June 2, 1964 H. J. BASHAM 3,135,534

ALIGNING MEANS FOR STUFFING BOXES

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Fig. 1.

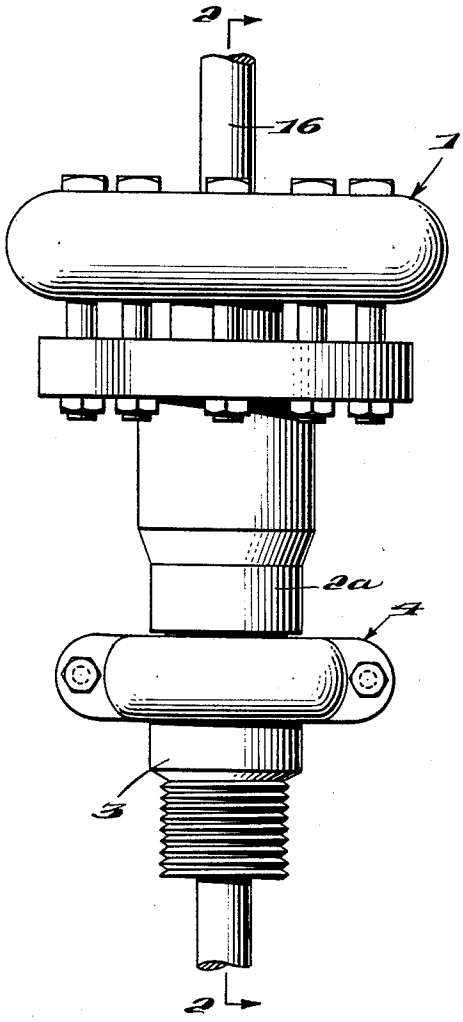
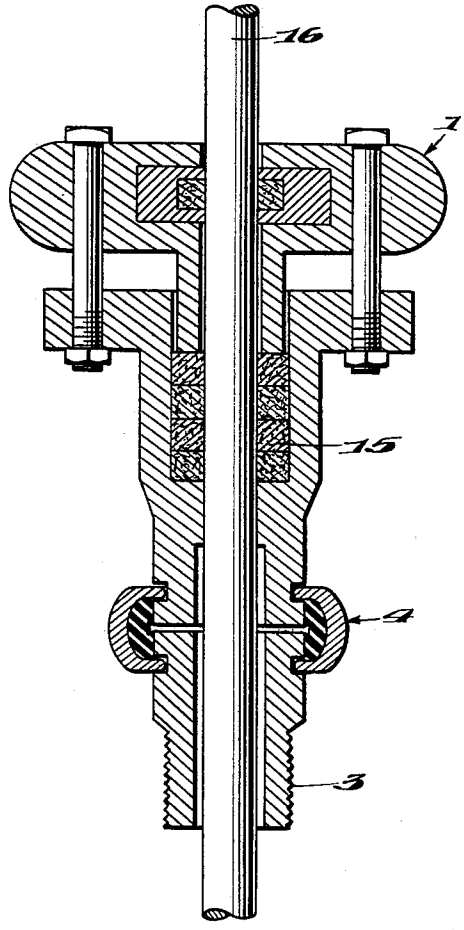


Fig. 2.



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Fig. 3.

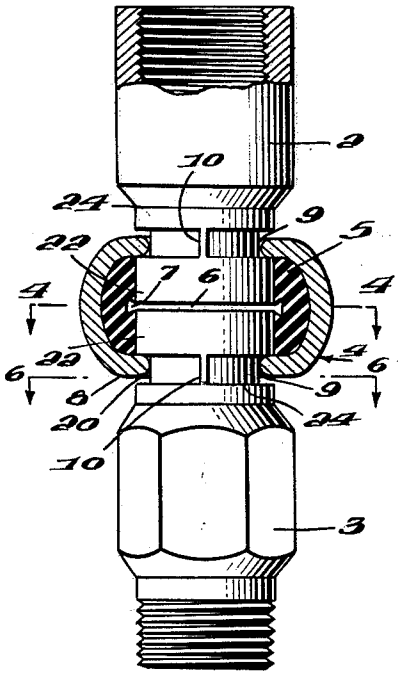


Fig. 5.

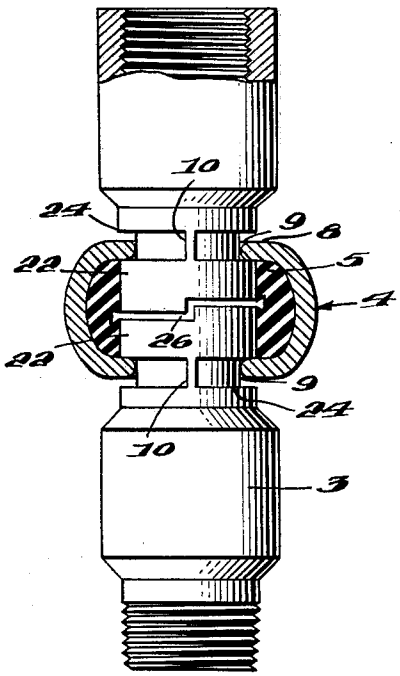


Fig. 4.

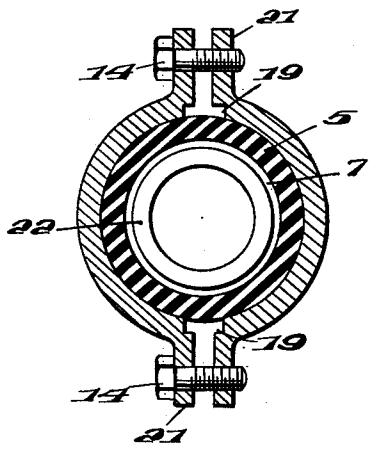
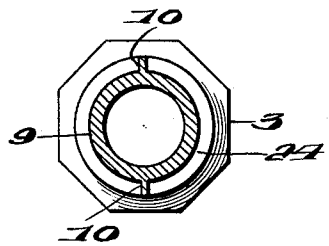


Fig. 6.



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ALIGNING MEANS FOR STUFFING BOXES

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4 Claims. (Cl. 285—112)

This invention relates to improvements in aligning means for stuffing boxes 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, increases the power needed to operate the pump jack and causes the stuffing box to leak.

In my prior Patent No. 2,490,333, granted December 6, 1949, I have provided aligner means integral with the stuffing box. This stuffing box has been very successful, and yet is not completely satisfactory. Due to certain weaknesses in its construction, it would at times, pull apart when the stuffing box packing would freeze to the polish rod.

It is an object of this invention to improve the construction of the stuffing box so that it will have all the flexibility of the old type, yet will have sufficient strength so it cannot be forced apart.

A further object of the invention is to provide aligner means which may be attached to any standard type of stuffing box.

A still further object of this invention is to provide means by which repacking of the stuffing box may be facilitated.

In carrying out these objects, I prefer to use a flexible mounting which is supported on the well structure and includes means to permit separation of the flexible 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 two nipple members are connected by a heavy metal clamp having enclosed therein a seal of flexible material such as rubber or "neoprene." The clamp prevents longitudinal separation, and at the same time will not interfere with the universal action of the stuffing box in all directions throughout 360 degrees of circumference.

This preferred embodiment of the invention, together with modifications thereof, is illustrated in the accompanying drawings, in which:

FIG. 1 is a side elevation of a stuffing box with built-in aligner;

FIG. 2 is a cross section taken on lines 2—2 in FIG. 1;

FIG. 3 is a side elevation, partly in section, of a separate aligner means for a stuffing box;

FIG. 4 is a cross section view taken on lines 4—4 in FIG. 2;

FIG. 5 is a side elevation, partly in section, of a modification of the separate aligner means for a stuffing box; and

FIG. 6 is a cross section view taken on lines 6—6 in FIG. 3.

The aligner means consists of an upper member and a lower member connected together by steel clamp means. The steel clamp means is arranged to provide a universal connection between said members.

The steel clamp means is of such strength as to be able to withstand pulling pressures of approximately 3000 lbs.

The invention is shown in one embodiment in FIG. 1, wherein the stuffing box **1** includes the upper member **2***a* of the aligner means as a part of the stuffing box. The lower member **3** is a nipple which is adapted to be attached to the upper end of the tubing **T** at the well head.

FIGS. 1 and 2 show the stuffing box and aligner means in operative position, with a polish rod **16** extending therethrough. The upper end of the polish rod is connected to a conventional well pumping means (not shown). The lower end of the polish rod extends through the tubing **T** and tubing into the well for pumping fluid therefrom.

When the two members are in operative position, a space **6** occurs between the adjacent end portions **22** of said members. This space is caused by the liquid from the well which clings to the periphery of the polish rod, penetrating between the adjacent end portions **22** and causing them to part a limited distance. This space allows free movement of one member relative to the other. In case, however, of a breakdown of the pumping means, or the parting of the pulling means, the width of this space is such that the adjacent ends of the members will come to rest together to prevent the shoulders **24** from engaging the side walls **8** of the clamp **4** and possibly damaging the clamp. Such an occurrence will put the entire weight of the tubing rods on the aligner means. This could be from 2,500 lbs. to 25,000 lbs. depending on the depth of the well.

The modification disclosed in FIG. 3 shows the upper member **2** as being a separate part and having internal threads therein for attachment to any standard stuffing box.

The details of the clamping means are identical, and it will suffice to discuss only one embodiment.

The upper member **2** is connected to the lower member **3** by a steel clamp **4**. The clamp **4** preferably consists of two semi-cylindrical sections with ear members **21**. The sections of the steel clamp are held together by fastening means **14**, such as bolts or other suitable means. The ear members **21** have apertures therein to receive the fastening means **14**.

The cross section of each section of the clamp **4** is substantially U-shaped and has side walls **8** extending into grooves **9** on the adjacent end portions **22** of the members. The width of each groove **9** is greater than the thickness of the side walls **8** so that the nipple members may move vertically relative to the clamp. The side walls **8** have rounded inner edges as at **20**, to allow relative rocking movement of the clamp and nipple members about an axis perpendicular to the longitudinal axis of said nipple members. The side walls **8** extend into the grooves **9** to prevent longitudinal separation of the nipple members while allowing for lateral or tilting movement of one member relative to the other member.

Each groove **9** is separated by a pair of diametrically opposed vertical rib members **10**. The clamp members **4** have notches **19** (FIG. 4) therein for loosely receiving

the rib members. The rib members **10** prevent rotation of the clamp means relative to the members **2** and **3**.

Within the cavity of the clamp is a flexible sealer or a sealing ring **5**, such as rubber or "neoprene." The sealer fits over the adjacent end portions **22** of the members **2** and **3** within the cavity of the clamp. The sealer has a triangular cavity **7** therein so that the liquid from around the polish rod and the space **6** will penetrate into the cavity **7** and expand the sealer, thereby increasing the efficiency of the sealer.

It will be evident from FIGS. 2 and 3 that if there is any misalignment of the polish rod, the flexible clamp **4** will permit the stuffing box to move laterally in any direction. The clamp **4**, at the same time, will be of sufficient strength so as to prevent any longitudinal separation of the connecting members.

This type of flexible coupling may be used for various types of pipe connections, wherein a universal connection is desired.

Also with this type of aligner, the packing **15** in the stuffing box may be easily replaced by merely loosening the clamp bolts **14** and the box can be placed in packing position by a slight push of the hand. After the stuffing box is repacked, the bolts can then be tightened.

In the modification shown in FIG. 5, the adjacent end portions **22** of the members have an offset portion so that the two members fit together in somewhat of an interlocking relationship as at **26**, to prevent rotation of one member relative to the other about their longitudinal axes. Due to this structure, with the aid of ribs **10**, the unit can be connected to either a well stuffing box or to a tubing T with heavy wrench tools attached to any part of the aligner without causing damage to any member.

While the invention is illustrated and described in certain embodiments, it is recognized that other variations and changes may be made therein without departing from the invention, except as specified in the claims.

I claim:

1. In a stuffing box structure including a stuffing box body adapted for passage of a reciprocating rod therethrough, an aligner comprising a nipple having one end adapted to be attached to a tubing of a well head, a pipe on said stuffing box body, the opposite end of said nipple being adjacent the end of said pipe and being in substantially axial alignment therewith for passage of said rod therethrough, said nipple and said pipe each having substantially the same outside diameter at their adjacent end portions and having a groove extending circumferentially in the outside surface thereof, each of said grooves having a first radial side wall adjacent the proximate ends of the nipple and the pipe and a second radial side wall remote from said proximate ends and a cylindrical bottom surface extending between said side walls, a pair of semi-cylindrical clamp members, each of said members having radial flanges along adjacent axial edges thereof, said clamp members having wall portions along opposite ends thereof, each of said wall portions having opposite plane surfaces extending radially into the grooves, each of said plane surfaces having a radial height substantially greater than the depth of the groove, said wall portions terminating in a circular edge of substantially the same diameter as said bottom surfaces of said grooves, said edges being transversely rounded, means for securing said clamp flanges together with said rounded edges of the wall portions extending into said grooves, and a sealing ring between said proximate ends and said clamp members, the axial distance between said first radial side walls of said pipe and nipple grooves when in assembled position being less than the distance between the wall portion plane surfaces adjacent said first side walls and the axial distance between said second radial side walls of said pipe and nipple grooves being greater than the axial length of said clamp, said sealing ring extending axially between said radial walls in sealing relation between said clamp wall portions and said pipe and nipple, whereby under normal conditions fluid pressure within said structure expands the sealing ring axially against the clamp wall portions and maintains the separation of said proximate ends, and upon the application of large axial forces in the stuffing box, the opposing ends of the nipple and pipe move into abutting relation while the groove radial walls remain spaced from the clamp wall portions.

2. In a stuffing box structure including a stuffing box body adapted for passage of a reciprocating rod therethrough, an aligner comprising a nipple having one end adapted to be attached to a tubing of a well head, a pipe on said stuffing box body, the opposite end of said nipple being adjacent the end of said pipe and being in substantially axial alignment therewith for passage of said rod therethrough, said nipple and said pipe each having substantially the same outside diameter at their adjacent end portions and having a groove extending circumferentially in the outside surface thereof, each of said grooves having a first radial side wall adjacent the proximate ends of the nipple and the pipe and a second radial side wall remote from said proximate ends and a cylindrical bottom surface extending between said side walls, a pair of semi-cylindrical clamp members, each of said members having radial flanges along adjacent axial edges thereof, said clamp members having wall portions along opposite ends thereof, each of said wall portions having opposite plane surfaces extending radially into the grooves, each of said plane surfaces having a radial height substantially greater than the depth of the groove, said wall portions terminating in a circular edge of substantially the same diameter as said bottom surfaces of said grooves, said edges being transversely rounded, said pipe and said nipple each having a radial rib extending across the respective grooves, means for securing said clamp flanges together with said rounded edges of the wall portions extending into said grooves, and a sealing ring between said proximate ends and said clamp members, the axial distance between said first radial side walls of said pipe and nipple grooves when in assembled position being less than the distance between the wall portion plane surfaces adjacent said first side walls and the axial distance between said second radial side walls of said pipe and nipple grooves being greater than the axial length of said clamp, said sealing ring extending axially between said radial walls in sealing relation between said clamp wall portions and said pipe and nipple whereby under normal conditions fluid pressure within said structure expands the sealing ring axially against the clamp wall portions and maintains the separation of said proximate ends, and upon the application of large axial forces in the stuffing box, the opposing ends of the nipple and pipe move into abutting relation while the groove radial walls remain spaced from the clamp wall portions and whereby the ribs resist relative rotation of the clamp, the pipe and the nipple.

3. In a stuffing box structure including a stuffing box body adapted for passage of a reciprocating rod therethrough, an aligner comprising a nipple having one end adapted to be attached to a tubing of a well head, a pipe on said stuffing box body, the opposite end of said nipple being adjacent the end of said pipe and being in substantially axial alignment therewith for passage of said rod therethrough, said nipple and said pipe each having substantially the same outside diameter at their adjacent end portions and having a groove extending circumferentially in the outside surface thereof, each of said grooves having a first radial side wall adjacent the proximate ends of the nipple and the pipe and a second radial side wall remote from said proximate ends and a cylindrical bottom surface extending between said side walls, a pair of semi-cylindrical clamp members, each of said members having radial flanges along adjacent axial edges thereof, said clamp members having wall portions along opposite ends thereof, each of said wall portions having opposite plane surfaces extending radially into the grooves, each

of said plane surfaces having a radial height substantially greater than the depth of the groove, said wall portions terminating in a circular edge of substantially the same diameter as said bottom surfaces of said grooves, said edges being transversely rounded, said proximate ends of the pipe and nipple having opposing radial abutments thereon, means for securing said clamp flanges together with said rounded edges of the wall portions extending into said grooves, and a sealing ring between said proximate ends and said clamp members, the axial distance between said first radial side walls of said pipe and nipple grooves when in assembled position being less than the distance between the wall portion plane surfaces adjacent said first side walls and the axial distance between said second radial side walls of said pipe and nipple grooves being greater than the axial length of said clamp, said sealing ring extending axially between said radial walls in sealing relation between said clamp wall portions and said pipe and nipple whereby under normal conditions fluid pressure within said structure expands the sealing ring axially against the clamp wall portions and maintains the separation of said proximate ends, and upon the application of large axial forces in the stuffing box, the opposing ends of the nipple and pipe move into abutting relation while the groove radial walls remain spaced from the clamp wall portions and whereby the abutments resist relative rotation of the pipe and the nipple.

4. In a stuffing box structure including a stuffing box body adapted for passage of a reciprocating rod therethrough, an aligner comprising a nipple having one end adapted to be attached to a tubing of a well head, a pipe on said stuffing box body, the opposite end of said nipple being adjacent the end of said pipe and being in substantially axial alignment therewith for passage of said rod therethrough, said nipple and said pipe each having substantially the same outside diameter at their adjacent end portions and having a groove extending circumferentially in the outside surface thereof, each of said grooves having a first radial side wall adjacent the proximate ends of the nipple and the pipe and a second radial side wall remote from said proximate ends and a cylindrical bottom surface extending between said side walls, a pair of semi-cylindrical clamp members, each of said members having radial flanges along adjacent axial edges thereof, said clamp members having wall portions along opposite ends thereof, each of said wall portions having opposite plane surfaces extending radially into the grooves, each of said

plane surfaces having a radial height substantially greater than the depth of the groove, said wall portions terminating in a circular edge of substantially the same diameter as said bottom surfaces of said grooves, said edges being transversely rounded, said proximate ends of the pipe and nipple having opposing radial abutments thereon, means for securing said clamp flanges together with said rounded edges of the wall portions extending into said grooves, and a sealing ring between said proximate ends and said clamp members, the axial distance between said first radial side walls of said pipe and nipple grooves when in assembled position being less than the distance between the wall portion plane surfaces adjacent said first side walls and the axial distance between said second radial side walls of said pipe and nipple grooves being greater than the axial length of said clamp, said sealing ring extending axially between said radial walls in sealing relation between said clamp wall portions and said pipe and nipple whereby under normal conditions fluid pressure within said structure expands the sealing ring axially against the clamp wall portions and maintains the separation of said proximate ends, and upon the application of large axial forces in the stuffing box, the opposing ends of the nipple and pipe move into abutting relation while the groove radial walls remain spaced from the clamp wall portions, said pipe and said nipple each having a radial rib extending across the respective grooves.

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