2 Sheets--Sheet 1.

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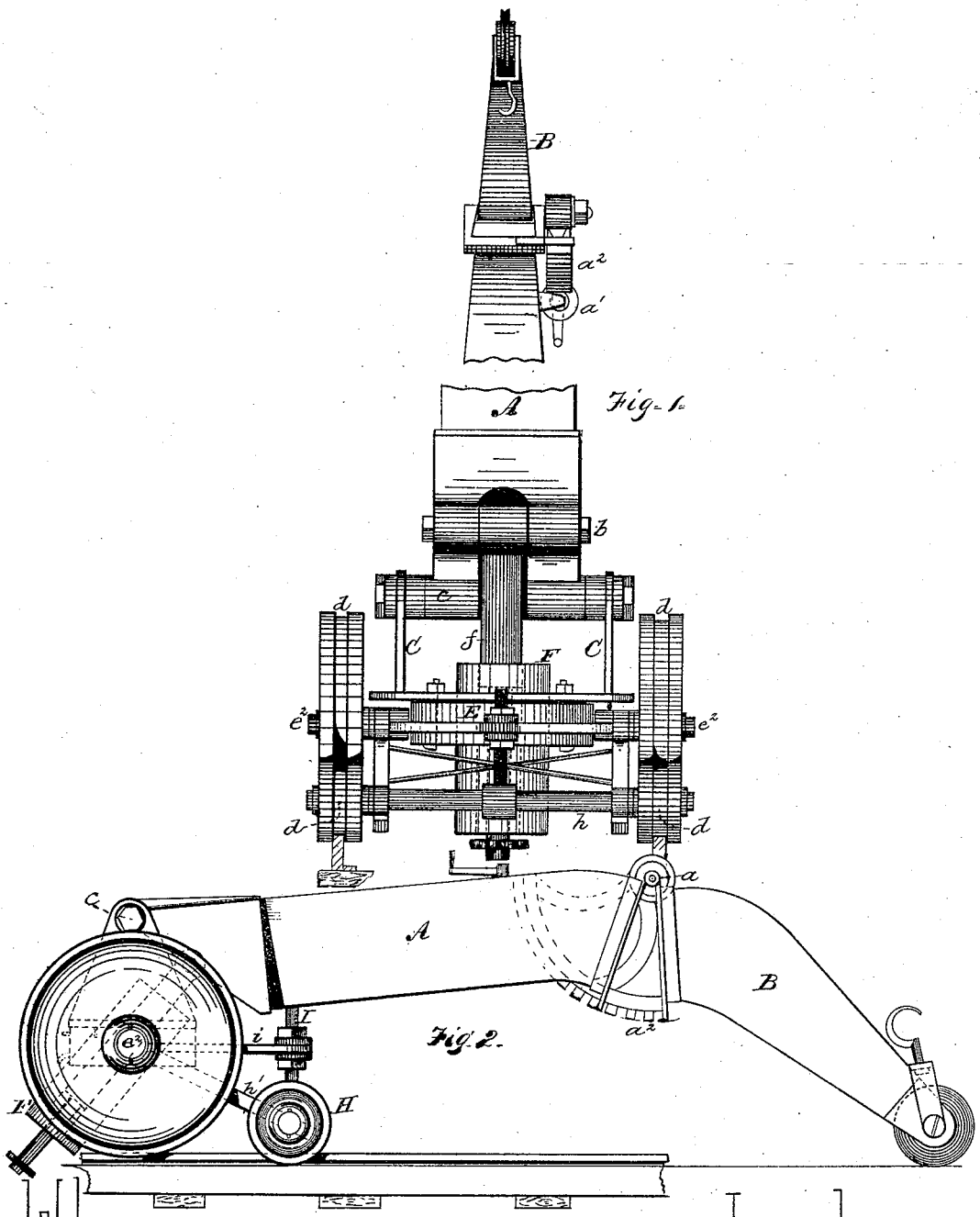
Crane.

No. 166,985. Patented Aug. 24, 1875.



WITNESSES

D. R. Cowl

A. Moore

INVENTOR

Ignatius Hahn

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Attys

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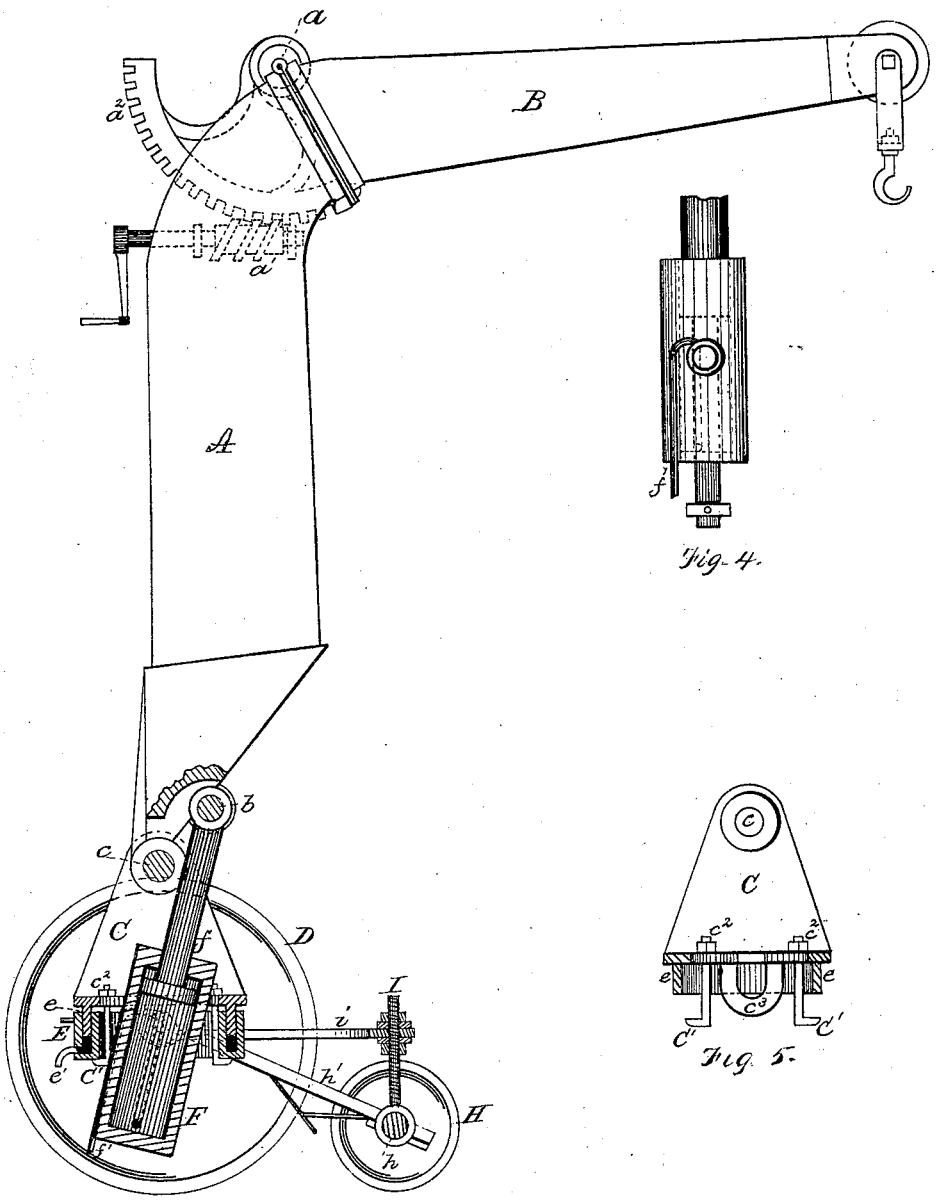

Fig. 3.

Fig. 4.

Fig. 5.

Witnesses.

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UNITED STATES PATENT OFFICE.

IGNATIUS HAHN, OF PITTSBURG, PENNSYLVANIA.

IMPROVEMENT IN CRANES.

Specification forming part of Letters Patent No. **166,985**, dated August 24, 1875; application filed June 26, 1875.

To all whom it may concern:

Be it known that I, IGNATIUS HAHN, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Cranes; and I do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawing forming part of this specification, in which—

Figure 1 is a front elevation of a crane embodying my invention. Fig. 2 is a side view, showing the post lowered and the jib extended. Fig. 3 is a side view, partly in section, showing the devices for operating the crane. Fig. 4 is a detached view of the oscillating cylinder for raising and lowering the post, and Fig. 5 is a section of the revolving frame and annular piston, showing one of the bearings for the journals of the oscillating cylinder.

Like letters refer to like parts wherever they occur.

My invention relates more especially to cranes operated by compressed air, hydraulic, or steam power, but contains several devices and combinations of devices equally applicable to cranes as commonly operated by worm, cog, and other gearing.

My invention consists, first, in combining the post and jib so that they travel together in a vertical plane around a common axis, whereby the crane may be caused to raise the load at a greater distance than the reach of the jib proper; second, in applying the power directly to the post, the post being hinged to its frame or carriage, the point of hinging or the journals acting as a fulcrum, whereby chains, ropes, &c., are dispensed with, and the post may be brought to any desired position to receive and discharge its load, for transportation from place to place, and for other purposes; third, in combining with a hinged post and its supporting frame or carriage an oscillating cylinder and piston, the piston acting upon the post to raise and lower the same; fourth, in combining with the crane-post, and the piston and cylinder for cushioning the same, adjusting mechanism whereby the cushioning-cylinder may be kept level irrespective of the grade or incline upon which the crane is used; fifth, in combining the crane-post and its operative mechanism with a single pair of wheels, the parts being relatively arranged so that the points of support, center of trunnions, and fulcrum are in a vertical line, whereby the momentum of the load is transmitted directly to the ground through the wheels, obviating any tendency of the carriage to tilt or lift.

I will now proceed to describe my invention, so that others skilled in the art may make and use the same.

In the drawing, A represents the post of a crane, and B the jib, the two being hinged, as at *a*, so as to allow of the jib being extended in line with the post, or set at any desired angle thereto. The jib may be extended and held in position by blocks or wedges inserted between the inner end thereof and the post, or by means of a worm or screw, a^1, and worm-wheel a^2 secured to the post and jib. The post A is hinged or journaled, as at *c*, to a frame or stand, C, which rests upon an annular cylinder, to which are attached the journals of the wheels D. This hinging of the post A to its frame permits the jib and post to travel together in a vertical plane around a common axis, and in cases where the jib is not extensible the hypotenuse of the triangle formed by the post and jib will be the greatest reach of the crane. The power is applied to the crane-post at a point outside the point of hinging, *c*, preferably at the point *b*. C is the frame or stand to which the crane-post is hinged, said stand resting upon an annular cylinder, E, and being provided with a dependent flange, *e*, which acts as a piston for cylinder E, said cylinder E being provided with a pipe, e^1, which leads to an accumulator, or any other source of fluid or gaseous power. This frame C, which is preferably of annular form, is held to the annular cylinder E by a series of bent rods or bolts, C′, which pass to the inside of the annulus, and permit the free rotation of the frame upon the cylinder, so that the crane-post may be swung around; but, in order to prevent the frame being lifted so as to raise the flange or piston *e* out of the cylinder, these rods are secured by nuts c^2 above the frame. Attached to the frame C within the annular opening thereof are the bearings c^3 for the journals of an oscillating cylinder, F, by the piston *f* of which the power to raise,

lower, and operate crane-post A is applied. The piston *f* of the oscillating cylinder F is attached to post A at a point, *b*, outside the point of hinging, so that the hinge or journals act as the fulcrum when power is applied to the post for raising a load. The oscillating cylinder is provided with a supply-pipe, *f'*, which may enter at the journals or other suitable point, and if hydraulic power is used may be connected with an accumulator, or with a pump located on the frame or attached to the cylinder. E is an annular cylinder, upon which rests the frame C of the crane-post, and is provided with journals e^2, which form the axles for the main wheels D, the whole forming the carriage of a movable crane. H H represent the wheels of a guide or brace carriage, composed of the axle or shaft *h*, and two or more cross or brace bars, *h'*, the latter secured to the axle *h*, but journaled loosely on the same journals e^2 with the main wheels D. The wheels H H and D D are grooved, as at *d*, so as to hold the carriage upon the rails, the wheels otherwise having a broad tread, which also adapts them for use on common roads. Secured to the annular cylinder, and extending therefrom, is an arm or arms, *i*, through the outer end of which passes a screw-threaded rod, I, which rises vertically from the axle *h*, said rod being provided with two or more nuts and washers, by which the arm *i* is adjusted, and secured so as to support and maintain the annular cylinder in a horizontal position irrespective of the grade upon which the crane carriage or frame rests, thus insuring the most favorable position for the operation of this cylinder and piston, which forms the cushion and vertical pivot upon which the crane-post rests, and swings in a horizontal plane.

The crane may be provided with a second brace-carriage and adjusting mechanism, extending in the opposite direction from the one described, and such a construction will be necessary when the crane is to describe a complete circle in a horizontal plane.

It will be noticed on reference to the oscillating cylinder shown in Figs. 1, 2, and 4 of the drawing, that the piston *f* extends through the lower head of the cylinder, and, as shown in dotted line, is of less diameter at the lower end, being surrounded on the outside by a collar, which may be threaded, or loose and secured by a pin. The object of such construction is to regulate and control the stroke of the piston.

The operation of these devices is as follows: Supposing the crane to be in the position shown in Figs. 1 and 3, the inlet-pipes being connected to an accumulator or a hydraulic pump, either located on the carriage or at a distance, I open the waste-valves, permitting the fluid in the cylinders to be forced out by the weight resting on their respective pistons until the crane frame or stand rests upon the upper surface of the annular cylinder, and the post and jib have sunk sufficiently low to permit the load to be attached to the hook on the end of the jib or post. As soon as this position of the several parts is attained (shown in Fig. 2) I shut off the waste-valves in order to retain as much fluid in cylinder as possible, thereby avoiding unnecessary waste and lifting. I then open communication with the supply-pipe of the oscillating cylinder admitting the fluid to act on the piston, and, through the piston, on the post, causing the post to swing on its hinge or axle, and to rise, together with its load, through a vertical plane until the desired height is attained, in which position it is held by simply closing the supply-pipe, the waste-valve (common to all such apparatus) being also shut. The fluid being thus prevented from escaping from the cylinder the whole pressure will rest thereon, and as the axis of the oscillating cylinder is considerably off the axis around which the crane-post swings, the arcs which both describe are from different centers, and consequently the load cannot force the piston to turn on the journals of its cylinder. When I desire to swing the load to another spot on one side, I open the supply-pipe of the annular cylinder, permitting the inflow of fluid, forcing up the annular piston, and with it the frame, crane, and oscillating cylinder, which is journaled in the frame, until the frame or stand is arrested by the bolts and nuts, which prevent it from rising further and create a resistance whereby the fluid is caused to force open the safety-valve commonly used with hydraulic apparatus, when the supply-pipe of the annular cylinder may be closed or left open, as preferred. The crane will now rest upon the fluid in the annular cylinder, and it will require but little power to swing it and its load around to the desired position, after which the fluid may be permitted to escape gradually from the annular cylinder until the stand or frame is lowered upon its seat upon the cylinder, where it will be held stationary by frictional contact.

To lower the load, open the discharge-pipe of the oscillating cylinder and permit the gradual escape of the fluid, which will be forced out by the crane and its load, and as soon as the load has reached the desired position close the escape-pipe to prevent the unnecessary waste.

In order that the annular cylinder may be always level at the time the crane is to be raised and swung on its vertical pivot, all that is necessary is to change the position of the nuts upon the vertical rod of the brace or guide-buggy, when the annular cylinder will be turned upon its journals, (which are the axles of the main wheels,) until the cylinder assumes a horizontal position, after which the nuts can be tightened, and the cylinder will retain its level position irrespective of the incline or grade upon which the buggy rests.

I have described the operation of these devices by hydraulic power; but it is evident steam or compressed air will produce the same

results, though perhaps they may not be as conveniently applied; and, as before specified, several of the devices and combinations may be employed with well-known means for applying power, as, for instance, the piston passing through an oscillating cylinder or sleeve may be operated by a worm and worm-wheel similar to the one shown for extending and adjusting the jib; and power may also be applied to the post by innumerable well-known arrangements of gearing now applied for similar purposes.

A stationary or an oscillating cylinder for applying the power may be placed on one side of the point of hinging or fulcrum of the crane-post, and the crane-stand may be supported upon a separate frame between two axles, all of which are changes of construction within the knowledge of the skilled mechanic, and may be made without departing from the spirit of my invention.

When the crane is used upon railroads or on steep grades of common roads, I propose to employ brakes with the carriage, and shall adopt any of the well-known forms; and, when necessary, on common roads I may use mud-shoes upon the wheels, all which can readily be applied without specific directions being herein given.

The advantages of my devices are, first, that, by bringing the point of support, center of trunnions, against which the momentum comes, and center of fulcrum, around which the post revolves, all in a vertical line, the pressure downward on the bearings of the trunnions of the oscillating cylinder is always greater than that tending to lift the buggy, and will therefore keep the buggy stationary (without counterweights, and without the excessively-long buggies hitherto necessary) while the crane is in operation, and I can use light adjusting-wheels and bring them close to the main or supporting-wheels, thereby decreasing the proportions between dead-weight and load to one-fifth, where hitherto it was near three-fourths. Secondly, the jib may be extended (shown in Fig. 2) and the post swung down upon its hinge so that its highest point will not be above that of its stand or supporting-frame. The forward end of the jib will travel upon the ground, supporting the jib and post, so that cranes of twenty and thirty feet in height may be transported through tunnels, doors, and narrow passages of five or six feet in height, and used in apartments of eight or ten feet in height, and this by simply changing the angle of the jib and post. Finally, it will be noticed that the whole machine is reduced to the least number of parts, everything being direct acting, so that with my portable crane any load may be lifted to the desired height; and yet, even when constructed for the heaviest loads and highest lifts, can still be transported and handled on ordinary roads.

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

1. The combination of the crane-post, jib, and frame, the crane-post being hinged to the frame, so that the jib and post travel together in a vertical plane around a common axis, substantially as and for the purpose specified.

2. The combination of a crane-post, its supporting stand or frame, and suitable mechanism for raising and lowering the post and its load, the post being connected to its stand by a hinge joint or connection, and the power for raising and lowering the post being applied directly thereto, substantially as and for the purpose specified.

3. In combination with a crane-post hinged to its stand or frame, an oscillating cylinder and piston, the piston acting upon the post to raise and lower the same, substantially as and for the purpose specified.

4. In combination with a crane-post hinged to its frame or stand, an oscillating cylinder and piston acting upon the post to raise and lower the same, and an annular cylinder and piston for raising and cushioning the post, substantially as specified.

5. In combination with the crane-post and the piston and cylinder for raising the post upon its vertical pivot, a vertical rod and cross-arm or mechanism, substantially the same, for adjusting and preserving the level of the cylinder, substantially as specified.

6. The combination of the crane-post, its frame or stand, the oscillating cylinder for operating the post, and a single pair of supporting-wheels, the several parts being relatively arranged, so that the points of support, center of trunnions, and fulcrum are in a vertical line, whereby the weight of the load is transmitted directly to the ground, substantially as and for the purpose specified.

In testimony whereof I, the said IGNATIUS HAHN, have hereunto set my hand.

IGNATIUS HAHN.

Witnesses:

T. B. KERR,

F. W. RITTER, Jr.