G. F. MOSER.

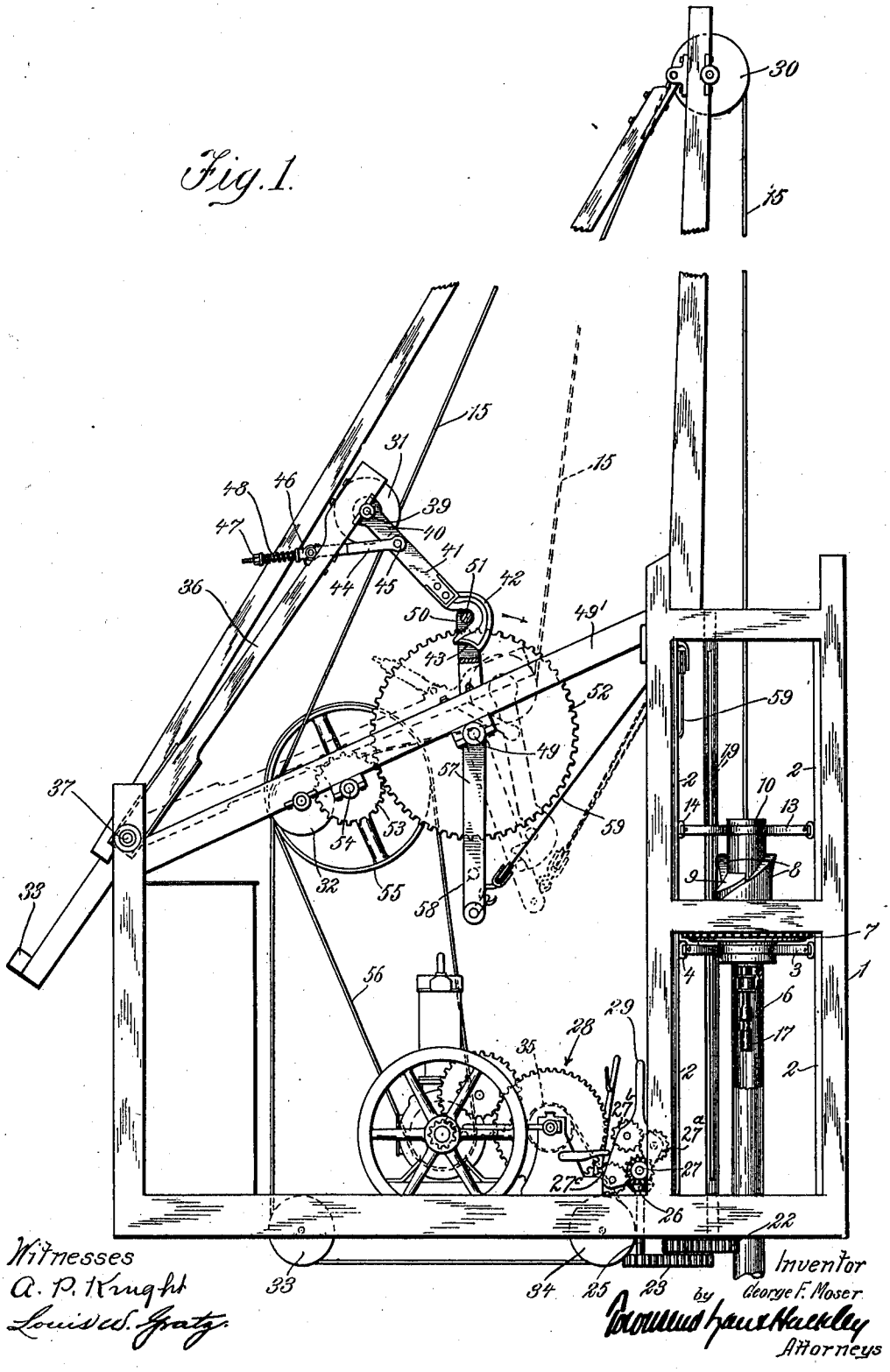
DRILLING APPARATUS.

APPLICATION FILED FEB. 28, 1910.

992,895. **Patented May 23, 1911.**

4 SHEETS—SHEET 1.

Fig. 1.



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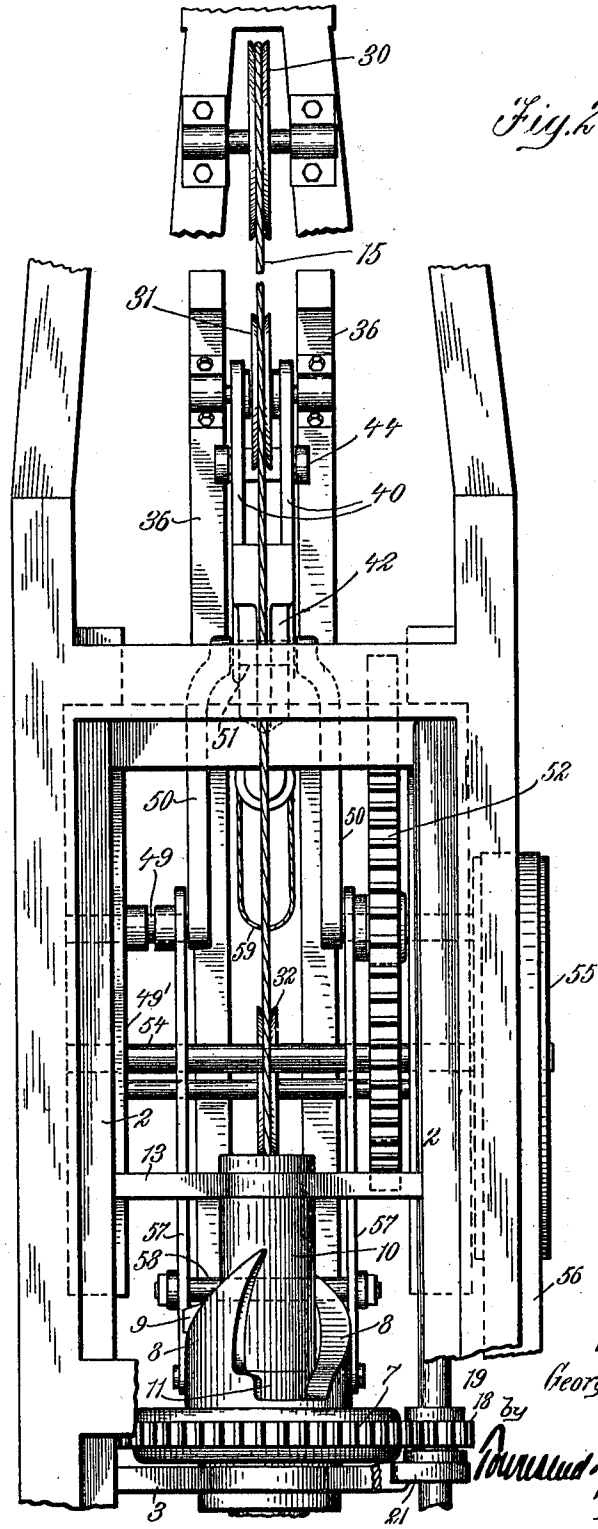
4 SHEETS—SHEET 2.

Fig. 2.



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4 SHEETS—SHEET 3.

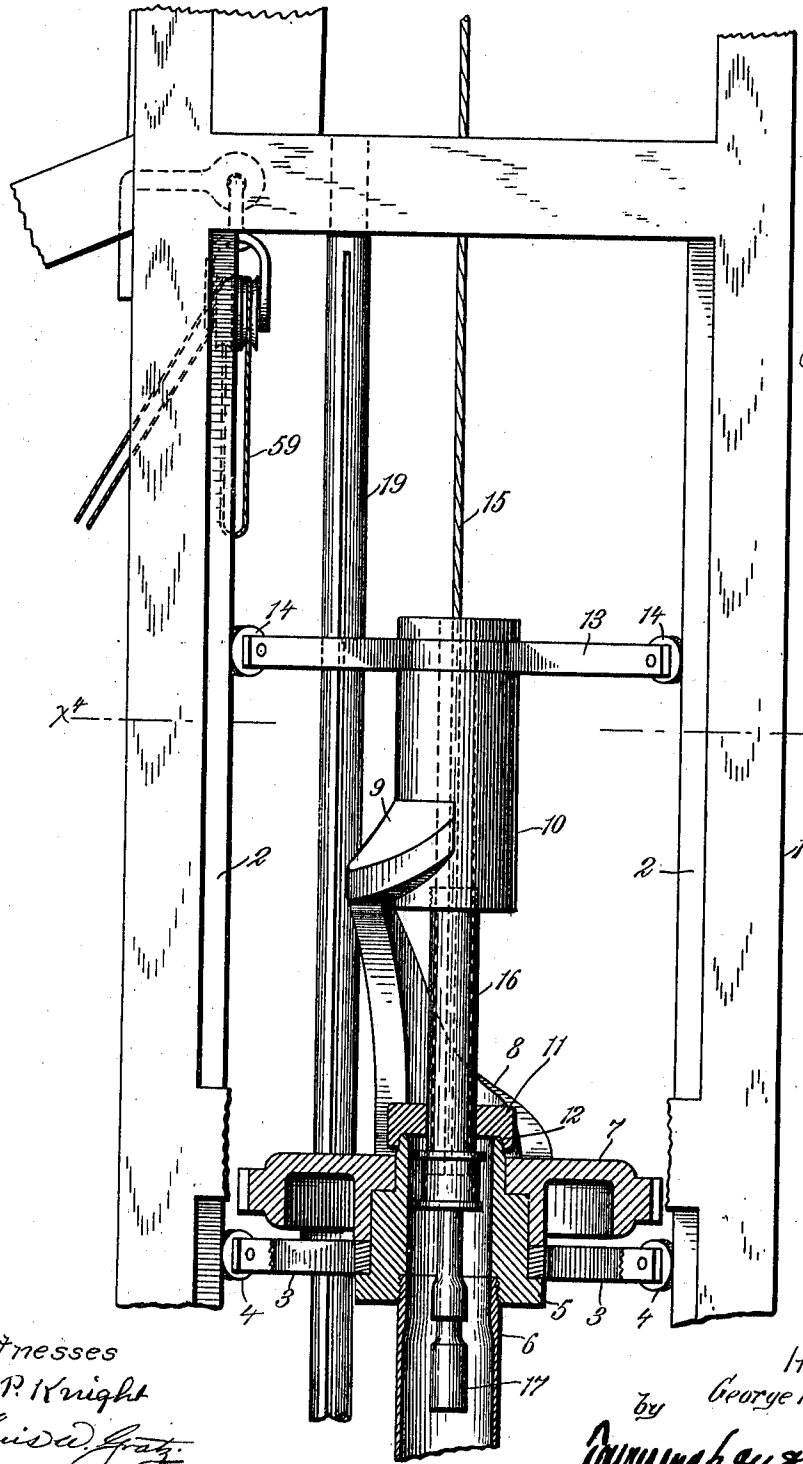

Fig. 3.

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4 SHEETS—SHEET 4.

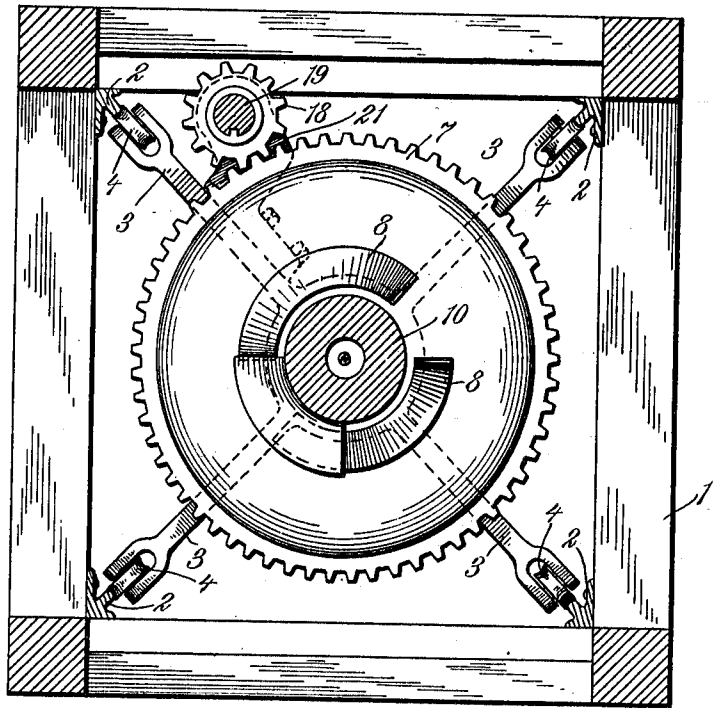

Fig. 4.

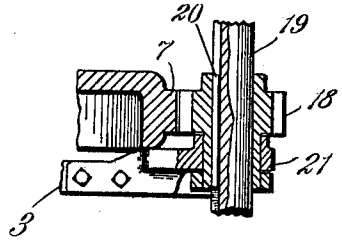

Fig. 5.

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UNITED STATES PATENT OFFICE.

GEORGE F. MOSER, OF LOS ANGELES, CALIFORNIA.

DRILLING APPARATUS.

992,895. Specification of Letters Patent. **Patented May 23, 1911.**

Application filed February 28, 1910. Serial No. 546,555.

To all whom it may concern:

Be it known that I, GEORGE F. MOSER, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented a new and useful Drilling Apparatus, of which the following is a specification.

This invention relates to a drilling apparatus which is adapted for drilling for water or oil, and is applicable to mining.

The main object of the invention is to operate the tool by moving the cable thereof laterally and suddenly releasing it, the mechanism for accomplishing this being continuously driven and causing a regular reciprocation of the tool.

Other objects and advantages of the invention will be brought out in the following description.

Referring to the drawings:—Figure 1 is a side elevation of the invention. Fig. 2 is a front elevation of the intermediate part of the mechanism on a larger scale. Fig. 3 is a side elevation of the hammer means for sinking the casing, the upper portions of the casing and connected points being shown in section, said figure also showing the supporting means for the controlling cable for the spudding device. Fig. 4 is a section on line x^4—x^4 Fig. 3. Fig. 5 is a detail view, partly in section, through the sliding pinion.

1 designates the tower having four vertical ways 2. A spider 3 having four arms, each provided with a roller 4, is operable vertically along the ways 2, each roller 4 riding on one of the ways 2. Supporting the spider 3 is a sleeve 5, in the lower end of which is screwed the upper end of the casing 6. Journaled on the sleeve 5 is a gear 7 which is provided with two lifting cams 8 which coöperate with a cam 9 on a hammer 10 to alternately lift the latter, dropping it in succession upon a cap 11 which rests upon a rim 12 of the cam of sleeve 5 which projects above the gear 7. The hammer 10 is guided by an upper spider 13 having rollers 14 which operate along the ways 2 and which prevent the hammer 10 from turning, thereby producing the necessary coaction of cam 9 with lifting cams 8. A cable 15 extends freely through the center of the hammer 10 and extends into a sleeve 16 at the lower end of which is a socket 17 to which the string of tools, not shown, is connected. The operation of the cam mechanism and hammer 10 takes place annularly with respect to the cable 15, so that the latter, together with the string of tools, can be reciprocated simultaneously with the operation of the hammer 10.

The gear 7 is driven by a pinion 18 which is slidable on a vertical shaft 19 and caused to rotate therewith by feather 20. The pinion 18 is retained in mesh with the gear 7 and caused to move longitudinally therewith by means of a bracket 21 which is secured to the adjacent arm 3. Thus, while the pinion 18 can slide along the shaft 19 to accompany the gear 7, the pinion 18 is continuously rotated by the shaft 19 and thus imparts motion to the gear 7 irrespective of the vertical position thereof.

The shaft 19 has a gear 22 on its lower end which is connected through a train of gears 23 with a gear 24 on the bottom of shaft 25, the latter having a bevel gear 26 which is driven from a bevel gear 27, the latter being operated by a hoist 28. A pivoted lever 29 is arranged to place the gear 27 in gear or out of gear with the hoist 28 through the medium of gears 27^a, 27^b and 27^c. The string of tools which is carried by the cable 15 is operated by moving the cable 15 laterally and then suddenly releasing the cable to permit the string of tools to descend. This is accomplished as follows: The cable 15 at the upper end of the tower passes over a sheave 30, thence under a sheave 31, thence over a sheave 32, thence under sheaves 33 and 34 and thence to the hoisting drum 35. The sheave 31 is so mounted that it is movable bodily to move the cable 15 sidewise, the sheave 31 being journaled at the upper end of a lever 36 which is pivoted at 37 and provided with a counterweight 38. Said lever 36 extends in the general direction of the cable 15 and the pivotal movement of said lever is transverse or lateral to the direction of the cable, the cable being operated by said lever by a lateral bending or spudding action in distinction to a direct pull. Pivoted at 39, concentric with the sheave 31, is the forked end 40 of an operating arm 41, on the lower

end of which is a hook 42 having a contact face 43 on its end. An arm 44 is pivotally connected at 45 to the operating arm 41 and loosely extends through a pivoted sleeve 46 on the lever 36, the end of the arm 44 having a nut 47 and a compression spring 48 being arranged between the nut 47 and sleeve 46.

A shaft 49 is journaled below beams 49′, and the shaft 49 operates crank arms 50 which carry a crank pin 51, and a gear 52 is mounted on shaft 49 to rotate the latter, the gear being driven by pinion 53 on shaft 54 which is driven by a pulley 55 connected by belt 56 with the hoist 28. A pair of releasing arms 57 are journaled to swing on the shaft 49 and depend therefrom, and carry a releasing pin 58, the position of the releasing arms 57 and releasing pin 58 being regulated by means of a block and tackle 59 which extends to a point on the tower 1 within convenient reach of the operator.

As the gear 52 and shaft 49 rotate, the crank 50 moves the pin 51 into engagement with the hook 42, and continued movement of the gear and crank acting upon hook 42 and operating arm 41, draws the sheave 31, supported by lever 36, into the position shown in dotted lines in Fig. 1, and the sheave 31 during this movement moves the cable 15 sidewise into the dotted line position shown in Fig. 1, thereby lifting the tool on the end of the cable. Upon reaching the position shown in dotted lines, the contact face 43 of the hook 42 strikes the releasing pin 58 which arrests further progress of the hook 42, and as the pin 51 continues to rotate with crank 50 and gear 52, the pin 51 is moved out of engagement with hook 42, thereby releasing the latter, whereupon the counterweighted lever 36 quickly swings back to normal position shown in full lines in Fig. 1. This rearward movement of the lever 36, carrying with it the sheave 31, releases the cable 15 and permits the tool to drop quickly. The gear 52, crank 50, and pin 51 continue to rotate, and the pin 51 is again brought into engagement with the hook 52, and the operation before described is repeated, thereby producing successive reciprocations of the tool.

By operating the block and tackle 59, the releasing arms 57 may be adjusted to move the pin 58 to various points in the cycle, whereby the pin 58 will release the hook 42 at different periods in the cycle to produce a longer or shorter stroke of the cable. Thus, in Fig. 1 dotted lines show the releasing arms 57 as having been adjusted, so that the hook 42 will be released after a much shorter movement of the cable has been effected, than it would be if the hook were not released until it struck the pin 58 shown in the full line position in Fig. 1.

It is obvious that the reciprocation of the tool is carried on simultaneously with the operation of the hammer 10 by reason of the interrelation of the parts which is accomplished by the construction herein shown.

What I claim is:—

1. A tool, a cable connected at one end therewith, means securing the other end of the cable, a counter-weighted lever, means on said lever for engaging the cable, an arm pivoted to said lever and provided with a hook, operating means releasably engaging the said hook and adjustable controlling means adapted to release the hook from the operating means, in a definite position of the operating means.

2. A tool, a cable connected at one end therewith, means securing the other end of the cable, a pivoted lever, a sheave on the lever and lying adjacent against the cable, a hook connected with said lever, a rotating crank pin adapted to engage the hook to rock the lever and move the cable laterally, and means for automatically releasing the hook from said crank pin at a definite point in the cycle of the pin.

3. A tool, a cable connected at one end therewith, means securing the other end of the cable, a pivoted lever, a sheave on the lever and lying adjacent against the cable, a hook connected with said lever, a rotating crank pin adapted to engage the hook to rock the lever and move the cable laterally, a pair of releasing levers, a releasing pin carried thereby and in the path of movement of said hook for arresting said hook to cause the crank pin to pass out of engagement with the hook.

4. A tool, a cable connected at one end therewith, means securing the other end of the cable, a pivoted lever, a sheave on the lever and lying adjacent against the cable, a hook connected with said lever, a rotating crank pin adapted to engage the hook to rock the lever and move the cable laterally, means for automatically releasing the hook from said crank pin at a definite point in the cycle of the pin, an operating arm supporting the hook and pivotally connected to the lever, an arm pivotally connected to said operating arm and loosely guided on the lever, and a spring for retracting the latter arm.

5. A vertical support or tower, a pulley on said support, a cable extending over said pulley and provided at one end with means for carrying the tool, the other end of said cable being connected to a hoist, and said cable extending in a general downward direction from said pulley to said hoist, a lever pivotally mounted along the side of such downwardly extending portion of said cable and extending in the same general direction as such downwardly extending portion, and engaging the cable so as to move the cable laterally in the pivotal movement of said le-

ver, and operating means having a releasable connection with said lever and controlling means to control the releasable connection between the operating means and said lever when the operating means reaches a definite point in the operation thereof.

In testimony whereof, I have hereunto set my hand at Los Angeles, California, this 19th day of February 1910.

GEORGE F. MOSER.

In presence of—
G. T. HACKLEY,
FRANK L. A. GRAHAM.