(No Model.)

G. W. DURBROW.

HYDRAULIC WELL BORING MACHINE.

No. 385,600. Patented July 3, 1888.

Fig 1

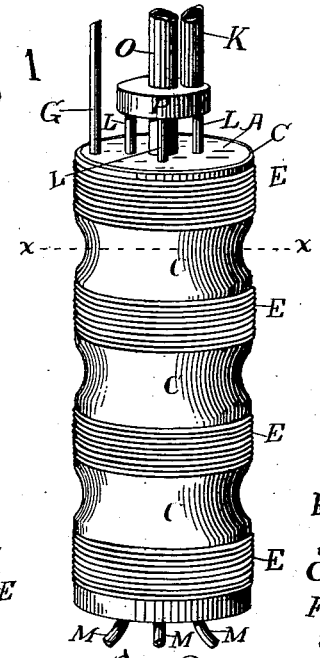


Fig. 2

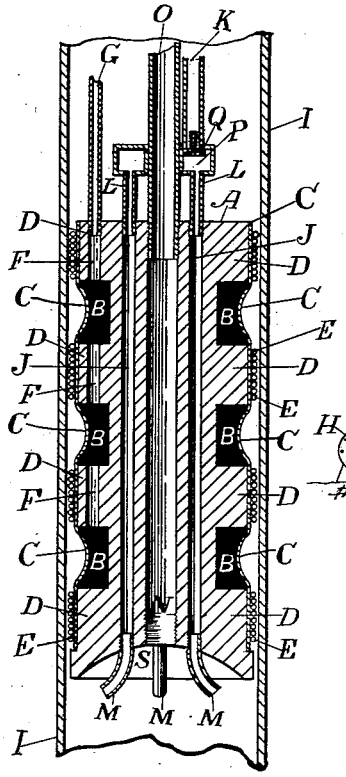


Fig. 3

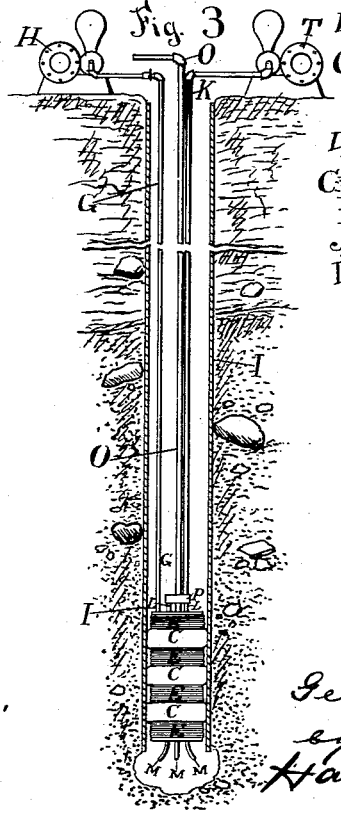


Fig. 4

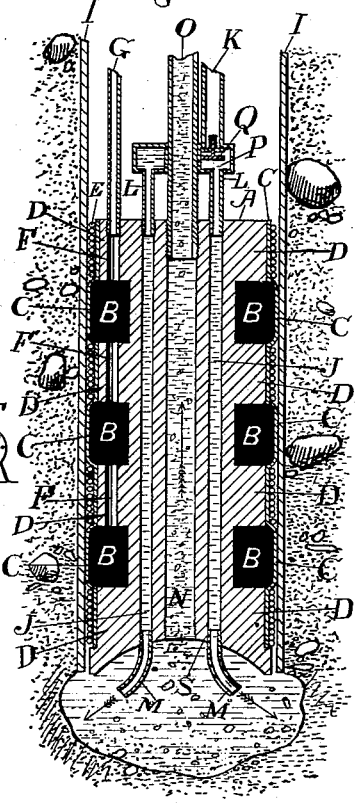
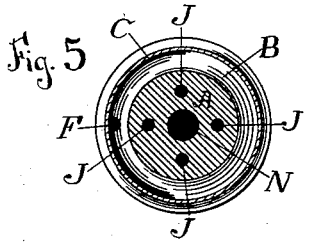


Fig. 5



Witnesses.

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UNITED STATES PATENT OFFICE.

GEORGE W. DURBROW, OF LOS ANGELES, CALIFORNIA.

HYDRAULIC WELL-BORING MACHINE.

SPECIFICATION forming part of Letters Patent No. 385,600, dated July 3, 1888.

Application filed December 12, 1887. Serial No. 257,690. (No model.)

To all whom it may concern:

Be it known that I, GEORGE W. DURBROW, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented a new and useful Improvement in Hydraulic Well-Boring Machines, of which the following is a specification.

My invention relates to that class of machines in which a stream of water is directed against the bottom of the well, so as to loosen the earth and débris and carry it out at the top of the pipe.

In order that machines of this class shall operate most efficiently, it is necessary that the hydraulic stream be forcibly discharged at the bottom of the well in such a manner as to cut away the earth and débris, and that a rapid current be maintained in the stream which flows out at the top of the well, so that the coarse as well as the fine débris will be carried out by the force of the stream.

In order that the current of the stream flowing out at the top of the well or pipe be rapid and sufficiently forcible to carry out the coarser débris, it is necessary that the hydraulic stream be confined and pass out of the well in a discharge-pipe but slightly larger than the induction-pipe.

My invention consists in devising means for plugging the casing-pipe of the well, so as to prevent the escape of any water, except through a discharge-pipe specially provided for that purpose; also, in so constructing such plug as to allow it to be easily inserted into and withdrawn from the casing-pipe at pleasure; also, to so construct the plug and its connections as to direct and use the hydraulic stream to the best advantage in loosening and removing the earth.

The drawings illustrate my invention.

Figure 1 is a perspective view of the improved hydraulic plug invented by me for the purpose of discharging the water at the bottom of the casing-pipe and directing it out in a forcible current. Fig. 2 is a vertical mid-section of the improved plug as it appears when being lowered into or withdrawn from the casing-pipe. Fig. 3 is a vertical mid-section of a well with my improved machine at the bottom thereof ready for operation. Fig. 4 is a vertical mid-section of my improved machine in operation. Fig. 5 is a cross-section of the plugger on line x x, Fig. 1.

A is a metal core provided with a number of annular grooves forming chambers B, extending around the core.

C is a strong flexible tubular case, preferably made of rubber, into which the core A is slipped.

Rubber tubing having an inner diameter somewhat smaller than the diameter of the core is preferable, so that the elasticity of the rubber will cause the tubing to fit tightly upon the core. In fitting the tubular case C on the core it is pressed into the grooves, as shown in Figs. 1 and 2.

The natural elasticity of the rubber tends to draw it into the grooves in case the tube is smaller than the core, as above suggested. When the rubber tube is pressed into the grooves to the extent desired, I wrap the portions of the case which fit the flanges D of the core with wire, E, thus binding the tubular case C closely upon the flanges of the core. The unbound portions of the case thus form flexible outside walls for the chambers formed by the grooves. I provide a passage, F, through each of the flanges, except the bottom one, to connect the chambers with the pipe G, which I fit into the passage F in the top flange. The pipe G connects with a force-pump, H, by means of which air or water may be forced into the chambers B, thus bulging out the portions of the tubular case C which were compressed within the grooves. The plug formed by the core A covered with the case C and wrapped with the wire, E, is slightly smaller than the casing-pipe to be used in the well, so that it will slip freely through such pipe; but when those portions of the flexible tubular case which form the outer walls, C, of the chambers B are bulged out by the pressure of air or water within the chambers the walls C press against the walls of the casing-pipe I and effectually seal the pipe against the passage of any water. Whenever the pressure of air or water within the chambers B is released, the rubber walls C recede from the walls of the casing-pipe.

I prefer to use compressed air in the cham-

bers B to force out the rubber walls C; but it is obvious the same object can be attained by using water or any other fluid instead. The core A is provided with a number of passage-ways, J. The hydraulic stream is introduced into the well through the pipe K, which connects with the passage-ways J by means of pipes L.

Pipes M are screwed into the lower end of the passage-ways J, to give direction to the water as it issues from the bottom of the plug. These pipes are preferably bent toward the periphery of the plug, so that the water will be directed outward to cut the walls of the well. This is not absolutely necessary. N is the discharge-passage in the center of the core. Into the upper end of this is screwed the discharge-pipe O.

The operation of the machine is as follows: When the end of the casing-pipe is in the class of earth which can be worked by hydraulic means—that is to say, when it is in sand, clay, or similar formation—I insert my improved plug into the casing-pipe and allow it to slip down to within a few inches of the bottom of the casing. I connect the air-pipe G with suitable air-compressing machinery, and force the flexible walls C out against the walls of the casing-pipe, as shown in Figs. 3 and 4. I connect the induction-pipe K with suitable hydraulic machinery, so that a hydraulic stream may be passed into the space beneath the plug. This cuts away the earth beneath the plug and casing-pipe and carries it up through the discharge-passage N and pipe O to the top of the well, where it is discharged.

P is a chamber, which I provide for the purpose of connecting the pipe K with the pipes L.

Q is a valve provided to prevent any upward flow through the pipe K in case the hydraulic pressure should be removed at any time when the discharge-pipe is full of mud and water. If such backflow is not provided against, there is a liability of filling the chamber P with sand and mud.

The core A may be made of any suitable material; but I prefer metal. Bands of any material may also be used instead of the wire to secure the tubing, the only object being to secure the tubing so as to prevent the escape of air or water, as the case may be, from the chambers B.

The principal feature of my invention is the plug comprising the core A, provided with annular grooves, surrounded by flexible walls C, which thus form chambers provided with flexible outer walls, which can be bulged out by internal expansive pressure produced by pneumatic or hydraulic means, thus increasing the size of the plug when desired.

The bottom of the core is preferably hollowed out to form the dome or chamber S, from the apex of which the discharge-passage N opens, so that the water and débris will find a ready passage out of the well.

T represents the machinery for creating hydraulic pressure within the pipe K.

It is obvious the hydraulic pressure to operate the machine may be produced by any machinery for that purpose which may be convenient, and the same is true of the machinery for creating the pressure within the chambers B; and I therefore do not limit my claim to the use of any special machinery for the production of the necessary pneumatic and hydraulic pressure.

Now, having described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a hydraulic well-boring machine, the combination of the plug for the casing-pipe, comprising the core A, provided with the induction and eduction passages therethrough, extending from end to end thereof, and with one or more annular chambers, B, having flexible outer walls, C, and means for producing expansive pressure within such chambers, whereby the flexible outer walls thereof may be caused to bulge out beyond the face of the plug, as and for the purpose set forth.

2. In a hydraulic well-boring machine, the combination of the casing of the well, the plug comprising the core A, provided with induction and discharge passages extending therethrough from end to end thereof, and with annular chambers B, having the flexible outer walls, C, a discharge-pipe extending from the discharge-passage in the core to the top of the well, induction-pipes connecting the induction-passages of the core with a machine for producing hydraulic pressure, a conduit connecting the chambers B with machinery for producing expansive pressure within the chambers, a machine for producing such pressure, and hydraulic machinery connected with the induction-passages of the core.

3. The combination of the casing-pipe of the well, the plug comprising the combination of the case C and the core A, provided with induction-passages J, discharge-passage N, one or more annular chambers, B, passages F, and pipes M, the pipe G, discharge-pipe O, induction-pipes K L, chamber P, hydraulic machinery connected with the pipe K, and machinery for producing expansive pressure connected with the pipe G, substantially as and for the purpose set forth.

4. The combination of the casing-pipe of the well, the plug comprising the combination of the case C and the core A, provided with induction-passages J, discharge-passage N, one or more annular chambers, B, passages F, and pipes M, the pipe G, discharge-pipe O, induction-pipes K L, chamber P, valve Q, hydraulic machinery connected with the pipe K, and machinery for producing expansive pressure connected with the pipe G, substantially as and for the purpose set forth.

5. The combination of the casing-pipe of the well, the plug comprising the combination of the case C and the core A, provided with induction-passages J, discharge-passage N, one or more annular chambers, B, passages F, dome S, and pipes M, the pipe G, discharge-pipe O, induction-pipes K L, chamber P, hydraulic machinery connected with the pipe K, and machinery for producing expansive pressure connected with the pipe G, substantially as and for the purpose set forth.

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Witnesses:
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