

(No Model.)

3 Sheets—Sheet 1.

S. MACEACHEN.
WELL DRILLING MACHINE.

No. 513,240.

Patented Jan. 23, 1894.

Fig. 1.

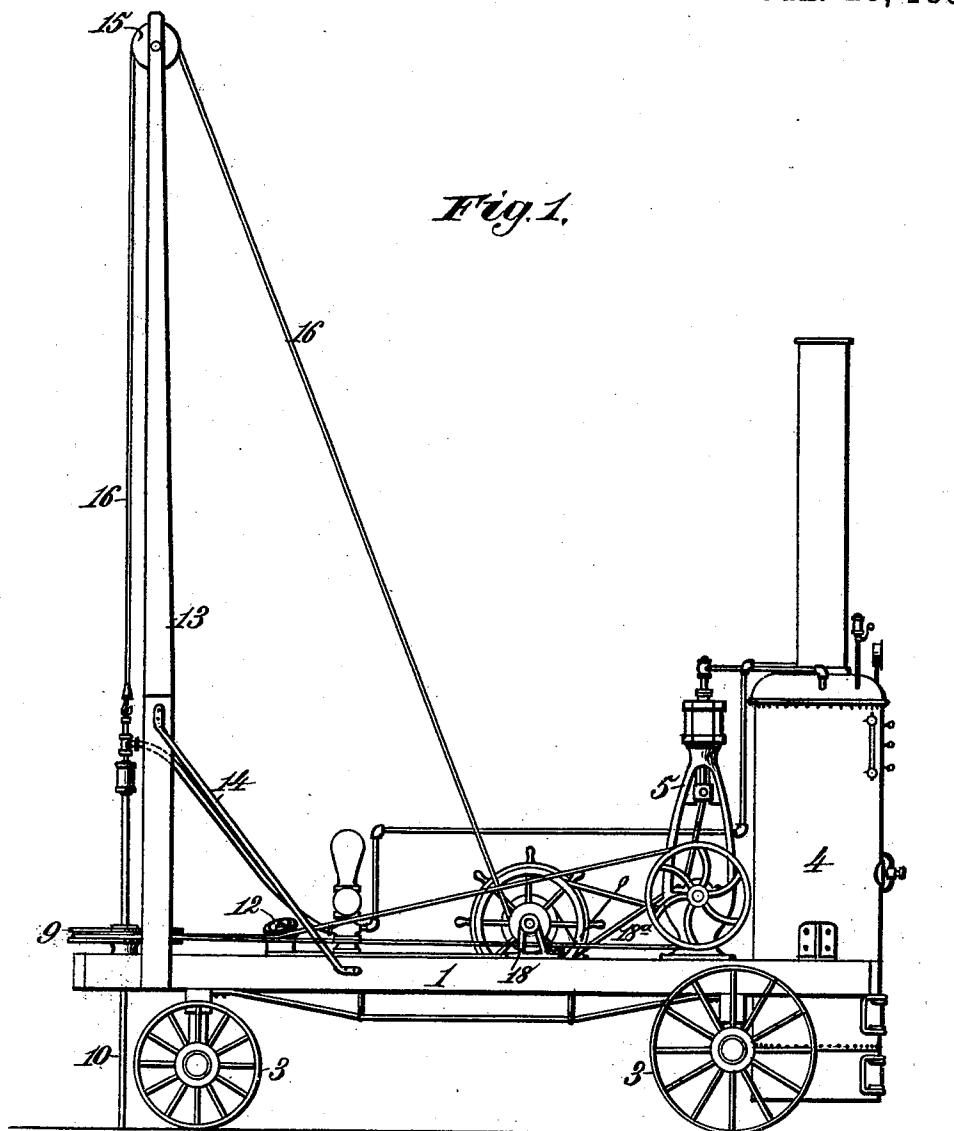
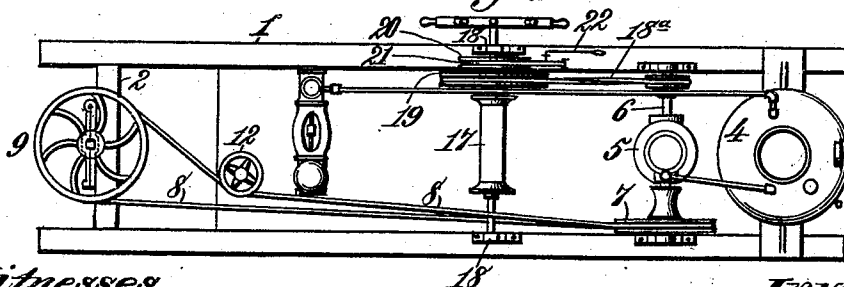


Fig. 2.



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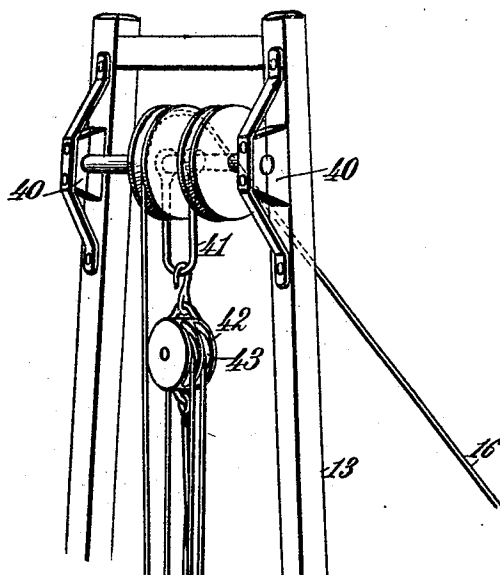


Fig. 3.

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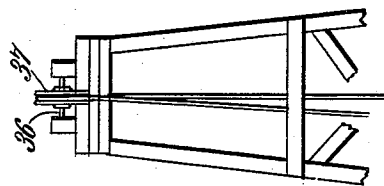


Fig. 5.

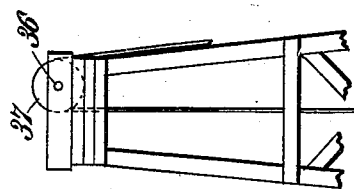
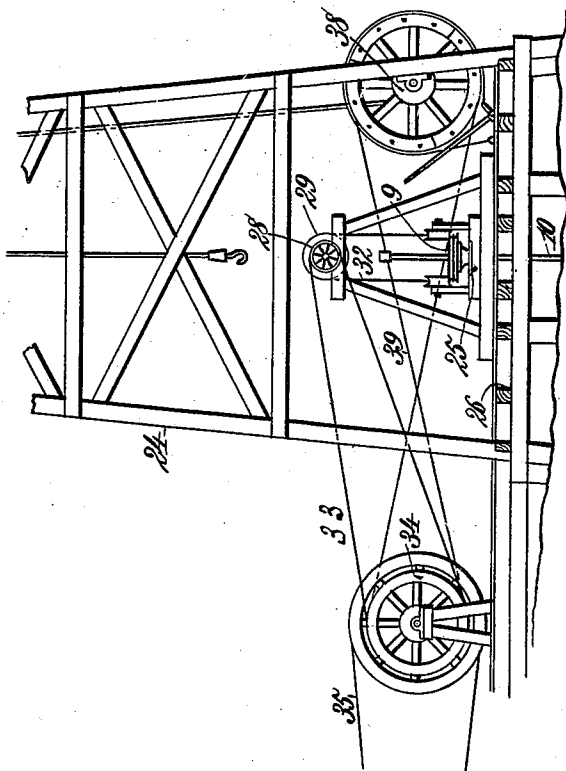
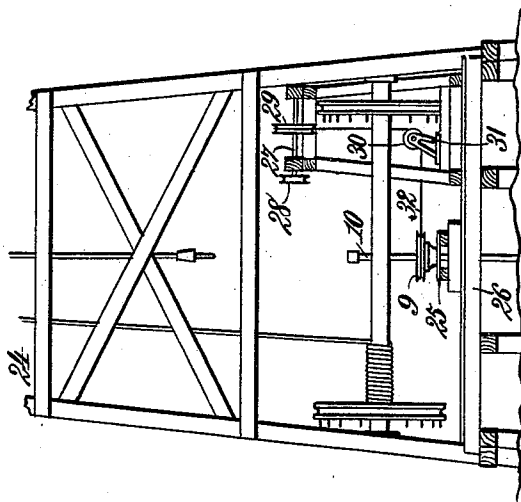


Fig. 4.



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UNITED STATES PATENT OFFICE.

SAMUEL MACEACHEN, OF SCRANTON, PENNSYLVANIA, ASSIGNOR TO THE
NATIONAL BORING AND DRILLING COMPANY, OF SAME PLACE.

WELL-DRILLING MACHINE.

SPECIFICATION forming part of Letters Patent No. 513,240, dated January 23, 1894.

Application filed April 6, 1893. Serial No. 469,285. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL MACEACHEN, a citizen of the United States, residing at Scranton, in the county of Lackawanna and State of Pennsylvania, have invented new and useful Improvements in Well-Drilling Mechanism, of which the following is a specification.

This invention relates to drilling mechanism designed for the construction of Artesian and other wells, or for core drilling; and it has for its object to provide novel, simple, efficient, and economical means for relieving the pressure of the drilling tube at the necessary depth.

To accomplish this object my invention consists in the features of construction and the combination or arrangement of devices hereinafter described and claimed, reference being made to the accompanying drawings, in which—

Figure 1 is a side elevation of a portable drilling apparatus embodying my invention. Fig. 2 is a plan view of the mechanism shown in Fig. 1. Fig. 3 is a detail perspective of the upper portion of the derrick, showing the relief mechanism. Fig. 4 is a side elevation of a drilling mechanism, showing a modified construction adapted for heavy work. Fig. 5 is an end elevation of the same, the upper portion of the derrick being omitted.

In the said drawings the reference numeral 1 indicates the supporting-frame of a core-drilling apparatus, organized in many respects upon the same plan as that shown in my application for Letters Patent filed upon the 14th day of December, 1892, Serial No. 458,525, and allowed March 8, 1893. This frame consists of parallel side-bars, connected by suitable transverse bars 2, to provide a rigid structure. Said frame is mounted upon wheels 3, in any suitable manner. At one end of said frame is mounted the boiler 4, in suitable proximity to which is the engine 5, its vertical cylinder being preferably arranged above the transverse driving-shaft 6. Upon this shaft which is mounted on boxes supported upon the side bars of the frame 1, is a driving-pulley 7, preferably of grooved form, and having a single groove. A cable belt 8 connects this pulley to the drill-pulley 9, which is provided with a non-circular open-

ing to receive and permit the longitudinal movement of the drill-rod 10, said pulley having a suitable bearing upon the transverse bar 2 at the end of the frame most remote from the engine. Between the two pulleys 7 and 9 is arranged a belt-tightening pulley, 12 which also has the function of a guide-pulley, which engages one member of the cable-belt 8 in such manner as to draw that portion which lies between the driving pulley and said guide-pulley into the plane of revolution of the driving-pulley 7, or nearly so, and at the same time draws that portion lying between said guide-pulley and the drill-pulley 9 downward, and into, or nearly into the plane of revolution of the latter pulley. The derrick 13 rises from the side-bars of the supporting-frame and is suitably stiffened by braces 14. The derrick is provided with a shaft at its top, on which is mounted a pulley 15, over which the rope 16 is carried to provide means for pulling up the drill-rods, or raising the cores. This rope is wound upon a windlass or winch 17 having its shaft mounted in boxes 18 on the side bars of the frame. Said shaft is driven by a belt 18, or other suitable gearing, carried from a pulley on the driving-shaft 6 over a larger pulley 19 on the shaft of the winch 17, said belt being crossed between these points. Upon the same shaft is mounted a brake-pulley 20, having the usual brake-strap 21 carried over its periphery, and operated by a brake-lever 22 of the well known form.

The drill-rod 10 is passed down through the drill-pulley and connected to the bit, or core-cutting tube, in any preferred manner. This mechanism as illustrated in Figs. 1 and 2 is adapted for light work, of a grade which includes the larger part of the core-drilling ordinarily required.

For heavier work I prefer to use the structure shown in Figs. 4 and 5, in which the numeral 24 denotes the derrick, constructed in substantially the same manner as those employed in other systems of drilling, as for example, in using steel drills, which have reciprocating movement and operate upon the rock by percussion. I adopt, for my present purposes, the entire structure of this kind, which is well known in the art, simply making the

following changes therein. The samson-post and walking-beam are removed and a suitable, detachable bearing 25 is provided for the support of the drill-pulley 9, which is similar to that already described, in connection with Figs. 1 and 2 of the drawings. Upon one side of the sub-structure 26 is erected a frame, on which is journaled a counter-shaft 27, having a small and a large pulley, 28 and 29, respectively, and provided below the latter, with guide-pulleys 30, arranged in brackets 31. A belt 32 is led over the pulley 29, then over the guide-pulleys 30 and from the latter over the drill-pulley 9. The counter-shaft 27, is driven by a belt 33, connecting the smaller pulley 28 with the large driving-pulley 34, which is revolved by a separate belt 35, taken from a pulley on the engine-shaft. By this system of belt-gearing I obtain the speed of revolution required for the drill-rod.

At the summit of the derrick is the shaft 36 usually employed in this structure having a pulley 37 over which the rope 16 is carried, its end being taken to the windlass, or winch 38, which is driven by a crossed belt 39 carried by a pulley upon the same shaft from which motion is transmitted to the counter-shaft.

In both forms of frame shown in Figs. 1 and 4, the shaft at the top of the derrick is preferably hung in boxes 40, and from said shaft hangs a loop, or yoke 41, which supports a block 42 having a plurality of pulleys 43 therein. This block is connected with a similar block, 44 by simply carrying the rope 16 over the pulley on the shaft 36 and then down to and over one of the pulleys in the block 44. The end of the rope may then be fastened to an eye-bolt or hook, upon the pulley-block 42, or, if necessary, the rope may be carried over a plurality of corresponding pulleys in the blocks 42 and 44 thus compounding the two pulleys according to the force required.

It should be noted that by carrying the rope 16 over the pulley upon the shaft at the summit of the derrick, the block 42 may have one pulley less than the number employed in the block 44. For example, if the latter block have three pulleys, the upper block 42 will require but two, as the shaft-pulley supplies the place of the third.

To the lower block 44 I attach a temper-screw 45 provided at its lower end with a swiveled hook 46 which engages the well known water-swivel 47. To the latter the drill-rod 10 is connected in the usual manner.

I use the apparatus last set forth and shown in Figs. 4 and 5, for deep drilling and heavy

work, but I also employ the relief mechanism, shown in Fig. 3, or some suitable form of such mechanism, upon the drilling mechanism illustrated in Figs. 1 and 2. I have already alluded to the fact that in core-drilling with chilled iron shot it is found that after penetrating to a depth of from one hundred and fifty feet to three hundred feet or thereabout, the weight of the bit and drill-rod becomes such as to prevent further drilling with this method, but by connecting the relief mechanism to the drill-rod this pressure may be diminished to any desired extent and the drilling continued. After penetrating to a depth of about five hundred feet however, the weight of the drill-rod and bit again becomes excessive, and it is now necessary to employ relief mechanism of greater power. This I accomplish by simply compounding the blocks 42 and 44 as far as required. At further depths the pulley blocks will be again compounded and so on, as far as may be necessary.

By my invention the process of drilling by the use of chilled iron shot is rendered available, practically speaking, at all depths. The relief-mechanism is of the simplest description and no substitute apparatus or expensive mechanism is necessary, and the relief-mechanism is capable of being used in raising the cores and pulling up the drill-rods.

What I claim is—

1. In a drilling mechanism of the type described the combination with a core-drilling tube, or bit, and a drill-rod attached thereto, of means for revolving the same, a pair of pulley-blocks having a plurality of pulleys, a rope by which said pulleys may be variably compounded, and a windlass to operate the same, substantially as described.

2. In a drilling mechanism of the type described, the combination with a core-drilling tube, or bit, and with a drill-rod, of means for revolving the same, a pair of compound pulley blocks, one connected to the summit of the derrick and the other to a temper-screw, between the same and the water-swivel, a rope passing from a windlass over the shaft-pulley at the summit of the derrick and thence to said pulley-blocks which are variably compounded thereby, and means for operating the windlass, substantially as described.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

SAMUEL MACEACHEN.

Witnesses:

ALBERT H. NORRIS,
THOS. A. GREEN.