

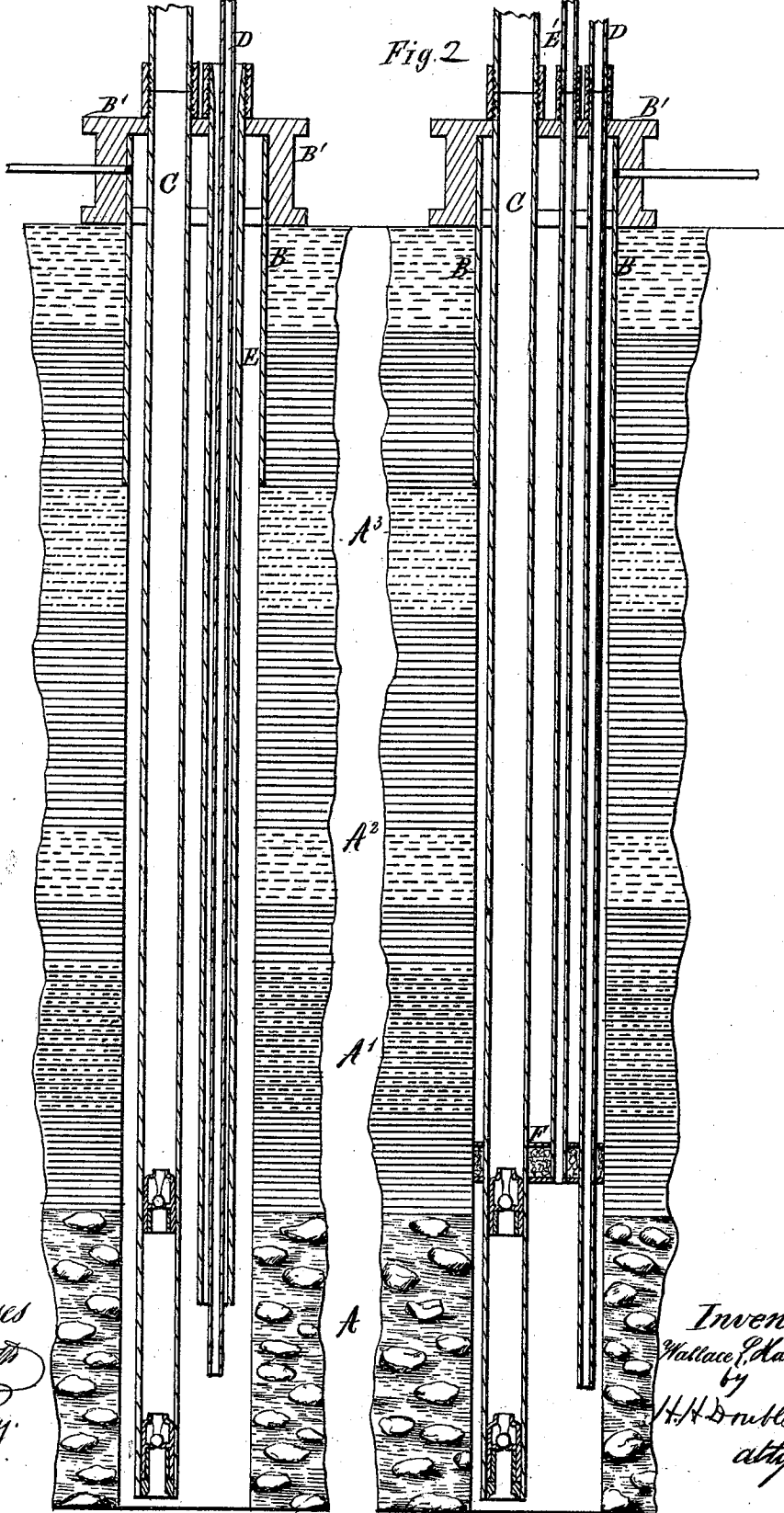
W. L. HARDISON.
PETROLEUM-WELL.

No. 171,563.

Patented Dec. 28, 1875.

Fig. 1.

Fig. 2.



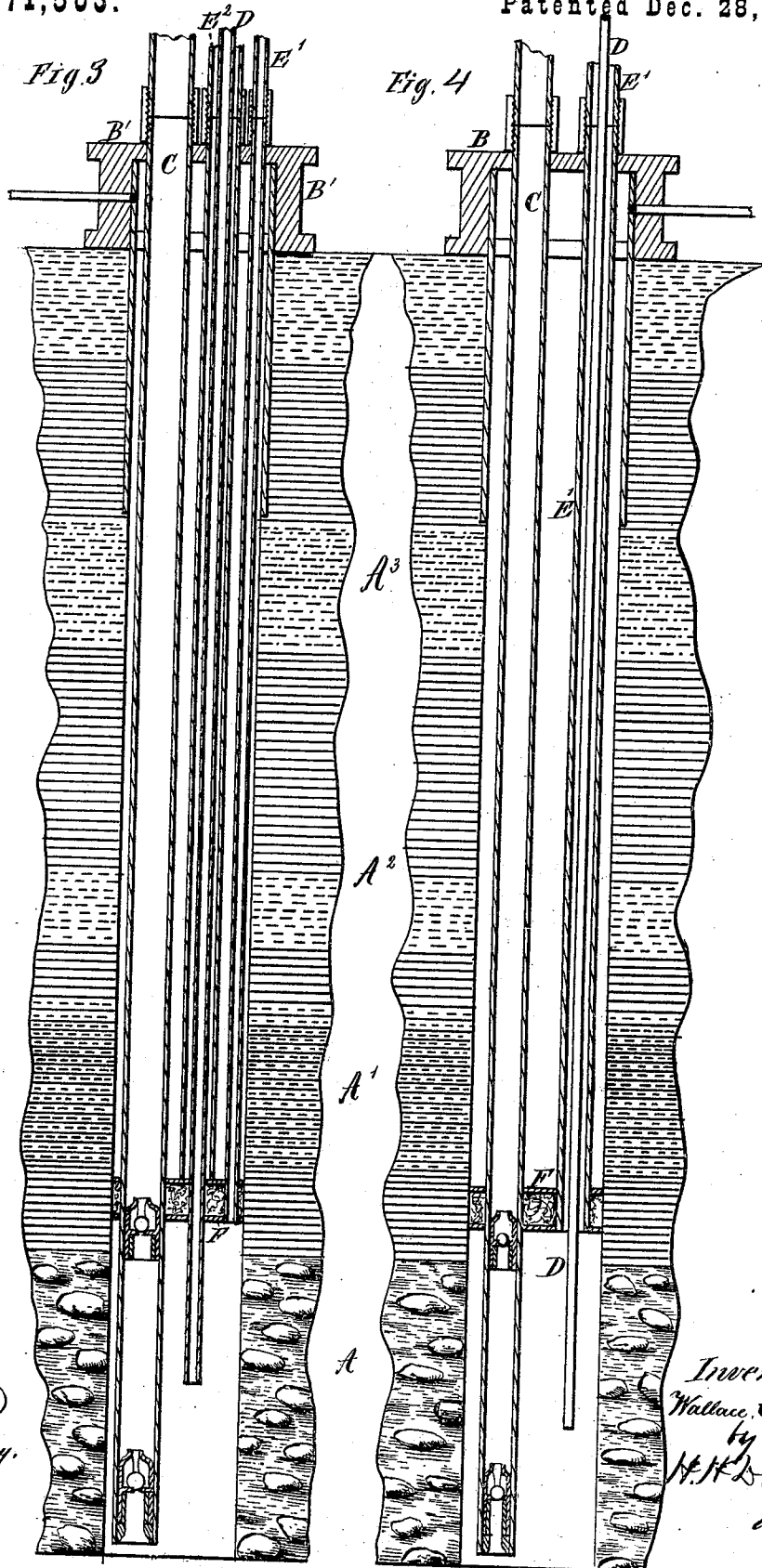
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UNITED STATES PATENT OFFICE

WALLACE L. HARDISON, OF ST. PETERSBURG, PENNSYLVANIA.

IMPROVEMENT IN PETROLEUM-WELLS.

Specification forming part of Letters Patent No. **171,563**, dated December 28, 1875; application filed November 23, 1875.

To all whom it may concern:

Be it known that I, WALLACE L. HARDISON, of St. Petersburg, in the county of Clarion and State of Pennsylvania, have invented certain new and useful Improvements in Petroleum-Wells; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

Under some circumstances the flow of oil in a petroleum-well is greatly retarded by the deposit of paraffine upon the walls, and the use of steam has been resorted to for the purpose of removing such paraffine, the steam being introduced through an auxiliary pipe inserted into the well by the side of the pumping-tube.

But serious difficulties are sometimes encountered in this use of steam; for instance, in some wells, salt water flows in below the casing, and, trickling down the steam-pipe, condenses the steam before it reaches the oil-bearing rock; and where a packer is employed around the pumping and steam tubes to exclude the salt water from the oil-bearing rock, not only is this difficulty arising from condensation increased, (because the steam-pipe passes through a solid column of water,) but the gas which is confined below the packer creates so much pressure that it is almost impossible, in practice, to introduce steam enough to produce any beneficial results.

Another difficulty which is met with when no packer is used is this: the steam in its passage from the bottom toward the top of the well softens the slate-rock, and causes it to cave in, which necessitates clearing out the well, thus involving large expense, and materially injuring the well by suspending the pumping while the accumulation of rock is being removed, and the pumping-tube is being taken out and replaced.

My object is to obviate both of these difficulties; and to this end, the first part of my invention consists in combining, with a tube through which steam is introduced into an oil-well, a supplementary or protecting tube, surrounding the steam-tube, to protect it from

the water in the well, whereby condensation of the steam in its passage to the oil-rock is prevented.

The second part of the invention consists in combining, with a petroleum-well, a pumping-tube, a tube through which steam is introduced to the lower part of the well, a tube for the escape of the gas and steam from the well, and a packer surrounding these tubes.

The third part of the invention consists in combining, with a pumping-tube, a packer located below the salt-water supply, a steam-tube, and a tube surrounding the steam-tube and extending to the packer, whereby the heat of the steam is confined to that part of the well below the packer, and the water is kept from contact with the steam-pipe.

The fourth part of the invention consists in extending the pipe which surrounds the steam-pipe through the packer, whereby it also serves as an outlet for the gas, thus facilitating the introduction of the steam into the lower part of the well.

In the drawing, Figure 1 is a vertical section of a well having the first part of my improvements applied thereto. Figs. 2, 3, and 4 show, respectively, the second, third, and fourth parts of my invention.

A represents the oil-bearing rock, and A^1 A^2 A^3 the upper strata of rock and soil. B is the casing, which usually extends to such depth as will exclude the fresh water. B' is the casing-cap. C is the pumping-tube, of any usual or approved construction, and provided with the ordinary pumping rod and valves, which need not, therefore, be described. D is the steam-tube, extending to near the bottom of the well, care being taken to keep its lower end above such portion of dead oil or water as cannot be readily removed by the pump. E is the supplementary or protecting tube surrounding the steam-tube D, and either united to the packer F by a water-tight joint, or connected with the steam-tube D by a water-tight joint near the packer, when a packer is used, (see Fig. 3,) or extending through the packer, as shown in Fig. 4.

The packer represented at F may be of any desired manufacture, and as this invention does not relate to the packer I propose to employ any one which will answer my purpose.

In operating my devices, the dead-oil, or oil and water, are pumped out through the pumping-tube C, in order that the discharge of steam may be unobstructed, as a small amount of either oil or water in the well will prevent any efficient use of the steam.

My invention is designed more especially as an improvement upon and for use in connection with the flowing-tube used by Stevenson, as shown and described in his patent of December 8, 1874; and I design to use a flowing-tube of about the same proportion relative to the yield of the well as that set forth by him, and by Stewart in his patent of August 3, 1875, when the steam-pipe is inserted within the tube E², Fig. 4; but the invention may be used in connection with a pumping-tube.

It will also be seen that water which may accumulate above the packer F, cannot come in contact with the steam-tube D. It is further apparent that if steam be introduced through tube D into the lower part of the well, the heat and moisture thereby produced will be confined to the rock below the packer, as the water above said packer will condense the steam, which might otherwise pass up through tube E, and in case there be not enough water above the packer, a sufficient quantity to produce the desired result can be poured in from above, or the surplus steam may pass out through the tube E, and escape at the top of the well.

I do not wish to be limited to the precise location of the packer here shown, because it may be arranged higher up—that is, just below the salt-water supply, and yet prevent the condensation of the steam which is going downward, and also permit the escape of the gas or the ascending steam; nor do I wish to be limited to extending tube E through the packer F, as the water may be so far excluded from the steam-tube D as to prevent serious condensation, even though tube E should not reach the packer, in which case I propose to employ a separate pipe, to permit the escape of the gas; nor do I wish to be limited to the use of the packer at all, as the tube E may be employed as a protector to shield the steam-tube from the dripping or trickling water, by extending it (tube E) nearly the entire length of the steam-tube, both these tubes being open at the bottom.

When tube E is used as a flowing-tube it should have the usual discharging nozzle or pipe. Nor do I wish to be limited to the arrangement of steam-tube D within the tube E, because in wells in which there is no salt water, these tubes may be placed side by side and still prevent the slate or rock from being softened by the action of the ascending steam, as this steam will be conducted to the top of the well through tube E, and thus kept from contact with the slate-rock.

From the above description it will be seen that by the use of my invention I can successfully introduce steam into the lower portion of a well in which a packer, F, is employed, because I relieve the pressure of the gas through the gas-tube E, and also pump out the contents of the well, thus making a free passage or exit for the steam from the lower end of the steam-tube.

What I claim is—

1. In a petroleum-well, the combination of a pumping-tube, a tube through which steam is admitted to the lower part of the well, a tube through which gas and steam may escape from the well, and a packer surrounding these tubes, substantially as set forth.

2. In a petroleum-well, the combination of a pumping-tube, a tube through which steam is introduced into the lower part of the well, and a protecting-tube, which surrounds the steam-tube, substantially as set forth.

3. In a petroleum-well, the combination of a pumping-tube, a tube through which steam is introduced into the lower part of the well, a protecting-tube, which excludes the water from the steam-tube, and a packer which surrounds the pumping and steam tubes, substantially as set forth.

4. In a petroleum-well, the combination of pumping-tube, a packer, a steam-tube, and a protecting-tube, all of which tubes extend through the packer, substantially as set forth.

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

WALLACE L. HARDISON.

Witnesses:

E. C. WEAVER,
H. H. DOUBLEDAY.