(No Model.)

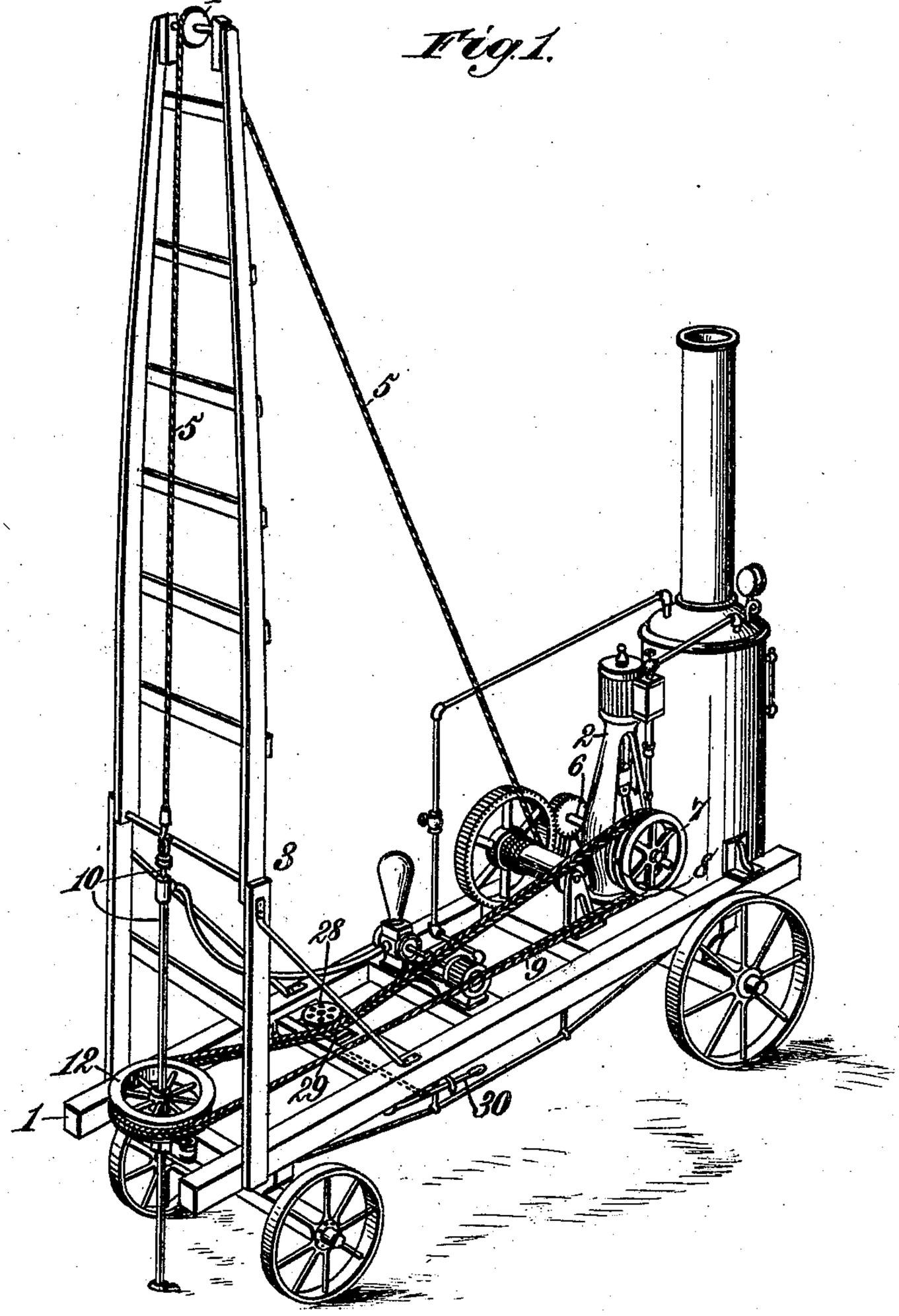
2 Sheets—Sheet 1.

S. MacEACHEN.

APPARATUS FOR DRILLING WELLS.

No. 503,051. Patented Aug. 8, 1893.

Fig. 1.



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(No Model.) 2 Sheets—Sheet 2.

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APPARATUS FOR DRILLING WELLS.

No. 503,051. Patented Aug. 8, 1893.

Fig. 2.

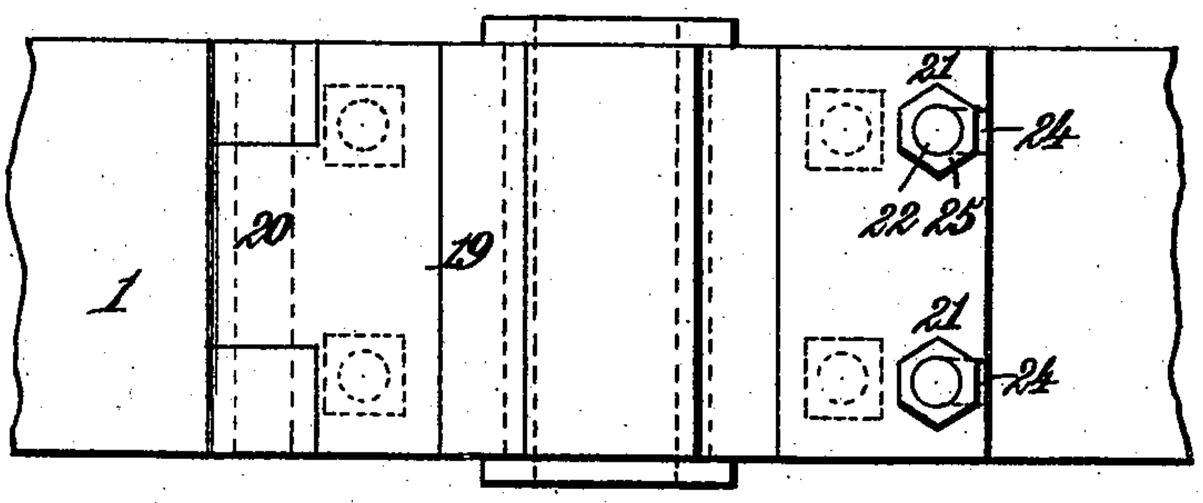


Fig. 3.

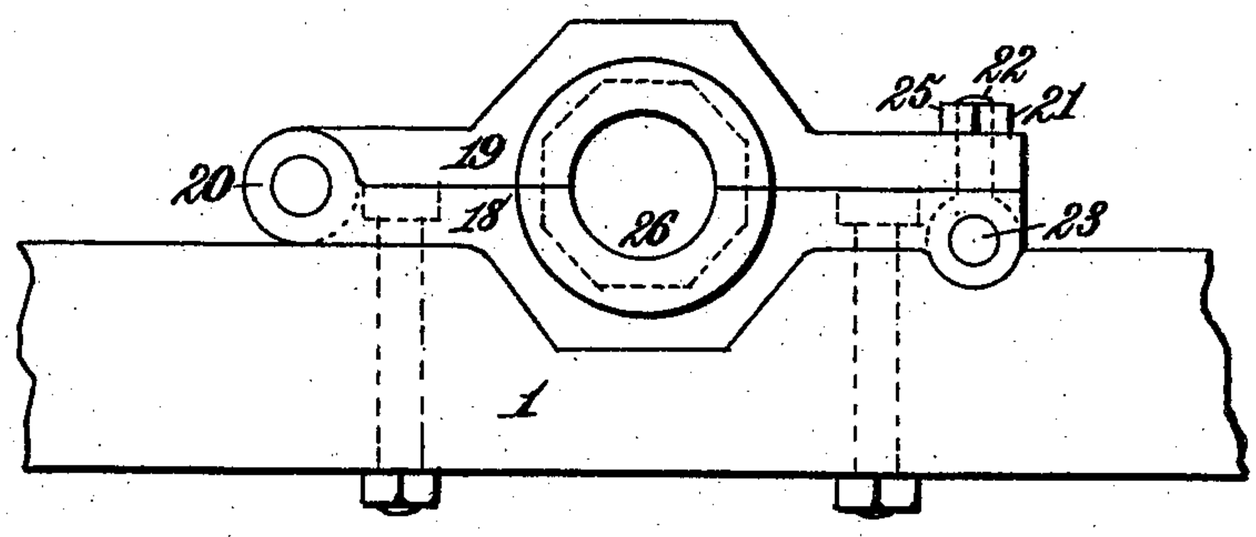


Fig. 4.

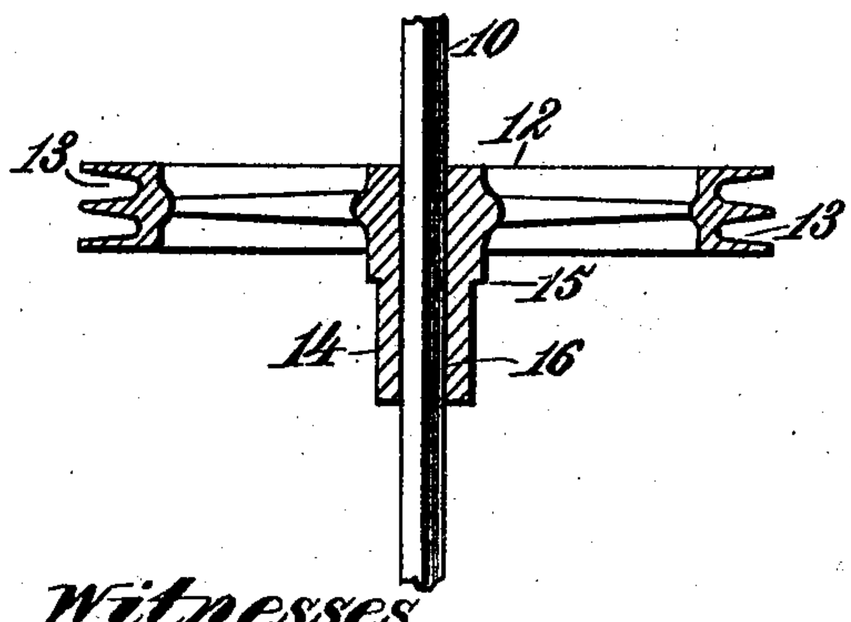
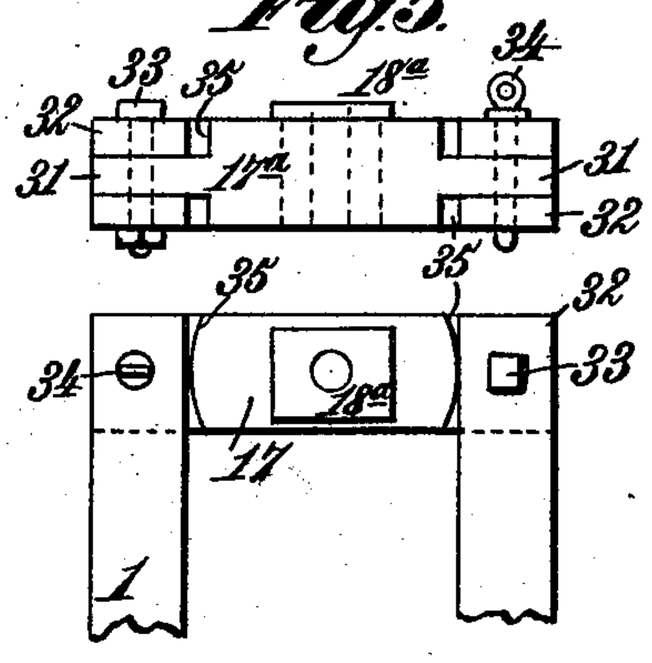


Fig. 5.



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UNITED STATES PATENT OFFICE.

SAMUEL MACEACHEN, OF SCRANTON, PENNSYLVANIA, ASSIGNOR OF ONE-HALF TO THOMAS J. FOSTER, OF SAME PLACE.

APPARATUS FOR DRILLING WELLS.

SPECIFICATION forming part of Letters Patent No. 503,051, dated August 8, 1893.

Application filed January 16, 1893. Serial No. 458,525. (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 Apparatus for Drilling Wells, of which the following is a specification.

My invention relates to mechanism for drilling Artesian and other wells, or for core-drilling in prospecting quarries, or for penetrating strata where the use of such methods is expedient.

It is the purpose of my invention to provide a simplified, non-positive gear-connection between the main driving-pulley of a drilling-mechanism and the pulley on the drill-stem, the construction and arrangement being such that a slip of the said gear-connection is provided for whenever the drill-stem offers a resistance equal to the force by which the operative engagement of said connection is maintained, whereby the danger of breaking, or injuring the drill, or twisting, bending or otherwise damaging the drill-stem is avoided. This portion of my invention also comprises the provision of means whereby the belt-connection between the driving pulley and the pulley on the drill-stem is maintained at a suitable, but variable tension, and is brought into proper relations with the faces of both of said pulleys; the oppositely moving parts of said belt also being thereby brought practically into the plane of rotation of the driving-pulley which is on a suitable shaft, and also into the plane of rotation of the driven pulley, said pulleys having axes lying at any angle, one to the other.

It is a further purpose of my said invention to provide and combine with the drill-stem a detachable bearing, whereby the drill-stem may be pulled up and the core removed without involving the necessity of digging and removing the earth, or of elevating the supporting-frame of the drilling mechanism, in order to obtain access to the core, when the latter is withdrawn.

For the purposes and to the several ends specified my invention consists in the several novel features of construction and new combinations of parts hereinafter fully explained and then particularly pointed out and defined in the claims which follow and form part of this specification.

To enable others skilled in the art to which said invention pertains to fully understand and to make and use the same, I will now proceed to describe said invention in detail, reference being had for such purpose to the accompanying drawings, in which—

Figure 1, is a perspective view of a drilling mechanism organized in accordance with my invention. Fig. 2, is a detail view in face-elevation upon an enlarged scale, of the detachable bearing for the drill-stem. Fig. 3, is a detail plan-view of the parts shown in Fig. 2. Fig. 4, is a detail view of the pulley mounted on the drill-stem, or spindle. Fig. 5, is a detail view in two parts, showing a slightly modified construction of the detachable bearing for the drill-stem.

The reference numeral 1 in said drawings indicates the supporting-frame of a well-drilling, or core-drilling machine of any preferred type, that shown in the drawings being portable, for which purpose the frame 1 is placed upon wheels, in any suitable or preferred manner. While this is the preferred form, in many cases, my invention is not, in any respect, limited by this or other features of specific construction save as hereinafter distinctly explained.

Upon suitable portions of the frame 1 are mounted the engine 2, and the derrick, or rope-supporting-frame, 3, on which is mounted the pulley 4, over which is led the rope, or cable 5, attached to the end of the drill-stem and used either for pulling up the latter and raising the core, when core-drilling is employed, as well as for counteracting the gravity of the drill-stem, the former being constantly lengthened as the process of drilling is continued.

The numeral 6 indicates the main driving-shaft of the engine, upon which is mounted in the ordinary manner the main driving-pulley 7, which is provided, in the present instance, with a plurality of grooves, or peripheral channels 8, adapted to receive and guide a single rope, or cable-belt 9, by which power is transmitted from the main driving-pulley.

At the end of the frame 1 supporting the

derrick 3, the drill-stem or spindle 10 is arranged, said stem consisting of a non-circular rod, or bar, and either solid, or tubular, its construction, in these respects, being independent of any specific restrictions. For example, I may use a rectangular, hexagonal, octagonal, or other angular form of stem, or I may substitute a stem which is elliptical, or oval, in cross-section, this being the mechanical equivalent, for the purposes of my invention, of any one of the angular forms specified. This drill-stem, or spindle, is supported by the cable 5, in the ordinary manner, and is united to the sectional parts, by which said stem or spindle, is lengthened periodically, as the drilling continues, by any of the well known devices suitable for such purpose. Upon said drill-stem or spindle 10 is mounted a pulley 12, having a plurality of peripheral channels 13, corresponding to those formed in the face of the main driving pulley 7. The pulley 12 is provided with a hub 14, which is prolonged upon one side of said pulley, for a purpose presently to be explained. The exterior of this prolonged hub is of cylindrical form throughout the greater portion of its length, the cylindrical portion terminating at a circumferential shoulder 15, located a little outside the plane of the adjacent flat face of said pulley. Within said hub 14 is formed an opening 16, extending through the same and concentric with the pulley, said opening having such correspondence in form with the drill-stem, or spindle 10, that the latter shall fit within the said opening closely enough to compel the parts to rotate in unison, but not so closely as to prevent the drill-spindle, or stem, from moving longitudinally in the opening 16.

Upon the frame 1, in suitable proximity to the derrick 3, is mounted a bearing 17, having such construction that it will afford journal-support to the pulley 12, but permit the ready detachment and removal of the latter. My invention is, in this respect, obviously compatible with different constructions of a bearing of this class, but I prefer to use the construction of which the form shown in Figs. 2 and 3, is a type. Such a bearing consists, essentially, of two parts, viz., a rigid member 18, which is bolted or otherwise fastened to the frame 1, and a movable or detachable member 19, which is suitably connected to the rigid member 18. This connection is preferably effected by hinging one end of the member 19, as shown at 20, and providing one or more suitable fastenings 21, to lock the other or movable end, in its closed position; a convenient form of such fastening being the catch, or latch-bolt, 22, one, or more, of which is pivotally mounted upon a pintle 23 in such manner that the shank of such bolt may turn into and out of a slot, or notch 24, in the end of the part 19, a nut 25 being turned upon the threaded end of the latch-bolt to clamp the end of the hinged member 19 firmly in place. In each of said members 18 and 19 is a semicircular seat 26, the circular opening formed by closing the parts being adapted to receive the prolonged hub 14 of the pulley 12 and support the latter, the shoulder 15 resting upon the top of the bearing.

The main driving-pulley is geared to, or operatively connected with, the drill-pulley 12 by means of the cable-belt 9. As this connection is intended to be non-positive, the operative engagement is maintained by friction, only, and as circumstances may render it necessary to vary the frictional contact, and, moreover, as it is desirable to bring the oppositely traveling portions of the cable belt 9 into the respective planes of revolution of the driving and of the driven pulleys. To effect both these results I provide a movable, or adjustable belt-tightening pulley 28, preferably journaled upon a sliding support 29, and operated by any suitable form of lever 30. This belt tightening device is so located that it engages that portion of the cable belt which is most remote from the plane of revolution of the main driving-pulley 4, and thereby draws the part upon which it presses toward and into, or nearly into, said plane, the latter being prolonged hypothetically toward the drill-pulley to aid this explanation. To render this arrangement in all respects perfect, the prolonged plane of revolution of the main driving-pulley should be tangent, or nearly so, to one side or the other of the driven pulley, or drill-pulley 12, as shown in Fig. 1. That portion of the belt, therefore, coming from, or upon, the other side of the drill pulley will diverge from the said plane at an angle proportioned to the diameter of the pulley last named and to the distance between the two axes of rotation. By increasing the tension of the cable-belt, under these conditions, the diverging portion thereof is not only brought substantially into the plane of revolution of the main driving-pulley, the shaft of which is at any angle, but it is also caused to closely approximate the different plane of revolution of the drill-pulley 12, and to draw the cable belt over a greater periphery of the drill pulley, thus increasing the area of frictional contact and the intensity thereof. The belt-tightening pulley is grooved circumferentially, like the driving and drill-pulleys, to engage the said cable-belt. By its adjustment the required power may be imparted to the drill-stem or spindle, and if necessary this power may be considerably increased by enlarging the diameter of the drill-pulley 12. As the gear, or belt-connection is not positive, however, any material obstruction to the revolution of the drill, will cause the cable-belt to slip upon one or the other of its pulleys and permit the drill and its spindle to cease rotation. This function preserves the drilling tool from fracture, and where diamond, or other similar drills are used, it will prevent the destruction of the teeth, and avoid the danger, also, of twisting the spindle, or stem, as well as other injuries. As many of the

drilling-tools in use are of costly materials and construction, this immunity from injury, or breakage, is very essential to economical work.

By providing the detachable bearing 17, I not only enable the operator to pull up the drill and its spindle or stem, at any moment, but I also render it possible to raise a core of any length without removing the soil, in order to obtain access to said core and remove the same after it is brought to the surface. As these cores are always of considerable length, and may be of any length compatible with the tensile strength, or cohesion, of the particles of the stratum from which it is taken, it is obvious that, in raising such cores, either the bearing for the drill-pulley must be so far elevated as to allow the lower extremity of said core to clear the surface, or the surface-soil must be removed upon one side to a depth sufficient to permit the core to be raised as far as the mountings of the drill-pulley will allow, and to expose the lower extremity of said core by said excavation after it has been raised to its maximum height. Practically speaking, neither of these methods are feasible. By my invention I am enabled to completely avoid the necessity of resorting to either, since by merely removing, or releasing the drill-pulley from its bearing-support, the core-holder may be hoisted to the height of the rope-pulley at the top of the derrick. By my invention, therefore, the work of drilling may commence as soon as the drilling-apparatus is located at the proper point.

While I prefer the form of bearing last referred to, as being more convenient in some respects, I substitute therefor, in many instances, the modified form of bearing shown in Fig. 5, in which a single bearing takes the place of the two-part bearing heretofore referred to. In this modification, the reference-numeral 17ª indicates the end-bar or head block of the machine frame, which consists of a single block of any suitable material having at or near its center a bearing 18ª for the support of the drill-stem and drill-pulley. Said bearing may be of any preferred form suitable for the purpose, its construction being so familiar as to require no special description. The two extremities 31 of the end-bar, or head-block 17ª are of such form as to enable them to have detachable engagement with the side-bars of the frame 1, as, for example, by entering between the arms 32 of forked extremities of said side-bars, the engagement being maintained by a bolt and nut 33, at one end, and a pin 34 at the other end. The shoulders of the end-bar are trimmed to form rounded faces 35 and allow the bar to turn freely at either end upon the bolt 33, or pin 34.

The manner of operating this device is obvious. By withdrawing the pin 34 the drill-stem and drill-pulley can be swung to one side, to give the hoisting devices unobstructed access to the parts to be raised, or pulled up. Or, if preferred, the head-block 17ª may be removed bodily by simply disconnecting both its ends.

What I claim is—

1. In an apparatus for drilling wells and other like purposes, the combination with a main driving-pulley mounted upon a suitable driving shaft, of a drill-pulley mounted on the drill-stem, or spindle, a non-positive cable-belt connecting said pulleys, one of the two oppositely moving portions of said belt lying substantially in the plane of revolution of the driving-pulley said plane being tangent to one side of the drill-pulley, and an adjustable belt-tightening pulley engaging the other or second portion of said belt and drawing the same into, or nearly into, the said plane of revolution and toward the different plane of revolution of the drill-pulley, substantially as described.

2. In an apparatus for drilling wells and like purposes, the combination with a main driving-pulley and a drill-pulley having their axes at an angle to each other, of a non-positive cable belt connecting said pulleys, a belt-tightening pulley engaging one portion of said belt and drawing it into, or nearly into the plane of the other portion, a non-circular drill-stem, or spindle, longitudinally movable in a central opening in the drill-pulley, and a movable bearing for the latter, whereby the drill-pulley and spindle may be removed to enable the hoisting-devices to have access to the core, or other part to be hoisted, substantially as described.

3. In an apparatus for drilling wells and like purposes, the combination with a main driving pulley and a drill pulley having their axes at an angle to each other, of a non-positive cable-belt connecting said pulleys, a belt-tightening pulley engaging one portion of the said belt and drawing it practically into the plane of the other portion, a non-circular drill-stem or spindle longitudinally movable in a central opening in the drill pulley, and a bearing for the latter having one part movable to receive and release a prolongation of the hub of the drill-pulley, substantially as described.

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

SAMUEL MACEACHEN. [L. S.]

Witnesses:
CHAS. L. HAWLEY,
WM. D. BOYER.