

**April 27, 1965**

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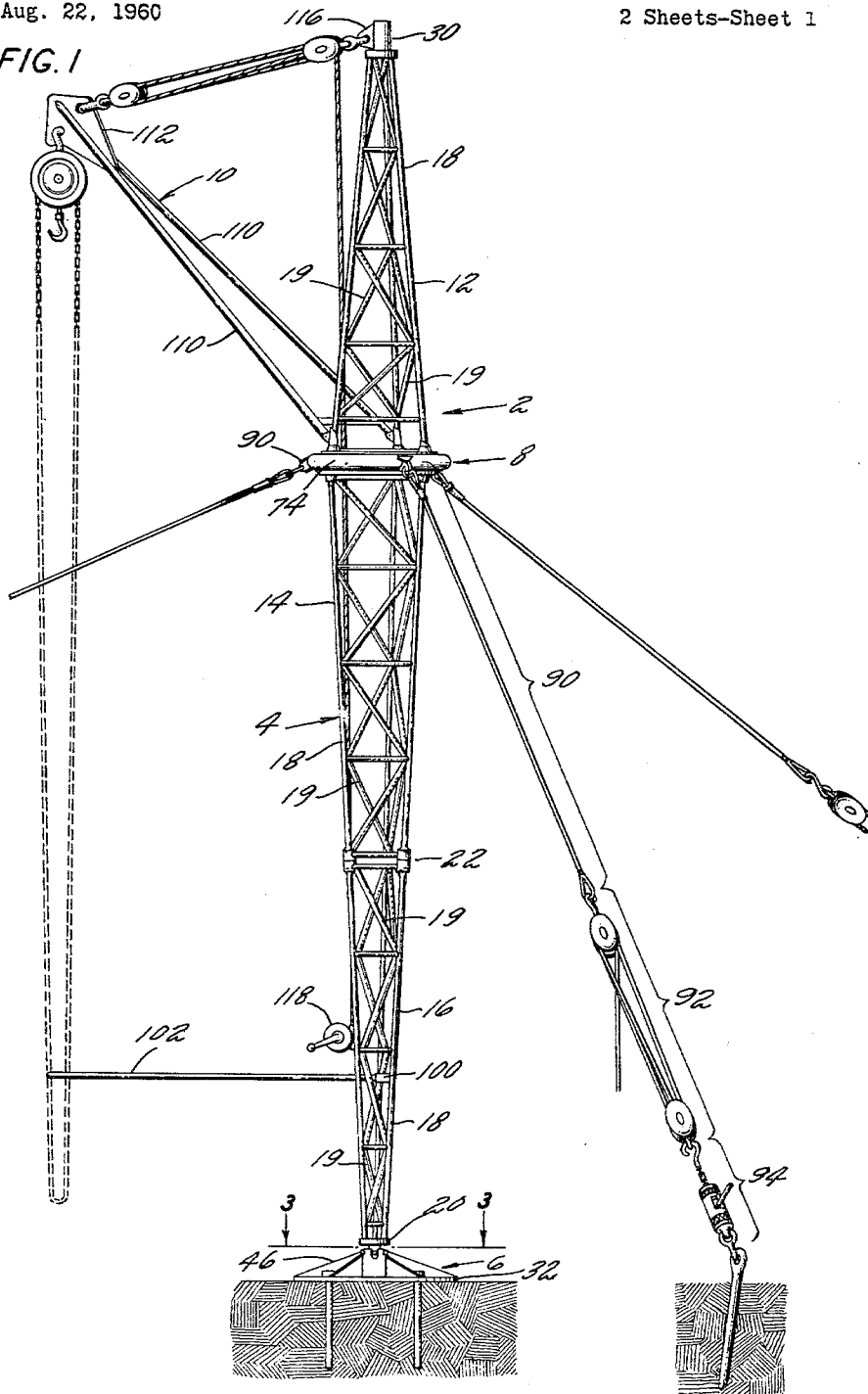
**3,180,496**

PORTABLE DERRICK

Filed Aug. 22, 1960

2 Sheets-Sheet 1

*FIG. 1*



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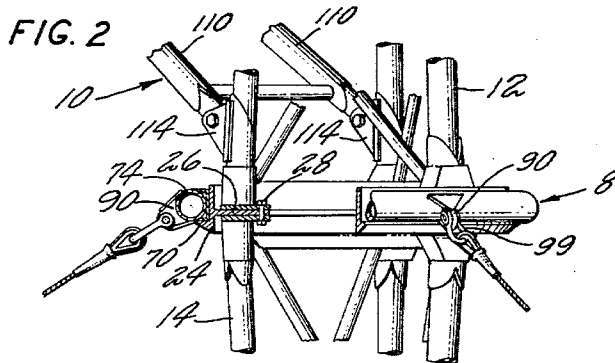


FIG. 3

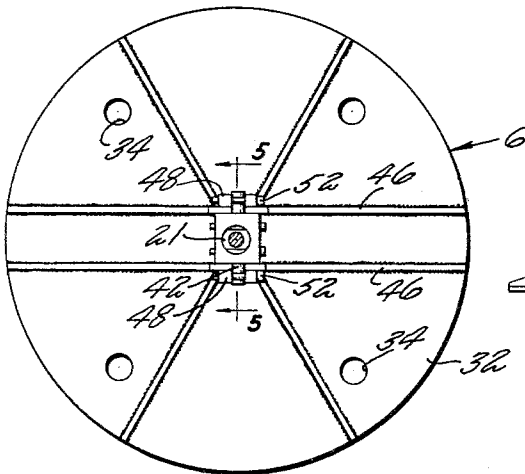


FIG. 4

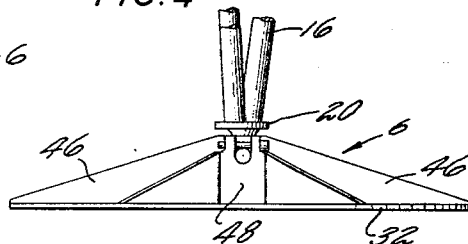


FIG. 5

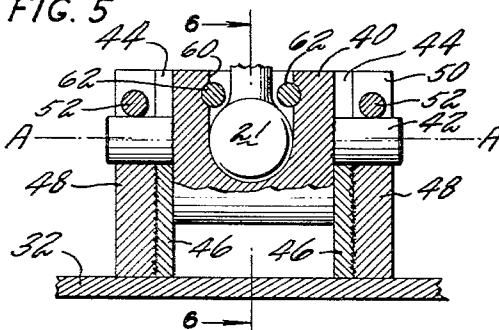
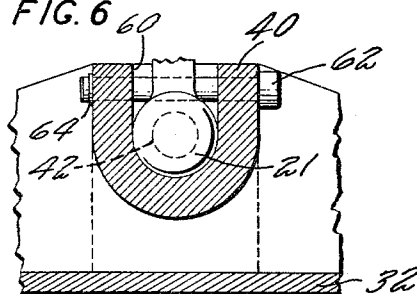


FIG. 6



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## PORTABLE DERRICK

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4 Claims. (Cl. 212—58)

This invention relates to a derrick and more particularly to a portable derrick capable of use in field operations.

An object of this invention is to provide a derrick capable of being set up in remote areas by a minimum number of personnel.

Another object of this invention is to provide a derrick having an upwardly extending center member or truss rotatable in a support bearing member located around the member.

A further object of this invention is to provide a derrick of lightweight construction.

Another object of this invention is to provide a derrick which can be set up easily in areas having an uneven terrain.

A further object of this invention is to provide a derrick having a base around which the derrick will rotate and also pivot downwardly toward the ground.

Another object of this invention is to provide a derrick capable of easy disassembly for transportability.

Other objects and advantages will be apparent from the specification and from accompanying figures which illustrate the invention.

FIG. 1 is a side elevational view of a portable derrick constructed in accordance with subject invention;

FIG. 2 is an enlarged sectional view of the support bearing member and associated portion of the main center structural member or truss;

FIG. 3 is an enlarged view taken along the line 3—3 of FIG. 1;

FIG. 4 is a side elevational view of FIG. 3;

FIG. 5 is an enlarged view taken along the line 5—5 of FIG. 3; and

FIG. 6 is a view taken along the line 6—6 of FIG. 3.

Referring to FIG. 1, the derrick 2 illustrated comprises four main parts. These four parts are represented by (1) a main center structural member or truss 4, (2) a base member 6 on which said structural member 4 is mounted, (3) support means 8 for said structural member 4, and (4) lifting means 10.

The structural member or truss 4 is made up of three sections, top section 12, intermediate section 14 and bottom section 16. Each of these sections has a triangular cross section and is fabricated from tubular members 18. Cross members 19 interconnect tubular members 18. The bottom section 16 tapers outwardly as it extends upwardly from its base member 20. A ball 21 extends downwardly from base member 20 for a purpose to be hereinafter described. The top of section 16 is connected to the bottom of section 14 by joint couplings 22. These joint couplings are merely enlarged portions on adjoining parts of sections 16 and 14 which are bolted together. It is to be understood that other type coupling means can be used. Intermediate section 14 also tapers outwardly as it extends upwardly from the top of section 16.

An annular member 24 is positioned around the top of intermediate section 14. A flange 26 extends inwardly from said annular member and engages the top of said intermediate section 14. This annular member 24 will be hereinafter described. Top section 12 has its lower end engaging the upper side of the flange 26. Bolts 28 extend through flanges on the top and intermediate sec-

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tions 12 and 14 and flange 26 to fixedly hold these elements together. Top section 12 tapers inwardly as it extends upwardly from flange 26. A cap member 30 is fixed to the top of section 12. Each of the sections 12, 14 and 16 are approximately the same in height. This is to permit the derrick to be stored in as small an area as possible when it is dismantled.

Base member 6 comprises a flat plate 32 with means fixed thereto for receiving ball 21 of the bottom section 16. Plate 32 has openings 34 therein which can be used to fix the plate in relation to its mounting surface. For example, if the derrick is to be mounted on the ground, stake members may be driven through the holes into the ground and if the derrick is to be mounted on a wooden floor, bolts or screws may be used to fixedly hold the plate member.

The means fixed to base member 6 for receiving ball 21 on the bottom section 16 comprises a socket member 40 having trunnions 42. These trunnions extend from opposite sides of socket member 40 and are positioned for rotation in grooves 44 in support members 46 which extend upwardly from plate 32. These members 46 are located across the upper face thereof in parallel relationship and are equally spaced from the center of the plate. Support and holding blocks 48 are fixed to the outer side of each of the support members 46 adjacent the grooves 44 and have grooves 50 which provide an extension of the grooves 44. Trunnions 42 are retained in position in grooves 44 and 50 by pins 52. One pin 52 extends through each support and holding block 48 across is cooperating groove 50 just above the cooperating trunnion 42. This permits socket member 40 to rotate about axis A—A, the trunnion axis.

Socket member 40 contains a socket 60 for receiving the ball 21. This ball 21 is retained in position in the socket 60 by retaining pins 62 which pass through the socket member 40 in a manner so as to intersect the socket 60 at a point above the ball 21 when it is positioned in the bottom of the socket. The pins 52 and 62 may be maintained in position by a lock ring 64 or by any other holding means. This construction maintains the lower end of the main center structural member or truss 4 fixed to base member 6 against lateral movement while permitting rotation of said main center structural member or truss 4 with respect to said base.

Annular member 24 is formed having a flange 70 extending outwardly from its lower end. The exposed outer surface of the annular member 24 and the exposed upper surface of the flange 70 are formed as bearing surfaces. A separate bearing member or means can be located on member 24 if necessary. Mating with these bearing surfaces is an annular support bearing member consisting of annular means 74 having two annular bearing surfaces which mate with the bearing surfaces respectively of the outer surface of annular member 24 and flange 70. As shown in FIG. 2, these surfaces are fixedly positioned on the interior circumference of an annular tube. The surfaces are on a member having a channel section.

The annular means 74 is fixed in position by means attached thereto and to a fixed surface. In FIG. 1 the derrick is shown extending from a position on the ground. Three connections are provided between the annular means 74 and the ground. Each connection extends between a bracket 90 on the annular means 74 and a stake in the ground and comprises a cable section 90 of fixed length, a section 92 changeable in length to provide for large variances in the length of the connection, and a section 94 to provide for making small changes in the length of the connection.

Each cable section 90 has its upper end connected to a

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U-shaped clasp 99 which is pivoted at its open end to its cooperating bracket 90. The lower end of each cable section 90 has an open loop thereon. The upper end of each section 92 has a hook which engages the open loop of its cooperating cable section. The lower end of each section 92 has a loop member extending therefrom. The upper end of each section 94 has a hook which engages the loop of its cooperating section 92. The lower end of each section 94 has a hook which engages a stake set in the ground. Each section 92 can be a block and tackle with means for fixing the length thereof and each section 94 can be a unit designed for providing small increments of movement in changing its length. While each connection is shown as a composite unit having a section of cable in its length, each connection could be rigid and adjustable in length such as by having a telescoping action. It can now be seen that the main center structural member or truss 4 is mounted for rotation in its base 6 and support means 8. A receptacle 100 is fixed to the bottom section 16 of said truss 4 and is adapted to receive one end of a pivoting bar 102 which can be used to obtain leverage in turning the upstanding main center structural member or truss 4.

A lifting means 10 is provided which comprises an arm means pivotally mounted to the lower end of the top section 12. The arm means 10 has two tubular members 110 connected at their outer end by a bracket plate 112 and pivoted at their other ends to brackets 114 on tubular members 18 of the top section 12. The upper portion of bracket plate 112 is connected to the top bracket 116 on the top cap member 30 of the top section 12 by a block and tackle arrangement. The rope from this block and tackle extends downwardly to a winch 118 on the bottom section 16 of the truss 4. While this winch is shown being hand operated, it may be electrically or hydraulically driven. A chain hoist arrangement extends downwardly from the lower portion of bracket plate 112 so that that some lifts may be made by an operator controlling this chain hoist alone.

### Operation

When the main structural member or truss has been assembled, along with the annular means 74 and the lifting means 10, the ball 21 can be placed in the socket member 40 of the base member. This is done with the truss member 4 resting on the ground. This means that the socket member 40 is rotated about its axis A—A so that the ball 21 can engage the socket 60. When this has been done, the pins 62 are placed in position to maintain the ball within socket 60. With the base plate 6 located in the position determined to be the best for setting up the derrick, the truss 4 is lifted into position by use of the three connections provided between annular means 74 and the ground.

For example using FIG. 1, in this figure the derrick can pivot angularly either to the left or to the right about the axis A—A of socket member 40, if the derrick extends towards the right then the connection extending to the left is lengthened until it can extend between its bracket 90 and its ground stake. The other two connections are placed between their cooperating brackets 90 and their respective ground stakes. These are allowed to have a little slack. Then the long connection is shortened by shortening section 92, while this section 92 is being shortened both other sections are lengthened to permit the derrick to rise into place. To enable accurate vertical alignment of the derrick two levels can be permanently attached to the structure. It is to be understood that any alignment means can be used.

To rotate the main center structural member or truss 4 about its vertical axis the operator need merely move the free end of the pivoting bar 102. It is to be under-

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stood that a plurality of sockets 100 can be provided to permit varying positions of the pivot bar 102. Further, this would permit the use of a plurality of bars if necessary.

It is to be understood that the invention is not limited to the specific description above or to the specific figures, but may be used in other ways without departure from its spirit as defined by the following claims.

I claim:

1. A portable derrick comprising, in combination, a plurality of groups of member rigidly joined by cross braces, said groups being alined and releasably secured to one another to define a tower, the bottom group of members being supported on a base plate, a support member fixed transversely of said tower between two of said groups of members, the tower tapering inwardly as it extends from the support member to said base plate, the tower tapering inwardly as it extends from the support member to the top of said tower, said support member defining a cylindrical surface surrounding the tower and an annular surface extending outwardly from the lower portion of said cylindrical surface, bearing material secured to both said cylindrical surface and said annular surface, a swivel ring surrounding said member and having surfaces in abutting engagement with said bearing material so that the member is smoothly rotatable within said ring, and guy wires coupled to said ring for supporting said tower in an erect position extending upwardly from said base plate.

2. A portable derrick comprising, in combination, a plurality of groups of members rigidly joined by cross braces, said groups being aligned and releasably secured to one another to define a tower, the bottom group of members being supported on a base plate, a trunnion block rockably supported on said plate, said block having an upwardly opening semispherical socket, said bottom group of members having a pivot pin with a lower ball portion seated within said socket, said pin rotatably supporting said tower, a support member fixed transversely of said tower between two of said groups of members, the tower tapering inwardly as it extends from the support member to said base plate, the tower tapering inwardly as it extends from the support member to the top of said tower, said support member defining a cylindrical surface surrounding the tower and an annular surface extending outwardly from the lower portion of said cylindrical surface, bearing material secured to both said cylindrical surface and said annular surface, a swivel ring surrounding said member and having surfaces in abutting engagement with said bearing material so that the member is smoothly rotatable within said ring, and guy wires coupled to said ring for supporting said tower in an erect position extending upwardly from said base plate.

3. A portable derrick comprising, in combination, a plurality of groups of members rigidly joined by cross braces, said groups being alined and releasably secured to one another to define a tower, the bottom group of members rigidly joined by braces being rotatably supported on a base plate, a circular plate sandwiched between two of said groups of members, the tower tapering inwardly as it extends downwardly from the circular plate to said base plate, the tower tapering inwardly as it extends upwardly from the circular plate to the top of the tower, a swivel ring carried by said plate for free rotation thereon, said ring being removably supported on said plate, and guy lines coupled to said ring for supporting said tower in an erect position extending upwardly from said base plate.

4. A portable derrick comprising, in combination, a plurality of groups of members rigidly joined by cross braces, said groups being alined and releasably secured to one another to define a tower, a circular plate sandwiched between two of said groups of members, the bottom group of members rigidly joined by braces being

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rotatably supported on a base plate, said base plate having upwardly extending portions defining a pair of upwardly directed slots, a trunnion block rockably and removably supported in said slots, said block having an upwardly opening semi-spherical socket, said bottom group of members having a pivot pin with a lower ball seated within said socket, the tower tapering inwardly as it extends downwardly from the circular plate to said base plate, the tower tapering inwardly as it extends upwardly from the circular plate to the top of the tower, a swivel ring carried by said plate for free rotation thereon, said ring being removably supported on said plate, and guy lines coupled to said ring for supporting said tower in an erect position extending upwardly from said base plate.

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