A. P. LUNDIN.

CRANE OR DAVIT.

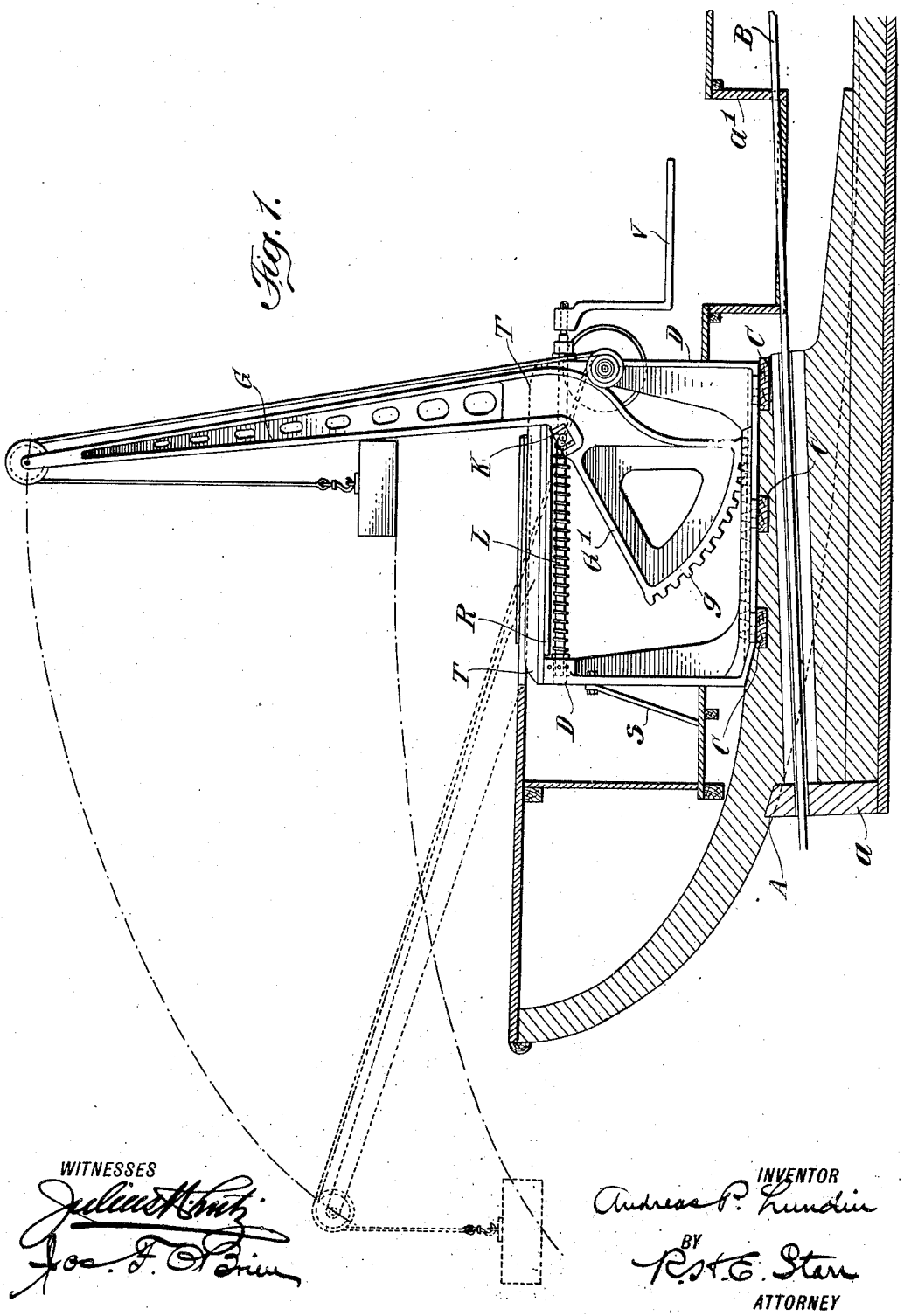
APPLICATION FILED AUG. 28, 1908.

1,034,128.

Patented July 30, 1912.

2 SHEETS—SHEET 1.

Fig. 1.



WITNESSES

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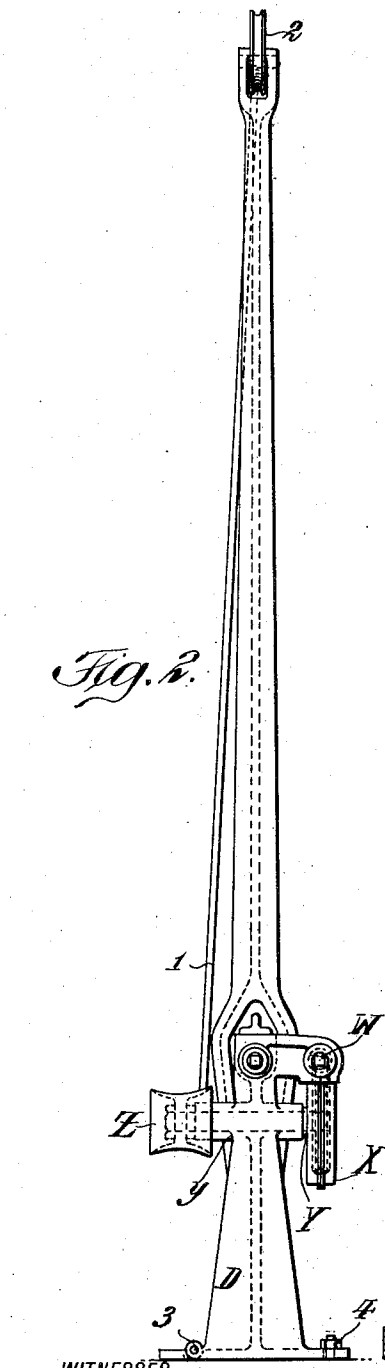

Fig. 2.

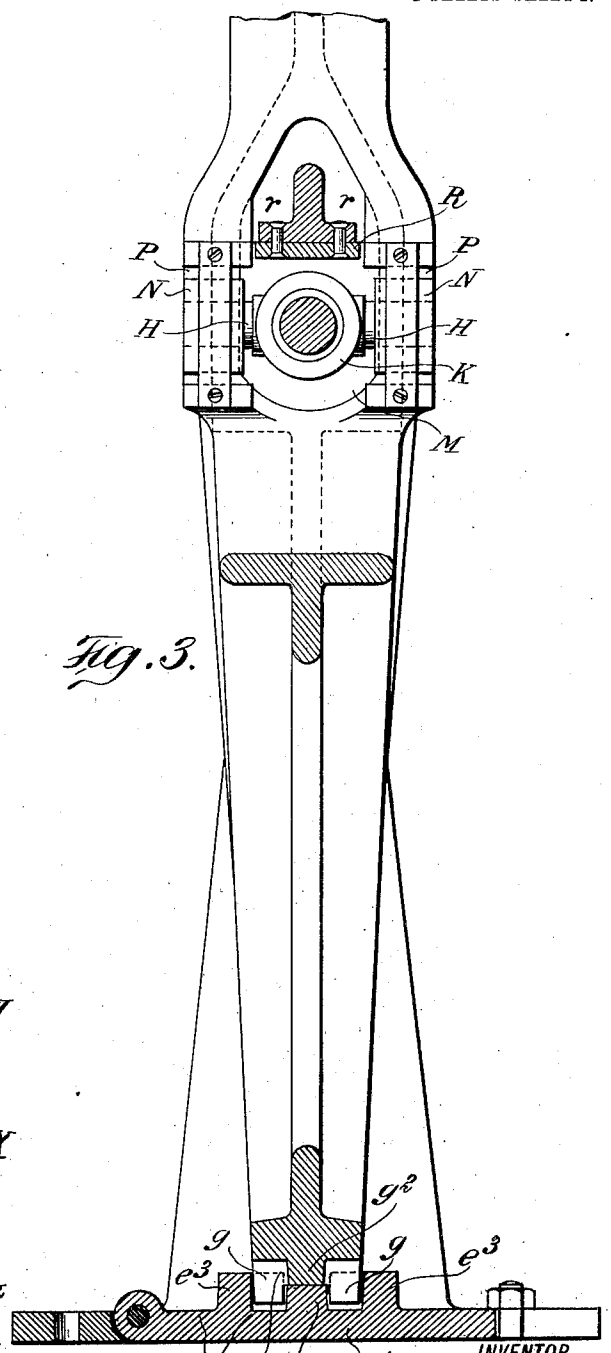

Fig. 3.

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CRANE OR DAVIT.

1,034,128. Specification of Letters Patent. **Patented July 30, 1912.**

Application filed August 28, 1908. Serial No. 450,605.

To all whom it may concern:

Be it known that I, ANDREAS P. LUNDIN, a citizen of the United States, and a resident of the borough of Manhattan, city, county, and State of New York, have invented certain new and useful Improvements in Cranes or Davits, of which the following is a full, clear, and exact description.

My invention relates to improvements in cranes or davits.

It may be utilized for either land or marine work for the handling of boats or any other loads.

In the accompanying drawings, in which similar reference characters designate corresponding parts, I have illustrated a small crane or davit embodying my invention mounted on a small launch,—the entire construction being especially well adapted for the laying of mines for coast or harbor defense work.

Referring to these drawings, Figure 1 is an end view of a davit embodying the preferred form of my invention, the view being partially in cross-section; Fig. 2 is an inner or rear view; and Fig. 3 is a vertical section of the same davit.

Referring now to the preferred form illustrated in these drawings, A designates a boat provided with a keel *a* and a well *a'*.

B designates the propeller shaft and C beams running longitudinally of the boat and suitably secured to serve as a support for the davit frame.

D designates the davit or crane frame which may be of any suitable construction. Preferably it will be a casting as shown.

As shown in Figs. 1 and 3, the frame is provided at its lower portion with a rack E provided with two sets of teeth *e e'* separated by a raised intermediate rail e^2 which is raised above the normal level of the casting of the rack proper. This rack may be cast integrally with the frame of the davit or separately therefrom and bolted or otherwise secured thereto.

As shown, the davit arm proper G is provided at its lower end with a segment G' provided with two sets of teeth *g g'* coacting with the teeth *e e'* of the rack E. Arranged intermediate these teeth *g g'* is a downwardly projecting track g^2 shorter than the teeth *g g'* and adapted to roll along a corresponding rail e^2 of the rack E.

The davit arm G is pivotally mounted on trunnions H and nut K, which nut in turn is mounted on a worm L. The nut K is internally threaded to correspond with the worm L, which worm is capable of being rotated but incapable of any appreciable longitudinal movement. Obviously, when the worm is rotated in either direction, the traveling nut K will be compelled to move longitudinally carrying with it the davit arm G, the segment G' of which will then be forced to roll along the rack. The worm L may be supported in any suitable manner, and I have shown it (Fig. 1) as supported at its inner end in an ordinary bearing in the casting of the frame D and at its outer end supported in an anti-friction bearing in the outer end of the frame D. This anti-friction bearing may be of any suitable character, but I have shown it as comprising a series of balls arranged around the outer end of the worm shaft.

It will be noticed, Fig. 3, that the frame of the davit arm G is provided with a centrally arranged opening M through which the worm passes and in which the traveling nut and its connection are arranged. As the davit rolls along the rack, assuming that the segment G' is quadrant-shaped, there will be some point on the davit arm which will travel in an absolutely horizontal plane. In practice, I have found it preferable as a general proposition to have the segment G' approximately a quadrant and to pivot the davit to the traveling nut approximately at the aforesaid point. Under certain conditions, however, it is advisable to use a segment having a curve differing somewhat from an absolute quadrant. Furthermore, it is not always practicable to arrange the pivot at precisely this theoretical point. Again, there is always a possibility of a rope or some other obstruction accidentally getting in the path of the moving quadrant. Again, in the manufacture of davits with segmental lower portions, I have found that there is frequently a variation owing to a greater or less degree of contraction of the metal in casting. For these and other reasons, I have found it advisable in practice to permit of the davit or crane having a certain amount of vertical play with regard to the traveling nut and worm. For this reason, instead of connect-

ing the trunnions directly to the davit frame, I have shown the trunnions H H extending into blocks N, which blocks may be of any desired shape, but are shown as rectangular, arranged in similarly shaped apertures P in the frame. These apertures P are of substantially the same width as the blocks N, but of greater length, thus permitting vertical play or movement between the davit arm D and the traveling nut and worm. Moreover, assuming the normal position of the apparatus to be its inboard position as illustrated in Fig. 1, I have arranged the segment outboard of the crane arm proper. In other words, assuming the normal position of the apparatus to be that in which the crane or davit arm proper is substantially vertical, in the preferred form of my invention the segment will be arranged to project at one side of that vertical position and at that side in which the davit arm moves from its normal position to its extreme opposite position. In such a construction, it will be extremely difficult to select any point which will travel in a substantially horizontal plane. Consequently, the use of the vertically movable blocks N N is especially important in such an arrangement. On the other hand, any construction which will permit of davit so constructed being moved backward and forward or caused to roll its segmental lower portion would come within my invention.

In operating a davit or crane of this construction, I may use either one single davit or two working together. For example, on a long heavy boat, I should prefer to use two, one connected with each end thereof. Similarly, on a very wide boat, such as a lighter, or any other wide object, I might use four or more cranes or davits, as for example, two at each end and at either side thereof. For ordinary work, one will suffice. Where one alone is used, and even in some cases where more are used, there will be considerable side strain on the davit. This will be counteracted, to a certain extent, by the upwardly projecting flanges e^3 e^3 on the rack arranged to project upward and outside of the teeth g g' of the segment of the davit arm. Furthermore, (Fig. 3) I prefer to secure a lateral guide-plate in the frame D. This plate will preferably be made of bronze and be located as indicated by R in the space above the traveling nut. It may be secured in any suitable manner, but I have shown it (Figs. 1 and 3) as being bolted or riveted by bolts or rivets r to the underside of a T-plate T, which rests upon and is secured to each end of the frame or casting D. This construction not only provides a guide to take up lateral strains as the davit moves backward and forward, but also materially strengthens and stiffens the frame and entire structure. Furthermore, it should be arranged sufficiently far above the traveling nut to permit of the vertical play or movement already described as being permitted by the blocks N N, and, at the same time sufficiently close to the top of the traveling nut to prevent the same from rising a sufficient distance to permit the segmental lower end of the davit to leave the rack or to be forced out of engagement therewith in the event of an obstacle being met. Of course, the guide-plate R will be of such width compared with the area of the aperture in the davit arm at that point merely to leave enough clearance on either side thereof to permit of an easy longitudinal movement,—so as to retain the davit arm in a substantially constant upright position both as against any side strains resulting from a load and also against any tendency to tilt due to the rolling of the vessel or other causes.

S designates an additional brace arranged at the outer end of the frame to take care of outward strains when the davit is in its extreme outer position or between that and a substantially vertical position.

In an earlier application, Serial No. 404,829, filed December 2, 1907, I have shown a hoisting apparatus working in combination with this general type of davit or crane. Consequently, I do not broadly claim herein the combination of a drum with this general type of davit. I have found, however, that in certain class of work, and particularly on comparatively small launches or wherever the operating space is small, that it is important to have the operating mechanism as close together as possible. For example, in the type of boat illustrated in the accompanying drawings, practically the only place from which the apparatus could be operated conveniently would be in the well a'. Under such or similar conditions, it becomes important to have both the davit and the hoisting apparatus operated from substantially the same point.

As shown in the drawings, the inner end of the worm shaft is cut square to permit the attachment thereto of a handle V for turning the same. Arranged in a portion of the casting near thereto is shown another attachment W for the handle V to drive a wheel X keyed to a shaft Y which passes through an aperture y in the casting of the frame D and has keyed to its other end a hoisting drum Z. A rope 1 has one end secured to this hoisting drum and passes over a pulley 2 arranged in the upper or outer end of the davit arm G and from there outboard, being provided at its outer end with a suitable securing device for the object to be handled.

3 designates a pivot, such as a stout hinge provided at one side of the davit casing

and 4 securing means, such as a series of bolts and nuts arranged on the opposite side of the casting or frame. By removing these nuts, the entire davit may be swung sidewise on the hinge 3 and the davit or crane lowered to the deck and out of the road when not in use.

What I have stated as to economy of space and the lowering of the davit out of the way on a small boat applies equally well to any other conditions where the same circumstances exist or where the same results are desired, such, for example, as on flat cars, carts, crowded docks, yards, etc.

The operation of the preferred form of my apparatus is as follows: If it is desired to pick up a given object from a given spot and move it to another point, it may or may not be necessary to make any use of the hoisting drum. The moment the davit worm is actuated to roll the davit from the position shown in Fig. 1, three separate movements take place simultaneously. In the first place, the rope being secured to the hoisting drum, the moment the davit starts to move outboard, the rope is tightened up somewhat and the load will be raised slightly from its initial position. Simultaneously the davit moves in a horizontal direction and also swings on its pivot. If, for example, the load to be handled rests on the deck of a vessel, by merely operating the davit worm, the same will be lifted and swung outboard to clear the deck without any use of the hoisting apparatus, which may be subsequently employed simply to lower away into the water or a nearby vessel. On the other hand, under some circumstances, the hoisting apparatus will be utilized first to raise the load to a certain point and then the davit operated to raise it still farther and clear. In other words, the hoisting apparatus in some cases continues the initial upward or downward movement of the load which has been started by the mere movement of the davit, and in other cases, the movement of the davit continues and completes the upward or downward movement of the load commenced by the hoisting apparatus. Furthermore, by using two handles and slacking away on the hoisting drum while operating the davit worm, the strain on the latter may be considerably diminished. In other words, a davit of this type, as it is operated from either extreme position toward the center, raises the load. If a hoisting drum is rotated in an opposite direction at a sufficient speed to slack away to the same extent as the davit is taking up, or in other words, to keep the load in a substantially horizontal plane, all strain on the davit due to its take up, will be done away with. Similarly, if the load is to be lowered to a point below its initial position, by lowering at the same time the davit is swinging in either direction, the ease of operating the davit will be considerably increased for the same reason.

It will be noticed further that by the use of my invention, the center of gravity of the entire construction will be a point considerably lower than that in other devices.

I do not mean to draw any distinction in this application between a davit and a crane, as by the word "davit" I mean nothing more than a small crane, more particularly adapted for use on ships.

What I claim as new is:

1. A crane having a lower portion provided with a segment having two sets of teeth arranged on either side of a track, in combination with a rack provided with an intermediate rail upon which the track rolls and two sets of teeth on each side of said rail adapted to engage and co-act with the teeth on the segment.

2. A frame secured to a support, a worm rotatively mounted in said frame, a crane arm provided with an opening substantially centrally arranged to permit the worm passing therethrough, a traveling nut interiorly threaded to co-act with the worm and mounted thereon, and trunnions connecting the movable arm with the traveling nut.

3. A frame secured to a support, a worm rotatively mounted in said frame, a crane provided with an opening substantially centrally arranged to permit the worm passing therethrough, a traveling nut interiorly threaded to co-act with the worm and mounted thereon, vertically movable blocks mounted in said crane and trunnions connecting said blocks and said traveling nut.

4. The combination of a crane arm, a forwardly-extending segment at its lower end, a support upon which said segment may roll, a movable pivot traveling substantially parallel to said support and about which said crane may turn, means for permitting vertical play between said pivot and crane, and means for moving said pivot.

5. The combination of a crane, a movable pivot on which said arm may turn, a forwardly-extending toothed segment at the lower end of said arm, a rack on which said segment may roll, means for moving said pivot substantially parallel to said rack, and means for permitting vertical play between the crane and pivot.

6. The combination with a crane arm adapted to swing and provided with an aperture extending in the direction of its swinging movement, of a lateral guide and strain plate fixed to a support and adapted to engage with the side walls of said aperture.

7. The combination with a crane arm, of a pivot on which it is adapted to swing—the said pivot being vertically movable with

regard to the crane arm, and a guide plate constructed and arranged at once to serve as a lateral guide for the crane arm, to take up side strains therefrom, and to limit the extent of vertical movement of the aforesaid pivot.

In witness whereof, I have signed my name to the foregoing specification in the presence of two subscribing witnesses.

ANDREAS P. LUNDIN.

Witnesses:
L. D. JAKINS,
JOHN C. SILVA.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."