This invention relates to cranes, and consists in a feature of collapsibility. While it is applicable to cranes of various sorts, variously situated, I shall describe it in application to a crane mounted upon a scow.

In the accompanying drawing Fig. 1 is a view in side elevation, and Fig. II a view in plan, of a scow upon which the crane of this invention is mounted.

It is a usual requisite of floating cranes that operate in navigable streams and upon estuaries that the height of the structure be limited, that the crane may pass beneath bridges; and it is under such circumstances that the value and utility of the invention particularly appear.

Referring to the drawing, the hull 1 of a scow is shown to carry a turret 10, thus constituting the crane that is mounted upon the turret a revolving crane. The crane which is mounted upon the turret includes a jib 2, pivoted at e for vertical swing. Load lines a, a run upon sheaves at the tip of the jib, and luffing means connect the jib with a suitable anchorage, called an "A-frame." The load lines in the case shown carry, suspended, a bucket.

The A-frame includes a rigid member 3 (ordinarily a steel beam) pivotally mounted at d in the turret 10 for vertical swing, in a plane coincident with that in which the jib also swings.

The frame includes also a collapsible tension member, conveniently in the form of lengths 5 of wire rope, secured at one end to the distal end of member 3 and at the other end anchored in the turret. Functionally considered, the rigid member 3 is a thrust-sustaining member, and members 5 are tension-sustaining members.

The luffing means include a luffing-line c trained upon sheaves that are carried in the extremities of two tension members 12 and 13 (ordinarily steel bars) that are severally pivoted to the tip of the jib 2 and to the tip of the member 3. The luffing-line is taken in and paid out, to effect the raising and lowering of the jib.

The structure additionally includes flexible members 6 (typically, lengths of wire rope), which may be styled descriptively jib anchor cables, and which are pivoted anchored, at one end in the turret and at the other end in the jib, and at a point toward the outer and free end of the jib. Referring to Fig. I, it will be perceived that the pivot points e and d for jib and for member 3, lying necessarily in the vertical plane in which both jib and member swing, are spaced apart (conveniently in vertical alignment) at a substantial interval; and it will additionally be perceived that the pivotal anchorage for the jib anchor cables 6 in the turret (necessarily remote from pivot point e) is conveniently made coincident in position with and structurally unified with the pivot point d.

With particular attention to Fig. I, it will be observed that, as luffing-line c is paid out, the jib 2 will move under gravity downward, until it comes to the approximately horizontal position indicated in broken lines. The jib anchor cables 6 are of such length that, hanging slack so long as the jib is raised, they become taut as the jib moves downward to such broken-line position. The cables 6 thus are effective to limit the range of downward movement of the jib; and they are so effective by virtue of their length, and by virtue of the fact that the point of their anchorage to the turret is spaced at an interval from and is above the point e of jib pivoting.

When in the paying out of luffing-line c the jib has so come to the limit of its range of downward movement, further paying out of the luffing-line will be effective to permit the rigid member 3 of the A-frame to move downward under gravity, turning upon its pivot point d, while the flexible members 5 become slack.

When a boat carrying a crane of this invention, in its movement from place to place, approaches a bridge of low clearance (at which time the crane ordinarily will not be in service), the luffing-line is paid out until, first, the jib comes to the limit of its range of downward movement (the broken-line position, Fig. I), and, then, with the further paying-out of the luffing-line, until the A-frame collapses of its own weight, and lies in its broken-line position, Fig. I. The boat with its crane, having thus been brought to minimum height, passes beneath the bridge. When, thereafter, the crane is to be brought again to operative position, the luffing-line c is taken in. The A-frame will then first rise to its elevated position (the full-line position, Fig. I); and, with the further taking in of the luffing-line, the jib 2 will be raised and brought to desired position. It is the tension of the flexible members 5 that limits the upward movement of the member 3 of the A-frame, and that so constitutes those members 3 and 5 the efficient A-frame of the crane.

It will be perceived that the point of pivoting of the bar that constitutes tension member 13 to beam 3 lies to one side of the longitudinal centre line of beam 3. In consequence, when the parts are in collapsed positions, though tension exerted through the luffing-line c is in a line approxim-
ing the longitudinal extent of beam 3, the offset of the pivot-point suffices to render the tension effective to swing beam 3 upon its centre d and so to erect the frame.

It will be perceived that this feature of collapsibility that characterizes the A-frame of my invention renders possible the employment of an A-frame which in service position is relatively high. There is, in comparison with a crane whose A-frame is relatively low, a reduction of stresses; and from this it follows that, without loss of capacity, the weights of the jib, of the luffing ropes, and of the mechanism organized therewith, may be reduced.

I have described the invention as applied to and embodied in a boat-borne crane. Manifestly it is applicable to cranes generally, and will be found advantageous in application to all vehicle-borne cranes (whether adapted for travel upon water or over land). And within the term crane I include such structures as power shovels, in which are found the essential element of a crane: namely, a jib or beam swung by power in vertical plane. The invention is applicable with advantage to structures of the general sort indicated, even though they are intended to be maintained ordinarily in stationary position; since in transportation of them from place to place, whether by railroad or by truck, this feature of collapsibility makes transportation possible without dismantling, and while the apparatus continues in assembled condition and ready for use.

I claim as my invention:

1. A crane structure including a support, a jib pivoted in said support for vertical movement, an A-frame including a rigid thrust member pivoted in said support and a tension member anchored in said support, a luffing-line arranged between the jib at a point remote from its point of pivoting and the A-frame, and a second tension member secured at one end in said support at a point remote from the point of pivoting of the jib and at the other end to the said jib at a point remote from the point of pivoting, whereby as the luffing-line is paid out and the jib is lowered such second tension member becoming taut is effective to hold the jib against further lowering, and further paying out of the luffing-line permits collapse under gravity of the A-frame, and the taking in again of the luffing-line effects successively the reerection of the A-frame and the raising of the jib.

2. A crane structure including a support, a jib pivoted in said support for vertical movement, an A-frame including a rigid thrust member pivoted in said support and a tension member anchored in said support, a luffing member engaging the jib at a point remote from its point of pivoting to the support and engaging the said thrust member also at a point to one side of its longitudinal centre line, and a second tension member secured at one end to said support at a point remote from the point of pivoting of the jib and at the other end to the jib at a point remote from its point of pivoting and adapted to be drawn taut by the downward swing of the jib.

3. A vehicle-borne crane including a vehicle, a jib pivoted upon said vehicle, an A-frame including a rigid thrust member pivoted upon said vehicle and a tension member anchored to the vehicle and to the thrust member, a luffing-line running upon sheaves borne by said A-frame and by the jib, and a second tension member secured at one end to said vehicle at a point remote from the point of pivoting of the jib and secured at the other end to the said jib at a point remote from the said point of pivoting, whereby as the luffing-line is paid out and the jib is lowered, such second tension member becoming taut is effective to hold the jib against further lowering, while further paying out of the luffing-line permits collapse under gravity of the A-frame, and the taking in again of the luffing-line effects successively the reerection of the A-frame and the raising of the jib.

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