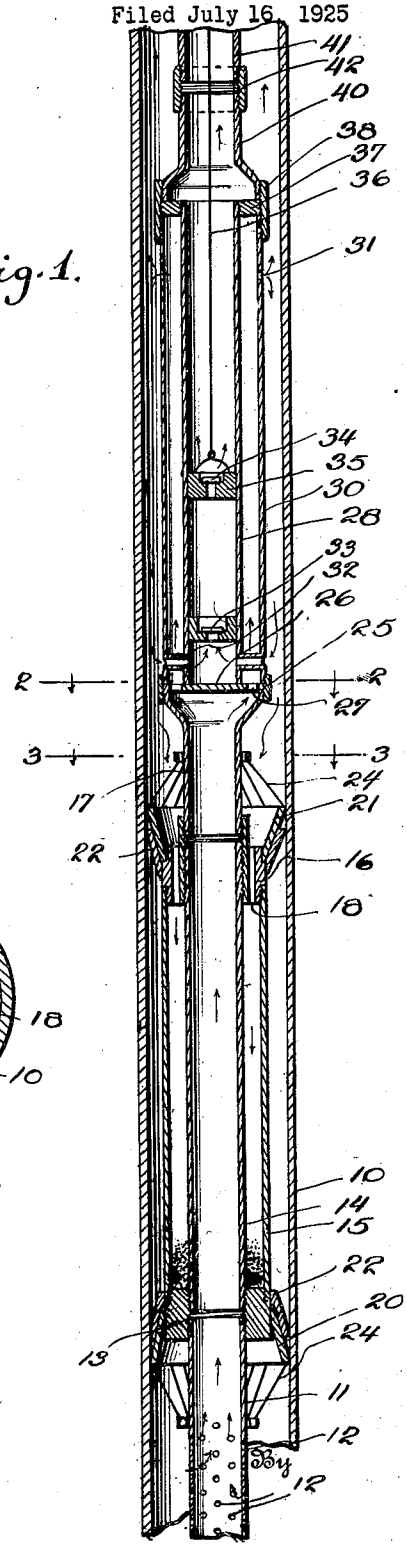
Jan. 8, 1929. 1,698,444

B. H. LYBYER

APPARATUS FOR PUMPING OIL FROM WELLS

Filed July 16, 1925

Fig. 1.



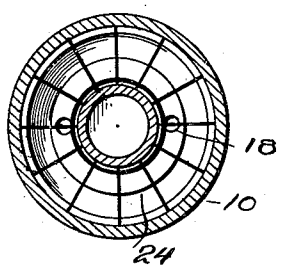


Fig. 3.

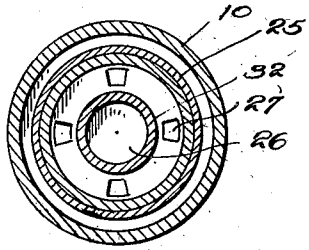


Fig. 2.

Inventor
B. H. Lybyer

Attorney

Patented Jan. 8, 1929. 1,698,444

UNITED STATES PATENT OFFICE.

BENJAMIN H. LYBYER, OF LAVOYE, WYOMING.

APPARATUS FOR PUMPING OIL FROM WELLS.

Application filed July 16, 1925. Serial No. 44,046.

This invention relates to an apparatus especially for pumping oil from oil wells, and it is with relation to such that the following specification is applied.

In oil well pumps of the character now in general use, an oil column is pumped to the surface, carrying with it entrained gas and sand particles, necessitating the separating out of the gas and sand in operations separate from the pumping operation. These successive steps are accompanied with many disadvantages, such as increased amount of apparatus, which increase the expense involved of pumping the oils to a material extent.

One of the objects of my invention therefore is to provide an oil pump adapted to pump oil from an oil well which automatically separates the oil and contained gas during the pumping operation, so that the oil and gas may be taken from the well separately, as well as separating out the entrained sand and sediment particles so that they may be removed from the oil and gas.

A further object of my invention is to provide an oil well of the above character which automatically serves to separate the oil, gas, and sand particles pumped from an oil well in one operation.

A further object of my invention is to provide an oil pump which is simple in manufacture and operation, which requires small degree of repair and adjustment, and which is economical in operation.

A further object is to provide a simple and durable construction which may be operated continuously without change or adjustment for a relatively long time.

The invention accordingly consists in the features of construction, the combination of parts, and in the unique relation of the various members and the relative proportioning and dispositioning thereof, all as more clearly outlined herein.

To enable others skilled in the art to fully comprehend the underlying features thereof, in order that they may embody the same, by numerous modifications in structure and relation contemplated by this invention, drawings depicting a preferred form of the invention have been annexed as part of this disclosure, and in such drawings like characters of reference indicate corresponding parts throughout all the views, of which—

Figure 1 is a longitudinal section of the oil well casing and contained parts.

Figure 2 is a section along lines 2—2 of Figure 1.

Figure 3 is a section along lines 3—3 of Figure 1.

Referring now to the drawings and more particularly to Figure 1, the numeral character 10 designates an outer casing common in oil well pump construction. Disposed within the casing is a pump tube 11 having apertures 12 at the lower portion thereof, adapted to receive the oil entering the lower portion of the casing 10 from the oil bearing strata. The tubing 11 is screw-threaded to a collar 13 serving as a coupling which unites the tube 11 and an upper continuation 14 thereof and forming therewith a continued solid body.

An outer tube or pipe 15 surrounds tubing 14 and is screw-threaded at its lower end to the coupling collar 13. It is seen that an annular chamber, closed at its bottom, is formed between the tubing 14 and 15 for the purpose hereinafter described. The tubing 14 and 15 are coupled at the upper portion thereof by a collar 16, which also serves to unite the pipe 14 with a swedge nipple 17. Openings 18 are provided in the coupling 16 and form communicating means opening into the annular chamber between tubing 14 and 15.

Packing elements 20 and 21 are provided, in the nature of a swab rubber, which are connected to the collars 13 and 16 by a steel disc 22 pressed into a cone-shape, while supporting wires 24 connect the outer rim of the packers 20 and 21 with the tubing 11 and nipple 17, respectively. It is pointed out that the packing members are positioned in reverse relation with respect to one another and act as packing members between the tubing 15 and the outer casing 10. The wires 24 which connect the outer rim of the rubbers to the surrounded tubing serve to prevent the packing rubbers from folding backwardly on themselves and also to hold them in their proper position while lowering the mechanism into place in the well casing. Further, the packing elements serve to hold the pressure within the casing and prevent any oil from escaping except thru the perforated pipe 11, while the top rubber packing 21 holds the oil upon return thereof, as will be described hereinafter, as well as directing the sand and sediment into its proper receptacle.

The swedge nipple 17 is enlarged at its

upper portion and is screw-threaded into a collar 25, as shown in Figure 2. There is also threaded into the collar 25 a blind bushing 26 having drilled about its outer portion the apertures 27 which permit the oil column with its contained gas and sediment content to pass from tubing 14. A tubing 28, forming a working barrel as, hereinafter described, and a continuation of tubing 14, is joined to the blind bushing 26 which serves to close the bottom opening thereof, and is surrounded by tubing 30 screw-threaded to the collar 25. Outlets 31 are provided in the tube 30 at the upper portion thereof, and the oil column with its gas and sediment content passing up between the tubes 28 and 30 flows thru the outlets 31 where the direction of flow thereof is deflected. At this point, the gas separates from the oil and sediment carried thereby, and escapes upwardly between the outlet pipe and casing 10, while the oil with the entrained sediment settles back into the chamber above the packing member 21. The sand and sediment carried by the oil then settles after passing thru the apertures 18 in collar 16 into the sediment chamber between tubes 14 and 15.

The oil is then pumped from the chamber above the packing element 21 thru openings 32 in the tubes 28 and 30 into the working barrel of the pump, or, as hereinbefore described, the pipe 28. The oil column then passes thru standing valve 33 in the working barrel 28, which is of the usual type, and is advanced further into the working barrel thru a traveling valve 34 arranged in a piston 35 which is operated by any suitable means to reciprocate the piston rod 36.

The tubing 28 and 30 are coupled at the top thereof by means of a bushing 37 screw-threaded into a collar 38. A swedge nipple 40 is likewise screw-threaded to the collar 38 and is secured at its other end to a discharge pipe 41 by means of a collar 42, forming therewith a solid continued body.

The operation of the device is as follows: Upon reciprocation of the pump piston 35, an oil column with its contained gas and sediment particles is drawn into tube 11 thru apertures 12, is raised in the tube 14, and is discharged thru aperture 27 in the blind bushing 26. The oil column with its contained gas and sediment particles then passes upwardly between tubes 28 and 30 and is discharged therefrom and deflected outwardly thru the discharge apertures 31, the gas at this point being free to separate itself from the oil and contained sediment, and escaping upwardly between the discharge pipe 41 and the casing 10. The oil and contained sediment particles then passes downwardly between the casing 10 and tubing 30 into the relatively large chamber above the packing element 21. Sand and sediment particles settle thru apertures 18 of the collar 16 into the annular receptacle provided therefor formed between the tubes 14 and 15, and collar 13. The oil in its relatively pure state is then pumped thru openings 32 into the working barrel 28, due to the suction pressure exerted thereon upon operation of the pump, from whence it passes thru check valves 33 and 34, and is finally raised thru the discharge pipe 41 and taken therefrom into any suitable container or receptacle (not shown).

From the above it is evident that the pump, as described, is so arranged that it will continuously pump the oil from an oil well and simultaneously cause the entrained gas carried by the oil to escape from the main oil column thru a pipe, for separate removal, as well as providing a receptacle into which the sand and sediment contained in the oil column is filtered therefrom and settles therein, from which it may be separately removed, when necessary or when desired. It is further obvious that the above described arrangement is such that all of the parts will operate automatically to attain the above set forth objects, and they are further so simply arranged as to eliminate, as much as possible, complication and expense in repair, as well as requiring the minimum amount of adjustment.

It is further pointed out that due to all of the parts being arranged in a substantially solid body throughout, a structure is provided which has few weak parts and, conversely, has a high degree of rigidity and strength. Furthermore, inasmuch as the device as described is construced of standard pipes and fittings, the cost of installation and repair is reduced to the lowest possible minimum.

In view of the above, it will be seen that the several objects of the invention are achieved and other advantageous results attained. As many changes could be made in carrying out the above construction, without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrated and not in a limiting sense.

I claim—

1. In an apparatus of the character described, in combination, a casing, a working barrel within said casing, tubing about said barrel, means adapted to flow a column of oil upwardly within said tubing and to discharge the oil from said tubing, and means to deliver the oil thru the working barrel from a level below the oil discharge from said tubing.

2. In an apparatus of the character described, in combination, a well casing, a working barrel therein, tubing about the working barrel, means adapted to flow a

column of oil with its entrained gas and sand particles upwardly in said tubing, and to change the direction of flow of the column of oil upon discharge from the tubing, whereby the gases are permitted to escape from the oil, means to further change the direction of flow of the oil whereby the sediment particles settle from the oil, and means to deliver the oil thru the said working barrel.

3. In an apparatus of the character described, in combination, a well casing, a working barrel therein, tubing about the working barrel, means adapted to flow a column of oil with its entrained sand particles upwardly in said tubing and to discharge the oil downwardly from said tubing, means delivering the oil thru the working barrel from a level below the oil discharge from the tubing, and means to trap the entrained sand particles from the oil delivered to the working barrel.

4. In an apparatus of the character described, in combination, a well casing, tubing within said casing, a working barrel, said tubing being positioned about said working barrel and having discharge apertures in the upper portion thereof, means adapted to flow a column of oil upwardly within said tubing, and to discharge the oil thru said discharge apertures, said means acting to deflect the oil upon discharge from said tubing thereby to permit the gases contained in the oil to escape, and means to raise the oil when freed of the contained gases into said working barrel from a point below the discharge of the oil from said tubing.

5. In an apparatus of the character described, in combination, a well casing, a tubing within said casing, tubing surrounding said first mentioned tube, and forming therewith a chamber closed at its lower end, a working barrel, tubing in communication with said first mentioned tube and positioned about said working barrel, means adapted to flow a column of oil with its contained gas and sediment content upwardly in said first mentioned tubing about the working barrel, and to discharge the oil therefrom, the flow of the oil upon discharge thereof from said first mentioned tubing being deflected upon said discharge, thereby to permit the gases to escape from the oil and the oil and its contained sediment to settle in said chamber, means to raise the oil freed of its gas and sediment content from said chamber into said working barrel.

6. In an apparatus of the character described, in combination, a well casing, a tubing within said casing, a tubing surrounding said first mentioned tubing for a portion of its length and forming with said first mentioned tubing an annular chamber closed at its bottom portion, packing elements positioned between said tubing and said casing, a working barrel, tubing in communication with said first mentioned tubing and positioned about said barrel for a portion of its length, means adapted to flow a column of oil with its contained gas and sediment content upwardly in said tubing about said barrel and to discharge the oil from said tubing, the flow of said column of oil and contents thereof being deflected upon its discharge from said tubing, thereby to permit the gases to escape from the oil and causing the oil and contained sediment to flow back into said chamber, means to separate the sediment from the oil in said chamber, and to deliver the oil freed from its gas and sediment content from said chamber into the working barrel.

7. In an apparatus of the character described, in combination, a well casing, a tube within said casing, a second tube surrounding said casing for a portion of its length and forming therewith a chamber closed at its lower end, a collar uniting said tubes at the upper portion thereof and being apertured to provide an opening into said chamber, packing elements between said tubes and said casing, a working barrel closed at its lower end, said first mentioned tube being continued and enlarged to surround said working barrel for a portion of its length, and having discharge openings therein near the upper portion thereof, means adapted to flow a column of oil with its contained gas and sediment content upwardly in said first mentioned tube about said barrel and to discharge the same thru said discharge openings, thereby to change the direction of flow of said column of oil to permit the contained gas to escape from the column and to cause the oil and contained sediment to flow downwardly between said casing and first mentioned tubing, means to separate the sand from the oil within the chamber formed by said first and second mentioned tubings, and means to raise the oil above said chamber into said working barrel thru inlet openings thereto at its lower closed portion.

Signed at Casper, Wyoming, this 30th day of April, 1925.

BENJAMIN H. LYBYER.