Jan. 3, 1928.

1,655,159

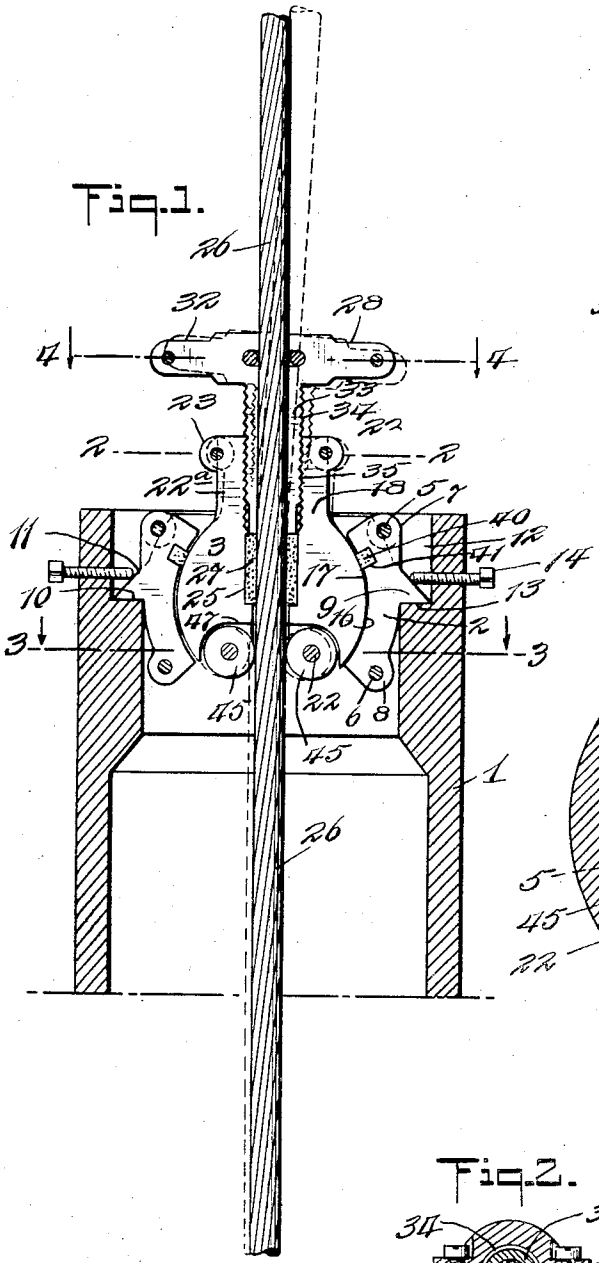
B. E. PARRISH

OIL SAVING AND LINE CLAMPING DEVICE

Filed July 18, 1924

2 Sheets-Sheet 1

Fig. 1.



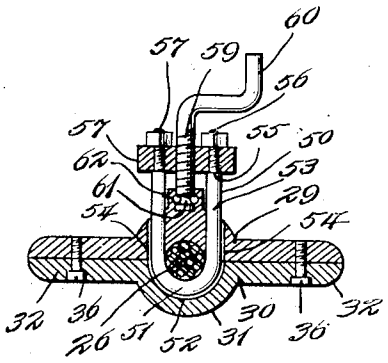


Fig. 4.

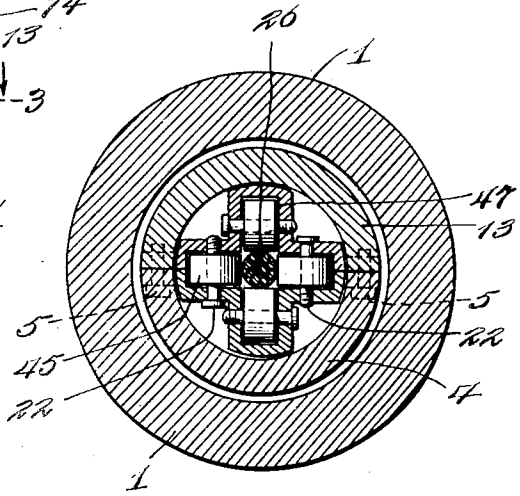
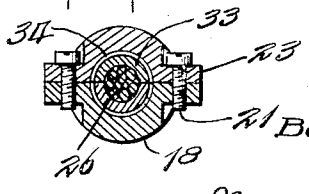


Fig. 3.

Fig. 2.



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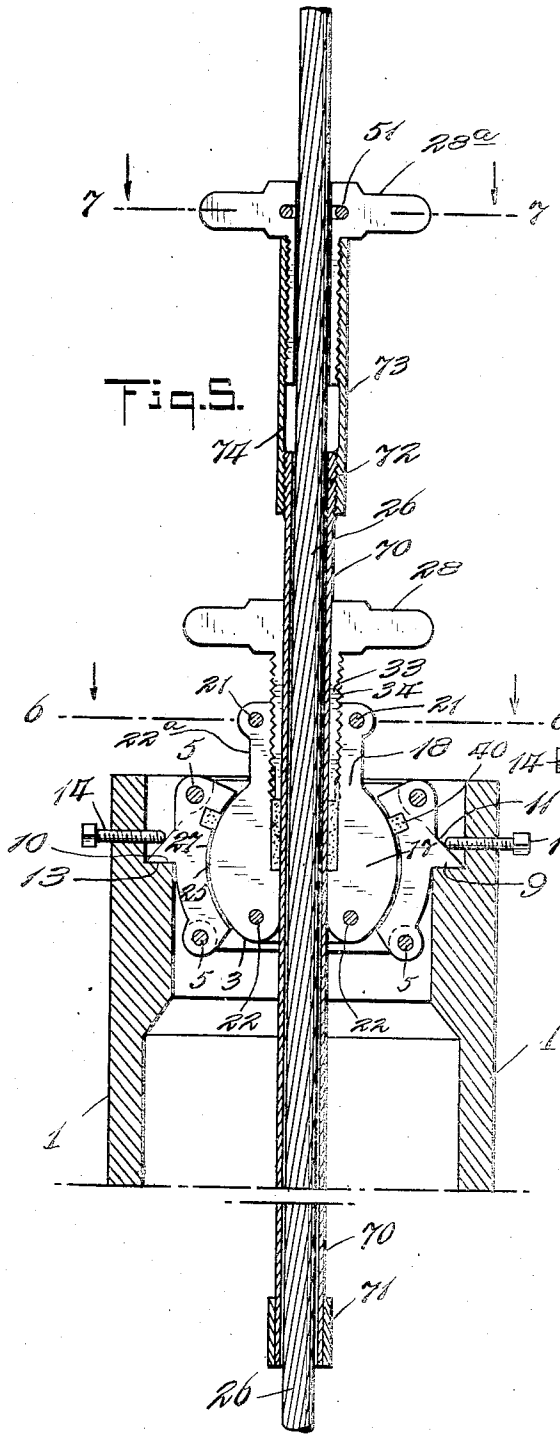


Fig. 5.

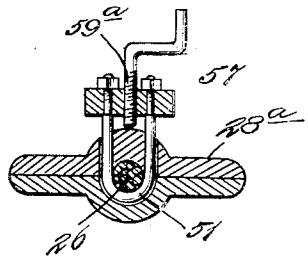


Fig. 2.

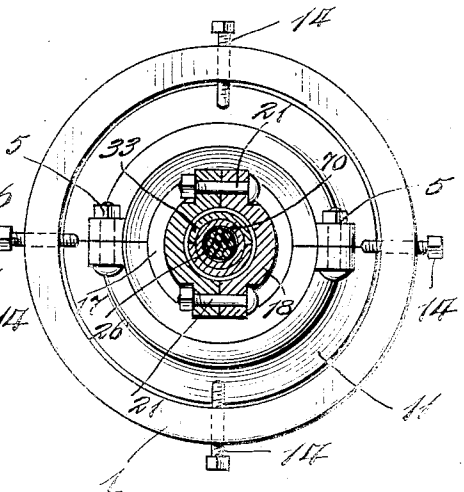


Fig. 6.

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UNITED STATES PATENT OFFICE.

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OIL-SAVING AND LINE-CLAMPING DEVICE.

Application filed July 18, 1924. Serial No. 726,746.

My invention relates to appliances useful in drilling oil wells, and other wells where conditions are similar, and more especially to devices commonly known in this art as oil saving and line clamping devices.

The general object of the invention is to provide an oil saver or appliance for the top of a casing head, which is easily applied and removed, which effectively closes the top of the casing head and prevents unexpected or premature egress of gas, oil or other liquids, which provides a suitable guide for the drilling line (rope or cable) and more especially provides a yielding or deflectable guide which accommodates itself to different angular positions of the drilling line, and also to provide an improved line clamp which in some cases is combined or incorporated with the oil saving appliance, but is also capable of use, or is capable of being designed or arranged for use, as a line clamp independent of the oil saver, and for instance, as a part of or in connection with a working barrel or similar device.

In drilling oil or gas wells, when no suitable closure is provided for the casing head, loss of valuable materials, such as oil or gas, frequently occurs before the well can be plugged or capped; and more particularly, property loss from fire and explosions, and injury or death of workmen, are frequently caused by the flow of gas or oil, which in the case of gas may cause partial or complete asphyxiation of workmen and in either case may cause fire or explosion through the burning of the oil or gas as it issues, or fire or explosion resulting from the oil running over the floor or ground in the neighborhood of the casing head and catching fire from the engine furnace, or from various other causes. In the case of oil, or water, when water is struck in the course of drilling, the uncontrolled flow of liquid will run over the derrick floor and frequently cause injury to workmen from slipping. Without a suitable casing head fitting, also, when a gas or oil pocket is struck the drilling tool will frequently be blown out of the hole and gas or oil that is prematurely struck or that flows in less than full production volume, will be wasted.

To avoid the above mentioned and other difficulties and dangers, sufficiently understood by persons skilled in this art, and to realize positive advantages sufficiently explained hereafter, my invention comprises, as briefly and generally described, a socket member arranged for ready attachment to and removal from the casing head, which is suitably formed or arranged to cooperate with the socket; and an "oil saver", "core", or closure member movably or deflectably located in the socket, the closure member being provided with a central bore or aperture to accommodate and guide the drilling line, and usually also being provided with a suitable stuffing box or packing about the line.

These combined devices, which may be collectively described as an "oil saver" or "casing head closure", properly center, direct or guide the drilling line, and permit its reciprocating movement in the drilling operations and also by reason of the movable or deflectable arrangement of the closure or core member, accommodate the different angular position of the line, due to the movements of the walking beam, with a minimum of friction or wear upon the line. At the same time the casing head is entirely or approximately sealed during drilling against egress of gas, oil or other liquids. Therefore workmen may comfortably work near the casing head, as well as anywhere about the derrick floor, without inconvenience or danger from gas, oil or other liquids; if a gas or oil pocket is prematurely struck during drilling, pressure is maintained in the casing above the tools, and there is no possibility of the tools being blown out, and moreover, gas or oil which may be prematurely struck in less than production quantities is confined and prevented from running about the derrick floor and becoming ignited from various causes, some of which are mentioned above, and these confined oils or gases may, moreover, be tapped off at a point below the top of the casing head and stored or used for incidental purposes, such as firing the boiler which supplies steam to the derrick engine; and when a production flow is encountered the pressure is similarly retained in the casing above the tools and loss of valuable oil or gas is prevented, and there is no trouble or danger connected with capping the well or providing for proper flow of the product to storage or pipe lines, as is experienced when the

well blows without any casing head closure and must be plugged or capped under difficult and dangerous conditions.

Various parts of the appliance, such as the socket and core, and usually also, the packing gland, are each made in separate parts or otherwise suitably arranged so that they may be easily and quickly located about the line, and put in proper position and removed without necessity for disconnecting the line from the walking beam, or from the tools.

The oil saving appliance and especially the core or closure member thereof, is also preferably designed or capable of being arranged for cooperation with a working barrel, that is to say, a tube or sleeve which may be located upon the drilling line and will take the friction and wear due to movement of the line in drilling; or the working barrel may be omitted and the line may be run directly through the core or closure member, with the provision of suitable packing as above stated, and desirably, in such cases suitable anti-friction devices are provided to guide and relieve the line of friction and wear.

Desirably, also, in many cases, an improved line clamping device is incorporated in or combined with the casing head closure, this device being operable easily and quickly to clamp or release the line, and providing for the convenient and advantageous control of the casing head closure or oil saver, and the tools, under various working conditions, sufficiently referred to hereafter.

The line clamp is also desirably arranged, or capable of being adapted for use, either in connection or combination with the oil saver or independently thereof, for example, it may be used in connection or combination with a working barrel or appurtenances thereof.

The characteristics and advantages of the invention are further sufficiently explained in connection with the following detail description of the accompanying drawings, which show certain representative embodiments of the invention. After considering these examples, persons skilled in the art will understand that many variations may be made within the principles of the invention, and I contemplate the employment of any structures that are properly within the scope of the appended claim.

Figure 1 is a vertical section through the upper end of a casing head and an oil saver or casing head closure, and line clamp, embodying the invention in one form.

Figure 2 is a section at 2—2, Figure 1.

Figure 3 is a section at 3—3, Figure 1.

Figure 4 is a section at 4—4, Figure 1, explanatory mainly of a two-part packing gland and a line clamp associated therewith.

Figure 5 is a vertical section showing the oil saver or casing head closure as arranged for use with a working barrel and showing also a line clamp associated or combined with the working barrel.

Figure 6 is a section at 6—6, Figure 5.

Figure 7 is a section at 7—7, Figure 5, illustrating mainly a simplified form of line clamp.

Referring first to the invention as shown in Figures 1 to 4, the upper end of a casing head 1 is formed to receive a suitable socket 2. This socket is preferably formed in at least two parts, such as the two similar or symmetrical halves 3 and 4, detachably connected by screws or bolts 5 and 6 passing through suitably formed holes in the socket members. In some cases these holes are formed in ears 7 and 8 arranged to properly accommodate the bolts 5 and 6 respectively. The socket members are provided with flanges 9 which have flat lower faces 10 and angular or beveled upper faces 11. When the socket members 3 and 4 are secured together, the flange members form a continuous circular flange having flat and beveled faces as stated. The formation of the upper interior end of the casing head is suitable for the accommodation of the composite socket and its flange; for example, the casing has a counter-bore 12 down to a flat horizontal seat 13, the counter-bore being large enough to accommodate flange 9 and the seat being designed for engagement by the flat lower flange surface 10. Any suitable means may be provided for securing the composite socket or its flange in the casing head, such means being sufficiently represented in the present instance by screws 14 passing through threaded holes in the casing head, and arranged so that their inner ends engage the beveled upper flange surface 11. By retracting screws 14 the socket and its associated parts may be easily moved up out of the casing head counter-bore and as easily reinserted with the flange in the position shown in Figure 1, and a tight connection and secure location of the socket and its associated members is then quickly obtained by turning in and tightening the screws 14, a completely or practically oil and gas tight joint being effected at the meeting surfaces 10 and 13.

The inner faces of the socket members 3 and 4 are hemispherically formed so that the combined members provide at their interior a spherical socket 16 accommodating a spherical portion 17 of the closure or core member proper, designated as a whole as 18. The member 18 is also preferably formed in two similar or symmetrical parts 19 and 20, and these parts are detachably secured together by screws or bolts 21 and 22 passing through suitable holes in the core members. The upper portion of the composite core 18 is desirably formed with a neck 22 of smaller diame-

ter than the ball portion 17, and ears 23 may be provided at the upper end of this neck to properly accommodate the bolt holes for screws or bolts 21. The members 19 and 20 of the core are provided on their inner faces with part-cylindrical recesses which form, when the members are secured together, a cylindrical longitudinal aperture or bore to accommodate the drilling line 26. An approximately central portion 25 of this bore or sleeve is of considerably larger diameter than the line and provides a stuffing box enclosing suitable packing 27 which is properly compressed to engage the line by any suitable gland, the particular form of gland employed in the present instance being designated as a whole as 28.

This gland, as best shown in Figure 4, is desirably formed in two similar or symmetrical parts 29 and 30. Each of these parts has at its upper end a hub member 31 from which extends at each side a handle member 32, and each gland member also has a sleeve portion 33, these formations of the individual members combining when the parts are put together about the line, to form a complete hub, two handles and a sleeve, also designated as 33, which is provided with an external screw thread 34 adapted to fit internal threads 35 formed in an upper portion of the cylindrical bore of the composite core 18. The end of the sleeve 33 engages the packing 27, and by turning the gland 28 by means of its handles 32, the packing can be properly compressed to form a practically or completely oil and gas tight seal fitting slidably about the line. In some cases the gland members 29 and 30 may merely be placed loosely together in proper positions and then inserted in the upper end of the core 18; otherwise, if desired, the members may be detachably connected as by screws 36.

Desirably, packing is placed between the core ball portion 17 and its socket. In the present embodiment of the invention this consists of a ring, or separate pieces, of suitable packing material 40, located in an annular recess 41 in the socket members 3 and 4, the packing being of such dimensions that it is substantially compressed and sufficiently packs the ball member 17, and substantially or completely prevents passage of gases or liquids between the ball and its socket.

Since the drilling tools are very heavy, it is desirable in many cases, and especially where, as shown in Figure 1, the line 26 runs through the core or closure member 18 without any interposed tube or working barrel, to provide means for reducing friction and wear between the line and the core bore. For this purpose therefore, in the present embodiment of the invention, anti-friction rollers 45 are provided. Two of the rollers are journaled on bolts or screws 22 previously mentioned, and the other pair of rollers may be journaled on pins 46 which may be in fact bolts or screws, inserted in suitable members 47 of the lower portion of the core members 19 and 20. The inner peripheries of the rollers are arranged to bear against the drilling line, and the aperture in the combined core members just above the rollers, as as 47, Figure 1, may be of slightly greater diameter than that of the line, to provide running clearance, and the movement of the line through the core member is thus taken care of by rollers 45 and by the bore in sleeve 33 of the composite packing gland.

The complete appliance as described may be put in position about the line at any convenient time, whether the line is in the well or not. The separate members of the core 18 are first placed about the line after suitable packing 27 is wound or otherwise placed about the line, and when the packing is properly located in the proper space in the two core members, the latter are secured together by screws 21 and 22, two of the rollers 45 being properly located on screws 22 in the assembling operation. The gland members are then placed about the line and secured together with screws 36, or if it is not desired to secure them together, they are merely properly positioned and the threaded end of sleeve 33 is inserted in the upper end of the bore formed in the composite core, and the gland is screwed in by means of its handles 32 until the packing is properly tightened about the line. The socket members 3 and 4 are then properly positioned about the core ball portion 17, suitable packing 40 having been previously inserted in socket channel 41, and the socket members are secured together by screws 5 and 6. The entire appliance is then moved down into counterbore 12 of the casing head until the flat under face of flange 9 rests on the flat seat 13, and the casing is then secured in position by set screws 14 as previously explained. The device may be removed in an obvious way, substantially by reversal of the described operations.

The oil saving appliance provides a substantially or completely oil and gas tight closure for the casing head during drilling operations, to avoid the difficulties and disadvantages of previous operating conditions, and to realize the positive advantages sufficiently referred to above. As the line 26 is reciprocated it slides through the bore in gland sleeve 33 and in core 18 with little or no friction on account of the anti-friction rolls 45 and the long bearing for the line provided in the bore or sleeve 33. In the different positions of the walking beam, the line above the casing head assumes different angular positions, one of which is sufficiently indicated by dotted lines in Figure 1. This deflection of the line is readily permitted by movement of the ball member 17 of core 18 in its socket, and this flexible or deflectable

mounting of the core and other parts which enclose or guide the line materially reduces the strain and friction on the line, and correspondingly reduces wear. There is no sharp deflection of the line, but deflection is substantially controlled by the rollers 45, that is to say, the principal line deflection occurs at the rollers where friction is practically eliminated and the line is smoothly guided in its vertical movement under all conditions.

To facilitate various operations, such as the proper manipulation of the closure appliance as a whole or of the drilling tools, and for other purposes, it is desirable in many cases to provide in connection or combination with the oil saving appliance as described, a line grip or clamp. Such a line grip in the present embodiment of the invention is constructed and arranged as follows: A clamp 50, which conveniently may be substantially in the form of a U-bolt, is associated with the packing gland at the upper end thereof. The bent or semicircular portion 51 of the clamping member, which constitutes the clamp proper, partly encircles the drilling line 26 and is accommodated in a recess 52 formed in hub portion 30 of one of the gland members. The parallel arm or bolt members 53 of the clamp extend through suitable holes 54 in hub portion of the other gland member. The bolt members 53 are provided with shoulders 55, and the threaded bolt ends 56 pass through suitable apertures in a cross-piece 57, which rests on the shoulders and is secured by nuts 58. An operating screw 59 passes through a threaded hole in the center of the cross-piece, and desirably the screw has a cranked end. or handle, 60, for its convenient rotation. The inner end of the screw may simply bear against the hub portions of the adjacent gland member, or preferably, as shown, the screw has an annular channel 61 near its inner end and one or more pins or other suitable retaining devices 62 engage this channel and substantially prevent end movement of the screw.

To clamp the line to the gland members and therefore operatively to the entire oil saving or casing head closure device, the cranked handle 60 of screw 59 is rotated in one direction to cause the line 26 to be clamped by clamp member 51 against the opposite packing gland member; and the clamp may be positively released by turning the handle 60 in the opposite direction, which causes the clamping member 51 to be pushed outward into its socket 62, clear of the line.

The above described or other suitable clamping device is useful for many purposes, such as the following: When there is any substantial pressure within the casing which might cause the oil saving device to be blown upward on the line as soon as the screws 14 are retracted, this may be prevented by first tightening the clamp and slacking the upper part of the line slightly, whereupon the weight of the tools is supported by the part of the line within the well, which "hangs" on the oil saving device. This weight is sufficient to retain the entire oil saving appliance in position while screws 14 are retracted, and the appliance as a whole may then be lifted away from the casing head by raising the line and tools, and the appliance may then be conveniently removed from the line and the tools hoisted out of the well in the usual way. Reversal of this procedure provides for the convenient location of the complete appliance in the casing head, whereupon, after the screws 14 are tightened, clamp 51 may be loosened and drilling may then proceed as usual. Other methods of manipulating the clamp for various purposes incidental to drilling operations, will be understood by persons skilled in the art without further detailed explanation.

The provision of a clamp such as that described in connection with the oil saving appliance, eliminates the necessity for any separate clamp placed on the line above the casing head or oil saver, and also eliminates the use of various tools, or the necessity for various difficult operations under annoying or dangerous conditions, which have previously been required in manipulating casing head closures, and in general, the clamping device materially simplifies operations, and reduces risk to workmen and danger of explosions.

In the modification of the invention shown in Figures 5, 6 and 7, the oil saving appliance is adapted to or combined with a working barrel located on the line, and the line clamp is combined or associated with the working barrel or an appurtenance thereof instead of being combined or associated with the oil saver proper. The line 26 passes through a working barrel 70, which is a metal tube of diameter slightly larger than the line and of sufficient length to give the proper working stroke. A collar 71 may be formed or secured on the lower end of the barrel to prevent inadvertent lifting of the barrel out of the oil saver. The oil saver may be substantially as in the previous example, the bore in the core member and in the composite gland being arranged for sliding engagement with the working barrel instead of directly with the line. In this case, however, the anti-friction rollers 45 may be omitted and screws 22, which in the previous example, served as journals for two of the rollers, simply serve to hold the lower ends of the composite core 18 together. The upper end of barrel 70 has an external screw thread 72, and on this is screwed a tube 73 of larger diameter to provide a packing chamber 74,

in which any suitable packing is placed to form a seal between the barrel and the line. A composite packing gland 28ª, which may be of substantially the same construction as the packing gland 28, employed in connection with the oil saver, is screwed into the upper end of sleeve 73 to properly compress the packing. A line clamp 51 substantially similar to the clamp previously described, is associated in this instance with the composite gland 28ª and therefore is associated or combined with the working barrel instead of with the oil saver proper. Figure 7 shows the clamp in sectional detail and also explains a simplification in construction, in accordance with which the screw 59ª is arranged so that its end simply bears against the hub of the adjacent gland member. The clamp is tightened in an obvious way and may be loosened after the screw is retracted by merely tapping the screw or cross-piece 57. The oil saving appliance in this case cooperates with the line in substantially the same way as in the previous example, except that the working barrel is interposed between the line and the oil saver, and takes the wear instead of the line. Angular deflection of the working barrel is accommodated by movement of the ball member 17 in its socket in substantially the same way. Clamp 51 is, of course, tightened to secure the working barrel to the line and may be loosened at any time to permit the line to be drawn through the working barrel, and, in effect, through the oil saving appliance, after which the clamp may be again tightened. Other manipulation of the clamp for the proper placement or removal of the oil saving appliance will be sufficiently understood by skilled persons without detail description.

I claim:

An oil saving appliance or casing head closure, comprising a two-part spherical socket arranged to be detachably secured to a casing head, a two-part guide and closure member having a ball-shaped portion movably fitting in the spherical formation of the socket and provided with an axial aperture for the drilling line, packing in the aperture and means for compressing the packing about the line, and anti-friction rollers revolubly mounted in the lower portion of the guide member arranged to engage and direct the line as it passes from the guide member downward into the casing.

Signed at American consulate, Tampico, Mexico, this third day of July, A. D. 1924.

BENJAMIN E. PARRISH.