No. 760,138. PATENTED MAY 17, 1904.

H. G. MORSE, DEC'D.

M. K. MORSE, EXECUTRIX.

JIB CRANE FOR PORTABLE TOOLS.

APPLICATION FILED JULY 13, 1903.

NO MODEL. 4 SHEETS—SHEET 1.

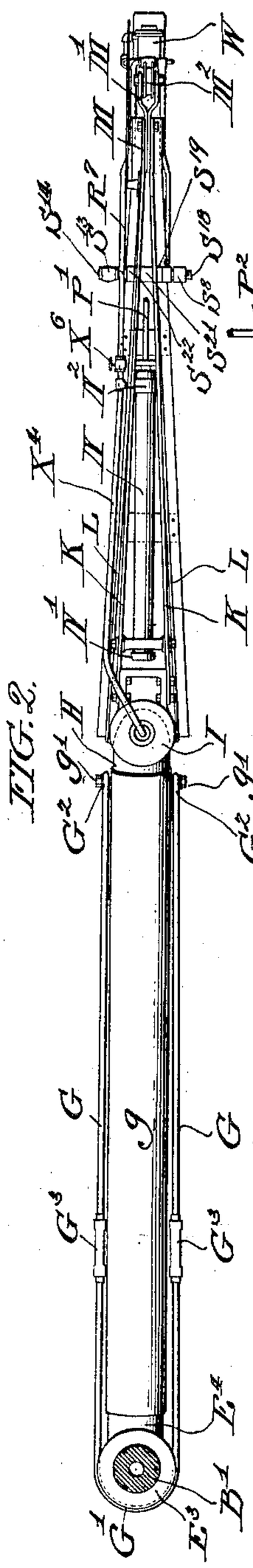

FIG. 2.

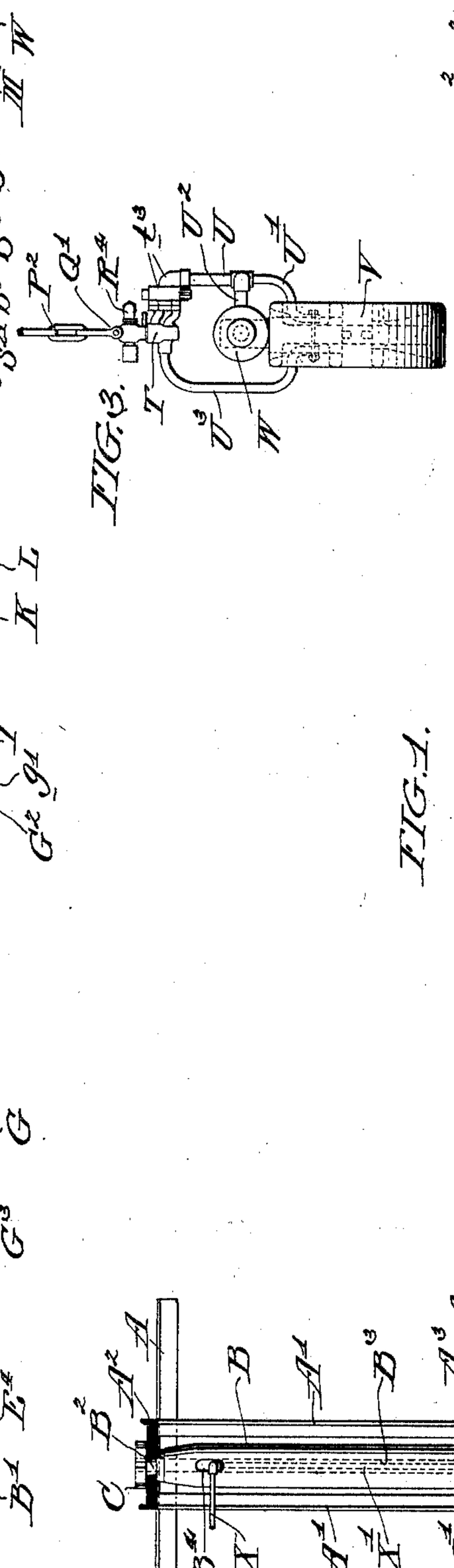

FIG. 3.

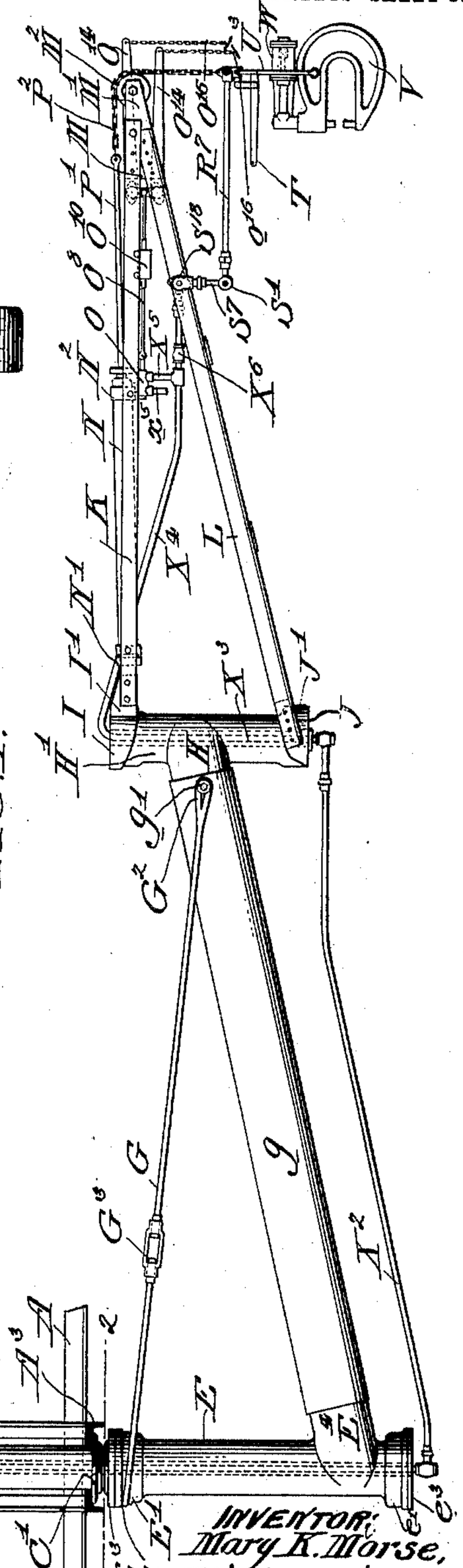

FIG. 1.

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FIG. 4.

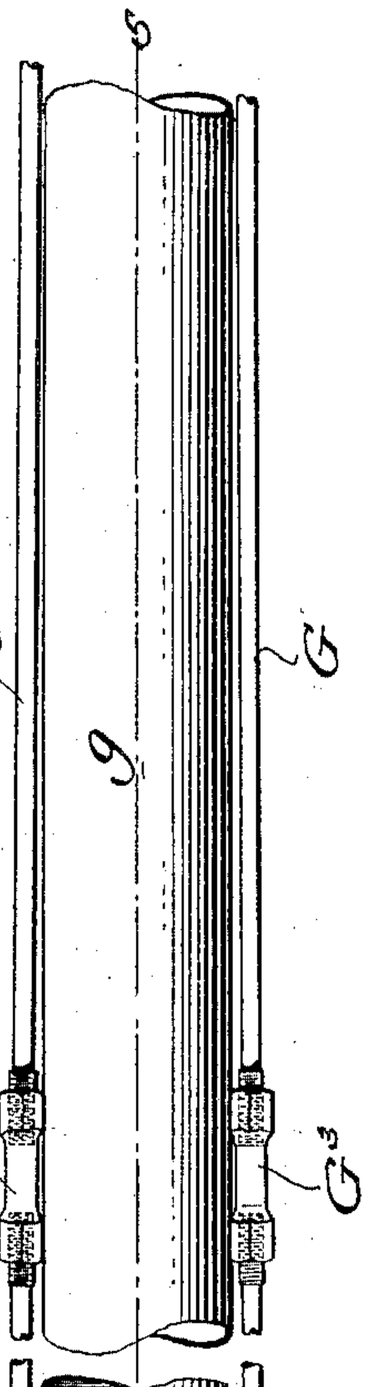


FIG. 5.

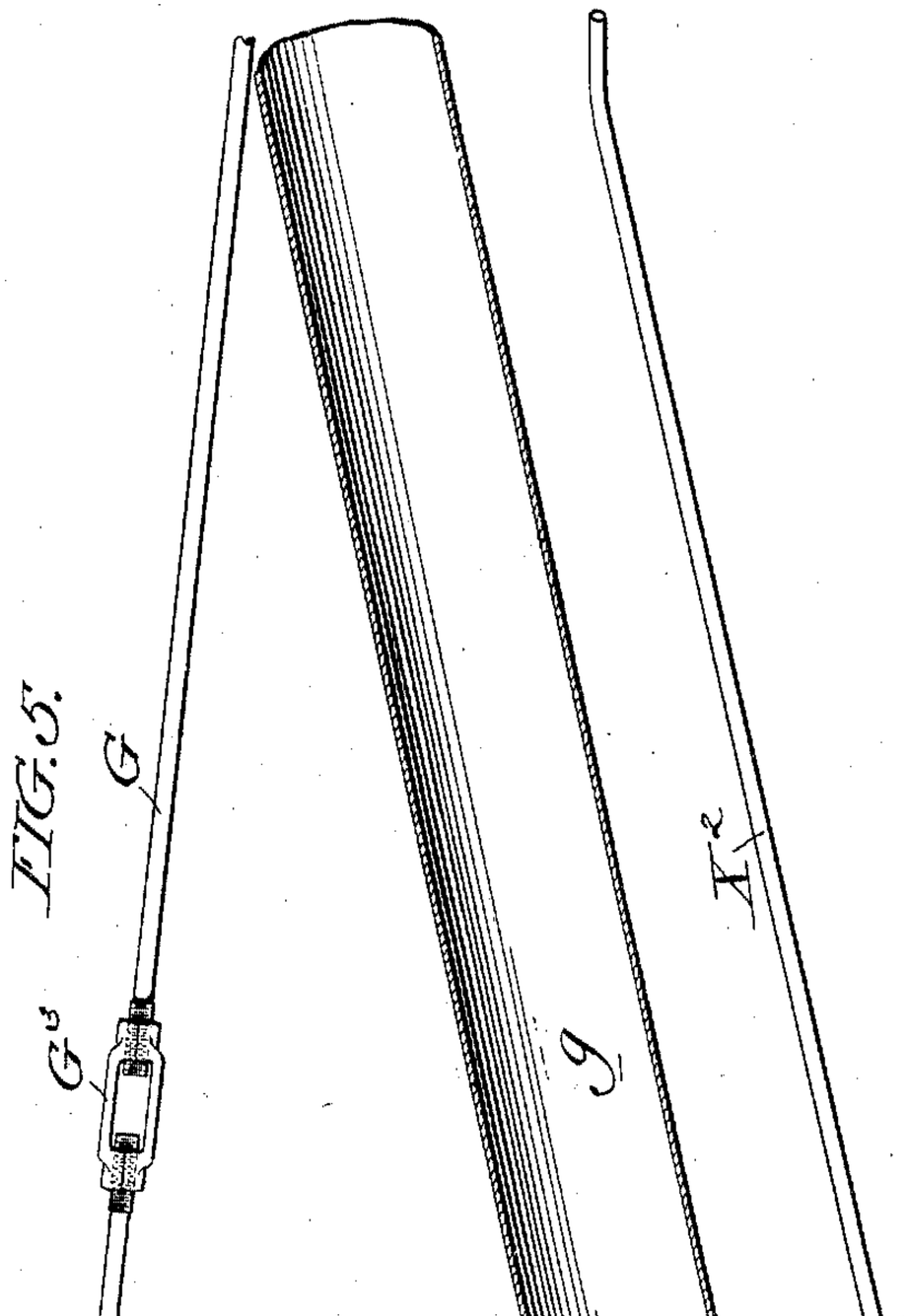


FIG. 7.

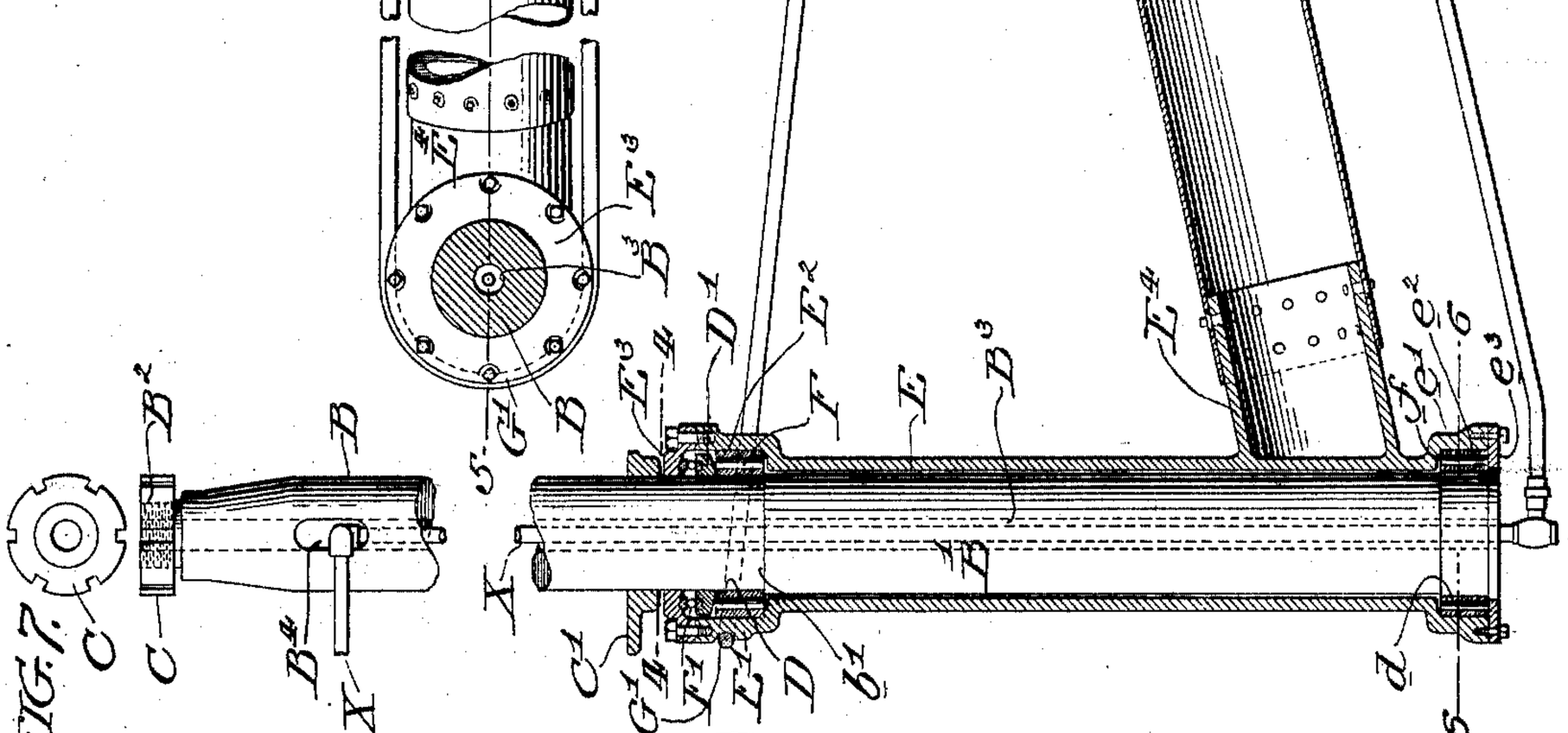
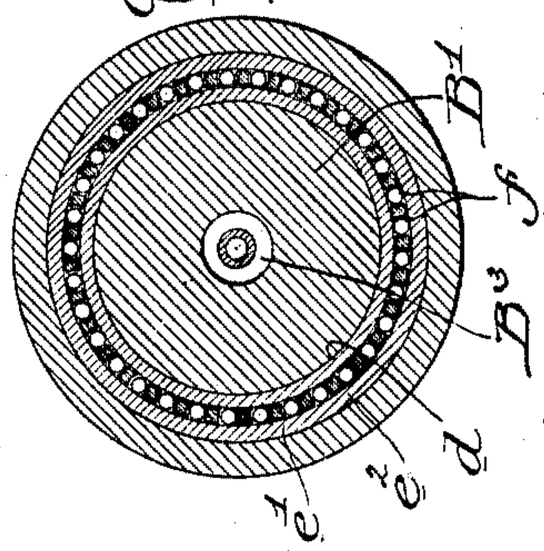


FIG. 6



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JIB CRANE FOR PORTABLE TOOLS.

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NO MODEL.

4 SHEETS—SHEET 3.

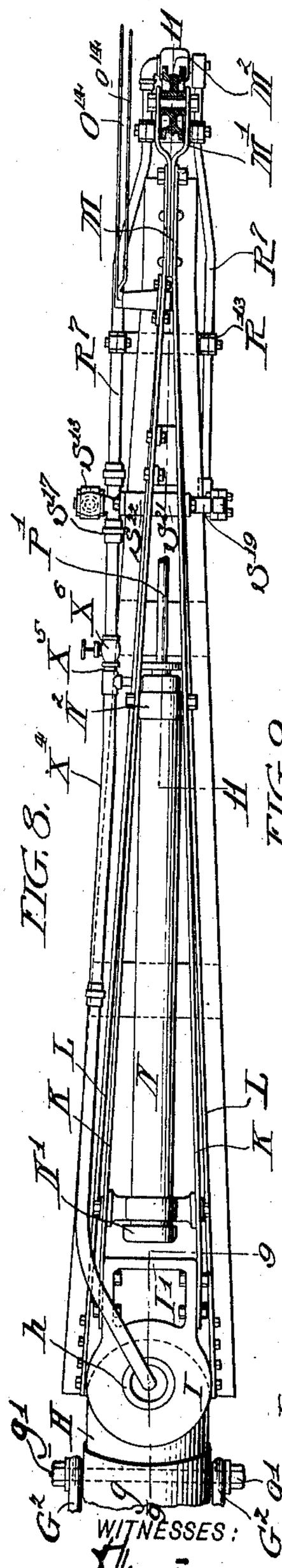

FIG. 8.

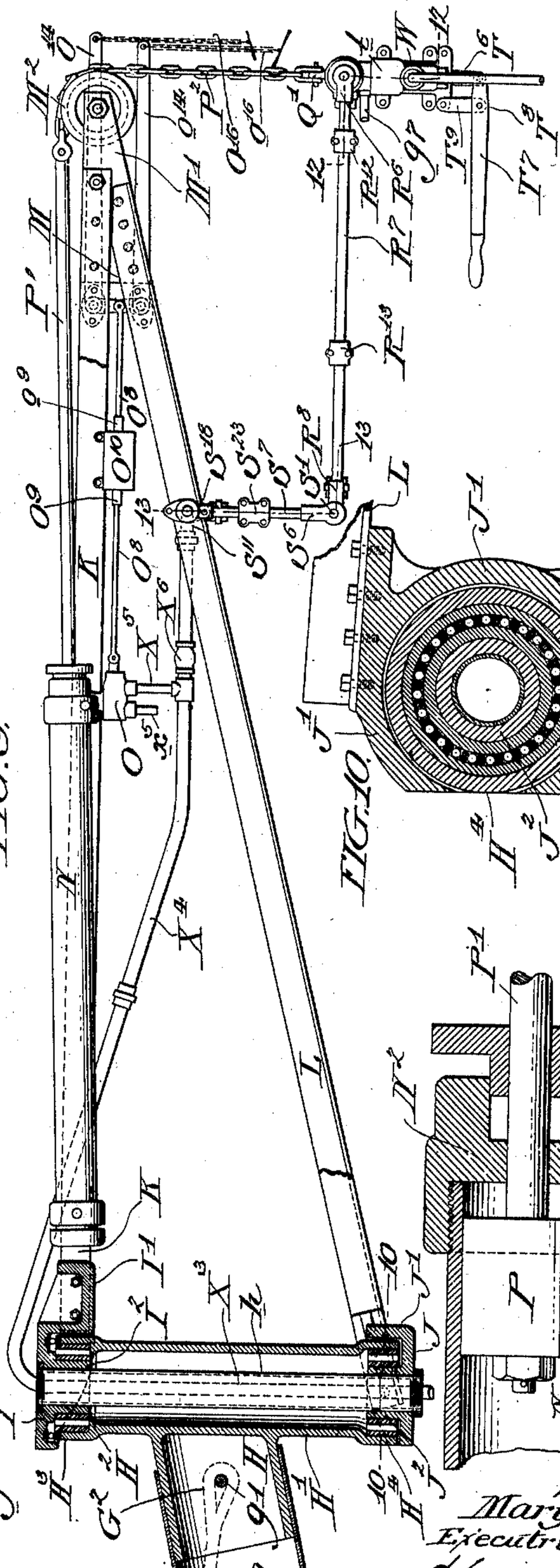

FIG. 9.

FIG. 10.

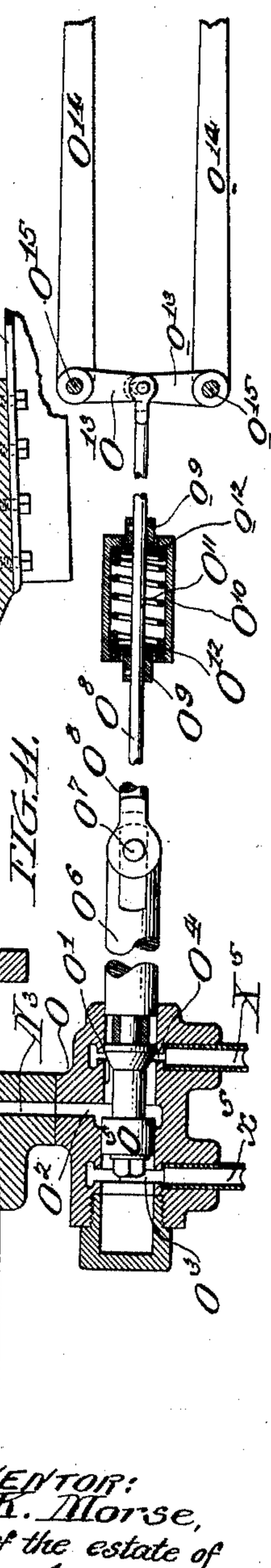

FIG. 11.

FIG. 12.

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No. 760,138. PATENTED MAY 17, 1904.

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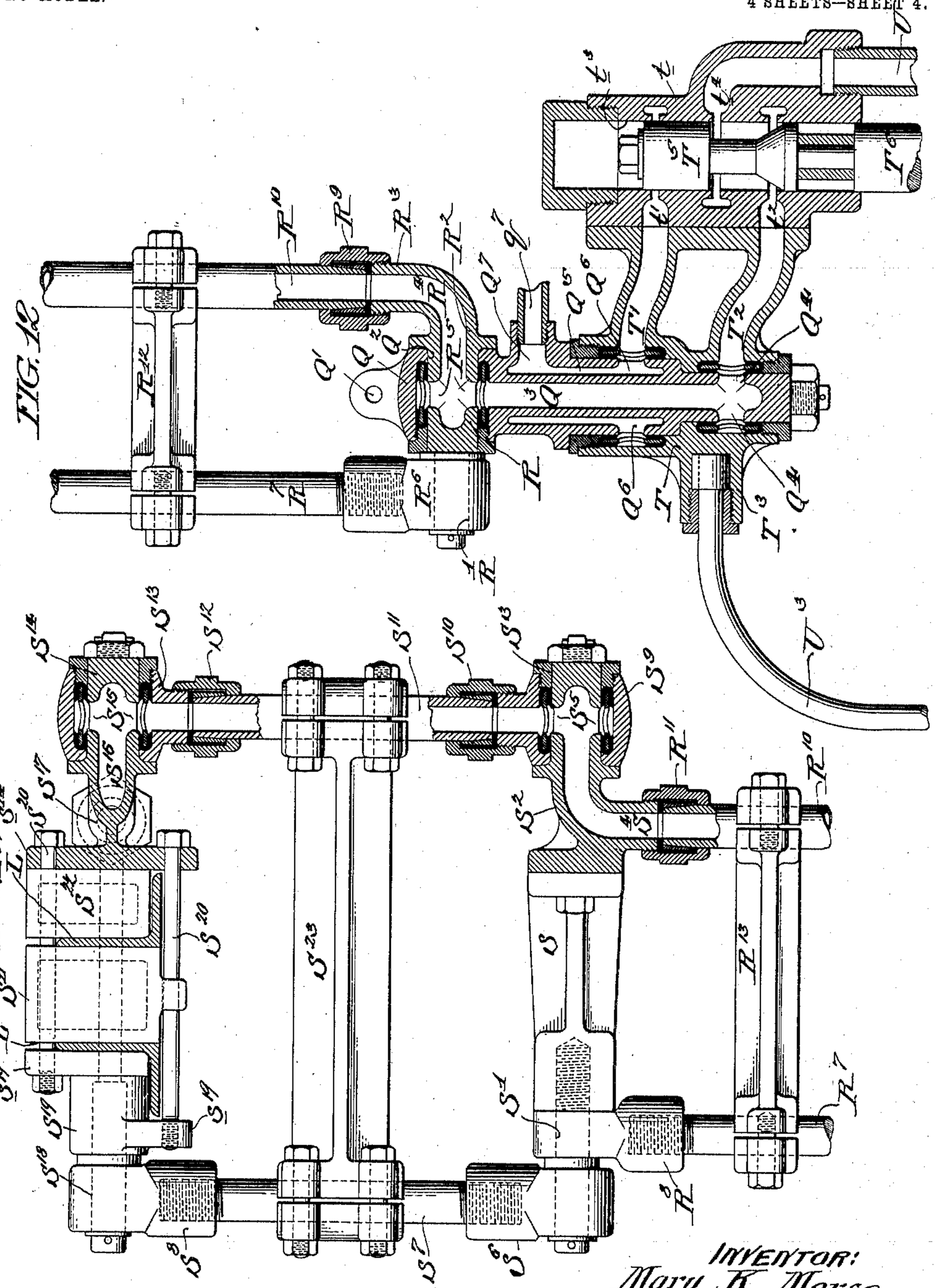
JIB CRANE FOR PORTABLE TOOLS.

APPLICATION FILED JULY 13, 1903.

NO MODEL. 4 SHEETS—SHEET 4.



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No. 760,138. Patented May 17, 1904.

UNITED STATES PATENT OFFICE.

MARY K. MORSE, OF PHILADELPHIA, PENNSYLVANIA, EXECUTRIX OF HENRY G. MORSE, DECEASED, ASSIGNOR TO NEW YORK SHIP-BUILDING COMPANY, OF CAMDEN, NEW JERSEY, A CORPORATION OF NEW JERSEY.

JIB-CRANE FOR PORTABLE TOOLS.

SPECIFICATION forming part of Letters Patent No. 760,138, dated May 17, 1904.

Application filed July 13, 1903. Serial No. 165,272. (No model.)

To all whom it may concern:

Be it known that HENRY G. MORSE, deceased, late a citizen of the United States of America, residing in the city and county of Philadelphia and State of Pennsylvania, did invent certain new and useful Improvements in Jib-Cranes for Portable Tools, of which the following is a true and exact description, reference being had to the accompanying drawings, which form a part thereof.

The invention relates to double-jointed jib-cranes especially intended and adapted to support and permit the manipulation of portable tools, though in its broader features this crane is capable of utilization for other purposes.

Where a portable tool or other weight is carried on the outer arm of a double-jointed jib-crane, the inner arm of such crane is necessarily at times exposed to very considerable torsional strains; and the leading purpose of the invention is to provide a construction in which either the tension or compression member of the truss making up the inner arm of the crane is so constructed as to serve also as a torsional member to resist such torsional strains, and by preference the compression member is constructed in this way.

The invention has also to do with various details of construction by which the arms of the jib-crane are best adapted for their work and by means of which the tool is supported, adjusted, alined, and operated, the nature of which will be best understood as described in connection with the drawings, which illustrate the invention in what is believed to be its best and most convenient form.

In said drawings, Figure 1 is a side elevation of the jib-crane, showing the mechanism for supporting, adjusting, and operating the tool carried by the outer arm. Fig. 2 is a plan view of the crane, the supporting-post being shown in section as on the line 2 2 of Fig. 1; Fig. 3, a rear elevation of the tool carried by the crane and the mechanism immediately connected therewith. Fig. 4 is a plan view, on an enlarged scale, of the rear end of the inner crane-arm. Fig. 5 is a sectional elevation of the same part of the crane, the section being taken on the line 5 5 of Fig 4. Fig. 6 is a cross-section on the line 6 6 of Fig. 5. Fig. 7 is a plan view of the nut C, shown at the top of the supporting-post about which the inner arm of the crane swings. Fig. 8 is a plan view of the outer arm of the crane and an adjacent portion of the inner arm, shown on a larger scale than in Fig. 2. Fig. 9 is a side elevation of the outer crane-arm and adjacent parts, shown partly in section on the section-line 9 9 of Fig. 8. Fig. 10 is a cross-section on the line 10 10 of Fig. 9. Fig. 11 is a view showing one end of the hoisting-cylinder and the valve-casing connected therewith in section and showing also the valve and valve-actuating mechanism controlling the admission of pressure fluid to the hoisting-cylinder. Fig. 12 is a view of the tool-carrying socket-piece with its attachments and connections, taken as on the section-line indicated at 12 12 in Fig. 9. Fig. 13 is a view showing a portion of the alining-frame, partly in section, on the line 13 13 of Fig. 9.

A A in Fig. 1 of the drawings indicate portions of the truss of a traveling crane to which the double-jointed jib-crane is connected. As shown, vertical braces A′ A′ are clamped in position on the truss A A by headers A^2 A^3, which in turn support the post B, said post having (see Fig. 5) a collar C′ secured to it, which abuts against the header A^3, and a threaded end B^2, which projects through the header A^2 and is secured thereto by a nut, (indicated at C.) At some distance below the collar C′ the post B has an outwardly-extending shoulder (indicated at *b*′) and is continued below said shoulder of greater diameter, as shown at B′. The post is formed with a central perforation (indicated at B^3) and near its upper end with a lateral opening B^4, leading into said perforation, as shown in Fig. 5.

D (best shown in Fig. 5) is a collar secured to the post and adapted to serve as a bearing

for rollers, (indicated at F.) A similar collar *d* is secured to the bottom of the portion B′ of the post to serve as a bearing for rollers *f*. (Shown in Figs. 5 and 6.) Also secured to the post immediately above the bearing-ring D is the bearing-ring D′, the upper surface of which serves as a bearing for the balls, (indicated at F′.)

E is a sleeve surrounding the portion B′ of the post, having, as shown, enlarged portions E′ and *e*′, to which are secured bearing-rings E^2 and e^2 for the rollers F and *f*, and E^3 is a cap secured to the top of the enlarged portion E′ and extending over the bearing-ring D′, the sleeve E being thus supported on the post B B′ by roller and ball bearings.

E^4 is a cylindrical lateral extension from the sleeve E, preferably of substantially the same diameter as the sleeve and preferably forming a portion of the compression member *g* of the truss forming the inner crane-arm, the said compression member *g* consisting of a stout cylinder of substantially the same or slightly greater diameter than the extension E^4, provided at or near its outer end with projecting pins, (indicated at *g*′ *g*′,) and the tension member of the truss consists, preferably, of the tie-rods G G, secured at G^2 G^2 to the pins *g*′ and at their rear ends to the top of the sleeve E. By preference a strap passes around the upper part of the sleeve, as shown, and connects with and forms part of the tie-rods G through adjusting-turnbuckles G^3 G^3.

H is a cylindrical socket-piece firmly secured to the end of the cylindrical truss member *g* and supporting a vertical post, preferably in the form of a sleeve, (indicated at H′.) As shown, this sleeve-post is provided near its top with an internal shoulder H^2 and an upwardly-extending and larger portion H^3 and at its bottom with an enlarged portion H^4.

I and J are cap-pieces rotatively secured to the top and bottom of the vertical sleeved post H′. Both of these cap-pieces are formed with projections (indicated at I′ and J′) for the convenient attachment of the angle-irons making up the compression and tension members of the truss forming the outer arm of the crane, and, as shown, both of the cap-pieces have inwardly-extending hubs, (indicated at I^2 and J^2,) which support bearings for rollers working on the inside of the enlarged portions H^3 and H^4 of the sleeve-post, and the cap-pieces are firmly secured in position along the sleeve-post by a central perforated binding-post, (indicated at *h* and best shown in Fig. 9.)

K K are iron braces secured to the flanges I′ of the cap-pieces I and forming the tension member of the outer arm of the truss. L L are angle-irons secured to the flanges J′ of the cap-piece J and forming the compression members of this truss. The two sets of angle-irons are, as shown, secured together at their outer ends by abutments to plates M, which at their outer ends are spread apart, as shown at M′, Fig. 8, and support a bearing for a wheel, (indicated at M^2.)

N is a hoisting-cylinder supported on the braces K of the jib-arm, N′ indicating a head closing the rear end of the cylinder, and N^2 (best shown in Fig. 11) showing the head closing the front end of the cylinder and having formed in it a port N^3, connecting with a port O^2 in the valve-casing O, which valve-casing has a cylindrical valve O′, into which leads the port O^2, and I provide also on each side of the port O^2 a port O^3, leading to the exhaust, and a port O^4, connecting with a conduit for fluid under pressure.

O^5 indicates the piston-valve working in the casing and connected through its stem O^6 and by a pivot-pin O^7 with a valve-rod O^8, having attached to an intermediate portion of it collars O^9 o^9, against which abut washers O^{12} o^{12}, fitting in a stationary casing O^{10}, in which is situated a spring O^{11}, which bears against the washer and through the washers against the collars O^9 o^9, acting to hold the valve in the position in which the port O^2 is cut off from communication with either of the ports O^3 and O^4 and to return it to this position when shifted therefrom. The view in Fig. 11 is fragmentary, and the position of the valve does not correspond with the position of the valve-actuating rod shown in intermediate section or the position of the valve-actuating levers shown in the right-hand section. The end of the rod O^8 is connected with the ends O^{13} o^{13} of the lever-arms O^{14} o^{14}, pivoted at O^{15} o^{15} and extending out, as shown in Fig. 9, to the end of the frame of the crane, O^{16} and o^{16} indicating depending chains by which the levers can be conveniently operated.

P is the piston working in the hoisting-cylinder N and connected through the piston-rod P′ with a hoisting-chain P^2, which works over the pulley M^2 and, as shown, is connected with an eye Q′ of the socket-piece Q, (best shown in Fig. 12,) said socket-piece being formed near its head with a transverse perforation Q^2, communicating with a longitudinal perforation Q^3, which at the bottom has laterally-extending ports Q^4 Q^4. The socket-piece is also formed with an annular channel Q^5, having near its bottom laterally-extending openings or ports Q^6 and at its top an upwardly-extending port Q^7, which connects with an exhaust-pipe, (indicated at q^7.) The socket-piece Q is connected at its top with an alining-frame, which also serves as a conduit by which fluid under pressure is led to the internal channel of the socket-piece and through it conducted to the operating mechanism of the tool supported upon the socket-piece. As shown, a pin R extends through the transverse opening Q^2, having a bearing-pin R′ extending from one end and a hollow curved arm R^2 extending from its other end, the pin being secured in the transverse perfo-

ration so as to be capable of turning therein, but not of moving longitudinally.

R^4 indicates the channel in the arm R^2, communicating with the perforation Q^3 of the socket through ports R^5 and connecting, through a threaded end R^3 and a joint-piece R^9, with a pipe-section R^{10}, which (see Fig. 13) connects at its other end through a pipe-joint R^{11} with a casting S^2, having a bearing-surface S^3 and a channel S^4, which channel connects through ports S^5 with a perforated sleeve-section S^9, connected, through a pipe-joint S^{10}, with a pipe-section S^{11}, which in turn is connected by a pipe-joint S^{12} with a sleeve-section S^{13}, turning on the perforated pin S^{14}, having ports S^{15} and a channel S^{16}, which communicates through a port S^{17} with a conduit for fluid under pressure, (indicated at X^4.) The other part of the alining-frame is made of similar though unchanneled connections, the bearing-pin R′ having pivoted upon it the socket-piece R^6, which, through a rod R^7, connects with another socket-piece R^8, pivoted on the pin S′, extending out from a frame S, to which is bolted the casting S^2. The pin S′ has also pivoted upon it the socket-piece S^6, connecting through a rod S^7 with socket-piece S^8, pivoted on a pin S^{18}, which is attached to a casting S^{19}, which is abutted against one of the angles L, another block S^{21} being situated between the angles L L and a third block S^{22}, fitting in the second angle-plate L, the said blocks and the hollow pin S^{14}, with its connections, being securely bolted together by bolts S^{20} S^{20} passing through the blocks and flanges s^{14} of the pin-casting S^{14} and s^{19} of the block S^{19}.

R^{12}, R^{13}, and S^{23} are braces stiffening the alining-frame, which, it will be seen, gives perfect freedom to the socket-piece Q to rise or fall, but keeps it in perfect alinement with the outer arm of the jib-crane.

T is a sleeve-like section fitting on the socket-piece Q and held thereon by a nut, as shown, the said sleeve having ports (indicated at T′ and T^2) which communicate with the ports Q^6 and Q^4 of the socket-piece and connect with a valve-casing, (indicated at *t*.) The sleeve-casting has also a bearing-section (indicated at T^3) to which a supporting-bail U^3 is pivotally connected, as shown in Fig. 12. The valve-casing *t* is secured to the sleeve-socket T and is formed with a cylindrical valve-chamber t^3, which communicates with the ports T′ and T^2 through ports t' and t^2, and is formed with an intermediate port t^4, which communicates, as shown, with the tubular supporting-bail, (indicated at U.)

T^5 is the piston-valve working in the valve-chamber t^3, T^6 indicating the valve-stem and which is operated, as shown in Fig. 9, through a lever T^7, pivoted at T^8 to link T^9.

U′ (see Fig. 3) is a continuation of the hollow tubular bail U, the tubular portion of the bail communicating, through a connection U^2, with a tool-actuating cylinder (indicated at W) and supported directly on the top of the tool, (indicated at V,) the said tool being in turn supported by the bail-pieces U^3 and U′ U.

X is a conduit for pressure fluid which enters the pivot-post B through the opening B^4 and extends, as indicated at X′, through the central perforation B^3 to the bottom of the portion B′, where it connects through a swivel-joint with the conduit extension, (indicated at X^2,) said extension connecting with the swivel-joint to the bottom of a vertical pipe-section X^3, which extends through the hollow post *h* in the sleeve-post H′ and continues, as indicated at X^4, to connect with the socket S^{17} and the pipe system extending through the aline-ment-frame. A valve X^6 is provided to cut off the flow of fluid to the tool, and a branch pipe X^5 leads to the valve-casing O, from which also extends the exhaust-conduit, (indicated at x^5.)

It will be seen that the inner arm of the double-jointed jib-crane turns freely on the post B B′ and that the outer arm turns freely on the sleeve-post H′. When the two arms of the crane are in alinement, the weight upon the outer arm is transmitted directly to the inner arm, the lower member of which serves as a compression member and the upper member as a tension member. As soon, however, as the outer arm of the crane is swung out of alinement with the inner arm the said arm has not only to support the direct weight of the outer arm and its load, but also to resist a torsional stress brought upon it by the angular deflection of the outer arm and which increases with the deflection up to the point when the outer arm is at right angles to the inner arm; but this torsional stress is provided for not only by giving to one of the truss members of the inner arm the tubular construction which adapts it to resist torsional strains, but also by the bracing of this torsion-arm by tie-rods extending to both sides of it and to both sides of the sleeves E, the truss as a whole being excellently adapted to withstand both compression, tension, and torsional strains.

It will be seen that the construction permits the movement of the crane-arms in all directions without interfering with the pressure-fluid connections, and it is also obvious without detailed description that means are provided for conducting the pressure fluid both to the hoisting-cylinder and to the tool suspended on the outer arm of the crane in all positions of the crane and of the tool with respect to the arms. The function of the hoisting-cylinder and alining-frame in regulating the position of the suspended tool below, has already been pointed out and it is only necessary to note that the valve and valve-actuating connections for acting upon the hoisting-cylinder and upon the tool are in this crane arranged within ready and convenient access of the tool-operator.

Having now described the said invention,

what is claimed as new, and desired to be secured by Letters Patent, is—

1. A double-jointed jib-crane having its inner arm formed of a truss comprising a tension and compression member, one of said members being also formed to resist torsional strains, in combination with a vertical bearing supported solely on the torsion-resisting member of the said truss, and an outer weight-carrying arm pivotally supported on said bearing.

2. A double-jointed jib-crane having its inner arm formed of a truss comprising a vertical rotary member, a hollow cylindrical member comprising the compression member of the truss and adapted to resist torsional strains and a tension member, in combination with an outer weight-carrying arm pivotally secured to the end of the hollow cylindrical member of the inner arm-truss.

3. A double-jointed jib-crane having its inner arm formed of a truss comprising a vertical rotary member, a hollow cylindrical member composing the compression member of the truss and adapted to resist torsional strains and tie-rods G G secured to the opposite sides of the end of the compression member and to the vertical rotary member, said tie-rods serving as the tension member of the truss, in combination with an outer weight-carrying arm pivotally secured to the end of the hollow cylindrical member of the inner arm-truss.

4. A double-jointed jib-crane consisting of a pivot-post, as B, B′, in combination with a sleeve E, surrounding and rotatable about said post, said sleeve having a cylindrical extension from its side, as E^4, an inner arm-truss comprising compression and tension members secured to said sleeve and to each other and one such member consisting of a hollow cylinder firmly secured to the cylindrical extension from the sleeve, a vertical post firmly secured to the cylindrical member of the inner arm-truss, and an outer arm-truss pivotally connected to the said vertical post.

5. A double-jointed jib-crane consisting of a pivot-post as B B′, in combination with a sleeve E, surrounding and rotatable about said post said sleeve having cylindrical extension from its lower side, as E^4, an inner arm-truss comprising compression and tension members secured to said sleeve and to each other and the compression member consisting of a hollow cylinder firmly secured to the cylindrical extension from the sleeve, a vertical post firmly secured to the cylindrical compression member of the inner arm-truss, and an outer arm-truss pivotally connected to the said vertical post.

6. A double-jointed jib-crane consisting of a pivot-post, as B B′, in combination with a sleeve E, surrounding and rotatable about said post said sleeve having a cylindrical extension from its lower side, as E^4, an inner arm-truss comprising compression and tension members secured to said sleeve and to each other and the compression member consisting of a hollow cylinder firmly secured to the cylindrical extension from the sleeve and the tension member consisting of tie-rods G G secured to opposite sides of the outer end of the cylindrical compression member and to the sleeve, a vertical post firmly secured to the cylindrical compression member of the inner arm-truss, and an outer arm-truss pivotally connected to the said vertical post.

7. A double-jointed jib-crane consisting of a pivot-post, as B B′, in combination with a sleeve E, surrounding and rotatable about said post said sleeve having a cylindrical extension from its lower side, as E^4, an inner arm-truss comprising compression and tension members secured to said sleeve and to each other and the compression member consisting of a hollow cylinder firmly secured to the cylindrical extension from the sleeve and the tension member consisting of tie-rods G G secured to opposite sides of the outer end of the cylindrical compression member and to the sleeve, a vertical hollow sleeve firmly secured to the outer end of the cylindrical member of the inner arm, cap-pieces I and J rotatably secured to the top and bottom of the sleeve-piece, and tension and compression members making up the outer jib-crane arm secured to said rotatable cap-pieces.

8. In combination with a double-jointed jib-crane having an inner arm constructed to resist torsional strains and an outer weight-carrying arm, a fluid-pressure conduit comprising vertical sections passing through the pivotal centers of the inner and outer arms and operative cylinders supported on the outer arm and connected to said conduit.

9. In combination with a double-jointed jib-crane having an inner arm constructed to resist torsional strains and an outer weight-carrying arm, a hoisting-cylinder N and pulley M^2 supported on the outer arm, a chain extending from the cylinder over the pulley, a tool-supporting socket-piece suspended from the chain and channeled to give passage to fluid, a tool supported on said socket-piece by bails one of which is channeled for the passage of fluid to the tool-actuating mechanism an alining-frame pivotally secured to the outer arm of the crane and to the socket which supports the tool said frame having an intermediate pivotal joint and embodying a fluid-channel leading to the channel in the socket-piece, a conduit for fluid under pressure supported on the outer crane-arm and connecting with the hoisting-cylinder and with the channeled alining-frame, valves for controlling the admission of the fluid to the hoisting-cylinder and the tool-actuating mechanism and valve-actuating mechanism therefor assembled at the end of the outer crane-arm in easy reach of the operator.

10. In combination with a double-jointed

jib-crane having an inner arm constructed to resist torsional strains and an outer weight-carrying arm, a hoisting-cylinder N and pulley M^2, supported on the outer arm, a chain extending from the cylinder over the pulley, a valve-casing having ports adapted to connect the hoisting-cylinder with the fluid-conduit or an exhaust, a valve moving in said casing, a valve-rod actuating said valve, a spring connected to said rod whereby it is normally held and returned to an intermediate position wherein the valve closes both the admission and exhaust and levers O^{14} o^{14} connected to said rod and extending toward the end of the crane-arm, said levers being arranged to actuate the rod in different directions when moved in the same direction.

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