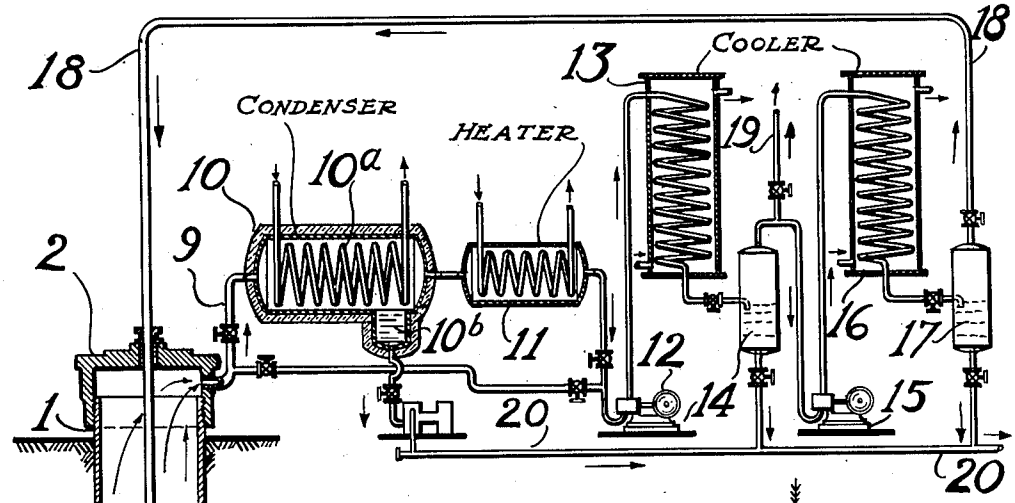
May 17, 1932. P. L. YOUNG 1,858,847

PROCESS FOR OBTAINING HYDROCARBONS FROM WELLS

Filed July 28, 1928



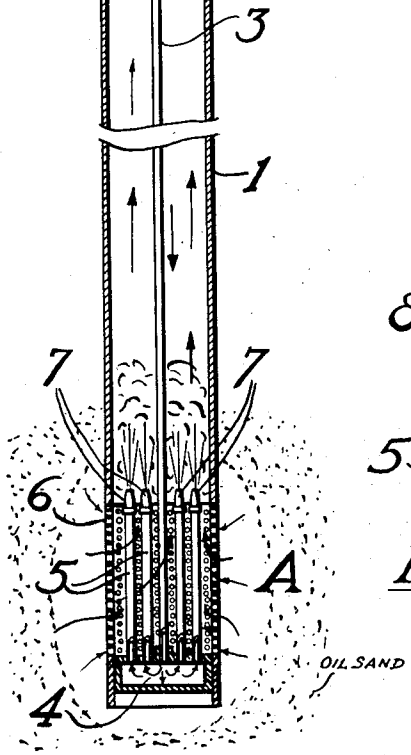


FIG.-1

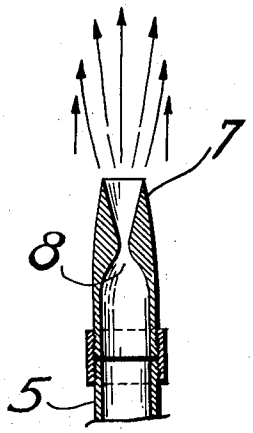


FIG.-2

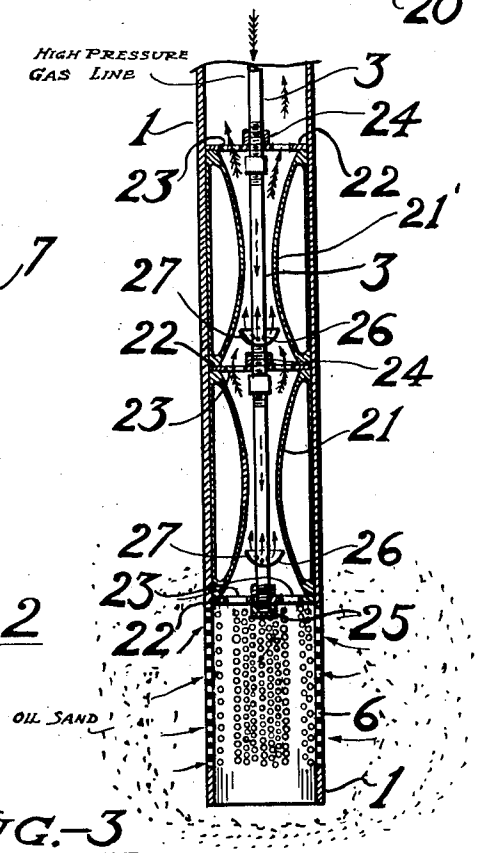


FIG.-3

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Search R

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UNITED STATES PATENT OFFICE

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PROCESS FOR OBTAINING HYDROCARBONS FROM WELLS

Application filed July 28, 1928. Serial No. 295,871.

The present invention relates to an improvement in the art of obtaining hydrocarbon gases and vapor from the earth and more specifically comprises an improved method for increasing the flow of natural gas and oil vapors from wells under reduced pressure. My invention will be fully understood from the following description and the drawings which illustrate apparatus for accomplishing the process.

In the drawings, Fig. 1 is a semi-diagrammatic view in sectional elevation of a well casing and the associated apparatus for accomplishing my process, the casing being broken away so as to show the apparatus above ground and a part of that below the surface.

Fig. 2 is an enlarged section of one of the nozzles used in the apparatus illustrated in Fig. 1 and

Fig. 3 is a modified apparatus constructed according to my invention.

The present method is an improvement of processes for obtaining gas and vapors from oil wells under high vacuum by which higher vacuua may be obtained in an extremely efficient manner directly on the producing sands. Although my process is of especial advantage when the vacuua are used, it may be applied to gas wells even under a slight pressure or slight vacuum to greatly increase the flow.

Referring to the drawings, Fig. 1 reference character 1, denotes a casing such as is ordinarily used for oil or gas wells and it is fitted with a casing head 2. A gas pipe 3 is mounted within the casing 1 and extends through the head 2 down to the base of the casing where it is connected into a header chamber 4 which is fitted with several vertical pipes 5. The lower part of the casing wall is perforated as shown at 6 to allow gas and vapor to enter the casing from the producing sands, indicated generally at A. Pipes 5 extend somewhat above the top of the perforated portion 6 of the casing and each pipe is fitted with an expansion nozzle 7, which is illustrated in detail in Fig. 2.

Referring to Fig. 2, the end of one of the pipes 5 is shown with a nozzle 7 formed preferably with a constricted throat 8, as shown, but any other form capable of producing a high velocity of gas is suitable.

Gas and vapor pass up the casing to the head 2 which is fitted with an outlet pipe 9. Pipe 9 may be connected directly to a vacuum pump 12 or through heater 11 to the pump but preferably the vapor first passes to a condenser 10 which is fitted with a refrigerating coil 10*a* and a trap 10*b* for condensate.

The vacuum pump discharges through cooler 13 to separator drum 14 from which gas is withdrawn to compressor 15. The compressed gas then passes through cooler 16 and drum 17 and is conducted to pipe 3 for reuse by pipe 18. Gas may be added to the system or withdrawn therefrom by pipe 19. Condensate is collected in trap 10*b* and separator drums 14 and 17 and is withdrawn to storage (not shown) by manifold 20.

Referring to Fig. 3 an apparatus is shown which may be substituted for tubes 5 and nozzles 7 of Fig. 1. Only the lower part of the casing 1 is shown in Fig. 3 with the perforated portion 6 as before for entrance of gas and vapor from the sand. Fitting closely within the casing above the perforated part 6 a plurality of Venturi throat pieces, of which only two 21 and 21′ are shown, are placed, the one above the other. The throat pieces may be made in any preferred manner, for example, by casting or otherwise. The upper ends are open while the lower ends are constructed with base plates 22 pierced with holes 23 for passage of gas and vapor. Plates 22 are also fitted with a central threaded collar 24 thru which the gas pipe 3 may be screwed and which furnishes a means of supporting the throat pieces at the desired position in the casing. A plug 25 is placed over the lower end of pipe 3. Small holes 26 are

drilled into pipe 3 so as to allow the escape of gas into the nozzles 21 and 21′ preferably at a point somewhat below the section of minimum area and deflection plates 27, preferably formed with concave surface upward in a suitable manner, direct the escaping gas upwardly through the nozzle.

In the operation of my process, gas under high pressure is forced down through pipe 3 and in expanding through nozzles 7 or 21 and 21′ into the casing, it produces a high vacuum on the lower part of the casing and directly on the sands. In this manner gas and vapor from the sands are drawn into the casing and forced upwardly to the surface of the ground. The gas pressure may be as high and conveniently obtained and it will be understood that the vacuum produced is, within limits, dependent on the pressure and flow of gas.

Although I prefer to use apparatus similar to that shown in Fig. 1, I also contemplate the use of several nozzles in series which may be conveniently provided as in Fig. 3, and while I have shown only two nozzles, 21 and 21′, and the one immediately above the other, any desired number may be used and they may be placed at considerable intervals which will be of great advantage in removing gas and vapors from deep wells. The flow of gas to each nozzle may be restricted by suitably arranging the size and number of the holes 26, as will be understood.

By the use of my process, it is possible to economically reduce pressure on gas and oil wells to less than one half of an inch of mercury and to greatly increase the flow of gas and oil vapors. The gas pressure should be 100 to 200 pounds per square inch but it is preferable to provide higher pressures, for example, 600 to 800 pounds.

In the description of my process, I have shown the compression and cooling method for the removal of normally liquid hydrocarbons from the gas mixture but absorption in oil may be substituted therefor or adsorption in charcoal may be used, as will be readily appreciated. In any case the residual gas is preferably recompressed and recirculated through line 3 to the expansion nozzles, as disclosed.

My invention is not to be limited by any theory of the mechanism of the process nor by any example given merely by way of illustration, but only by the following claims in which I desire to claim all novelty inherent in the invention.

I claim:

1. The method of lifting hydrocarbon vapors to the surface of the earth from a natural gas bearing stratum through a well which opens into the natural gas bearing stratum above the level of any liquid in the stratum which comprises passing gas under greater than atmospheric pressure in a confined stream into the well, expanding the gas from the confined stream into the well at the opening of the well into the stratum in the direction of the outlet of the well and above the level of any liquid in the stratum with sufficient velocity to obtain less than atmospheric pressure directly upon the gas producing sands, and withdrawing the mixed gases through the outlet of the well.

2. The method according to claim 1 in which suction is applied to the outlet of the well to draw the mixed gases from the well.

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