

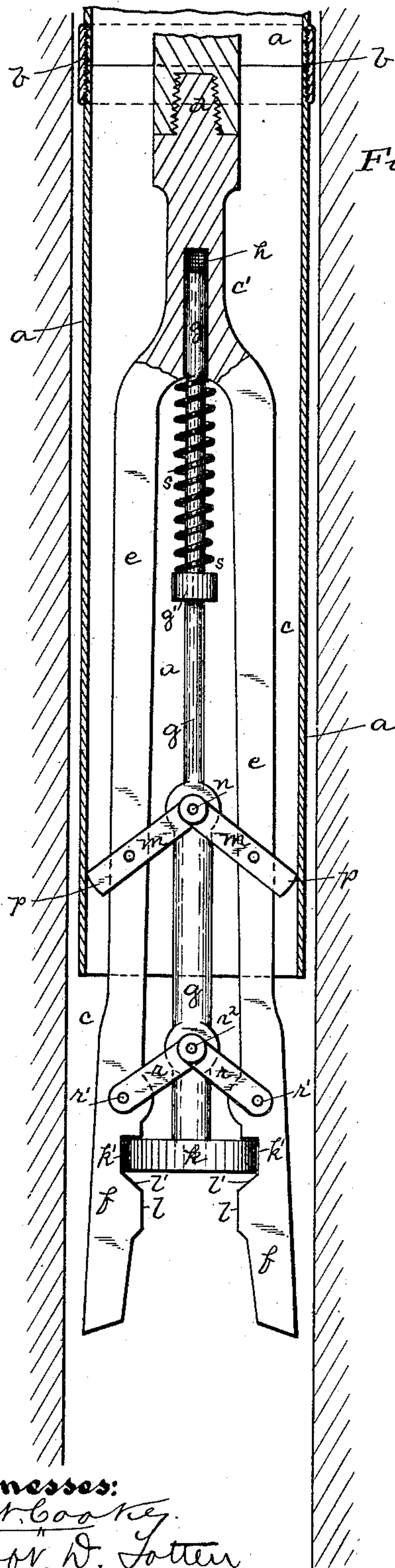
(No Model.)

P. YORKE.

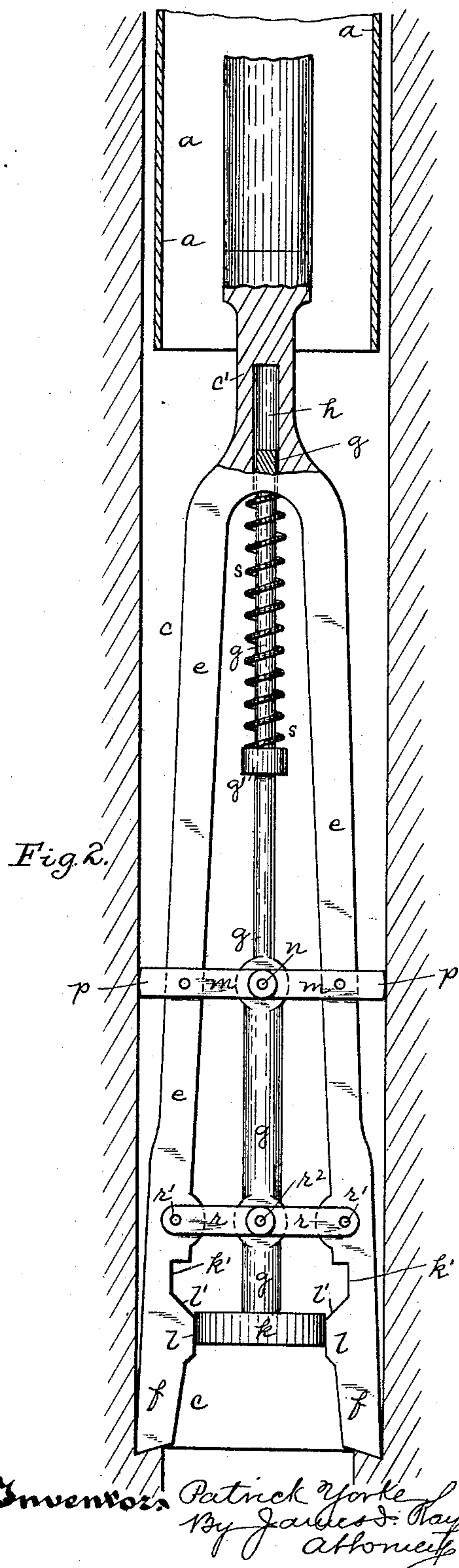
APPARATUS FOR DRILLING ARTESIAN WELLS.

No. 475,913.

Patented May 31, 1892.



Witnesses:
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UNITED STATES PATENT OFFICE.

PATRICK YORKE, OF WASHINGTON, PENNSYLVANIA.

APPARATUS FOR DRILLING ARTESIAN WELLS.

SPECIFICATION forming part of Letters Patent No. 475,913, dated May 31, 1892.

Application filed May 4, 1891. Serial No. 391,493. (No model.)

To all whom it may concern:

Be it known that I, PATRICK YORKE, a resident of Washington, in the county of Washington and State of Pennsylvania, have invented a new and useful Improvement in Apparatus for Drilling Artesian Wells; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to tools for drilling oil and other Artesian wells, its object being to provide what might be termed an "under reamer or tool" for drilling through tubing, which may be inserted in the well for the full diameter for which the well had heretofore been drilled by means of an expanding reamer, which can be inserted through the well-tubing and expanded below the same and then contracted so as to be withdrawn.

The present invention consists, generally stated, in certain improvements in such class of reaming-tools, as will be hereinafter fully described and claimed.

To enable others skilled in the art to make and use my invention, I will describe the same more fully, referring to the accompanying drawings, in which—

Figure 1 is a view illustrating the manner of introducing the reamer into the well and passing it down through the tubing thereof and withdrawing the tool, and Fig. 2 is a like view illustrating the manner in which the tool is employed for under reaming.

Like letters of reference indicate like parts in both figures.

The well-tubing *a* is usually made in sections about eighteen feet in length, and is connected by threaded coupling sockets or collars *b*, screwed around the outer faces thereof, so requiring the bore of the well to be of a diameter sufficient to receive the tubing and the coupling-sockets, as shown. The ordinary well varies in different parts from thirteen inches in diameter to five and one-half inches, according to the different points at which a drilling operation is carried on and according to the number of lines of tubing within the well; but for the ordinary drilling it may be presumed that the well is of the full bore of thirteen inches. The under reamer

c has formed at its upper end a threaded pin *d*, by which it is connected to the ordinary string of tools within the well, such as to the drill-jars, and above that to the rope. The reamer is formed with the two arms *e e* extending down from the upper or body portion *c'* thereof and having formed at their lower ends reaming-bits *f f*, the arms *e e* being spring-arms and being naturally adapted to spring out as soon as they are released by the mechanism hereinafter described. When so released, as shown in Fig. 2, the reaming-bits *f f* are adapted to extend out a sufficient distance to ream out the well to a diameter sufficient to receive the tubing—that is, in the illustration above referred to to a diameter, say of thirteen inches. When the tool is closed up, however, as shown in Fig. 1, the entire tool may be passed down through the tubing *a*, so that it may be inserted within the well and withdrawn therefrom when necessary. This is accomplished in the following manner. Sliding between the two arms *e e* of the reaming-tool is the central bar *g*, the upper end of which fits within the socket *h*, while its lower end carries what I have termed the "wedge" *k*, which wedge, when the tool is closed to pass through the tubing, fits into seats *k'* in the arms *e e*, but which wedge, when it is lowered in the manner hereinafter described, is adapted to enter the space between the shoulders *l l* on the inner faces of the arms *e e* and hold the reamer open, expanding the arms a sufficient distance to enable it to ream out the well to the full diameter required, the wedge *k* being guided in its course from the seats *k'* to between the shoulders *l* by the inclines *l'*. If desired, the seats *k'* may be dispensed with and the wedge *k* be made of smaller diameter, while the shoulders extend in farther than illustrated, for some tools this being desirable in order to prevent the weakening of the arms *e*. The central bar *g* is connected to the arms *e e* by two sets of levers, the upper levers *m* being hinged or pivoted to the bar at *n*, and their free ends *p* extending beyond the arms *e* in such position that as soon as the levers *m m* pass below the base of the line of tubing they may extend beyond it, as shown in Fig.

2, so as to permit the opening to the tool and the passage of the wedge k between the shoulders l , but said free ends p of said levers bearing upon the inner face of the line of tubing 5 when the tool is lowered through the well, and also providing means for closing the tool when it is desired to withdraw the same from the well, the free ends of the levers striking against the base of the tubing and being forced inwardly and downwardly thereby, and so drawing upwardly the wedge k and drawing together the two arms of the reamer. Below said levers m and just above the wedge k I also employ the links r , connected to the arms 15 e at r' and to the bar g at r'' , said levers acting to limit the spread of the reaming-tool and acting with the wedge k to hold the same rigid during the reaming operation. In order to force down the central bar g , and so cause the opening of the tool as soon as the levers 20 m pass the base of the tubing, I employ a heavy spring s , confined around the bar g and between the top or body c' of the tool and the collar g' on the bar, which spring will act to force the bar g downwardly as soon as the free ends p of the levers m will permit the spreading of the tool, and will so act to force the wedge k between the shoulders l , said spring also acting to resist the heavy strain or jar 30 which might come upon the tool in the reaming operation, and might act to cause the closing thereof by jarring the wedge k from between the shoulders l .

The invention may be practiced and the improved reaming-tool may be employed in different ways, according to the work to be done. For example, let it be supposed that a line of tubing has been carried down into a well the desired distance—such, for example, to cut off 40 a vein of salt water—and that the driller encounters a strata of treacherous or caving rock and that he has difficulty in drilling through the same. In such cases, instead of working through the strata of caving rock and then putting in a second line of tubing, he would 45 simply raise the tubing a sufficient distance to permit the reaming-tool to work under the same and hold the tubing in that position. He would then close together the reaming-tool and insert it within the tubing and permit it to pass down within the well. As it is 50 passing down through the tubing the free ends p will bear against the inner face of the tubing and hold the reamer in its closed position; but as soon as the levers m pass below the base of the tubing the spring s will force down the central bar g through the levers m and links r , extending the tool and at the same time forcing the wedge k between the 55 shoulders l of the arms e , and so locking the tool in its extended position. By raising and lowering the tool in the ordinary operation the driller is then enabled to ream out the well to the full diameter sufficient to receive

the line of tubing, and he can continue to 65 ream out the well until he gets below the difficulty encountered, such as until he gets below the caving rock, and at the same time he can protect his reaming-tool, or, for that matter, the drilling-bit, which can operate through 70 the tubing by suspending the line of tubing sufficiently close to the tool to prevent any rock from falling in and clogging or wedging around the tool, and so locking it within the well. When it is desired to withdraw the reaming-tool from the well, it is only necessary to 75 draw up thereon with sufficient pressure to overcome the force of the spring s , when as the free ends p of the levers m strike the lower end of the line of tubing they will be forced downwardly and inwardly and will force the central bar g upwardly, so as to compress the spring and withdraw the wedge k from between the shoulders l , so providing for the drawing 80 of the tool within the tubing, and the free ends p of the levers m will hold the arms e of the reamer in their closed position, so that the reamer may be drawn through the tubing. If desired, the operator in starting his well may employ a smaller diameter of tubing and may 90 tube or case his well continuously for any distance he may find desirable, simply drilling through the tubing, and then by means of the under reamer ream out the well to a sufficient diameter to receive the tubing and then lowering the line of tubing, adding section by 95 section thereof at the upper end.

By my invention I provide for the drilling of all wells without the necessity of inserting a separate length of tubing extending from 100 below any particular obstruction to the top of the well, as I am enabled to employ but one diameter and one line of tubing within the well. I am also enabled to drill the well by lowering the tubing, at the same time to hold 105 back any caving rock which might act to clog or lock the tools within the well, so overcoming the danger of the loss of the tools or the loss of the well, and providing easy means of passing through any strata of caving rock encountered. I also reduce to a great extent 110 the cost of drilling such wells by the saving in the cost of the tubing employed.

What I claim as my invention, and desire to secure by Letters Patent, is— 115

1. A reamer for Artesian wells, having two arms carrying bits at the lower ends thereof, a central bar longitudinally movable with relation thereto, and lever connections extending between and connected to said arms, said 120 bar to provide for the closing and expanding of such arms, said levers having free ends adapted to extend beyond the arms of the reamer, substantially as and for the purposes set forth.

2. A reamer for Artesian wells, having two arms carrying bits, a central bar longitudinally movable with relation thereto and car- 125

rying a wedge at the base thereof, and the levers pivoted to said bar and arms and having the free ends extended beyond the arms, substantially as and for the purposes set forth.

5 3. A reamer for Artesian wells, having two arms carrying bits, a central bar *g*, longitudinally movable with relation thereto and carrying the wedge *k* at the base thereof, the levers *m m*, pivoted to said bar and arms and
10 having the free ends *p* and the links *r*, piv-

oted to said bar and arms near said wedge-block, substantially as and for the purposes set forth.

In testimony whereof I, the said PATRICK YORKE, have hereunto set my hand.

PATRICK YORKE.

Witnesses:

J. N. COOKE,

ROBT. D. TOTTEN.