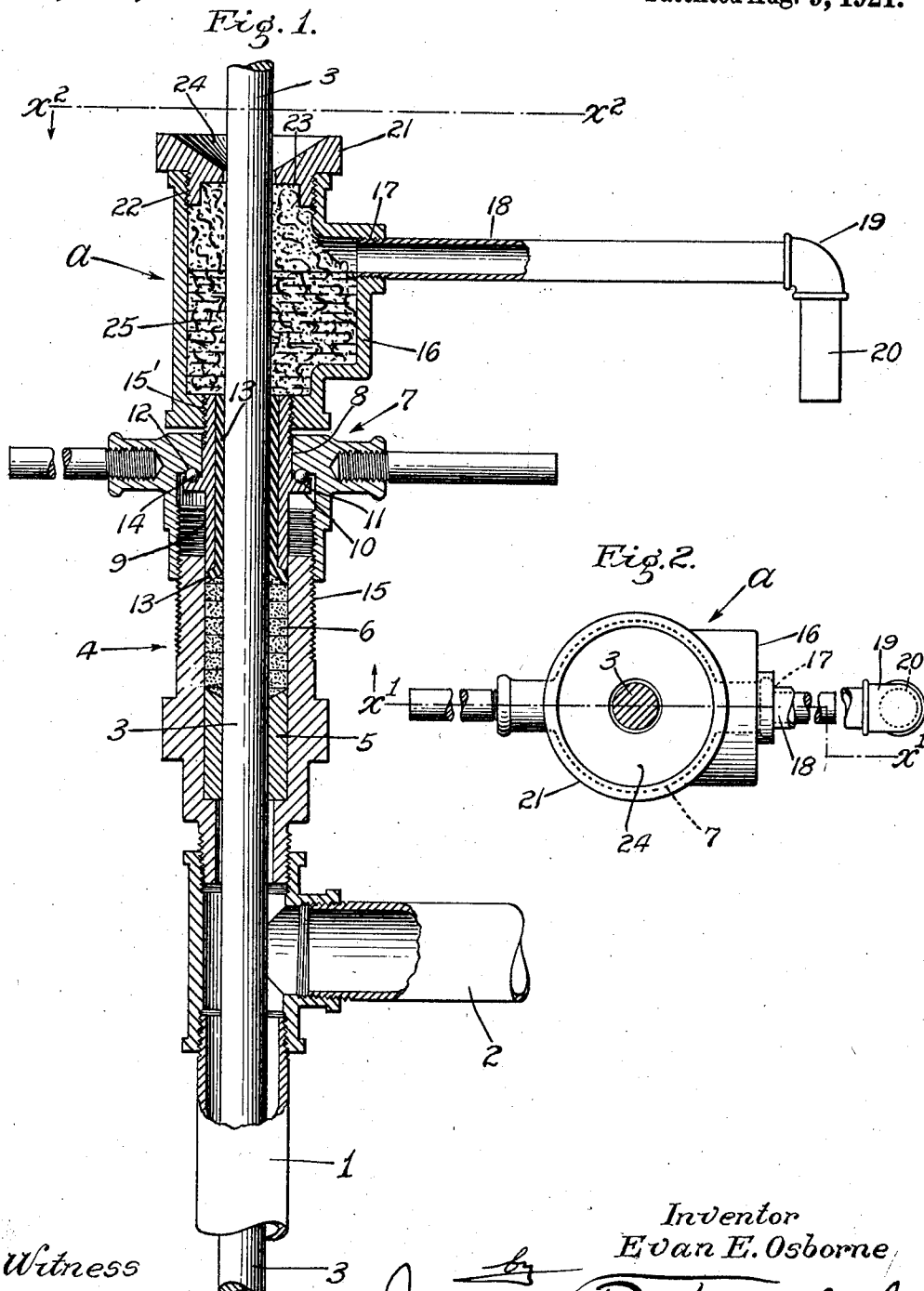


E. E. OSBORNE.
LUBRICATED STUFFING BOX.
APPLICATION FILED DEC. 23, 1916.

1,387,301.

Patented Aug. 9, 1921.



Witness

H. N. Luby

Inventor
Evan E. Osborne

James P. Townsend
his atty.

UNITED STATES PATENT OFFICE.

EVAN E. OSBORNE, OF LOS ANGELES, CALIFORNIA.

LUBRICATED STUFFING-BOX.

1,387,301.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, EVAN E. OSBORNE, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented a new and useful Lubricated Stuffing-Box, of which the following is a specification.

This invention relates to stuffing-boxes for the polished rods of oil well pumps and the like.

In the present practice the polished rods of oil well pumps enter the pump tubing through a stuffing-box, various forms of which are in common use, and in the construction of this invention parts of a polished rod stuffing box of common construction may be used as part of the device and the invention will be illustrated herein as constructed in part out of portions of the form of stuffing-box catalogued as the Noxon stuffing-box, although it is understood that the invention may be applied by making slight changes in and additions to any form of oil well pump stuffing box with which I am at present acquainted, and that its use may be extended to the polished rod stuffing-boxes of water pumps where desirable.

It is also adapted for use in the stuffing-boxes for the polished rods of sulfur and salt brine pumps and I do not intend to limit its use to any particular form of polished rod stuffing-box.

In oil well practice now in vogue the polished rod is sometimes sufficiently lubricated by the oil being pumped, but at times accumulations of gas in the well blow the oil out, thus leaving the polished rod without lubrication excepting such as may be afforded by cup grease or hard oil which the attendant may place on top of the stuffing-box with a view to allowing the same to melt to afford lubrication when the polished rod becomes heated.

In the practice now common it is necessary to pay particular attention to the lubrication of the polished rod, for the reason that if the gas causes a blow-out of oil the polished rod will get so hot by friction as to become rough and also to burn out the packing. It is also possible that fires at oil wells may originate from polished rods becoming hot for lack of lubrication.

The oil which is pumped by oil well pumps usually contains sand and silt which wears the packing and also the polished rod,

so that there is usually leakage at the stuffing-box, and this has become a source of much loss, partly counteracted by collecting the leakage in sumps and then pumping the contents of the sumps into tanks; and in some instances the leakage from a single well in one year amounts to as high as 1,300 barrels. It is not uncommon in some wells where there is a large amount of sand, for a stuffing-box, at a single well to leak ten barrels of oil in a single night through lack of attention at that time. Where there is much sand to cause wear there is usually much gas; that is to say, the gas escaping keeps the sand stirred up in the well so that the tendency to wear and the tendency to run dry both practically occur at the same time.

An object of this invention is to avoid the loss of oil and the burning-out of the stuffing-box packing heretofore so common in oil well pumping practice.

The pressure of the gas against the top of the stuffing-box is often very great owing to various conditions.

It is customary in many instances to pump directly from the well into a line pipe leading to settling tanks or sump holes and said line pipes are often 600 feet or more long.

It often occurs in oil well pumping practice in wells of oil having an asphaltic base, that the thick asphaltic oil becomes stiff and clogs the line pipe into which the pump discharges, and the gas pressure in the well in addition to the pressure of the plunger on the oil causes a pressure in the stuffing-box of about 600 or 700 pounds, more or less, per square inch, and it is necessary in applying the lubricator to the stuffing-box that resistance to such pressure be provided for.

In some instances the pressure is so great that two or three hundred feet of sucker rod will be blown out of the pump tubing, and this is likely to occur from explosions of gas heated or fired by a hot polished rod.

It sometimes occurs that a well may run dry on account of gas for a period up to two or three hours, more or less, and at such times if the pipe-line is clogged and the polished rod gets hot, thus heating the gas, an explosion is likely to occur, bursting the stuffing-box or the pipe line or pulling the tubing, particularly at the joint, and in some instances splitting the pump tubing at its weld for several feet along the length thereof. It also occurs sometimes that the pres-

sure above the plunger of the pump will be so great that the walking beam will part the sucker-rod, so that the plunger will be stationary and the polished rod will be worked rapidly in the stuffing-box, thus creating great heat, and thereby increasing the pressure of the gas. Furthermore, in starting the wells to pump, the pump often is required to run from ten minutes to several hours without pumping any oil.

It frequently occurs in oil well pumps that sudden spurts of oil will be expelled by the gas and the pressure of the plunger, so that oil is driven out through the stuffing-box and spread over the ground, thus wasting many barrels of oil because of the leakage of the stuffing-box, and in order to avoid this in some measure, it is customary with some wells to pump directly from the oil well pump into a tank at the well and to pump from said tank into the oil line by a separate pump which is called a tail pump. In spite of all these losses and of the vast expenditures made to avoid such losses, there has been no practical remedy by which lubrication of the polished rod is insured and the polished rod is stripped of the oil that passes up through the usual polished rod stuffing box. This invention is broadly new and pioneer in that I have provided above the stuffing box of the polished rod of an oil well pump an oil stripping and collecting device to collect the oil from the rod and a drainage device to drain the excess lubricant away from the rod. By adding this stripping and draining device to the oil pump equipments I thereby save oil and also keep the polished rod clean above the stuffing box.

An object of this invention is to construct a cheap, simple and effective lubricating stuffing-box for the polished rod of pumps which will obviate the difficulties herein enumerated heretofore existing with respect to lubrication, and which will automatically maintain lubrication for the polished rod irrespective of the oils being pumped.

A further object of this invention is to provide a pump with a drain for leakage from the stuffing-box and to allow the packing of the stuffing-box to be tightened easily and without shifting the drain pipe, so that when it becomes necessary to tighten the packing, this may be done without withdrawing the drain pipe from the tank or barrel arranged to receive the leakage, and with a minimum torsional strain on the tank or barrel.

In past practice much waste has occurred through allowing the wells to be untidy, allowing accumulations of oil to remain around the well so that while waste was apparent it was regarded as so common that the amount of waste could not be determined. It is now becoming a practice at

many wells to keep the premises free from waste oil and this is done at large expense costing in some instances as high as \$1700 to clean up a single untidy rig at one well.

An object of the invention is to make provision whereby the oil well pump, rig and its premises may be kept clean and tidy, free from the spraying oil which in the present practice is likely to spurt out from a leaking stuffing-box.

An object of the invention is to provide means whereby the work of compressing the packing in the stuffing-box is facilitated.

An object is to provide a cheap, simple, easily-applied lubricator for a polished rod stuffing-box which will automatically afford the lubrication necessary when the well is gassing, and which will collect any oil leakage and conduct it to a receptacle from which it may be pumped to a tank or to the pump line.

Other objects, advantages and features of novelty may appear from the subjoined detail description, the accompanying drawings and the appended claims.

The invention may be carried out in various ways and the lubricating bowl may be applied to the stuffing-box with or without a swivel connection, and it will only be necessary to show it herein in the form which is at present deemed preferable in order to attain all of the advantages above enumerated and to apply the invention to the form of the stuffing-box which is at present in common use.

The accompanying drawings illustrate the invention.

Figure 1 is an axial section on line x^1 , Fig. 2, of the invention as applied to an oil well pump.

Fig. 2 is a plan of the same viewed from line x^2 , Fig. 1, parts being broken away to contract the view.

The pump tubing 1 provided with its lateral head-line 2, the vertical polished rod 3 and the stuffing-box bowl 4 are all of common construction, likewise the lower follower 5 and the packing rings 6 in the bowl of the stuffing-box.

The stuffing-box cap 7 in the form shown is constructed out of a stock stuffing-box cap by boring out the upper orifice 8 to a larger diameter, and I provide inside said cap a swivel connection in the form of a follower 9, which has an upward and a downward extension and between its ends an annular flange 10 provided with a ball race 11. The inside under surface of the cap is provided with a ball race 12. The flanged follower is made of cast-iron provided with a Babbitt lining 13 to fit the polished rod, and rests upon the top of the packing 6 and is pressed thereonto by screwing down the cap 7. Said cap acts through the race-ways and the balls 14, being internally screw-

threaded at its lower end and screwed down on the pin 15 of the stuffing-box bowl.

The lower end of the follower constitutes means to compress the packing in the packing bowl.

The upper end of the flanged follower is threaded as at 15' and a lubricating bowl *a* is connected through the medium of said threaded upper end 15' and the balls in the race-way, to the upper end of the stuffing-box cap. In the instance shown, said bowl is in the form of a T fitting that surrounds the polished rod, the stem of the T being horizontal and closed by closure 16, there being at the upper side of said stem, at a distance above the bottom of the bowl, a threaded orifice 17 into which a drainage pipe 18 is screwed, the same being a nipple of suitable length provided at its outer end with an elbow 19; into which a nipple 20 is screwed.

A leakage baffle and collecting cup in the form of a bushing 21 concave on top and having a threaded pin 22 to screw into the upper end of the T and having an inner flange 23 to closely encircle the polished rod and having a depression 24 in the top face of said flange to collect the leakage which may accumulate from the polished rod, and direct such leakage down between the polished rod and the flange into the bowl thus provided constitutes a cap for the lubricant bowl *a*.

An oakum filling 25 may be applied inside the lubricant bowl *a* and held crowded down by the cap bushing. The oakum filling 25 serves as a stripper to strip from the rod the oil carried up by the rod 3 from the tubing 1. Said oakum filling is porous and the portion thereof lying below the drainage orifice 17 becomes filled with oil as indicated by the horizontal lines through the lower portion of 25 in Fig. 1. As the oil rises to the orifice 17 it is drained away and the oakum above such level serves to strip from the rod the oil carried up from within the lubricating bowl *a*.

It is thus seen that the rod 3 is kept practically free from oil by employing first the packing 6 and the stuffing box bowl 4 which is compacted against the oil by the follower 9, 13; and the loose packing 25 in the lubricating bowl which not only serves as a stripper but also as a percolator to allow the said oil to drain out by gravity through the drainage orifice 17. In this way the oil is finally stripped from the rod about the follower 9 and 13. The oil in the lubricating bowl serves as a lubricant on the down stroke and is especially serviceable as a lubricating bowl when the pump is running without pumping oil through the tube 1. This occurrence is quite common in the oil fields on account of the flow of gas in some instances which may occur for a period of

half an hour more or less; and in other instances when the pump becomes sanded or broken and is not producing either gas or oil.

When you unscrew the cap 7 and then raise the follower 9, 13 to take out the old worn packing 6 and replace it with new, then the oil cup will drain. The follower 9, 13 is not tight enough around the polished rod to keep oil from flowing back from the bowl *a* and when the stuffing box 4 is replaced with fresh packing 6 and the follower 9, 13 is put back in place and the cap 7 screwed tightly down against the follower 9, 13 compressing the packing 6, the bowl 16 is then dry of oil. The bowl may be moist but will be dry of any amount of oil. When the pumping operations are started, the oil will come up again and lubricate the polished rod.

The method of assembling the parts will be apparent to those skilled in the art and in practical operation the oil lubricating the polished rod avoids the heating thereof and consequent roughening, wearing and leaking.

When the stuffing-box and lubricator have been installed with or without the oakum filling, the lubricating bowl is filled through its open top with oil up to the drainage outlet 18 and the device is ready for use. If desired the oakum filling and the cap 21 may be applied, thus to guard against spurt- ing of oil in case the polished rod or the babbitting becomes worn. It is understood that by screwing the cap 7 down to tighten the packing from time to time as leakage appears at the drainage pipe, the stuffing-box will continue effective for indefinite long periods of time until the packing is nearly worn away, and no leaking will occur.

I claim:

1. A vertical rod having a stuffing box provided at its upper end with a bowl that surrounds the rod and is adapted to hold liquid lubricants thereon; means at the upper end of the bowl for collecting leakage above and outside of the bowl and for directing the leakage thereinto; a drainage pipe leading from the bowl near the top thereof and loose packing material in said bowl for the purpose of stripping the oil from the polished rod at the upper part of the rod so as to allow the same to be drawn off and yet to leave an accumulation of oil in the bowl without allowing the polished rod to be covered with oil where exposed to the outside.

2. A vertical rod having a stuffing box provided with a lubricant bowl surrounding the rod above the cap of the stuffing box; means at the upper end of the bowl for collecting lubricant leakage above and outside of the bowl and for directing such leakage into the bowl; and means surrounding the

rod between the cap and the rod and extending above the cap for connecting the lubricant bowl to the stuffing box cap.

3. A vertical rod having a stuffing box 5 provided with a lubricant bowl surrounding the rod above the cap of the stuffing box; means at the upper end of the bowl for collecting leakage above and outside of the bowl and for directing the leakage 10 thereinto; means between the cap and the rod and extending above the cap for connecting the lubricant bowl to the stuffing box cap; and a drain pipe leading from the bowl near the top thereof to conduct leakage 15 away from the bowl.

4. A vertical rod having a stuffing box comprising a packing bowl provided with an upwardly extending swivel connection; a lubricant bowl connected to the upper end 20 of the swivel connection and surrounding the rod; and means at the upper end of the lubricant bowl for collecting leakage above and outside of the lubricant bowl and for directing the leakage thereinto.

5. A vertical rod having a stuffing box comprising a packing bowl that surrounds the rod; a cap connected with the upper end 25 of the bowl; a follower adapted to compress packing in the bowl and having a flange within the cap, and an upward extension through and above the cap; balls between the flange and the inside of the top of the cap; a lubricant bowl connected to the upward extension and surrounding the rod; 30 and means at the upper end of the lubricant bowl for collecting leakage above and outside of the lubricant bowl and for directing the leakage thereinto.

6. A vertical rod having a stuffing box 40 comprising a packing bowl provided with an upwardly extending swivel connection; a cap connected to the upper end of the bowl and fitting loosely over the upward extension of the swivel connection; a lubricant bowl connected above the cap to the 45 upper end of the swivel connection and surrounding the rod; means at the upper end of the lubricant bowl for collecting leakage above and outside of the lubricant bowl and for directing the leakage 50 thereinto; and a drain pipe leading from the lubricant bowl at a distance from the bottom thereof.

7. A vertical rod having a stuffing box 55 comprising a packing bowl provided with an upwardly and downwardly extending swivel connection; packing in the bowl; a cap connected to the bowl; a lubricant bowl connected to the upper end of the swivel connection and surrounding the rod; means at 60 the upper end of the lubricant bowl for collecting leakage above and outside of the lubricant bowl and for directing the leakage thereinto; means connected with the 65 swivel connection to compress the packing

in the packing bowl; and anti-friction means inside of the cap to minimize the torsional strain on the lubricant bowl and to force the compressing means against the packing when the cap is screwed down. 70

8. On a vertical rod, the combination with a stuffing box comprising a packing bowl that surrounds the rod, of a cap threaded onto the bowl; a follower surrounding the rod and having a flange within the cap and 75 a threaded part extending upwardly from the cap; a lubricant bowl screwed onto said part and adapted to surround the rod and to contain the lubricant therefor; and means at the upper end of the lubricant bowl for 80 collecting leakage above and outside of the lubricant bowl and for directing the leakage thereinto.

9. On a vertical rod, the combination with a stuffing box comprising a packing bowl 85 that surrounds the rod, of a cap threaded onto the bowl; a follower surrounding the rod and having a flange within the cap and a threaded part extending upwardly from the cap; a lubricant bowl screwed onto said 90 part and adapted to surround the rod and to contain the lubricants therefor; means at the upper end of the lubricant bowl for collecting leakage above and outside of the lubricant bowl and for directing the leak- 95 age thereinto; and anti-friction means between the cap and the flange of the follower.

10. The combination with a vertical rod having a stuffing box, of a lubricant bowl 100 connected at its lower end to the stuffing box and adapted to surround the rod; a cap connected with the upper end of the lubricant bowl, the cap having means for collecting leakage above the cap and for directing the leakage into the lubricant bowl; 105 and a draining pipe leading from the lubricant bowl at a distance from the bottom thereof to conduct leakage away from the upper part of the bowl.

11. On a vertical rod, the combination 110 with a stuffing box comprising a packing bowl that surrounds the rod, of a cap threaded onto the bowl; a follower surrounding the rod and adapted to compress packing in the bowl and having a flange 115 within the cap and an upward extension through and above the cap; a lubricant bowl screw-threaded to the upward extension and surrounding the rod; and means at the upper end of the lubricant bowl for collecting 120 leakage above and outside of the lubricant bowl and for directing the leakage thereinto.

12. A vertical rod having a stuffing box provided at its upper end with a lubricant bowl that surrounds the rod and is adapted 125 to hold liquid lubricants on the rod; means at the upper end of the bowl for collecting leakage above and outside of the bowl and for directing the leakage thereinto; a drainage outlet in the bowl near the top thereof; 130

and means in the bowl at and above the level of the drainage outlet for filtering the leakage before it reaches the drainage outlet.

13. A vertical rod having a stuffing box provided with a lubricant bowl surrounding said rod above the cap of said stuffing box; and a drainage pipe leading from said bowl; and means in said bowl for wiping said rod of any escaping oil and retaining sufficient oil to lubricate said rod.

14. A vertical rod having a stuffing box provided at its upper end with a bowl that surrounds the rod and is adapted to hold liquid lubricants thereon; means at the upper end of the bowl for collecting leakage above and outside of the bowl and for directing said leakage thereinto; a drainage pipe leading from said bowl near the top thereof, and means in said bowl for wiping the vertical rod of any excess oil and retaining sufficient oil to lubricate said rod.

15. A vertical rod having a stuffing box provided with a lubricant bowl surrounding the rod above the cap of the stuffing box; means at the upper end of the bowl for collecting lubricant leakage above and outside of the bowl and for directing such leakage into the bowl; and means surrounding the rod between the cap and the rod and extending above the cap for connecting the lubricant bowl to the stuffing box cap, and means in said bowl for wiping said rod of any escaping oil and retaining sufficient oil of said escaping oil to lubricate said rod.

16. The combination with pump tubing provided with a lateral outlet and a polished

rod operating in said tubing; of a stuffing box surrounding the polished rod and connected to the upper end of the tubing; packing in the stuffing box; a follower to compress the packing; means to force the follower onto the packing; an oil collecting bowl connected to the upper end of the follower and provided with a drainage orifice near the top of said bowl; percolating packing in the bowl to wipe oil off of the polishing rod; and means at the top of the bowl to retain the percolating wiper packing and to conduct any oil which may be carried by the rod above the percolating wiping packing into the top of said packing so that it may flow down to fill the lower part.

17. A vertical rod having a stuffing box provided with a lubricant bowl surrounding the rod above the cap of the stuffing box; means at the upper end of the bowl for collecting lubricant leakage above and outside of the bowl and for directing such leakage into the bowl; and means surrounding the rod between the cap and the rod and extending above the cap for connecting the lubricant bowl to the stuffing box cap; means in said bowl for wiping said rod of any escaping oil and retaining sufficient oil of said escaping oil to lubricate said rod.

In testimony whereof, I have hereunto set my hand at Los Angeles, California, this 16th day of December, 1916.

EVAN E. OSBORNE.

Witness:

JAMES R. TOWNSEND.