March 13, 1951 L. R. RUSSELL 2,545,047

ADJUSTABLE BOOM FOR CRANES OR THE LIKE

Filed July 12, 1947 3 Sheets-Sheet 1

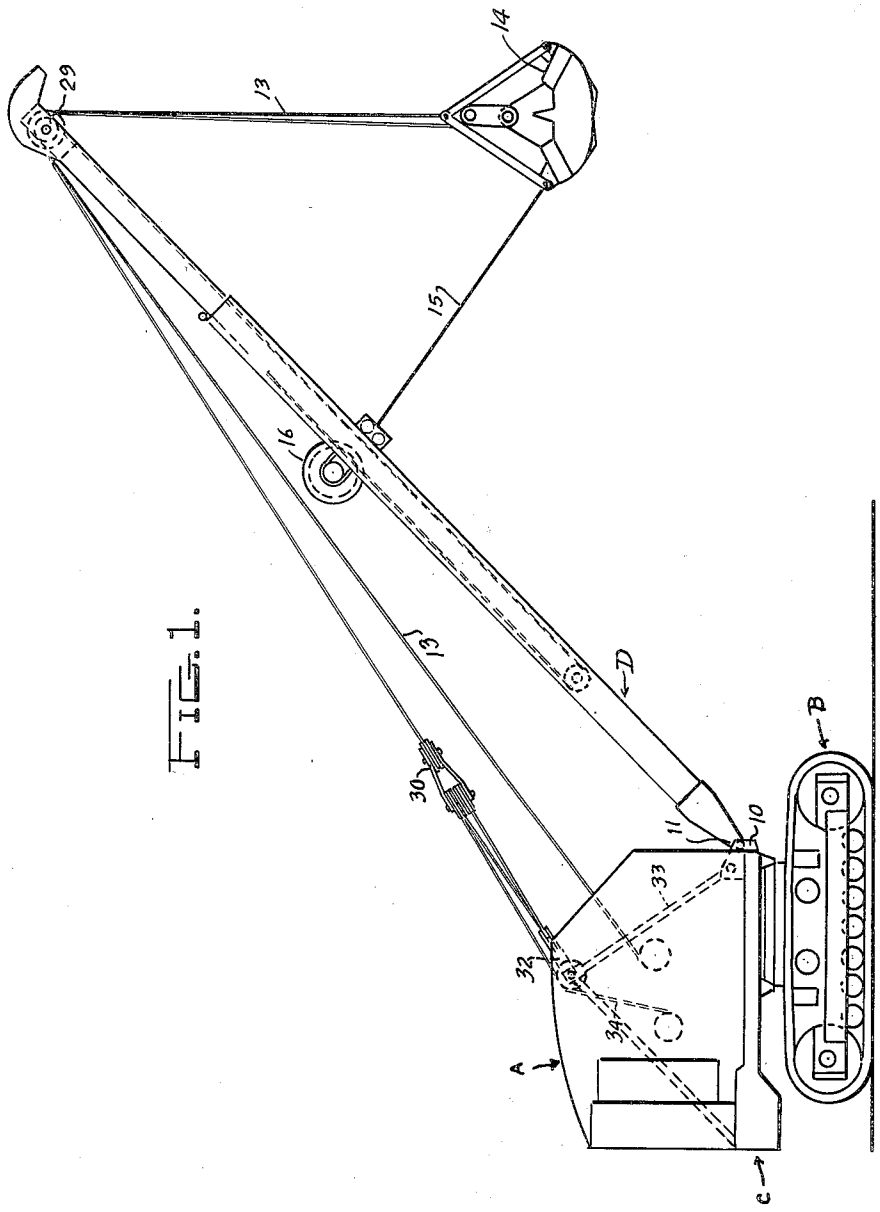


FIG. 1.

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Filed July 12, 1947 3 Sheets-Sheet 2

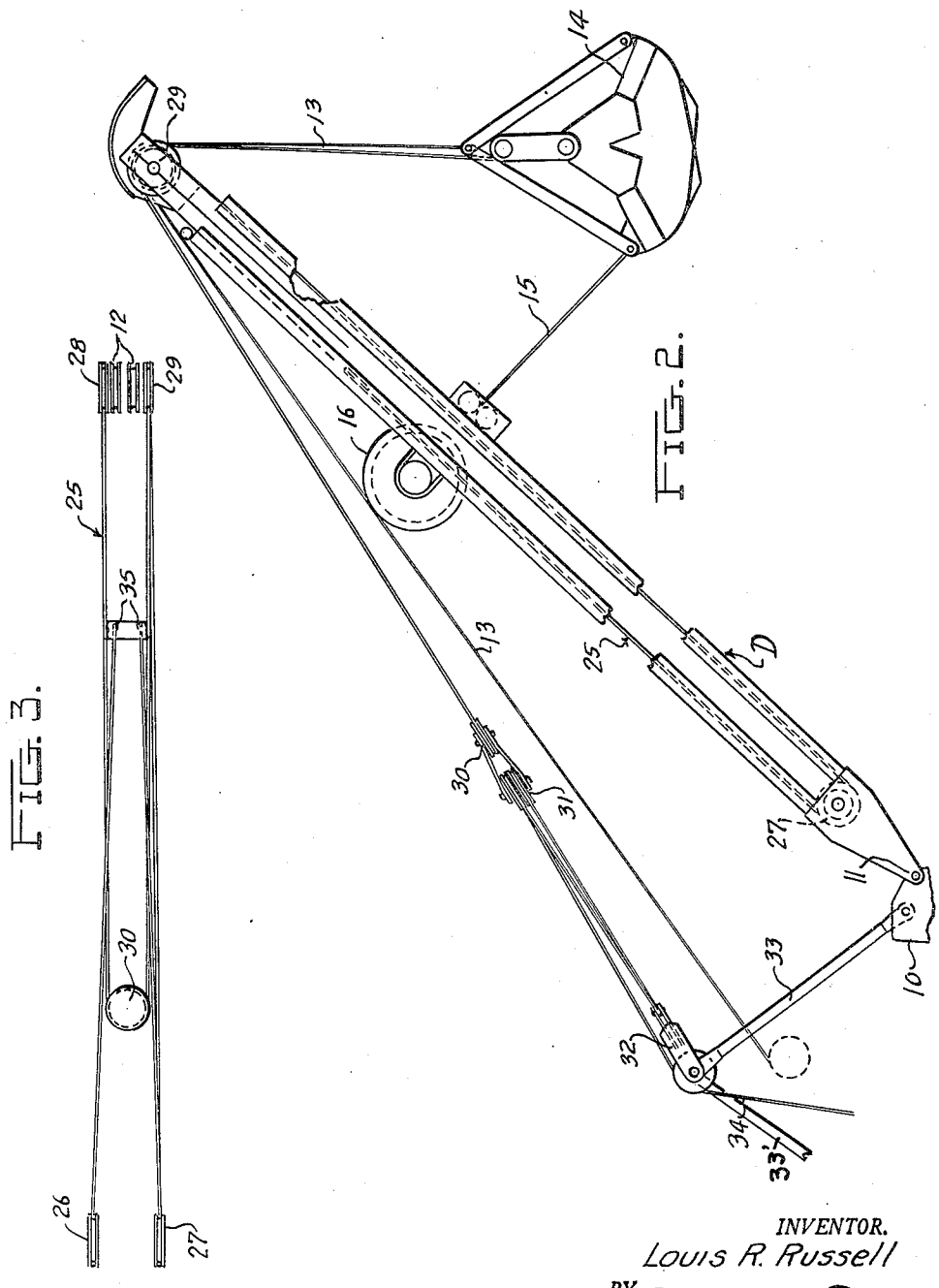


FIG. 2.

FIG. 3.

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Filed July 12, 1947 3 Sheets-Sheet 3

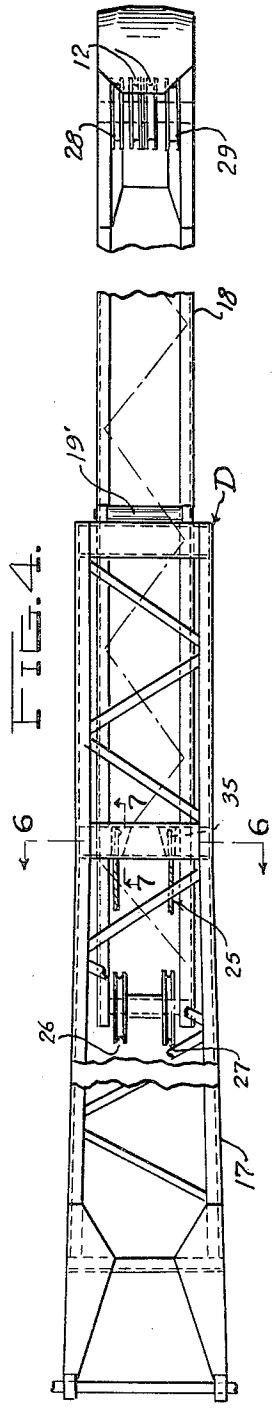


FIG. 4.

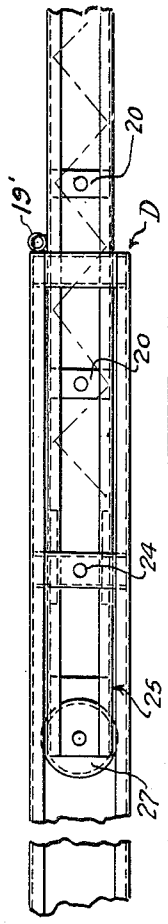


FIG. 5.

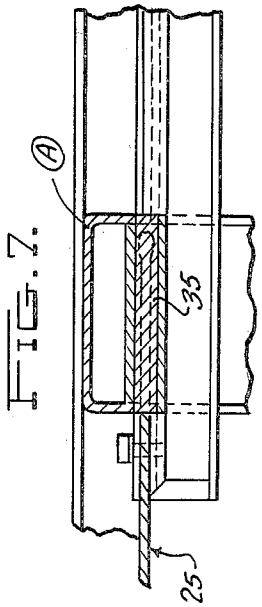


FIG. 7.

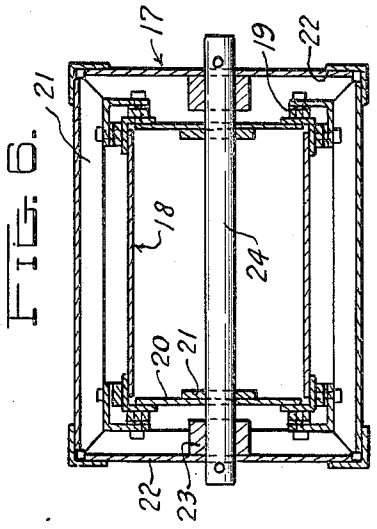


FIG. 6.

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UNITED STATES PATENT OFFICE

2,545,047

ADJUSTABLE BOOM FOR CRANES OR THE LIKE

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Application July 12, 1947, Serial No. 760,571

5 Claims. (Cl. 212—55)

1

This invention relates to machines or apparatus equipped with a boom which is mounted for vertical swinging movement upon a carriage, or the like, such, for example, as cranes and excavating machines.

Heretofore, in machines of this character, it has been an onerous operation to vary the length of the boom. In many cases, this necessitated that the boom be dismantled and one or more sections added or removed, depending upon whether a longer or shorter boom was required for the particular job. Not only has this been a time-consuming operation, but a difficult and expensive one. With a view of overcoming this problem, telescoping booms have been used to some extent, but this has required changing the boom hoist, as well as the boom section supports. This still has involved expensive work, additional equipment and skilled workmen, and, therefore, has not fully overcome the problem.

An object of this invention is to produce a simple and efficient extensible boom, the length of which can be conveniently varied without varying the boom hoist or the support for the boom sections.

Another object is to produce an extensible boom for cranes, excavating machines or the like, which, upon being lowered to the supporting surface and by moving the machine, will be readily varied in length.

Other objects and advantages reside in details of construction, assembly and operation hereinafter described, and by way of illustration but not of limitation, an embodiment of the invention is shown on the accompanying drawings, in which

Figure 1 is a side elevation of an excavating machine embodying the invention;

Figure 2 is a side elevation with some of the parts broken away of the extensible boom showing the hoist and supporting cables and a clam shell bucket suspended from the outer end;

Figure 3 is a diagrammatic plan view showing the supporting cable for the boom sections and the manner in which runs of such cable pass over sheaves on the boom sections as well as the sheave connected to the boom hoisting cable or tackle;

Figure 4 is a top plan view of the extensible boom;

Figure 5 is a fragmentary side elevation of the sectional boom;

Figure 6 is an enlarged transverse sectional view on the line 6—6 of Figure 4; and

Figure 7 is an enlarged sectional view on the line 7—7 of Figure 4.

The illustrated embodiment of the invention

2

comprises an excavating machine A which, as shown, is mounted on crawlers B, suitable machinery being provided for operating the crawlers to enable the machine to be moved from place to place. The machine has the usual turntable C supporting the operating machinery and pivotally connected to a suitable bracket 10 on the turntable is an extensible boom D. As shown, the boom is pivoted at 11 for vertical or up and down swinging movements. As will be hereinafter more fully described, the boom is formed of telescoping inner and outer sections, the outer section being pivoted to the bracket support 10 and the inner section carrying at the outer or free end sheaves 12 over which pass cables 13 for supporting a clam shell bucket 14, which is controlled by a cable 15 leading to a suitable drum 16 carried by the boom. The operation of the clam shell bucket as well as its control form no part of the present invention and further description and illustration thereof is not considered necessary. However, it should be pointed out here that the boom can be used to advantage with other types of machines as, for example, cranes and other excavating machines such as drag line buckets, etc.

As shown particularly on Figure 4, the extensible boom D has an outer telescoping section 17 and an inner telescope section 18 which is mounted for free sliding movement within the outer section. As shown on the drawings, both boom sections are elongate and rectangular in cross section. Detail description of the boom structure is not considered necessary. Suffice it to say that each boom section is of fabricated metal form constructed of angle irons and metal bracing straps and as particularly shown on Figure 6, the inner telescope boom section 18 slides along and is guided by a series of relatively short plates 19 which are bolted to the inside of the outer boom section 17. A roller 19' is mounted on the outer end of the telescoping boom section 17 to militate against shearing of cables as will be readily understood.

The inner or telescope boom section 18 is formed along opposite sides with a series of plates 20, opposite plates having aligned apertures, and fixed to the inside of each plate 20 in register with the respective aperture is a reenforcing plate 21. Provided in the outer telescoping boom section 17 adjacent the outer or free end thereof is an oppositely disposed pair of plates 22 which are centrally apertured and provided on the inside is a rigid sleeve 23. It will be manifest that by sliding the telescope boom 18 in or out of the telescoping boom 17, one of the series of

apertured plates may be brought into registry with the apertured plates 22 of the boom section 17. Rigidly to lock the sections in the desired position of adjustment, a rod 24 (Figure 6) may be inserted through the aligned apertures, suitable cotter keys or the like being employed for holding the rod from dropping out. In this manner, after the desired length of the boom has been achieved, the boom sections may be rigidly secured in the position of adjustment.

As will hereinafter appear, the length of the boom may be readily varied to suit the conditions of service. Conveniently, the outer end of the boom is lowered to the ground or other supporting surface, and the securing rod 24 is removed. Thereafter, by moving the machine forwardly or rearwardly, the inner boom section 18 will either slide inwardly into the telescoping boom section 17, or conversely the boom section 18 will be drawn outwardly to lengthen the boom. The boom sections 17 and 18 are connected together by a single cable 25 which, in addition to providing a connection between the boom sections, also provides the connection between the boom and the hoisting device.

As shown, sheaves 26 and 27 are mounted at the inner end of the telescope boom section 18, and sheaves 28 and 29 are mounted at the outer end of the telescope boom section 18. A sheave 30 is carried by a suitable bracket fastened to a block 31 forming part of the block and tackle hoist, the other block 32 being supported by a post 33 rising from the machine mounting bracket 16 and a rearwardly inclined leg 33'. The cable 34 leading from the block and tackle hoist extends to a winch (not shown).

Both ends of the cable 25 are anchored to the outer or telescoping boom section 17 to a cross plate which is socketed so that the ends of the cable may be embedded in lead 35 or a suitable wedge and socket securely to hold the cable from coming loose. It will be observed that from one point of anchorage, the cable 25 extends inwardly to the sheave 27 on the telescope boom section 18, thence outwardly to the sheave 29 on the boom section 18, thence about the sheave 30 associated with the boom hoisting device, thence outwardly about the sheave 28 on the outer end of the boom section 18, thence inwardly about the sheave 26 on the inner end of the boom section 18, and finally, outwardly to its other point of anchorage.

From the above description, it will be seen that the two telescoping boom sections are connected together by a single cable which also leads from the outer end of the boom to the hoisting device. This enables lengthening or shortening of the boom in a very simple manner. All that is required is that the hoisting cable 34 be paid out sufficiently to allow the outer end of the boom to rest on the ground or other supporting surface. Thereafter, by moving the machine to which the boom is connected forwardly or rearwardly, after the securing rod 24 has first been removed, the boom can be lengthened or shortened as desired. After arriving at the desired boom length, the rod 24 is again inserted through the aligned apertures in the boom sections and the boom is then ready to perform its work. It will be recognized that this structure is of decided advantage for contractors, for example, since they are not required to carry lengthy insert sections or different length boom hoist cables. Lengthening or shortening of the boom can be effected according to the above described structure within a very few minutes whereas heretofore several hours are consumed to achieve the result.

It is to be understood that numerous changes in details of construction, arrangement and operation may be effected without departing from the spirit of the invention especially as defined in the appended claims.

What I claim is:

1. Apparatus of the class described, comprising a movable carriage, a sectional boom pivotally connected at one end to said carriage, the sections of the boom being shiftable relatively to each other for lengthening or shortening same, hoisting means for said boom connected to the carriage, cable means providing a connection between the boom sections respectively and said hoisting means, and a device for rigidly securing the boom sections selectively in different positions of adjustment whereby upon lowering the free end of the boom to a supporting surface, rendering the connecting device ineffective, and imparting movement to the carriage, the length of the boom may be varied.

2. Apparatus of the class described, comprising a movable carriage, a sectional boom pivotally connected at one end to said carriage, the sections of the boom being shiftable relatively to each other for lengthening or shortening the same, hoisting cable means for said boom connected to the carriage, a single cable providing a connection between the boom sections respectively and said hoisting cable means, and a device for rigidly securing the boom sections selectively in different positions of adjustment, whereby upon lowering the free end of the boom to a supporting surface, rendering the connecting device ineffective, and imparting movement to the carriage, the length of the boom may be varied, without changing the length of the hoisting cable means.

3. Apparatus of the class described, comprising a carriage mounted for to and fro movements, a boom having a pair of telescoping sections freely slidable one within the other, a pivotal mounting for one end of the boom connected to the carriage, hoisting means on the carriage for said boom, a single cable having its ends anchored to one section and reeved about opposite end portions of said sections respectively and also reeved about said hoisting means whereby hoisting of the boom is effected by said hoisting means through said cable and the boom sections may be shifted relatively to each other without affecting said hoisting means, and a device for rigidly securing the boom sections in different positions of adjustment.

4. Apparatus of the class described, comprising a carriage mounted for to and fro movements, a boom having a pair of telescoping sections freely slidable one within the other, a pivotal mounting for one end of the boom on the carriage, hoisting means connected to the carriage for said boom, a single cable anchored at its ends to the outer end portion of the outer telescoping boom section, a pair of sheaves at the inner end of the inner boom section, a pair of sheaves at the outer end of the inner boom section, a sheave associated with said hoisting means, said single cable extending from one anchorage point about a sheave on the inner end of the inner boom section, thence about a sheave on the outer end of the inner boom section, thence about the hoisting means sheave, thence about the other sheave on the outer end of the inner boom sec-

tion, thence about the other sheave on the inner end of the inner boom section to the other point of anchorage, and a device for rigidly securing the boom sections in selected positions of adjustment.

5. Apparatus of the class described, comprising a carriage mounted for to and fro movements, a boom having a pair of telescoping sections freely slidable one within the other, a pivotal mounting for one end of the boom on the carriage, block and tackle hoisting means for the boom connected to the carriage, a single cable anchored at its ends to the outer end portion of the outer telescoping boom section, a pair of sheaves at the inner end of the inner boom section, a pair of sheaves at the outer end of the inner boom section, a sheave associated with said block and tackle, said single cable extending from one anchorage point about a sheave on the inner end of the inner boom section, thence

about a sheave on the outer end of the inner boom section, thence about the hoisting means sheave, thence about the other sheave on the outer end of the inner boom section, thence about the other sheave on the inner end of the inner boom section to the other point of anchorage, and a device for rigidly securing the boom sections in selected positions of adjustment.

LOUIS R. RUSSELL.

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