Aug. 6, 1968 M. A. REMKE ETAL 3,395,923

SELF-LUBRICATING STUFFING BOX

Filed July 9, 1965 2 Sheets-Sheet 1

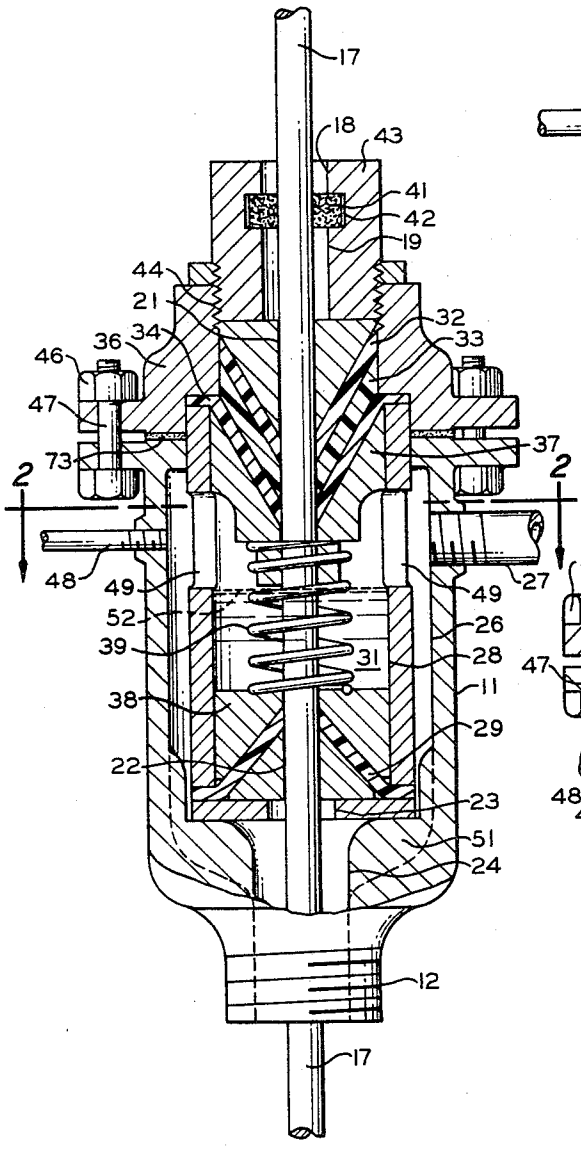


FIG. 1

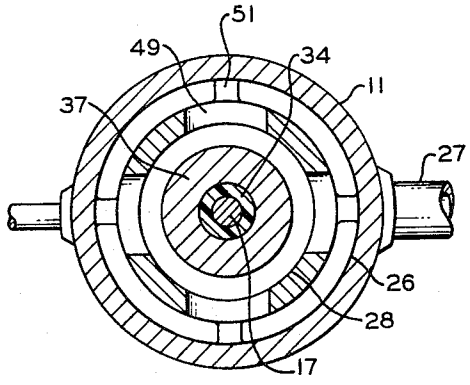


FIG. 2

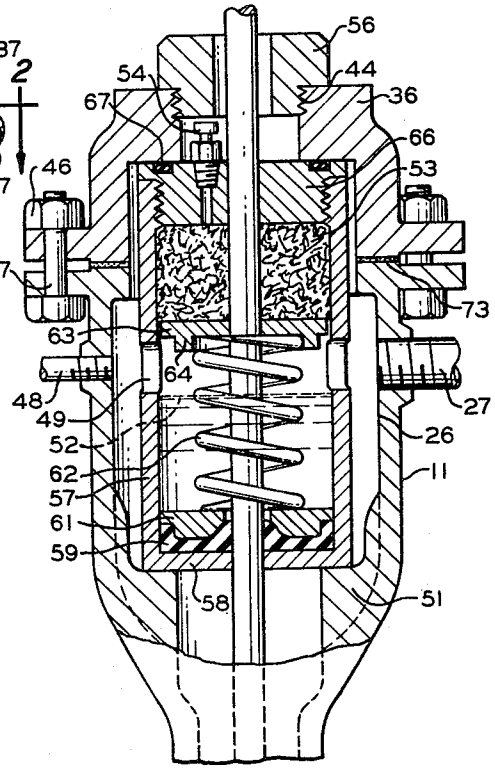


FIG. 3

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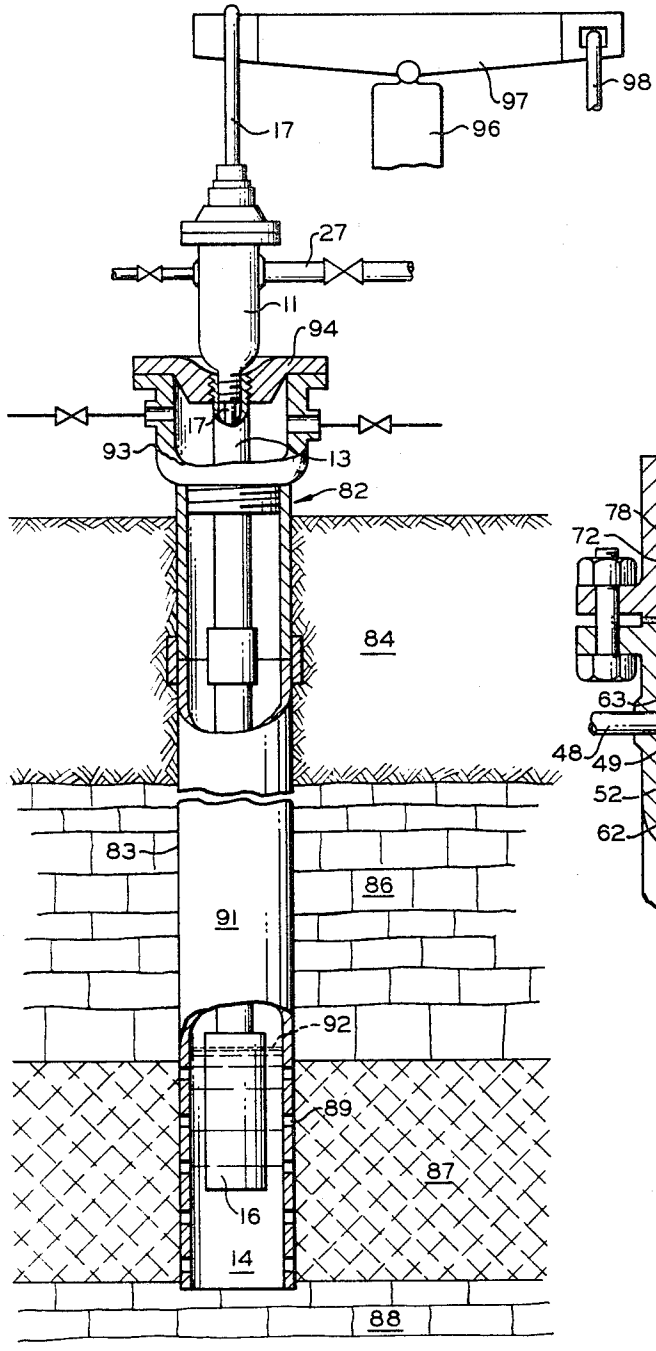


FIG. 5

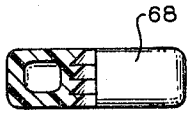


FIG. 7

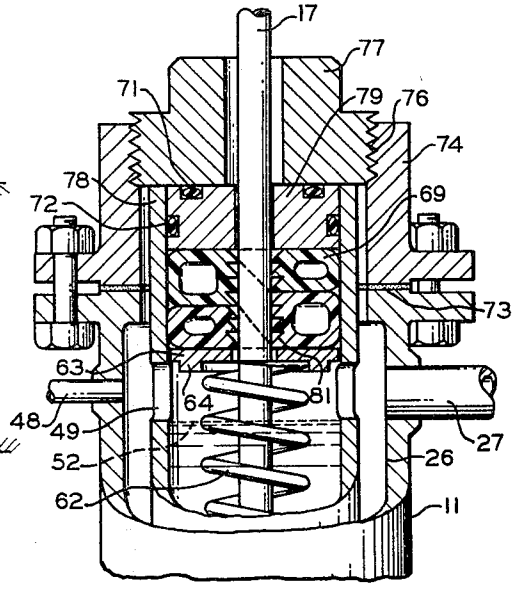


FIG. 4

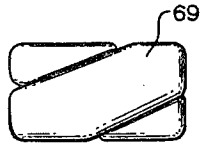


FIG. 6

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SELF-LUBRICATING STUFFING BOX

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2 Claims. (Cl. 277—59)

ABSTRACT OF THE DISCLOSURE

In an oil well tubing head having a chamber connected to the tubing, with a stuffing box at the top of the chamber, a polished rod reciprocating through said box and chamber, and an oil outlet conduit to said chamber, the improvement comprising an oil-retaining cup slidably mounted on said rod and secured in said chamber, with said oil outlet conduit connected to said chamber at a point at least as high as the top of said cup, whereby when oil passes from said tubing out said conduit it will also fill said cup which will retain said oil in contact with said rod for a substantial period of time. A further improvement is a helical spring around the rod between the stuffing box packing and packing between the cup and rod to separate the two packings and urge them into packing contact with the rod.

This invention relates to a self-lubricating stuffing box. In one aspect it relates to such a stuffing box for an oil well tubing in which there is an oil reservoir positioned to receive and retain a small portion of the oil being pumped in such a position that the polished rod during pumping is reciprocated through the oil in said reservoir so as to maintain an oil layer on the surface of said polished rod and obviate pulling a dry rod through the packing in the stuffing box and thereby destroying said packing.

In the prior art, difficulty has been experienced due to the surface of the polished rod drying out between the times that oil is being produced from the well and pumped to the surface through the tubing by a reciprocating movement of said polished rod through the packing in said stuffing box.

The dried-out polished rod will stick against the packing and soon tear the same to pieces.

While attempts have been made in the prior art to lubricate such stuffing boxes, such attempts are generally unsuccessful. This lack of success is due in part to the poor design of the lubricating means, and in part to the operator forgetting to actuate or renew the lubricating means.

The present invention avoids these objectionable features of the prior art by maintaining a reservoir of oil obtained during pumping in a position where the polished rod passes through the same so that the polished rod remains wet with oil, or is immediately wetted with oil upon restarting the pump, so that it will not adhere to the packing and tear up the same. Means is provided to readily renew the body of oil in said reservoir whenever oil is pumped.

One object of the present invention is to provide an improved self-lubricating stuffing box. Other objects are to provide improvements in the elements employed in such stuffing boxes.

Numerous other objects and advantages will be apparent to those skilled in the art upon reading the accompanying specification, claims and drawings.

FIGURE 1 is an elevational view with parts broken away in cross section of a stuffing box embodying the present invention.

FIGURE 2 is a cross-sectional view of the apparatus

of FIGURE 1 taken along the line 2—2 looking in the direction indicated.

FIGURE 3 is an elevational view with parts broken away in cross section of a second modification of the stuffing box.

FIGURE 4 is a similar elevational view with parts broken away in cross section of a third species of the present invention.

FIGURE 5 is an elevational view with parts in cross section showing the present invention applied to the tubing of an oil well.

FIGURE 6 is an elevational view of one form of stuffing box packing shown in FIGURE 4.

FIGURE 7 is an elevational view of a second form of stuffing box packing that could be used in place of that shown in FIGURE 6.

In FIGURE 1 a tubing head **11** is shown containing a self-lubricating stuffing box for the top of an oil well tubing. The tubing head **11** is provided with threads or other connecting means **12** adapted to be connected to the tubing **13** (see FIGURE 5) of a pumping oil well through which oil **14** is at least intermittently pumped by a pump (not shown) inside pumping housing **16** actuated be a reciprocating polished rod **17** passing into said tubing **13** through said head **11**. The head **11** has a vertical conduit **18**, **19**, **21**, **22**, **23** and **24** passing said rod, a chamber **26** forming a portion of said conduit, and a branch conduit **27** being connected to said chamber for the outlet of oil pumped into said chamber by said pump.

This improved self-lubricating structure comprises in combination an oil-retaining cup **28** mounted in said chamber **26** around said rod **17**, a lower packing **29** between the body of said cup **28** and said rod disposed to form an oil-retaining space **31** between said rod **17** and said cup **28** above said packing **29**, and a stuffing box having upper packing **32**, **33** and **34** disposed at the top of said chamber **26** and sealing between the body **36** of said head and said rod **17** above said oil-retaining space **31** and said branch conduit **27**.

While not essential to the invention, it is preferred that in the cup **28** around the rod **17** and between the lower packing and stuffing box there is disposed an upper packing follower **37**, a lower packing follower **38** and a helical compression spring **39** separating the two followers and urging them against their respective packing **32**, **33**, **34** and **29**.

In FIGURE 1 the upper and lower packing comprises conical resilient packing rings **29**, **32**, **33** and **34**. While not necessary to the invention, it is also preferable in some instances to provide a resilient dust-wiping ring **41** retained in groove **42** of a stuffing box follower **43** preferably threaded at **44** into stuffing box head **36**, which in turn is retained by nuts **46** and bolts **47** to the top of tubing head **11**. While not essential, tubing head **11** is often provided with an outlet **48** of lesser diameter than oil outlet **27** for the purpose of removing samples of gas, measuring pressure or the like. Cup **28** is provided with a plurality of windows **49** allowing free passage of oil between cup **28** and tubing head chamber **26**. The bottom of cup **28** is supported on ring **23**, which may be supported on radial fins **51** in the chamber **26**. However, other suitable means of supporting the cup obviously may be employed.

During pumping, oil coming up passage **24** through chamber **26** to flow line **27** overflows through windows **49** into cup **28**, filling the same up to the level **52** of the bottom of windows **49**. Later, when no oil is being pumped, the reservoir of oil in **28** up to level **52** acts to keep the polished surface of rod **17** wet with oil. Even if the oil dries out above level **52**, as soon as the rod **17** again is reciprocated some of the oil will be carried on its surface up into the upper packing **41**, **32**, **33** and **34**

and, of course, into the lower packing **29** so that the packing will not be destroyed by a dry rod **17**.

FIGURE 2 is a cross section of FIGURE 1 and needs no further explanation.

FIGURE 3 is a second embodiment of the present invention in which the upper packing **53** comprises loose packing material and a grease nipple **54** in said stuffing box accessible from the outside of said tubing head **11** is connected to supply grease to fill the space in said loose packing **53**. When not using the follower **43** and dust ring **41** of FIGURE 1, a simple follower or closure means **56** may be substituted at **44**.

In FIGURE 3 the cup **57** is provided with an integral bottom **58**, a lower rubber packing washer **59** and a steel follower **61** below helical compression spring **62** which presses upwardly on upper follower **63** provided with spring centering boss **64** against loose packing **53** retained in cup **57** by threaded cover **66**.

Although not essential, if desired a rubber O-ring **67** may be provided in an annular slot in the top of cover **66** to seal against head **36** to prevent the escape of fluid from chamber **26** through the central passage in **56**.

Parts having the same number are the same as parts shown in FIGURE 1.

All the various packing members **41, 32, 33, 34, 29, 67, 59, 68, 69, 71** and **72** may be made of oil-resistant synthetic rubber, such as Neoprene (trademark), and the same or other well known material can be used for gaskets **73**. Hemp or polyolefin fiber can be used as packing **53**.

In FIGURE 4, tubing head **11** has a cap **74** with an upper thread end **76** into which a retaining ring **77** is threaded. Retaining ring **77** holds down the top of cup **78** which has an open top closed by follower **79** which may be provided with annular O-rings **71** and **72**. Between spring **62** and follower **79** is disposed a helical tube of resilient material **69**, the elevation of which is shown in FIGURE 6. The inner surface of **69** may be provided with an annular saw-tooth surface **81** to provide a series of horizontal serrations or annular ridges on its inner surface wiping on rod **17**. As shown in FIGURE 3, the lower packing may be a flat ring of resilient material **59**.

In FIGURE 5 the stuffing box **11** of FIGURE 1 is shown applied to an oil well generally designated as **82**. The well comprises a well bore **83** extending down through geological formations **84, 86, 87** and part of **88**. Oil from oil bearing formation **87** passes through holes **89** in casing **91** and rises by natural hydrostatic pressure to level **92**. Casing **91** is provided with a casing head **93** supporting a tubing support ring **94** in which tube **13** is secured. Stuffing box **11** is secured in tubing **13**.

A Samson post **96** supports a walking beam **97** which is actuated by a pitman **98** to reciprocate polished rod **17**, which rod extends through stuffing box **11** down through tubing **13** to a pump (not shown) in pump housing **16**. When reciprocated, pump **16** tries to pump oil **14** up tubing **13** through stuffing box **11** and out oil flow line **27**. However, in many wells the oil level **92** is pumped down below the intake of pump housing **16**, upon which rod **17** is liable to be wiped clean of oil and dry out. Pumping is discontinued. In the prior art, when pumping is renewed, dry rod **17** will tear up the packing. In the present invention, the cup **28, 57** or **78** will retain a reservoir of oil up to level **52** at the bottom of windows **49**, so that when pumping is renewed polished rod **17** is still wet with oil or is made wet with oil on the first stroke of the pump, thereby lubricating the packing

and preventing the rod from tearing up the packing. It is therefore obvious that we have provided a self-lubricating stuffing box for an oil well tubing as claimed below.

FIGURE 6 is an elevational view of the helical tubular rubber packing **69** of FIGURE 4.

FIGURE 7 is an elevational view with a portion in cross section of an annular tubular rubber packing **68** which can be substituted for packing **69** in FIGURE 4.

While certain specific embodiments of this invention have been illustrated in the drawing and described in the specification in order to explain the invention, it is obvious that the invention is not limited thereto.

Having described our invention, we claim:

1. A polished rod stuffing box assembly comprising in combination:

a tubing head having a body adapted to be secured to an oil well tubing, said body having a first vertical passage therethrough, the bottom of which passage is adapted to be connected in communication with said tubing;

said first vertical passage being adapted to have a reciprocating polished rod passed therethrough in spaced relation therewith;

said body having a chamber forming a part of said first vertical passage;

an oil-retaining cup secured to said body with the top, the wall and the bottom of said cup in spaced relation to the wall of said chamber inside said chamber, with a vertical second passage through the bottom of said cup adapted to have said polished rod passed therethrough in spaced relation to the wall of said cup;

first packing means secured in the bottom of said cup adapted to restrict the flow of oil between said cup and said rod and thereby to form a substantial oil-retaining space between said rod and said cup from above said first packing to the top of said cup;

the top of said cup communicating with said chamber;

second packing means secured in said body adjacent the top of said chamber adapted to restrict the flow of oil between said body and said rod; and

a conduit connected to said chamber at a point at least as high as the top of said oil-retaining space in said cup for the outlet of oil from said chamber;

whereby when oil passes from said tubing out through said conduit is will also positively fill said oil-retaining space in said cup by gravity flow over the top of said cup, and then said cup will retain said oil in contact with said rod for a substantial period of time.

2. The combination of claim **1** in which in the cup around the rod and between the first and second packing means there is disposed a helical compression spring separating the two packing means and urging them into packing contact with said rod.

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