Dec. 6, 1949 H. J. BASHAM 2,490,333

FLEXIBLE STUFFING BOX AND PIPE JOINT ASSEMBLY

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Fig. 1

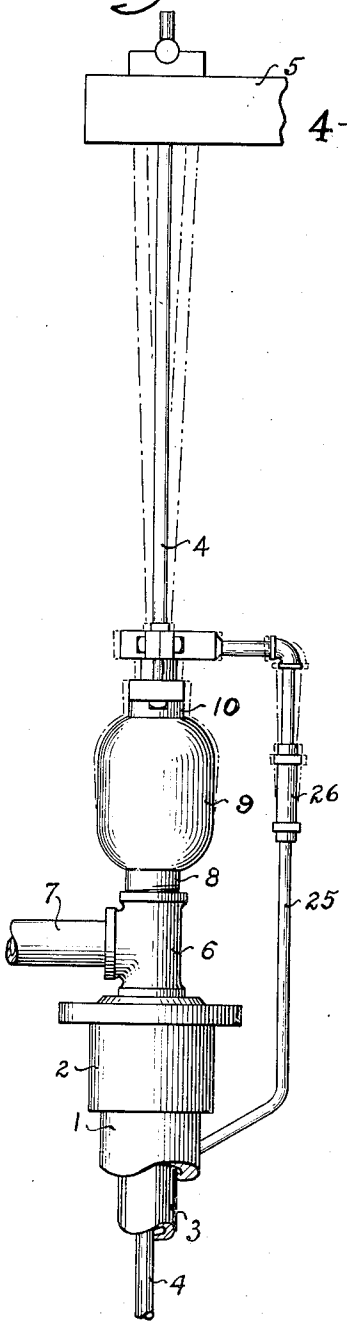



Fig. 2

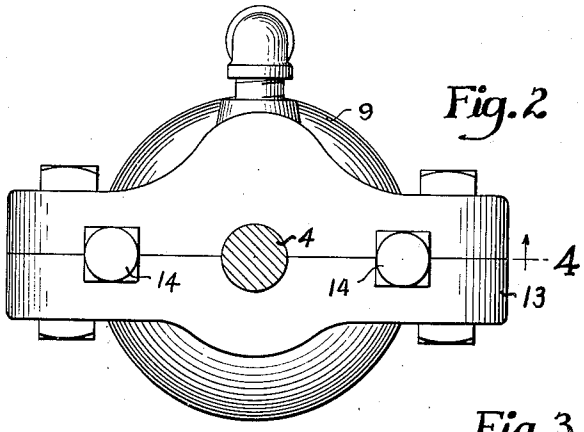
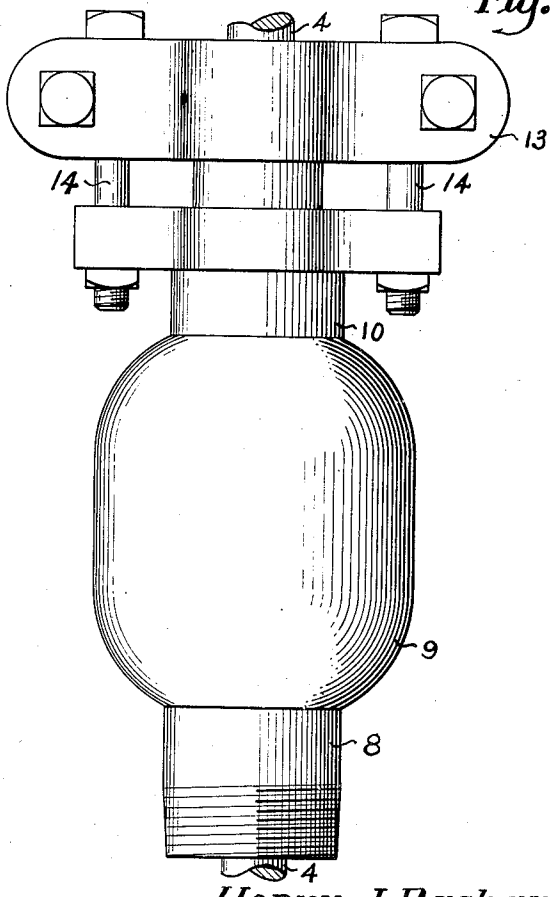



Fig. 3




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Fig. 4

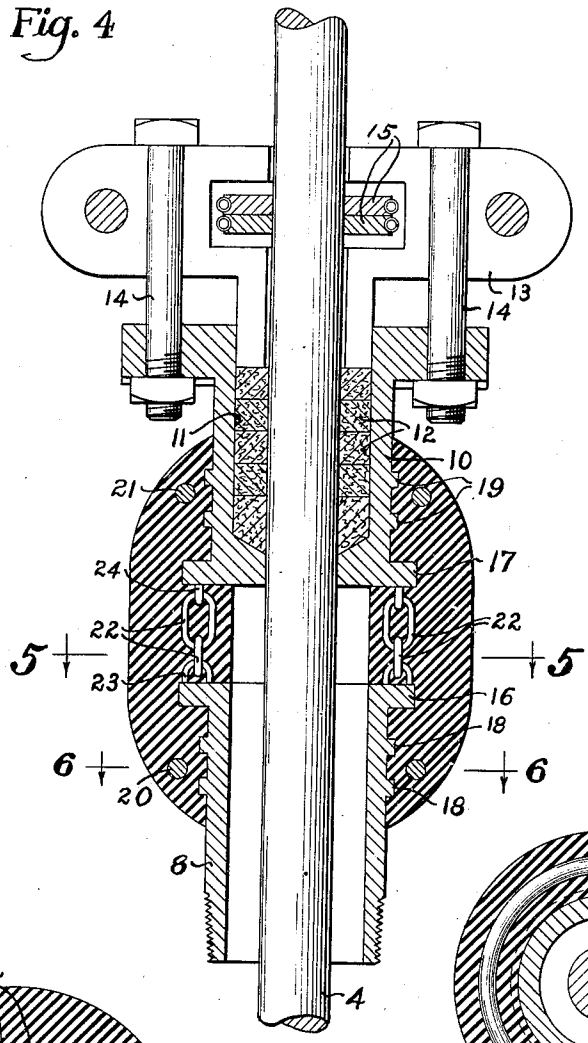



Fig. 6

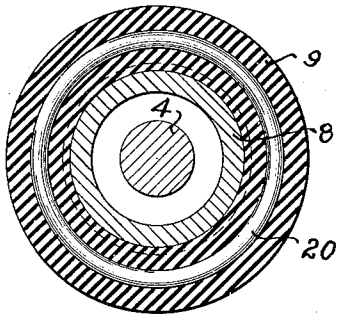
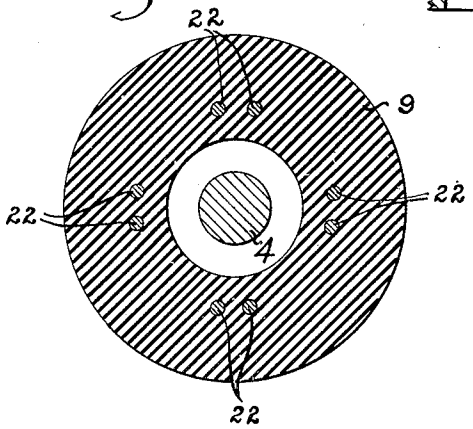



Fig. 5




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2,490,333

# UNITED STATES PATENT OFFICE

2,490,333

## FLEXIBLE STUFFING BOX AND PIPE-JOINT ASSEMBLY

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Application August 15, 1946, Serial No. 690,744

8 Claims. (Cl. 285—90)

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This invention relates to improvements in stuffing boxes, particularly of the character used for the polish rod of a reciprocating pump, such as an oil well pump.

It has been customary heretofore to operate the polish rod of an oil well pump by a swinging walking beam that oscillates in a vertical direction. The polish rod extends to the pump located in the well, and inasmuch as it operates in the oil and other fluid in the well, this will be carried upward on the polish rod and will drop off outside of the well.

Due to the swinging motion imparted to the polish rod by the walking beam it has not been practical heretofore to use stuffing boxes that would close and seal off the upper end of the well around the polish rod, and where these are loose enough to allow lateral vibration of the polish rod due to the action of the walking beam, they are not effective in preventing the escape of the oil on the rod. Consequently much oil has been lost through leakage at the stuffing box, which not only is wasted inasmuch as it cannot be recovered, but it also damages the soil and often runs into streams and pollutes the water therein. The presence of this wasted oil around the well also causes settling of the foundation of the pump jack, which, together with the excessive wear resulting to the operating parts, causes the jack to get out of line with the polish rod and stuffing box. This misalignment causes abnormal wear on the parts and increases the tendency of the stuffing box to leak.

Because of the considerable number of wells located in close proximity to each other it has not been practical heretofore to provide an operator or pumper for one particular location, but on the contrary, one man has been required to maintain a substantial number of wells. This makes it all the more difficult for him to observe leaking conditions and usually results in failure to correct these difficulties either by tightening the stuffing box or substituting a new one.

The object of this invention is to improve the construction of the stuffing box and its mounting on the well so that the stuffing box will automatically coact with any and all misalignments of the pump jack and polish rod as the latter passes into and out of the stuffing box, thereby eliminating strain and excessive wear on the pump jack, polish rod, stuffing box and its packing, and effecting important savings in maintainence as well as preventing the leakage and wasting of the oil.

A further object of the invention is to provide

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a flexible mounting for a stuffing box on the well which will permit swinging movement of the stuffing box in any direction to maintain the packing action on the polish rod, and yet provide an effective mounting which will hold the stuffing box on the well structure in proper operating position.

In carrying out these objects, I prefer to use a stuffing box mounted on a yieldable support, such as rubber, or synthetic rubber, preferably "neoprene," which flexible mounting is supported on the well structure and includes means to provide separation of the yieldable mounting while yet providing universal flexibility of the stuffing box, so that it will coact automatically with any misaligned movement of the polish rod in any and all directions during the travel of the rod into and out of the stuffing box. The mounting nipple and the stuffing box body may be molded directly in the yieldable material and connected therewith to prevent separation from the rubber while also being connected together by flexible devices which will prevent longitudinal separation. At the same time these flexible devices will not interfere with the universal action of the stuffing box mounting freely in all directions throughout 360° of circumference, and nevertheless the construction is so simple that it will not add appreciably to the cost of the stuffing box and may be applied to the well in a very simple and expeditious manner.

This embodiment of the invention is illustrated in the accompanying drawings, in which:

Fig. 1 is a side elevation of a well structure including a portion of the pumping equipment and showing the invention applied thereto;

Fig. 2 is a top plan view of the stuffing box structure with the polish rod in section;

Fig. 3 is a side elevation thereof;

Fig. 4 is a vertical section on the line 4—4 of Fig. 2;

Fig. 5 is a cross-section through the stuffing box mounting on the line 5—5 of Fig. 4; and

Fig. 6 is a similar view on the line 6—6 of Fig. 4.

The invention is shown in Fig. 1 as applied to well pumping equipment of the character used for the pumping of deep wells, such as oil wells. The well structure includes a casing 1 that extends downward in the well from a casing head 2 located at the surface of the ground. Within the casing 1 is the usual tubing 3 through which a polish rod 4 extends to the pump mechanism connected with the tubing 3 at a point in the lower portion of the well. The polish rod 4 extends

vertically from the well to operating mechanism that includes a walking beam 5 which is oscillated in a vertical direction by power means, usually an engine.

The pump mechanism forces the oil up through the tubing 3 to a T 6 connected with the casing head 2 and from which the oil is discharged ordinarily through a pipe 7. Because the polish rod 4 extends upwardly through the top of the T 6 by means of which it is operated, there would be a tendency for the oil to follow out on the periphery of the polish rod and be carried upward to a point externally of the well. This is prevented by a stuffing box ordinarily provided around the polish rod at the point where the latter is directed out of the well through the T 6.

Such a stuffing box is mounted on a nipple 8 screwthreaded into the upper end of the T 6 and surrounds the polish rod 4, as shown in Fig. 4. Carried by the nipple 8 is a mounting 9 which in turn supports the stuffing box and the packing gland that prevent the leakage of oil along the polish rod. The structure of the stuffing box and packing gland generally is similar to that as set forth in my prior patent, No. 2,249,679, granted July 15, 1941.

As shown in Fig. 4, the stuffing box includes a body 10 having a chamber 11 therein within which packing rings 12 are mounted closely surrounding the polish rod 4. These packing rings are confined by a packing gland 13 secured by bolts 14 to the body 10. Wiper rings 15 are enclosed within the packing gland 13, and yieldably embrace the polish rod 4 to prevent any oil from following up the rod on the upstroke thereof.

The packing gland support 9 preferably is formed as a body of yieldable material, such as rubber, or synthetic rubber, preferably "neoprene." Such a material can be molded to the desired shape and thickness and yet has flexibility capable of yielding in any direction to provide a universal mounting for the stuffing box that will allow tilting action throughout 360° of circumference in response to variations in direction of the polish rod.

The nipple 8 and body 10 are in axial alignment and telescope with opposite ends of the tubular mounting body 9, and at the same time these are securely bonded together by vulcanizing or welding in the usual manner of securing rubber, or synthetic rubber, to metal. This will provide an effective, tight connection between the parts, and yet the separation of the elements 8 and 10 will permit freedom of universal action of the rubber mounting body to yield in any direction in accommodating itself to the swinging movements of the polish rod 4.

It is preferred that the elements be anchored to the yieldable body 9 as well as secured together to prevent accidental separation of the parts. I have provided for this purpose flanges 16 and 17 on the respective inner ends of the nipple 8 and stuffing box body 10, and also ribs 18 and 19 surrounding the sides of these respective parts spaced from each other and from the flanges. These flanges and ribs are embedded in the molded body 9 tending to anchor the body to the parts against axial separation or relative sliding movement. This anchoring action is increased by the provision of rings 20 and 21 molded in the rubber body 9 at points preferably between the spaced ribs 18 and 19, respectively, but spaced radially therefrom, as shown in Figs. 4 and 6. These rings will prevent radial expansion of the end portions of the rubber body under excessive pressure, which would tend to separate it from the connected parts.



The nipple 8 and stuffing box body 10 are also connected together through flexible devices generally indicated at 22, which will hold these against axial separation and yet will not interfere with the relative universal movement of these connected parts. These flexible devices 22, shown as chain links, are attached to the respective parts by rings 23 and 24, and are molded in the rubber body 9, as shown in Figs. 4 and 5.

It will be evident from Fig. 1 that the up and down oscillating movements of the walking beam 5 will not only reciprocate the polish rod 4 in a vertical direction, but this polish rod will have some oscillating movement lengthwise of the walking beam due to the shifting position of the point of connection therebetween. The nipple 8 is fixed rigidly to the well structure by its screwthreaded engagement with the T 6, so that it cannot yield laterally to accommodate for the lateral swinging motion of the polish rod 4. However, the yieldable body 9 on which the stuffing box is mounted is free to yield in a universal manner throughout 360° to any lateral motion of the polish rod 4 as it extends through the stuffing box, as indicated in dotted lines in Fig. 1. The construction of this body of soft rubber or similar yieldable material will maintain the stuffing box in axial alignment with the polish rod in any lateral position of the latter that may result from the vertical reciprocating action of the polish rod by the walking beam 5. At the same time the stuffing box and packing gland will keep the polish rod free of oil at the point where it emerges from the packing gland and maintain the wiping action that is desirable for this purpose. This prevents the waste of oil that might otherwise be drained from the well and drop off from the polish rod outside of the well.

As set forth in my Patent No. 2,249,679, granted July 15, 1941, it is desirable to provide a pipe connection from the packing gland 13 back to the casing 1, which pipe connection is indicated in Fig. 1 at 25. I found that it is necessary to provide a flexible joint 26, as by a rubber sleeve, in this pipe connection 25, to allow movement of the upper end of the pipe connection laterally relative to the lower end thereof in accommodating itself to the movements of the yieldable body 9.

While the invention is illustrated in one embodiment as described above, it is appreciated that variations and changes may be made therein without departing from the invention, except as specified in the claims.

I claim:

1. A stuffing box structure comprising a stuffing box body and a nipple arranged in axial alignment and adapted for passage of a reciprocating rod therethrough, and a mounting body of yieldable material telescoped over the adjacent ends of the stuffing box body and nipple and forming a universal connection therebetween having freedom of movement in all directions.

2. A stuffing box structure comprising a stuffing box body and a nipple arranged in axial alignment and adapted for passage of a reciprocating rod therethrough, and a mounting body of yieldable material telescoped over the adjacent ends of the stuffing box body and nipple and forming a universal connection therebetween having freedom of movement in all directions, said stuffing box body and nipple having peripheral projections thereon embedded in the mounting body

and said mounting body being bonded directly to the stuffing box body and nipple in permanent secure relation.

3. A stuffing box structure comprising a stuffing box body and a nipple arranged in axial alignment and adapted for passage of a reciprocating rod therethrough, and a mounting body of yieldable material telescoped over the adjacent ends of the stuffing box body and nipple and forming a universal connection therebetween having freedom of movement in all directions, and a flexible device connecting the stuffing box body and nipple together inwardly of the mounting body and preventing axial separation thereof without intereference to the universal action of the mounting body.

4. A stuffing box structure comprising a stuffing box body and a nipple arranged substantially in axial alignment with adjacent ends spaced apart and adapted to receive a reciprocating rod therethrough, a mounting body of relatively thick wall section telescoped over the adjacent ends of the stuffing box body and nipple and molded thereto in secure bonded relation forming a permanent connection between said stuffing box body and nipple, said mounting body being constructed of relatively soft, yieldable material having freedom of swinging movement in all directions and providing a universal connection between the stuffing box body and nipple.

5. A stuffing box structure comprising a stuffing box body and a nipple arranged substantially in axial alignment with adjacent ends spaced apart and adapted to receive a reciprocating rod therethrough, a mounting body of relatively thick wall section telescoped over the adjacent ends of the stuffing box body and nipple and molded thereto in secure bonded relation forming a permanent connection between said stuffing box body and nipple, said mounting body being constructed of relatively soft, yieldable material having freedom of swinging movement in all directions and providing a universal connection between the stuffing box body and nipple, each of said stuffing box body and nipple having a peripheral flange thereon embedded in the body member, and rings surrounding the stuffing box body and nipple and embedded in the end portions of the body member on the opposite sides of the respective flanges from the opposing faces of the flanges to prevent separation of the body member from the stuffing box body and nipple.

6. A stuffing box structure comprising a stuffing box body and a nipple arranged substantially in axial alignment with adjacent ends spaced apart and adapted to receive a reciprocating rod therethrough, a mounting body of relatively thick wall section telescoped over the adjacent ends of the stuffing box body and nipple and molded thereto in secure bonded relation forming a permanent connection between said stuffing box body and nipple, said mounting body being constructed of relatively soft, yieldable material having freedom of swinging movement in all directions and providing a universal connection between the stuffing box body and nipple, and chains connecting the stuffing box body and nipple together to prevent axial separation and molded in the stuffing box body.



7. A stuffing box structure comprising a stuffing box body and a nipple arranged substantially in axial alignment with adjacent ends spaced apart and adapted to receive a reciprocating rod therethrough, a mounting body of relatively thick wall section connecting the adjacent ends of the stuffing box body and nipple and molded thereto in secure bonded relation forming a permanent connection between said stuffing box body and nipple, said mounting body being constructed of relatively soft, yieldable material having freedom of swinging movement in all directions and providing a universal connection between the stuffing box body and nipple.

8. A stuffing box structure comprising a stuffing box body and a nipple arranged substantially in axial alignment with adjacent ends spaced apart and adapted to receive a reciprocating rod therethrough, a mounting body of relatively thick wall section connecting the adjacent ends of the stuffing box body and nipple and molded thereto in secure bonded relation forming a permanent connection between said stuffing box body and nipple, said mounting body being constructed of relatively soft, yieldable material having freedom of swinging movement in all directions and providing a universal connection between the stuffing box body and nipple, each of said stuffing box body and nipple having a peripheral flange thereon embedded in the body member, and rings surrounding the stuffing box body and nipple and embedded in the end portions of the body member on the opposite sides of the respective flanges from the opposing faces of the flange to prevent separation of the body member from the stuffing box body and nipple.

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