E', which are secured to the frame-work of
30 the carriage.

E² E² are uprights of the lamp-carriage, being, in the present instance, six in number, arranged in a circle, three of them being located opposite the tower-angles, as plainly
35 shown in Fig. 5. Those uprights or posts E² of the lamp-carriage which are adjacent to the tower-uprights A are joined by horizontal girts e' , arranged parallel with the sides of the tower, and said uprights are joined with the remaining or intermediate posts of the carriage by horizontal girts or frame-pieces e'' , forming a regular hexagon. As seen in Fig. 3, there are two sets of said girts, e' and e'' , connecting the posts E²—one set above the other—and forming panels which are suitably
40 braced to give rigidity to the carriage-frame by diagonals e^3 . The above-mentioned posts E², intervening between those adjacent to the tower-uprights, are supported from their lower ends by braces e^4 , running to the intersection of the adjacent diagonals, and are thus prevented from sagging. The posts E² of the carriage-frame extend above the upper horizontal frame-pieces e' and e'' sufficiently to support
45 the lamps entirely above the top of the tower, as plainly indicated in Fig. 1.

At the top of the tower is usually located a rail, G, for the purpose of giving a suitable finish to the tower, and for a safeguard for persons visiting the top of the tower. Said rail may have a polygonal form when viewed in plan, having the same number of sides as the lamp-carriage and arranged with its angles alternating with those of the carriage-frame, as shown in Fig. 5, whereby the posts E² may
50 freely rise exterior to the sides of said rail.

The lamp-frame is connected with hoisting-ropes H H, suitable in number, and suitably arranged to lift evenly upon the carriage. In the present instance there are three such ropes, and they are connected with those angles of the carriage which are adjacent to the tower-uprights, being preferably attached to the brackets E', which support the guide-wheels e , as shown. Said ropes are endless and are
75 trained over upper and lower pulleys, H' and H², arranged radially at the angles of the tower, as plainly shown in Fig. 5. A single counterpoise or weight, H³, is connected in the endless ropes H, so as to rise and fall in the axis of the tower, by which weight the carriage and lamps are suitably counterbalanced.

To give place for the lower pulleys, H², of the tower, arranged radially at the angles of the tower, as shown, the lower sections of the tower-uprights are made in the duplex form shown in Fig. 7, wherein A' A' are two parallel sections of an upright, joined at top and bottom by short cross-pieces A², constructed to afford suitable connection with the adjacent
85 superposed parts and base. The inclined supports A³ for the upper pulleys, H', are similarly constructed, as plainly indicated in Figs. 5 and 6, and the pulleys are of such size, and so protrude through their several duplex supports, as to carry the ropes H in vertical lines. The three lower pulleys, H², are connected to a single radial frame, H⁴, the extremities of whose arms h protrude between the sub-uprights A', and are T-shaped exterior thereto, as seen at h' , whereby said frame and the pulleys thereto attached are laterally held in proper relation to the tower, while at the same time they are free to rise and fall as required by any inequality in expansion or contraction
90 between the tower-uprights and the hoisting-ropes. Any desired tension upon the lower portions of the hoisting-ropes may be given them by means of a rod, h^2 , centrally connecting the frame H⁴ with a subjacent stationary part of the tower or forming means for the attachment of a suitable weight.

The manner of connecting the pulleys H² with the frame H⁴ is sufficiently indicated in Figs. 9 and 10, wherein h^3 h^3 are rods, rising one on either side of the pulley, having bearings h^4 for the pulley-shaft, and connected by a suitable casting, h^5 , with the arms h of said frame H⁴.

Referring to Fig. 16, which shows one of the upper guide-brackets, E', attached to the carriage-post E², attention is called to the adjustable threaded eyebolt E³, arranged vertically through an arm, e^5 , and provided with nuts e^6 , by which said eyebolt may be raised and lowered at pleasure. This eyebolt affords attachment for one end of the hoisting-rope H, and a similar bolt, inverted on a bracket at the lower end of the carriage-post E², gives similar attachment to the other end of said
120 hoisting-rope. By means of these adjustable eyebolts the tension upon all three of the

hoisting-ropes may be made equal, so as to insure an easy and free movement of the carriage.

The counter-weight H^2 is shown as being made of a number of circular disks, h^6 h^7 , connected by a central vertical rod, h^8 , the terminal plates h^7 being provided with lugs h^9 , which afford attachment for the hoisting-rope. Of course it is not strictly necessary that the counter-weight shall connect the ropes as shown; but it is obviously desirable to so connect said ropes, in order that they may move accurately together, and thus avoid all tendency to bind the carriage upon its ways. Other forms of the counter-weight may obviously be employed.

The ways F are preferably of the form shown in Figs. 11, 12, and 13—that is to say, T-shaped, and arranged with their thin, rounded edge i outward in position to receive the grooved wheels e on the cab-brackets E' . Various devices in the nature of brackets F' may be employed for attaching and supporting said ways F to the tower-uprights. It is desirable that these brackets shall be such as to permit an independent adjustment of the ways, by which they may be brought accurately into line with each other, in order that the carriage may run with reasonable closeness upon them, and yet with perfect freedom. It is also desirable that said brackets shall be adapted to be secured to the uprights A at any desired point. The construction shown in Fig. 12 consists of a casting, J , recessed or flanged so as to slip over the T-flanges of the rail F , and provided with the inner recesses, j , back of the rail or way F , to admit a key for tightening the rail in the chair or casting J . Said chair is provided with two rearward projections, j' , having their inner faces parallel with each other.

J' J' are two clamping-plates, formed to, together, nearly embrace the tower-upright A , provided at one end with outwardly-turned projections j^2 , which bear against the inner parallel faces of the chair-flanges j' , and at the opposite end with flanges j^3 , which latter are apertured and fitted with the clamping-bolt j^4 . When the parts are brought into position, as shown in Fig. 12, it is obvious that running up the nut of bolt j^4 will throw the opposite ends of the plates J' outward, so as to bind upon and hold firmly the rail-seat or chair J . It is also obvious that by partially releasing the bolt j^4 the rail-seat or casting J may be readily forced outward or inward, so as to bring the rail F into line, after which said seat-casting may be again secured by retightening the bolt j^4 .

In Fig. 13 another device for the same purpose is shown, consisting of the plate J , suitably formed to fit over the flanges of the rail F , together with clamping-plates J^2 , which partially embrace the tower-upright A , and a binding-bolt, j^1 , and adjusting-bolts j^5 . Said bolts j^5 are threaded into the plate J , and pass through the flanges j^6 on the plates J^2 , being

provided with set-nuts j^7 on opposite sides of said flanges j^6 . The operation of this construction is obvious. The plates J^2 are firmly clamped at the desired point upon the tower-upright A , and the plate J is keyed to the rail F . The threaded bolts j^5 , previously screwed into the plate J , and provided with the inner nuts, j^7 , are thrust through the flanges j^6 , after which the outer nuts, j^7 , are applied, and adjustment made in the usual manner of operating such bolts and nuts.

In Figs. 14 and 15 still another construction of the rail or guide-supporting bracket is shown, consisting of a casting, J , bifurcated at its inner end, so as to partially embrace the upright A , and provided with the adjusting-bolts j^8 j^8 on the side of the upright toward the rail F . The branched ends of the said casting are severally provided with the flanges j^9 , preferably wider at the bottom than at the top, as shown in Fig. 15. A second branched casting, J^3 , connects the flanged ends of the casting J , being recessed to drop down over the flanges j^9 , as clearly shown in Fig. 14, and being provided with a set-screw, j^{10} , arranged to act in opposition to the screws j^8 j^8 . The space afforded within the castings J and J^3 for the upright A is such as to provide for all needed inward and outward adjustment of the rail F , and such adjustment is effected by means of the bolts j^8 and j^9 in a manner so obvious as to require no further explanation. By giving to the flanges j^9 the tapering form shown in Fig. 15 it will be easy to uphold both castings J and J^3 , though loosened from the upright by simply supporting the casting J , which feature will be found advantageous in making the necessary adjustment.

In the arrangement of the lamp-carriage exterior to the tower, as herein described, it is found desirable to provide for swinging the lamps inward, when requiring attention at the hands of the attendant, and of again swinging them outward, after being properly dressed, not only that they may rise free of the tower and of the upper railing, G , if present, but also that they may be separated as widely as possible from each other, experience having shown that better illuminating effects are obtained when the lamps are thus widely separated from each other at the top of the tower. To this end the lamps L are provided each with a horizontal arm, L^1 , terminating in the vertical tube L^2 , which sets over the upper end of the extended post E^2 . A set-screw, L^3 , passing through the tube L^2 , and bearing against the posts E^2 , serves to hold the lamp in any position that may be given it. By means of this construction the lamps may be swung inward, as shown at the top in Fig. 2, whereby the lamps are brought into reach of the attendant standing upon the platform or grating M , provided near the lower end of the tower. Of course, the arm L^1 may be provided with a depending rod, which shall drop

into the post E^2 when the latter is of tubular form, and the set-screw may in that case enter the post and bear against the said rod.

In another specification I have described a clamping device for locking the diagonal braces to each other at the point where they cross or intersect. In said former specification such diagonals are described as being made in two parts, each part being provided with a square head, which is seated in a corresponding square recess in the locking-plate, by which the parts are joined. In that case the tightening or loosening of one of the two-part diagonals necessitates the rotation of both together with the plate which joins them. The improvement herein described consists in omitting the square heads upon the parts of the diagonal above referred to and in providing in its place a cylindrical nut. Said nut (seen in Figs. 20, 21, and 22) has an annular collar at one end, which fits within the parti-cylindrical recess in the junction-plate, and also has a squared head at the opposite end, which is exposed externally to the junction-plate, whereto a wrench may be applied. By this means the nut is rotated, and either part of the diagonal may be varied in length, and the diagonal as a whole either tightened or loosened without the rotation of said diagonal or of the junction-plate. Said junction-plate is a box-shaped casting, N , provided on its inner and open side with the lateral semicircular flanges N' . The recess in the box N is in depth equal to its breadth, and it has open ends provided each with a marginal inwardly-directed flange, n .

N^2 is the cylindrical nut, of suitable size to drop into the open end of the box N , and having an annular collar or flange, n^1 , which engages with the flange n of the box, and prevents the withdrawal of the nut in the direction of its axis. The outer and exposed end of the nut N^2 has the squared flange n^2 , by which a wrench may be applied thereto. The axial aperture n^3 of the nut N^2 is threaded to receive the correspondingly-threaded end of the diagonal rod D , as shown more plainly in Figs. 20 and 21. As described in the other specification referred to, each two-part diagonal is provided with one of the junction boxes or plates N , and said boxes or plates are arranged, when in place, to mutually close each by having their open sides contiguous, as plainly seen in Fig. 21. When the junction-plates N are brought into proper juxtaposition, they are joined by the bolt n^4 , thus locking the two diagonals together and greatly increasing their efficiency as braces to the tower.

In order to insure greater accuracy in the union of the two coincident junction-plates, each plate is provided with a cross-bar, n^5 , across its open side, having a central aperture, n^6 , to receive the locking-bolt n^4 .

The boxes N and the diagonal rods D are made of such length, respectively, that room is afforded within the box for any longitudinal

movement of said rods necessary to effect any ordinary adjustment required, albeit the ends of the rods may, if preferred, be provided with screw-threaded connections at their outer extremities, so that the several parts of the diagonals may be adjusted at both ends.

We claim as our invention—

1. The combination, with a skeleton tower, pulleys for supporting the hoisting-ropes arranged radially to said tower at the top thereof, and an exterior lamp-carriage, of two or more suspending-ropes trained over said pulleys and severally connected at both ends with the carriage, pulleys suspended by the several ropes at the lower end of the tower, means for holding the suspended pulleys upright, and a weight or weights connected with the ropes for counterbalancing the carriage, substantially as described.

2. In combination with the external lamp-carriage, the upper and lower pulleys, and the endless suspension-ropes connected with the carriage, as described, a frame, H^1 , to which the several lower pulleys are attached, and a central tension device for tightening the suspension-ropes, substantially as described.

3. In combination with the duplex tower-uprights, Fig. 7, the pulley-frame H^1 , having its arms extended between the members A' of said duplex uprights, and the pulleys H^2 , connected with said frame, substantially as described.

4. In combination with the radial pulley-frame H^1 in the structure described, the tension-rod h^2 , applied centrally to said frame, substantially as described, and for the purpose described.

5. In combination with the tower-uprights A , external rails or ways, F , and adjustable brackets F' , for supporting said rails from the uprights, substantially as described.

6. In combination with the prismatic tower, the external lamp-carriage and guides therefor, and supports for the lamp extending above the carriage-frame, whereby the lamps are supported above the top of the tower, substantially as described.

7. In combination with a prismatic tower having a polygonal platform or rail at its top, the lamp-carriage having upwardly-extended posts for supporting the lamps, said posts being arranged in position to rise above said rail or platform opposite its sides, substantially as shown.

8. In combination with the tower-uprights A and rails F , a chair, J , immediately secured to the rail, a clamp attached to the upright, and means for adjusting the rail-chair with reference to the clamp and upright, substantially as described.

9. The combination, with a skeleton tower and a lamp-carriage capable of moving up and down exteriorly to said tower, of a supporting-post, E^2 , attached to said moving carriage, and a bracket for immediately supporting the lamp, constructed to rotate upon said

post, whereby said lamp may be caused to swing within reach of the attendant standing within the tower.

10. The combination, with a skeleton tower 5 and a lamp-carriage adapted to move up and down exteriorly to said tower, provided with upwardly-extended posts, E^2 , of the lamps L , brackets L' , tubes L^2 , and set-screws L^3 , whereby the lamps are supported above the frame- 10 work of the carriage, may be swung inwardly within reach of the attendant standing upon the platform M , and may be adjusted and fastened in any position desired.

11. In combination with the external lamp- 15 carriage, rails F , exteriorly secured to the tower, and with the hoisting-ropes, the brackets E' , provided with wheels e , fitted to the rails, and with the eyes E^3 , to give attachment to the hoisting-ropes, substantially as de- 20 scribed.

12. In combination with a triangular tower, the exterior hexagonal lamp-carriage consisting of posts E^2 , located opposite the angles of the tower and directly joined by horizontal girts e' , parallel with the tower-sides, 25 and intermediate posts, E^2 , supported in the same circle with those first mentioned by girts e^2 and necessary braces, substantially as described.

30 13. In combination with the two-part diagonal braces of a skeleton tower, the recessed

junction-plate N , provided with flanges n and the nuts N^2 , having the collar n^4 , and constructed to project outside the junction-plate to give attachment for a wrench, substantially 35 as described.

14. In combination with the two-part diagonal braces of a skeleton tower, the recessed junction-plates N , constructed to mutually close each other when in position, and provided 40 with apertured cross-bars n' , whereby the tie-bolt holds said plates more accurately in position opposite each other, substantially as shown.

15. In combination with the junction-plate 45 N , having the semicircular end openings and flanges, n , the cylindrical nut N^2 , provided with the collar n^4 , and exterior squared head n^5 to receive the wrench, substantially as described. 50

In testimony that we claim the foregoing as our invention we affix our signatures in presence of two witnesses.

JOHN S. ADAMS.

FREDERICK U. ADAMS.

Witnesses to the signature of John S. Adams:

GEO. R. DUNHAM,

JAMES TODD.

Witnesses to the signature of Frederick U. Adams:

M. E. DAYTON,

JESSE COX, Jr.