

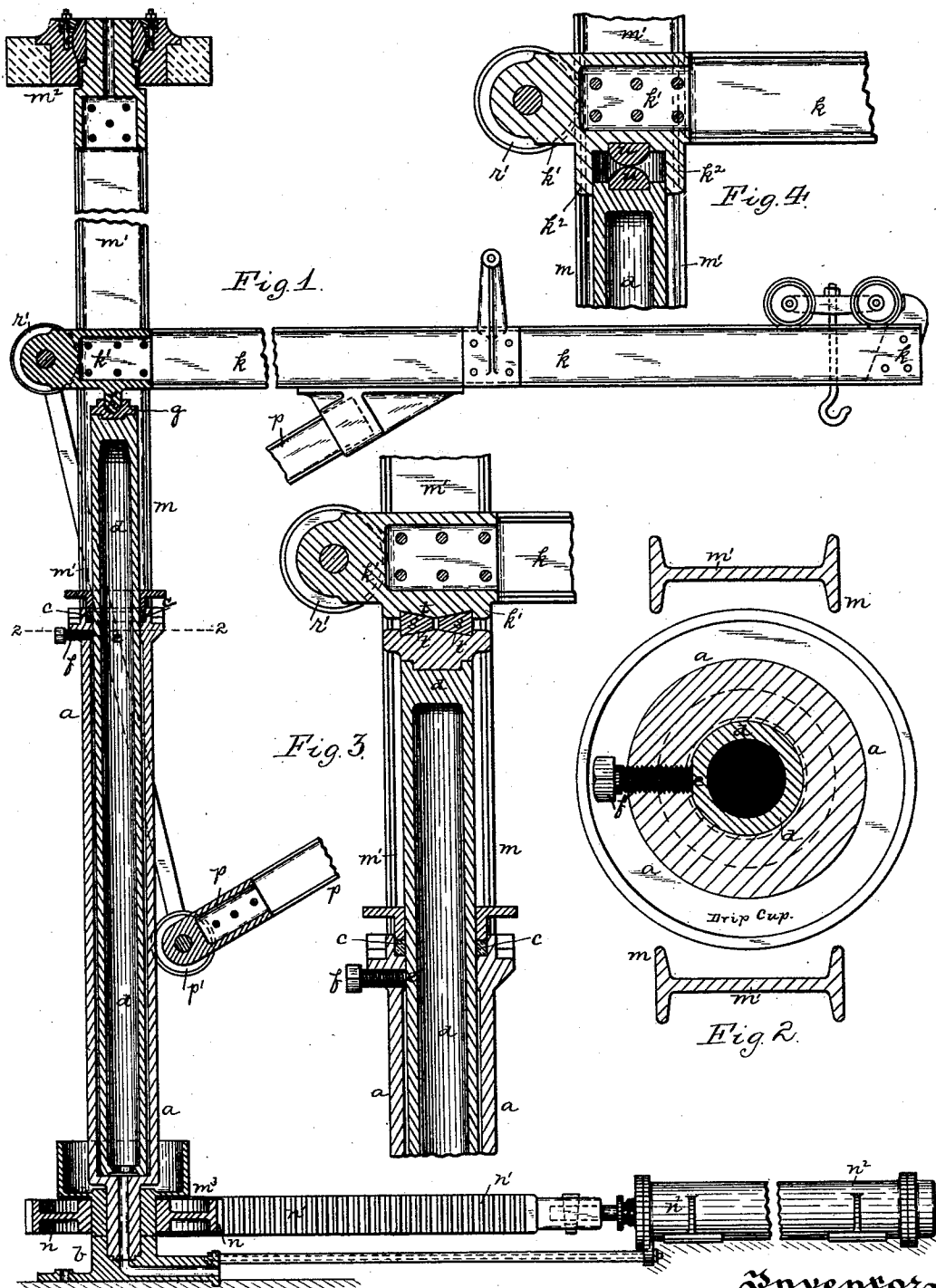
(No Model.)

2 Sheets—Sheet 1.

I. W. FRANK.
HYDRAULIC CRANE.

No. 428,749.

Patented May 27, 1890.



Witnesses:

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Inventor
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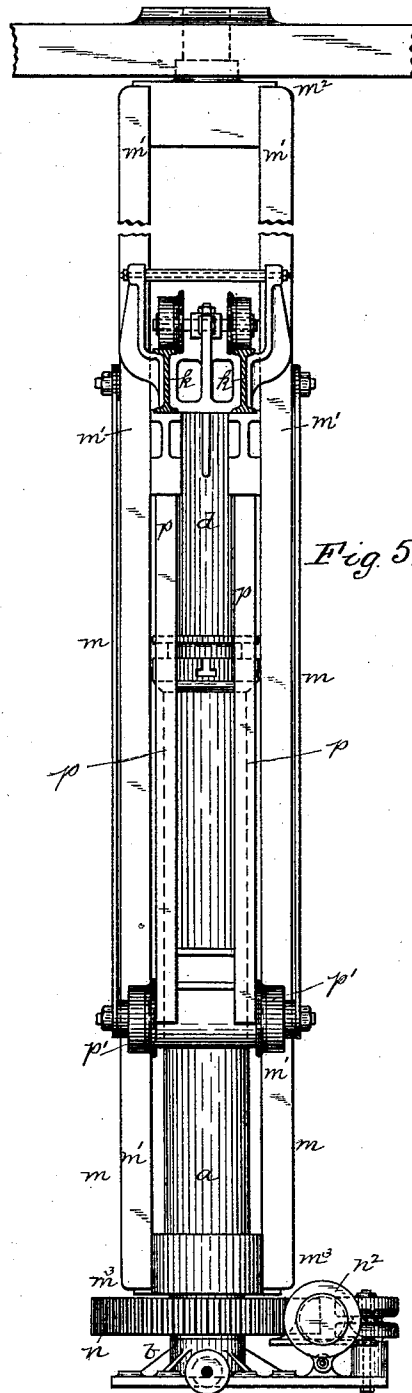
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UNITED STATES PATENT OFFICE.

ISAAC W. FRANK, OF ALLEGHENY, PENNSYLVANIA.

HYDRAULIC CRANE.

SPECIFICATION forming part of Letters Patent No. 428,749, dated May 27, 1890.

Application filed March 6, 1890. Serial No. 342,828. (No model.)

To all whom it may concern:

Be it known that I, ISAAC W. FRANK, a resident of Allegheny, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Hydraulic Cranes; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to what are known as "hydraulic cranes;" and its object is to provide a crane in which the jib can be swung in any desired direction, while at the same time the ram of the crane is held from rotary movement and is simply required to rise and fall within the cylinder.

In the usual form of crane the cylinder is mounted on any suitable bed-plate and is held stationary, and the ram or plunger is connected at its upper end to the jib and turns with the jib, rotating within the cylinder. In the constant use of these cranes, however, it is found that the surface of the ram will become scored longitudinally, being cut or worn out by the packing or by gritty matter which works into the packing, and when the crane is turned as the ram is rotated the jib acts to cut out the packing at the upper end of the cylinder and very soon causes leakage through the packing-gland, thus necessitating the frequent repacking thereof. In my invention I employ, briefly stated, a non-rotative vertical cylinder, a vertically-moving ram which is held from rotation therein, a jib supported by and having a vertical pivotal connection with the top of the ram, and suitable vertical braces or supports by means of which the lateral strain upon the jib is sustained.

To enable others skilled in the art to make and use my invention, I will describe the same more fully, referring to the accompanying drawings, in which—

Figure 1 is a side view, partly in section, illustrating my invention. Fig. 2 is a cross-section of the ram and cylinder on the line 2-2, Fig. 1. Figs. 3 and 4 are detail views illustrating other forms of pivotal connections between the ram and the jib; and Fig. 5 is a front view, looking toward the jib, showing the connections of the vertical beams at the top and bottom.

Like letters of reference indicate like parts in each.

As the invention is illustrated in the drawings the cylinder *a* is secured to a stationary base *b*, through which the fluid under pressure is fed to the cylinder, the cylinder having at the upper end the packing-gland *c* and the ram or plunger *d*, fitting within the cylinder and corresponding in cross-section thereto, except that along one side thereof the ram is planed off, so as to give a flat face, as clearly shown at *e*, Fig. 2; or in like way a shallow groove is formed in the ram, with which a suitable bolt or key *f* may engage to prevent the turning of the ram. I find, however, that the simple flat face, against which the square end of the bolt *f* may fit, is sufficient for the purpose, and at the same time that it provides for the easier packing of the gland.

In the preferred form of pivotal connection embodying my invention I employ at the upper end of the ram *d* a socket *g*, into which fits a ball or pin *h*, extending down from the head or inner end *k'* of the jib *k*, so forming the pivotal connection between the jib and the ram, this pivotal connection permitting the jib to turn or swing on the bearing at the top of the ram, so that it may be drawn to any desired position, while it is raised and lowered by the ram, as is usual in this class of hydraulic cranes. The crane may be braced by any suitable supports, those shown in the drawings being two vertical beams *m'*, one on each side of the hydraulic cylinder, extending up to any desired height and secured together at the top and bottom, so forming the frame *m*, this frame being mounted in any suitable supports at the top and bottom, as at *m*² *m*³, and in the construction shown carrying at the base thereof a large gear-wheel *n*, which is turned by a rack *n'*, secured to the piston of the hydraulic cylinder *n*².

Secured to the jib *k* at the proper distance from the inner end thereof is the strut *p*, which in the construction shown extends in a downward incline from the jib, and carries at the lower end thereof rollers or bearing-blocks *p'*, pressing against the frame *m*, while the lower end of this strut is connected by the tie-rods with the head or inner end *k'* of the jib *k*, which also has the rollers or bearing-blocks *r'*, fitting against the side of the frame *m* opposite to that against which the rollers *p'* fit.

The construction of the frame and the method of bracing the jib may be varied, however, according to the location of the crane, the weights to be lifted, and the space within which it is to operate.

I have shown in the drawings the simplest form of pivotal connection between the non-rotary ram and the swinging jib, and such pivotal joint or connection is considered the most desirable for the ordinary size of cranes. Such pivotal connection may, however, be changed without departing from my invention, and I have illustrated in Figs. 3 and 4 two other forms of such pivotal connection, both of which embody my invention.

In Fig. 3 rollers are employed to overcome the friction between the ram and jib, these rollers being preferably conical in shape, and the lower face of the head or inner end k' of the jib and the upper face of the ram are each made with inclined sides corresponding in incline to the conical rollers s , these seats being shown at t . Such construction provides for the easy swinging of the beam on its axis, even when sustaining very heavy loads.

In Fig. 4 the head k' of the jib k is made to extend down in the form of a sleeve or collar k^2 over the upper end of the ram, and I secure to the top of the ram and the lower face of the head k' semi-spherical blocks—such as shown at u —of hard material—such as chilled iron, steel, or bronze—which bear upon each other and sustain the vertical strain of the ram, while permitting the swinging of the jib with but little friction.

In the use of my invention the ram is raised and lowered by the admission of the liquid under pressure to the cylinder, and as it is raised through the pivotal connection between it and the jib it raises and lowers the jib. By means of the bolt and keyway, however, the

ram is held from rotation, and consequently in its movement through the packing-gland it is not so liable to cut out the packing, and even if its surface should become worn, as above described, it can be more easily packed and the fluid retained within the cylinder. The ram therefore rises and descends with a straight or non-rotary movement, while the jib of the ram may be swung on its pivotal connection with the ram and drawn to whatever position it is desired to perform the work required of it, being either drawn by connections with the jib itself or being turned by power applied to the frame m , as may be found desirable. I am thus enabled to overcome the principal wear in this class of cranes and without increasing the cost thereof, so adding to their durability and overcoming the necessity of frequent packing of the gland of the cylinder.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a hydraulic crane, the combination of a non-rotative vertical cylinder and a ram vertically movable therein, but held from rotation therein, a jib having a pivotal connection with the top of the ram, and supports or braces to sustain the horizontal strain on the jib, substantially as and for the purposes set forth.

2. In hydraulic cranes, the combination of the cylinder a , the ram d , having the flat face or keyway e , the bolt or key f , and the jib k , having a pivotal connection with the top of the ram, substantially as and for the purposes set forth.

In testimony whereof I, the said ISAAC W. FRANK, have hereunto set my hand.

ISAAC W. FRANK.

Witnesses:

F. G. HAY,
J. N. COOKE.