Aug. 24, 1943. O. R. ROWE 2,327,461

TRAILER DERRICK

Filed Feb. 10, 1942 2 Sheets-Sheet 1

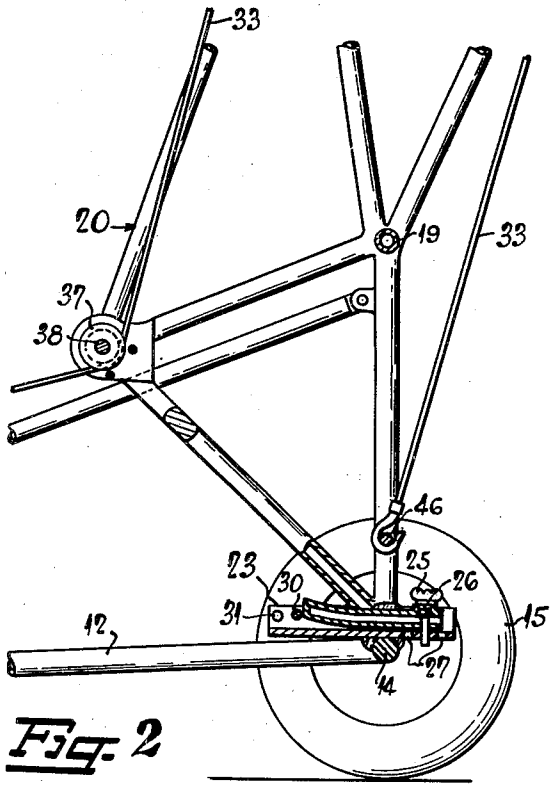

Fig. 2

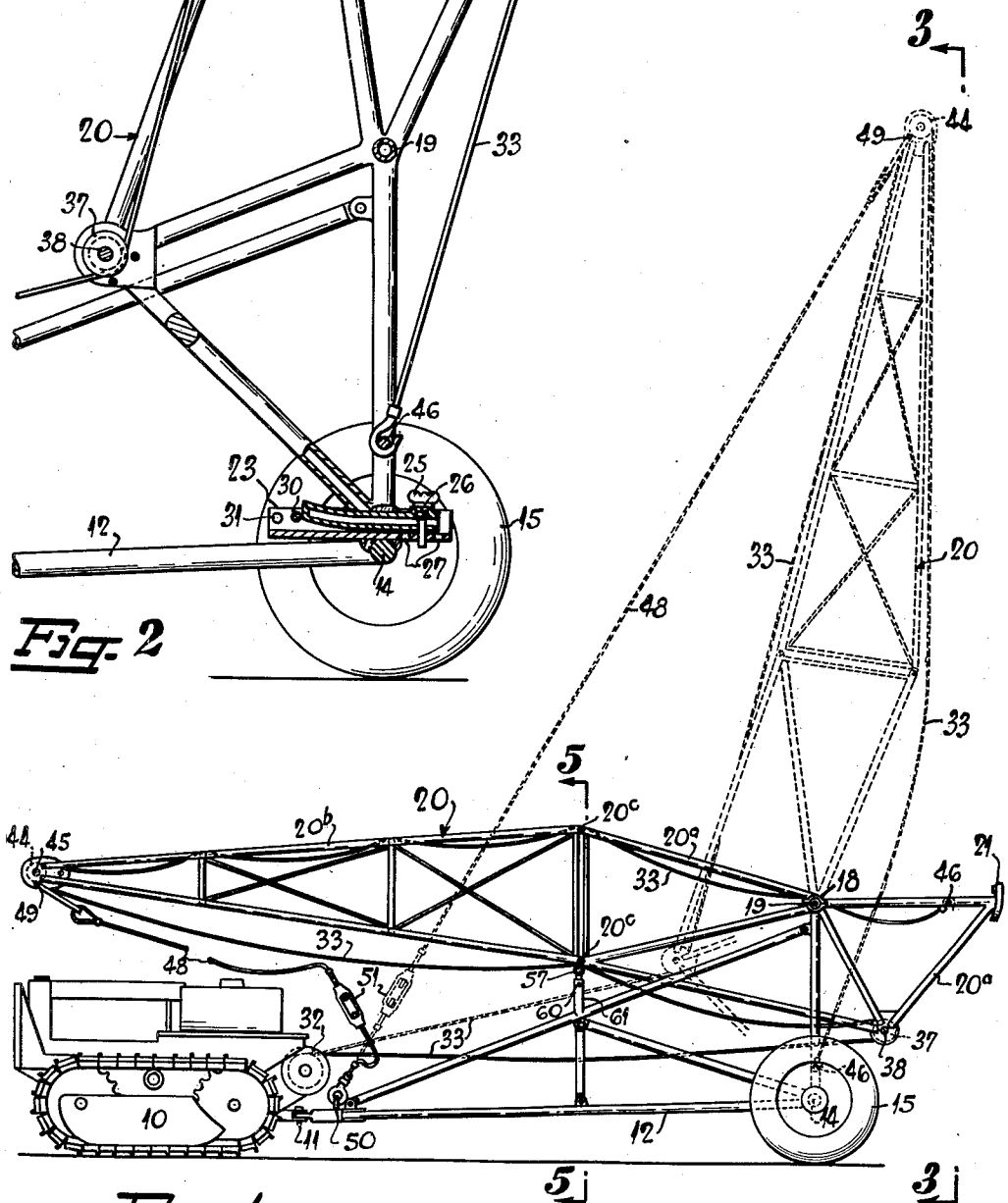

Fig. 1

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Filed Feb. 10, 1942 2 Sheets-Sheet 2

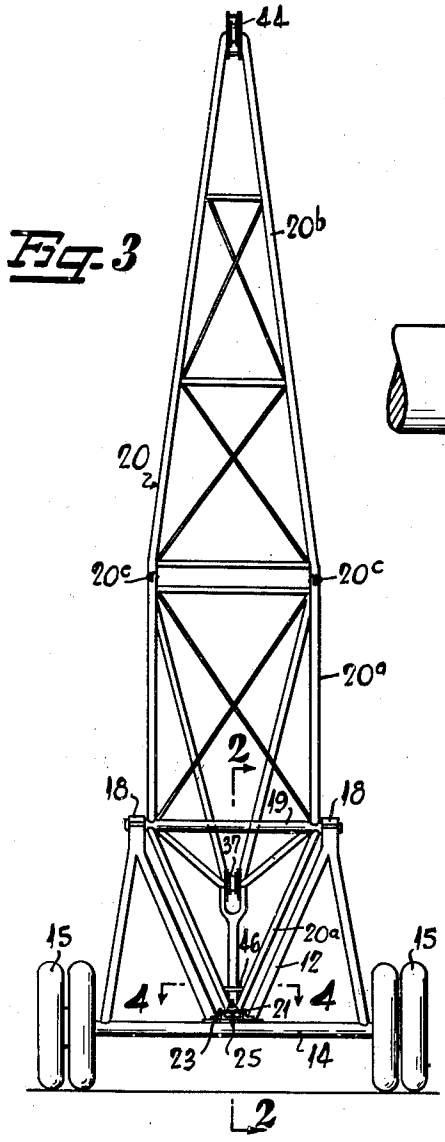

Fig. 3

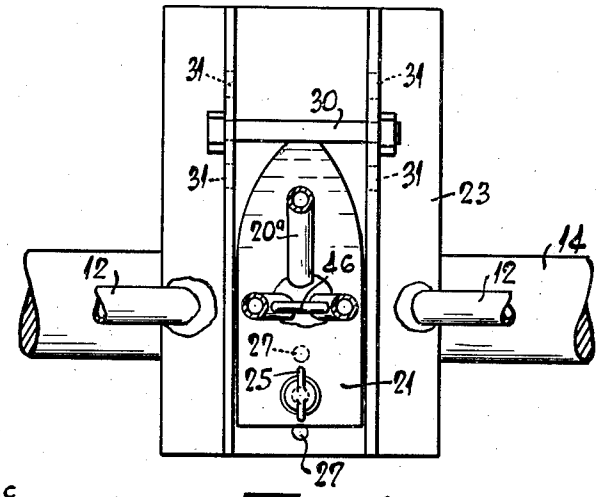

Fig. 4

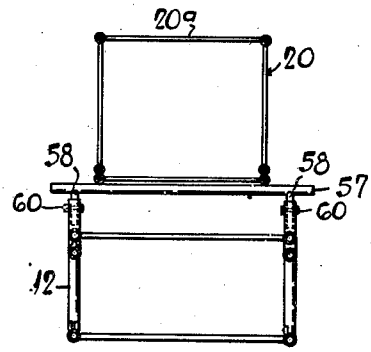

Fig. 5

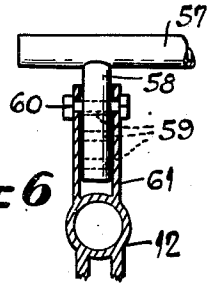

Fig. 6

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TRAILER DERRICK

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Application February 10, 1942, Serial No. 430,187

3 Claims. (Cl. 254—139.1)

This invention relates to a hoisting apparatus and more particularly to a combination of a tractor and a trailer assembly having a readily erectible boom or mast.

In certain types of construction work such as the erection of telephone and power line poles and the like, it is necessary to employ a high vertically disposed boom in order to have the proper control over the pole during erection. It is also desirable that the boom or mast be capable of occupying a substantially horizontal position while being transported from one location to another so as to reduce the likelihood of overturning. When in this lowered horizontal position, the overall length of the hoisting assembly should be as small as possible in order to aid in maneuverability; therefore, the boom or mast should overlap the tractor and trailer structure.

Heretofore, much difficulty has been encountered in erecting and lowering the boom or mast of certain types of hoisting apparatus. In many instances a double drum winch together with suitable cables are employed, one drum and its associated cable being employed to raise the boom and the other drum and its associated cable being employed to lower the boom.

It is an object of this invention to provide a hoisting assembly of the class described employing a boom, in which a single drum winch and cable may be employed for raising and lowering the boom.

It is another object of this invention to provide in a hoisting apparatus, the combination of a tractor having a single drum winch and a trailer having a pivoted boom together with a connecting cable between the boom and the winch, whereby the boom may be lowered to an overlapping position relative to the tractor and trailer and thereby cause the assembly to occupy a short overall dimension during transportation.

It is another object of this invention to provide a hoisting apparatus of the class described having a boom in which the boom may be releasably locked in a plurality of erected positions, and also be supported in a plurality of lowered positions during transit.

Some of the objects of the invention having been stated, other objects will appear as the description proceeds when taken in connection with the accompanying drawings, in which

Figure 1 is a side elevation of my improved hoisting apparatus, showing the boom or mast in a lowered bold line position, and also showing the boom or mast in an erected dotted line position;

Figure 2 is a longitudinal sectional view through the lower right hand portion of Figure 1 showing the lower portion of the mast in an erected position;

Figure 3 is a view looking at the right-hand end of Figure 1 and taken along the line 3—3;

Figure 4 is a sectional plan view taken along the line 4—4 in Figure 3, illustrating the means for latching the boom or mast in a plurality of erected positions;

Figure 5 is a transverse sectional view taken along the line 5—5 in Figure 1, showing the means for supporting the free end of the boom or mast in a plurality of lowered positions;

Figure 6 is an enlarged sectional detail view similar to the left-hand portion of Figure 5 and illustrating the adjustable feature for holding the free end of the boom or mast in a plurality of lowered positions.

Referring more particularly to the drawings, the numeral 10 denotes a tractor of the caterpillar type. This tractor has pivotally secured thereto as at 11, a chassis framework 12, said framework having an axle member 14 upon which wheels 15 are mounted. The rear portion of chassis 12 extends upwardly a substantial distance from the axle 14. At the uppermost point of the chassis 12 and directly above the axle 14 bearings 18 are located in which are rotatably mounted a shaft 19 and upon this shaft the intermediate portion of a mast or boom 20 is secured. One end of the boom 20 when erected extends downwardly (Figures 2 and 3) and has a suitable shoe 21 integral with the lower end thereof.

Figures 2 and 4 illustrate the detailed structure of this shoe. When the mast is in an upright position, the shoe 21 is adapted to fit in a suitable socket or trough-like member 23, which in turn is secured to the axle member 14 by any suitable means such as welding or the like. In order to hold the shoe 21 in a fixed position within the socket member 23, a suitable pin 25 is employed, said pin 25 being threadably mounted as at 26 in the shoe 21 and having the lower end thereof projecting through the lower portion of the shoe (Figure 2) and penetrating one of a plurality of spaced holes 27 in the bottom of socket member 23. The pin 25 serves to secure one end of the shoe to the socket member.

In order to provide an additional securing means for the shoe within the socket, a suit-

able horizontally disposed pin 30 is adapted to penetrate a set of horizontal holes 31 in the sidewalls of socket member 23. When the pin is in an installed position as shown in Figure 4, the pin is adapted to serve as a stop for the opposite end of shoe 21 from the end penetrated by the pin 25. It will be noted that there are three spaced sets of holes 31 near one end of the socket member to correspond to the three spaced holes 27 near the other end. Of course, when the pin 25 is disposed in the left-hand hole 27 (Figure 2) the pin 30 will be disposed in the left-hand holes 31. The position of the shoe 21 within the socket member 23 determines the tilt of the upper end of mast 20.

It will be noted by referring to the drawings, that the mast 20 comprises two sections, namely, 20*a*, and 20*b*. The section 20*a* is secured to horizontal pivot shaft 19 and section 20*b* is secured to the upper free end of section 20*a* and extends uppermost when the mast is in erected position. The two sections 20*a* and 20*b* are removably secured to each other by any suitable means such as bolts or the like as at 20*c*.

One of the most important features of the present invention is the provision of a single drum winch for the purpose of raising and lowering the mast or boom. A suitable single drum winch 32 is secured to the tractor 10 and operated thereby in a conventional manner (Figure 1). From this winch a cable 33 extends substantially in a horizontal direction to a sheave 37, said sheave being rotatably mounted as at 38 in the lower portion of the mast section 20*a*. It is desirable that sheave 37 be located at a point lower than the pivot shaft 19 at all times so that the desired leverage may be obtained when tension is applied to the cable 33 to cause the boom to be rotated to erected position. From the sheave 37 the cable 33 passes over a second sheave 44 and this second sheave is rotatably mounted as at 45 in the extreme outer end of the mast section 20*b*. After passing over the sheave 44 the cable is removably anchored to the mast at point 46 near the lower end thereof. To erect the mast when the parts are in bold line position (Figure 1), the winch 30 is caused to rotate in a counterclockwise manner thereby increasing tension upon the cable 33. Since this cable is anchored to the mast, there will be a rotation of the mast with the pivot shaft 19 as a center to cause the same to be moved from bold line position to erected position in Figure 1. When the mast 20 has been raised to dotted line position so that the toe of shoe 21 engages top pin 30 the locking pin 25 is inserted to secure the mast in fixed position.

It is desirable to have a suitable guy cable such as indicated by the reference character 48 for supporting the upper end of the erected mast. This guy cable has one end thereof secured to the outermost end of the mast 20 as at 49 whereas the other end of the cable is attached as at 50 to the chassis structure 12. In order to provide means for taking up excess slack in the cable and for adjusting the length of same to correspond to the different positions of pins 25 and 30, a suitable turnbuckle 51 is provided. After the mast has been erected to dotted line position (Figure 1) and after the pin 25 is placed, the end of cable 33 may be released from point 46 because the mast will be self-supporting. The released end of the cable 33 is then available for attaching to telephone poles or other loads to be lifted.

When it is desired to lower the boom from dotted line position to bold line position (Figure 1), as will be the case during transportation of the derrick, it is necessary for the cable 33 to be anchored as at 46. Then the operator grasps the cable 48 and exerts a slight pull to the left so as to facilitate the removal of pin 25, after which the single drum winch 32 is placed in operation to gradually release the cable 33. At the same time the operator who has the cable will pull the free end of the mast to the left until is passes to the left of the pivot shaft 19, after which the weight of the mast will normally cause the same to rotate in a counterclockwise manner. The winch 32 will therefore gradually release the cable and slowly lower the mast to the bold line position as shown in Figure 1 where it will be transported to another location.

Means are provided for limiting the lowermost position of the free end of the mast during transportation. This supporting means is clearly shown in Figures 1, 5, and 6. It is here seen that a substantially horizontal bar 57 is provided, said bar having downwardly extending legs 58 integral therewith. Suitable spaced holes 59 are provided in the downstanding legs 58 and these holes are adapted to be penetrated by suitable bolts 60 which also penetrate upstanding pipe members 61 of the chassis 12. The set of holes 59 penetrated by the bolts 60 will determine the elevation of horizontal bars 57, and consequently the lowermost position that the mast may occupy.

Not only will a combination of this type enable the mast or boom to be raised and lowered with a single drum winch and with a single cable but the method of lowering the mast in overlapping relation to the chassis and the tractor reduces the overall length of the hoisting assembly to a minimum for transportation. The hoisting assembly remains intact during transportation, as well as during operation. The only changes necessary for operation of the assembly after the same has been transported is the erection of the boom and this can be quickly accomplished since the winch remains operatively connected to the boom at all times through cable 33.

Also, particular attention is called to the manner of attaching the trailer 12 to the tractor 10. By observing Figure 1, it is seen that the point of attachment 11 is disposed below the winch 32. When the winch is turned so as to apply tension to cable 33 a compressive stress is exerted in the lower chord of the trailer frame 12, thereby producing a stress couple which will tend to bodily rotate the tractor in a clockwise manner. In other words, the trailing end of the tractor will be moved more firmly into engagement with the ground, thus enabling a smaller tractor to be used than would be the case if pivot point 11 were disposed at the same level or above the winch. The present connection also offsets some of the tension in cable 48, produced by lifting a load.

In the drawings and specification, there has been set forth a preferred embodiment of the invention, and although specific terms are employed, they are used in a generic and descriptive sense only and not for purposes of limitation, the scope of the invention being defined in the claims.

I claim:

1. In combination, a tractor having a winch, a trailer chassis detachably secured to said tractor, a boom pivotally mounted intermediate its ends to said chassis, a sheave on said boom and

located on one side of said pivot, a second sheave on said boom and located on the other side of said pivot, a cable extending from said winch and passing over said sheaves, means for anchoring said cable to said boom whereby the boom can be rotated about its pivot upon the actuation of said winch, a horizontal bar carried by said chassis and being located between said boom pivot and said tractor, said bar being adapted to support the free end of said boom when the same is in lowered position, means for adjusting the vertical position of said horizontal bar, a shoe rigidly secured on the lower or rear end of the boom, and a socket on said trailer chassis into which the shoe is adapted to fit when the boom is in raised position.

2. In combination, a tractor having a winch, a trailer chassis detachably secured to said tractor, said chassis having an axle, wheels on said axle, a boom pivotally secured intermediate its ends to said chassis at a point above said axle, a shoe rigidly secured on one end of said boom, a socket member on said axle for receiving said shoe when the boom is in upright position, means for releasably locking said shoe in said socket member, a sheave on said boom and being located on one side of said pivot, a second sheave on said boom and being located on the other side of said pivot, a cable extending from said winch and passing over the first sheave and then over the second sheave and having its end remote from the winch anchored to said boom whereby the boom can be rotated about its pivot upon the actuation of said winch, a horizontal bar carried by said chassis and being located between said boom pivot and said tractor, said bar being adapted to support the free end of said boom when the same is in lowered position, and means for adjusting the vertical position of said horizontal bar.

3. In combination, a tractor having a winch, a trailer chassis having one end thereof detachably secured to said tractor below said winch, said chassis having an axle, wheels on said axle, a boom pivotally secured intermediate its ends to said chassis at a point above said axle, a shoe on one end of said boom, a trough-like member on said axle for receiving said shoe when the boom is disposed in substantially vertical position, a pin removably penetrating said shoe and said trough-like member for releasably locking said shoe in the trough-like member, a sheave on said boom, said sheave being adapted to bodily rotate through an arc lying entirely below said boom pivot as the boom is raised and lowered, a second sheave on said boom and being located above said boom pivot when the boom is in an erected position, a cable extending from said winch and first passing over said first sheave and then over said second sheave, means for anchoring said cable to said boom whereby the boom can be rotated about its pivot upon the actuation of said winch, a horizontal bar carried by said chassis and being located between said boom pivot and said tractor, said bar being adapted to support the free end of said boom when the same is in lowered position, and means for adjusting the vertical position of said horizontal bar.

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