N. S. MINNISS & D. A. WRAY.

Method and Apparatus for Obtaining Oil from Oil-Wells.

No. 202,570. Patented April 16, 1878.

Fig 1

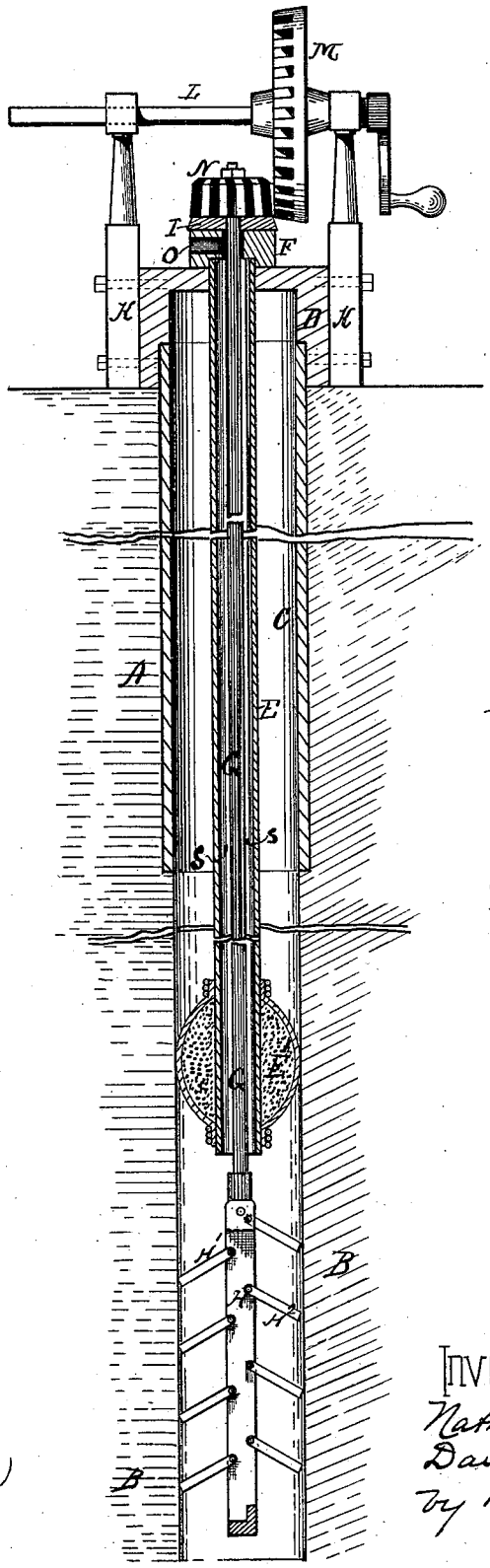
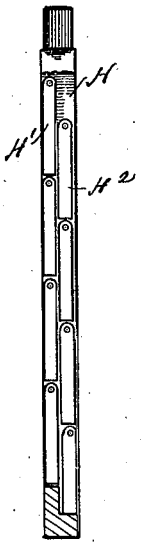


Fig 2



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UNITED STATES PATENT OFFICE.

NATHAN S. MINNISS AND DAVID A. WRAY, OF BRADFORD, PA.

IMPROVEMENT IN METHODS OF AND APPARATUS FOR OBTAINING OIL FROM OIL-WELLS.

Specification forming part of Letters Patent No. **202,570**, dated April 16, 1878; application filed October 4, 1877.

To all whom it may concern:

Be it known that we, NATHAN S. MINNISS and DAVID A. WRAY, of Bradford, in the county of McKean and State of Pennsylvania, have invented a new and useful Improvement in Method of and Apparatus for Obtaining Oil from Oil-Wells; and we do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawing, forming part of this specification, and which is a sectional view of an oil-well and our improved apparatus for operating the same.

Our invention relates to the method of and apparatus for obtaining oil from wells in which the oil does not flow to the surface naturally—*i. e.*, where the well has not gas in sufficient quantities to force the oil to the surface without the aid of mechanical contrivances and artificial means; and consists in agitating the oil in oil-bearing sand, at or near the bottom of the well, in such manner as to prevent the clogging of the veins or pores with paraffine, heavy oil, &c., to facilitate the escape of gas and increase the yield of oil.

The object of our invention is best accomplished by inserting rods, rope, or wire into the well to a point at or near where the oil enters the well in the sand or oil-bearing rock, said rods, rope, or wire, if desired, being provided at the lower end with devices for increasing their effectiveness, and being rotated or reciprocated from the surface by any of the well-known contrivances applicable to the purpose.

We will now proceed to describe our invention, so that others skilled in the art to which it appertains may apply the same.

Figure 1 is a vertical section. Fig. 2 is an elevation of the agitator with wings closed.

In the drawing, A indicates a well terminating in the sand or oil-bearing rock B, and provided with the usual casing C, having casing-head D. Within the well, and extending down to the oil-bearing rock, is arranged tubing E, having attached to its lower end a seed-bag or other suitable packer, E′, adapted to close the space between the tube and walls of the well, thereby converting the oil-bearing portion of the well into a closed chamber, whose only outlet is pipe E. Tube E is sustained in the well by head F, which rests upon the casing-head D. The diameter of the tube E will, of course, vary according to circumstances, and will be determined by the amount of gas and oil the well can be made to yield when agitation is effected.

G represents rods, rope, wire rope, or like device, (preferably rods,) extending from the surface (or derrick-floor) down into the oil-bearing section of the well, and armed below with agitators H^1 H^2. The agitators are preferably wings, arms, or beaters, which are fitted to the agitator frame or stem H, and are pivoted thereto at their upper ends in such a manner that when the wings, arms, or beaters H^1 H^2 are at rest they, by their own weight, will fall into the recesses or slots formed in the stem or frame H for them, and will hang in a perpendicular position in the frame or stem H, so that they will be even or flush with the edge of agitator frame or stem H. When in this position the whole agitator will readily pass through the tubing E, and form no obstruction to lowering the rods, rope, or wire G, with the agitator attached, into the well. The same will be the case when it is desired to remove the rods, rope, or wire, with agitator attached, from the well. When the agitator is in position in the well a rapid rotary motion is given to the rods, rope, or wire G at the surface by means of the device L M N I, &c., or any other device for giving a reciprocating motion to the rods, rope, or wire G, which sets the agitator H, at or near the bottom of the well, in rapid motion, and causes the wings, arms, or beaters H^1 H^2 to be thrown out by centrifugal force at an angle from the rod or stem H of the agitator, making as effective an agitator as though the wings, arms, or beaters H^1 H^2 were fixed rigidly at right angles with stem or bar H.

The wings, arms, or beaters H^1 H^2 can be made of such length or size as that when they are revolving at their extreme length they will swing clear of the walls of the well; or they can be made so that they will touch and scrape the walls of the well, and thus remove any accretions that may form or collect thereon.

The rods or rope are suspended in the well by means of a head, I, which should be

smooth upon its under surface, so that it will move easily upon head F, and also form a close joint therewith, to prevent the escape of oil, &c.

In order to actuate rod or rope G, jack-posts K are bolted or otherwise secured to the casing-head D, and form bearings for a shaft, L, upon which is a gear-wheel, M, that meshes with a pinion or bevel-gear, N, secured to rod G or its head I. O is the discharge-pipe, connected to head I when the tubing G is employed; but when G is not required, then it is inserted in the casing-head D.

In wells where our invention can be used, and the desired effect of causing the oil to flow to the surface through the full diameter of the well (usually five and one-half or five and five-eighths inches) can be produced, we dispense with tubing E, and lower the rod, rope, or wire G, with the wings or agitators H^1 H^2 attached, to its place at or near the bottom of the well, and apply rotary motion by means of crank or pulley through pinion and bevel-wheel M N, thus setting the wings H^1 H^2 in rapid motion and violently agitating the oil, by which means gas is evolved, forcing the oil to the surface through the full diameter of the well to the top, where it is discharged through pipe O into the tank; but in wells in which gas cannot be liberated in sufficient quantities by the process of agitation to force to the surface so large a column of oil as is represented by the full diameter of the well, we reduce the diameter of the well by inserting tubing E, with annular packing or seed-bag E′, as before specified, and introduce the rods G, &c., through the central tubing.

The power to operate the agitator is applied as before specified, and the gas evolved by violently agitating the oil serves to force the oil to the surface through the annular space *s s* between rods G and tubing E, from whence it is delivered by pipe O, as before specified. The oil in the well is agitated from time to time, as often as may be found necessary, which will depend on the amount of oil coming into the well and the natural supply of gas in the well.

In many cases the supply of oil from the oil-bearing rock is impeded in its passage into the well by the formation and accumulation of paraffine or heavy oil on the walls, and by the dead or heavy oil lying in the bottom of the well, which cannot be removed by the pump, and therefore necessitates the frequent use of torpedoes.

The nature of our invention is such that the action of the wings or agitators, rotating rapidly in the oil in the well, will keep the walls washed clean of paraffine, heavy oil, or other accretion; and, if desired, the wings can be so set that they will touch the wall when rotating, so as to scrape off any accretions.

The advantages of our invention are, first, increased yield in the well; secondly, many wells can be operated as flowing wells which would otherwise have to be pumped; thirdly, reduction of labor in operating wells, as a single laborer can manage several wells, the wells only having to be agitated occasionally, and the number attended to by one man being limited only by the distance between the wells; fourthly, in many wells salt-water enters the well from the sand or oil-bearing rock, prevents the well from flowing, and eventually injures the well. This salt-water cannot be shut off by the packer or seed-bag above the sand or oil-bearing rock; but the violent agitation produced will so incorporate the salt-water with the oil and gas that the salt-water will flow to the surface along with the oil; and, finally, there is great saving in machinery and power.

Having thus described our invention, what we claim, and desire to secure by Letters Patent, is—

1. The method of causing oil to flow from a non-flowing well, the same consisting in agitating the oil at or near the bottom of the well, substantially as specified.

2. The combination, with an oil-well, of an agitator arranged and adapted to be operated within the well, substantially as and for the purpose specified.

3. The combination, with an oil-well, of a tubing extending down to or near the oil-bearing rock, a packer or seed-bag arranged upon the lower end of the tubing, and an agitator, substantially as and for the purpose specified.

In testimony whereof we, the said NATHAN S. MINNISS and DAVID A. WRAY, have hereunto set our hands.

NATHAN S. MINNISS.
DAVID A. WRAY.

Witnesses:
JAMES BRODER,
HENRY GROSS.