Sept. 6, 1966 L. A. JOHNSTON 3,270,810

POLISHED ROD PROTECTOR AND BLOW DEFLECTOR

Filed Feb. 13, 1963 2 Sheets-Sheet 1

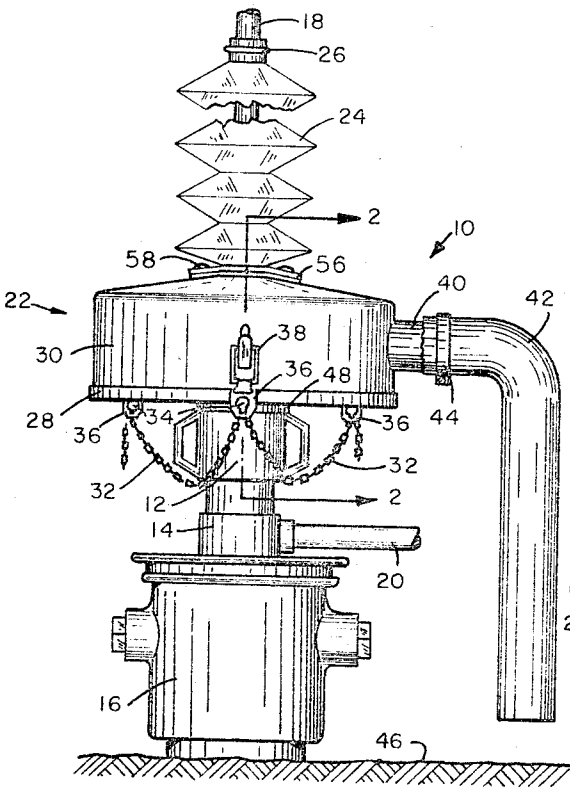


FIG. 1

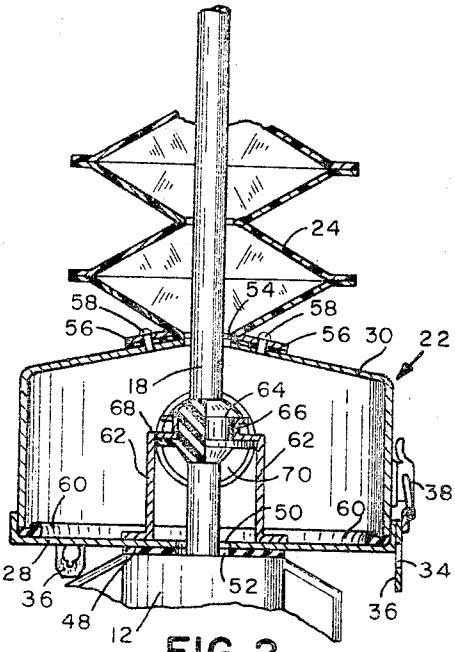


FIG. 2

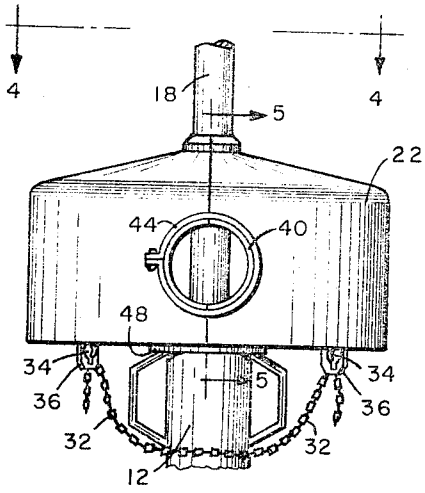


FIG. 3

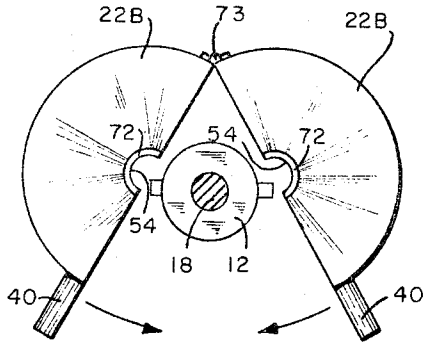


FIG. 4

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POLISHED ROD PROTECTOR AND BLOW DEFLECTOR

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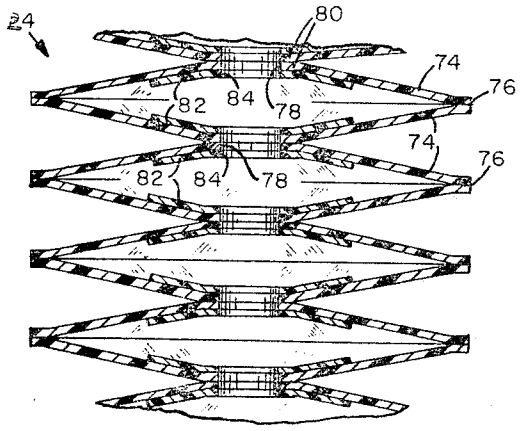


FIG. 6

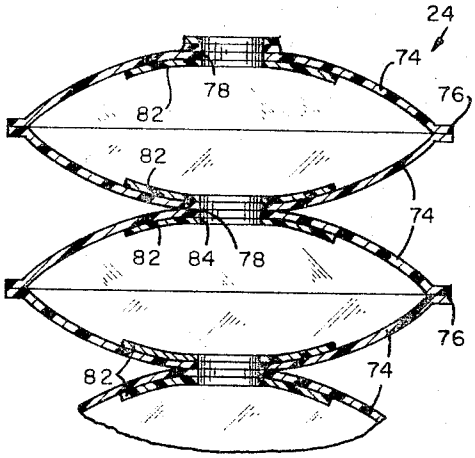


FIG. 7

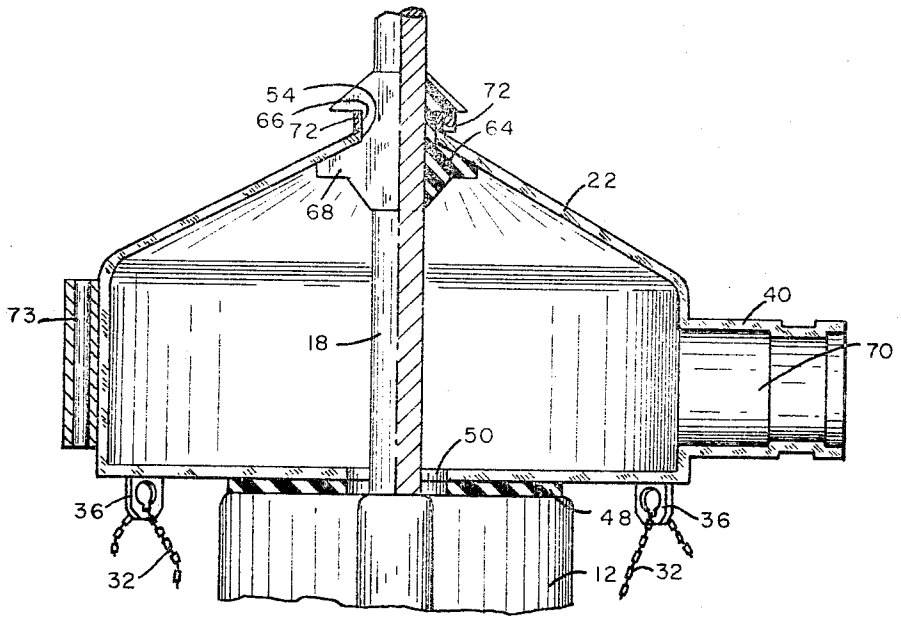


FIG. 5

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POLISHED ROD PROTECTOR AND BLOW DEFLECTOR

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Filed Feb. 13, 1963, Ser. No. 258,294

5 Claims. (Cl. 166—84)

This invention relates to a polished rod protector. More particularly, the invention relates to a device for protecting polished rods as used in the oil industry for pumping wells.

In my co-pending application filed July 25, 1962, having a serial number of 212,292 for a "Polished Rod Protector" now Patent No. 3,186,722, I have set forth a polished rod protector particularly adaptable for use to protect the polished rods utilized on beam and hydraulic type pumping units for pumping oil wells. This invention relates substantially to improvements, modifications and alternate embodiments of the prior filed application.

It is an object of this invention to provide a polished rod protector for use in protecting polished rods of oil wells including improved and simpler means of mounting the protector on the oil well.

Another object of this invention is to provide a polished rod protector for use in protecting the polished rods of oil wells including improved means of disengaging the device from the stuffing box.

Another object of this invention is to provide a polished rod protector for use in protecting the polished rods of oil wells including improved blow deflection means in the device.

Another object of this invention is to provide an integral blow deflector device for oil wells for use to prevent the spraying of oil and salt water when the stuffing box of the well fails.

Another object of this invention is to provide a blow deflector device having improved means for readily mounting the device on an oil well.

Another object of this invention is to provide improvements in a bellows member as utilized on a polished rod protector including reinforcing means to substantially prolong the life of the bellows.

These and other objects and a better understanding of the invention may be had by referring to the following description and claims taken in conjunction with the attached drawings, in which:

FIGURE 1 is a plan view of a portion of an oil well showing a polished rod protector according to this invention mounted on the well.

FIGURE 2 is a cross-sectional view of the polished rod protector and a portion of the bellows as taken along the line 2—2 of FIGURE 1.

FIGURE 3 is a plan view of an alternate embodiment of this invention showing the invention serving as a blow deflector mounted on the stuffing box of an oil well.

FIGURE 4 is a top view of the blow deflector of FIGURE 3 with the blow deflector shown pivoted open to disclose means whereby it is readily mounted onto or dismounted from an oil well.

FIGURE 5 is a cross-sectional view taken along the line 5—5 of FIGURE 3 of the improved blow deflector embodiment of this invention.

FIGURE 6 is a cross-sectional view of a portion of an improved bellows as utilized on the polished rod protector of this invention showing a means for reinforcing the bellows to substantially extend the life of the bellows. FIGURE 6 shows the bellow substantially compressed.

FIGURE 7 is a cross-sectional view of the improved bellows of FIGURE 6 showing the bellows expanded.

This invention may be described as a polished rod protector. More particularly, but not by way of limitation, the invention may be described as a polished rod protector for use with an oil well pumping system having a polished rod reciprocated through a stuffing box, said stuffing box positioned a distance above the surface of the earth, the polished rod protector comprising a hollow bonnet member supported to said stuffing box, said bonnet member having an opening in the top and bottom surfaces thereof to receive said polished rod, said bonnet member having an exhaust opening therein, and a bellows member affixed at its lower end to said bonnet member to said upper opening in said bonnet member, said bellows member receiving said polished rod therein, said bellows member affixed at its upper end to said polished rod.

Referring first to FIGURE 1, the polished rod protector of this invention is shown in plan view, the protector being indicated generally by the numeral **10**. The polished rod protector is shown supported to a stuffing box **12** as typically used on an oil well, the stuffing box being in turn supported on a pumping T **14** which is affixed to a well head **16**. A polished rod **18** is reciprocated within the stuffing box, pumping T and well head and connects to a sucker rod string (not shown) which extends to the bottom of the well to reciprocate a pump. Produced oil flows away from the well through a tubular lead line **20**.

The polished rod protector consists of a hollow bonnet member **22** having affixed to its upper end a bellows **24**. The upper end of the bellows **24** is affixed to the polished rod **18** such as by means of a clamp **26** and the lower end of the bellows is affixed to the upper end of the bonnet member **22**.

In the preferred embodiment the bonnet member **22** consists of a lower portion **28**, which serves in the manner of a base for the device, and an upper portion **30**. The lower portion **28** is supported to stuffing box **12** such as by means of chains **32** which extend beneath all or at least some portions of the stuffing box **12** and through eyelet openings **34** in brackets **36** affixed to the lower portion **28** of the bonnet **22**.

The upper portion **30** of the bonnet **22** is supported to the lower portion **28** such as by means of suitcase type releasable clamps **38**.

An exhaust outlet is provided in the bonnet member **22** such as by means of provision of an integrally formed tubular extension **40**. The outlet extension **40** provides means for air to breathe in and out of the bonnet **22** as the bellows **24** is reciprocated up and down with polished rod **18**. To retard dust entering into bonnet **22** and to conduct away any blow-by oil or water which may occur due to the failure of stuffing box **12**, a discharge conduit **42** may be affixed to the tubular extension **40** such as by a clamp **44**. The discharge conduit **42** preferably terminates near the surface of the earth **46** so that any oil or water which is discharged by failure of stuffing box **12** will be conveyed to the earth immediately adjacent the well rather than sprayed over surrounding vegetation.

The details of construction of the polished rod protector of FIGURE 1 may better be seen in the cross-sectional view of FIGURE 2. A resilient seal pad **48** is provided between the stuffing box **12** and the lower portion **28** of the bonnet **22** so that the interior of the stuffing box **12** is sealed in close communication with the interior of the bonnet member **22** through the lower opening **50** in the bonnet and opening **52** in the seal pad **48**, each of which openings receives the polished rod **18** therethrough.

An upper opening **54** in the bonnet member **22** receives the polished rod **18**. The bellows **24** may be affixed to the upper end of the bonnet member **22** in a variety of

ways. One means is by the use of a circular clamp ring **56** which holds the end portion of the bellows against the upper surface of the upper portion **30** of bonnet **22** by means of screws **58**.

A ring seal **60** is preferably provided between the lower portion **28** and the upper portion **30** of bonnet member **22** to effect a complete seal of the bonnet member.

Affixed to the lower interior portion **28** of the bonnet are upstanding brackets **62** which support a gasket member **64**. The gasket member **64** is preferably constructed of some material such as plastic, rubber and so forth, which has long wearing characteristics. The gasket member **64** is preferably provided with a groove **66** to receive the portions of the bracket **62** by which it is supported. Although the gasket member **64** may be of a multitude of configurations it is preferably provided with an integrally formed radially extending flange portion **68** which serves to deflect any oil, salt water, gas or mixtures thereof which may escape out of the stuffing box **12** and through openings **50** into the bonnet **22**. The flange **68** of the gasket member **64** prevents the blowing contaminants from passing upwardly through the upper opening **54** of the bonnet and thereby prevents the contaminants from being blown into the atmosphere and widely disbursed. Any accumulation of oil, gas or water escaping from stuffing box **12** will pass out of the bonnet **22** through the exhaust opening **70** communicating through the tubular extension **40** as shown in FIGURE 1.

The gasket member **64** has an opening therein to receive the polished rod **18**. The opening is preferably slightly larger than the polished rod **18** so that the gasket member is not in substantial friction engagement with the polished rod but the annulus between the gasket member and polished rod is so small as to prevent the passage of any consequential fluid or gases therethrough upon the failure of stuffing box **12**.

Referring to FIGURE 3, an alternate embodiment of the invention is shown. The embodiment of FIGURE 3 serves substantially the purposes of the polished rod protector of FIGURE 1 and FIGURE 2 except that no provision is made to protect the polished rod from dust. Whereas the embodiment of FIGURE 1 and FIGURE 2 is primarily adapted to be used in very dusty locations, such as frequently occurs in the western portion of Texas as an example, the embodiment of FIGURE 3 is primarily adapted to prevent damage to vegetation and property adjacent a well upon the failure of a stuffing box. In highly populated areas such as the west coast of the United States where high pressure wells are located adjacent residences and other valuable property, great amounts of damage may occur when the stuffing box fails and the oil, salt water and gas are sprayed into the atmosphere to be carried by the winds over large areas. In many of such areas there is no dust problem so that it is not necessary to protect the polished rod against dust, but a requirement exists to protect adjacent property owners from damage when a stuffing box fails. This is substantially the purpose of the blow deflectors of FIGURES 3, 4 and 5.

Referring first to FIGURE 3, the device is shown in an external plan view and consists basically of a bonnet member **22** supported to the top of a stuffing box **12** in the same manner as described for FIGURE 2, that is, by the use of chains **32** extending below the stuffing box **12** and through eyelet openings **34** in brackets **36**. An integral tubular extension **40** is provided, with FIGURE 3 shown having the extension **40** extending towards the viewer. A clamp **44** is provided to receive a discharge conduit (not shown).

Referring to FIGURE 5, the device is shown in cross-section. The bonnet **22** is provided with an upper opening **54** and a lower opening **50**. Seal pad **48** seals the interior of the bonnet **22** in closed communication with the interior of the stuffing box **12**. Supported in the upper opening **54** is a gasket member **64** substantially identical to the gasket member as shown in FIGURE 2. The gasket member **64** is provided with a groove **66** to receive the upper opening **54** of bonnet **22**. An adjustable clamp **72** holds the gasket member **64** in proper position around the polished rod **18**. As has been previously described, the gasket member **64** may be made of any material such as rubber, plastic or so forth which has long wearing characteristics and which will not score or abrade the polished rod **18**. The bore of gasket member **64** is preferably slightly larger than the exterior of the polished rod **18** for reasons previously mentioned. The gasket member **64** is likewise preferably designed to include an integral radially extending flange **68**.

The blow deflector of FIGURES 3, 4 and 5 provides a means of containing any blowing gas, oil and water which may escape from the stuffing box **12**. The gasket member **64** prevents any harmful quantities of the fluid escaping past the polished rod **18** and contains such fluid within the bonnet **22**. The contained fluid and gas may then be vented through exhaust opening **70**. By means of a conduit (not shown) connected to tubular extension **40**, escaped fluid or gas may be conducted to some safe disposition.

A means of readily mounting the bonnet **22** on a well and about polished rod **18** is shown in FIGURE 4. The bonnet member **22** is bifurcated into two portions designated as **22A** and **22B**. A hinge **73** supports the portions together so that the device may be easily mounted around the polished rod **18** and around the gasket member **64**. Although a variety of means may be provided for supporting the two halves **22A** and **22B** together, the preferred arrangement is to design the halves so that each includes one-half of the tubular extension **40**. In this manner, by means of clamp **44**, as shown in FIGURE 3, the two halves are supported together.

The polished rod protector of FIGURE 1 and FIGURE 2 utilizes a bellows member to shield the polished rod from blowing dust and dirt. In my previously referred to copending application I have set forth a means of constructing a bellows by joining discs of plastic or some similar type flexible material at the outer and inner alternate peripheries. This is an inexpensive and completely satisfactory means of providing a bellows, except that when a highly flexible material is used to manufacture a long bellows member, a great amount of stress is placed around the inner peripheries of the upper portion of the bellows and a high incidence of failure may occur. FIGURES 6 and 7 show a means of providing an improved bellows. The bellows is constructed primarily of flat circular sheets of plastic material **74** arranged in adjacent uniaxial relationship with alternate outer peripheries of the flat circular sheets joined at **76**. This is accomplished by welding the outer peripheries **76** by the application of heat and pressure to the plastic and, according to the plastic used, bonding cement may also be utilized.

Each of the flat circular sheets **74** are provided with an opening **78** which receives the polished rod as the device is applied to protect the polished rod according to this invention. The bellows is completed in its basic formation by bonding together the inner peripheries **80** of alternate discs **74**. Bonding of these is likewise obtained by the application of heat and pressure, or, when necessary, the application of a cement. The bellows thus formed is satisfactory except, as has been previously mentioned, there is a great amount of strain placed by the continuous expansion and contraction of the bellows at the inner peripheries **80**. An important element of this invention is the provision of means of reducing the incidents of failure at the inner peripheries.

To substantially improve the life of the bellows, reinforcing discs **82** made of some resilient material are applied to each side of the bonded inner peripheries **80**. The reinforcing discs **82** are likewise provided with an inner opening **84** substantially conforming to the opening

78 in the flat circular body discs 74. The reinforcing discs 82 are of an exterior diameter less than the flat body discs 74 and preferably of a diameter approximately one-half of the diameter of the body discs 74, although the external diameter of the discs 82 may vary according to the design of the overall bellows and the types of materials used. The material composing the reinforcing discs 82 is preferably of a resilient type easily bonded to the material used to manufacture the flat circular body discs 74 and preferably is of the same material as the flat body discs 74. The reinforcing discs 82 are preferably of a material having greater stiffness or a material which is less flexible than the material utilized for the body discs 74. This may be accomplished, although the same material is utilized, by using material having greater thickness than the material utilized for the body discs.

FIGURE 7 shows the bellows of this invention expanded and disclose the means whereby the reinforcing discs 82 serve to strengthen the bellows. The extra stiffness of the reinforcing discs 82 causes the flat body discs 74 to expand in a curved arc rather than a sharp angle at the inner periphery 80. This distributes the tension as the bellows is expanded and contracted and more completely distributes the area of fold and flexing. In this manner, the overall body discs 74 assume the weight of supporting the lower sections of the bellows 24 rather than concentrating the stress in the immediate areas of the inner peripheries 80.

When the inner peripheries of the reinforcing discs 82 and the main body discs 74 are bonded or welded together they become, in effect, a unitary structure having highly increased strength.

Although the invention has been described as it pertains to polished rods of oil wells operated in a vertical position, it can be seen that the principles of the invention may equally as well be applied to the protection of reciprocating rods, plungers and so forth operated in a horizontal position.

Although this invention has been described in a certain degree of particularity, it is manifested that many changes may be made in the details of construction and the arrangement of components without departing from the spirit and scope of this disclosure.

What is claimed:

1. A polished rod protector for use with an oil well pumping system having a polished rod reciprocated through a stuffing box, said stuffing box positioned a distance above the surface of the earth comprising:

a hollow bonnet member supported to said stuffing box, said bonnet member having an opening in the top and bottom surfaces thereof to receive said polished rod, said bonnet member having an exhaust opening therein; and

a bellows member affixed at its lower end to said bonnet member at said upper opening in said bonnet member, said bellows member receiving said polished rod therein, said bellows member affixed at its upper end to said polished rod.

2. A polished rod protector according to claim 1 including a blow deflector positioned in said bonnet, said blow deflector comprising:

a gasket member having an opening therein receiving said polished rod; and

bracket means extending from the interior of said bonnet member supporting said gasket member intermediate the interior top and bottom of said bonnet member.

3. A polished rod protector according to claim 1 including means of detachably supporting said bonnet member to said stuffing box, said means comprising:

a multiplicity of bracket members affixed to and extending from said bonnet member, each of said bracket members having a notch opening therein; and

chain means received by said notch openings of said bracket members extending below portions of said stuffing box.

4. A polished rod protector according to claim 1 including a conduit means communicating with said exhaust opening in said bonnet member, said conduit means terminating adjacent the surface of the earth.

5. A blow deflector for use with an oil well pumping system having a polished rod reciprocated through a stuffing box positioned a distance above the surface of the earth comprising:

a hollow bonnet member sealably supported on said stuffing box, said bonnet member having an opening in the bottom thereof communicating the interior of said bonnet member with the interior of said stuffing box, the bottom opening receiving said polished rod, and an opening in the top thereof;

a gasket member sealably supported in said top opening of said bonnet member, said gasket member having an opening therein reciprocably receiving said polished rod, the bonnet member having an exhaust opening therein;

a multiplicity of bracket members affixed to and extending from said bonnet member, each of said bracket members having a notch opening therein; and

chain means received by said notch openings of said bracket member extending below portions of said stuffing box for detachably supporting said bonnet member to said stuffing box.

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