

March 21, 1939.

J. SUTH

2,151,057

WELL DRILLING MACHINE

Original Filed Oct. 7, 1936

3 Sheets-Sheet 1

Fig. 1.

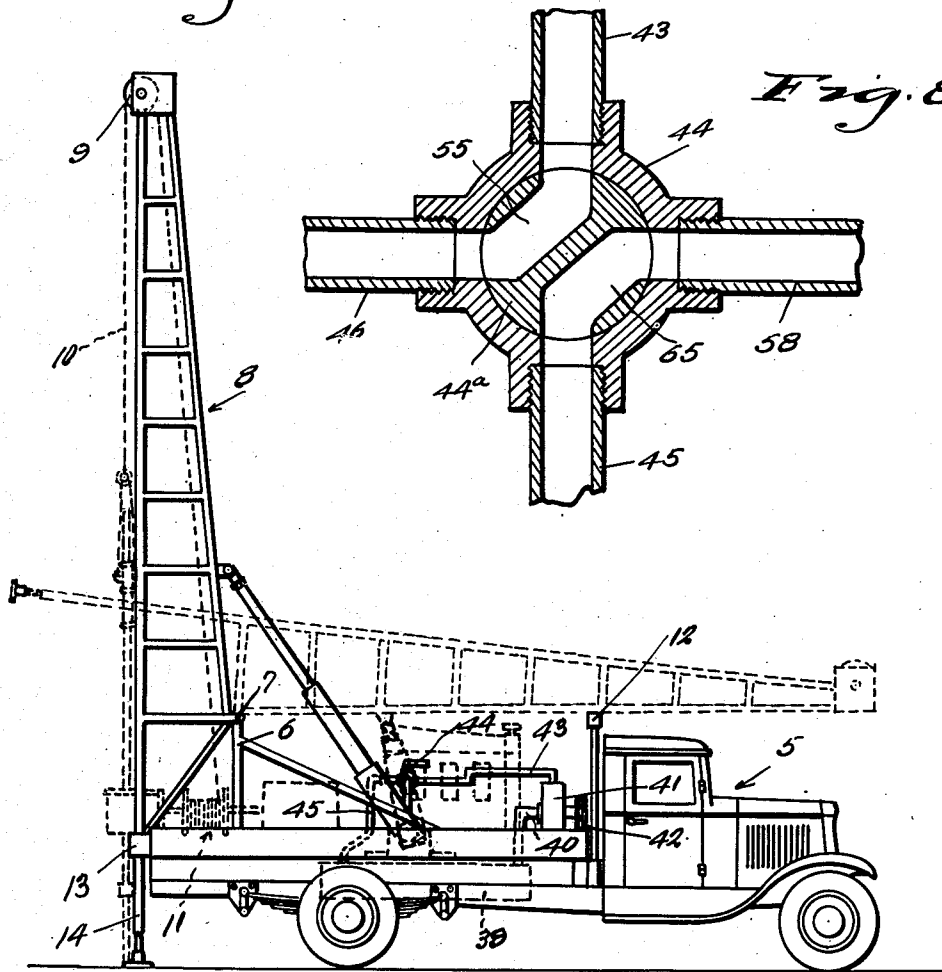


Fig. 8.

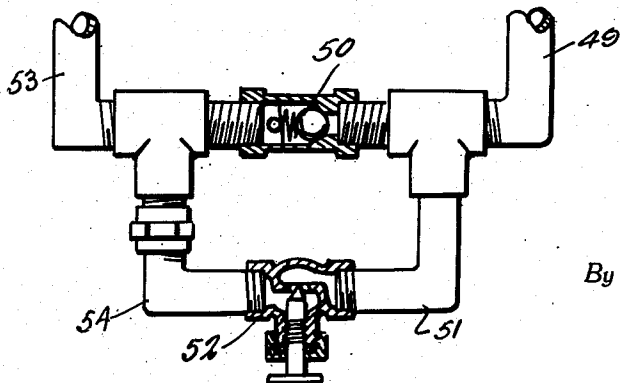
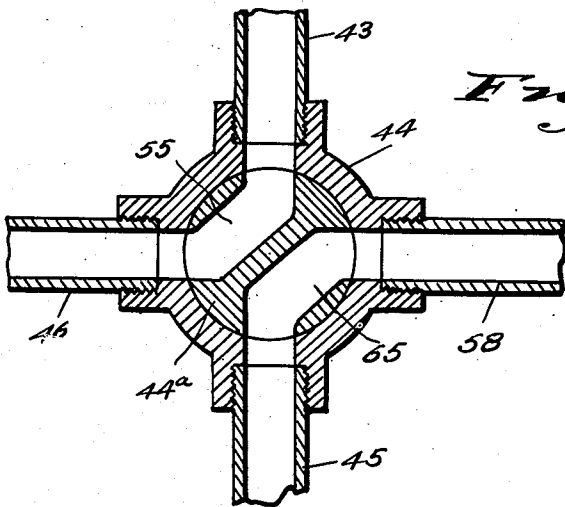


Fig. 7.

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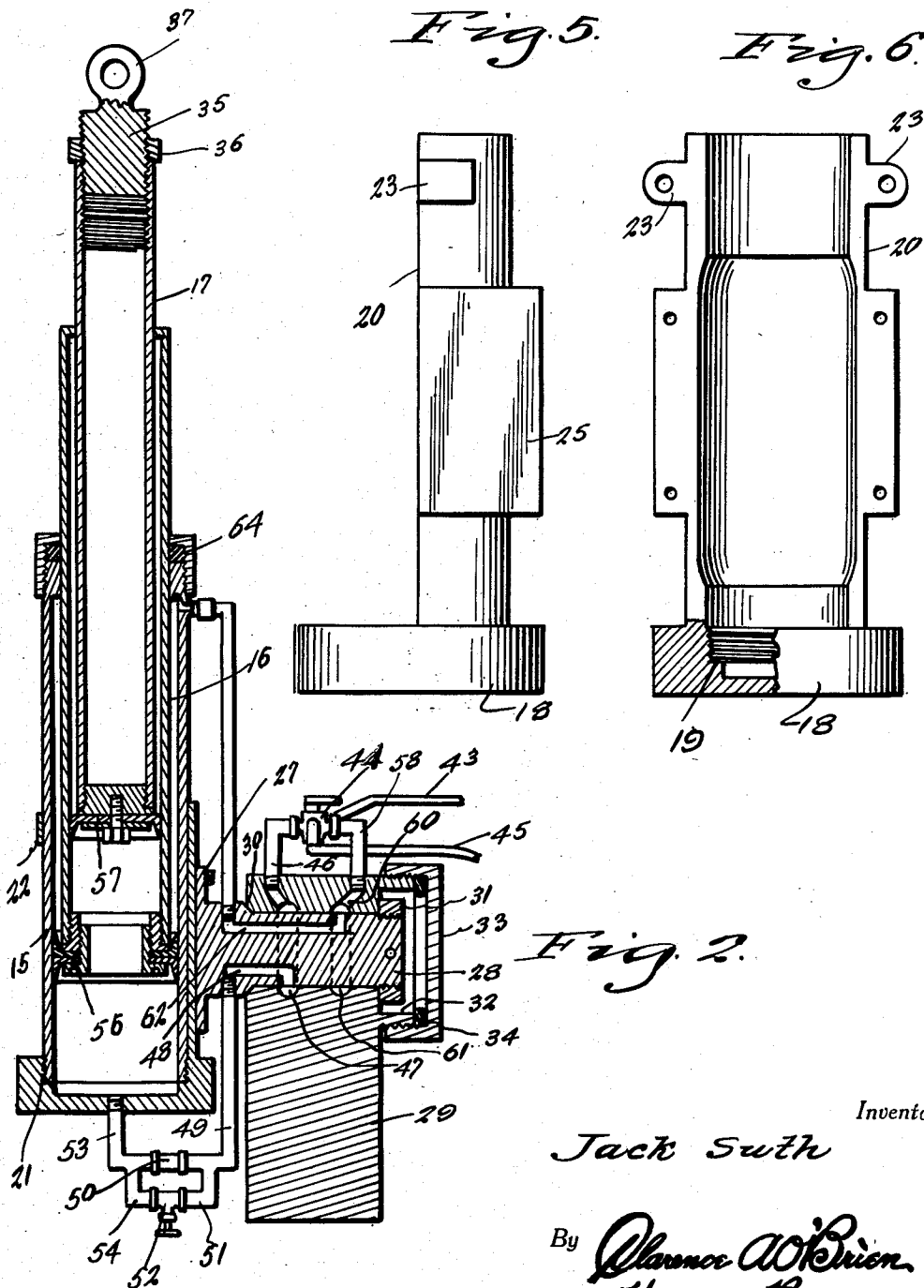
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*Fig. 3.*

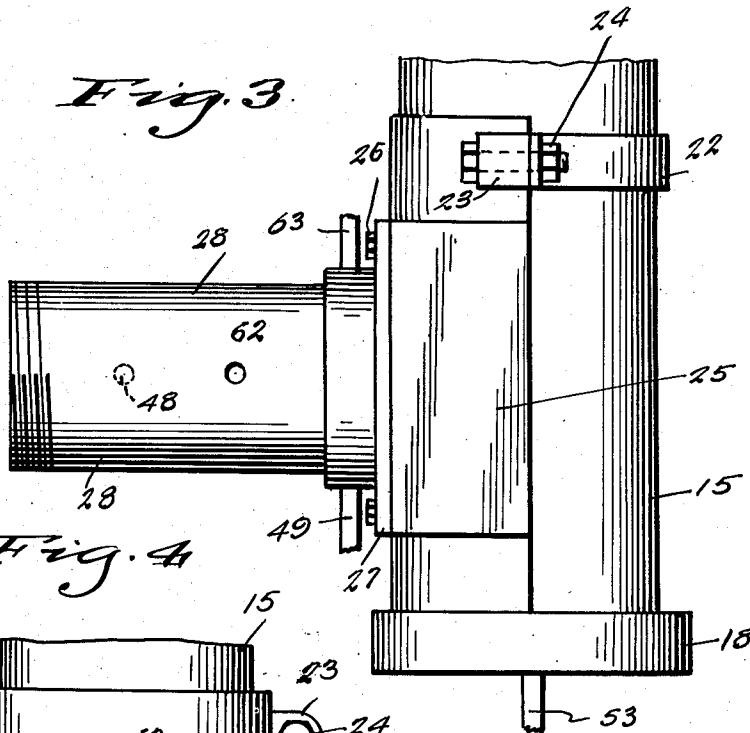
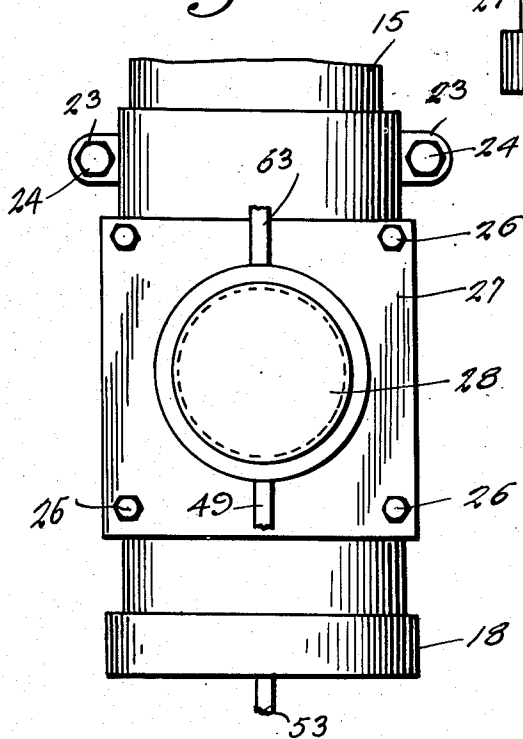


*Fig. 4.*



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## UNITED STATES PATENT OFFICE

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## WELL DRILLING MACHINE

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Application October 7, 1936, Serial No. 104,515  
Renewed November 8, 1938

## 1 Claim. (Cl. 254—93)

This invention relates to devices for drilling wells and more particularly to that form of well drilling device referred to as a portable drilling rig and embodying a boom or derrick pivotally mounted at the rear of the vehicle to swing from a substantially horizontal position when not in use to a substantially vertical position for use.

The invention per se, consists in the provision of improved means for swinging the boom or derrick of the portable drilling rig to either of the two positions above mentioned.

More particularly the invention consists in what may be termed a hydraulic jack for raising or swinging the boom or derrick to a vertical position when the rig is to be used for drilling a well.

The invention together with its objects and advantages will be best understood from a study of the following description taken in connection with the accompanying drawings wherein:

Figure 1 is a side elevational view illustrating the application of the invention.

Fig. 2 is an enlarged detail sectional view taken through the jack.

Fig. 3 is an enlarged detail side elevational view of the lower portion of the jack with its supporting bracket associated therewith.

Fig. 4 is an elevational view taken at right angles to Fig. 3.

Fig. 5 is a side elevational view of the clamp forming part of the supporting bracket.

Fig. 6 is an elevational view taken substantially at right angles to Fig. 5 and with parts broken away and shown in section, and

Fig. 7 is a detail view partly in section and partly in elevation showing a valve assembly hereinafter more fully referred to.

Figure 8 is a horizontal section of the valve controlling the fluid for extending the jack.

Referring in detail to the drawings, it will be seen that 5 indicates generally a conventional motor truck forming part of the portable well drilling equipment.

Mounted on the body frame of the truck 5 adjacent the rear end of the frame is a suitable supporting structure 6, to which is pivoted as at 7, the well drilling boom or derrick 8.

The boom or derrick 8 is more or less of conventional structure being provided at its upper end with a sheave 9 over which the drilling cable 10 is trained as shown. The winch on which the drilling cable 10 is windable is also suitably mounted on the body frame of the truck as indicated by the numeral 11.

The present invention is concerned with the

mechanism for swinging the boom or derrick 8 from the dotted line position shown in Fig. 1 to the full line position shown in said figure, and for controlling the return movement of the derrick 8 from the vertical full line position shown in Fig. 1 to the horizontal position shown in Fig. 1.

For supporting the boom or derrick 8 in the dotted line position shown in Fig. 1, there is provided directly rearwardly of the cabin of the truck a suitable rest or support 12.

For securing the derrick 8 in the vertical position shown in Fig. 1, there are provided at the rear of the body of the truck 5 suitable clamps 13 engageable with the leg extensions 14 of the derrick in a manner clearly shown, but forming no essential part of the present invention.

The mechanism of the present invention consists of an hydraulic jack comprising a plurality of telescoping tubes, in the present instance three tubes indicated generally by the reference numerals 15, 16 and 17, respectively.

A carrier or supporting bracket for the jack comprises, in the present instance, a substantially circular plate 18 provided with a circular threaded recess 19 and a semi-cylindrical wall extension 20 which accommodates the section 15 of the jack. Section 15 of the jack at its lower end is open and is externally threaded as at 21 for threaded engagement with the recess 19 of the plate 18. Cooperating with the semi-cylindrical wall 20 of the carrier is an arcuate clamp strap 22, the opposite ends of which are provided with laterally directed apertured lugs to mate with apertured lugs 23 provided at opposite sides of the wall extension 20 to accommodate bolts 24 as clearly shown.

The wall section 20 is provided with a substantially squared formation 25 to which is bolted or otherwise secured as at 26 a plate 27.

The plate 27 has formed integral therewith one end of a pivot or stub shaft 28. The shaft 28 is journaled in a suitable bearing 29 provided therefor on the body frame of the truck 5 and is held in position against endwise movement through the bearing block through the medium of a shoulder 30 provided adjacent one end of the stub shaft and a lock nut 31 threaded on the free end of the stub shaft. The nut equipped end of the stub shaft 28 is housed within a circular flange 32 projecting from the bearing 29 and externally threaded for the threaded reception of a dust cap 33. Confined within the cap 33 is a suitable gasket 34, (see Fig. 2). Thus it will

be seen that the jack is mounted on the body frame of the truck for pivotal movement.

The section 17 of the jack has threaded in its free end a plug 35 secured in position through the medium of a lock nut 36. Plug 35 is provided with an integral eye 37 through the medium of which and a pivot bolt 38 the section 17 of the jack is pivoted to the boom or derrick 8 at one side of the latter as shown in Fig. 1. Thus it will be seen that as the sections of the jack are caused to move outwardly relative to one another, a push is exerted on the derrick 8 for forcing the same from the dotted line position shown in Fig. 1 to the full line position shown in said figure. Also as the sections of the jack are permitted to telescope one within the other, the boom or derrick 8 will be permitted to slowly swing from the vertical position shown in Fig. 1 to the dotted line position shown in said figure. In this connection it will be appreciated that the telescoping movement of the sections of the jack will serve to retard the downward swinging movement of the boom or derrick and will preclude sudden or unanticipated return movement of the derrick from the vertical to the horizontal position.

There is also mounted on the truck 5 and suitably positioned on the truck a tank or reservoir 39 for oil or other suitable fluid. The oil in the tank or reservoir 39 is drawn therefrom through a pipe 40 which connects the tank with a pump 41 suitably mounted on the truck and driven from the power take-off shaft of the truck or otherwise and as indicated generally at 42.

Leading from the outlet side of the pump 41 is a conduit pipe 43 that is connected to one side of a suitable four way valve 44.

As best shown in Fig. 8, there is connected to the opposite side of the valve 44, an outlet pipe 45 that leads to the tank 39 for returning the fluid to the latter incidental to a lowering of the boom or derrick 8.

Also leading from one side of the valve 44 is a pipe 46 that at one end is tapped into the bearing 29 for feeding fluid to an internal groove 47 formed in the wall of the bearing 29 and which is in constant communication with a passage 48 provided in the stub shaft 28.

Connected with the passage 48 in the stub shaft is one end of a pipe 49, which at its opposite end is connected with one side of a check valve 50 and is also provided with a branch 51 that is tapped into one side of a control valve 52.

Tapped into the bottom of the plate 18 is a pipe 53 that has one end thereof tapped into the casing of the check valve 50 and at said end a branch 54 is tapped into the casing of the valve 52.

Since it will be seen that with the core 44a of valve 44 in the position shown in Fig. 8 so that the passage 55 in the core connects the pipes 43, 46, oil pumped from the tank or reservoir 39 will flow through the valve 44, the pipe 46, groove 47, passage 48, pipe 49, valves 50 and 52, and pipe 53 into the jack section 15 to act on the piston 56 associated with the inner end of the jack section 16 to move the latter outwardly with respect to the section 15, and then on the piston 57 at the inner end of the jack section 17 to move the latter outwardly relative to the jack section 16 and in this manner force the boom or derrick 8 from the horizontal position shown in Fig. 1 to the vertical or full line position shown in said figure.

Tapped in the casing 44 at the side thereof

opposite the pipe 46 is one end of a pipe 58 that at its respective opposite end is tapped into the bearing 29 as at 60 for feeding oil to a second groove 61 provided in the bearing 29 and which is in constant communication with a passage 62 formed in the stub shaft 28. Also tapped into the stub shaft 28 at one end of the passage 62 is one end of a pipe 63 that has its other end tapped into the upper gland equipped end 64 of the jack section 15.

Thus it will be seen that when it is desired to lower the boom or derrick 8, that is to cause the latter to swing from a full line position shown in Fig. 1 to the dotted line position shown in said figure, the core 44a of valve 44 is turned so that passage 55 in the core registers with the pipes 46 and 45 while passage 65 in the valve core registers with pipes 43 and 58. Thus it will be seen that oil pumped from the container 39 will pass through the pipe 43 into the valve 44 passing through the passage 65 in the valve and the pipe 58 into the groove 61 in the bearing 29. From the groove 61 the oil will pass through the passage 62 through the pipe 63 into the space between the sections 16 and 15 of the jack in a manner to act on the piston 56 of the section 16 to cause the latter to telescope or move within the section 15. As the section 16 of the jack moves toward its final telescoped position the fluid within the sections 15 and 16 of the jack will drain through the pipe 53, valve 52, pipe 49, passage 47, groove 47, and pipe 46 to pass through the passage 65 of valve core 44a and through the pipe 45 to return to the tank or reservoir 39. Obviously as the fluid pressure on the piston 57 is released in this manner, jack section 17 will tend to move inwardly of the jack section 16 under weight of the derrick 8 so that the derrick 8 will slowly move from the vertical position shown in Fig. 1 to the horizontal position suggested by the broken lines in Fig. 1.

After the lowering of the boom or derrick 8 has been accomplished in this manner, valve 42 is returned to neutral position where it will remain until the operation of raising the derrick or boom 8 and the lowering thereof as above described is to be repeated.

In connection with the above, it will be apparent that the check valve 50 will serve to cause the fluid draining from the jack to pass through the valve 52 which may be positioned at any desired position of adjustment for controlling the fluid therethrough, and thereby regulate the speed at which the derrick 8 will swing downwardly to horizontal position. Thus it will be seen that as the sections of the jack telescope one within the other, the derrick 8 will move slowly downwardly from its vertical to the horizontal position and will come to rest smoothly and easily on the support 12.

It will thus be seen that a machine embodying the features of the present invention for controlling the raising and lowering of the derrick 8 will have many advantages over the present practice of resorting to a cable windable on a drum driven through gearings for effecting a raising or lowering of the mast, boom or derrick, as the member 8 is generally referred to in the art.

It is thought that a complete understanding of the construction, utility, operation and advantages of the invention of this character will be had without a more detailed description.

Having thus described the invention, what is claimed as new is:

In a hydraulic lift for the boom of a portable well drilling rig, a bearing mounted on the rig, a bracket having a recessed horizontal base plate and a semi-cylindrical vertically extending wall, a pivot bolt journaled in the bearing and connected with the said wall of the bracket, and a telescoping jack having a base section seated in the recess of the bracket base plate and secured to the semi-cylindrical wall thereof and extensible sections in said cylinder and pivotally connected with the boom, and means for extending and collapsing the said extensible sections.

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