J. HARRIS.

Steam-Heater for Oil-Wells.

No. 200,393. Patented Feb. 19, 1878.

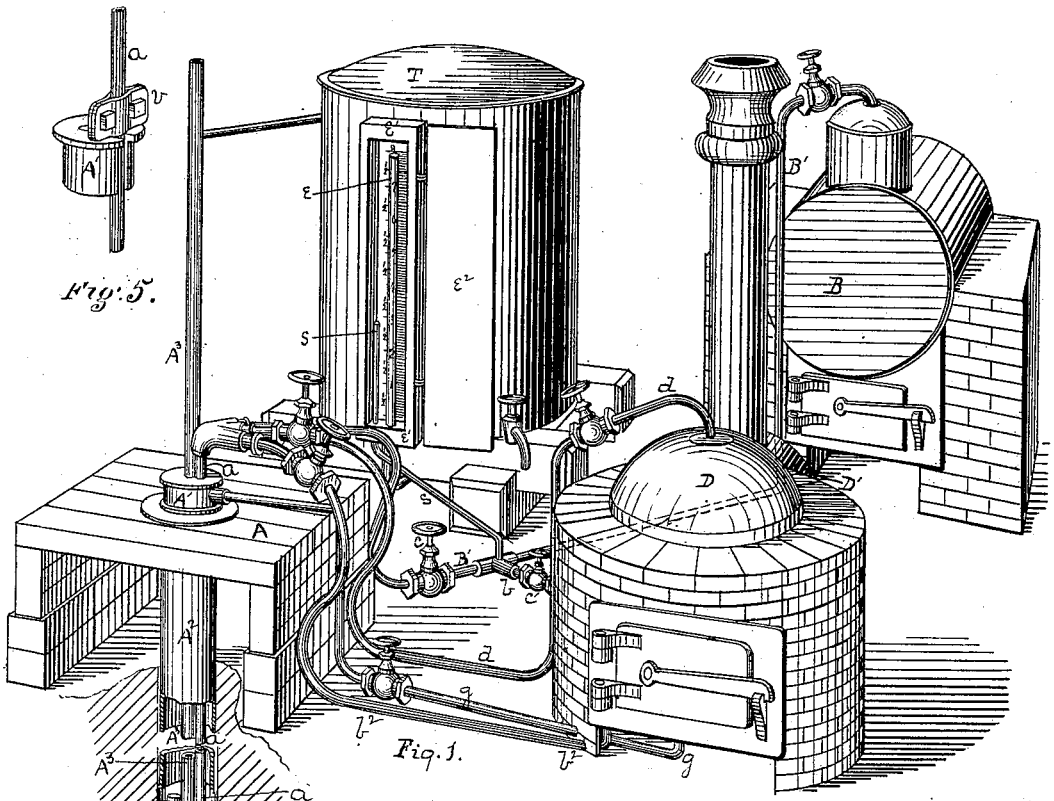
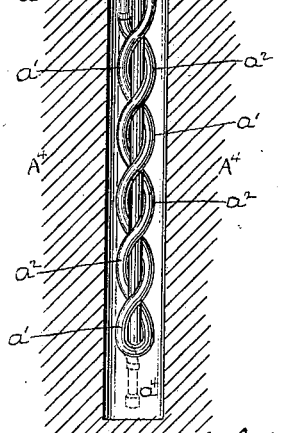


Fig. 5.



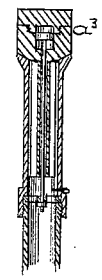


Fig. 2.

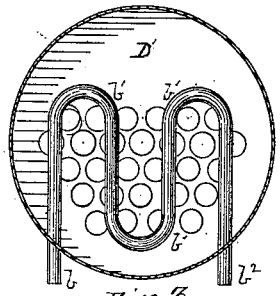


Fig. 3.

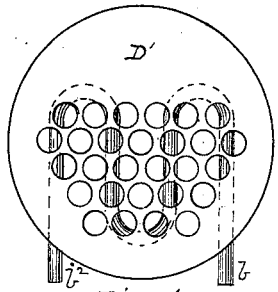


Fig. 4.

Witnesses C. L. Parker
W. C. Christy

Inventor Joseph Harris
By Attorney George H. Christy

UNITED STATES PATENT OFFICE.

JOSEPH HARRIS, OF ALLEGHENY, PENNSYLVANIA.

IMPROVEMENT IN STEAM-HEATERS FOR OIL-WELLS.

Specification forming part of Letters Patent No. **200,393,** dated February 19, 1878; application filed December 29, 1877.

To all whom it may concern:

Be it known that I, JOSEPH HARRIS, of Allegheny city, county of Allegheny, State of Pennsylvania, have invented or discovered a new and useful Improvement in Steam-Heaters for Oil-Wells; and I do hereby declare the following to be a full, clear, concise, and exact description thereof, reference being had to the accompanying drawing, making a part of this specification, in which—like letters indicating like parts—

Figure 1 is a view in perspective of my improved apparatus, illustrative of its use in connection with an oil-well; and Figs. 2, 3, 4, and 5 are detached views, presently to be explained.

The use of steam in oil-wells as an agent for facilitating the production of oil, or, perhaps more properly, for removing the obstacles which prevent or lessen the productiveness of the well, is well known.

My improved apparatus is designed to facilitate such use of steam.

The derrick floor or platform of an oil-well is represented at A, the casing-head at A^1, the casing at A^2, the tubing at A^3, such tubing extending down to the oil-bearing rock, which may occur, say, at A^4.

Heretofore steam has been introduced into the well at the level of the oil-bearing rock through a pipe having lateral perforations. Such device does not fully meet all the requirements, since, being introduced on one side of the tubing, the steam therefrom cannot act uniformly on all sides of the wall of the well; and also the introduction of free steam in such way and under such circumstances tends to injure the quality of the oil, if any, in the well. To avoid these practical difficulties, I introduce a steam-pipe, *a*, through the casing-head, as usual; but on its coming down to or near to the upper level of the oil-bearing rock, I bend it in a spiral or other equivalent form, so that it shall pass around on all sides of the tubing, as shown at a^1; and from the lowest point to which it is extended—say at or near the lower level of the oil-bearing rock—I cause it to return by a reverse spiral, as at a^2. At its upper end, which may be at any desired point above the oil-bearing rock and below the lower end of the casing, I arrange a check-valve, a^3. (Shown in section in Fig. 2.) This check-valve may be of any suitable form or construction, the one shown, however, being suitable for the purpose. It is arranged to be opened only by steam-pressure, so that the steam may escape as it loses its heat, and in escaping may blow out any water of condensation which may accumulate in the pipes; and it may be made heavy, as shown, so as to open only after a considerable pressure has been attained; or a spring may be added to it in any of the ways known to the art, to accomplish the same purpose.

With this construction, the heat given off from the pipes a^1 a^2 will be operative uniformly all around on the walls of the well in melting or fusing the paraffine or gummy or resinous deposits, which are apt to clog the oil crevices or openings.

This part of my invention may also be carried out, though less effectually, by the use of a single spiral, with a check-valve opening downward, as illustrated by dotted lines at a^4; and, as a mechanical equivalent of a spiral, I include herein a series of rings surrounding the tubing, with pipe-connections from one to the other, as also two pipes, one on each side of the tubing, and each bending about half round the tubing, and then back, so as to form a series of **S**-shaped bends. In any case room should be left within the spiral or other form of pipe construction, as described, so that such device may be slipped down through the casing on and around the tubing, used, and removed, without the necessary removal of the tubing from the well.

In the drawing I have shown various devices for supplying steam to the pipe *a*, the use of which will vary somewhat with the conditions of use.

It is quite common to operate two or more well-pumps from a single engine, or to operate an engine at each well by steam from a single boiler. Such a boiler or steam-generator I have shown at B. If it is not too far from the well, a single pipe, B′, leads to the pipe *a;* but if the distance be so great that—say in cold weather—the steam loses much of its heat, I provide for reheating it at or near the well, or superheating it and "drying" it, by clos-

ing the cock c, opening a cock, c', in the branch pipe b, and passing it through a coil, b^1, Figs. 3 and 4, in a heating-chamber, D′, connected with any suitable furnace or heater; but, for convenience of illustration, I have shown such heater as connected with the fire and heating flues of a steam-generator, D, the use of which latter will presently be explained. After the steam has been thus sufficiently heated it passes by the pipe b^2 to the pipe a, and therein does its work. But, assuming that each well, or any particular well, has its own generator, I have shown such a generator at D. The steam may be taken from this generator directly to the pipe a by a pipe, d; but by preference I take the steam from this generator through the coil b^1 in the chamber D′, and, having superheated it, conduct it to the pipe a, as before. As a matter of convenience, I have shown all these pipes as uniting in a single head. The form of the coil, as well as of the other devices described, may be varied at pleasure.

A pipe for taking off the gas and supplying it to the fire is shown at g.

The tank into which the oil is pumped is shown at T. As oil and water are pumped up together, the bottom of the tank usually contains water, and practically, in gaging and measuring the contents of large tanks, it is impossible to tell with accuracy what the depth of water in any case is. Hence I have added to the tank a gage-tube, e, of glass, and connected the same with the inside of the tank in such manner that the level of the water in the bottom of the tank, as well as the height of the oil above, will be indicated in the gage-tube at all times; and to keep the water in this gage-tube from freezing in cold weather, I inclose it in a box, e^1, having a door, e^2, and take a branch pipe, s, with an outer-closed end, from one of the steam-pipes into the box, so that the warmth of the steam-pipe shall keep the water in the glass tube above the freezing-point.

The steam-pipe may be supported in the casing-head in any suitable way; but one very convenient construction for such purpose is shown in Fig. 5, where the steam-pipe a is supported on the top of the casing-head by a clamp, v, which clamp can be tightened and loosened by screw-nuts, as occasion may require.

I claim herein as my invention—

1. In combination with the tubing of an oil-well, a steam-heating pipe or pipes, passing around or inclosing the same opposite the oil-bearing rock, substantially as and for the purposes set forth.

2. The double reverse spiral a^1 a^2, in combination with the tubing, substantially as and for the purposes set forth.

3. The combination, for use in connection with an oil-well, of a steam-generator, a superheater, tubing, and steam-heating pipe or pipes surrounding the tubing, substantially as set forth.

4. As a device for use in oil-wells, a steam-coil adapted by its form to pass down through the casing, around the tubing, and distribute heat with practical uniformity to the walls of the well on all sides, substantially as set forth.

In testimony whereof I have hereunto set my hand.

JOSEPH HARRIS.

Witnesses:
J. J. McCormick,
George H. Christy.