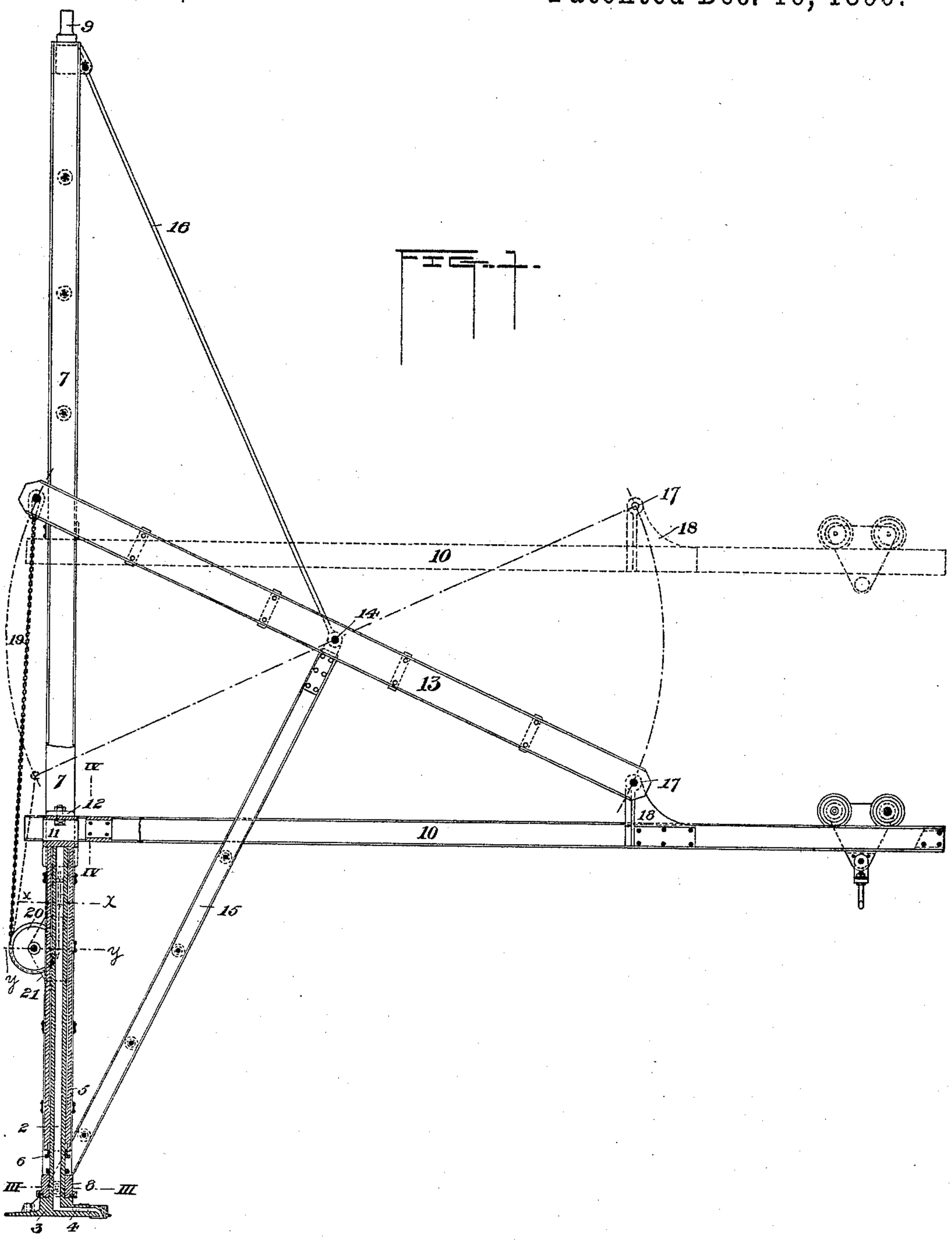
(No Model.)

3 Sheets—Sheet 1.

S. FORTER & J. KENNEDY.

CRANE.

No. 442,877. Patented Dec. 16, 1890.



WITNESSES

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(No Model.) 3 Sheets—Sheet 2.

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CRANE.

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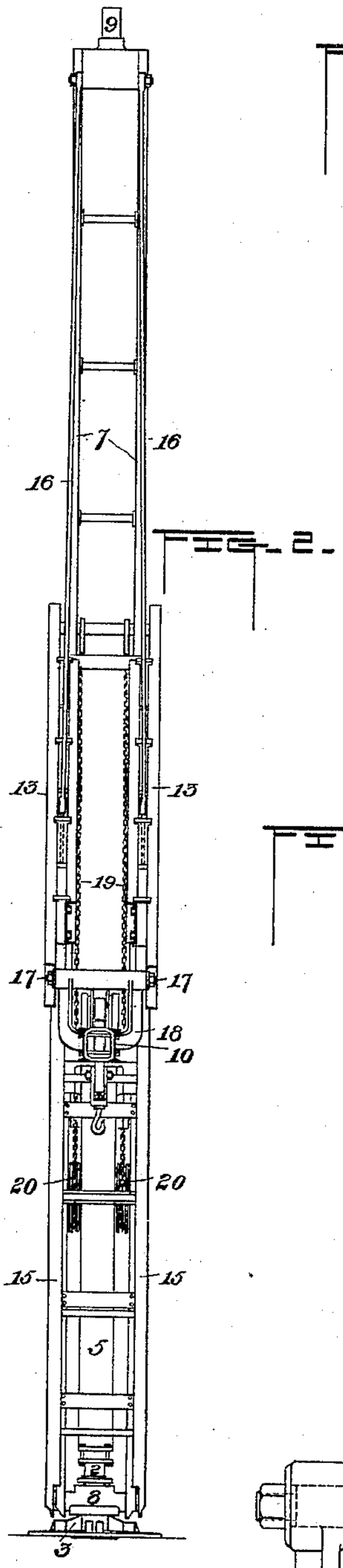

FIG. 2.

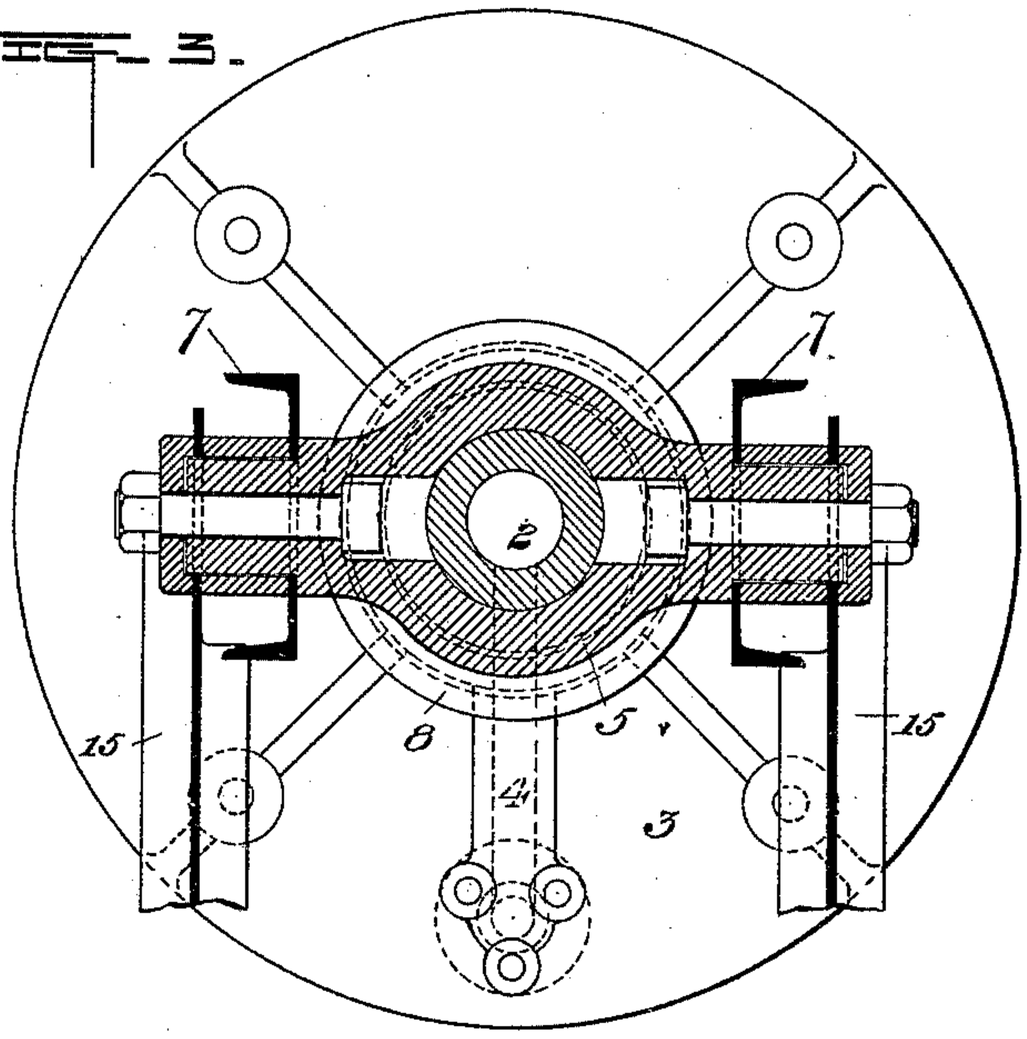

FIG. 3.

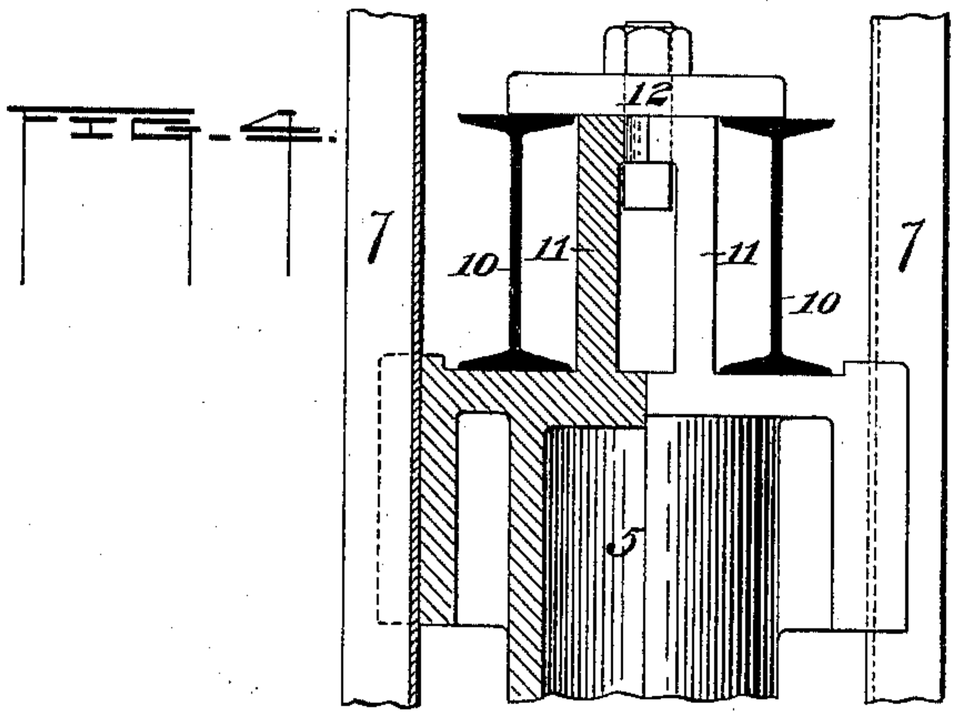

FIG. 4.

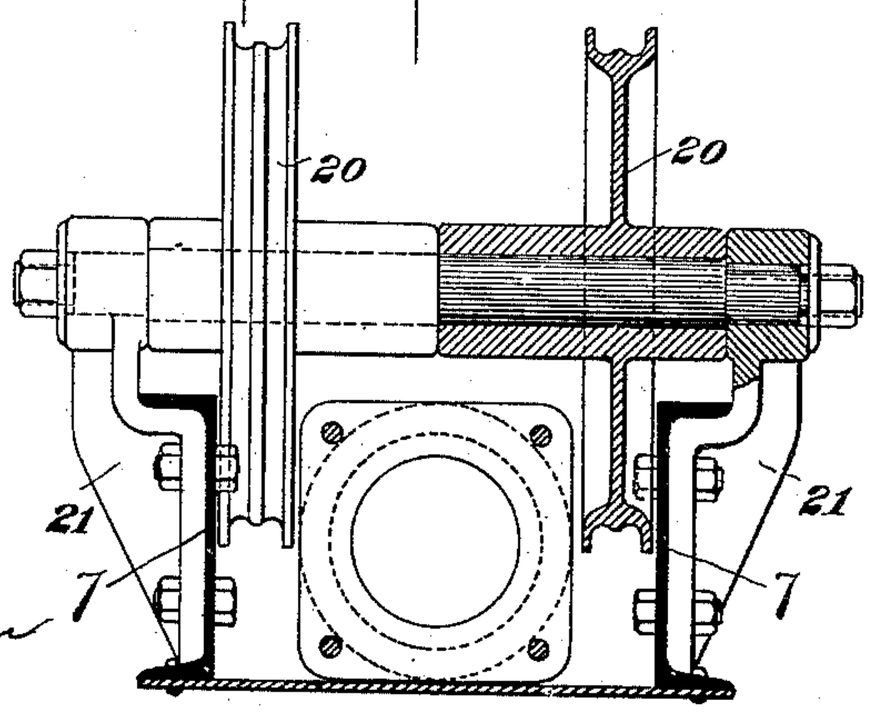

FIG. 5.

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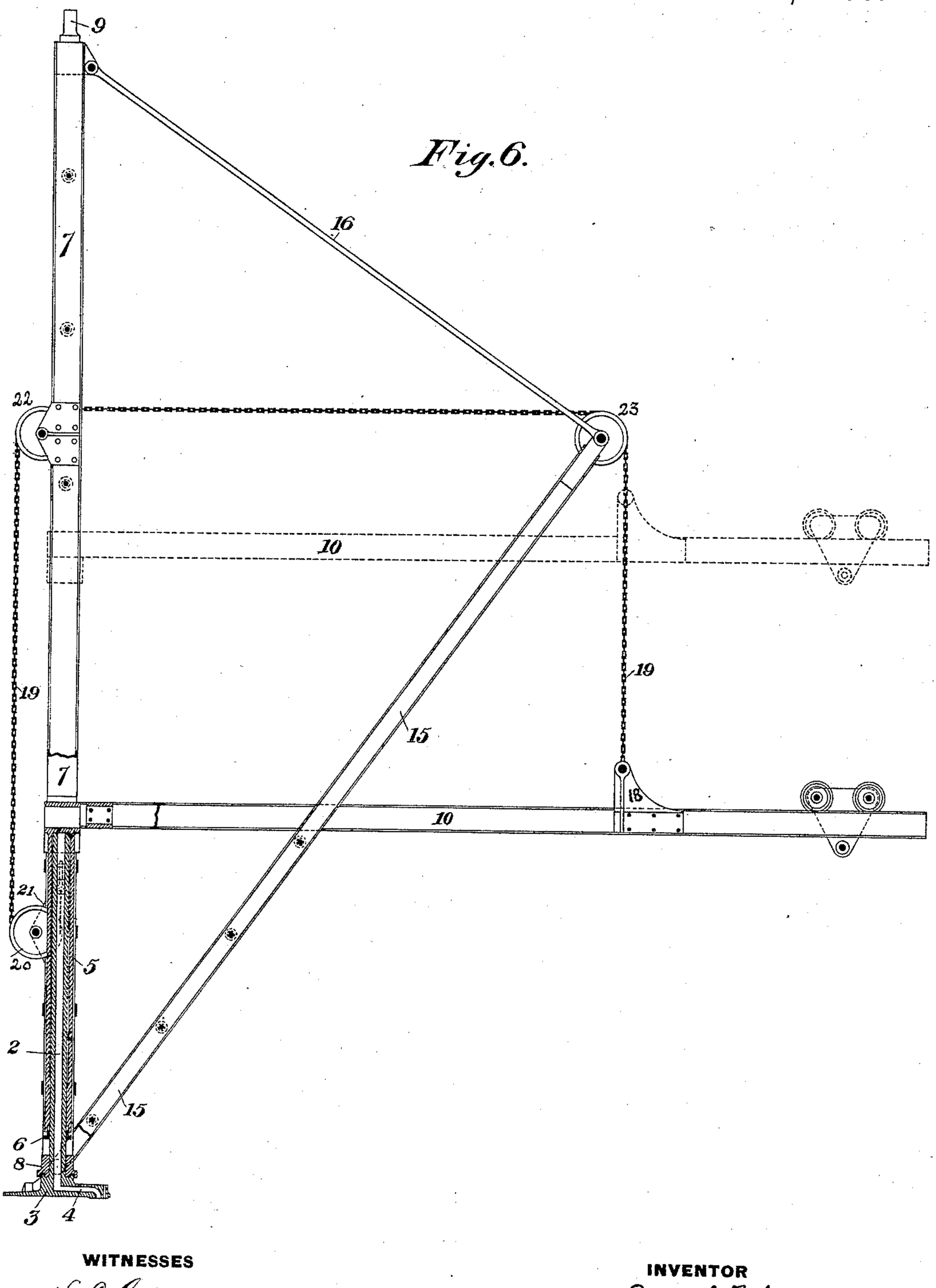
CRANE.

No. 442,877. Patented Dec. 16, 1890.

Fig. 6.



WITNESSES

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UNITED STATES PATENT OFFICE.

SAMUEL FORTER, OF PITTSBURG, AND JULIAN KENNEDY, OF LATROBE, PENNSYLVANIA.

CRANE.

SPECIFICATION forming part of Letters Patent No. 442,877, dated December 16, 1890.

Application filed June 30, 1890. Serial No. 357,219. (No model.)

To all whom it may concern:

Be it known that we, SAMUEL FORTER, of Pittsburg, in the county of Allegheny and State of Pennsylvania, and JULIAN KENNEDY, of Latrobe, in the county of Westmoreland and State of Pennsylvania, have invented a new and useful Improvement in Cranes, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a side elevation of the crane, showing the cylinder and ram in vertical section. Fig. 2 is an end elevation thereof. Fig. 3 is a horizontal cross-section on the line III III of Fig. 1. Fig. 4 is an end elevation of the top of the cylinder, showing the jib in vertical section on the line IV IV of Fig. 1. Fig. 5 is a horizontal section partly on the line $x\ x$ and partly on the line $y\ y$ of Fig. 1. Fig. 6 is a view similar to Fig. 1, showing a modified construction of the crane.

Like symbols of reference indicate like parts in each.

In the drawings, 2 represents the upright hollow ram or plunger of the crane, which is set at its lower end on a step 3, having a water-passage 4, which communicates with the passage through the ram.

5 is an inverted cylinder, which is fitted on the ram and is vertically movable thereon between the beams of the mast, being provided with suitable packing 6, making a water-tight joint between the ram and cylinder.

The mast of the crane is composed of upright beams 7, secured together and provided at the lower end with a foot 8, which encircles the plunger and is rotatory on the step 3. The top journal 9 of the mast fits in a suitable bearing or steadiment. (Not shown.)

The jib of the crane is compound, being constituted of two parts, one a horizontal part, which rests on the vertically-movable cylinder and is carried thereby, and the other a pivoted swinging beam, which is connected with the horizontal part before mentioned and serves to support the same. The swinging beam may itself be properly called a "jib;" but, in order to prevent confusion of terms, we shall designate it as a "walking-beam," and shall call the horizontal part the "jib." Said jib 10 is composed of parallel horizontal beams set on top of the cylinder 5 on each side of a vertically-projecting portion 11 thereof, and held in place by a cap-plate 12, so as to be capable of slight longitudinal motion, Figs. 1 and 4. The walking-beam 13 is composed of parallel beams pivotally connected at an intermediate point 14 to diagonal struts 15 and 16, which extend from the bottom and top portions of the crane-mast, respectively, Figs. 1 and 2. At the outer end the parts of the walking-beam 13 are pivotally connected by a cross-bolt 17 to brackets 18, projecting from the beams of the jib, and the inner ends of the parts of the walking-beam are provided with chains or flexible connections 19, which extend therefrom around sheaves 20 (journaled in brackets 21, projecting from the mast) to the cylinder to which the chains are fixed. The consequence of this construction is that as the cylinder is raised to lift the jib the draft of the cylinder on the chains 19 will pull down the inner end of the walking-beam 13 and will elevate the outer end, as shown by dotted lines in Fig. 1. The burden carried by the jib is supported by the connection of the walking-beam to the brackets 18, and the load is tranferred from the intermediate pivot 14 of said beam to the diagonal struts 15 and 16, and by them to the mast, on which they exert a vertically-compressing force. On inspection of the drawings, it will be seen that the walking-beam performs this function of a lifting-support in every position of the jib, and as it is composed of separated beams it affords no obstruction to the vertical rise of the jib between them nor to the motion of the trolley on the jib. The consequence of this construction is that the great bending moment exerted by the jib on the cylinder or plunger in former cranes is obviated and the strain is distributed upon the mast in such manner as to secure the most effective results in strength of material and ease of motion of the parts.

In cranes where the jib is lifted solely by the direct action of the upright cylinder, the bending moment on the jib being transferred to the cylinder and ram, causes these parts to bind, and the resulting friction increases considerably the power required to lift the bur-

den. This is not so in our crane, since the bending moment is taken up by the walking-beam and does not appreciably affect the cylinder and ram, which operate without such excessive friction. The advantages of the invention in this regard will be appreciated by the skilled engineer.

Instead of using a stationary ram and a vertically-movable cylinder for operating the crane-jib, the parts may be reversed, so that the cylinder shall be stationary and that the ram shall move within the same and shall lift the jib. Either construction may be applied to our crane.

In the modification illustrated in Fig. 6 the jib 10 is supported at an intermediate point, not by a walking-beam, but the chain or flexible connection 19 extends from the cylinder and sheaves 20 over a sheave 22 on the mast and thence over a sheave 23 at the junction of the struts 15 and 16 to the bracket 18 or other suitable place of attachment on the jib. Then as the cylinder of the crane is lifted it pulls on the chain 19, and the force thereby supplied will be exerted as a lifting force on the jib at the place of attachment 18. This lifting force is transmitted to the mast through the struts in the manner above explained with reference to the construction illustrated in Fig. 1.

Other modifications in the form and construction of the parts of the apparatus within the scope of our invention may be devised.

We believe we are the first to device a crane in which the jib is supported not only by the direct support of a lifting-cylinder, but also by a power-connection whose bearing is on struts extending from the mast, and we intend to claim the same, broadly.

The other items of our invention are specifically recited in the claims.

We claim—

1. In a crane, the combination of a mast, horizontal jib, struts, and a lifting-motor comprising an upright cylinder and plunger situate below the jib, the movable element of which motor has a direct bearing on the jib and serves to lift the same, and a lifting power connection connected with the movable element of the motor and also having a bearing on the struts and connected with the jib, substantially as and for the purposes described.

2. In a crane, the combination, with the horizontal jib and the lifting-motor, of a pivotally-supported walking-beam connected with the jib and with the moving part of the lifting-motor, whereby motion of the latter is transmitted to the walking-beam and by the walking-beam to the jib, substantially as and for the purposes described.

3. In a crane, the combination of the horizontal jib, a lifting-motor, a walking-beam connected with the jib, diagonal struts by which the walking-beam is pivotally supported, and means for rocking the beam, substantially as and for the purposes described.

4. In a crane, the combination, with the horizontal jib and the lifting-motor comprising a cylinder and ram, of a pivotally-supported walking-beam connected with the jib at one end and a flexible connection extending from the other end of the walking-beam to the moving part of the lifting-motor, substantially as and for the purposes described.

5. In a crane, the combination of a horizontal jib and lifting-motor, a walking-beam 13, connected at one end to the jib and composed of separated parallel parts between which the jib may rise, struts by which the walking-beam is supported, and mechanism for rocking the beam, substantially as and for the purposes described.

6. In a crane, the combination, with a lifting-motor comprising an upright cylinder and ram, of a jib carried by the moving part of the lifting-motor and longitudinally movable, a walking-beam connected with the jib, supports by which the walking-beam is pivotally supported, and means for rocking the beam, substantially as and for the purposes described.

In testimony whereof we have hereunto set our hands this 26th day of June, A. D. 1890.

SAMUEL FORTER.
JULIAN KENNEDY.

Witnesses:
W. B. CORWIN,
H. M. CORWIN.