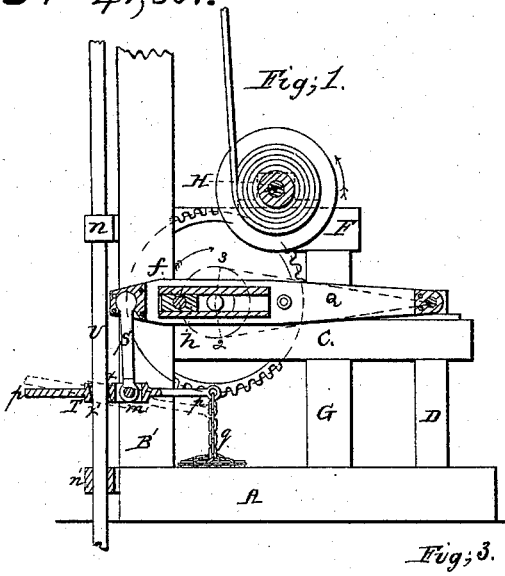
H. Howson,

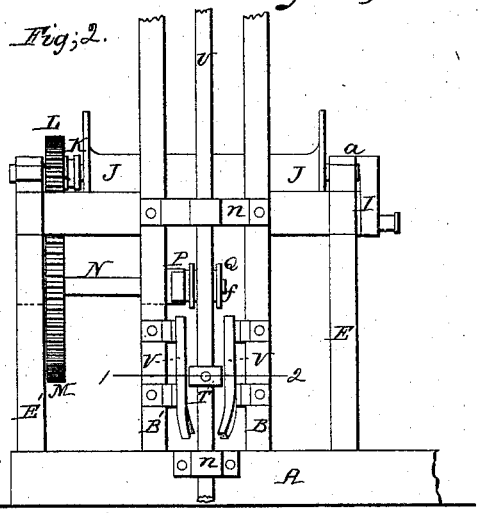
Boring Artesian Wells.

No. 47,897. Patented May 23, 1865.

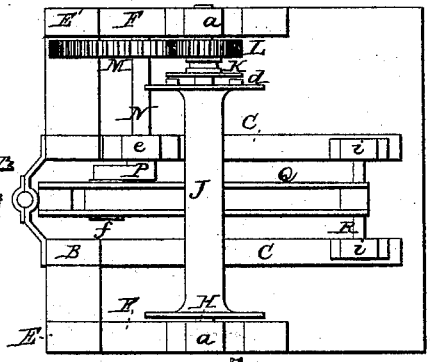
Fig; 1.



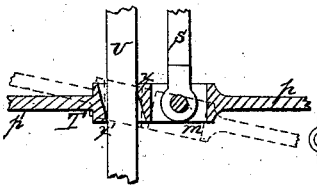
Fig; 2.



Fig; 3.

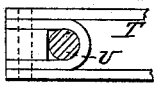


Fig; 11.

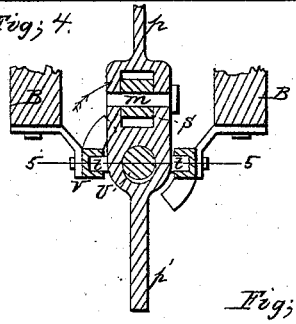


Fig; 9.

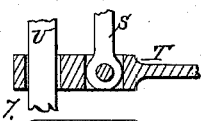
Fig; 10



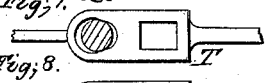
Fig; 4.



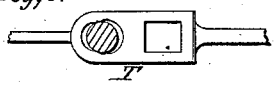
Fig; 6.



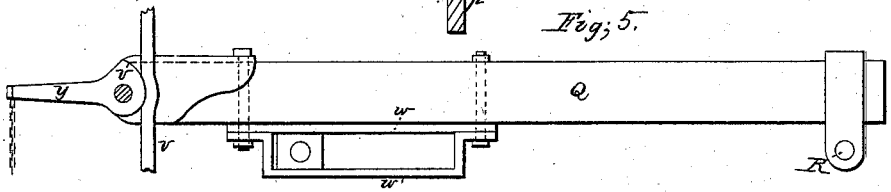
Fig; 7.



Fig; 8.



Fig; 5.



Witnesses;
Wm Albert Steel.
Chas B Price.

Inventor;
Henry Howson

UNITED STATES PATENT OFFICE.

HENRY HOWSON, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO WILLIAM WHARTON, JR., OF SAME PLACE.

IMPROVEMENT IN WELL-BORING.

Specification forming part of Letters Patent No. **47,897**, dated May 23, 1865.

To all whom it may concern:

Be it known that I, HENRY HOWSON, of Philadelphia, Pennsylvania, assignor to WM. WHARTON, Jr., of the same place, have invented certain Artesian-Well Boring and Pumping Mechanism; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

My invention consists of certain mechanism (fully described hereinafter) to be used in boring for oil, the main advantages of my invention being its ready applicability to the boring of wells, to pumping, to the raising and lowering of boring-rods, to which advantages may be added those of simplicity, cheapness, and lightness as regard construction, rapidity of action, economical and judicious disposal of power, and the lateral turning of the boring-bar without the aid of an attendant.

In order to enable others skilled in the art to make and use my invention, I will now proceed to describe its construction and operation.

On reference to the accompanying drawings, which form a part of this specification, Figure 1 is a vertical section of my well boring and pumping machinery; Fig. 2, a front view of the same; Fig. 3, a plan view; Fig. 4, a sectional plan of part of the apparatus on the line 1 2, Fig. 2, drawn to an enlarged scale; Fig. 5, a modified plan of constructing the vibrating beam; Figs. 6, 7, and 8, modifications of the grasping and releasing lever; and Figs. 9 and 10, further modifications of the same; Fig. 11, an enlarged view of part of Fig. 1.

Similar letters refer to similar parts throughout the several views.

The base A consists, in the present instance, of a substantial frame of wood, and to this base, at the front of the same, are secured the two uprights or spars B and B′, to each of which is secured one end of a beam, C, and the rear of each of these beams is supported by an upright, D. Two other uprights, E and E′, are secured, one to each corner of the base A, and to each of these is secured one end of a horizontal bar, F, supported at the opposite end by an upright, G.

In suitable boxes, *a a*, secured to the beams F F of the frame, turns the driving-shaft H, which may derive its motion directly from an engine secured to the frame-work. A winding-barrel, J, is so adapted to the driving-shaft H that it can turn freely thereon when the clutch K is out of gear with the projection *d* on one end of the said barrel, this clutch being arranged to slide to and fro in the driving-shaft, but not to turn independently of the same, and being controlled by a lever or other suitable mechanism within reach of the attendant. A pinion, L, on the shaft H gears into a cog-wheel, M, on the shaft N, which turns near one end in a box, *e*, secured to one of the longitudinal beams C, the other end turning in a similar box secured to a cross-beam attached to the uprights E′ and G. On the inner end of the shaft N is a crank, P, the pin *f* of which passes through a block, *h*, adapted to an elongated opening in the vibrating beam Q, and to the rear end of the latter is secured a shaft, R, adapted to boxes *i i*, secured to the horizontal beams C. To the outer end of the vibrating beam Q a rod, S, is connected, (in the present instance by a ball-and-socket joint,) the lower end of the rod being jointed by means of a pin, *m*, to the lever T, which serves to grasp and release the boring-rod U, the latter being guided by the upper and lower brackets, *n* and *n′*, secured to the frame. The opening in this lever T, through which the boring-bar passes, is of the form or approximating to the form represented in Fig. 11, so that when the outer end of the vibrating beam Q is elevated the upper and lower edges, *x* and *x′*, of the said opening in the lever will bear hard against the boring-bar, the latter being thus grasped firmly by the lever and elevated with the latter. The outer end of the arm *p* of the lever is connected by a chain or cord, *g*, to the frame of the machine, for the purpose described hereinafter. From each side of the grasping-lever projects a pin, *t*, so situated that a line, 5, drawn through the two pins will pass through the center of the boring-bar U, as best observed on reference to Fig. 4, and each pin is adapted to a guide V, secured to the frame-work of the apparatus. The lower end of each guide is bent, as seen in Fig. 4, the bend being such that when the lever T approaches the limit of its downward movement it will be turned round the boring-bar as a center to a limited extent

in the direction of the arrow, Fig. 4. A rotary motion having been imparted to the driving-shaft I in the direction of the arrow, the shaft N will turn in the direction of its arrow, Fig. 1, and consequently a vibrating motion will be imparted to the beam Q and a reciprocating movement to the connecting-rod S. As this lever descends, it will slide freely down the boring-bar U, owing to the peculiar shape of the opening through which the boring-bar passes, and as the lever approaches the limit of its downward movement it will, as before remarked, be turned to a short distance, owing to the bent or curved guides V, in the direction of the arrow, Fig. 4. The moment the upward movement of the beam Q commences the lever T will seize the boring-bar U with a firm grasp, and, as the lever rises and its pins *t t* are controlled by the bent guides, it must of necessity be turned back in a direction contrary to that pointed out by the arrow, Fig. 4, carrying with it the boring-bar U. As the lever with the boring-bar in its grasp approaches the limit of its upward movement, the chain or cord *q* becomes tight and causes the lever to assume the inclined position shown in red lines, Fig. 11, when it will be released from its hold of the boring-bar, which is at liberty to fall, to be followed by the descending lever, which again grasps the rod, and a repetition of the above-described movements takes place. As the beam Q continues to vibrate, therefore, the rod U is raised, turned partly round, and released, and permitted to fall, the distance of this fall being regulated by the length of the chain or cord *q*.

The above-described mechanism has been especially designed for use in the oil regions, and the main objects aimed at, and, it is believed, fully attained, may be enumerated as follows: first, simplicity in construction of parts, so that unskilled hands may be employed as attendants, and so that repairs when necessary can be readily made by comparatively inexperienced artisans; secondly, lightness and compactness, so that the apparatus can be conveyed without difficulty to distant points over rough roads; thirdly, so constructing the apparatus that it can be used for either boring, pumping, or winding; fourthly, economical expenditure of power; fifthly, the turning of the boring-bar without the aid of an attendant.

The shaft N might be driven directly by the engine without the aid of the cog-wheels and shaft H, but two important advantages are obtained by their employment in the manner described. First, the small engine should, to operate economically, run much faster than the boring or pumping rod is required to reciprocate, by the use of the cog-wheels—therefore the engine may operate at the desired fast speed, while the movements of the vibrating beam operate at the requisite slow rate; second, the shaft H is made available as medium for carrying a barrel, by the aid of which the periodical raising and lowering of the boring-bar and other appliances is accomplished.

The crank and slotted beam afford the best medium for an economical distribution of the power of the engine.

In either boring or pumping the greatest power is required in lifting the boring or pump rods, and this lifting is accomplished while the pin *f* of the crank P is traversing in a circle in the direction of the arrow from the point 2 to the point 3, Fig. 1, and as the crank-pin is farther from the beam's fulcrum or center of vibration while taking this course between the points indicated than it is while traversing from the point 3 to the point 2, it will be evident that much greater force is exercised in raising than in lowering the beam. The latter rises much slower than it descends; hence the desired result of a slow and powerful force exercised in raising the boring or pump rod, while but little time is lost in performing the lighter duty of lowering the grasping-lever preparatory to seizing the boring-rod or in lowering the pump-rod.

When the mechanism is required for hoisting purposes, all that is necessary is to move the clutch K into gear with the barrel, the rope on which passes over a pulley on the top of the uprights B and B′, which may be carcarried to any desired height above the base.

When the boring of a well has been completed, the pump-rods may be readily connected to the vibrating beam after the removal of the grasping lever.

As regard simplicity in construction, it will be evident to any expert mechanic that the apparatus contains no machinery of an elaborate or costly character or difficult to repair, the grasping-lever being especially light and simple when compared with the cumbrous and costly mechanism heretofore employed for accomplishing the same purpose.

As regard compactness, the arrangement of the machine is such that the entire apparatus, including an engine of sufficient power, may be contained within a space of less than six feet long, seven feet broad, and six feet high, excluding the posts B and B′, which are of necessity made much higher.

If a rope with a drill at the end be used for boring, the lever T has simply to be made with an opening suitable for the rope, which is grasped and released in the same manner as the rod, or the rope may be attached directly to the beam, the descent of which is so rapid as to move nearly as fast as the rope and its boring-tool would by their own weight.

Fig. 5 represents a more simple mode of constructing the vibrating beam of wood, the elongated opening for the sliding block of the crank-pin being formed by two plates, *w* and *w′*, secured to the under side of the beam to which the rope *v* is confined by means of a cam, *v′*, the shape and arrangement of the latter being such that on elevating the beam the cam will be self-tightening.

The advantages of the slotted beam, with its differential movement, over the ordinary walking-beam, which has an upward and downward movement alike, will be at once understood when it is borne in mind that rapidity in the descent of the rope is essential to the proper working of the boring-tools. If desired, a lever, *y*, may be attached to or form a part of the cam *v'*, and a chain or cord may be attached to this lever and to any permanent part of the frame, so that when the cord becomes tight the cam will be so moved as to release the rope.

The grasping-lever T may be modified in form without departing from the main feature of this part of the invention. It may be made, for instance, in the form illustrated in Fig. 6, of which Fig. 7 is a plan view, and Fig. 8 an inverted plan. In this instance the lever is arranged to grasp the sides of the rod, or the lever may be made in the manner shown in Figs. 9 and 10, which will be readily understood without description. In either case the same main principle is involved—namely, that of causing the force exercised in raising the boring or pumping rods to be transmitted through a leverage to insure a firm hold on the rod by the grasping-lever. It will also be evident that the frame-work and other parts of the machine may be modified without departing from the invention, and that a driving-belt or simple friction-wheels may be used in place of the wheels L and M, although I prefer the latter.

I claim as my invention and desire to secure by Letters Patent—

1. The combination of the crank I, its pin, and the lever Q with the drill-rod or rope of well-boring apparatus, the whole being arranged and operating substantially as set forth, for the purpose specified.

2. The arrangement, substantially as described, of the driving-shaft H, its winding-barrel J, the clutch K, or its equivalent, cog-wheels L and M, or equivalent driving-gear, the crank-shaft *h*, and beam Q.

3. The lever T, adapted to the boring-rod or drill-rope, and constructed for grasping and releasing the same, substantially as set forth.

4. The said grasping and releasing lever, in combination with the bent or curved guides V V, or their equivalents, whereby the said lever is caused to turn laterally to a limited extent, in the manner and for the purpose described.

5. The combination of the said grasping-lever with the chain or cord *q*, or the equivalent to the same.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

HENRY HOWSON.

Witnesses:
JOHN WHITE,
W. J. R. DELANY.