(No Model.) 2 Sheets—Sheet 1.

T. R. MORGAN.

HYDRAULIC CRANE.

No. 245,544. Patented Aug. 9, 1881.

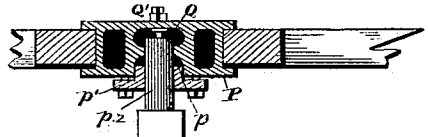


Fig. 3.

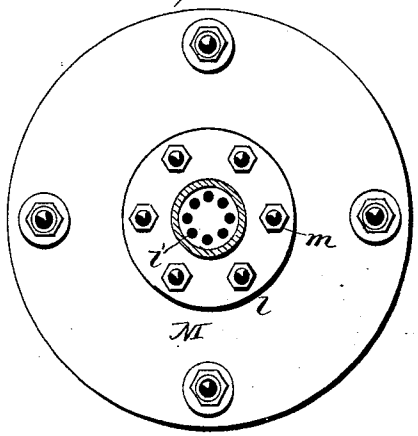


Fig. 1.

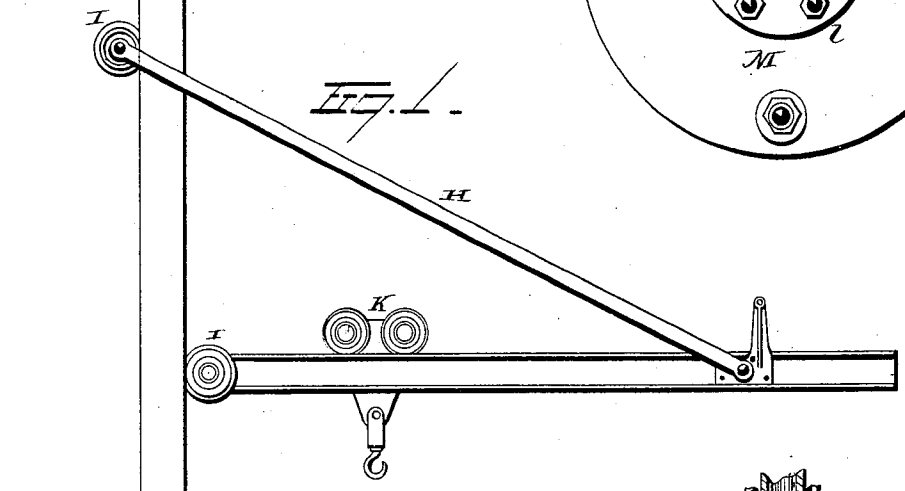
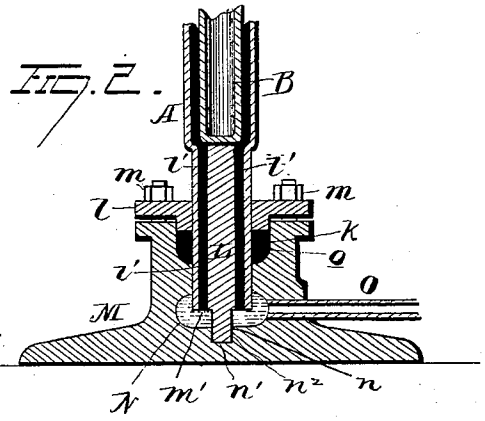
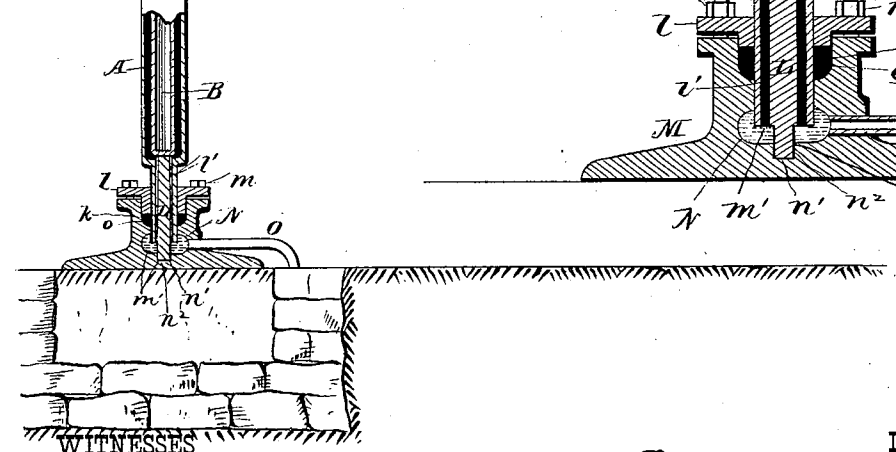


Fig. 2.





WITNESSES

Herman Moran.

A. W. Bright.

INVENTOR

Thomas R. Morgan,

By Henry A. Seymour.

ATTORNEY

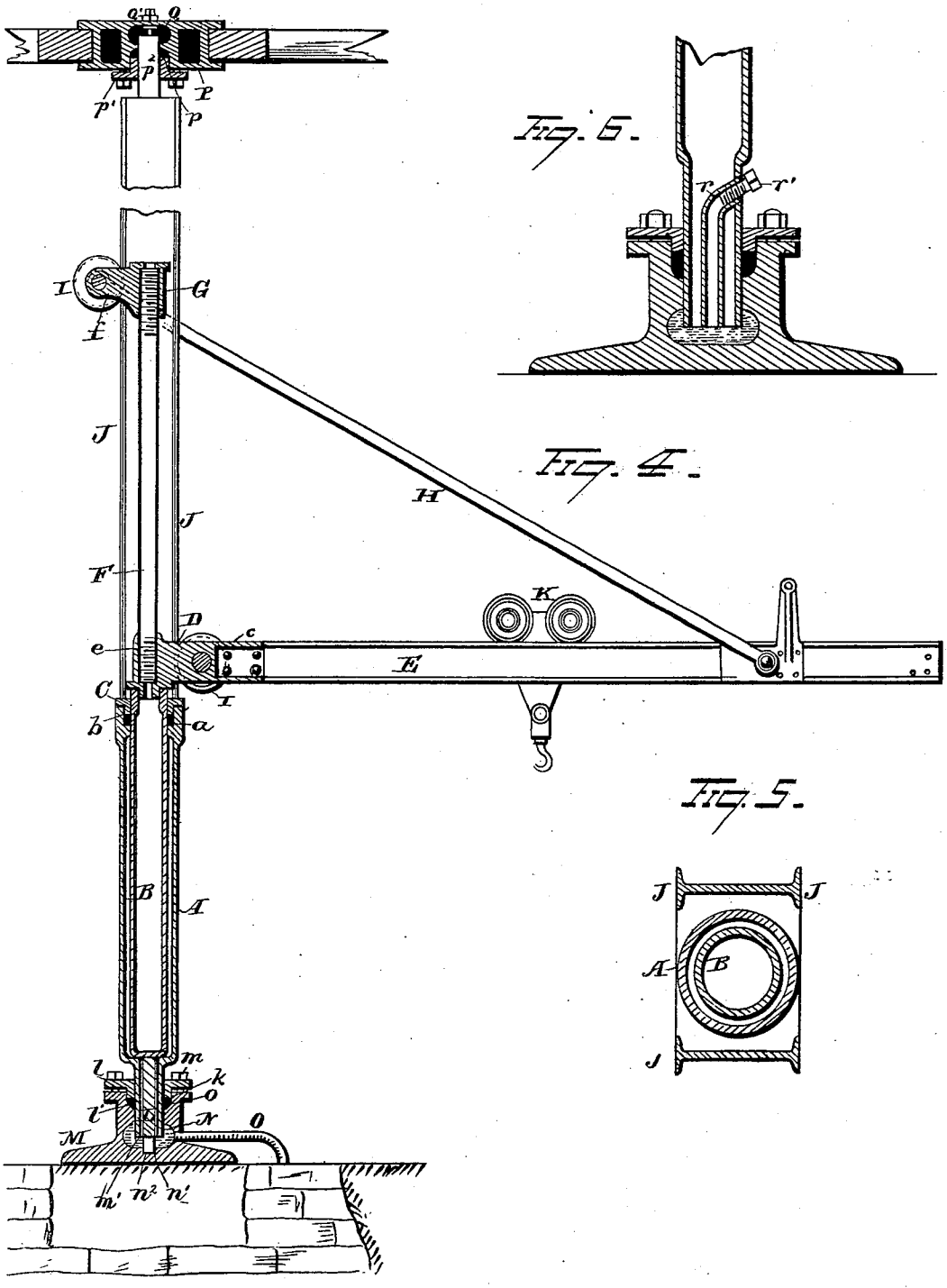
N. PETERS, Photo-Lithographer, Washington, D. C.

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Herman Maran.

A. M. Bright

INVENTOR

Thomas R. Morgan.

By Henry A. Seymour.

ATTORNEY

N. PETERS. Photo-Lithographer. Washington, D. C.

UNITED STATES PATENT OFFICE.

THOMAS R. MORGAN, OF ALLIANCE, OHIO.

HYDRAULIC CRANE.

SPECIFICATION forming part of Letters Patent No. 245,544, dated August 9, 1881.

Application filed June 1, 1881. (No model.)

To all whom it may concern:

Be it known that I, THOMAS R. MORGAN, of Alliance, in the county of Stark and State of Ohio, have invented certain new and useful Improvements in Hydraulic Cranes; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which pertains to make and use it, reference being had to the accompanying drawings, which form part of this specification.

My invention relates to an improvement in cranes, and pertains more especially to hydraulic cranes.

Heretofore hydraulic cranes have been provided with a jib attached to a plunger adapted to be raised by hydraulic pressure, said plunger being located in a cylinder supported at its lower end upon conical rollers resting and traveling upon an annular steel bed or trackway. Hydraulic cranes thus constructed are objectionable for the following reasons: The expense incurred in providing the annular steel bed or trackway and conical steel rollers is unduly great, as such parts must be made quite large and most accurately fitted and nicely adjusted to insure the easy rotary adjustment of the lifting-jib; but the main objection to the employment of the roller-bearings is due to the fact that after a little time any lubricant that may have been used to lubricate the rollers will become impregnated with dust or sand and will become thick and sticky, rendering it very difficult to swing the jib around when a load is supported thereby.

The object of my invention is to obviate the objectionable features in hydraulic cranes referred to and provide bearings of such construction that they will be of small initial cost, not liable to become impaired by use, and insure the easy adjustment of the swinging jib irrespective of the weight suspended therefrom.

With these ends in view my invention consists in the combination, with a hydraulic cylinder and plunger, the latter having a jib directly or indirectly connected therewith, of a step-bearing provided with a liquid-chamber, the parts being constructed and arranged to cause the pressure employed in raising the plunger to be upwardly exerted on the crane-post and relieve the latter of undue wear on its lower end.

My invention further consists in certain features of construction and combinations of parts, as will hereinafter be described, and pointed out in the claims.

In the accompanying drawings, Figure 1 is a view, partly in side elevation and partly in vertical section, of a hydraulic crane constructed in accordance with my invention. Fig. 2 is an enlarged view, in vertical section, of the bed-plate and lower end of the cylinder and plunger. Fig. 3 is a transverse section of the step of the cylinder, taken just above the stuffing-box. Fig. 4 is a vertical section. Fig. 5 is a transverse section taken through the cylinder, plunger, and uprights; and Fig. 6 is a modification.

A represents the water-cylinder, and B the hollow plunger. The upper end of cylinder A is enlarged at *a*, forming a stuffing-box, *b*, within which is inserted any suitable packing, which is compressed tightly around the plunger by means of the gland C, screwed into the upper end of the cylinder.

To the upper end of the plunger is secured, in any desired manner, a bracket, D, constructed with a laterally-projecting arm, *c*, to which is secured the inner end of the jib E. Within a socket, *e*, formed in the bracket D, is inserted and secured the lower end of a pipe-section, F, to the upper end of which is attached a bracket, G, provided with laterally-projecting arms *f*, having the upper ends of the jib brace-rods H attached thereto, the lower ends of said braces being secured to the jib near its outer end. Rollers I are journaled upon the upper and lower brackets, D G, and arranged to travel on the upright guides J, whereby the weight of the jib and load suspended therefrom is properly distributed and friction materially reduced.

K is a carriage of any desired construction, located on the jib and adapted to travel to and fro thereon. The lower end of cylinder A is reduced in diameter at its lower end, forming a journal or step, L, which is supported as follows:

M is a bed-plate, of any desired size and form, provided with a stuffing-box, *k*, in its upper end, and a gland, *l*, adapted to be tightened by the screw-bolts *m*, and thus force the pack-

ing in the stuffing-box tightly around the journal of the cylinder. The lower portion of the bed-plate is provided with a liquid chamber or receptacle, N, with which is connected a liquid-supply pipe, O. The lower end of the cylinder-journal is cut away, as at n, forming a short step, n', which is received in a bearing, n^2, in the bottom of the liquid-receptacle. The stuffing-box is contracted at its under side, forming a bearing, o, which gives lateral support to the journal of the cylinder. The journal L has a number of vertical passages, l', bored therein, said passages extending from the annular face m' on the lower end of the enlarged portion of journal L upwardly, and communicating with the cylinder. Through the passages l' water or other liquid is conducted from the liquid-chamber N to the cylinder A, where it exerts its pressure on the lower end of the plunger and raises it, together with the jib and load suspended therefrom. The construction and relative arrangement of parts are such that the area of the annular face m', against which an upward pressure of the liquid is exerted, slightly exceeds the area of the lower end of the plunger; and hence when the crane is being operated the liquid under pressure, that operates to elevate the plunger carrying the jib and its load, will also exert an upward pressure against the annular face m' of the cylinder-journal, and, as stated, the upward pressure on the journal, being slightly in excess of that on the plunger, will operate to lift and thus relieve the step or journal of the cylinder of the pressure due to the weight of the crane and load carried thereby, and thus not only prevent any undue wear, but insure a perfectly free and easy swinging adjustment of the jib irrespective of the weight carried thereby. The liquid is a good lubricant, and prevents any sticking or clogging of the parts.

P represents the upper bearing, which is constructed quite similar to the lower. Bearing P is provided with a stuffing-box, p, and gland p', for retaining packing material tightly around the upper journal, p^2. Above the stuffing-box is formed a liquid-chamber, Q, which is supplied with liquid through a hole in the top of the bearing, which is closed by a screw-plug, Q'. This construction of upper bearing is such that the upper journal will be relieved of any undue wear, notwitstanding the degree of upward pressure on the lower end of the cylinder-journal, because sufficient distance is provided for between the upper end of the upper journal and the upper plate of the bearing to allow of a slight upward movement of the journal therein, which needs to be but very slight to relieve the lower journal, and as the liquid in the upper bearing is completely secured against escape, and is, of course, non-compressible, the upper journal is prevented from striking the upper plate of the bearing.

In Fig. 6 I have represented a bearing for an ordinary swinging crane. It is provided with a stuffing-box liquid-chamber constructed and arranged in the manner and for the purpose hereinbefore described. Liquid may be introduced through a small passage, r, formed in the journal, and prevented from escape by the screw-plug r'. Before liquid is introduced the crane-post is slightly raised by jacks or in any other manner, and the liquid then introduced into the liquid-chamber, and the screw-plug then secured in place. The crane-post then being lowered, its lower journal will be supported in the liquid-chamber, and thus the wear and friction of the parts be materially reduced.

Instead of forming a liquid-passage in the journal, it may be formed in the bed-plate or bearing. Any liquid suitable for the purpose may be employed.

The construction and arrangement of parts may be slightly varied without departing from the spirit or scope of my invention, and hence I would have it understood that I do not restrict myself to exact construction and arrangement of parts shown and described; but,

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

1. In a hydraulic crane, the combination, with a rotary hydraulic cylinder, a plunger located in the cylinder, and a jib connected with the plunger, of a supporting bed-plate provided with a liquid-chamber surrounding the lower portion of the journal of the cylinder, said journal being constructed with an annular face to enable the liquid under pressure to elevate the said journal and relieve it of undue wear and friction, substantially as set forth.

2. In a hydraulic crane, the combination, with a plunger and jib, of a hydraulic cylinder provided with a journal at its lower end, said journal having water-conduits leading from an annular face on the lower portion of the journal to the interior of the cylinder, a supporting bed-plate provided with a liquid-chamber surrounding the lower portion of the cylinder-journal, and a supply-pipe for conducting liquid under pressure to said liquid chamber or receptacle, substantially as set forth.

3. In a hydraulic crane, the combination, with the plunger, of a cylinder provided with a journal having water-passages formed therein, and an annular face on its lower portion of greater area than the lower end of the plunger, substantially as set forth.

4. In a hydraulic crane, the combination, with the plunger, of a cylinder provided with a journal having a step which rests in a bearing in a supporting bed-plate, said journal being provided with a series of water-conduits extending from an annular face near its lower end to the interior of the cylinder, substantially as set forth.

In testimony that I claim the foregoing I have hereunto set my hand this 26th day of May, 1881.

THOS. R. MORGAN.

Witnesses:
WALLACE H. PHELPS,
J. I. AMERMAN.