J. M. HILL.

PORTABLE GENERAL UTILITY DERRICK.

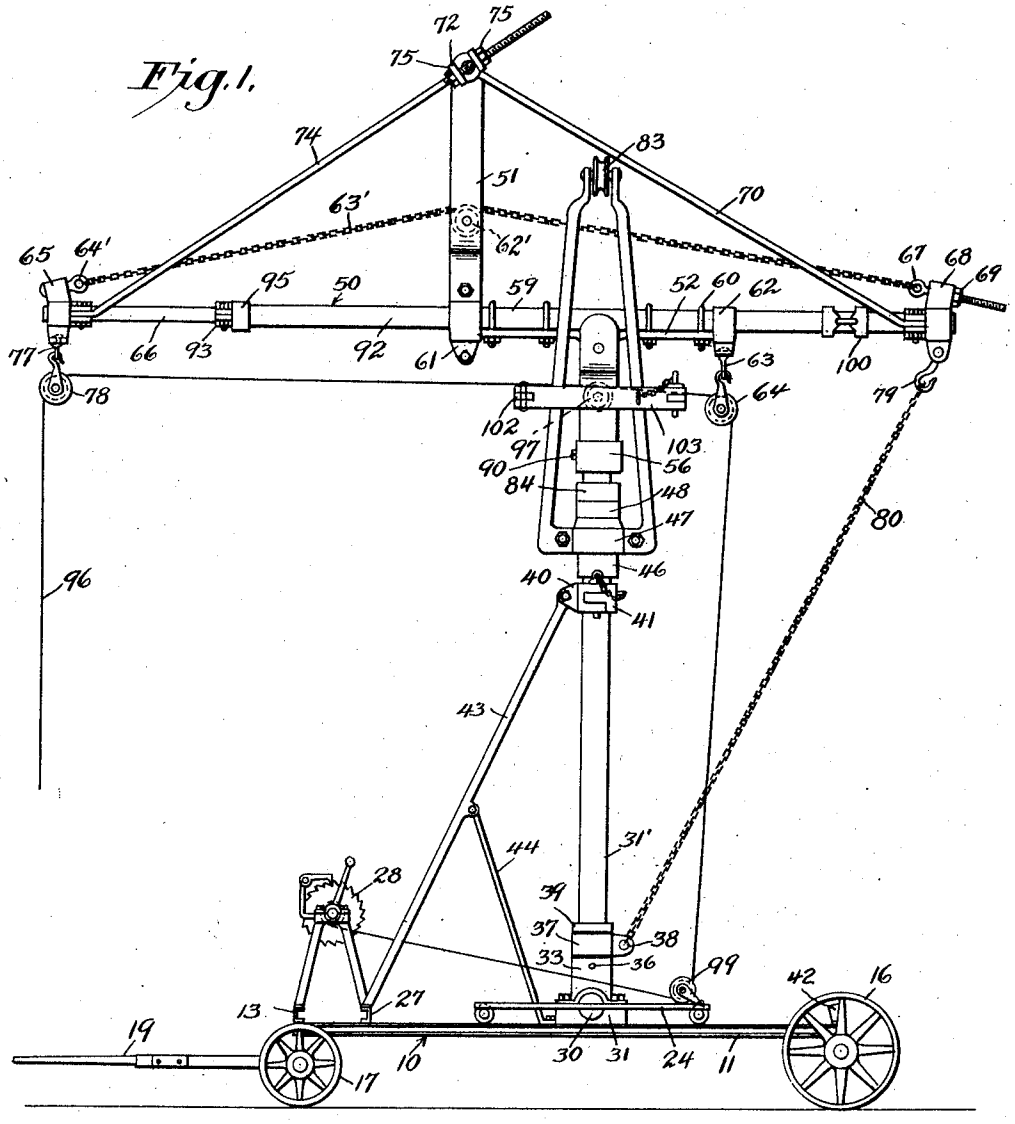
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1,345,008.

Patented June 29, 1920.

3 SHEETS—SHEET 1.

Fig. 1.



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3 SHEETS—SHEET 2.

Fig. 2.

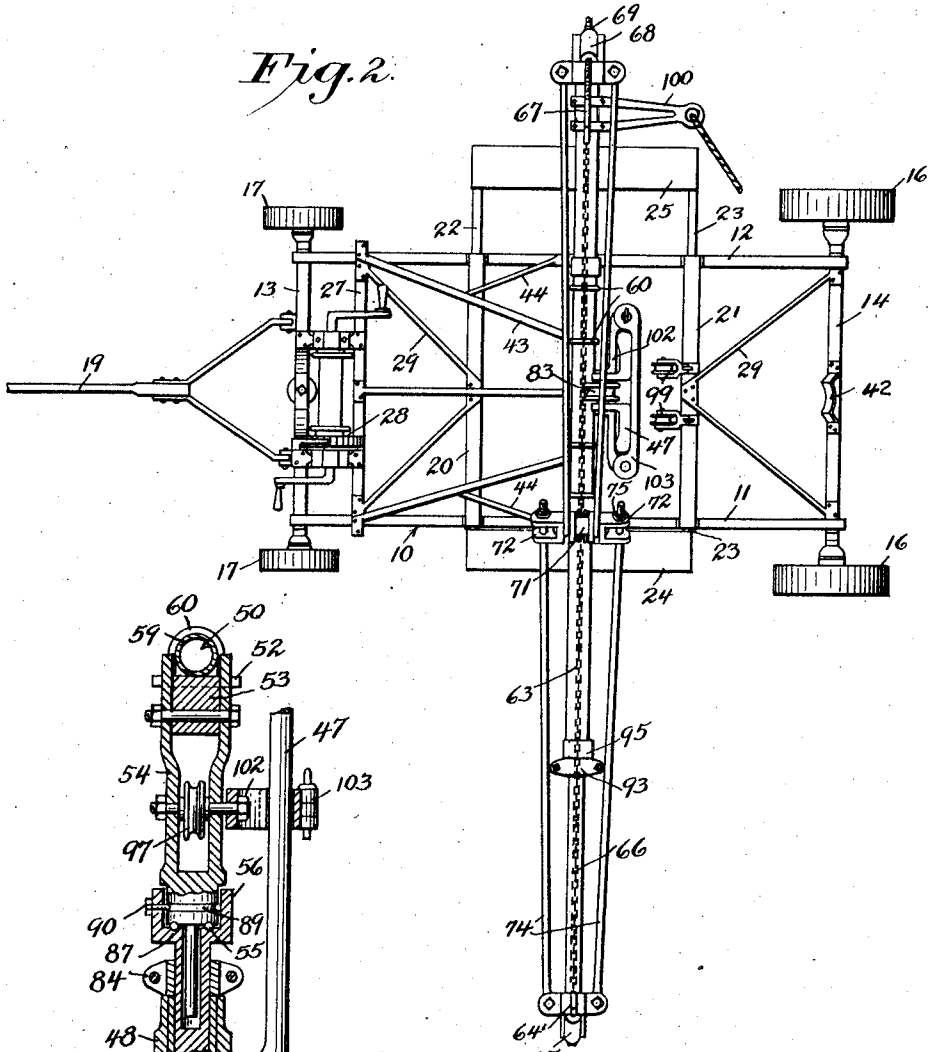


Fig. 4.

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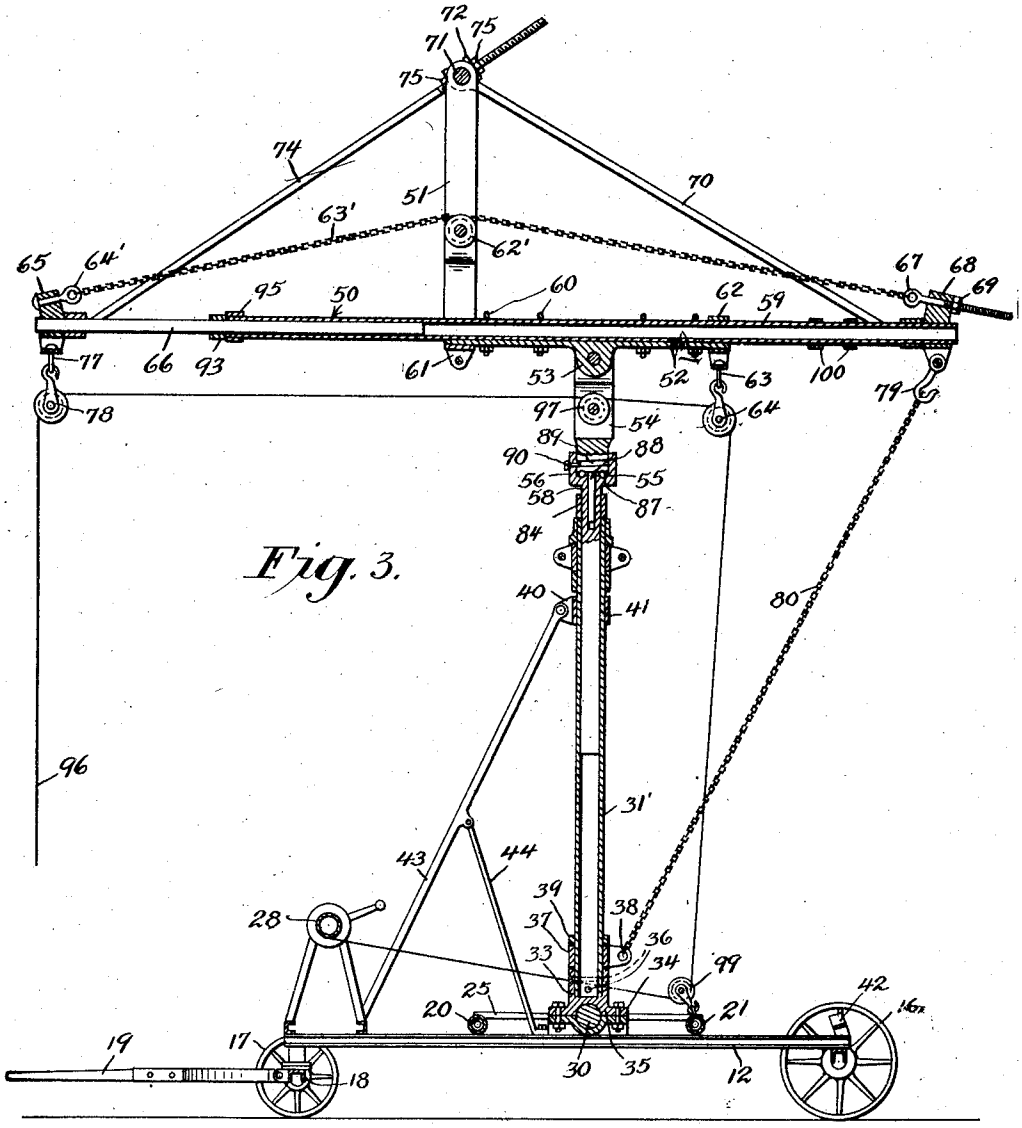


Fig. 3.

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UNITED STATES PATENT OFFICE.

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PORTABLE GENERAL-UTILITY DERRICK.

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To all whom it may concern:

Be it known that I, JOSEPH M. HILL, a citizen of the United States, residing at Twin Falls, in the county of Twin Falls and State of Idaho, have invented certain new and useful Improvements in Portable General-Utility Derricks; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings forming part of this specification.

This invention relates to a portable general utility derrick, and while described in this specification particularly as a farm implement, it should nevertheless be borne in mind that its field of usefulness is not limited in any way to such use, but that the device may be altered for a great variety of work without departing from the fundamental principles of the invention.

The object of the invention is to provide a portable crane or derrick which will have a great range of usefulness. In the present structure the mast is made adjustable in length as is the boom, which is believed to be novel in the art. A further object of the invention is to improve various details of derrick construction.

In the drawings:

Figure 1 is a side elevation of one form of my device.

Fig. 2 is a plan view thereof, but showing the boom at right angles to the position shown in Fig. 1, and showing the forward channel iron below the I-beams.

Fig. 3 is a vertical section taken through the center line of Fig. 2.

Fig. 4 is a fragmentary section on an enlarged scale of the upper portion of the mast.

The truck 10 which forms the base of my device is built in rectangular form and consists of a pair of longitudinal I-beams 11 and 12 connected at their front and rear ends by channel bars 13 and 14, the former being arranged above the I-beams and the latter below. The channel iron 14 rests upon the rear axle on which is mounted the ground wheels 16, while the pivoted front axle carrying the relatively smaller ground wheels 17 supports a channel bar 18 to which is secured in the usual manner a tongue 19 for transporting the device from place to place. The frame is also stiffened by a plurality of pipe sections 20 and 21 transversely arranged on and firmly secured to the I-beams 11 and 12. These pipe sections are hollow and slidably receive the neatly fitting solid rods 22 and 23 on the outer ends of which are located the platforms 24 and 25 which may be used for holding counterweights when the boom of the derrick is at right angles to the truck. When not in use the platforms are brought close against the side I-beam, in which position they do not extend beyond the outer line of the ground wheels, the rods being entirely telescoped in the sections 20 and 21, but when extended they may be pulled out nearly half the width of the truck, or in case only one platform is provided, which will be the usual equipment, the rods will extend entirely through the pipes and the amount of possible overhang is consequently doubled.

The transverse channel or angle section 13 together with the similar section 27 supports the hoisting mechanism 28 which in the present showing consists of an ordinary hand operated windlass, but it will be readily understood that the invention contemplates the use of any desired means for this purpose. The brace rods or stiffeners 29 are of the normal type and are secured to the central transverse members 20 and 21 at a mid point and then extend outwardly to the corners of the frame or in proximity thereto.

A cylindrical shaft 30 upon which all of the superstructure is supported is journaled in bearings 31 on each of the I-beams 11 and 12 so as to permit the free rotation of the shaft 30. The mast 31 is secured to the shaft 30 in any desired manner but preferably by fitting it into a socket member 33 having an extended foot 34 which with the cap piece or plate 35 forms an encircling member tightly gripping the hollow mast 31 to the axle or shaft 30. If desired, the socket 34 may be shrunk to the mast 31 or the latter may be secured thereto merely by means of a plurality of pins or bolts 36 passing through both of the members, since the mast rests in the bottom of the cavity of the socket member and there is practically no stress save the vertical thrust. A loosely mounted band 37 is fitted on the upper end of the socket member 33 and carries an eye 38 for a purpose to be described later, the loose band being held against upward movement by means of a collar shrunk on the mast just above the edge of the socket member or preferably by an integral lip or flange 39 on the socket member itself, as shown.

The mast 31 is held in vertical position between a U-shaped member 40 and its removable clamp or hasp 41, these two elements forming a detachable support for the mast, permitting it to be turned on its axle 30 into a nearly horizontal position at which time the mast rests in the saddle 42 on the rear channel iron 14. The member 40 is supported from the frame work by means of a plurality of sloping and converging brace rods 43 each stiffened by diagonal struts 44 joining the center of the brace rod to one of the side I-beams.

At a point just above the member 40 a band 46 is shrunk on the mast 31 to serve as a thrust bearing for the elevating frame or davit 47 which loosely embraces the mast and is freely rotated thereon, but is held against upward longitudinal movement by a shrunk collar 48 similar to the collar 46. The collar 48 is arranged flush with the top of the mast and serves as a ferrule to protect such end in addition to its duty of holding the davit 47 in proper position.

The superstructure consists of a truss built of a telescoping boom 50, a forked standard 51 and a plurality of rods or diagonals connecting the top of the standard with the ends of the boom for the usual purpose. The truss is strengthened and supported by a saddle member 52 pivoted by means of an integral lug 53 to a fork 54 rotatably mounted in ball bearings 55 in the head 56 of the post 58, the latter telescoping within the hollow mast 31.

The saddle member 52 is secured to the outer member 59 of the boom by means of a plurality of U-bolts 60 and also by means of the clamping action of the lower section 61 of the standard 51 and by a collar 62 shrunk on the end of the saddle and embracing the boom, this collar carrying at its lower end a swivel eye 63 adapted to receive a pulley block 64. The standard 51 as previously mentioned is of fork shape, the two sides of the fork being fitted to embrace the pipe and saddle and being carried parallel at their upper sections receiving between them a wheel 62 over which is led a flexible steel cable 63′ connected at the forward end by a swiveled eye bolt 64′ in the end clamp 65 on the inner pipe 66 of the boom, and connected at the rear end to a threaded eye bolt 67 adjustably mounted in the rear end clamp 68 and held in adjustable position thereon by means of the nut 69. At its upper end the rear diagonals or truss rods 70 are each secured to the standard 51 by means of a bolt 71 passing through the truss rod eyes, this bolt also serving to pivotally connect a plurality of swivel plates 72 pierced to slidably receive the free ends of the forward diagonal member 74, the latter being permanently connected to the free or load end of the inner pipe 66 and being locked in desired position on the swivels 72 by means of the lock nuts 75.

The front clamp 65 is provided with a swivel eye 77 to receive a pulley block 78, while the rear end boom clamp 68 has at its lower portion a heavy hook 79 intended to be connected by a chain 80 to the eye 38 of the loosely mounted band 37 on the upper end of the socket member receiving the hollow mast, this chain acting as a tension member when the derrick is lifting a load, it being noted that as the boom swings about the mast, the band 37 will also swing so as to keep the hook 79, the eye 38, and the chain 80 in a single vertical plane.

The davit 47 previously mentioned is freely rotatable on the mast 31 between the shrunken bands 46 and 48 and carries at its upper bend a pulley wheel 83 which is used in elevating and lowering the post 58 with respect to the mast 31, a collar 84 serving to act as a stop against downward movement of the post within the mast when the collar is bolted at the desired location on the post, such collar contacting with both the end of the mast and the upper reinforcing ferrule or collar 48.

The post 58 has an enlarged head 56 in the bottom of the socket of which is located a ball race 87 to receive the balls 55 which support the fork 54, the latter having a short pintle 88 extending a short distance into the post to guide the same. For general convenience and also to prevent accidental displacement of the parts, it is preferred to cut a relatively narrow groove 89 in the lower portion of the fork 84 and to provide the head 56 with one or more screws 90 seating slightly into this groove, so as to not prevent rotation, but to effectually prevent longitudinal movement of the parts. It is the intention, however, when the post is to be raised, to throw the chain or rope around the post just below the head 56 and then run the rope over the pulley 83, which it will be noted will not have any tendency to lift the fork 54 out of its bearing in the head 56.

In order to lengthen the boom, the nuts 75 are loosened and the cable 63′ is also loosened by movement of the nut 69. This permits the inner tube 66 to be moved into or out of the outer pipe 92 and when it has been pulled to the desired position the bolted clamp 93 is fastened securely to the pipe 66 tightly against the shrunken ferrule 95 protecting the outer end of the pipe 92. The nuts 75 on the truss rod 74 are then locked in place and the cable 63′ is made taut in the usual way. A hoisting cable 96 is led from the load (not shown) over the pulley 78 and also over the pulley wheel 97 between the legs of the fork 54 and is then turned by the pulley 64 on the farther side of the post

down to a block 99 secured by means of a short piece of chain and hook to any convenient part of the truck, the only requirement being that the location of this block 99 shall be such as to give a straight pull from the windlass 28 to the pulley 64 without interfering with the mast or braces. By having one of the pulleys on either side of the mast the load is well distributed and there is less tendency of the mast to tilt.

In turning the superstructure about the mast I find it convenient to bolt a bracket 100 to the rear end of the pipe 92 and to connect a cable or rope to the free end of such bracket, this enabling me to turn the entire truss about its vertical pivot by means of a pull practically parallel with the length of the boom.

In order to have the two legs of the davit 47 always parallel with the boom I preferably secure to the forked member 54 an extended arm 102 to which is hinged a retaining member 103 loosely fitting about the davit and constraining it to move with the boom, but not in any manner preventing the raising and lowering of the boom with respect to the mast to which the davit is secured.

What I claim is:

1. A portable derrick consisting of a wheeled truck, a mast pivoted to said truck, a boom pivotally mounted on said mast and readily detachable therefrom, and means for raising the boom out of contact with said mast.

2. In a portable collapsible derrick, a wheeled truck, an axle pivoted to the frame of said truck, a mast on said axle, means on said frame for receiving said mast when in collapsed position, means on said mast for holding said mast in vertical position, a boom rotatably mounted on said mast and detachable therefrom, and elevating means carried by said mast for raising said boom out of contact with said mast.

3. A portable derrick comprising a wheeled truck, a telescoping mast carried thereby, a boom pivoted to the inner section of said mast, and means carried by the outer section of said mast to aid in the raising and lowering of the boom and inner section.

4. In a derrick structure, a mast, a superstructure pivoted thereto comprising a truss frame formed of a telescoping boom, a standard carried by said boom, tie rods carried by said standard and the inner section of said boom, and a tension member connecting the free ends of said boom.

5. In a superstructure for a derrick, a truss consisting of a telescoping boom, a standard on said boom, a tie rod permanently connected to the upper section of said standard and the free end of the larger section of said boom, a tie rod connected to the free end of the inner section of said boom and adjustably mounted in the upper end of said standard, and means for maintaining said tie rod in adjusted position on said standard.

6. In a derrick, a mast, a boom pivoted thereto, a tension member connecting the free end of said boom with the lower portion of said mast, a standard on said boom, a plurality of tie rods connecting said standard and the ends of said boom, and an adjustable flexible tension member for connecting together the two ends of said boom.

7. In a portable derrick, a frame, wheels rotatably mounted on said frame, a hollow mast mounted on said frame to rotate about its connection with said frame, means for holding said mast in vertical position, a post slidable within said hollow mast, means for securing said post in desired adjusted position on said mast, a forked member pivotally mounted on said post, and a boom pivotally mounted in said forked member, whereby said boom may be pivoted about a horizontal axis and may be rotated about a vertical axis.

JOSEPH M. HILL.