

No. 671,429.

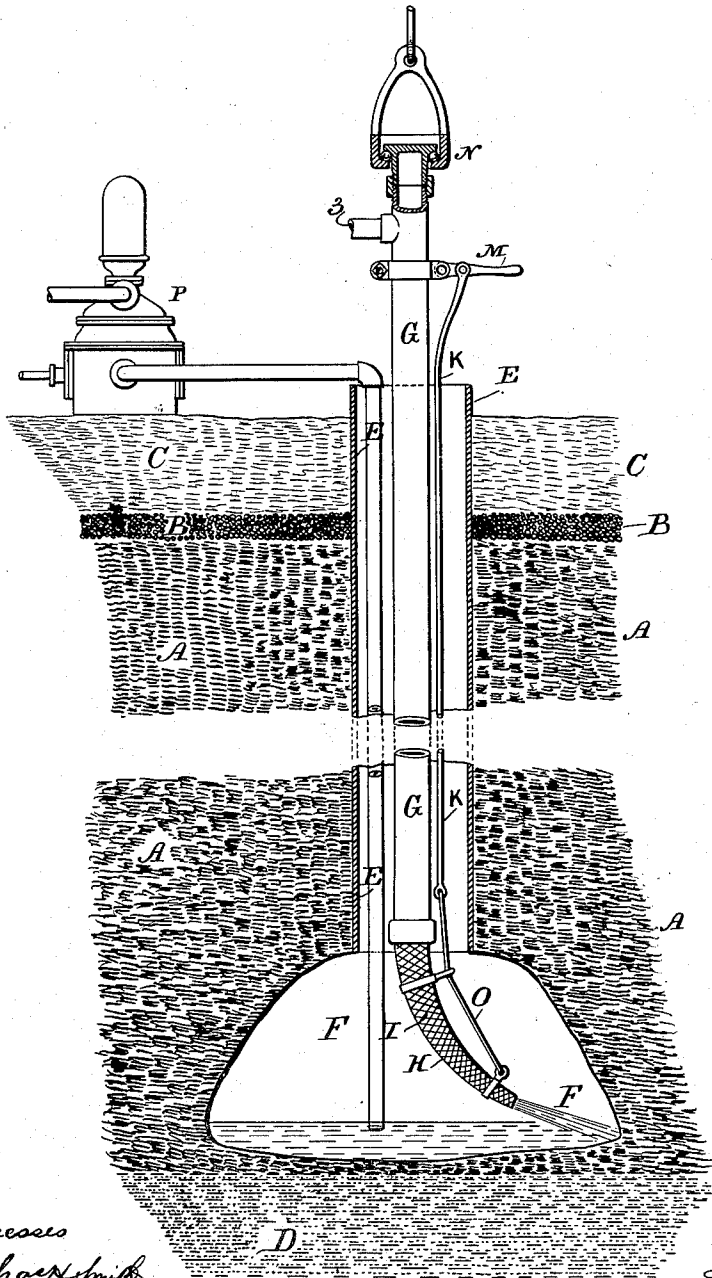
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J. E. BACON.

PROCESS OF MAKING OR IMPROVING WELLS.

(Application filed June 14, 1898.)

(No Model.)



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UNITED STATES PATENT OFFICE.

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PROCESS OF MAKING OR IMPROVING WELLS.

SPECIFICATION forming part of Letters Patent No. 671,429, dated April 9, 1901.

Application filed June 14, 1898. Serial No. 683,431. (No model.)

To all whom it may concern:

Be it known that I, JAMES E. BACON, a citizen of the United States, residing in the city and State of New York, have invented a Process of Making or Improving Wells, of which the following is a specification.

There are many places where a water-bearing sand is covered with an impervious clay or hard pan of considerable depth, and under these circumstances the water-bearing sand is often very fine, so that it fills in and obstructs the well even when a fine netting is employed or when the well-tube is slotted vertically or longitudinally with very narrow slots, and the consequence is that the well-tube that passes into the fine sand frequently has to be withdrawn and cleaned or else repaired owing to the sand cutting the pipe at places where the slot may have become sufficiently wide to allow the sand to pass through, and in this instance the water carries the sand along with it and not only fills up the well, but injures the pumping apparatus in consequence of considerable of the sand passing off with the water that is raised.

The present improvement relates to a well passing down through the impervious clay or hard pan to near the bottom thereof, there being a large chamber excavated in the impervious strata, and a sufficient pressure of water is maintained in the chamber to prevent the head of water in the water-bearing sand breaking through the bottom of the chamber, and after such chamber has been excavated by the action of water and an apparatus hereinafter described the bottom of the chamber is broken up by water-pressure, so that the top of the water-bearing sand becomes the bottom of the chamber, and gravity will retain the sand in position, and the extent of area of the bottom of the chamber allows the water to pass up from the sand gradually into the chamber without the sand being carried with the water to the discharging apparatus, so that strainers of every character are dispensed with, the water being drawn from the chamber excavated in the impervious strata.

In the drawing I have illustrated the present improvement by a vertical section.

The impervious strata of clay or hard pan

is illustrated at A, and above this usually is a layer of gravel B and loam or earth at C. These vary in relative thickness at different places, and the water-bearing strata is represented at D, the same being composed of sand, which usually is quite fine.

In preparing the well I sink a suitable pipe E of sufficient size to contain the water-raising apparatus, which may be an ordinary pumping device or an air-lift water-raising apparatus, and in some instances the pressure of water in the water-raising strata is sufficient for the water to overflow at the surface of the ground. This pipe E is not extended down to the water-bearing strata D; but it is stopped at a sufficient distance from the same for a chamber F to be excavated, and this is effected in the following manner: A water-supply pipe G is provided with a flexible nozzle H at the lower end, which nozzle is advantageously of rubber with a metallic armor I, that is flexible, and the rod K extends down the well, either inside or outside the water-pipe G and connects with a flexible band or rope O, that is fastened to the exterior end of the nozzle H, so that by the lever M the flexible nozzle H can be curved more or less, as required; and I remark that the height of the well-tube E is to be such that a column of water contained therein will exert a greater pressure than the pressure of the water in the water-bearing strata D, and the pipe G is properly suspended, preferably by rollers or ball-bearings at N, so that such pipe G can be revolved, and with it the nozzle H, and water under a suitable pressure and advantageously in a hot condition is forced down the pipe G and discharged from the nozzle H, and the pipe G is revolved progressively, so that the water issuing from the nozzle H dissolves and washes away the impervious clay in the strata A, and the water holding this clay in suspension rises in the well-pipe E and runs away and may pass into a settling-tank in which the solid materials subside, and the water is again heated and forced down the pipe G, and these operations are continued until a chamber F of the desired size is excavated by the action of the water. It is important that the bottom of this chamber F should not be disturbed down to the water-bearing strata until the

chamber F has been excavated to the desired size, and then the impervious layer at the bottom of the chamber F is to be broken up, so as to open the chamber to the strata of water-bearing sand.

In consequence of the column of water in the pipe E counterbalancing the pressure of the water in the sand D there will be no tendency for the sand to fill into the chamber F, and the bottom of the chamber F can be excavated in any desired manner. I, however, prefer to pump out water from the pipe E until the level of the same is lowered sufficiently for the pressure of water in the water-bearing strata D to break up the bottom of the chamber F, and then the washing operation can be continued until the clay has been dissolved and washed away, the same overflowing the upper end of the well-pipe E or being pumped out of such pipe E until the water becomes clear, the manipulation of the nozzle H being continued until all the soluble matter of the impervious clay or strata is removed from the chamber F, and the sand of the water-bearing strata forms the bottom of such chamber, after which water-elevating mechanism, such as a pump or air-lift, is to be introduced into the well E to take the water-supply from the chamber F and deliver the same at any desired elevation.

If the water-pressure in the water-bearing stratum is known, as will frequently be the case, it is advisable to keep a depth of matter in the chamber F and pipe E equivalent to or greater than the pressure in the water-bearing stratum during formation and enlargement of the chamber, and subsequently when the well is completed and in operation the water should not be drawn from the well at such a rate as to cause the sand or loose material in the water-bearing stratum to be carried downward into the chamber. Therefore chamber F is to be of such a size, having regard to the volume of water to be taken off from the well, that the water will percolate through the sand at the bottom of the chamber F without materially disturbing the same, whereby the chamber will be maintained substantially free from sand that would otherwise rise in the said chamber and finally choke it.

I have represented at 3 a connection to the water-pipe G, through which hot water can be supplied to wash and dissolve the clay of the impervious strata in forming the chamber F, and I remark that usually the nozzle H will be directed downward in the first part of the excavating operation, and then it will be gradually turned into a horizontal position as

the pipe and nozzle are revolved to cause a jet of water to wash away the impervious clay and excavate the chamber F without such chamber becoming filled during the operation by the fine sand of the strata D.

In instances where a torpedo has been exploded for the purpose of forming a chamber at the bottom of a well the sandy materials are frequently of such a character that they pack tightly and interfere with the water-supply.

In the present instance the materials are loosened and washed out and disturbance of the strata is avoided, and should the chamber become partially filled it may be easily washed out by using this apparatus again in the well.

I have illustrated a pump at P by which the water and earthy material can be pumped out to whatever extent is required, or a pressure may be obtained thereby to break up the bottom of the chamber previous to the materials being softened by the water and washed out.

I claim as my invention—

1. The method herein specified of forming a chamber in an impervious clay stratum at the bottom of a well, consisting in forcing through a pipe heated water and directing the same by a nozzle upon the clay to dissolve the same and revolving the pipe and nozzle so as to act around within the chamber and allowing the hot water and earthy materials dissolved by the same to flow away or be removed from the top of the well, breaking up the stratum of impervious clay between the bottom of the chamber and the water-bearing stratum and washing the same away by the action of water, substantially as set forth.

2. The method of forming a well through a relatively more impervious stratum and into a relatively less impervious water-bearing stratum, which consists in washing out and enlarging by the dynamic force of water an artificial chamber in the relatively more impervious stratum at the foot of the well, and separated by a thin wall or bottom from the said water-bearing stratum, and subsequently opening communication through the said wall or bottom for the passage of water from the said water-bearing stratum into the said chamber, substantially without disturbing the material of the said water-bearing stratum, for the purposes set forth.

Signed by me this 2d day of June, 1898.

J. E. BACON.

Witnesses:

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