(Model.)

T. L. CROWLEY.

SAND AND GAS SHIELD FOR OIL WELLS.

No. 244,037. Patented July 12, 1881.

Fig. 1.

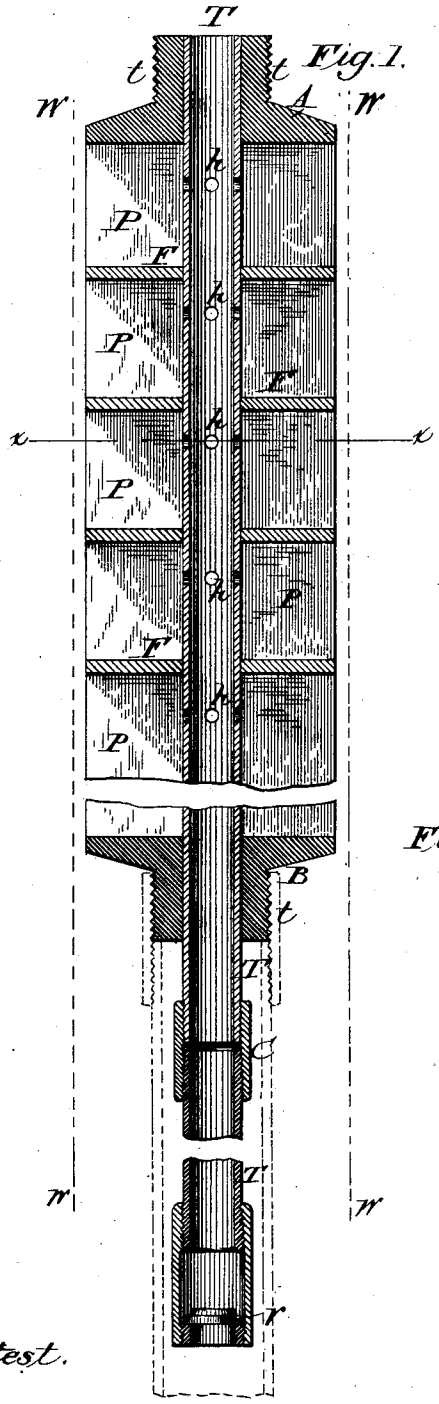


Fig. 2.

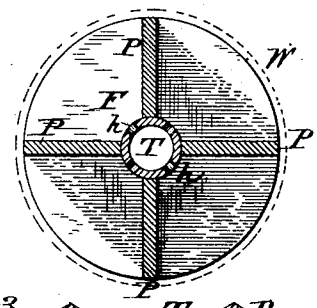
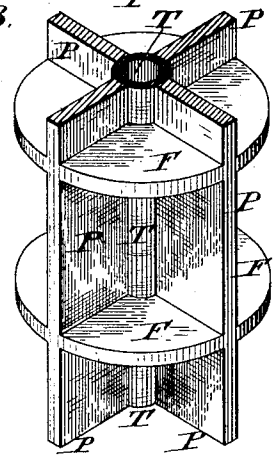


Fig. 3.



Attest.

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SAND AND GAS SHIELD FOR OIL-WELLS.

SPECIFICATION forming part of Letters Patent No. 244,037, dated July 12, 1881.

Application filed February 18, 1881. (Model.)

To all whom it may concern:

Be it known that I, THOMAS L. CROWLEY, of Kendall Creek, in the county of McKean and State of Pennsylvania, have invented certain new and useful Improvements in Sand and Gas Shield for Oil-Wells; and I do hereby declare that the following is a full, clear, and exact description of the invention, 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 letters of reference marked thereon, which form a part of this specification.

Figure 1 is a vertical section of my sand and gas shield inserted in a well. Fig. 2 is a transverse section on line *x x* of Fig. 1. Fig. 3 is a perspective view of a part of the shield.

The same letter indicates the same part in all the figures.

The object of my invention is to provide a protection for the pump-barrels of oil-wells from the entrance of sand and grit, and also from the inflow of gas—the two most serious evils to which oil-well pumps are liable, the sand by its grit rapidly destroying the valve-cups, packing, and barrel of the pump, and the gas, by reducing the vacuum, diminishing the suction power of the pump, retarding the flow of the oil, and increasing the deposit of paraffine in the pores of the oil-bearing rock and the clogging of the valves both by paraffine and mud.

A further object is the more complete and economical saving of the gas for fuel. The gas that commonly passes into the pump-barrel and tubing of an oil-well either escapes into the air and is lost or has to be collected and held in a gas-tank at great trouble and expense, while that which is prevented from entering the tubing passes up around it, enters the casing, and may be conducted by a pipe from the casing-head under the boiler of the pumping-engine, and there burned as fuel.

The nature of my invention consists in attaching to the tubing of an oil-well, at or near the bottom of the well, one or more sections of smaller tubing, provided with circular disks or flanges attached at short intervals upon the outside, and large enough to reach within a short distance—say about a quarter of an inch—of the wall of the well, said flanges being connected and supported by upright partitions, preferably cast solid with them, and the tube perforated with holes, generally near the top of each compartment, and provided near its lower end with a check-valve opening upward, the shield thus formed being furnished at top and bottom with threaded caps for the purpose of attaching it at the desired point in the string of tubing, all as hereinafter more specifically set forth.

In the drawings, W W are dotted lines, which indicate the position of the walls of the well. The full lines in Fig. 1 represent the shield complete located in the well.

A is the upper flange of the shield, provided with a hub threaded at *t* for the attachment of the shield to the upper string of tubing. The working-barrel of the pump will usually be attached at this point; but sometimes one or more lengths of tubing will be interposed between the working-barrel and the shield.

B is a similar flange and hub for attachment to the string of tubing below the shield,

T marks the shield-tube, which is about half the diameter of the well-tubing. It projects a few feet below the lowermost flange, and has a check-valve, V, opening upward in its lower end.

On the outside of tube T are attached, preferably by casting, a series of horizontal flanges, F, parallel to each other, and from two to four inches apart. These flanges are circular, and extend to within about a quarter of an inch of the wall of the well. They are united and supported by vertical partitions P, which I prefer to cast solid with the flanges around the central wrought pipe T. These partitions divide the space between each pair of flanges into four compartments, and in each of these the tube T is perforated with a small hole, *h*, located usually near the top of the compartment, as shown.

The shield may have any desired number of flanges, and its length will be determined by the character of the well into which it is to be introduced, being greatest in such as have the most sand and gas, or either, to be separated from the oil.

The shield thus made is attached at or near

to the lower end of the tubing, and lowered into the well, in the usual manner, till it reaches the bottom, or nearly to the bottom, of the well. The best location for it is in the torpedo-hole, as that is usually much larger than the bore of the well and allows free passage to the rising gas.

The working-barrel of the pump is placed above the shield, as before stated, and the pump is worked in the usual way.

Owing to the smallness of the holes *h* the current of oil drawn toward them by the pump moves laterally so slowly that the sand, which is at first in suspension in the oil, has more than time to settle from it, and drops upon the upper surface of the flanges F, instead of being drawn with the oil into the tube T through the holes *h*. The greater part of the sand thus separated from the oil runs off between the flange-rims and the well-wall and drops to the bottom of the well. The gas which, mingled with the oil, enters the well through the pores of the oil-bearing rock rises rapidly and passes up the annular space on the outside of the flanges, and if any should be caught under the flanges it would be lodged above the level of the holes *h*, and, owing to the slow lateral movement of the oil-current before noticed, would not be drawn into the tube T, but escape at the edges of the flanges and rise next the wall of the well, outside the tubing, to be ultimately received by the casing and conducted by it to the top of the well and thence by a pipe through the casing-head under the boiler of the pumping-engine, to be consumed as fuel.

The lower tubing—generally called the "anchor"—is attached to the threaded hub *t* of the lowermost flange, B, and extends to or near the bottom of the well. It is plugged at bottom, and its sides are perforated near the lower end for the admission of water. The diameter of this tubing is so much greater than that of the shield-tube T, through which all the fluid pumped has to pass, that the upward current in this tubing produced by the action of the pump is comparatively slow, and has little tendency to keep in suspension and carry up through valve V into tube T any coarse and gritty sand, which would cut the pump valves and leathers and scratch and spoil the inside of the working-barrel. The use of this differential method of eliminating the sand and gas from the oil and water of the well is the distinguishing characteristic of my invention.

The exclusion of the gas from the pump-tubes renders the entire vacuum of the pump effective in raising fluids alone, which are thus much more rapidly drawn from the well. As a consequence of this, the oil has much less time to deposit its paraffine in the pores of the oil-bearing rock, and this material would not so often be drawn into and clog the action of the pump-valves. The rock yields its product more freely and the pump acts more efficiently.

Having thus fully described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The sand and gas shield herein described, the same consisting of the combination of the perforated tube T, flanges F, and flanges A B, having threaded hubs *t t*, and check-valve V, all constructed substantially as specified, for the purposes set forth.

2. The combination of the tube T, flanges F, and flanges A B, having hubs *t t*, all constructed as and for the purposes stated.

3. The combination of the tube T, flanges F, and flanges A B, having hubs *t t* and partitions P, all constructed substantially as described, for the purposes set forth.

4. A sand and gas shield for separating sand and gas from the oil in an oil-well before the oil reaches the induction-orifices of the pump-tube, the same consisting of the combination, with the pump-tube, of horizontal projections or flanges located above and below the induction-orifices, and forming a series of open-sided chambers having such a proportion between their height and diameter that the sand will fall and the gas rise out of the oil before the oil can traverse the radius of the chamber and be drawn by suction into the pump-tube, all as specified.

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

THOS. L. CROWLEY.

Witnesses:
D. P. COWL,
CHAS. F. STANSBURY.