(No Model.)

2 Sheets—Sheet 1.

A. CAMERON.

WELL DRILLING MACHINE.

No. 512,003. Patented Jan. 2, 1894.

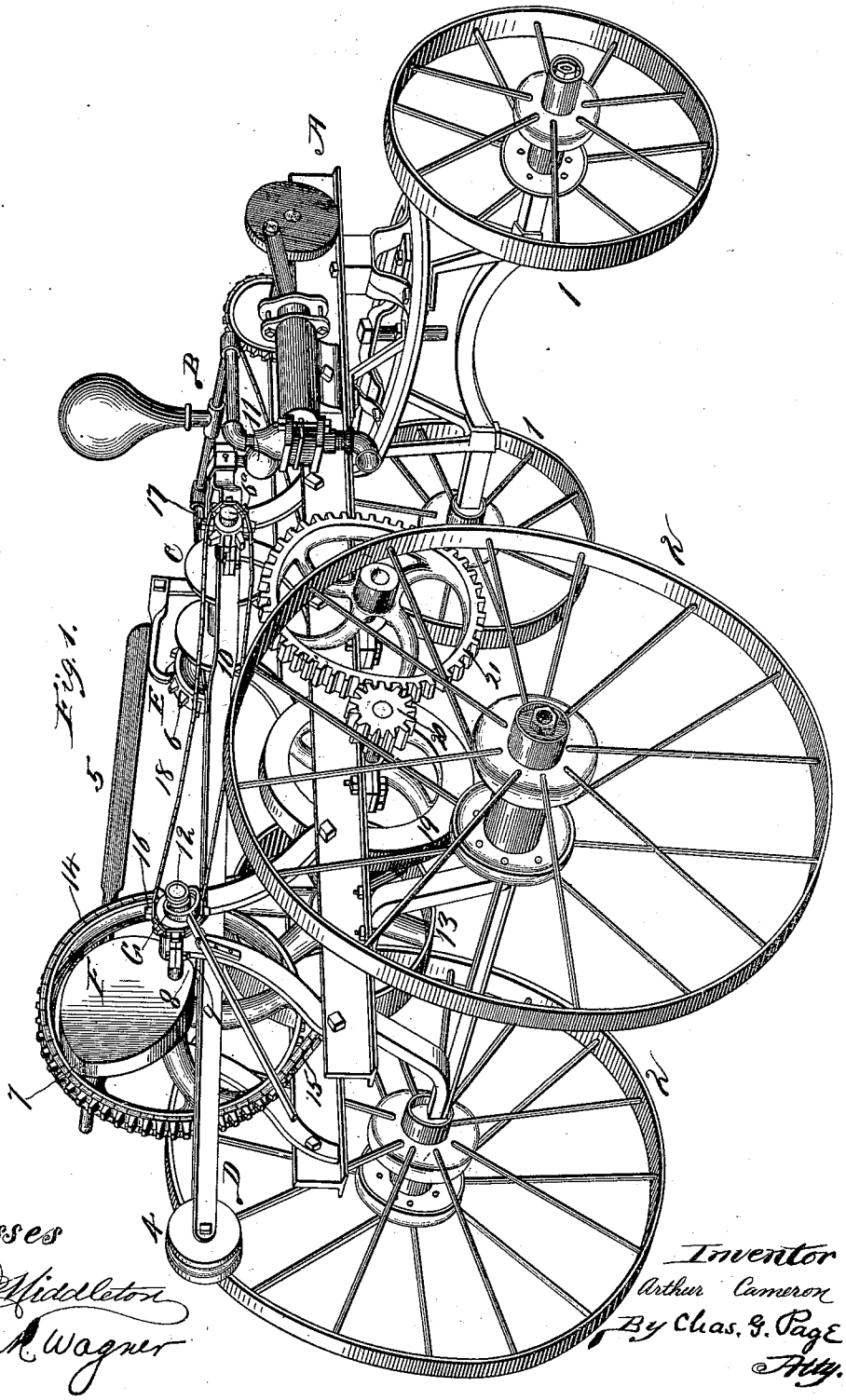

Fig. 1.

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(No Model.) 2 Sheets—Sheet 2.

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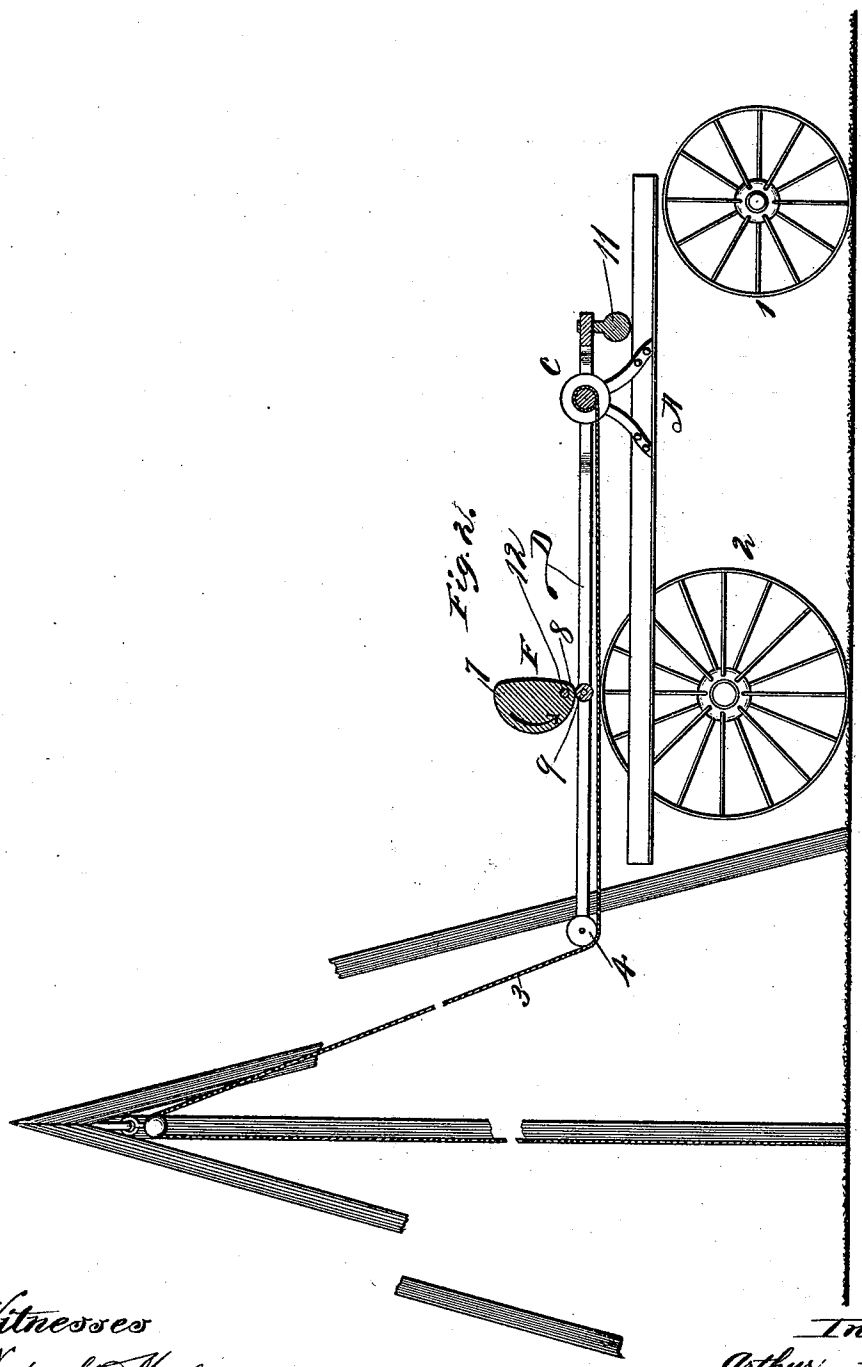

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UNITED STATES PATENT OFFICE.

ARTHUR CAMERON, OF CHICAGO, ILLINOIS, ASSIGNOR TO FREDERICK C. AUSTIN, OF SAME PLACE.

WELL-DRILLING MACHINE.

SPECIFICATION forming part of Letters Patent No. 512,003, dated January 2, 1894.

Application filed November 11, 1892. Serial No. 451,629. (No model.)

To all whom it may concern:

Be it known that I, ARTHUR CAMERON, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Well-Drilling Machines, of which the following is a specification.

In a well-drilling machine characterized by my invention, the drill-rope or cable is carried from a drum to a pulley arranged at the upper portion of a derrick or like support, and thence down to the well-drilling tool. The well-drilling tool is alternately carried and permitted to drop by a succession of pulls upon and releasements of the rope, in rapid alternation, and to such end the rope is operated by a vibratory walking beam or depressor which intermittently pulls or draws upon the rope portion between the drum and derrick-pulley. The rope or cable passes from the drum to a pulley on the free end portion of the walking beam and thence up to the derrick-pulley, and the walking-beam is arranged to vibrate about the axis of the drum so as to secure greater efficiency of action and various other advantages hereinafter more fully set forth. The walking beam is operated by a cam having a continuous bearing face or surface, and the walking beam is continuously subject to such bearing face of the cam so as to avoid shocks. The walking beam is provided with a counter weight which permits the drilling tool to readily drop, the arrangement in this connection being such that the cam action serves to operate the walking beam in a way to lift the drilling tool, while the latter in dropping exerts a pull upon the rope in a way to cause the walking beam to follow the cam face.

In the accompanying drawings—Figure 1 represents in perspective, a well-drilling machine embodying my invention. Fig. 2 represents a vertical longitudinal section through a portion of the machine, which to a limited extent is further illustrated in elevation, said view also including the upper and lower portions of a derrick, so as to illustrate the use of the rope or cable.

The body-frame A of the machine herein shown is supported by front and rear wheels 1 and 2 so that the machine can be conveniently moved from place to place.

The pump mechanism B is arranged upon the forward portion of the body-frame so as to permit the rope or cable which operates the drill rod, to extend upwardly from the rear portion of the machine to the pulley which is usually arranged at the top portion of a derrick.

It is not necessary to herein illustrate the derrick, the drill add all of the rope or cable employed, and hence I have herein shown only a portion of the rope or cable 3 in connection with the drum C, and the walking beam or vibratory depressor D. The winding drum C is supported upon the body-frame and arranged just back of the pumping mechanism, and is adapted for a coil of rope or cable which passes back from the drum to a pulley 4 on the free rear end of the walking beam or vibratory depressor, and thence up to the aforesaid derrick pulley, from which latter it is understood to pass down to the drill rod or drilling tool employed. The drum is held against rotation in a direction to uncoil the rope or cable, by a pawl E which is provided with a handle 5 for the convenience of an operator, and which can be raised from engagement with a ratchet 6 on the drum axle, so as leave the latter free to turn in a direction to pay out the rope or cable in accordance with the extent to which it is desired the drill shall drop. The rope or cable passes from the drum, to and under the pulley 4 on the rear portion of the walking beam or vibratory depressor, so that as a result of each down swing on the part of said walking beam, the rope or cable will be depressed or drawn down and thus secure a consequent up movement on the part of the drill. This vibratory depressor or walking beam hung upon the axle 6′ of the drum so as to vibrate about an axis passing axially through the drum, by which arrangement I avoid lost motion, and further dispense with all necessity for rotary reciprocating actions on the part of the drum in conjunction with the actions of the walking beam.

In further explanation of the foregoing, it will be understood that during the vibratory action of the walking beam the drum will re-

main stationary, and hence that one end of the rope will be in effect tied or held at a point close to the axis about which the walking beam vibrates, and consequently close to the center of a circle in which the pulley 4 is carried. During the up and down swing, therefore, of the free end of the walking beam, there will be no practical movement on the part of the pulley 4 along the rope, since the length of rope portion between such pulley and the drum will be substantially invariable. If however the drum axis is arranged eccentric to the axis about which the walking beam is to vibrate the length of rope portion between the drum and the pulley on the walking beam will be much greater at the completion of the down stroke or movement of the pulley than at the completion of the up stroke or movement of the same. Such arrangement however is undesirable from the fact that considerable lost motion is involved, and that to secure a proper extent of stroke, a cam employed to actuate the walking beam, must be disproportionally large with relation to the desired extent of stroke. By my arrangement however, I avoid such lost motion and secure a stroke commensurate with the size and throw or stroke on the part of the cam, in addition to which I avoid friction at the walking beam pulley and secure a quicker and generally better action.

As a matter of further improvement I provide a cam F adapted and arranged to have a constant engagement with the walking beam, so as to avoid shocks incident to the drop of the drill and consequent up swing on the part of the walking beam. The high and low bearing surface portions 7 and 8 of the cam are therefore arranged as portions of a continuous bearing surface which can be in continuous engagement with the walking beam, or more desirably, and as a matter of improvement, in continuous engagement with an anti-friction roller 9 on the walking beam.

The pivotally supported end portion of the walking beam is bifurcated as at 10, so as to straddle or embrace the drum C and permit the sides of forked or bifurcated portion to be pivotally hung upon the drum shaft 6^a or similarly supported so as to turn about the axis of said shaft, in which way, a steady motion on the part of the walking beam is insured, and the pulley at the free end of the walking beam positioned to move with the latter in a plane at right angles to the drum axis and intersecting the same midway of the length of the drum. The forked end portion of the walking beam is also extended beyond the drum and adapted to support an adjustable balance or counter-weight 11. This counter-weight serves to permit the ready drop of the drill-tool, it being seen that the drop of the drill-tool will necessitate the up swing of the walking beam, and that by providing the latter with a short forward end or arm having a balance or counter weight, the drop of the drill will not be retarded by resistance on the part of the long arm of the walking beam.

The rotary shaft 12 which carries the cam F can be driven by suitably applied power, as for example the power can be applied to a belt-pulley 13, and transmitted from a sprocket (not shown) on the shaft thereof, to a sprocket 14 on the cam shaft, through the medium of a link-belt 15. The cam-shaft 12 can also be employed for rewinding the rope or cable upon the drum, and to such end, the cam-shaft and drum shafts are respectively provided with sprockets 16 and 17, which are connected by a chain or link-belt 18, and a clutch device G provided for placing the sprocket 16 in clutch with the cam-shaft, when so desired. The shaft which carries the pulley 13 is provided with a balance wheel 19, and with a pinion 20 which engages a gear wheel 21. The pump mechanism can be driven from this gear through the medium of any ordinary or suitable mechanism, and which need not therefore be shown.

What I claim as my invention is—

1. In a well-drilling machine, the combination of the drum, a walking beam for the purpose set forth arranged to vibrate about the axis of the drum and extending both forwardly and rearwardly therefrom, a cam for intermittently depressing the forwardly extending portion of the walking beam, and a counter-weight arranged upon the rearwardly extending portion of the same, substantially as described.

2. In a well-drilling machine, the combination of the drum, the walking beam arranged to vibrate about the axis of the drum and extending forwardly and rearwardly therefrom for the purpose set forth and provided with a counter-weight upon its rearwardly extending portion, and a cam having a continuous face which is in constant engagement with the forwardly extending portion of the walking beam, substantially as described.

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