(No Model.)

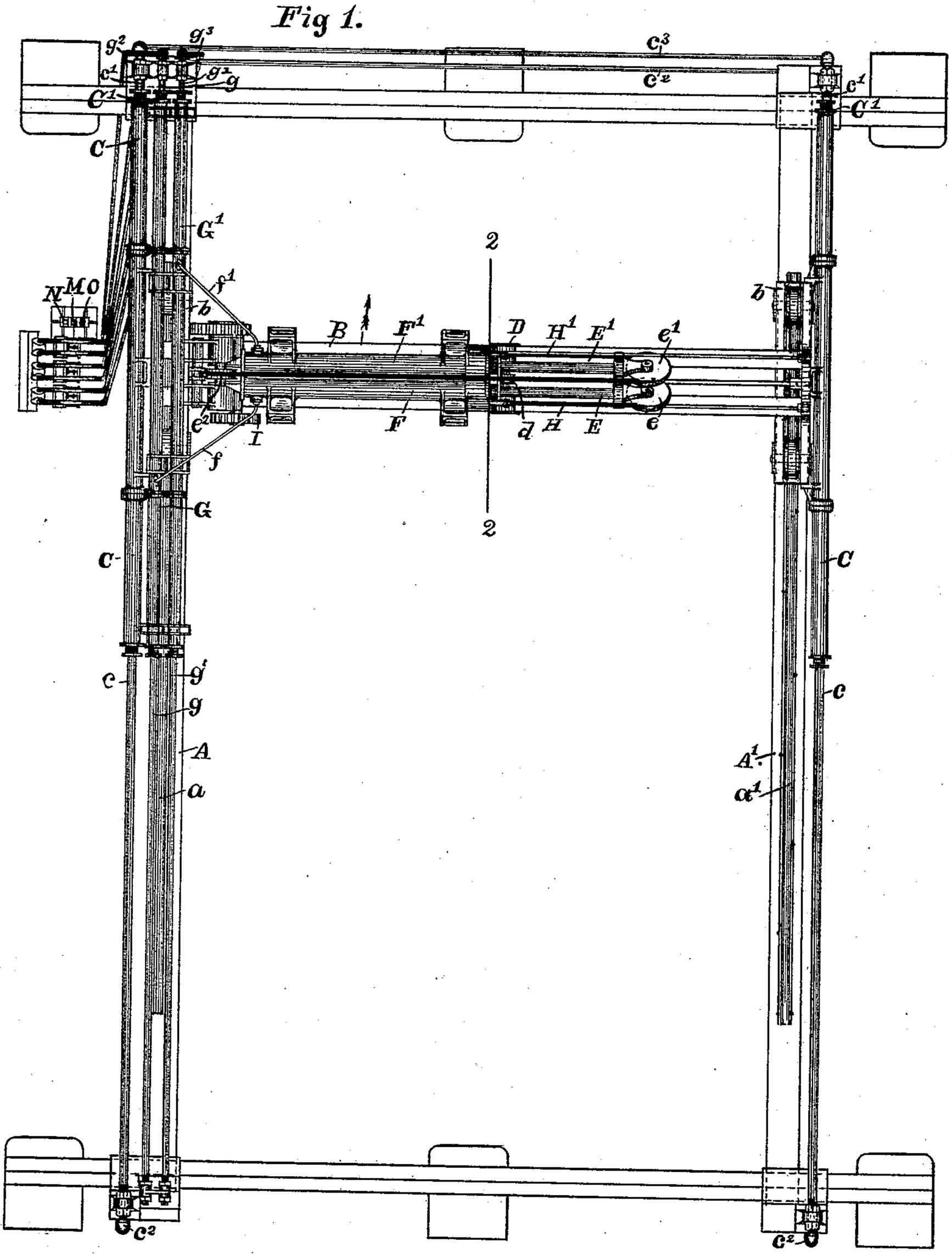
4 Sheets—Sheet 1.

E. W. NAYLOR.

HYDRAULIC TRAVELING CRANE.

No. 457,441. Patented Aug. 11, 1891.

Fig 1.



WITNESSES.

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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

(No Model.)

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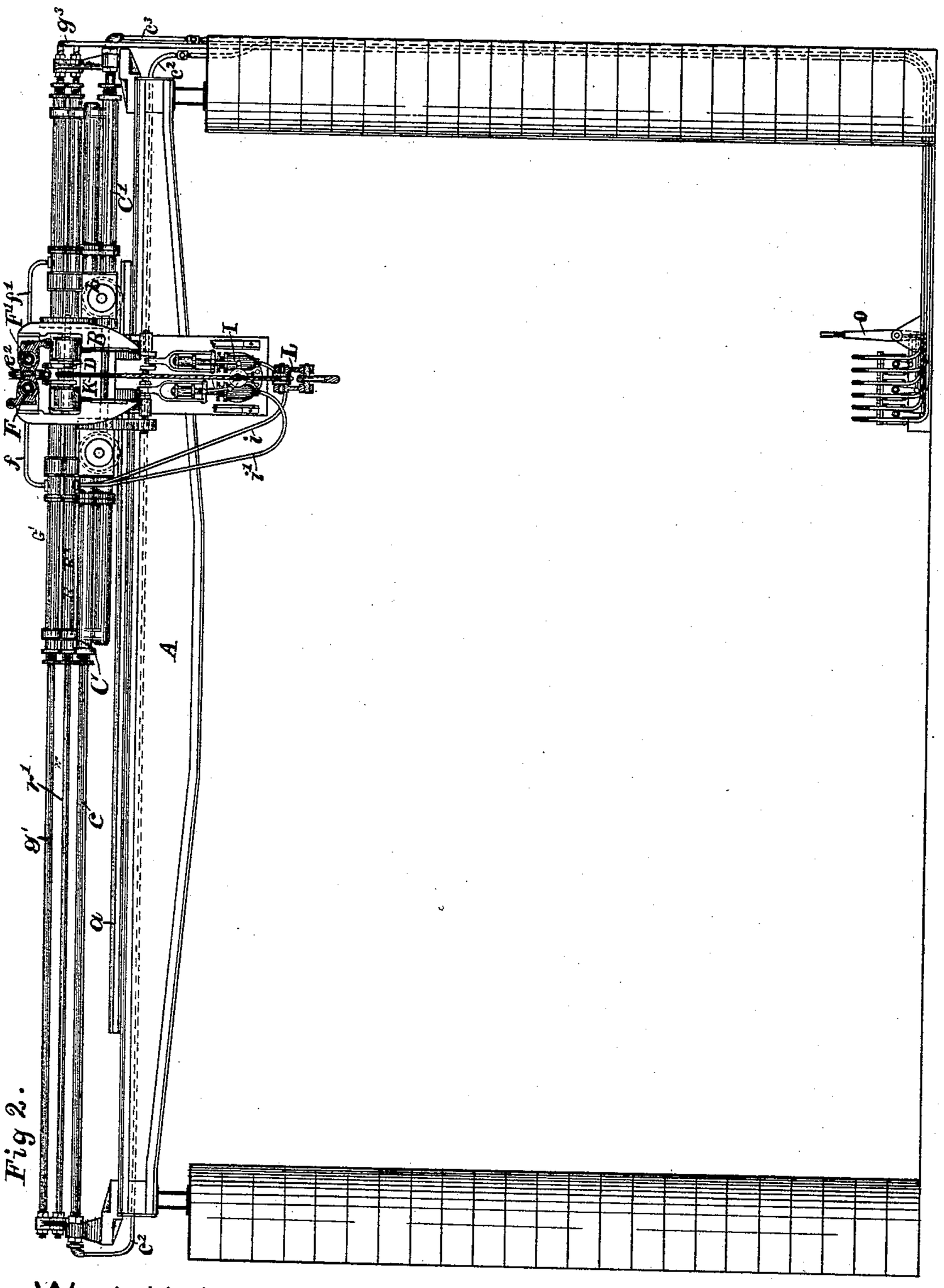

Fig 2.

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(No Model.) 4 Sheets—Sheet 3.

E. W. NAYLOR.

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Fig 3.

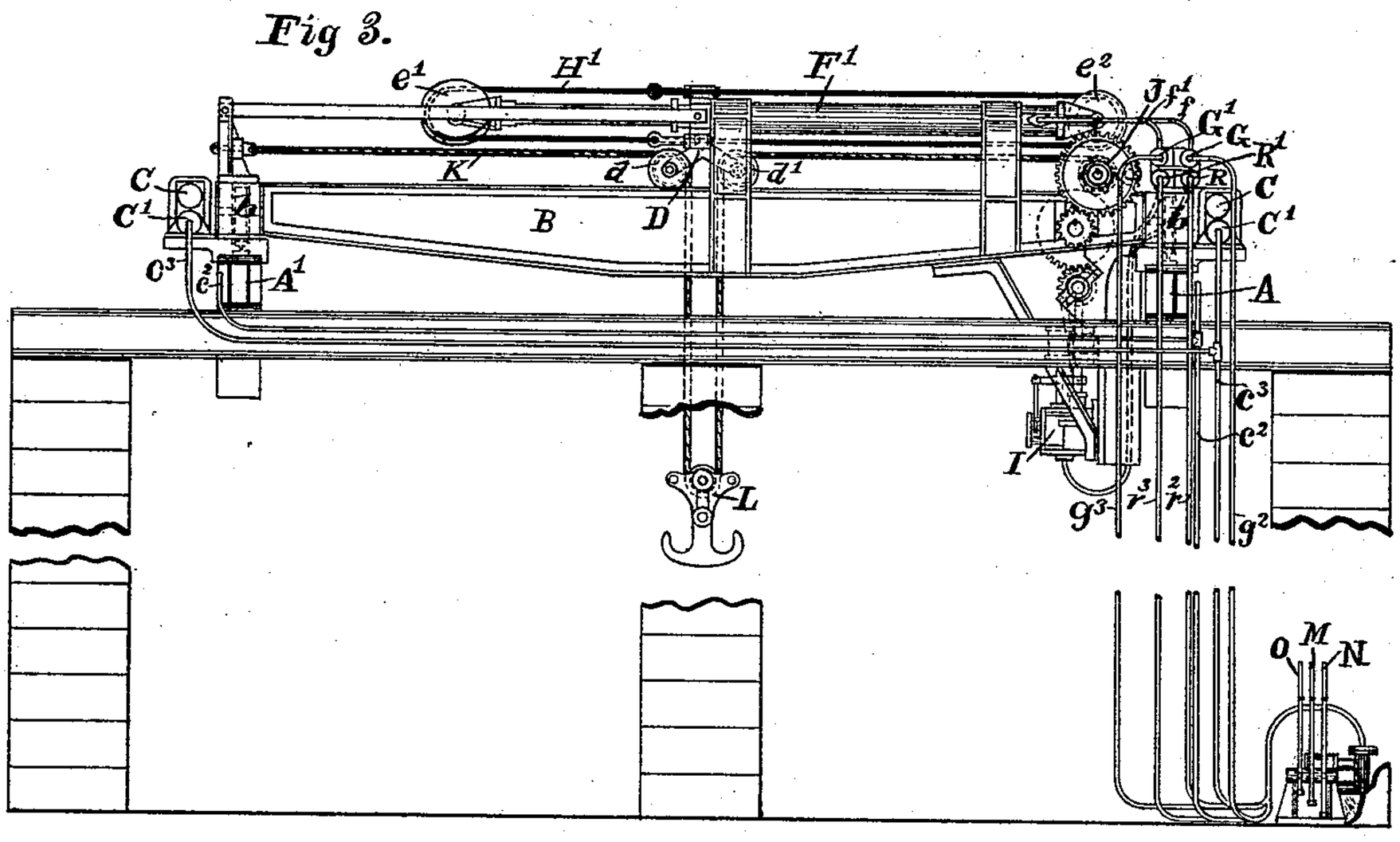

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Fig 4.

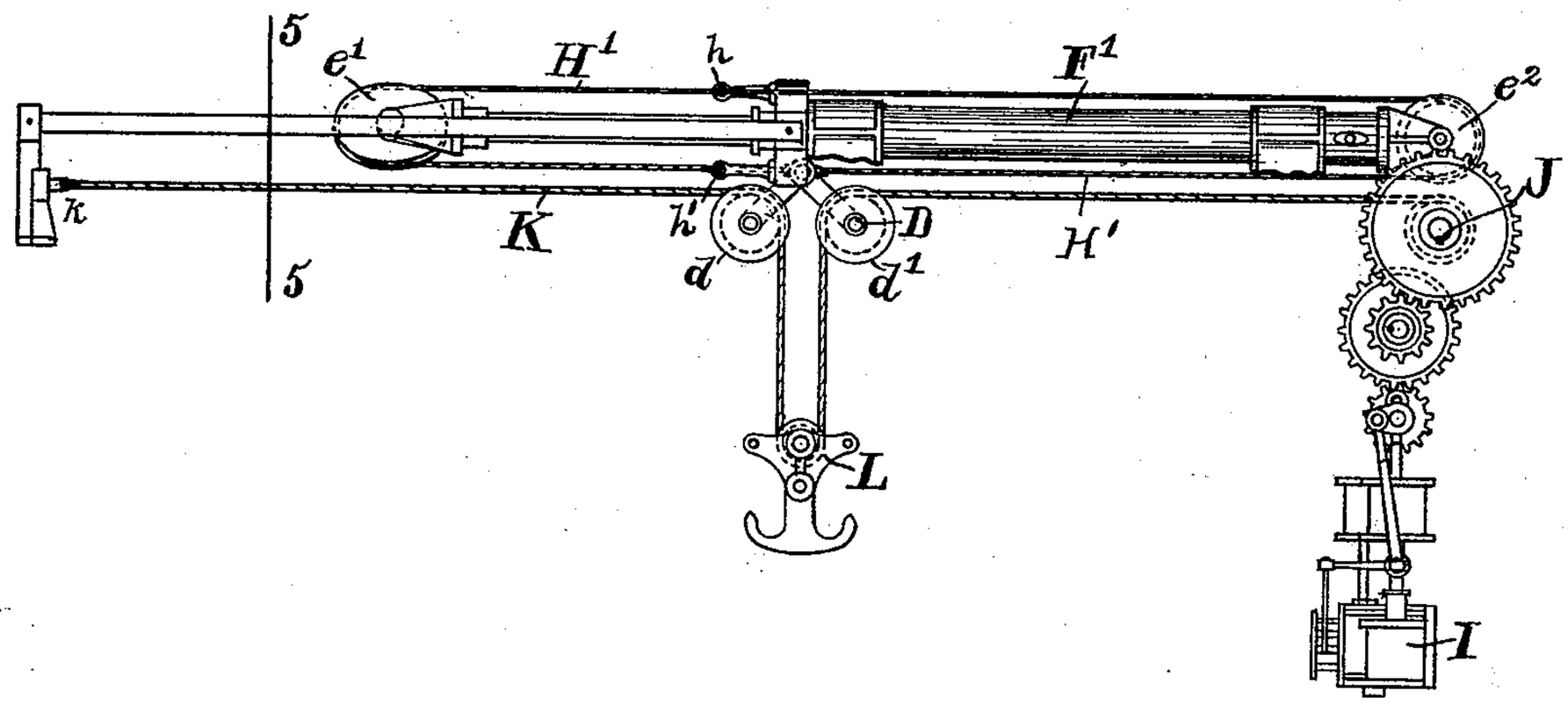
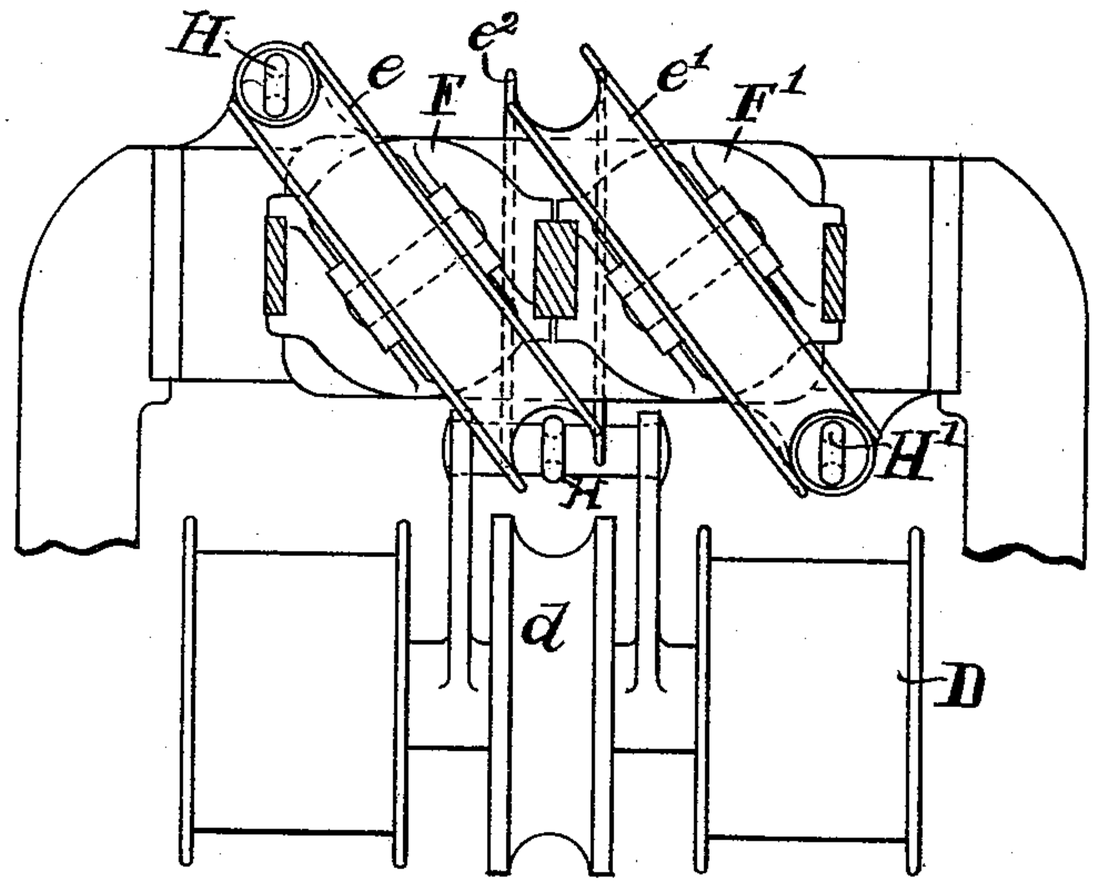


Fig 5.



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UNITED STATES PATENT OFFICE.

ERNEST W. NAYLOR, OF CLEVELAND, OHIO.

HYDRAULIC TRAVELING CRANE.

SPECIFICATION forming part of Letters Patent No. 457,441, dated August 11, 1891.

Application filed March 2, 1891. Serial No. 383,336. (No model.)

To all whom it may concern:

Be it known that I, ERNEST W. NAYLOR, a subject of the Queen of Great Britain, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Hydraulic Traveling Cranes, of which the following is a specification.

My invention relates to traveling cranes; and the object is to provide effective means whereby the bridge, the trolley, and the hoisting apparatus may be operated by hydraulic power. The track-girders and bridge are of the usual construction; but the essential distinguishing characteristics of my invention are these, viz: The bridge carries hydraulic cylinders and a motor which co-operate with each other and with other coacting parts, as hereinafter set forth, in producing the different movements common to traveling cranes, the water being taken to and from said cylinders and motor through telescoping-pipes, flexible pipes, or knuckled jointed pipes, as the case may be, the valves to which may be placed at and operated from any position most convenient for the operator.

In the drawings, Figure 1 is a top plan view of a hydraulic traveling crane constructed in accordance with my invention. Fig. 2 is a sectional side elevation at the point indicated by line 2 2 in Fig. 1. Fig. 3 is an end elevation viewed from that end of the device which is at the top of the sheet containing Fig. 1. Fig. 4 is a detached view of the trolley and its operating mechanism and the hoisting mechanism, and Fig. 5 is a sectional view on the line 5 5 of Fig. 4.

I will now proceed to describe in detail the embodiment of my invention, which is shown in the drawings.

Referring to the parts by letter, A A′ represent the longitudinal track-girders, which are suitably supported at the desired distance above the shop-floor. The tracks *a a′* are secured to these girders. The bridge B extends transversely between the track-girders, and its ends are supported by the trucks *b*, the wheels of which travel on the tracks *a a′*. This bridge is moved along the tracks in either direction by two pairs of oppositely-acting hydraulic cylinders and associated plungers, one pair at each end of the bridge. By connecting one cylinder of each pair with the pressure-column and the other with the exhaust-column the bridge is moved in one direction or the other, as the case may be. By thus arranging a pair of oppositely-acting hydraulic cylinders and associated plungers at each end of the bridge said bridge is kept in proper alignment and is moved with the minimum of friction. Both pairs are similarly constructed and operate in like manner. Therefore a description of one pair will answer for both.

C C′ represent two cylinders, which lie parallel to the track-girders and are secured by means of brackets to the end of the bridge. Entering one cylinder from one end and the other cylinder from the opposite end through suitably-packed joints are the plungers *c c′*, which are in the form of pipes which are rigidly secured to the adjacent girder. The ends of the pipes within the cylinders are open, whereby said pipes serve not only as plungers, but as parts of the means by which the cylinders are connected with the pressure and exhaust columns. The pipes c^2 c^3 connect the ends of the pipes *c c′*, respectively, with the hydraulic accumulator or its equivalent, and the valves in said pipes c^2 c^3 may be located at any convenient point in their length.

When it is desired to move the bridge B in the direction indicated by the arrow in Fig. 1, for example, the valves in the pipes c^2 c^3 are turned in such manner that the water from the accumulator flows through the pipe c^2 into the pipe *c* and from thence into the cylinder C, and the water in the cylinder C′, being forced out through the pipes *c′* c^3, escapes through the valve in the last-named pipe. When the valves are in the reverse position, the bridge moves in the opposite direction.

The valves in the pipes c^2 c^3, which control the flow of water to and from the cylinders C C′, are preferably what are known as "three-way valves," and both of them are preferably connected with a single lever, whereby either valve may be opened to permit the flow of water from the accumulator, while the other valve is simultaneously moved to a position where it permits the escape of water through itself, or both valves may be closed, under which condition the bridge is held in a fixed

position. The lever marked M in the drawings is the lever which may be operated with the above-described results upon the valves and consequently upon the bridge. The levers marked O and N are similarly connected with the valves in the supply-pipes, through which the water flows to and from the hoisting mechanism and the trolley mechanism, respectively.

The trolley D is provided with suitable wheels which run upon tracks extending lengthwise of the bridge. Two cylinders F F′ are secured to and at one end of the bridge parallel with the tracks thereon, and, as shown, above the trolley. Projecting from each of the cylinders F F′ is a ram, (indicated by the letters E E′,) and each ram has a cross-head at its end, in which is carried one of the inclined sheaves *e e′*. The chain H is secured at one end to the cylinder F by means of an eyebolt at *h*, and after passing under the sheave *e* is fastened at its other end to the trolley. Another chain H′, secured at one end to the cylinder F′ by means of the eyebolt at *h′*, passes over the sheave *e′*, then around the vertical sheave e^2, fixed at one end of the bridge, and its other end is secured to the trolley. When the ram E is moving out of its cylinder, the other ram E′ is being forced back into its cylinder, thus moving the trolley to the left, as shown in Fig. 4. When the ram E′ is moving out of its cylinder, the ram E is being forced back into its cylinder, and the trolley is consequently drawn toward the right.

The means shown for admitting water to and permitting its escape from the cylinders F F′ consist of two cylinders G G′, secured to one end of the bridge and lying parallel to the cylinders C C′. Through each of these cylinders G G′ passes one of the telescoping-pipes *g g′*, which are supported at their ends above the track-girders by suitable brackets. The pipes *f f′* connect the cylinders F F′ with the cylinders G G′, respectively, substantially as shown. Each of the pipes *g g′* is plugged at or near its middle, and water is admitted to and permitted to escape from said pipes through the supply-pipes g^2 g^3, which are connected with the accumulator. Near the plugs and in the parts of said pipes *g g′* which are always covered by the associated cylinders are suitable openings, through which water passes from each of the pipes *g g′* into its associated cylinder, and from thence to the cylinders F F′. As before explained, the valves in the pipes g^2 g^3 are connected with a hand-lever N in such manner that both valves may be closed and thus hold the trolley in a fixed position, or the valve may be opened in such manner as to permit the water to pass from the accumulator to one of the cylinders F F′ and to escape from the other cylinder, and thus move the trolley in either direction.

The hoisting and lowering apparatus includes a reversible hydraulic motor I of any approved construction, which is carried by the bridge B, and a chain-barrel J or its equivalent, which is also mounted on the bridge and is connected with the motor by a suitable chain of gears, as shown at the right of Fig. 4. As shown, about five revolutions of the crank-shaft of the motor are necessary to revolve the chain-barrel once, whereby the load on the chain K may be carried through as short a distance as required. The chain K, extending lengthwise of the bridge, is fastened thereto at *k* at the end opposite to that which carries the hydraulic motor. This chain passes over a sheave *d* on the trolley, down around a sheave in a block L, up over a second sheave *d′* on the trolley, and thence to the chain-barrel J, by which it is taken up. The motor I is connected by means of the pipes *i i′* with two cylinders R R′, secured to one end of the bridge and lying parallel to the other cylinders *c* and *g*, heretofore described. Passing through each of these cylinders is one of the telescoping-pipes *r r′*, which are secured in a fixed position above the track-girders by any suitable brackets. These pipes are plugged at or near the middle, and in a part of each pipe, which is always covered by its associated cylinder, are formed openings, through which the water passes from the pipe into its cylinder or in the reverse direction, as the case may be. Water is admitted to these pipes *r r′* through the supply-pipes r^2 r^3, which are connected with the accumulator, and their valves are operated as are the valves in the other supply-pipes heretofore described—that is to say, the valves will permit the escape of water from either pipe while it is being forced from the accumulator through the other pipe, whereby the motor may be operated in either direction for the purpose of hoisting or lowering the load on the block L.

The foregoing is a detailed description of the exact embodiment of the invention which the drawings show. Any hydraulic engineer will, however, immediately see that many changes in details may be made and substantially the same results be secured without any substantial departure from my invention embodied therein. I therefore wish it distinctly understood that I do not intend to limit my claims to the construction shown and hereinafter described to any greater extent than is distinctly expressed by the language of said claims.

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

1. The combination of the track-girders and the bridge movable thereon, with two cylinders lying parallel to the track-girders and fixed to said bridge, two stationary plungers which enter said cylinders, respectively, from opposite ends, and valve-controlled supply-pipes suitably connected with said cylinders, whereby water may be simultaneously forced into either cylinder and permitted to escape from the other, substantially as described.

2. The combination of the track-girders, a

bridge movable thereon, and two cylinders secured to the bridge and lying parallel to said girders, two telescoping-pipes entering said cylinders, respectively, from opposite sides, said pipes being rigidly held in a fixed position parallel to said girders, and supply-pipes connecting said telescoping-pipes with an accumulator, and valves in said supply-pipes, substantially as and for the purpose specified.

3. The combination of an elevated movable bridge, a reversible hydraulic motor mounted on the bridge, a cable-take-up device, and suitable connecting-gearing between the motor and take-up device, with two pipes in which water may flow from the accumulator to said motor, valves in said pipes, respectively, at a point where they may be operated from the floor, whereby either of said pipes may be connected with the exhaust-column, while the other is simultaneously connected with the pressure-column, substantially as and for the purpose specified.

4. The combination of the track-girders, a bridge, and a trolley with two hydraulic cylinders having rams mounted on said bridge, two cylinders secured to one end of the bridge and lying parallel to the track-girders, fixed pipes telescoping said cylinders, means for supplying water to said pipes, pipes connecting said cylinders with the ram-cylinders, and suitable connections between said trolley and rams, substantially as and for the purpose specified.

5. The combination of a movable bridge, a reversible hydraulic motor secured thereto, a trolley, a chain, a chain-barrel, and connecting devices between said chain-barrel and motor, with two cylinders secured to the bridge and lying parallel to its path of travel, two pipes connecting said cylinders with said motor, two pipes fixed in position telescoping said cylinders, two supply-pipes connecting said fixed pipes with an accumulator, and valves in said supply-pipes, substantially as and for the purpose specified.

6. The combination of the track-girders and a bridge having mounted thereon, first, a trolley; second, a reversible hydraulic motor; third, hoisting and lowering mechanism, and, fourth, two oppositely-acting hydraulic rams and their associated cylinders, all connected, substantially as described, with three pairs of cylinders rigidly secured to the end of the bridge, one pair connected with the motor and one pair with the cylinders of the oppositely-acting rams, a pair of telescoping-pipes entering from opposite ends of the third pair of cylinders, two pairs of telescoping-pipes entering the two pairs of cylinders first designated, and six valve-controlled supply-pipes connected with said six telescoping-pipes, substantially as and for the purpose specified.

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Witnesses:
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