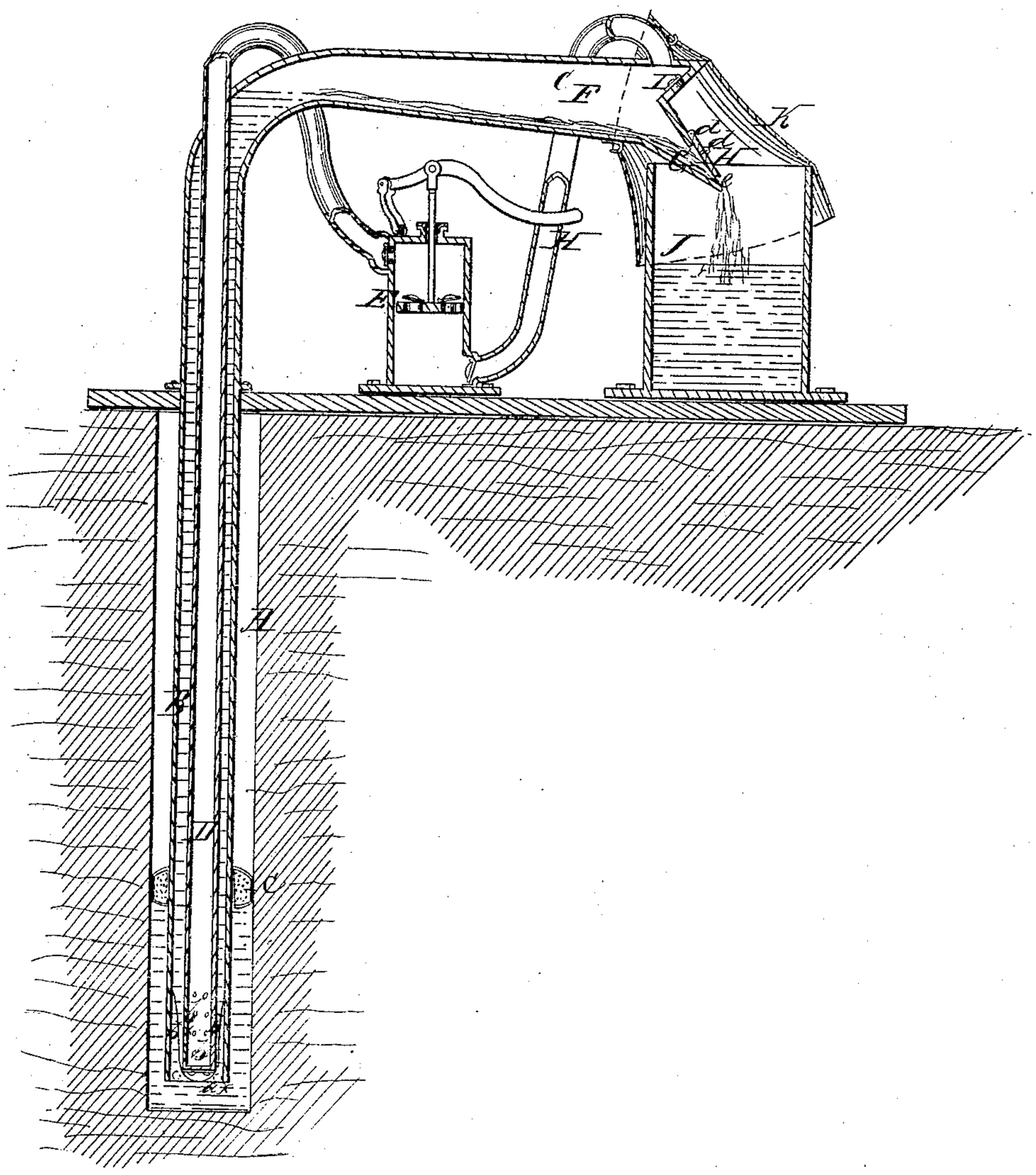
T. B. GUNNING.

OIL EJECTOR FOR OIL WELLS.

No. 45,153. Patented Nov. 22, 1864.

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# UNITED STATES PATENT OFFICE.

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## IMPROVEMENT IN OIL-EJECTORS FOR OIL-WELLS.

Specification forming part of Letters Patent No. **15,153**, dated November 22, 1864.

*To all whom it may concern:*

Be it known that I, T. B. GUNNING, of the city, county, and State of New York, have invented a Gas and Air Injector for Oil-Wells; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to make and use the same, reference being had to the accompanying drawing, forming part of this specification.

The drawing represents a vertical central section of my invention.

This invention relates to a new and useful means for ejecting or forcing oil from oil-wells, and is an improvement on the atmospheric pump recently employed for that purpose.

A represents the bore or shaft of an Artesian well, which extends from the surface of the earth down to the vein of oil, and B is a tube which is fitted in the shaft and extends down to its bottom or to the oil vein. This tube B is encompassed by what is termed a "seed-bag," C, which serves as a packing to prevent water from streams or veins above the oil vein from descending into the latter. This seed-bag is very essential, and sometimes a plurality of them are used. The oil-tube is open at its lower end, and within it there is fitted concentrically an air-tube, D, which extends upward above the surface of the earth, and is connected at its upper end with an air pump, E. The oil-tube B is curved at its upper part above the surface of the earth, and gradually increases in diameter, as shown at F, the bottom of the latter slightly inclining downward, and having at its under side a spout, G, which projects slightly in advance of the end of F, and is provided with a flap or door, H, having one or more joints, *d*. This flap or door H does not fully cover or close the end of G, a small space, *e*, being allowed to admit of a discharge of oil equal to the ordinary flow from the well. The end of F, it will be seen, is formed with a double slant, the angle being about the same, but in reverse directions, and in the upper slant there is a valve, I, opening inward, which, according to its position, has a tendency to remain closed by virtue of its own gravity.

H′ is a tube which leads from the upper part of F, near its end, and extends down to the air-pump E, as shown clearly in the drawing.

I is a valve placed in the outer end of F, above the flap or door G.

The gas and air tube D, which is the eduction-pipe of the air-pump, passes through the oil-tube B at its bend above the surface of the earth, and extends from thence down to a suitable distance below the surface of the oil in the tube B. The lower end of the gas and air tube D is closed, and just above the lower end holes *b* are drilled obliquely outward and upward, said holes extending all around the tube in rows arranged quincunx form.

In order to insure a central or concentric position of the tube D within the tube B, I attach three rollers to its lower end by means of elastic arms, as shown in red in the drawing at *a*′.

From the above description it will be seen that when the air-pump E is operated air will be forced down the tube D, and will pass out through the oblique holes *b* at its lower part in an upward direction in the lower part of the oil-tube B, the oil being forced upward thereby in the tube B and passing into the enlarged part F thereof, from which it escapes through the flap or door G. The enlarged part F of the oil-tube B admits of a space *e*, within it above the surface of the oil, and the tube H communicates with this space and conducts the gas which escapes from the oil to the air-pump E, from which it is forced down the air-tube D, (the latter being strictly a gas as well as an air tube,) and is made again subservient in raising the oil up through the tube B.

The cause of the free flow of oil from wells without any mechanical appliances is supposed to be mainly, if not wholly, due to the pressure of gas within them, and as this gas is always present in all oil-wells in greater or less quantity I can by my invention, when the gas is insufficient in quantity or power to effect in itself or alone the result above alluded to, return it from the surface of the elevated oil and make it again subservient in assisting the oil in its passage upward, using only so much atmospheric air as may be necessary to make up any deficiency of gas.

In case of an insufficiency of gas in *c* air is admitted through the valve I, for it will be understood that the pump E is supplied with air when necessary, as well as gas fro the space *c*, and when the air-pump is in o, eration a slight suction is produced in F, which assists the ascent of the oil in B.

I do not confine myself to any precise dimensions for tubes for the oil and the air and gas; but the tubes B D should be of such a relative size as to allow a sufficient space between them for the ascent of the oil.

The advantages derived from this invention are as follows: By having the air-tube D inserted within B, as shown and described, it can be readily adjusted to any point within the latter and readily removed, none of the fixed parts requiring to be disturbed, whereas in the old plan the air-tube is inserted in the bore or shaft at the exterior of the tube B. Consequently the seed-bag C is interfered with and much trouble and embarrassment are experienced, not only in first inserting the air-tube, but also in adjusting it afterward, should it be necessary at any time to do so.

By the employment of the gas-tube H with the air-pump and the oil-tube, as shown, the forcing up of the oil is greatly facilitated.

I would remark that instead of the oblique holes *b* in the lower end of the gas and air tube D for giving the gas and air a direction upward in tube B a bell-cap, *b* , may be used to effect the same end, as shown in red, the lower end of D being perforated or slotted in any suitable way to admit of the exit of the gas and air; but there are objections to this means, as will be presently set forth.

I would further remark that the receptacle J, into which the oil is discharged from F, may be provided with a canvas cover, K, the latter being fitted over the end of F, so as to retain the gas which may escape from the oil in J and allow it to escape through the valve I into F. By this means the gas which escapes with the oil from F may be saved and utilized with that which escapes from the oil in F.

For wells tubed with pipe of two (2) inches internal diameter, an injecting-pipe of one (1) inch bore and a quarter in thickness will be required in most cases of deep wells. This thickness of pipe will be strong enough for wells of any depth, and more than thick enough to give the holes, if bored with proper slant, sufficient length within the iron to turn the air upward, and thus dispense with the inverted bell-cap. By this plan an annular well exists between the pipes equal to a pipe of about fifteen-sixteenths of an inch bore, through which the oil will pass upward when assisted by the gas or air, or both, which, forced by the pump down the internal pipe, will pass through the holes around the lower end in an upward direction, acting immediately upon the oil, while the outer pipe takes the place of the bell-cap and keeps the current in the upward direction. By this plan all the power of the gas or air acts directly upon the oil, whereas a bell-cap not only interferes with the action of the air upon the oil, but also is an impediment to the latter by lessening the space for it to pass through. Therefore by my plan smaller pipes may be used, thus lessening the expense, for I do not confine my invention to any particular size or strength of the pipe, as in wells of three or four hundred feet deep lighter pipe may be used in many cases. In every well the size of the pipe must be adapted to the flow of oil and the amount of assistance required to get it to the surface of the ground. The holes should collectively be more than equal to the area of the pipe, and the holes in the different rows should not be over each other, but form a current of air all around the pipe. The horizontal oil-pipe must enlarge sufficiently in a vertical direction to give the oil a good descent to the tank and to give an upward direction to the pipe passing to the pump, its length, determined by the quantity of gas to some extent, or to the position convenient for the tank, provided that it ranges between ten and fifteen feet, and, say, from eight to twelve inches in height, including the opening or doorway for the oil, gradually lessening to the size of the well-pipe, and about the same width through the whole length. The gas-valve should be equal to the full supply of the pump at any moment, with its door opening inward and merely shutting by its own weight. There should be a permanent opening below the oil-door about equal to the ordinary run of oil, and the door made with joints sufficient in size and number to give exit to any possible amount of oil and gas that may want exit, the door shutting by its own weight. This oil-tube and valve, as described, is intended to economize the gas without taking any of the gas from the oil in the tank; but where convenient it can be aided by a canvas cover hung over its mouth and passing down around the tank, in which case the oil-door may be dispensed with in some cases. When the tank is situated at a long distance from the well, a canvas, metal, or other covering may be placed over the tank, the covering terminating in a point at the upper part, from which a pipe may extend to the gas opening or valve in the tube, while another pipe passes from the oil-opening (the door of which may then be left off) to the tank. This latter pipe might of course (if large enough) answer to carry the oil down to the tank, and also the gas back to the tube; but in most cases the tube will retain gas enough for the pump without assistance from that passing from the oil after it has reached the tank.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. The employment or use of a gas-tube or gas-chamber arranged with the air-pump and oil-tube, substantially as shown, for the purpose of admitting of the gas which escapes from the elevated oil being made subservient in forcing up the oil, as described.

2. The enlarged portion F at the upper part of the oil-tube B, provided with a flap or door, G, and a valve, I, and having the gas-tube H communicating with it, and all arranged substantially as and for the purpose specified.

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Witnesses:

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