J. Y. SMITH.

OIL EJECTOR.

No. 47,871. Patented May 23, 1865.

Fig: 1

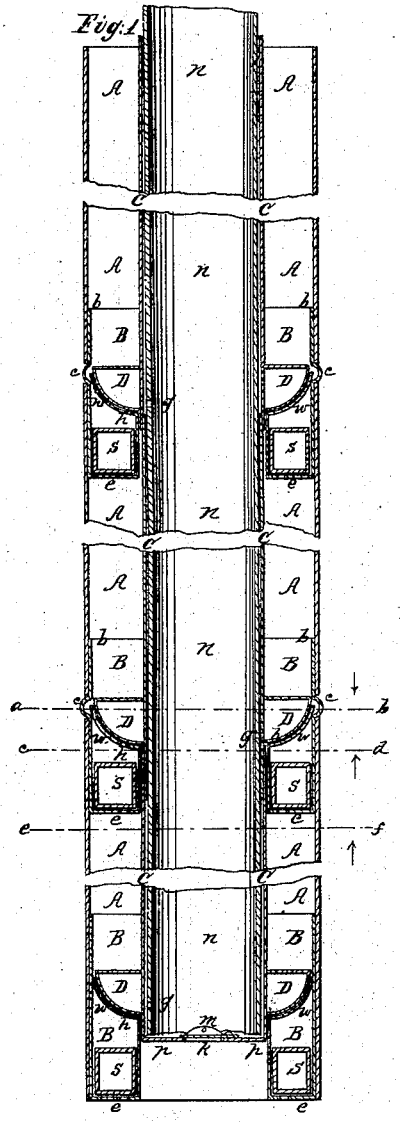


Fig: 2

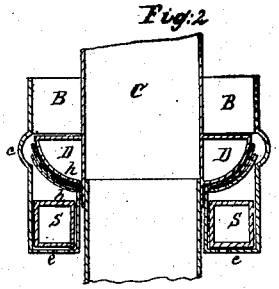


Fig: 3

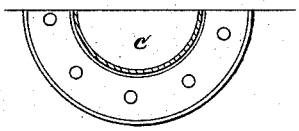


Fig: 4

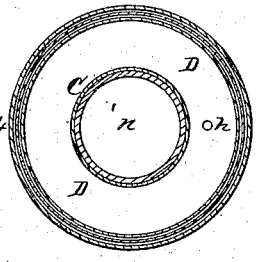


Fig: 5

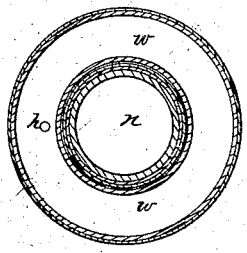
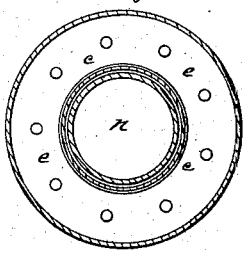


Fig: 6



Inventor

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UNITED STATES PATENT OFFICE.

JOHN Y. SMITH, OF ALEXANDRIA, VIRGINIA.

OIL-EJECTOR.

Specification of Letters Patent No. 47,871, dated May 23, 1865.

To all whom it may concern:

Be it known that I, J. Y. SMITH, of Alexandria, in the county of Alexandria and State of Virginia, have invented certain new and useful Improvements in Raising Liquids, Particularly Oil, from Petroleum-Wells or Water from Mines; and I hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawing, in which—

Figure 1, is a sectional elevation of an apparatus constructed in accordance with this my invention. Figs. 2 and 3 a sectional elevation and plan view in part of a portion of the apparatus representing a spherical valve and seat with steam deflector. Fig. 4, a horizontal section on line *a*—*b* in Fig. 1, and looking down. Figs. 5 and 6 horizontal sections on line *c*—*d* and *e*—*f* respectively—both looking up.

Heretofore oil or other liquids have generally been raised by means of pumps. The objections to thus raising liquids from deep wells are well understood, for not only is the dead weight of apparatus proportionate to the depth of the well but the additional weight of a column of liquid equal to the depth of the well is to be lifted at each stroke of the pump before any liquid can be brought to the surface or level proposed. Hence great consumption of power: on the other hand the cost of the pumps the efficiency of which depends in great measure upon their nice adjustment—the necessary repairs which the latter involves and other objections more specially applicable to oil wells, such as the formation at the bottom of the well and around the base of the pump of paraffin which obstruct the walls are serious hindrances to the continued and economical raising of oil or other liquids from deep wells or to high elevations.

The object therefore of this invention is to produce an apparatus which shall combine simplicity of construction and facility of adjustment—with efficiency and economy of power in operating the same and I have accomplished this by the construction of an apparatus as follows. I employ tubes constructed in sections such as are now generally used for pumps or I make them of suitable form also in sections so as to admit of their easy assemblage or connection. At given distances apart say at every hundred feet I interpose by means of slip joint a valve box or chamber B consisting of an outer tube *b* and an inner concentric tube *d* united and closed at their undersides by means of a perforated annular disk *e*. The upper edge of the interior tube *d* is provided with a cup or spherical valve seat *w* expanding upwardly into or toward an annular channel in the outer tube. In the space inclosed by the two tubes there is a light valve *s* (in this case made of thin metal and hollow) fitting the annular disk *e* before referred to which forms its valve seat. With the main tube or sectional tubes A thus fitted with valve boxes or chambers I combine a steam or air pipe *c* also in sections upnited by slip joint, so as to allow of play and adjustment in the direction of the length; to prevent transverse slipping of the pipe sections upon each other they are feathered or other devices may be resorted to for effecting the same object. This steam pipe is provided with valves D of a form to fit the cup valve seats in the valve boxes B, which valves are hollow to admit steam through an aperture *g* in the side of the steam pipe. Both the valve and valve seat have each a hole or port *h*, which in the position shown in Fig. 1, coincide with each other. The steam pipe is closed at the bottom by means of a plate *p* screwed or otherwise secured thereto, which plate is provided with a valve or trap *k* hinged at one side and capable of being lifted by a wire or cord fastened to an eye *m*.

As the steam pipe may be required to be of great length, I propose to line it with hemp hose *n* which I prefer to previously boil in linseed oil; by this means steam may be conveyed to great depths without sensible condensation. The pipe may be lined with pieces of hose of suitable depths as to leave the apertures *g* uncovered or the hose may itself be perforated correspondingly to the said apertures. The steam pipe is connected with some motive power by suitable gear to impart to it a rotary motion within the main tube. Such is the general construction and arrangement of the apparatus subject of this patent. It will be understood however that in point of detail numerous modifications may be adopted without departure from the principle of my invention.

In lieu of the series of spherical valves described, elongated slotted conical or other valves may be used and the pipe sections may be united by means of ball slip joints to

allow for lateral play of the tube and pipe section.

In addition to the valve seat a shield or deflector such as shown in Fig. 2 may be adapted for directing the steam upward to act on the liquid to be raised with an impelling force on the principle of the Giffard injector.

The port holes *h* in the valves are arranged helically around the steam pipe while the ports in the valve seats are situated all in one and the same vertical plane. By this arrangement the steam is entered the annular space between the main tube and the steam pipe successively and the action on the liquid is gradual and continuous.

Operation. For the purposes of explanation of the operation of this apparatus I shall suppose the parts to be properly adjusted as before described and in working condition in an oil well. Steam being admitted in and rotary motion imparted to the steam pipe it will enter the valve chambers or hollow valves and rush out therefrom whenever during the revolution of the pipe the port in the valve comes opposite that of the valve seat. This it will be seen takes place in rapid succession from the lowermost to the uppermost, steam issuing successively at all the ports during each revolution of the pipe into the valve box and impinges against and is retained in the annular channel where it rapidly condenses. Condensation produces a vacuum more or less perfect in the valve box and the oil will enter through the orifices in the plate *e* lifting the valve *s* off its seat. As soon as equilibrium is established the valve will sink into its seat, close the apertures and retain the oil thus raised. By repeating this operation (and the operation is continuous) the oil is gradually raised in the annular space between the main tube and the steam pipe until the annular column reaches the top of the apparatus whence it may be conveyed or discharged into vats. When the well becomes obstructed by the paraffin or "butter" as it is called—I dissolve it by admitting steam into the well. For this purpose I open the tap by pulling the wire or cord attached thereto. The steam thus admitted will dissolve the paraffin which may have accumulated around the base of the apparatus and stopped the crevices or fissures through which the oil oozes.

I have principally referred to steam as the elastic fluid used for the purpose of elevating liquid—but I do not wish to be understood as confining myself to the employment of steam alone. Air and other elastic fluids may be used with the same apparatus with equal advantages and may be found in some cases more available. It will also be understood that water or liquid other than oil may be raised by the means and in the manner described.

Having thus fully described my invention and the manner in which the same is or may be carried into effect, not wishing to be understood as claiming the raising of oil by means of steam or compressed air, I claim,

1. The combination with a suitable main tube and stationary valve seats of a central revolving steam or air cylinder provided with suitable valves constructed and operating substantially as hereinbefore described so that the steam or air is ejected into the space surrounding said cylinder in the manner and for the purposes set forth.

2. In combination with the above, I claim the employment at suitable intervals and interposed between the sections of the outer tube, of valve chambers for the admission and retention therein of the liquid raised by the injection of steam or other elastic fluid substantially as set forth.

3. In combination with the interior cylinder and surrounding valve chambers I claim the slip joint attachment so as to admit of the perfect yet easy vertical adjustment of the valves onto their respective seats substantially as set forth.

4. In combination with two concentric cylinders I claim making the valves and valve seats in the form of spherical caps or uniting the cylinder sections by ball joint attachment so as to yield to lateral adjustment substantially as set forth.

5. In valve chambers constructed as described and in combination with hemispherical valves I claim forming annular channels in the manner and for the purpose set forth.

6. I claim the employment in an apparatus for raising liquid by direct action of steam and in combination with and as a lining of the steam cylinder of a hemp hose, whether or not boiled in linseed oil substantially as set forth.

7. I claim the combination of a steam cylinder closed at the base with a hinge trap or valve operated by a cord or rod in the manner and for the purposes set forth.

8. In combination with a spherical valve I claim the employment of a steam deflector shield operating substantially in the manner and for the purpose set forth.

In testimony whereof I have signed my name to this specification before two subscribing witnesses.

J. Y. SMITH.

Witnesses:
Jos. L. Coombs,
Edm. F. Brown.