C. H. MORGAN.
Hydraulic-Crane.

3 Sheets—Sheet 1.

No. 207,200. Patented Aug. 20, 1878.

FIG. 1.

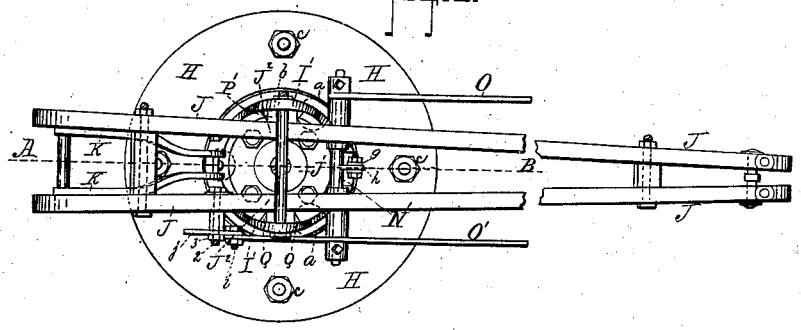
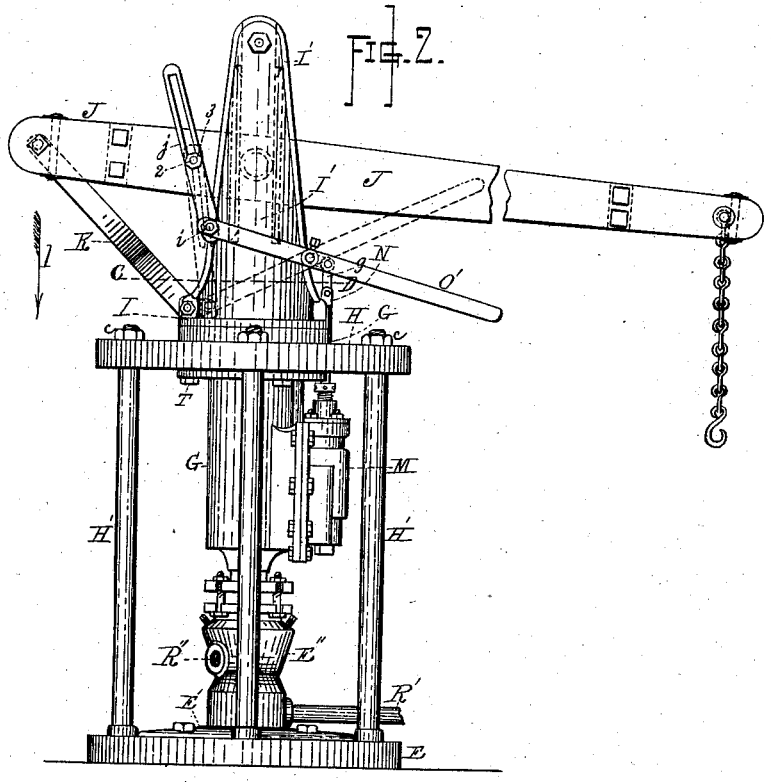


FIG. 2.



Witnesses;

Daniel B. Stapp
Edwin E. Moore

Inventor;

Chas. H. Morgan

3 Sheets—Sheet 2.

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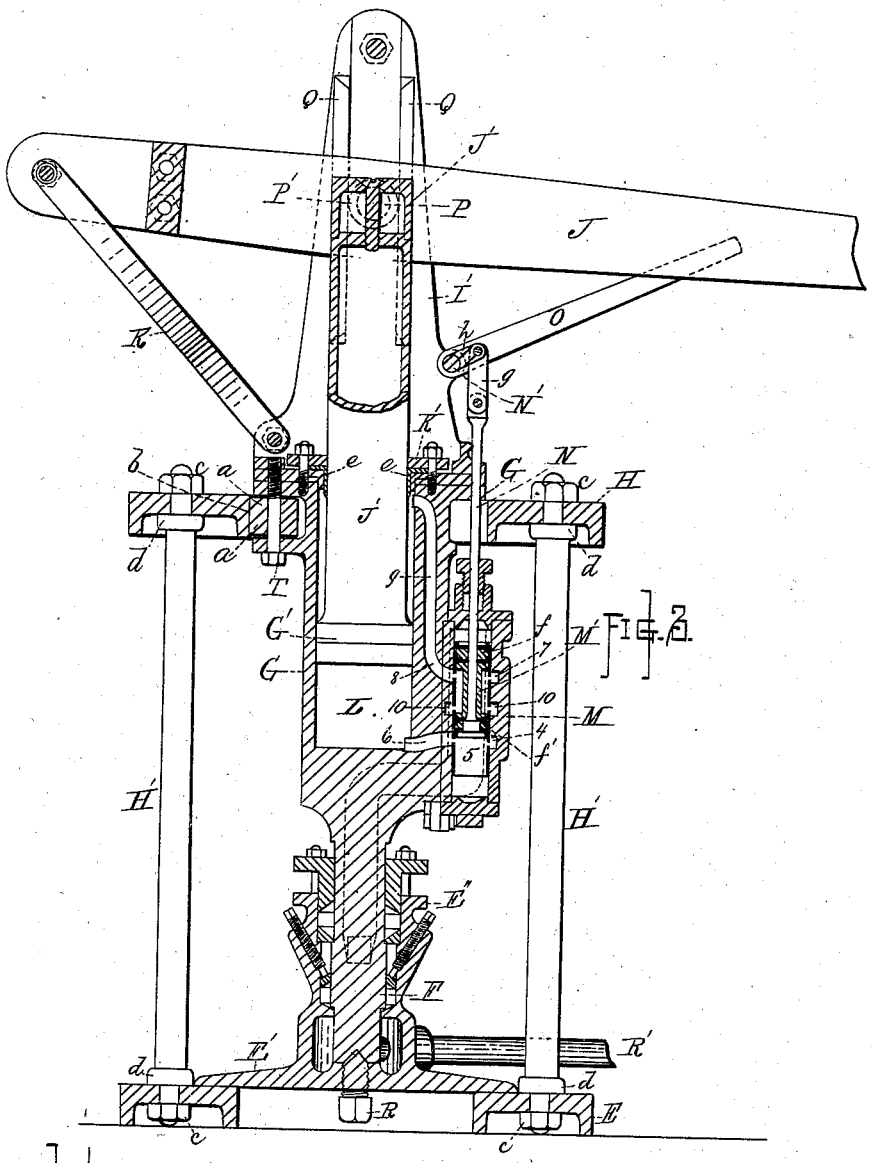

Fig. 2.

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3 Sheets—Sheet 3.

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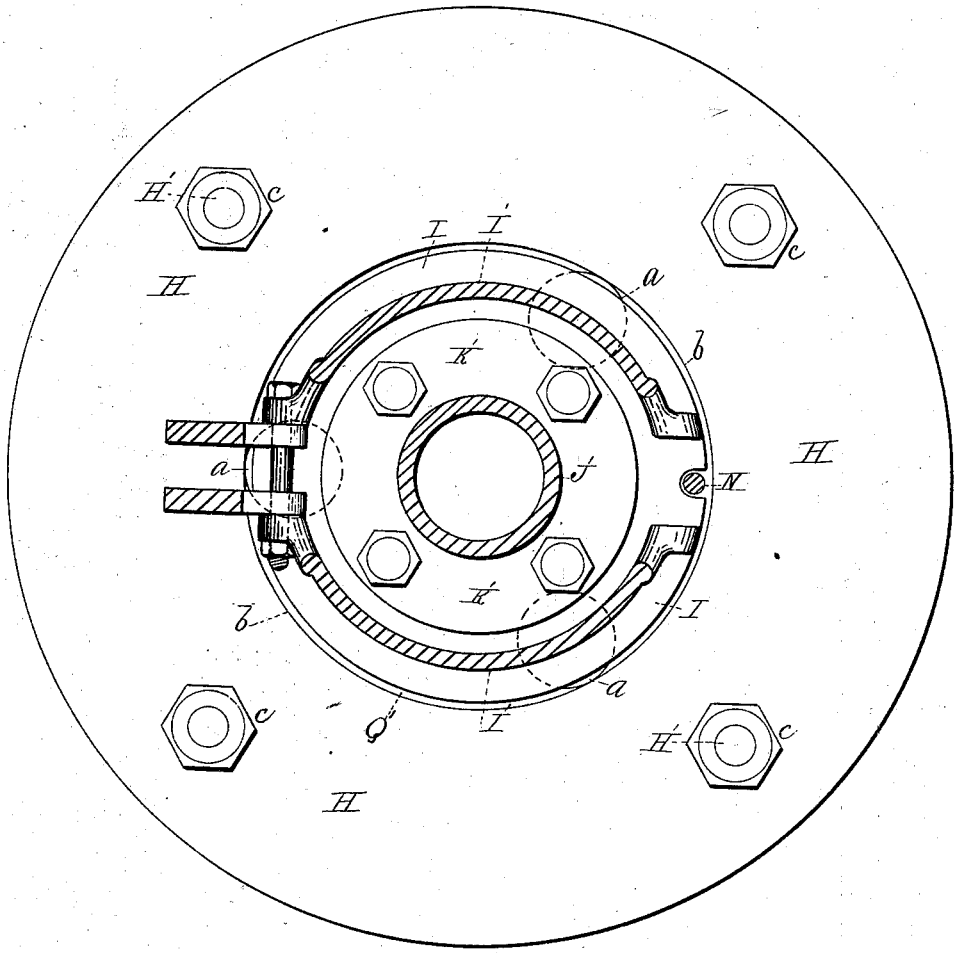
FIG. 4.



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Daniel B. Stacy

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UNITED STATES PATENT OFFICE.

CHARLES H. MORGAN, OF WORCESTER, MASSACHUSETTS.

IMPROVEMENT IN HYDRAULIC CRANES.

Specification forming part of Letters Patent No. **207,200**, dated August 20, 1878; application filed April 12, 1878.

To all whom it may concern:

Be it known that I, CHARLES H. MORGAN, of the city and county of Worcester, and Commonwealth of Massachusetts, have invented certain new and useful Improvements in Hydraulic Cranes; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification, and in which—

Figure 1 represents a top or plan view of my said invention. Fig. 2 represents a side view. Fig. 3 represents, upon an enlarged scale, a vertical central section on line A B, Fig. 1; and Fig. 4 represents, upon an enlarged scale, on line C D, Fig. 2, a cross-section, looking in the direction of arrow 1, Fig. 2.

To enable those skilled in the art to which my invention belongs to make and use the same, I will proceed to describe it more in detail.

In the drawings, the part marked E is a circular base, upon which is mounted the step or base E′, in which is fitted to turn the lower end, F, of the cylinder G, the upper end of the cylinder G being fitted or provided with a series of friction-rolls, *a*, which bear against the inner surface, *b*, of the top plate, H, which top plate and base E are firmly secured together by means of a series of upright standards, H′, said standards having nuts *c* upon their ends, whereby the base and top ring-plates are forced and held firmly against the shoulders *d*, which shoulders are so arranged as to hold said supporting ring-plates parallel with each other.

To the upper end of the cylinder G is secured a cap-piece, I, by means of suitable bolts, and from this cap-piece rise two standards, I′, one at each side, said standards being made, in this instance, of curved form, as indicated in Fig. 1; but they may be made of any desired shape, their object being to guide and give proper support to the crane-arm J, which, in this instance, is made of two pieces and bolted together in wedge form, as indicated in Fig. 1, such crane-arm being shown in Figs. 1 and 2 as broken apart, for the purpose of bringing the parts into a smaller compass longitudinally. Crane-arm J is connected to the upper end of piston J^1 by a rocking joint, and it is also connected to the cap-piece I by means of hinged brace-pieces K. The lower end of the piston J^1 is not shown in section, and it will be observed that it nearly fills the cylinder G; consequently but little water is used upon the upper side of the piston-head G′ when the crane-arm is being lowered.

A packing-ring, K′, is secured to the cap-piece I, and to the upper end of the cylinder G, as fully indicated in Fig. 3, for the purpose of retaining the packing *e* in place, while it also serves the purpose of guiding the piston J′ when it is forced up by the water, which enters the chamber L below the piston-head G′. Upon one side of cylinder G is secured a valve cylinder or chest, M, in which is arranged a valve, M′, having two heads, *f f′*. Valve M′ is secured to the lower end of a vertically-sliding rod, N, the upper end of which is connected by a link-piece, *g*, to the end of an arm, *h*, secured to the rocking shaft N′, which is fitted to turn or rock in bearings secured to the upright pieces or standards I′. To the outer ends of the rocking shaft N′ are secured two levers, O O′, lever O′ extending back and having its rear end hinged at *i* to the lower end of a slotted piece, *j*, whose slot is fitted to receive a stud, 2, projecting from the side of the crane-arm J, a nut or head, 3, being used to keep the slotted piece *j* in place upon stud 2.

As before explained, the crane-arm J is connected to the upper end of the piston by a rocking or loose joint—that is, projecting journals or gudgeons P, (see dotted lines, Figs. 2 and 3,) extend on both sides of the piston, and enter bearing-holes in the side pieces J^2 J^2, which form the crane-arm J; and upon each journal P is arranged a friction-roll, P′, which works between ribs Q on the inner sides of the respective side piece I′. By this arrangement the piston J^1 is retained in a vertical position when in operation.

The cylinder G is made to answer the purpose of a supporting-standard for the crane-arm J, and to permit it to turn freely and easily, while at the same time, being well supported, friction-rolls *a* are secured upon bolts T. In this instance three friction-rolls are used; but more may be used if desired, and they are so arranged (see full and dotted lines, Figs. 1, 3, and 4) that they bear against the inner sur-

face, *b*, of the circular opening Q′ in the upper supporting-plate, H.

It will thus be observed that cylinder G, which performs the function of the supporting-standard for the crane-arm J, is not only well supported, and that, too, so that it can turn freely and easily in either direction, but at the same time it is entirely above ground, where access can easily be had to all the parts for repairs or otherwise.

The lower end, F, is fitted to turn in the vertical part E″ of the base E′, as before indicated; and the vertical part E″ is provided with a series of packing devices, by means of which it can be packed water-tight.

To relieve the cylinder G from friction as it turns, a center bolt, R, having a conical point, is screwed up through the base-plate E′, as indicated in Fig. 3 of the drawings. Water is admitted to the base E′ by means of a pipe, R′, and R″ is the outlet.

There are two separate passages from the cylinder G down through its lower projecting part F, whereby water admitted through the pipe R′ can pass up and enter the valve chest or cylinder M, and from thence to the cylinder G, both above and below the piston-head G′, as will be hereinafter described, and also escape back and out of the exhaust-pipe R″ after it has done its work in raising or lowering the piston J′.

The operation is as follows: When it is desired to elevate the piston J′, and thereby the crane-arm J, one of the lever-arms, O or O′, is raised so as to raise the valve M′ to the position shown in Fig. 3, when water will pass from the supply-pipe up through the base F, and into chest or valve-cylinder M, and through the port 4, space 5, and port 6 into the chamber L under the piston-head G′, and, acting upon the piston J′, will elevate that, together with the crane-arm J, until stud 2 strikes in the upper end of the slot in the piece *j*, when arms O and O′ are rotated and thrown down, thereby depressing valve M′ so that its head *f*′ will close the ports 4 and 6, in which position the piston will stand until one of the arms, O or O′, is depressed still farther, so as to depress head *f* of valve M′ below ports 7 and 8, thereby permitting the supply of water to pass from the port 7 above head *f* into the passage-way 9 above the piston-head G′, thereby forcing said head G′, piston J′, and crane-arm J down, the water below the piston-head passing out of port 6 and into the exhaust 10 in valve M′.

So far as the construction of the valve is concerned, any other suitable arrangement may be employed for opening and closing the inlet and exhaust ports.

It will be observed that my improved hydraulic crane is compact, requires no top supports connected with the ceiling or cross-timbers of the building or room in which it is placed, while all of its parts are as readily accessible as those of an ordinary steam-engine, and can be operated by an ordinary workman.

It will also be observed that the outer end of the crane-arm, to which is attached the lifting-chain, moves with comparatively great rapidity, and has great extent of motion, as compared with the vertical motion of the piston, all of which features add to the practical value and importance of my said invention.

Having described my improvements in hydraulic cranes, what I claim therein as new and of my invention, and desire to secure by Letters Patent, is—

1. The combination, with the cylinder in which works the crane-arm-elevating piston, of a top plate, provided with an opening, Q′, and supported by upright standards H′ H′ from a base, E, substantially as and for the purposes set forth.

2. The combination, with the cylinder G, of base-piece E′ E″, top plate H, friction-rolls *a*, and upright standards I′, substantially as and for the purposes set forth.

3. The combination, with elevating-piston J′, of crane-arm J and hinged brace-pieces K, or either, substantially as and for the purposes set forth.

4. The combination, with crane-arm J, valve M′, sliding rod N, link *g*, and rocking shaft N′, of lever O′ and slotted piece *j* and stud 2, substantially as and for the purposes set forth.

5. The combination, with piston J′ and crane-arm J, of upright standards I′, ribs or flanges Q Q, journals or gudgeons P, and friction-rolls P′, substantially as and for the purposes set forth.

6. In a hydraulic crane, the combination, with the crane-arm, of a piston and a hinged brace or link-support for connecting the crane-arm to the rotating cylinder G, substantially as described.

CHAS. H. MORGAN.

Witnesses:
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EDWIN E. MOORE.