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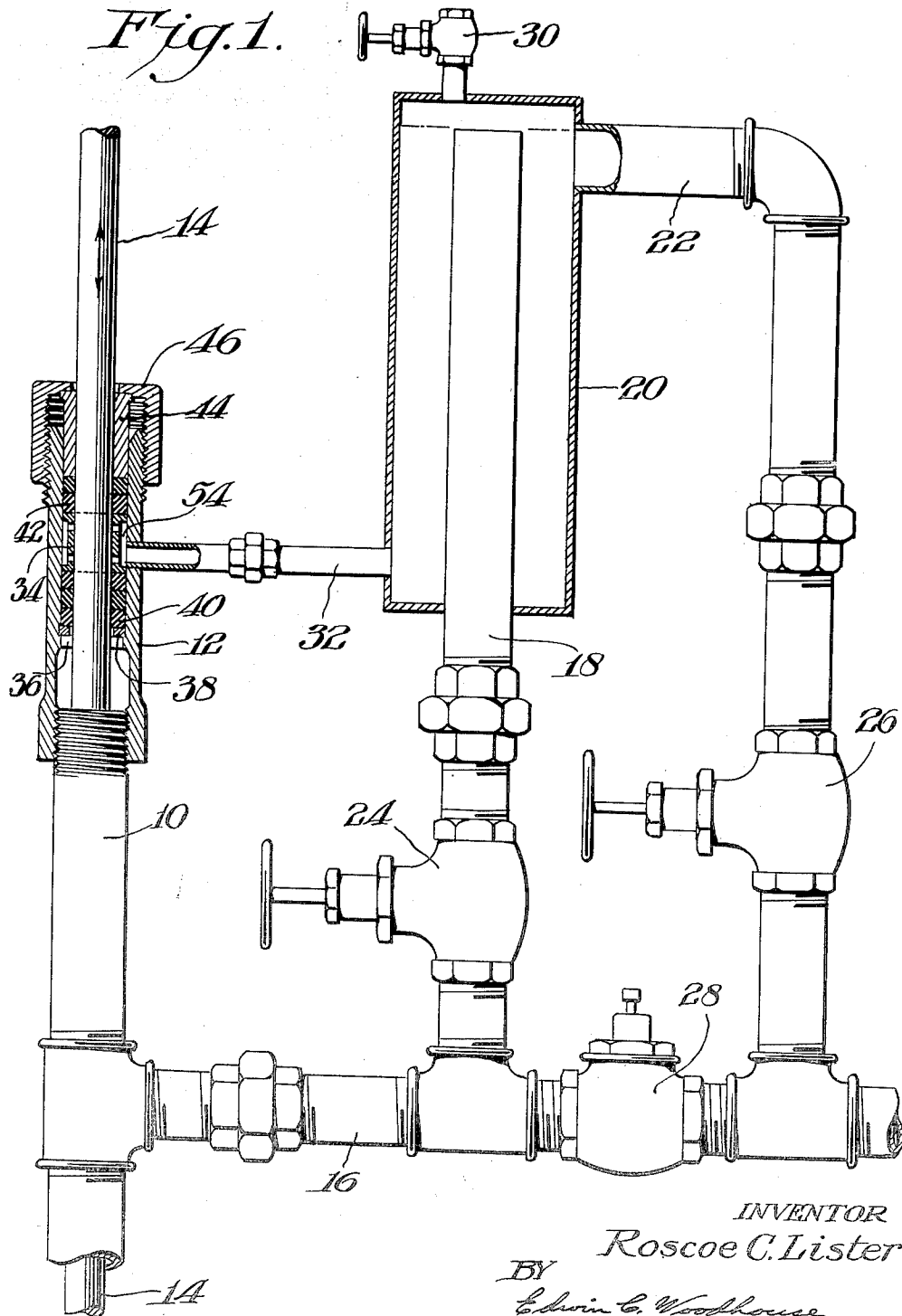
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APPARATUS FOR LUBRICATING POLISH RODS

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2 Sheets-Sheet 1



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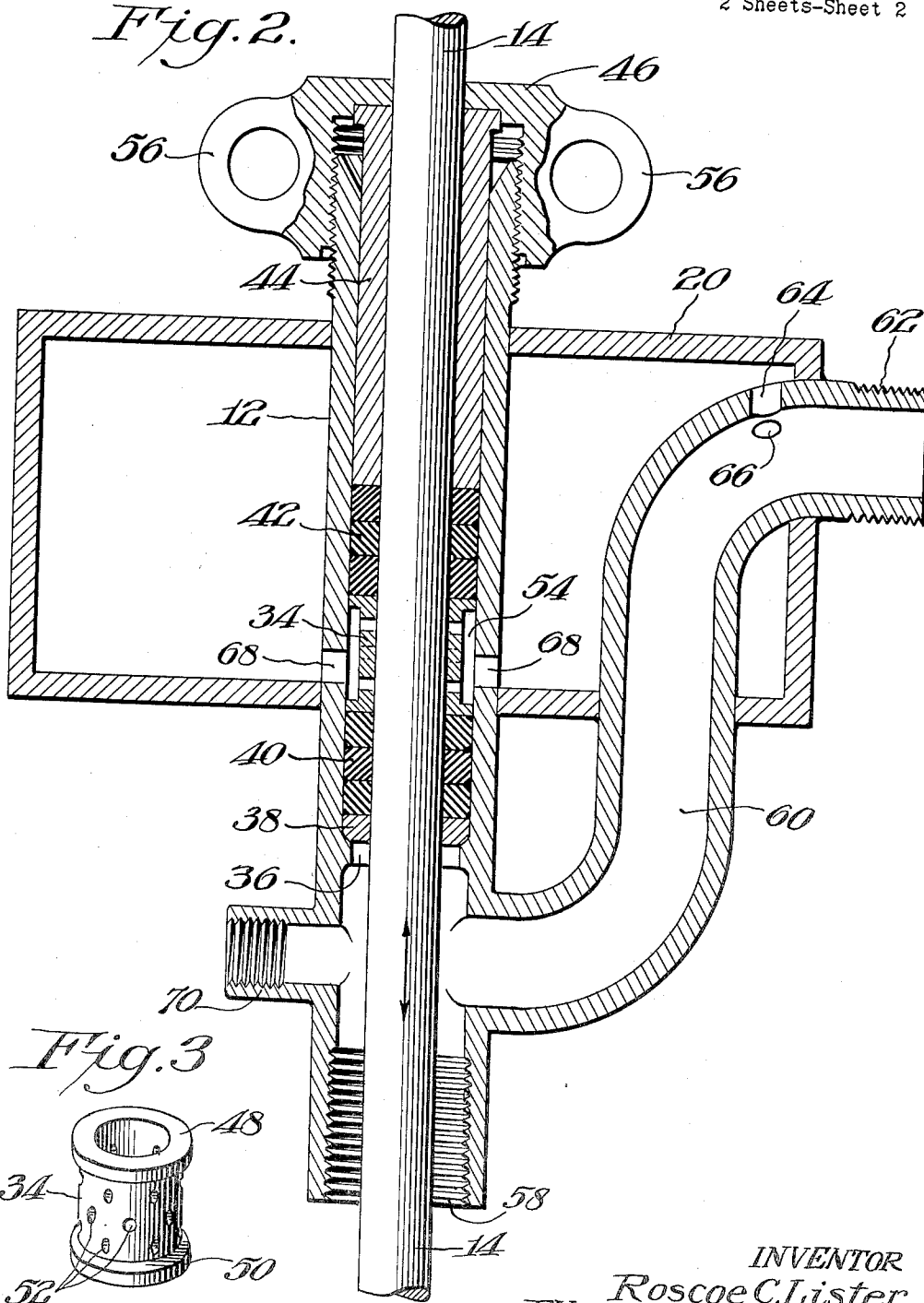
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## UNITED STATES PATENT OFFICE

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APPARATUS FOR LUBRICATING  
POLISH RODS

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6 Claims. (Cl. 286—27)

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This invention relates to apparatus for lubricating polish rods, particularly when the flow of oil from the well stops for some reason while the action of the pump actuating mechanism continues.

In the usual operation of an oil well, tubing is provided which extends down inside the casing to a point below the normal level of oil in the casing. A reciprocating pump is placed inside the tubing and sets on the bottom thereof. The plunger of the pump is connected with a string of sucker rods which run up through the tubing and, at the upper end, are connected to the lower end of a polish rod. The upper end of the polish rod is connected to suitable mechanism for imparting a reciprocating motion to the polish rod and sucker rods to thereby actuate the pump. The polish rod also passes through a stuffing box which is secured to the upper end of the tubing and which is provided with packing material to prevent oil being ejected from the top of the stuffing box. An oil delivery pipe is connected to the tubing below the packing material in the stuffing box and delivers the oil pumped from the well to a storage tank or tanks.

It frequently happens that the flow of oil will stop, due to flowing off of the well or its heading up with gas, while the action of the pump actuating mechanism continues. While the oil is flowing, part of it comes into contact with the packing material and furnishes lubrication for it and the polish rod. When the flow of oil stops while the pump actuating mechanism is still operating, the oil, in or on the packing material and polish rod, soon becomes exhausted and, if the operation of the pump actuating mechanism is not stopped promptly, the packing will burn out and the polish rod will be damaged so that the polish rod and stuffing box will need to be replaced. This is a frequent occurrence for the reason that a single operator usually has charge of a number of wells and can check each well only periodically, and the flow of oil often stops during the absence of the operator from the particular well.

It is an object of my invention to provide apparatus which will continuously furnish lubrication for the polish rod and packing material and particularly for an extended period of time after oil has ceased to flow from the well. Another object is to provide apparatus of such character that is automatic in operation, simple in construction and does not require close supervision. A further object is to advance the art. Still other objects will appear hereinafter.

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The above and other objects may be accomplished in accordance with my invention which comprises providing an oil reservoir adjacent the stuffing box which continuously supplies oil to the packing material in the stuffing box and is continuously supplied with oil from the well and which further retains a supply of oil for lubricating the packing material and polish rod after the flow of oil from the well has ceased. By this means, the packing material and the polish rod are better lubricated and are provided with lubrication after the flow of oil from the well has stopped and until the operator returns on his periodic check and thus prevents damage to the packing material, stuffing box and polish rod.

More particularly, my apparatus comprises; in combination with an oil well tubing, a polish rod and a stuffing box provided with packing material; a closed oil reservoir having a capacity of about 2 to about 8 quarts of oil adjacent the stuffing box with the major portion of the reservoir extending above the middle of the packing material, an oil delivery pipe connected to the tubing below the packing material and having a section passing through the reservoir adjacent the top of the reservoir, an oil passage in such section of the pipe opening into the reservoir adjacent the top of the reservoir and an oil feeding line extending from the lower portion of the reservoir into the stuffing box above the bottom of the packing material.

Part of the oil flowing through the delivery pipe passes through the oil passage in the section of the pipe in the reservoir and supplies and maintains a body of oil in the reservoir. When the flow of oil through the delivery pipe ceases for any reason, the body of oil in the reservoir will supply oil to the packing material and polish rod for a sufficient period of time to prevent burning of the packing material and damage to the polish rod.

Conveniently the oil reservoir will have a capacity of about 2 to about 8 quarts of oil but may be considerably larger if desired. Ordinarily, the reservoir will have a capacity of about 2 to about 3 quarts of oil, as such amount will usually be more than sufficient to maintain lubrication of the packing material and polish rod after the flow of oil from the well has ceased and until the operator returns for his periodic check of the operation of the well.

While the packing material in the stuffing box may be an absorbent or porous packing material, it will, preferably, be made of rubber, which is the usual material for this purpose. Since the

oil usually contains a certain amount of water and both water and oil are satisfactory lubricants for rubber packing, it is usual to provide the packing in the stuffing box in the form of oil-resistant rubber packing rings. When packing of this character is employed in connection with my invention, it will be desirable to provide the packing material in the form of 2 vertically spaced sections separated by a perforated oiler ring and to feed the oil from the reservoir into the stuffing box intermediate the upper and lower ends of the oil ring. More than two vertically spaced sections of packing material and more than one oiler ring may be employed if desired. Also, the vertically spaced sections and the oiler ring may be employed even when absorbent or porous packing material is used.

My invention will be more readily understood from the detailed description hereinafter given when taken with the accompanying drawings in which:

Fig. 1 is a view partly in section, illustrating somewhat diagrammatically, one embodiment of my invention;

Fig. 2 is a view in section illustrating somewhat diagrammatically a modified form of apparatus of my invention;

Fig. 3 is a detailed view of a preferred form of oil ring for use in my invention.

Referring first to Fig. 1, the usual oil well tubing 10 has secured to its upper end a stuffing box 12 through which passes the polish rod 14. An oil delivery pipe 16 is connected with the tubing and conducts the oil to the usual storage tank or tanks.

This oil delivery pipe has a section in the form of a bypass line composed of pipe 18 and pipe 22. Pipe 18 is in the form of a standpipe, open at its upper end, and which extends up through the bottom of the cylindrical reservoir 20 to a point adjacent the top of the reservoir, but spaced from such top by a distance sufficient to permit the free flow of oil out of the pipe. The distance, between the top of the pipe 18 and the top of the reservoir, will usually be about one-half to about three-quarters of an inch, but may be as much greater as desired. Increase in this distance merely results in decrease in the capacity of the reservoir. The flow of oil through the pipe 18 is controlled by valve 24. Pipe 22 is also connected with the reservoir, preferably adjacent the top thereof and is controlled by valve 26. Oil delivery pipe 16 is also provided with a valve 28 which is normally maintained closed so that the flow of oil from the well will be through the pipes 18 and 22 and the reservoir 20. The space, between the upper end of pipe 18 and near end of pipe 22, constitutes an oil passage opening into the reservoir 20.

The reservoir is provided at the top with a valve controlled gas vent 30. An oil feeding line 32 leads from the lower portion of the reservoir and into the stuffing box intermediate the top and bottom ends of the oil ring 34. If a porous or absorbent packing material is used without an oil ring, the feed line 32 will deliver the lubricant to the packing above the bottom thereof, preferably at about its vertical middle.

The stuffing box 12 is provided with a small inner flange 36 near the lower end. A junk ring, or retaining ring, 38 rests upon the flange and supports the section of packing material 40 shown as composed of 3 oil-resistant rubber rings. The oiler ring 34 rests upon the section of packing material 40. An upper section of

packing material 42, composed of 2 oil-resistant rubber rings rests upon the oil ring 34. The packing material and oiler ring are held in place by a ring cap 44 through which pressure is exerted on the packing material by means of stuffing box cap 46.

Referring particularly to Fig. 3, the preferred form of oiler ring has an inner cylindrical surface bearing loosely on the polish rod, an upper outwardly extending flange 48 and a lower outwardly extending flange 50, which flanges extend to the inner surface of the wall of the stuffing box. The body of the oiler ring, between the flanges 48 and 50, is relatively thin so that its outer surface is spaced from the wall of the stuffing box and is provided with a plurality of perforations 52. The intermediate wall may be from about one-half to about three-fourths the thickness of the flanges 48 and 50. By this construction, a small annular chamber 54 is provided between the oiler ring and the wall of the stuffing box which permits distribution of the oil to the perforations in the ring.

In the modified form of Fig. 2, the cylindrical reservoir 20 is made integral with the stuffing box 12. The cap 46 of the stuffing box is provided with ears 56 for lifting and supporting the stuffing box. The lower end of the stuffing box is threaded at 58 for connection to the oil well tubing.

In this modification, a section 60 of the oil delivery pipe is made integral with the stuffing box and the reservoir and is threaded at its end at 62 for connection with the pipe leading to storage. This pipe 60 is provided with an opening 64 about one-quarter inch in diameter at the top of the pipe adjacent the top of the reservoir. The pipe 60 is also provided with two one-quarter inch oil passages 66 on each side of the opening 64 and spaced about 45° around the circumference of the pipe. Additional oil passages may be provided if desired. When oil is flowing through the pipe 60, it will normally flow through opening 64 and oil passages 66 into the oil reservoir 20. However, in the event that there is some air or gas mixed with the oil which tends to become trapped at the top of the reservoir, the oil will flow through the oil passages 66 and force such trapped gas or air from the reservoir through the opening 64 and hence back into the pipe 60 where it will be delivered with the oil to storage. Thus, air or gas lock is avoided.

The stuffing box 12, as shown, is provided with 2 one-quarter inch diameter oil passages 68 spaced 180° about the stuffing box. These oil passages 68 are adjacent the bottom of the reservoir and are opposite the oiler ring 34 and constitute oil feeding lines leading from the reservoir into the stuffing box.

Also, as shown, the stuffing box 12 is provided with a short threaded connection 70 which will usually be closed by a plug. This connection is provided for connection with a blow off valve, with a pipe for treating the well with paraffin solvents, for obtaining a sample of the crude oil, or for other desired purposes.

In the drawings, the reservoirs are shown as being cylindrical but they may be of any desired shape.

When the well is pumping oil and such oil is flowing through the delivery pipe, the reservoir is supplied with oil from the oil delivery pipe. The oil from the reservoir continuously flows to the packing material and the polish rod to supply proper lubrication therefor. If the flow of oil

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from the well should cease for any reason and the pump actuating mechanism continue working, the packing material and the polish rod will continue to be lubricated by the reserve supply of oil in the reservoir, whereby burning of the packing material and damage to the polish rod and stuffing box will be avoided over a substantial period of time and until the operator makes his periodic checkup of it, determines that the flow of oil has ceased and is able to stop the operation of the pump. It is therefore apparent that, by my invention, accidental damage to the packing material, polish rod and stuffing box may be successfully avoided. The apparatus is simple and trouble-free and does not require close supervision. It is wholly automatic in operation and yet does not employ moving parts subject to wear and requiring replacement.

It will be understood that the specific embodiments disclosed and described are given for illustrative purposes solely and that my invention is not limited thereto. On the other hand, it will be readily apparent to those skilled in the art that many variations and modifications can be made therein particularly in the details of construction and arrangement of parts without departing from the spirit or scope of my invention.

I claim:

1. Apparatus for oil wells comprising a well tubing, a stuffing box attached to the top of the tubing, a polish rod extending through the stuffing box, packing material in the stuffing box, a closed oil reservoir having a capacity of about 2 to about 8 quarts of oil adjacent the stuffing box, the major portion of the reservoir extending above the middle of the packing material, an oil delivery pipe connected to the tubing below the bottom of the packing material and having a section passing into the reservoir with an open end adjacent the top of the reservoir and a second section leading out of the reservoir adjacent the top of the reservoir, and an oil feeding line extending from the lower portion of the reservoir into the stuffing box above the bottom of the packing material.

2. Apparatus for oil wells comprising a well tubing, a stuffing box attached to the top of the tubing, a polish rod extending through the stuffing box, packing material in the stuffing box, a closed oil reservoir having a capacity of about 2 to about 8 quarts of oil surrounding the stuffing box, the major portion of the reservoir extending above the middle of the packing material, an oil delivery pipe connected to the tubing below the bottom of the packing material and having a section passing through the reservoir adjacent the top of the reservoir, an oil passage in such section of the pipe opening into the reservoir adjacent the top of the reservoir, and oil passages in the walls of the stuffing box adjacent the bottom of the reservoir and above the bottom of the packing material.

3. Apparatus for oil wells comprising a well tubing, a stuffing box attached to the top of the tubing, a polish rod extending through the stuffing box, packing material in the stuffing box, a closed oil reservoir having a capacity of about 2 to about 8 quarts of oil surrounding the stuffing box, the major portion of the reservoir extending above the middle of the packing material, an oil delivery pipe connected to the tubing below the bottom of the packing material and having a section passing through the reservoir adjacent the top of the reservoir, an aperture in

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the upper wall and apertures in the side walls of such section of the pipe adjacent the top of the reservoir, and oil passages in the walls of the stuffing box adjacent the bottom of the reservoir and above the bottom of the packing material.

4. Apparatus for oil wells comprising a well tubing, a stuffing box attached to the top of the tubing, a polish rod extending through the stuffing box, packing material in the stuffing box, a closed oil reservoir having a capacity of about 2 to about 8 quarts of oil adjacent the stuffing box, the major portion of the reservoir extending above the middle of the packing material, an oil delivery pipe connected to the tubing below the bottom of the packing material and having a section passing into the reservoir with an oil passage opening into the reservoir adjacent the top of the reservoir and a second section leading out of the reservoir adjacent the top of the reservoir, and an oil feeding line extending from the lower portion of the reservoir into the stuffing box above the bottom of the packing material.

5. Apparatus for oil wells comprising a well tubing, a stuffing box attached to the top of the tubing, a polish rod extending through the stuffing box, two vertically spaced sections of packing material in the stuffing box, a closed oil reservoir having a capacity of about 2 to about 8 quarts of oil adjacent the stuffing box, the major portion of the reservoir extending above the space between the two sections of packing material, an oil delivery pipe connected to the tubing below the lowermost section of packing material and having a section passing into the reservoir with an oil passage opening into the reservoir adjacent the top of the reservoir and a second section leading out of the reservoir adjacent the top of the reservoir, and an oil feeding line extending from the lower portion of the reservoir into the stuffing box between the two sections of packing material.

6. Apparatus for oil wells comprising a well tubing, a stuffing box attached to the top of the tubing, a polish rod extending through the stuffing box, two vertically spaced sections of packing material in the stuffing box, a perforated oiler ring in the stuffing box surrounding the polish rod between the two sections of packing material, a closed oil reservoir having a capacity of about 2 to about 8 quarts of oil adjacent the stuffing box, the major portion of the reservoir extending above the perforated ring, an oil delivery pipe connected to the tubing below the lowermost section of packing material and having a section passing into the reservoir with an oil passage opening into the reservoir adjacent the top of the reservoir and a second section leading out of the reservoir adjacent the top of the reservoir, and an oil feeding line extending from the lower portion of the reservoir into the stuffing box intermediate the ends of the oiler ring.

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