My invention relates to new and useful improvements in suspension for crane booms, more particularly for the very long booms on that type of crane known as dragline excavators.

In such machines it is important that the boom and its suspension means be as light as possible. In the past, in the case of a long slender inclined boom suspended by guys extending from an A-frame on the base of the machine to the outer point of the boom, it has been customary to interpose between the A-frame and boom a strut or mast pivoted to the front of the base adjacent the foot of the boom and extending forwardly diagonally upward at a steeper inclination than the boom. This mast has two functions: (1) it supports the boom guys above the line between the A-frame and boom point, thus imparting an increased upward component on the boom in all operating positions of the boom, and (2) it permits the use of fixed-length guys between the mast and the boom, these guys providing permanent fixed supports from which to hang intermediate suspenders for the boom. This type of construction is shown and described more fully in U. S. Patent No. 2,978,915, issued June 26, 1941, to Trevor O. Davidson.

A difficulty with such a boom suspension is that the mast increases the weight of the machine, and increases the moment of momentum which resists the starting and stopping of the swing of the machine.

Accordingly it is the principal object of my invention to devise a boom suspension that will provide the advantages of the mast-type suspension without substantially increasing the weight or the moment of momentum.

In addition to my principal object, above stated, I have worked out a number of novel and useful details, which will be readily evident from the description progresses.

My invention consists in the novel parts and in the combination and arrangement thereof, which are defined in the appended claims, and of which one embodiment is exemplified in the accompanying drawings, which are hereinafter particularly described and explained.

Throughout the description the same reference number is applied to the same member or to similar members.

Figure 1 is a plan view, somewhat conventionalized, of my boom suspension.

Figure 2 is a side elevation, taken along the lines 2—2 of Figure 1, showing the boom in lowered position.

Figure 3 is similar to Figure 2, but shows the boom in raised position.

Referring now to the figures, we see that 11 is the main frame of a crane. Pivot to the front thereof, and extending forwardly diagonally upward (Figure 3) is a boom 12. Also pivotally supported by the front of the main frame 11, and extending forwardly diagonally upward at a steeper inclination, are tension members 13 which are supported by boom-hoist ropes 14 from the top of high A-frame 15 on the main frame, and by fixed-length guys 16 extending from the top of the members 13 to the outer end of the boom.

The A-frame 15 is of such height that members 13 are in tension for all positions of the boom (see Figures 2 and 3). Members 13 need not be separately pivoted to the frame. As shown, they are attached to the boom adjacent its foot.

Short suspender members 17 support approximately the middle of the boom from guys 16, and are preferably of such length that there is an initial angle in the guys due to sag of the boom, so that the sag will be straightened out when the guys straighten under load, all as described in the above-mentioned patent to Davidson.

The guys need not be ropes; other sorts of tension members, capable of angular, or even non-angular, bending at the point of attachment of the suspender members, would suffice, although ropes are simpler, being easier to rig and adjust.

The importance of having the guys 16 be fixed-length should be stressed. For if these guys were merely reaches of the boom-hoist ropes 14, it would be nearly impossible to maintain a proper adjustment of their relative lengths.

The presence of tension members 13 facilitates a permanent adjustment of the proper relative lengths of guys 16 and suspenders 17.

The hoist rope 18 runs from a winch 19 on the main frame 11, over a sheave 20 on boom 12, thence over a sheave 21 at the outer end of the boom, and thence downwardly to the load (not shown) to be delivered thereby. Other fairlead means than sheave 20 could be employed, or such means could be omitted.

From the foregoing, we see that by substituting tension members and a high A-frame for the conventional mast and low A-frame, I have greatly reduced the weight of the front end while increasing the weight of the A-frame to a lesser extent thereby effecting a net decrease in weight and a backward relocation of the center of gravity of the whole machine, thereby reducing the moment of momentum, without losing the advantage of the fixed anchorage for the guys 16 and suspenders 17 in all positions of the boom.
Although I have shown a two-legged boom, rather than a single-strut or other type of boom, it is clear that my invention is equally applicable to other types of boom and other types of suspenders therefor.

Having now described and illustrated one form of my invention, I wish it to be understood that my invention is not to be limited to the specific forms or arrangements of parts herein described and shown.

I claim:

1. In a suspension for a long slender upwardly inclined crane boom, the combination of: a main-frame; means thereon for pivotal support of the foot of the boom; first tension means, of fixed length, extending upwardly from a pivotal support by the main frame adjacent the foot of the boom; fixed-length guy means from the upper end of the first tension means to the outer end of the boom; fixed-length boom-suspension means between an intermediate point on said guy means and the boom; second tension means, of variable length, between an elevated point on the main frame and the upper end of the first tension means, for supporting the first tension means; the point of attachment of the second tension means to the main frame being above the transverse plane through the guy means when the boom is in any operating position.

2. A boom suspension according to claim 1, further characterized by the fact that the length of the suspension means is appreciably less than the distance from its point of attachment to the boom, to a straight line drawn between the two ends of the guy means, when the boom is not under load.

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