Feb. 19, 1929. 1,702,619

S. B. SARGENT, JR

LINER PUMP

Filed June 27, 1927

Fig. 1.

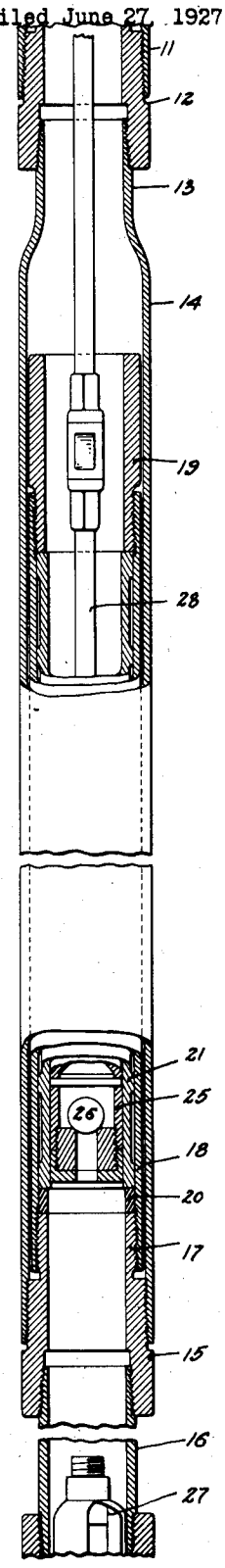


Fig. 2.

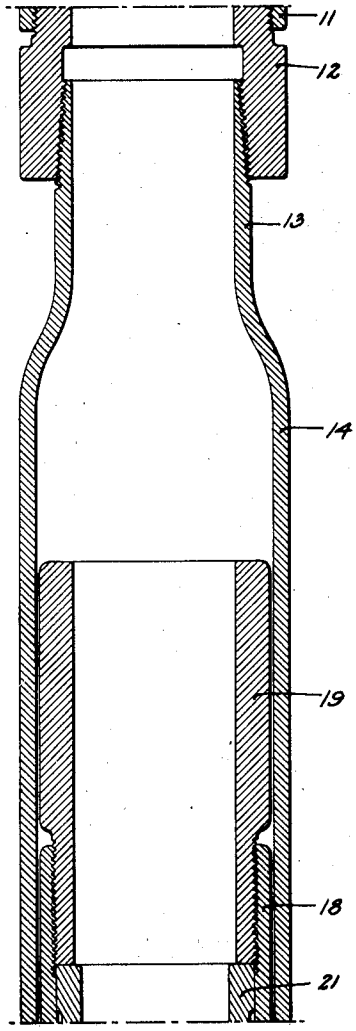
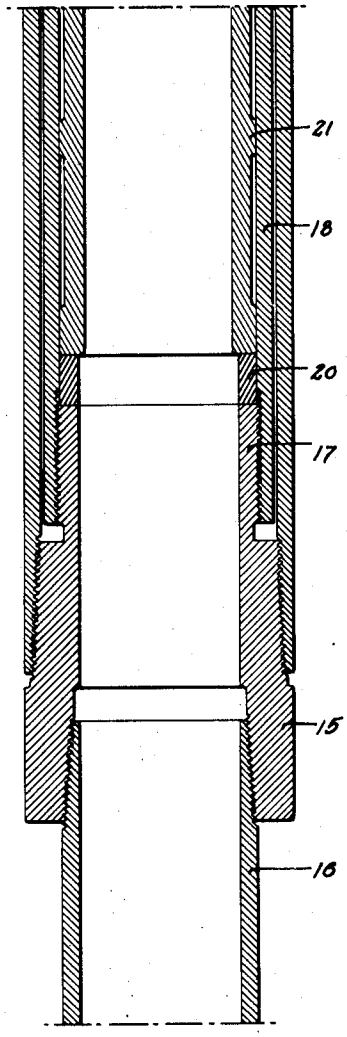


Fig. 3.



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Patented Feb. 19, 1929. 1,702,619

UNITED STATES PATENT OFFICE.

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LINER PUMP.

Application filed June 27, 1927. Serial No. 201,801.

My invention relates to the art of pumping oil wells, being more particularly a pump barrel construction. The common form of pump barrels now in use usually consist of a section of the tubing in which is arranged a series of liners formed of cylindrical cast sections, arranged end to end and forming a liner for the barrel in which the plunger reciprocates. Such liners are set up by placing the same end-to-end between two collars, one at each end, upon a mandrel, the collars being tightened in the barrel and the mandrel removed after which the liners depend for alignment solely on the end thrust established between the collars.

These liners are ordinarily made of cast iron and the barrel of steel, it being extremely esssential that the joints between the sections be smooth at all times and that such sections do not get out of alignment. However, with such common forms of construction, on the down stroke of the pump plunger, the pump barrel stretches due to the fact that the standing valve takes the entire load of the weight of oil, above the standing valve. This stretching amounts to approximately .009 inches on a 7 foot barrel, resulting in the allowance of the pump liners to loosen and become out of alignment. When this occurs, it frequently causes the plunger to stick and become inoperative, generally, it results in excessive wear on the plunger and cups thereon.

In my invention, I primarily desire to relieve the pump barrel of taking the load of the body of oil on the down stroke of the pump and, in so relieving such barrel of the load, I relieve such barrel of any stretching. Consequently the liners remain in alignment and the objectionable features above noted are overcome.

To attain this object, I provide a pump barrel which is attached to the tubing at its lower end, the pump barrel extending upwardly into the tubing and being unconnected at its upper end so that no stretching of the pump barrel or movement of the liners therein takes place.

I have also discovered that in view of the fact that the liners are ordinarily made of cast iron and the pump barrel of steel, the steel having a greater coefficient of expansion, some difference in the expansion between the barrel and the liners may take place, due to the heat of the oil during pumping, and it is one of the objects of my invention to provide also a pump barrel so constructed that the barrel and liners remain in substantially the same relation, regardless of different temperatures which may effect the same due to the heating of the oil during the pumping operation.

Referring to the drawings which are for illustrative purposes only—

Fig. 1 is a vertical view, partly in section of a string of tubing having attached thereto and combined therein a pump barrel construction embodying a form of my invention.

Fig. 2 is an enlarged vertical sectional view of the upper end of the device shown in Fig. 1, and

Fig. 3 is an enlarged vertical sectional view of the lower end of the device shown in Fig. 1.

11 designates the lower end of a string of tubing into which is threaded a coupling member 12, to which is threaded the upper reduced end 13 of a section of tubing 14, the lower end of such section of tubing 14 being threaded onto a lower fitting or coupling member 15. The lower end of the fitting 15 receives the upper end of tubing 16.

The coupling 15 is provided with a reduced upper end 17 threaded to receive the lower end of a pump barrel 18, the upper end of the pump barrel receiving the threaded lower end of a collar or cylindrical head 19.

Seated on the upper end of the coupling 15 is a ring or hollow block 20, preferably made of an alloy metal more fully hereinafter described. This ring 20 however forms a seat for the lower of a series of tubular sections 21 called liners, which form a lining for the pump barrel 18, the uppermost liner being seated under the lower end of the collar or head 19, and when such liners have been properly aligned in the barrel, the tightening of the head 19, exerting pressure through the liners against the ring 20 is designed to hold the liners in place.

25 designates a plunger containing the ordinary valve 26, a standing valve 27 being diagrammatically indicated at the lower end of the tubing and it being further understood that the plunger 25 is operated through a string of rods 28 from the upper end of the well. It is further to be understood that the pumping operation is the

same as ordinarily carried on but particular stress is laid on the fact that the pump barrel, instead of forming a portion of the tubing and connected both at the top and bottom thereto so that any stretching or compression thereof is imparted to the pump barrel, is only connected indirectly to the tubing at its lower end through the medium of the coupling 15, the upper end of the pump barrel being entirely free of any connection with the tubing, and the barrel being of smaller diameter than the inside of the tubing, any expansion or contracting of the tubing is not imparted to the barrel. Further, by this arrangement, the pump barrel does not take the weight of the oil during the pumping operation, consequently the liners do not get out of alignment but form an unbroken surface for the action of the plunger.

For the purpose of overcoming an unequal expansion of the liners and pump barrel, due to the different kinds of metal employed in their construction, I provide the ring 20 and make the same of a metal which has a greater coefficient of expansion than either the cast iron of the liners or the steel of the barrel, the thickness of the ring being designed to accommodate the difference in expansion between the said liners and the barrel.

What I claim as my invention is:

1. In combination with a string of tubing, a coupling member in said tubing string, a pump barrel in said tubing solely supported therein by connection at one end to said coupling member, said pump barrel being free throughout its length of said tubing, and a series of liner sections in said pump barrel.

2. In combination with a string of tubing, a coupling member in said tubing string, a pump barrel in said tubing solely supported therein by connection at one end to said coupling member, said pump barrel being free throughout its length of said tubing, and a series of liner sections in said pump barrel, and means for exerting pressure on said liners to hold said liners in alignment.

3. In combination with a string of tubing, a coupling member in said tubing string, a pump barrel in said tubing solely supported therein by connection at one end to said coupling member, said pump barrel being free throughout its length of said tubing, and a series of liner sections in said pump barrel seated on said coupling member, and a collar on the upper end of of said barrel engaging the upper of said liner sections.

4. In combination with a string of tubing, a coupling member in said tubing string, a pump barrel in said tubing solely supported therein by connection at one end to said coupling member, said pump barrel being free throughout its length of said tubing, a hollow block seated on said coupling member, a series of liner sections in said pump barrel, the lowermost of said sections being seated on said hollow block and a collar on the upper end of said pump barrel engaging the uppermost liner section.

5. In combination with a string of tubing, a coupling member in said tubing string, a pump barrel in said tubing solely supported therein by connection at one end to said coupling member, a hollow block seated on said coupling member, a series of liner sections in said pump barrel, the lowermost of said sections being seated on said hollow block and a collar on the upper end of said pump barrel engaging the uppermost liner section, said hollow block being formed of a material having a greater coefficient of expansion than the metal of said liners and pump barrel.

In testimony whereof, I have hereunto set my hand at Los Angeles, California, this 18th day of June, 1927.

SUMNER B. SARGENT, JR.