Sept. 22, 1925. 1,554,842

J. COULTER

APPARATUS FOR SEPARATING OIL AND GAS IN A WELL

Filed March 26 1924

Fig. 1

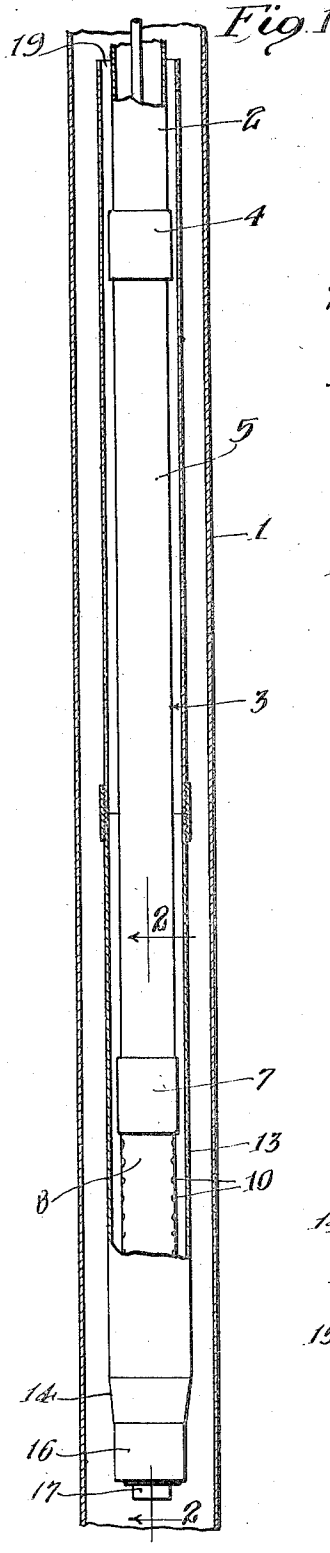


Fig. 2

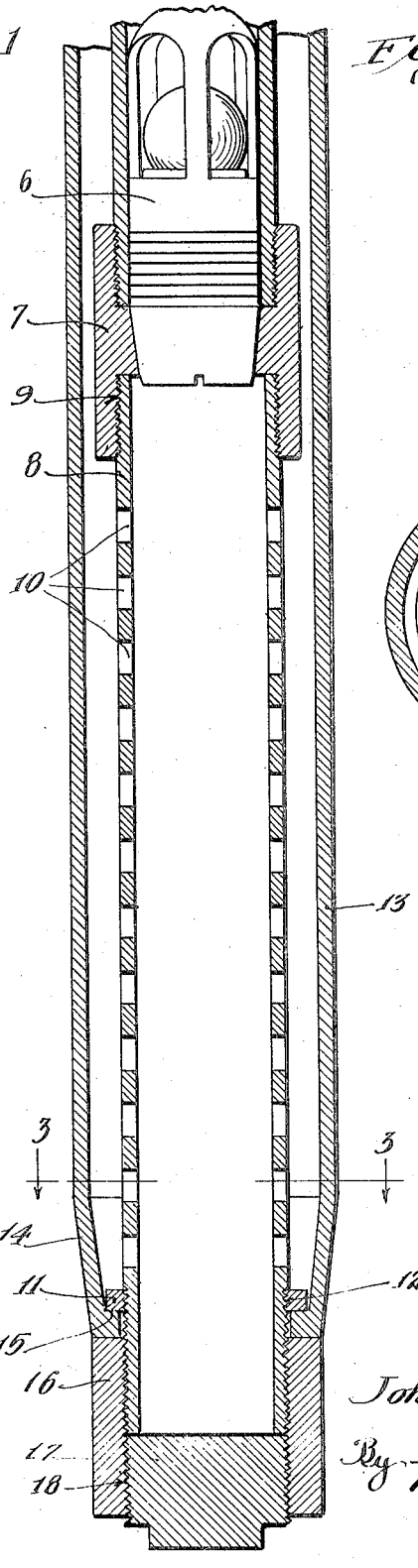
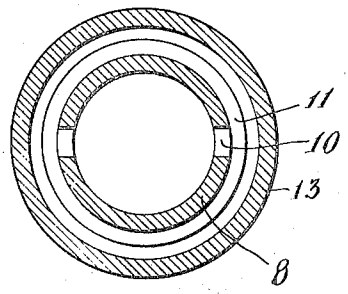


Fig. 3



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UNITED STATES PATENT OFFICE.

JOHN COULTER, OF HUNTINGTON BEACH, CALIFORNIA.

APPARATUS FOR SEPARATING OIL AND GAS IN A WELL.

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To all whom it may concern:

Be it known that I, JOHN COULTER, a citizen of the United States, residing at Huntington Beach, in the county of Orange, State of California, have invented a new and useful Apparatus for Separating Oil and Gas in a Well, of which the following is a specification.

This invention relates to a method of and apparatus for separating oil from gas at the bottom of an oil well, and is more particularly directed to an apparatus adapted for use in connection with an oil well pump for separating natural gas from petroleum oil before the oil is pumped from the well.

A mixture of gas and oil is very difficult to pump efficiently with the oil well pumps as are now commonly used in oil wells. Wells often stop pumping, due to the fact that there is such a large quantity of nitrogas in the bottom of the well where the pump is operating that the pump fails to raise the oil due to the large amount of natural gases admitted into the pumping barrel during the stroke or strokes of the pump. There still remains, however, a considerable amount of oil in the well that could be pumped from the well if it were possible to separate the natural gases from the oil so as to eliminate the natural gases taken into the pump barrel.

It is therefore an object of this invention to provide means for separating the natural gas from the oil before the oil is admitted to the zone of activity of the oil well pump.

It may be an object of this invention to provide an apparatus for separating the natural gases from the oil at the bottom of the well so that the natural gases may pass up the oil well casing and the oil, freed from the greater portion of these natural gases, may be pumped by the oil well pump through the tubing provided for the discharge of the oil.

An object of this invention may be to provide a comparatively simple, efficient and inexpensive apparatus for obtaining the above enumerated advantages, which is applicable to the oil well pumps as now in operation.

Other advantages and objects of this invention will be apparent from the following detailed description of a preferred embodiment thereof, as illustrated in the accompanying drawings.

In the drawings:

Figure 1 is a sectional side elevation of the lower end of an oil well illustrating this invention as embodied in connection with an oil well pump.

Fig. 2 is a sectional side elevation taken on the line 2—2 of Figure 1.

Fig. 3 is a sectional plan view taken on the line 3—3 of Figure 2.

An outer oil well casing is generally indicated by the numeral 1, in which the ordinary tubing 2 is disposed. The oil well pump 3 is secured to the lower end of the tubing 2, as illustrated at 4. The working barrel 5 of the pump may be an extension of the tubing 2. A standing valve 6 of the ball type is ordinarily located in or at the lower end of the oil well pump 3, which standing valve 6 is ordinarily screw-threaded into a shoe 7 substantially as illustrated in Figure 2 of the drawing. A nipple 8 is screw-threaded to the shoe 7 in some such manner as illustrated at 9, the said nipple 8 having a plurality of perforations, as illustrated at 10. A flange 11 is screw-threaded to the nipple 8, as illustrated at 12. A section of pipe 13 of greater internal diameter than the tubing 2 or the pump barrel 5, and of less external diameter than the casing 1, and having a depressed section 14, is adapted to be slipped over the pump barrel 5 and has an internally extending shoulder 15, which shoulder 15 is adapted to engage the flange 11. In order to hold the shoulder 15 in engagement with the flange 11, a collar 16 is screw-threaded to the nipple 8 to force the shoulder 15 against the flange 11. A plug 17 may be screw-threaded into the collar 16, as illustrated at 18, so as to restrict the passage of oil into the nipple 8 at this point. The pipe 13 may be of any desired length and it has been found that to obtain the best results, the pipe 13 should extend approximately to the top of the oil well pump 3 so as to provide a separating chamber of sufficient capacity or size to permit a complete or approximately complete separation of the gas from the oil before the oil is admitted to the chamber surrounding the perforated nipple 8, because if gas is carried with the oil into this region the gas and oil are drawn together through the perforation 10 of the nipple 8 and hence through the pump 3.

Oil will be pumped from the well in some

such manner as will now be described, it being understood that the pump 3 and this novel gas separator are lowered into the oil strata so that the same will ordinarily be submerged for a portion of its length in oil. The oil will therefore flow up the interior of the casing 1 to the top 19 of the pipe 13, where the oil will be permitted to drop into the interior of the said pipe 13. The oil will therefore assume a curved path and any gas carried by the oil will be separated by this curved flow and pass up out of the well between the casing 1 and the tubing 2. The oil passing down the interior of the pipe 13 will enter the pump barrel through the perforations 10 in the nipple 8 substantially free of gas, so that the pump 3 may operate to pump the oil up through the tubing 2 to the top of the well. The pipe 13 may be of any suitable construction; however it has been found that in the case of small wells, the space between the pumping barrel 5 and the casing 1 is so narrow that it has been deemed advisable in this case to construct the pipe 13 of tin or other very thin metal so that the passage between the pump barrel 5 and the casing 1 will not be restricted to any material degree.

Having fully described a preferred embodiment, it is to be understood that I do not wish to be limited to the exact construction heretofore set forth, which may obviously be varied in detail to obtain a separation of the gases from the oil, as heretofore described, without departing from the spirit of this invention, as set forth in the appended claims.

I claim:—

1. A gas and oil separator comprising a perforated nipple adapted to be secured to the shoe of an oil well pump, at its upper end, means for obstructing the direct flow of oil into the perforated nipple, including a flange screw-threaded to the nipple at its lower end, a pipe having an inturned shoulder, means for forcing the shoulder against the flange, and means to close the nipple at its lower end.

2. A gas and oil separator adapted to be secured to an oil well pump which pump is secured to a string of well tubing within an oil well casing, comprising a nipple, a plurality of perforations in said nipple, means for closing the nipple at its lower end, a pipe secured to said nipple at its lower end in fluid tight relation and adapted to fit in the space between the pump barrel and the casing said pipe extending upwardly to substantially the top of the oil well pump, the pipe being open at its upper end so as to permit the free fall of the oil into the space between the pipe and the nipple and whereby the gas flows freely out of the well through the space between the oil well casing and the well tubing.

Signed at Huntington Beach, Calif., this 20th day of March, 1924.

JOHN COULTER.