No. 824,502. PATENTED JUNE 26, 1906.

E. MOLLOY.

FRAME STRUCTURE.

APPLICATION FILED JUNE 5, 1903.

3 SHEETS—SHEET 1.

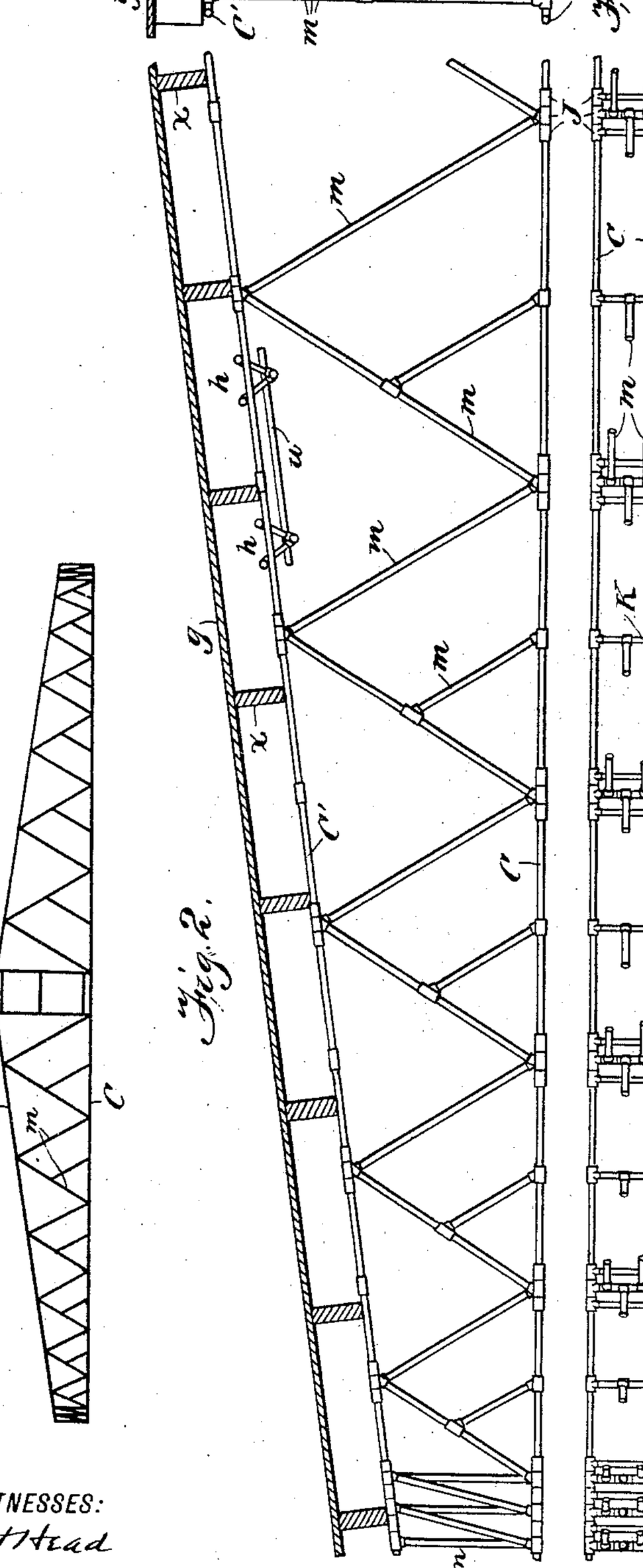

Fig. 4.

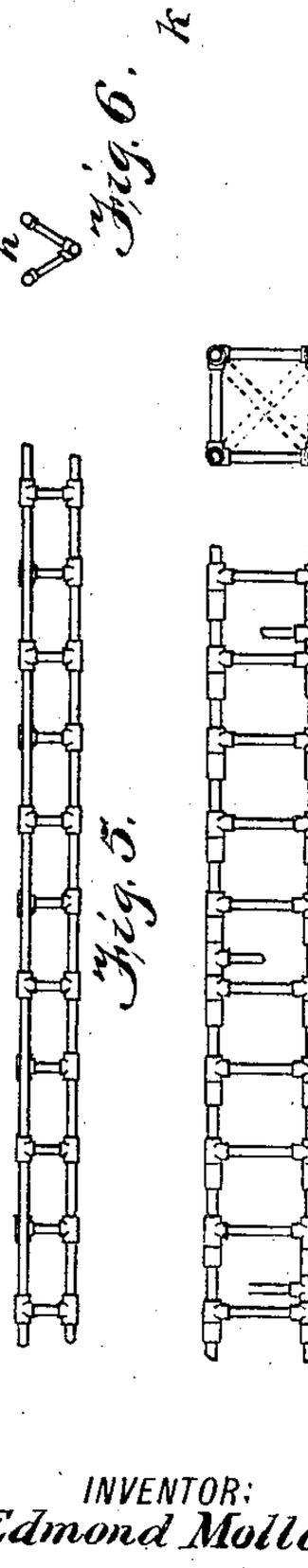

Fig. 9.

Fig. 3.

Fig. 6.

Fig. 8.

Fig. 1.

Fig. 2.

Fig. 5.

Fig. 7.

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3 SHEETS—SHEET 2.

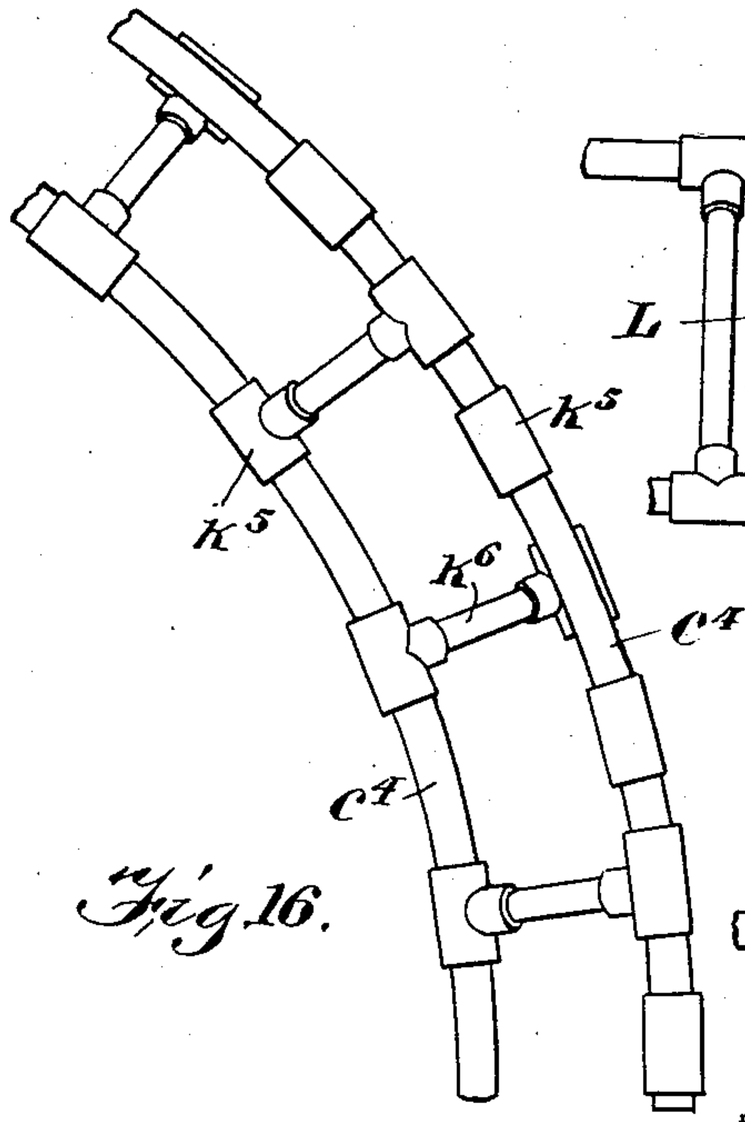

Fig. 16.

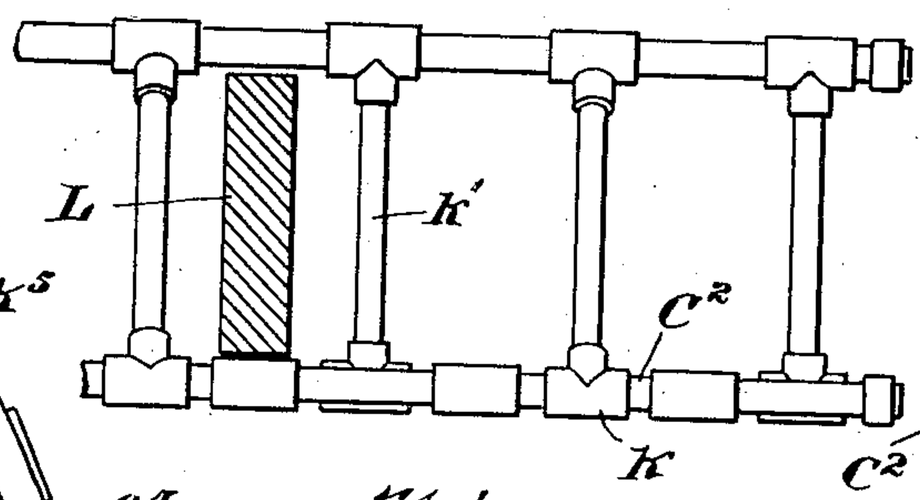

Fig. 11.

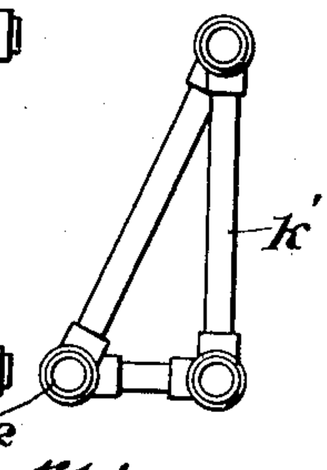

Fig. 10.

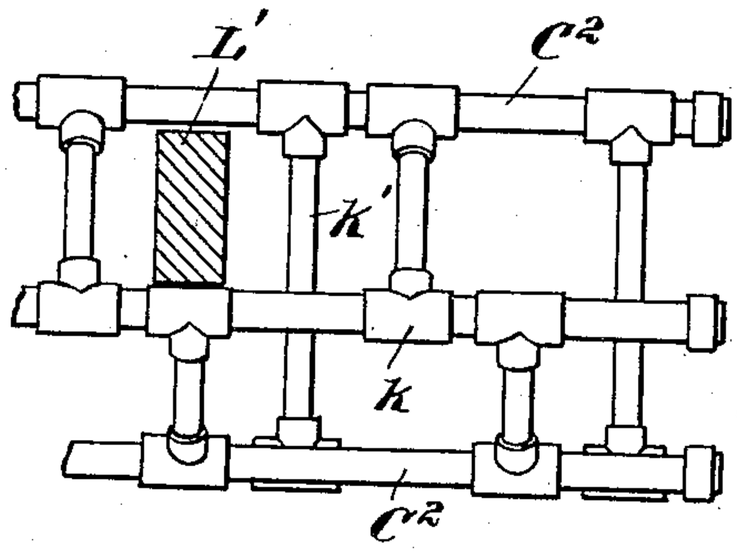

Fig. 13.

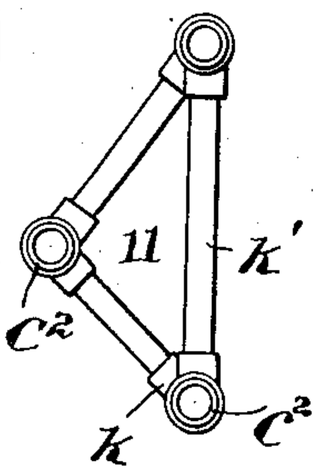

Fig. 12.

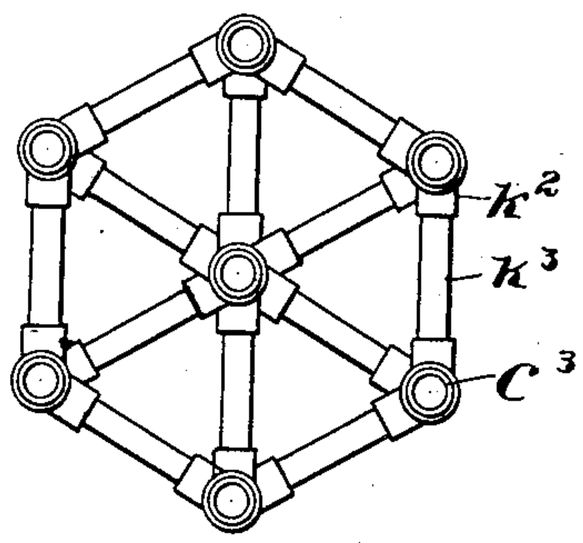

Fig. 15.

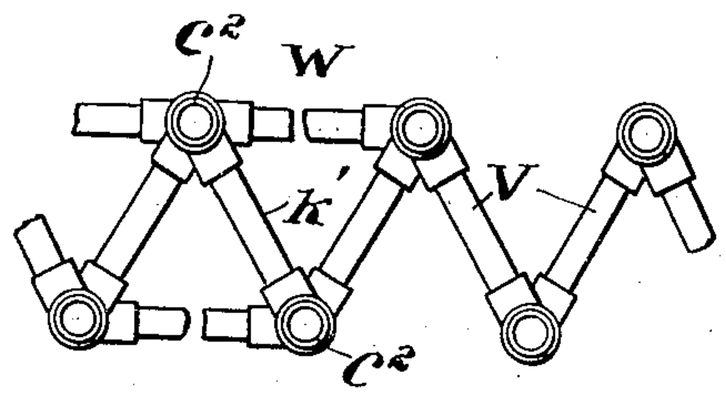

Fig. 14.

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3 SHEETS—SHEET 3.

Fig. 17.

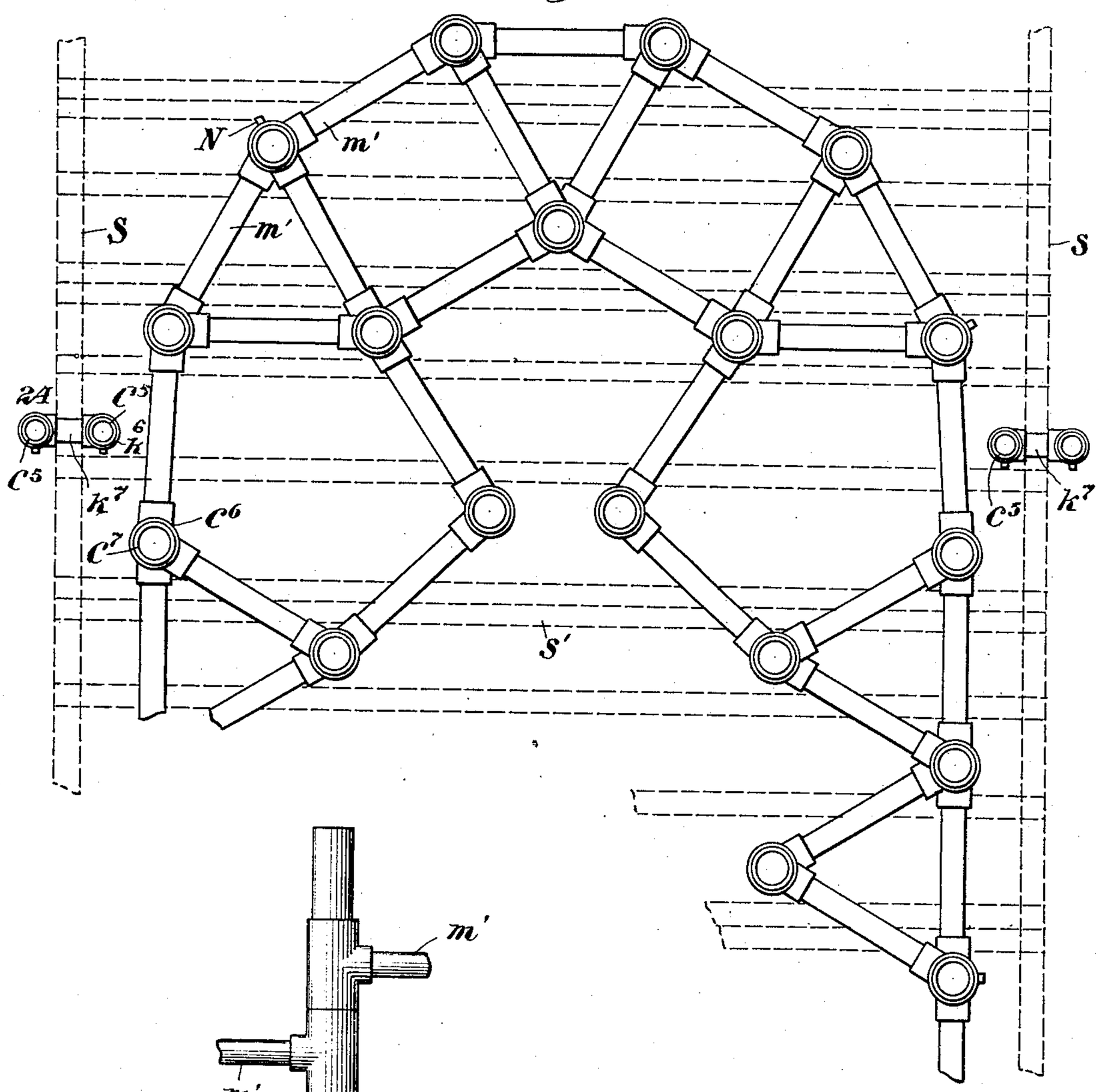

Fig. 18.

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UNITED STATES PATENT OFFICE.

EDMOND MOLLOY, OF PHILADELPHIA, PENNSYLVANIA.

FRAME STRUCTURE.

No. 824,502. Specification of Letters Patent. Patented June 26, 1906.

Application filed June 5, 1903. Serial No. 160,275.

To all whom it may concern:

Be it known that I, EDMOND MOLLOY, a citizen of the United States, and a resident of the city and county of Philadelphia, State of Pennsylvania, have invented certain new and useful Improvements in Frame Structures, of which the following is a specification.

My invention relates to improvements in frame structures, wherein I have devised a construction which is more simple, economical, and effective than most of the systems used in framing structures and structural work.

In a prior application filed by me on July 3, 1902, Serial No. 114,262, I have claimed, broadly, a novel tubular structure, while in the present application I have shown and claimed the adaptation and utilization of said structure in the construction of trusses, roofs, and similar structures.

Tubular metal as the means for carrying out my invention implies hollow piping, preferably round iron, steel, brass, and other material of which pipe and round forms may be made, although round forms of wood or stone are also applicable. Pipe-iron, especially gas-pipe iron, being such a familiar commodity to the public may and can be used largely in my invention, and this pipe-iron is herein represented in order that the invention may be readily understood from the following description of the frame structure. It may be noted that numerous fittings and couplings of various shapes, which may be readily obtained from the manufacturers in plumbers' and fitters' supplies, may also be used in a structure of my invention.

In the accompanying drawings, Figure 1 is a side elevation of a truss. Fig. 2 is an enlarged sectional elevation of a part of the truss shown by Fig. 1. Fig. 3 is a plan view of the truss shown by Fig. 2. Fig. 4 is a vertical cross-section through the truss. Figs. 5 and 6 are views in side and end elevation of a V-shaped purlin. Figs. 7 and 8 are views in side and end elevation, respectively, of a square tubular frame. Fig. 9 is a side elevation, partly in section, of a tension member adapted for use in connection with adjacent runners of tubular structure. Figs. 10 and 11 are views in end and side elevation of a weight-carrying device or girder. Figs. 12 and 13 are end and side views of another form of girder similar to Figs. 10 and 11, but of reduced height. Fig. 14 is a plan view of a framing for walls. Fig. 15 is a plan view of a post or column which may be designated as a "cluster" column. Fig. 16 is an elevation of a portion of an arch. Fig. 17 is a plan of a structure used in wharves, piers, caissons, and coffer-dams; and Fig. 18 is an elevation of one of the pipes and of the stems used in the framed structure of Fig. 17.

The truss shown by Figs. 1, 2, and 3 of the drawings is shown as consisting of runners C C, arranged in the same horizontal plane, other runners C′ C′, arranged in inclined planes, and the members or stems *m*, extending from the runners C′ to the runners C. Adjacent runners in the same horizontal plane are connected in pairs by the tension members K, one of which is shown more clearly by Fig. 9 of the drawings. Said tension member consists of the T-shaped couplings *k* and the stem *k*′. The sleeves of the coupling *k* are fitted loosely on the runners of the structure, and the elbows of these couplings are provided with right and left hand threads, respectively. The stem *k*′ is provided at its respective ends with right and left hand threads, said threaded ends being screwed into the elbows and couplings in a way to make the end portions of the stem *k*′ engage or bind frictionally with the runners, the threads of the stem and the couplings coöperating to draw the couplings and the runners toward each other, whereby the end portions of each stem are adapted to have frictional engagement with the runners, so as to bind the parts firmly one to the other.

Each member or stem *m* is supported by or connected at its lower end to the stem of one tension member between the runners C, while the upper end of said stem is connected in like manner to the stem of a tension device between the upper runners C′. In some cases, however, I employ a plurality or group of these stems M between the pairs of upper and lower runners, and in order to connect the end portions of said group of stems to the pair of runners I employ the group of members J J. (Shown more clearly by Fig. 3.) The end portions of the stems *m* are connected by couplings to the stem of the middle member J, said stem of the middle member being unthreaded and adapted to be slipped loosely into sleeves which are fitted on the runners. The outside tension members J J have their stems threaded into sleeves of the couplings similar to the construction shown by Fig. 9, and these two outside members J J

are adapted to bind the chords of the truss at the intersections and to keep the stems in their positions at the top and bottom of the truss. At the end or heel K′ of the truss the same operation is performed with stems *m*, which are numerous enough to strengthen said heel of the truss. A frame structure of pipe-iron constructed in the described manner is suitable for the construction of trusses of any form. The truss may be used in the construction of roofing, as represented by Figures 2 and 4 of the drawings, which represent purlins *x* on the top of the truss and board sheathing *y*.

In Figs. 5 and 6 of the drawings I have shown a V-shaped purlin which can be used in securing one truss to another. A piece of wood can be laid in this figure, to which sheet-metal or board covering can be fastened or sheet-metal or boarding *u* can be laid on the lower members of said purlins for receiving another covering which is equally as effective.

In Figs. 7 and 8 of the drawings I have shown a square frame consisting of longitudinal runners and suitable cross-pieces, the latter forming tension members and constructed as shown more clearly by Fig. 9.

In Figs. 10 and 11 of the drawings I have represented another form of my framed structure, wherein a weight-carrying device or girder is shown, the same being suitable for supporting a joist or the like, (indicated at L.) This girder is represented as being composed of suitable runners C^2, which are provided with sleeves *k*, and into these sleeves are screwed the stems *k′*. This form of construction may also be used in a chair or settee having legs attached thereto, and it may be employed in the construction of stair-steps, while conveyances, such as a wagon or push-cart, may be conveniently framed, the structure being used in the body of such conveyance. It is evident that two of the structures (shown by Figs. 10 and 11) may be placed at any convenient distance apart and united at their bottom portions by staffs in order to form a foot-bridge or the bottom of a vehicle.

Figs. 12 and 13 represent another form of weight-carrying device or girder, which is of reduced height as compared with the girder of Figs. 10 and 11. This girder may also be used for supporting a joist (indicated at L′) without diminishing the strength of the girder, the height of the girder L′ in Fig. 13 being less than that of the joist L in Fig. 11.

In Fig. 14 of the drawings I have shown my framed structure adapted for use as a framing for walls. This framing is indicated generally by the reference character W, and with the framing is associated suitable stems V, which may be straight or arched, although the straight form is shown for convenience.

In Fig. 15 of the drawings I have shown a post or column which may be termed a "cluster" column and is constructed substantially in the same way as the structures heretofore described—that is to say, suitable runners C^3 are employed in connection with the sleeves k^2 and the stems k^3. The column may be of any suitable diameter, and any desirable number of stems and sleeves can be used in the construction of said column. When it is desired to produce a double diamond column or an X-shaped column, the runners and stems are arranged accordingly. It will also be understood that turnstiles and revolving doors may be constructed in accordance with the structure of Fig. 15.

In Fig. 16 I have shown a portion of an arch wherein the runners C^4 are bent to the shape of the inside and outside of the arch. The sleeves k^5 are quite short, although the stems k^6 may be a little larger than the regular stems, the parts being pushed to their proper places, so that the stems should be on a line with the radius describing the arch.

In Fig. 17 of the drawings I have shown a construction adapted to be employed in the building of wharves, deep-water piers, caissons, or coffer-dams. Assuming that it is desired to build a pier, I employ runners C^5, which are of suitable height, and these runners are joined in pairs by the sleeves k^6 and the stems k^7. The pairs of pipes are put down as a line of posts on each side of the intended pier, and on these posts are laid the sills S. (Indicated by dotted lines in Fig. 17.) These sills carry the stringers or platform, also indicated by dotted lines at S′, and on the platform is laid the outline of the intended pier, which pier is framed with the pipes or runners C^6 and the stems *m′*. The runners C^6 are shorter than the posts C^5, and the inner portion of the intended pier may then be framed or arranged substantially in the manner shown by Fig. 17. When the frame composed of the short runners C^6 is finished, I employ longer runners C^7, which are dropped through the runners C^6 to the bottom and are held perpendicularly, the runners C^7 being held on the runners C^6 by suitable check-screws N, one of which is shown by Fig. 18, so as to secure the long runners C^7 to the short runners C^6. I then remove the stringers, loosen the chuck-screws, and the frame, consisting of the long runners C^7, slides to the bottom on the runners C^6, which are still held in perpendicular positions by the pipes. Smaller stems than those on the short runners are now put on the longer runners, and a skeleton pier is thus made which is capable of being covered over at the top or of being filled in and carried solidly to any desired height.

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

1. A frame structure having runners, ten-

sion members connecting said runners in pairs, each tension member being adapted to exert pressure on opposite sides of each runner, and stems held by said tension members.

2. A frame structure having runners arranged in pairs, tension members connecting the runners of each pair, each tension member being adapted to exert pressure on opposite sides of each runner, and stems between said tension members of the respective pairs of runners.

3. A frame structure having runners, tension members connecting said runners and binding them in pairs, each tension member being adapted to exert pressure on opposite sides of each runner, and diagonal stems fitted to the tension members.

4. In a frame structure longitudinal runners, tension members located between each pair of runners, and means whereby the members are effective in placing tension simultaneously on adjacent runners, or relaxing tension thereon, when said members are adjusted.

5. A frame structure having runners, a group of tension members connecting the runners in pairs, and stems fitted to said tension members.

6. In a frame structure, runners arranged in pairs, tension members between the runners of each pair each of which is adapted to exert endwise thrust thereon, and stems connecting said tension members.

7. In a frame structure, pairs of runners, tension members arranged in groups between each pair of runners, and stems connecting certain tension members of each group of the respective pairs of runners.

8. In a frame structure, longitudinal runners, T-pieces on said runners, and tension members screwed into the T-pieces and exerting endwise thrust on the runners.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

EDMOND MOLLOY.

Witnesses:
PATRICK H. O'DEA,
JAMES J. WHYTE.