(No Model.)

S. S. BOLTON.

MEANS FOR SINKING ARTESIAN OR TUBULAR WELLS.

No. 454,451. Patented June 23, 1891.

Fig. 1

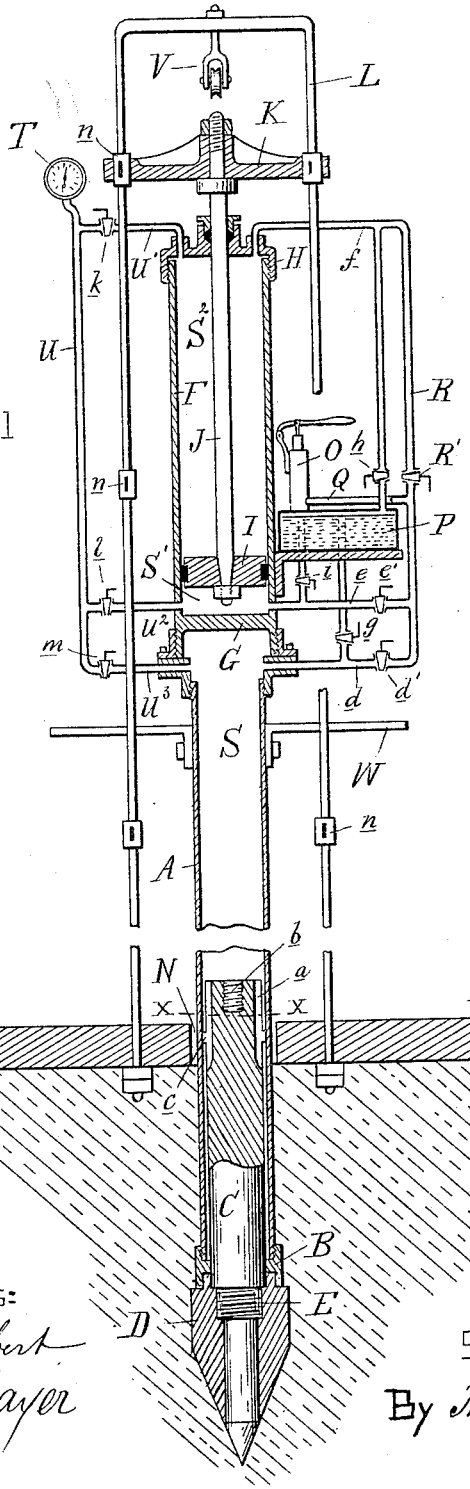
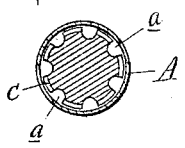


Fig. 2



Witnesses:
P. M. Hulbert
J. Paul Mayer

Inventor:
Samuel S. Bolton
By Thos. S. Sprague & Son
Atty.

UNITED STATES PATENT OFFICE.

SAMUEL S. BOLTON, OF BIG RAPIDS, MICHIGAN, ASSIGNOR OF ONE-HALF TO CHARLES A. OHLSON, OF SAME PLACE.

MEANS FOR SINKING ARTESIAN OR TUBULAR WELLS.

SPECIFICATION forming part of Letters Patent No. 454,451, dated June 23, 1891.

Application filed December 27, 1888. Serial No. 294,763. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL S. BOLTON, a citizen of the United States, residing at Big Rapids, in the county of Mecosta and State of Michigan, have invented certain new and useful Improvements in Means for Sinking Artesian or Tubular Wells, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to new and useful improvements in means for sinking Artesian or tubular wells by means of hydraulic power; and the invention consists in the peculiar application of hydraulic power, in combination with apparatus designed to carry out the operation.

To this end I carry out my invention by means of apparatus which operates by means of two hydraulic rams, one forming a piston in the tubular casing to be driven and carrying at its lower end the well-tube point. By the application of hydraulic power into the casing the piston is pushed out through the lower end of the casing, while the casing is held stationary, and after being pushed out a certain distance the casing is pushed out after it by the operation of another hydraulic ram operating on top of the casing. This ram is a cylinder with two heads secured on top of the casing in the vertical axis thereof, and has for its hydraulic head a piston, which is made stationary relative to the ground by securing it to a vertical anchor-frame, and this piston forms two pressure-chambers within the cylinder or ram, whereby by the application of hydraulic pressure either above or below the piston the cylinder or ram is lifted up or pushed down to pull the casing out of the ground or to push it into the ground, as desired. The hydraulic pressure is obtained by means of a suitable pump in the usual manner, and which pump has suitable connection with the interior of the well-tube to be driven and which forms the pressure-chamber for a piston-ram in the casing and with the pressure-chambers formed above and below the piston in the cylinder.

My invention also consists in the peculiar construction and arrangement of the different parts of the apparatus, whereby suitable provision is made to meet all the different contingencies in sinking such wells, all as more fully hereinafter described, and shown in the accompanying drawings, in which—

Figure 1 shows my apparatus in elevation as it appears in operation, the casing and some other parts of the apparatus being shown in vertical section. Fig. 2 is a cross-section on line X X in Fig. 1.

A is the casing to be driven. B is a packing-ring secured to the lower end thereof.

C is a piston forming a tight joint through the packing-ring B.

D is a well-tube point secured to the lower end of the piston by means of a screw-thread connection E.

a represents one or more small grooves upon the outer face of the piston at the upper end thereof.

b is a screw-threaded socket upon the upper end of the piston, and *c* is a collar near the upper end of the piston to prevent the piston from falling out of the tube.

F is a cylinder secured to the upper end of the tube A in the axial line thereof by means of a suitable coupling.

G is the lower head, and H is the head on the upper end of the cylinder.

I is a piston in the cylinder. J is the piston-rod.

K is a cross-head secured upon the upper end of the piston-rod.

L is an upright frame, to which the ends of the cross-head K are secured, and this frame is secured to the bed M, which is firmly anchored to the ground, and is provided with a suitable aperture N, through which the casing passes into the ground.

O is a pump.

P is a cistern from which the pump draws its water.

Q is a discharge-pipe from the pump.

R is a vertical pipe communicating therewith and having the branches *d*, *e*, and *f*. The branch *d* leads into the pressure-chamber S, formed within the tubular casing below the head G of the cylinder and is controlled by a valve *d'*. The branch *e* leads into the pressure-chamber S' between the piston I and the head G and is controlled by a valve *e'*, and the branch *f* leads into the pressure-chamber S'', formed between the

piston and the head of the cylinder and is controlled by the valve R′.

g, *h*, and *i* are waste-valves for the branches *d*, *e*, and *f*, and through which the water may be wasted or conducted into the cistern P.

T is a hydraulic indicator, and U is a pipe connecting this hydraulic indicator through the branches U′, U″, and U³ with the pressure-chambers S, S′, and S″, said branches U′, U″, and U³ being controlled by suitable valves *k*, *l*, and *m*.

V is a suitable hoisting-tackle secured to the top of the frame M.

W is a platform detachably secured to the casing for the operator to stand on.

In practice, the parts being constructed and arranged for operation as shown and described, they are intended to operate as follows: By opening the valve *d′* and *m* and closing all the other valves and then operating the pump O the water will be forced into the pressure-chamber S, formed within the casing, and after it becomes filled with water the piston C becomes a hydraulic ram and is driven out through the lower end of the casing, thereby driving the well-tube point D into the ground in advance of the casing until the grooved upper end of the piston passes through the packing and forms an exit for the water. The valve *m* being opened at the same time while driving the well-tube point, the hydraulic pressure is indicated on the indicator T, and when the work of driving the well-tube point to the required distance is accomplished it will be indicated by a sudden drop of the pressure on the indicator. Likewise an abnormal increase in the hydraulic pressure will clearly indicate an obstruction requiring drilling, for which contingency certain provisions are made in the construction of the parts, as will be explained hereinafter. The next operation after the well-tube point is driven down is to drive the pipe after it. This is done by opening the waste-cock *g* and the valves *e′* and *l* and closing all the other valves. By setting the pump in motion again the water is pumped into the pressure-chamber S′, while the water from the pressure-chamber S can escape through the waste-valve *g*. The pressure thus raised in the pressure-chamber S′ acts against the hydraulic head G, and thereby forces the casing down into the ground. At the same time the indicator being in communication with the pressure-chamber S′, the pressure indicated thereon will show when the work is completed. By the alternate repetitions of these operations the casing is thus driven into the ground. As soon as the piston I has reached the top of the cylinder it has to be lowered, and this is done readily by opening the waste-cock *i* and lowering the cross-head K on the frame, which latter for this purpose is provided at requisite distances apart with suitable means, such as the unions *n*, which are placed at intervals equal to the distance of the travel of the piston and to which the cross-head is keyed or secured in any other suitable manner. After one section of the casing is thus driven the apparatus may be raised by means of the hoisting-tackle V on top of the frame and another section of the tubing secured to the casing and to the apparatus, and the operation is continued as before. When water is reached, the piston C can be taken out and a screen secured in its place, as in the usual construction of drive-wells.

For the purpose of removing the piston the screw-socket *b* is formed in the upper end of the piston to make a suitable connection with the piston from the surface, and to unscrew it from engagement with the screw-thread E in the well-tube point the two screw-threads are respectively right and left.

Should it be necessary to draw the casing to prevent its being injured in case drilling or blasting is required through meeting rock or any other hard substance, the piston is taken out and the casing is lifted up by means of hydraulic power applied in the pressure-chamber S″, suitable connection being made therewith from the pump through the pipe R and the branch F by opening the valve R′.

If drilling has to be resorted to, the well-tube point D is secured to the packing-box B and the drilling-tool is applied through the aperture in the well-tube point.

In case it should be necessary to put a smaller tube inside the first tube the piston is taken out and a smaller tube put down inside the first with a smaller piston to fit the same, and the work is proceeded with as before.

Thus it will be seen that my apparatus is contrived to meet all the different contingencies arising in the art of driving Artesian or tubular wells, and with a well-rig to carry out the object of my invention the work of sinking Artesian or tubular wells is greatly simplified and is calculated to form an important advancement in the state of the art.

What I claim as my invention is—

1. The combination, with the well-tube point, the casing, and a movable cylinder mounted on top of the casing, of two hydraulic rams adapted to alternately drive the well-tube point and the casing, the one forming a piston within the lower end of the casing and carrying the well-tube point, and the other consisting of a stationary piston in said cylinder and forming an upper and lower pressure-chamber therein, and means for alternately supplying water under pressure to said pistons, substantially as described.

2. In a means for driving Artesian or tubular wells, the combination, with the casing, of the piston-ram secured in the lower end of the casing and carrying the drive-point, the cylinder-ram secured on top of the casing, the piston on which said cylinder reciprocates and which divides it into two pressure-chambers, the cross-head to which the upper end of the piston-rod which carries the piston is secured, the upright frame anchored to the

ground and to which the ends of the cross-head are adjustably secured, the pump, and the valve-controlled connections from said pump with the pressure-chamber in the tube, the pressure-chamber below and the pressure-chamber above the piston, all substantially as described.

3. In a hydraulic apparatus for driving Artesian or tubular wells, the combination, with the casing, of the piston C, carrying the well-tube point, the cylinder secured on top of the said casing and provided with the cylinder-head G, which serves also as the head for the lower pressure-chamber S, formed by the casing, the piston I in the cylinder, the pressure-chambers S′ and S″, the piston-rod J, the head H on top of the cylinder, the cross-head K, carrying the piston-rod, the anchored frame L, the pump O, the cistern P, and the valve-controlled connections of the pump with the pressure-chambers, the valve-controlled waste-connections of the pressure-chamber with the cistern, the hydraulic indicator, and the valve-controlled connections of the indicator with the pressure-chambers, all substantially as described.

4. In an apparatus for driving Artesian or tubular wells, the combination, with the casing, of the stuffing-box B, secured to the lower end thereof, the well-tube point D, provided with the screw-threads E, the piston C, provided with the screw-socket *b* and with the groove or grooves *a* on its upper end, and the cylinder F, having its head G secured on top of said casing and forming a pressure-chamber in the casing, the piston in said cylinder dividing it into two pressure-chambers for supplying water under pressure, substantially as described.

In testimony whereof I affix my signature, in presence of two witnesses, this 17th day of December, 1888.

SAMUEL S. BOLTON.

Witnesses:
I. E. MORGAN,
ANDREW HANSON.