Jan. 28, 1930. H. H. BARBER 1,744,942

LINKAGE CONNECTION FOR DIGGING BOOMS

Filed Dec. 29, 1927 2 Sheets-Sheet 1

FIG. 1

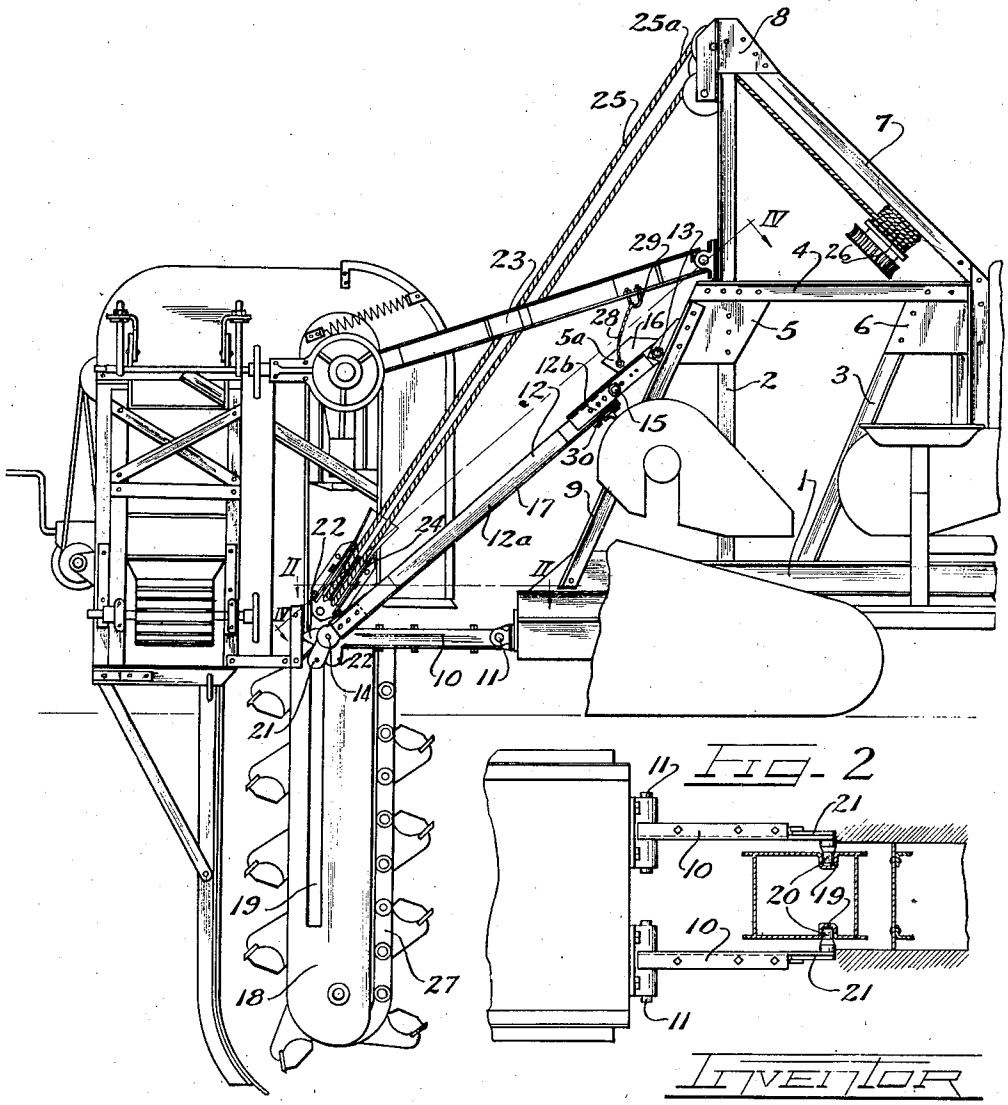

FIG. 2

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Filed Dec. 29, 1927 2 Sheets-Sheet 2

Fig. 3

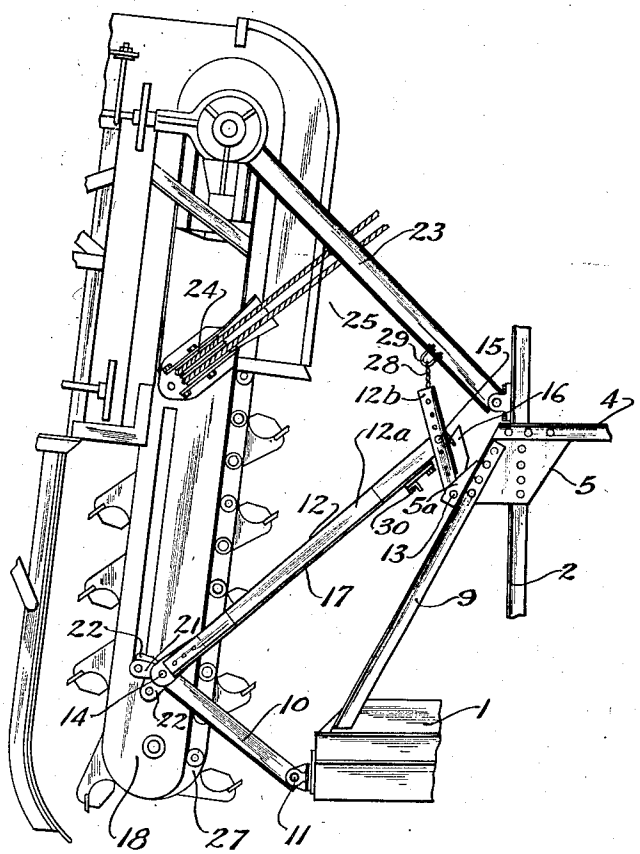
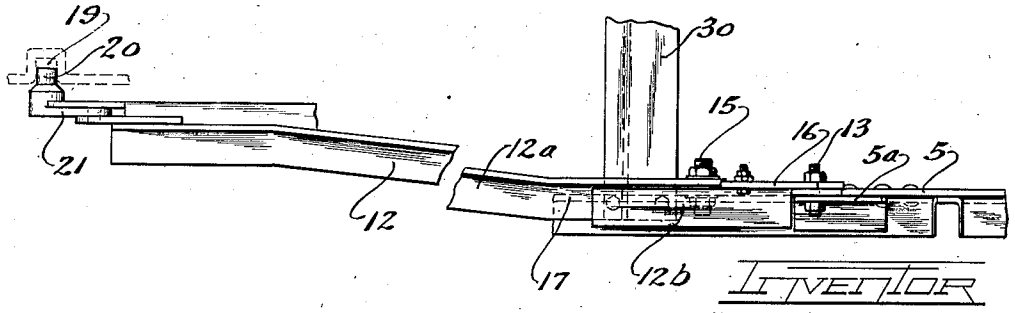


Fig. 4



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UNITED STATES PATENT OFFICE

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LINKAGE CONNECTION FOR DIGGING BOOMS

Application filed December 29, 1927. Serial No. 243,223.

This invention relates to a ditching machine and concerns itself primarily with a bracing device for supporting the boom in operative position.

It is an object of this invention to provide a normally rigid bracing device as low as possible for absorbing the thrust of the boom in its digging position, with means for modifying said bracing device to render the same flexible, in order that the boom may be completely elevated, the bracing device traveling with the boom during its final elevation.

The invention comprises the novel structure and combination of parts hereinafter described and more particularly pointed out and defined in the appended claims.

In the accompanying drawings which illustrate a preferred embodiment of this invention and in which similar reference numerals refer to similar features in the different views:

Figure 1 is a side elevational view of a ditching machine with its boom in working position involving this invention.

Figure 2 is an enlarged sectional view taken upon the line II—II of Figure 1.

Figure 3 is a fragmentary side elevational view of the machine showing the boom in partially elevated position.

Figure 4 is an enlarged sectional view taken upon the line IV—IV of Figure 1.

As shown on the drawings:

The ditching machine involving this invention embodies a frame mounted upon a crawler. The frame may be of any approved construction, and it is unnecessary to completely describe the same. It includes a pair of lower horizontal members 1, only one of which is shown, a vertical standard 2, a diagonal strut 3, an upper horizontal brace 4 which is respectively connected by gussets 5 and 6 to the standard 2 and strut 3. A diagonal strut 7 connected with the standard 2 by a gusset 8 is joined to the bracing member 4.

A normally rigid bracing device for the boom is attached to the frame and extends therefrom. The bracing device is in the form of a polygonal affair in contour. It consists of an angular member 9 which is rigidly secured at one end to the gusset 5, and at its other end to the frame member 1, a member 10 which is pivoted to the crawler frame as indicated at 11 adjacent the connection of the member 9 with the member 1, and a member 12 which is pivoted at one end as indicated at 13 to gusset 5^a secured to the member 9 and pivoted at its other end to the member 10, as indicated at 14. This produces a normally rigid bracing device for holding the boom at its work, as will later more fully appear.

The bracing device is adapted to be modified to render the same movable. One way of modifying the bracing device consists in providing one member with a breakable joint. In the present instance, the member 12 is provided with a breakable joint. It will be noted that this member 12 consists of a lower section 12^a and an upper section 12^b, provided with a plurality of apertures for adjustment purposes. A pivot 15 connects the section 12^a and section 12^b, which in turn is pivoted to the gusset 5^a by the aforementioned pivot 13. The sections 12^a and 12^b are of angular formation and a plate 16 is attached to the section 12^b and also pivoted upon the pivot 13, for a purpose that will later appear. In Figure 1 the bracing device is shown in its normal rigid position, while in Figure 3 it is shown in its modified condition. With reference to Figure 1, it will be noted that the horizontal flange 17, on the bracing member 12, maintains the sections in alignment.

A boom 18 is slidably connected to the aforedescribed bracing device. It might be here mentioned that the polygonal bracing device is duplicated upon the opposite side of the boom from that shown in Figs. 1 and 3. This duplication is shown in Figure 2. The boom 18 is box-like in cross-section and each side thereof is provided with a guideway 19, which extends from a point just above the foot sprocket to a point near the center of the boom and the upper ends of the guideways form abutments. A stud or slide 20 operates in each guideway and forms an abutment when coacting with the top of the guideway. Each stud 20 is carried by a short link 21 which is pivoted upon the pivot 14. The

forward end of each bracing member 10 is provided with spaced lobes 22, between which the respective studs 20 are located for limited movement upon their respective links.

The upper end of the boom 18 is pivotally connected between a pair of radius beams 23, which are pivotally connected to the aforementioned standards 2, only one of which is shown. A suitable sheave 24 on the boom has a hoisting cable 25 wound thereon. This cable passes around a sheave 25^a on the standard 2 and around a sheave 26 on the frame member 7. This hoisting cable constitutes the means for raising and lowering the boom which operates in a subtsantially vertically plane. While the cross or dumping conveyor and other parts are attached to the boom for movement therewith, they do not cooperate with this invention and will not be described. An endless digging chain 27 traverses the boom for vertical digging.

In Figure 1 the boom is shown in its lowered position, and it will be noted that the boom is supported between the two polygonal bracing devices by means of the cable 25 which is attached to the boom near the upper ends of the guideways, so that the boom is suspended between the two bracing devices, which counteract the operating thrust. The three pivot points 11, 13 and 14 of each bracing device, in effect, constitute apices of a triangle, consequently a rigid structure results.

Now when the boom is elevated until the studs 20 engage the bottoms of their respective guideways, the boom is still part way in the ditch. In other words, it is only partially elevated. In order to completely elevate the boom, it is necessary to disrupt the two polygonal bracing devices. For this purpose, a cable 28 is connected to each plate 16 on the section 12^b of the bracing members 12, and the other end of each cable is connected to a staple 29 on the adjacent radius beam 23, consequently, when the radius beams 23 are elevated, a pull will be exerted upon each cable 28, with the result that the bracing members 12 will be automatically broken, as shown in Figure 3. Thereafter, the boom may be completely elevated and the bracing devices, through the engagement of the studs 20 with the bottoms of the guideways, will also be elevated, as shown in Figure 3. If desirable, the bracing devices 12 may be connected by a transverse member 30 to further strengthen the structure and to cause the two connected parts to move as a unit.

It will be appreciated that according to this invention, the bracing devices may be located as low as possible on the crawler frame, in order to increase their effectiveness. Normally they are rigid against movement in either an upward or downward direction. However, when the boom is elevated, the bracing devices are automatically disrupted for movement with the boom.

I am aware that many changes may be made, and numerous details of construction may be varied through a wide range without departing from the principles of this invention, and I, therefore, do not purpose limiting the patent granted hereon, otherwise than necessitated by the prior art.

I claim as my invention:

1. In a ditching machine, embodying a frame, a movable boom, a connection between said frame and boom, said connection and boom having relative sliding movement, and means actuated by the movement of said boom for modifying said connection for partaking of the movements of the boom.

2. In a ditching machine, embodying a frame, a movable boom, a connection between said frame and boom, said connection being normally immovable with respect to the frame, and means operated by the elevation of said boom for modifying said connection for causing the same to move relative to the frame.

3. In a ditching machine, embodying a frame, a boom, a polygonal connection between said frame and boom, said boom slidably engaging said connection, and a device responsive to the elevation of said boom for modifying said polygonal connection for the purpose set forth.

4. In a ditching machine, embodying a frame, a boom, a connection extending from said frame and having slidable engagement with said boom, said boom having an abutment adapted for co-action with said connection after said boom has been elevated a predetermined distance, and means responsive to the elevation of said boom for modifying said connection for movement relative to said frame, for causing said abutment to elevate said connection.

5. In a ditching machine, embodying a frame, a movable boom, a polygonal bracing device extending from said frame and having slidable engagement with said boom, said boom and bracing device having abutments adapted to be brought into co-acting relation thru elevation of said boom, and a connection between said bracing device and boom for modifying said bracing device, whereby said co-acting abutments will cause said bracing device and boom to move together.

6. In a ditching machine, embodying a frame, a connection extending from said frame, a boom having a limited slidable engagement with said connection, said limited slidable engagement being insufficient for complete elevation of the boom, and means responsive to the elevation of the boom for modifying said connection for allowing complete elevation of said boom.

7. In a ditching machine, embodying a

frame, a polygonal bracing device extending from said frame, a boom having a limited slidable engagement with said bracing device, said slidable engagement being insufficient for complete elevation of the boom, and a connection between said boom and bracing device for modifying said bracing device for allowing complete elevation of the boom.

8. In a ditching machine, embodying a frame, a polygonal bracing device extending from said frame, and having a stud, a boom having a guideway with a bottom for slidably engaging said stud, a connection between said boom and bracing device for modifying said bracing device upon the elevation of the boom prior to the engagement of said stud with the bottom of the guideway.

9. In a ditching machine, embodying a frame, a pair of bracing devices extending from said frame, a boom extending between said bracing devices and having limited slidable engagement therewith, said slidable engagement being insufficient for complete elevation of the boom, and a connection between said bracing devices and boom operable by an elevation of said boom for modifying said bracing devices for allowing complete elevation of said boom.

10. In a ditching machine, embodying a frame, a pair of parallel and polygonal bracing devices extending from said frame, a boom extending between said bracing devices and having slidable engagement therewith, and connections between said boom and bracing devices for modifying said bracing devices upon the elevation of said boom.

11. In a ditching machine, embodying a frame, a pair of polygonal bracing devices extending from said frame and having studs, a boom having guideways with bottoms extending between said devices, with said studs engaging said guideways, and connections between said boom and bracing devices for modifying said bracing device upon the elevation of said boom and prior to the engagement of said studs with the bottom of said guideways.

12. In a ditching machine, embodying a frame, a normally rigid bracing device extending from said frame, a boom having sliding engagement with said bracing device, said sliding engagement being insufficient for complete elevation of the boom, and means for modifying said bracing device for allowing complete elevation of the boom.

13. In a ditching machine, embodying a frame, a normally rigid bracing device extending from said frame, a boom having a limited slidable engagement with said bracing device, said slidable engagement being insufficient for complete elevation of the boom, and means for rendering said bracing device flexible for complete elevation of the boom.

14. In a ditching machine, embodying a frame, a normally rigid polygonal bracing device extending from said frame, a boom having a slidable engagement with said device, said slidable engagement being insufficient for complete elevation of the boom, one member of said polygonal bracing device having a breakable joint for rendering said device movable for complete elevation of the boom.

15. In a ditching machine, embodying a frame, a normally rigid polygonal bracing device extending from said frame, a boom having a limited sliding movement with respect to said bracing device, said polygonal bracing device having a member with a breakable joint, and said boom and bracing device having co-acting parts at the limits of said sliding engagement whereby said device will partake of the movements of said boom during a predetermined period.

16. In a ditching machine, embodying a frame, a triangular bracing device extending from said frame, a boom having slidable engagement with said device, said boom and device having co-acting abutments adapted for co-action upon the elevation of the boom, said triangular bracing device including a member with a breakable joint whereby said device may be rendered movable for movement with said boom.

17. In a ditching machine, embodying a frame, a bracing device including a member with a breakable joint secured to said frame, a boom having a guideway in sliding engagement with said bracing device, said bracing device abutting one end of said guideway upon partial elevation of said boom, and means for breaking said joint for allowing complete elevation of said boom, said bracing device moving with said boom during the final elevation thereof.

In testimony whereof I have hereunto subscribed my name.

HARRY H. BARBER.