(No Model.) 2 Sheets—Sheet 1.

M. T. CHAPMAN.

APPARATUS FOR AND PROCESS OF SINKING WELLS.

No. 443,069. Patented Dec. 16, 1890.

Fig. 1.

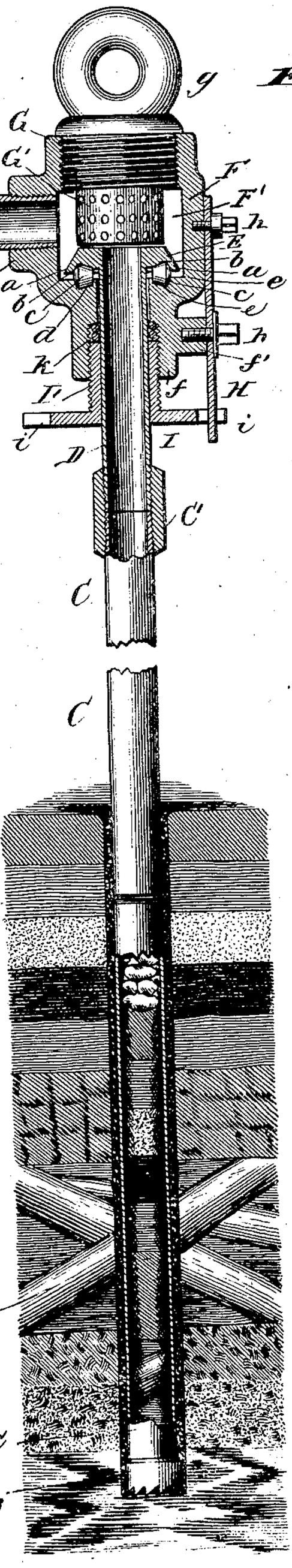


Fig. 2.

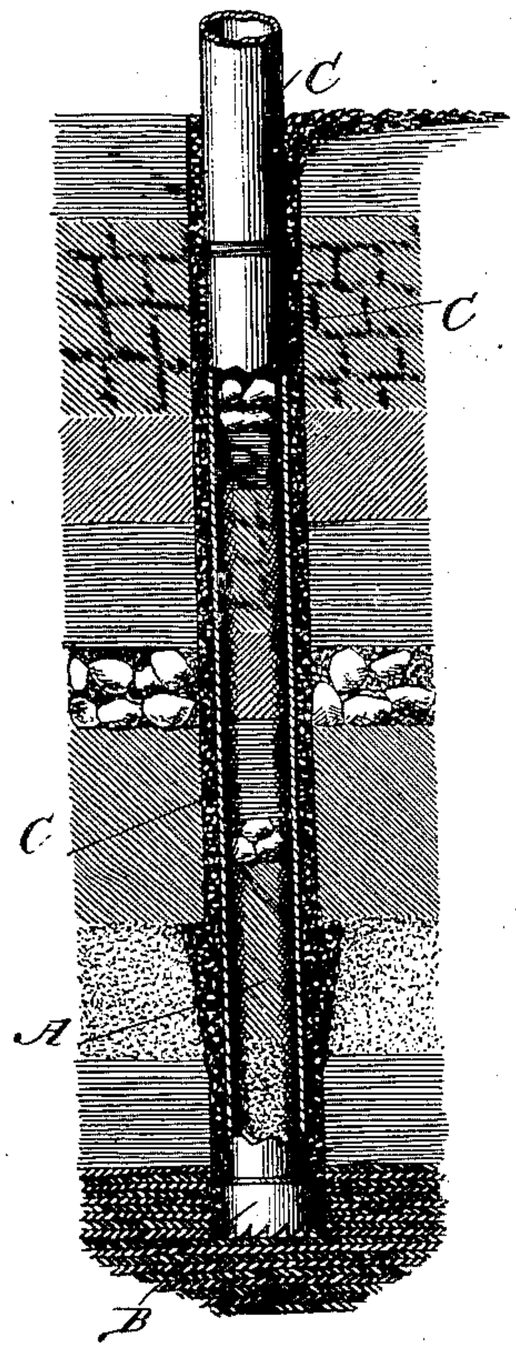


Fig. 3.

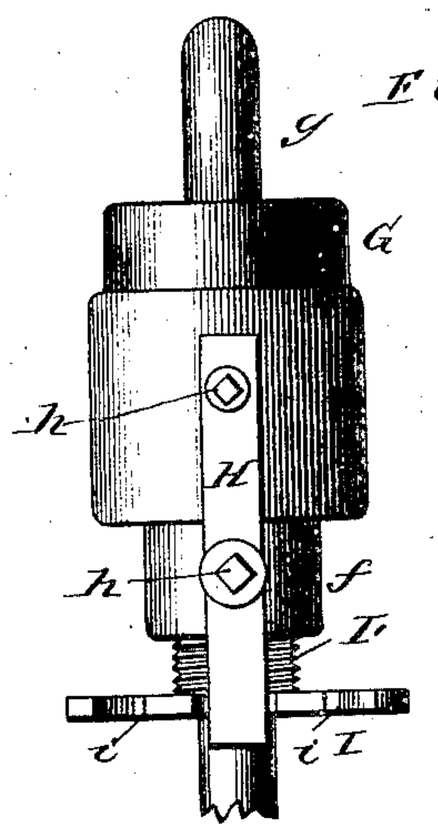
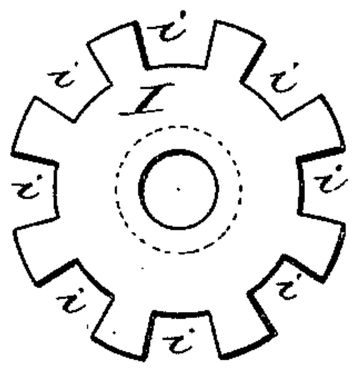


Fig. 4.



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(No Model.) 2 Sheets—Sheet 2.

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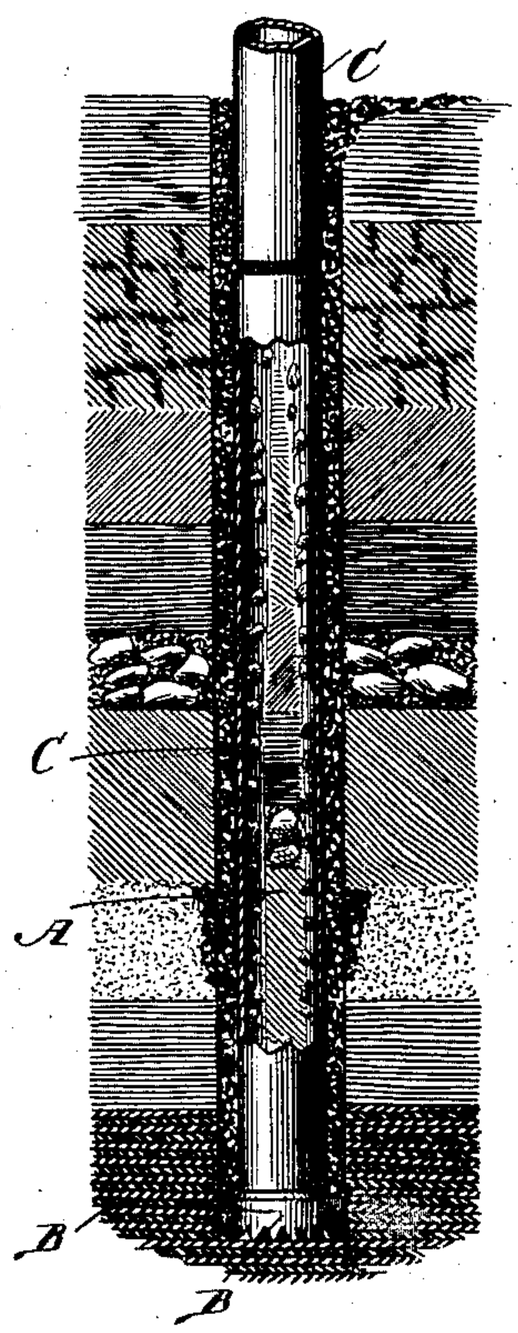
APPARATUS FOR AND PROCESS OF SINKING WELLS.

No. 443,069. Patented Dec. 16, 1890.

Fig. 5.



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UNITED STATES PATENT OFFICE.

MATTHEW T. CHAPMAN, OF AURORA, ILLINOIS, ASSIGNOR TO HIMSELF AND MARK C. CHAPMAN, OF SAME PLACE.

APPARATUS FOR AND PROCESS OF SINKING WELLS.

SPECIFICATION forming part of Letters Patent No. 443,069, dated December 16, 1890.

Application filed May 24, 1887. Serial No. 239,249. (No model.)

To all whom it may concern:

Be it known that I, MATTHEW T. CHAPMAN, residing at Aurora, in the county of Kane and State of Illinois, and a citizen of the United States, have invented a new and useful Improvement in Apparatus and Process for Sinking Wells, of which the following is a specification, reference being had to the accompanying drawings, in which—

Figure 1 is an elevation, partly in section, showing the tubing, the core cut by the tool, and the head for connecting the apparatus with the hoisting-rope and connecting a water-supply hose or tube; Fig. 2, a detail, being an elevation of the wall or tube, partly in section, and showing the tool in the earth; Fig. 3, an elevation of the connecting-head, showing the locking devices; Fig. 4, a detail of the locking-disk for the connecting-head. Fig. 5 is a sectional detail view illustrating a mode of forming an impervious wall of clay or other material around the well-tubing during the operation of sinking a well through a sandy or porous stratum.

This invention relates to an apparatus to be used for sinking a pipe-well, and embraces in its features of construction and operation a cutting-tool secured to the lower end of the tubing or piping, so that a drilling-rod is formed thereby, an improved connecting-head between the piping or tubing and the hoisting-rope, an improved arrangement by which a core is cut and left in the tube for use in filling spots of sand or gravel through which the water used in sinking will percolate and flow away, thereby stopping the successful operation of the tool, and a general improvement in the devices and operations of sinking tube-wells by means of cutters and an inflow of water to keep the cutters free and clear, and also clearing the hole cut, so as to leave a free passage for the tubing; and its nature consists in the several parts and combinations of parts hereinafter described, and pointed out in the claims as new.

In the drawings, A represents the core, which is cut out by the action of the cutter.

B is the cutter, made of steel and provided on its acting end with a series of teeth of the form shown or other form that will cut the soil and other material through which the well is sunk. This cutter is screw-threaded, so as to be secured to the lower end of the first section of the tubing or piping and has a cutting diameter somewhat larger than the diameter of the tube or pipe with which it is used, so as to leave a free passage for the tube or pipe.

C are the sections of the tubing or piping.

D is a tube, screw-threaded at one end to enter the coupling C′, which connects with the pipe-section C and forms a continuous tube of the pipe-sections C and tube D.

E is a head upon the upper end of the tube D, and, as shown, this head has at its periphery an overhanging lip *a*, inside of which is a groove *b*, having an inclined face to correspond with the inclined faces of the anti-friction rollers *c*, and these anti-friction rollers run in a groove *d*, formed in the bottom *e* of the opening of the shell in which the head E is located. The tube D and head E form in effect a swivel, and the anti-friction rollers *c* are for the purpose of overcoming the friction of the devices in use, so as to leave the tubing or casing, with which it is connected, free to be revolved.

F is a coupling or shell having an interior opening F′ for the head E.

G is a plug having an exterior screw-thread to enter the screw-threaded opening in the coupling F, and this plug has a hollow extension G′, the wall of which is provided with holes through which water can pass to enter the tube D, and this extension G′ is of a length to enter the opening F′, with its end in close proximity to the end of the head E to hold it on the anti-friction rollers and prevent its being thrown up in the operation of the devices.

H is a catch, made of a strip of spring-steel or other suitable material and attached to the side of the shell F and to a boss *f*′, projecting out from the extension *f* of the shell by suitable screws *h*.

I is a disk having in its periphery a series of notches *i* to receive the end of the catch H, and this disk has a screw-threaded thimble I′, which enters a screw-threaded opening in the extension *f* of the shell F, and, as shown,

in order to make a water-tight joint between the thimble and shell F a packing *k* is inserted at the end of the thimble and around the tube D.

The plug G has formed therewith an eye *g* for the attachment of the rope by which the mechanism is operated in raising and lowering by a suitable derrick and rope, the derrick not being shown, as it may be of any of the usual and well-known forms of construction.

J is a pipe screw-threaded into a boss *j* on the shell F, and connected with the chamber F′ and with a hose or other pipe leading to a water-supply for supplying the water to be used in cutting the hole by the cutter B.

The catch H locks the plate I, which, in connection with the thimble I′, forms a stuffing-box against withdrawal from the rotation of the tube D, and between the cap of the plug G and the abutting end of the shell E suitable packing is to be provided, so that the thimble I′ will be water-tight, insuring the flow of the water into the tubular extension G′, and thence into the tube D and down the piping or casing C, and this flow into and through the tube C will cause an outflow at the bottom through the serrations of the cutter B and pass up outside of the tubing or casing and carry with it the cuttings.

The operation is as follows: The first length of tubing or casing, with the cutter B thereto attached, is inserted in a suitable mechanism, by which it can be rotated, and its upper end is connected with the swivel-tube D by the coupling C′, and the pipe J has connected thereto a hose or other tube leading to the water-supply. The rotating mechanism is started, causing the cutter B to act, and the core formed by the cutter enters into the tubing or casing, as shown in Figs. 1 and 2, and this core is acted upon and gradually worn away by the action of the water supplied to the tubing or casing and the friction of the tubing or casing in its rotation, and the material thus worn away is carried down with the water and passes out through the openings formed by the acting end of the cutter, and as the water supplied through the tube J is at a higher head than the surface of the earth, or under the pressure of a force-pump or other power, such water will pass up outside of the tubing or casing, carrying with it the material forced out by the inflow, leaving a clear opening for the passage of the tubing or casing. The path or opening cut by the tool B will pass through the different strata of the earth and in its course is liable to meet with sand or gravel, through which the water will percolate, and such a stratum when reached will be indicated by the water ceasing to outflow on the outside of the tubing or casing; and in a case like this the tubing or casing is to be raised a few times, which will allow the clay and other close earthy substances, of which a sufficient quantity will usually be found in the core, to pass down and out and form a wall around the tubing or casing at the point where the water percolates, through which wall the water cannot pass, and will again rise and flow out at the top of the ground, and such wall, impervious to water, can be formed wherever a stratum of sand or gravel through which water will percolate is met, and this without removing the tubing or casing from the hole. The core itself will ordinarily furnish enough clay and other close earthy material for forming a wall impervious to water in a stratum of sand or gravel; but in case there should not be enough material in the core to form a wall clay or other suitable material can be inserted in the tubing or casing at the top, to be carried down by the water and pass out at the cutter-head and form a wall, as shown in Fig. 5, the tubing or casing being raised to allow the material to escape and force it into the bed of sand or gravel. The water stratum when reached will be indicated by the water rising above the surface and coming up with the overflow, as with this mode of forming a well there is a perfect hole made, into which the tube fits loosely, making a good conduit for the water, and a further indication that water has been reached will be disclosed by the material that escapes with the overflow, as when gravel or sand is reached it will come out with the overflow, and if no clayey matter is mixed therewith, it, with the water indication, will show that water has been reached, and in the event of reaching water without a sufficient amount of sand or gravel for filtering purposes a quantity sufficient for the water to be filtered can be supplied by filling the tubing or casing with gravel or other material—such as broken shells, stones, bricks, charcoal, or other material—to press down and form a bed, through which water will percolate and be filtered.

It sometimes occurs that beds of water are found in clayey material through which a well could not be formed, and in such a case, by the use of the means hereinbefore described and shown in the drawings, a bed of gravel or sand for the water to pass through can be formed by allowing clean gravel or sand or other material that will form a bed to pass down through the tubing or casing and out at the bottom and raising the tubing as in forming a clay wall. This will form a tube of gravel or sand or other filtering material that will convey water through it, and such water will rise to a point where a pump can reach it, or if the head of the supply is sufficiently high the water will flow of its own accord. The wall, at a stratum of sand or gravel in sinking the well, can be formed by the clay or other close earthy material in the core itself, or by inserting clay in the tubing or casing to pass down and out, or by inserting other material such as gumbo, bran, rice, grain, or other flexible and adhesive material that will fill the porous sand or gravel and pack or cement itself together to produce a wall impervious to water, and in places where the soil

is suitable a wall can be made by inserting cement and revolving the tubing or casing slowly and forcing the water gently down so that its current will not wash the cement away, and in forming a wall of clay or other material the water is to be graded as to pressure and flow so that it will act and pack the material firmly and also furnish the means of reducing the material to a proper condition to be packed. The pressure of the water will furnish a resistance by which the caving in of the wall will be prevented.

What I claim as new, and desire to secure by Letters Patent, is—

1. The cutter B and tubing or casing C, in combination with the swivel-connections D E, anti-friction rollers *e*, shell F, plug G, having the perforated tubular extension G′, and water-supply J, for sinking a well and forming a core in the tubing or casing, substantially as and for the purpose specified.

2. The process of boring and sinking a well through porous strata, which consists in rotating a tubular well-casing having on its lower end a cutter that leaves the end of the tubular casing open and conveying through said tubular casing a stream of water and a quantity of plastic material, whereby the core formed in the casing will be washed out and an impervious wall be formed around the exterior of the casing to constitute a conduit along the outside of said casing for the flow of water and cuttings to the surface, substantially as described.

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Witnesses:

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