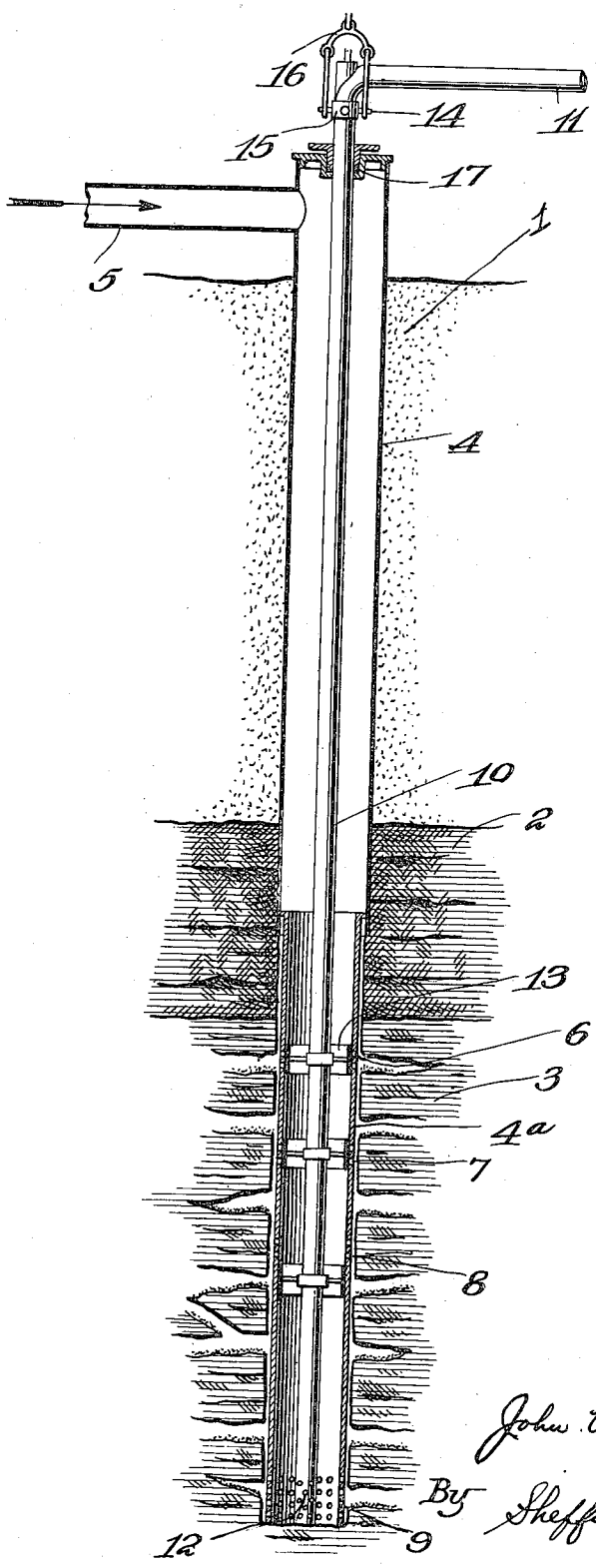
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APPARATUS FOR MINING SULFUR.

APPLICATION FILED SEPT. 25, 1918.

1,293,902.

Patented Feb. 11, 1919.



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UNITED STATES PATENT OFFICE.

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APPARATUS FOR MINING SULFUR.

1,293,902. Specification of Letters Patent. Patented Feb. 11, 1919.

Application filed September 25, 1918. Serial No. 255,552.

To all whom it may concern:

Be it known that I, JOHN W. PETERS, a citizen of the United States, residing at Roslyn, in the county of Nassau and State of New York, have discovered certain new and useful Improvements in Apparatus for Mining Sulfur, of which the following is a disclosure.

My invention relates to the art of mining sulfur.

It has been the custom heretofore to sink wells in sulfur deposits for the purpose of melting the sulfur underground and elevating it to the surface in a molten condition. In the operation of such wells, it has been found desirable to melt the sulfur by hot water and to be able to deliver such water at different levels in the sulfur deposit. These circumstances have led to the adoption of an expensive well structure comprising a number of concentric pipes within a liner or casing, certain of the pipes being of different lengths so as to deliver the hot water to different depths. Moreover, the quantity of hot water which can be delivered within a casing of given size is reduced to an inconvenient degree by the space taken up by two pipes.

It is accordingly the principal object of my invention to provide a well structure capable of use in mining sulfur by the hot water process which shall be of relatively simple and inexpensive construction, but which shall be convenient in operation and embody means whereby the heating fluid is delivered at different levels.

A second object of my invention is to provide means whereby the level at which the heating fluid is delivered may be changed at will.

A further object of the invention resides in the particular arrangement and construction of parts hereinafter described.

In the drawing accompanying and forming part of this specification, the figure is a diagrammatic sectional view of a portion of the earth's crust and sulfur well therein constructed according to my invention.

Referring more particularly to the drawing 1 is a bed of soil overlying a cap rock 2, beneath which is a sulfur deposit such as 3.

Extending from the surface of the ground to or within the cap rock 2 is a casing which may be such as is generally employed, As is well known, the method used for sinking the well is ordinarily changed after reaching the cap rock. Consequently, it is usually necessary to make the casing in section if it is extended below the cap rock, and I preferably extend the casing below rock 2 and into the deposit 3 by means of a pipe such as 4^a, the upper end of which preferably has an outwardly extending flange thereon making a sliding fit with the interior of part 4. Hot water may be introduced into the casing 4 through pipe 5, and I provide a series of ports such as 6, 7 and 8, arranged in sets at different levels in the pipe or casing 4^a through which the water may pass into the sulfur deposit 3. The lower end of the part 4^a serves as a receiver for the molten sulfur and is perforated as shown at 9, to permit the sulfur to flow into it. The molten sulfur may then be elevated to the surface through the central pipe 10 by means of a pump or other convenient mechanism. The discharge pipe for the sulfur connects with pipe 10 and is shown at 11. The lower end of pipe 10 is perforated to permit entrance of sulfur as shown at 12.

In order to cut off the interior of the casing from the deposit when desired, I provide cylindrical valve members, such as 13, which are suitably supported from the central pipe 10, and which are arranged to slide on the inner face of member 4^a and close the ports 6, 7 and 8, when in the proper relative positions. The valve members 13 are supported from the pipe 10 by suitable means, such as brackets. In order to permit the ports, such as 6, 7 and 8, to be opened and closed when desired, I provide means whereby the pipe 10 may be raised or lowered at will, such means comprising a set of pins, such as 14, carried by a collar 15 fixed to the pipe 10, where it extends above the casing 4. Links, such as 16, or other convenient members, may then be attached to the pins 15 and connected by a saddle member, such as 16, and a rope, chain, or the like runs to suitable machinery for raising or lowering purposes. The upper end of the casing 4 is closed by a stuffing box, such as 17, through which the pipe 10 extends.

Preferably the valve members 13 are spaced slightly different from the spacing of the ports 6, 7 and 8, so that at least one of the sets of said openings may remain open while the others are closed, as shown.

Thus, the operator is able to vary the quantity of flow and the level at which the water is delivered by means controlled from the surface. The particular set or sets of openings which should be left open most must be determined by experience for any particular well or formation.

It will be understood that I have described and shown the preferred embodiment of my invention, but I realize that various changes and modifications of the apparatus herein disclosed may be made without departing from my invention, and I desire protection for all rearrangements and modifications of my apparatus which are mechanically equivalent thereto, and I wish it to be further understood that parts of my invention may be used without using the whole. In using my improved apparatus for introducing hot water into the sulfur deposit while sulfur is not being pumped, as in the preliminary steaming of the well or when re-steaming after the sulfur melt is exhausted, the open lower end of the casing can be and is preferably used as an outlet for hot water. In order to effect the delivery of hot water through the lower end of the casing, the upper ports in the casing or a majority of them are closed, and hot water is forced to the bottom of the well and operates to store up heat in the rock surrounding the bottom of the casing.

Having thus described my invention, I claim:

1. A sulfur well comprising in combination a casing having a series of ports within the zone of the sulfur deposit for the delivery of heated fluid, a connection for delivering a heated fluid into said casing and means controlled from the top of the well for closing and opening the said ports as desired.

2. A sulfur well comprising in combination a casing having a series of ports opening within the sulfur deposit for the delivery of heated fluid, a vertically movable uptake pipe within said casing for delivering molten sulfur, and valve members supported from said pipe arranged to open and close said ports as said pipe is moved in one direction or the other.

3. A sulfur well comprising in combination a casing having a series of ports opening within the sulfur deposit for the delivery of heated fluid, a movable pipe within said casing for delivering the sulfur from the well, and valve members supported from said pipe and arranged to open and close said ports as said pipe is moved in one direction or the other, said valve members being so arranged that certain of said ports are opened before others, whereby the mean level of delivery of the fluid may be altered.

4. A sulfur well comprising in combination a casing having a series of ports at different levels opening into the sulfur deposit, and valve members controlled from the top of the well for closing and opening said ports, whereby the mean level of delivery of the fluid may be altered.

5. A sulfur well comprising in combination a casing having a series of ports opening within the sulfur deposit for the delivery of heated fluid at different levels, a movable pipe within said casing for delivering the sulfur from the well, valve members supported from said pipe for opening and closing said ports, and mean whereby said pipe may be raised and lowered to operate said valve members.

6. A sulfur well comprising a casing extending into a sulfur deposit, having an open lower end, a connection for forcing hot water into said casing, a port in the wall of said casing opening into the deposit above the lower end of the casing, and means controlled from the top of the ground for opening and closing said port.

JOHN W. PETERS.