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A. M. CHRISMAN ET AL

AUTOMATIC OIL AND GAS SEPARATING PUMP

Filed Dec. 6, 1924

Fig. 1.

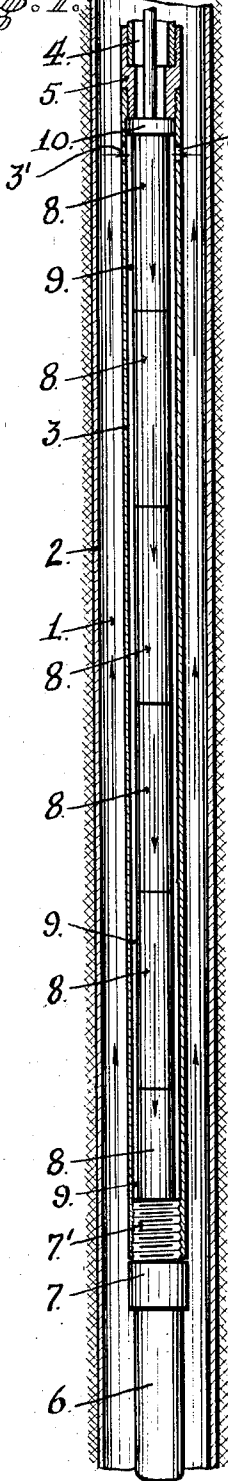


Fig. 2.

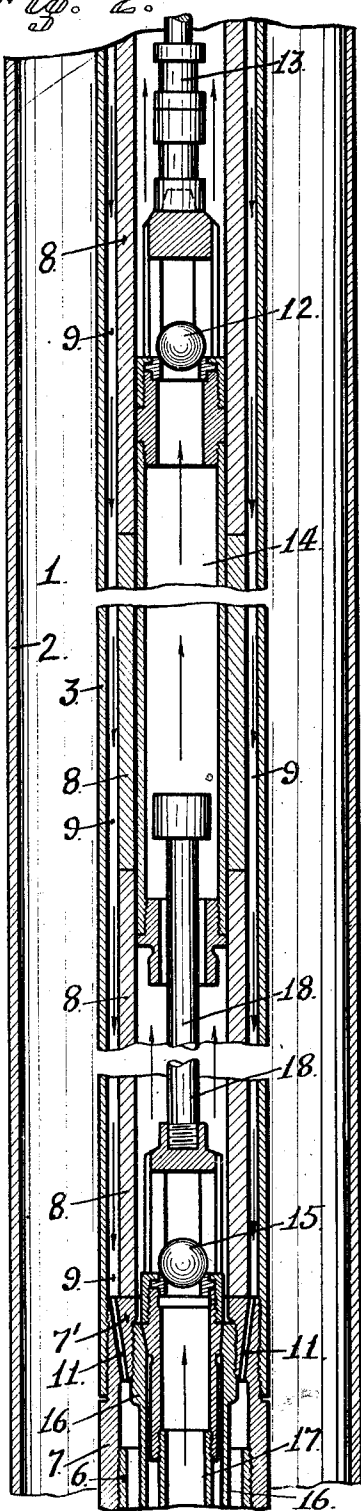


Fig. 3.

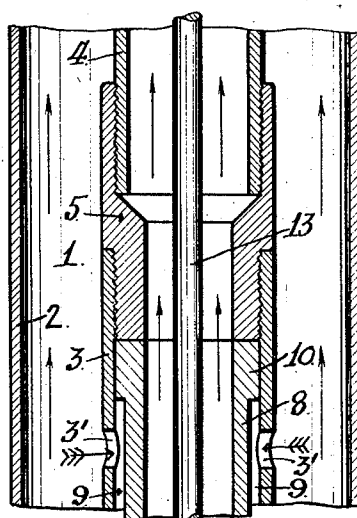
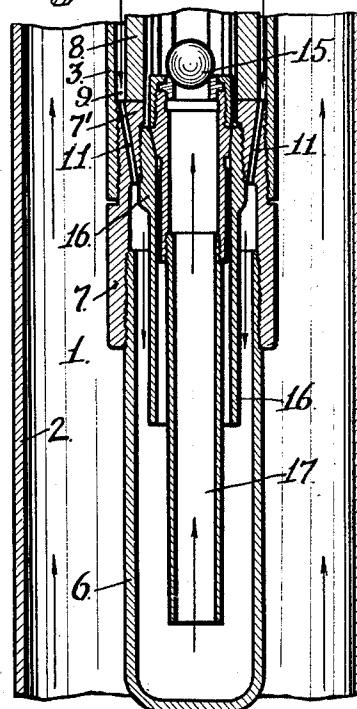


Fig. 4.



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AUTOMATIC OIL AND GAS SEPARATING PUMP.

Application filed December 3, 1924. Serial No. 754,347.

To all whom it may concern:

Be it known that we, ALBERT M. CHRISMAN and JACK E. WELLS, citizens of the United States, residing at Pacifico, in the county of Kern and State of California, have invented certain new and useful Improvements in Automatic Oil and Gas Separating Pumps, of which the following is a specification.

Our invention relates to the class of pumps adapted for use in the production of petroleum. It is especially applicable in wells where gas is present, in that it is capable of automatically separating the oil and gas, said separation taking place at the point where the oil enters the pump, the gas being mainly excluded, thus relieving the pumping instrumentalities of its presence, resulting in distinct advantages.

Our present invention is an improvement in the construction of the oil and gas separating pump of our application Serial Number 693373, filed February 16, 1924, which application has resulted in Patent No. 1,514,200, dated November 4, 1924.

The object of the present improvement is to provide for the simple and ready repair and resetting of the standing-valve assembly without disassembling the pump, so that the work can be done effectually and without loss of time at the well itself, instead of having, as in our previous case to dismember the pump and reassemble it with special appliances found only in a shop usually far removed from the well.

The nature of our improvement and manner in which our object is attained will hereinafter fully appear.

Referring to the accompanying drawings—

Fig. 1 is a vertical section of the barrel portion of our pump and its connections, the liners being in elevation whereby the valve and plunger assembly does not appear.

Fig. 2 is a vertical section enlarged and broken, of that portion of our pump which includes the valve and plunger assembly.

Fig. 3 is a vertical section of that portion of the pump in the region in which the separation of the gas takes place, showing the point of entrance of the oil to the annular space within the pump barrel.

Fig. 4 is a vertical section of that portion of the pump in the region in which the oil from the pump barrel enters the interior of

the pump to be directed to the plunger and valve assembly.

1 is a well and 2 is a casing therein. 3 is the barrel of the pump which at its upper end is connected by the coupling 5 with the tubing-string 4 leading to the surface. At the lower end the barrel is connected by a coupling 7 with the tail pipe 6, the bottom of which is closed, as seen in Fig. 4, thus forming a sealed reservoir.

Within the pump barrel 3 are the liner members 8, usually, as here shown, comprising a plurality of aligned abutting sections. These liners have an exterior diameter sufficiently smaller than the interior diameter of the barrel 3 to leave an intervening space indicated by 9. The top liner has a collar 10, Fig. 1, on its upper end which closely fits the barrel thus closing the space 9 above. The bottom liner rests upon the top of the inserted upper or collar portion 7' of the lower coupling 7, as seen clearly in Figs. 2 and 4, and said collar portion, in conjunction with the lower end of the upper coupling 5 against which the collar 10 of the top liner bears, holds all the liner sections in place.

The barrel 3 near its upper end has the ports or openings 3' through which the well interior communicates with the upper portion of the space 9, as shown in Figs. 1 and 3. The lower coupling 7 has in its inserted collar portion 7' the ports or opening 11 through which the space 9 at its lower end communicates with the sealed reservoir formed by the tail pipe 6, as shown in Figs. 2 and 4.

12 in Fig. 2 is the upper or traveling-valve assembly, with which is connected the sucker rod string 13 above and the hollow plunger 14 below.

15 is the lower or standing-valve assembly which is seated in the upper end of a removable bottom shoe 16 screwed into collar portion 7' of the lower coupling 7. Said valve assembly has extending downwardly from it the anchor or suction pipe 17, and is connected above with the plunger 14 by means of the usual garbutt rod 18, to enable said assembly to be pulled out with the other working parts of the pump, Fig. 2.

The operation of the device, as indicated by the arrows, is the same, as far as the separation of the gas and liquid is concerned, as that of the pump of our previous

patent above noted, that is to say, the gas and liquid rise together in the well.

At the upper ports 3' the separation takes place, the gas passing on up in the well, while the liquid passes through said ports 3' into the space 9. In this space the liquid descends and passes through the ports 11 in the inserted collar portion 7' of the lower coupling 7, into the sealed reservoir formed by the tail pipe 6. It thence passes up through the anchor or suction pipe 17, the standing-valve assembly 15, the plunger 14, the traveling-valve assembly 12 and the tubing string 4 to the surface.

In the pump of our previous application the lower communication of the space 9 with the sealed reservoir of the tail pipe 6 is through ports in the bottom liner section. Also in that pump the standing valve assembly is seated in said bottom liner section. In some pumping operations the standing-valve becomes loose or cut in its seat, and when this occurs it is necessary to pull the pump in order to refit said valve and seat. If this repair can be made at the well without disassembling the pump, manifestly a great saving in time and labor will result. But with the construction of our previous pump, such repair cannot be made at the well because to reach the valve after the pump is pulled, it is necessary to remove the lower coupling which holds the liners in place, and when this coupling is removed, the liners will drop from position. In this case, there is no way at the well of reassembling the pump liners, since this must be done in the shop on an expanding mandrel, in order that they may be accurately lined up.

By our present improvement, however, the necessary repair can be made at the well, without disassembling the pump, since all that is necessary, after the pump is pulled, is to unscrew the tail pipe 6 from the coupling 7, then unscrew from said coupling the bottom shoe 16 which supports the standing-valve assembly, and finally remove said assembly. This operation leaves the coupling 7 with its inserted collar portion 7' in place, thereby holding the liners in position. Also by having the ports 11 in the inserted collar of the coupling 7, the necessary communication between the space 9 and the sealed reservoir of the tail pipe 6 is provided for.

We claim:—

1. An oil and gas separating pump comprising a barrel adapted for suspension in a well; a liner within and spaced from said barrel, the space between the barrel and

liner being closed above, and said barrel having ports through which the well communicates with the upper portion of said space; a coupling fitted to the upper end of the barrel and abutting against the upper end of the liner; a coupling fitted to the lower end of the barrel, said coupling having an inserted portion abutting against the lower end of the liner, said inserted portion having ports leading from the lower end of the space between the liner and barrel; a tail pipe having a closed foot fitted to the lower end of the lower coupling and communicating with the ports in the inserted portion of said coupling; a tubular bottom shoe fitted interiorly to the upper portion of said lower coupling and spaced from the tail pipe; and pumping instrumentalities within the liner, intermediate the upper and lower ports, and comprising a standing valve assembly and suction pipe, carried by said bottom shoe, a plunger above said standing valve assembly and a traveling valve assembly associated with said plunger.

2. An oil and gas separating pump comprising a barrel adapted for suspension in a well; a plurality of abutting, aligned liner sections within and spaced from said barrel, the space between the barrel and liner sections being closed above, and said barrel having ports through which the well communicates with the upper portion of said space; a coupling fitted to the upper end of the barrel and abutting against the upper end of the uppermost liner section; a coupling fitted to the lower end of the barrel, said coupling having an inserted portion abutting against the lower end of the lowermost liner section, said inserted portion having ports leading from the lower end of the space between the liner sections and barrel; a tail pipe having a closed port, fitted to the lower end of the lower coupling and communicating with the ports in the inserted portion of said coupling; a tubular bottom shoe fitted interiorly to the upper portion of said lower coupling and spaced from the tail-pipe; and pumping instrumentalities within the liner section, intermediate the upper and lower ports, and comprising a standing valve assembly and suction pipe, carried by said bottom shoe, a plunger above said standing valve assembly and a traveling valve assembly associated with said plunger.

In testimony whereof we have signed our names to this specification.

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