

M. E. LAYNE, S. N. HALL & C. F. LAYNE.

HYDRAULIC SWIVEL.

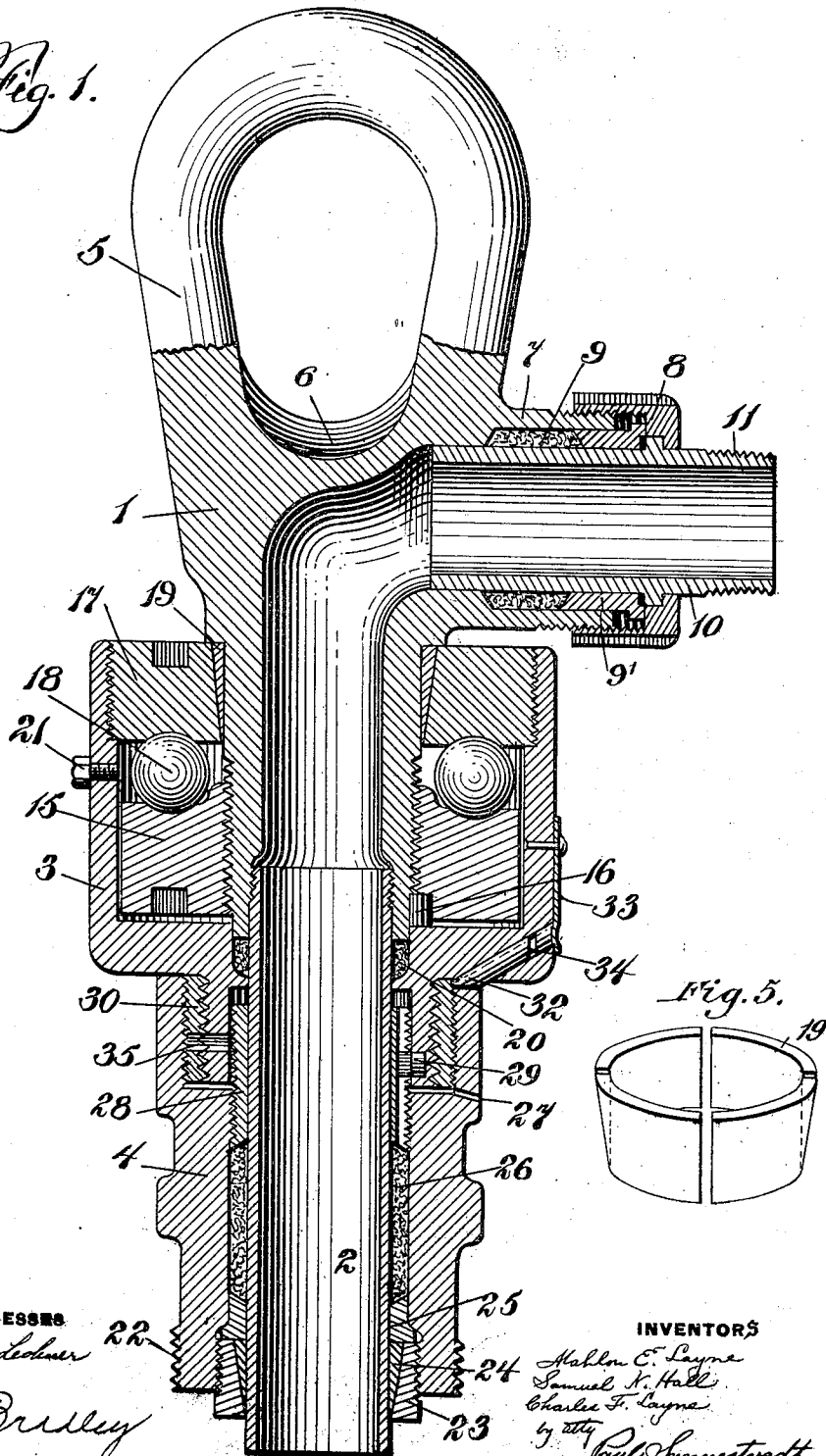
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Patented May 16, 1911.

2 SHEETS-SHEET 1.

Fig. 1.



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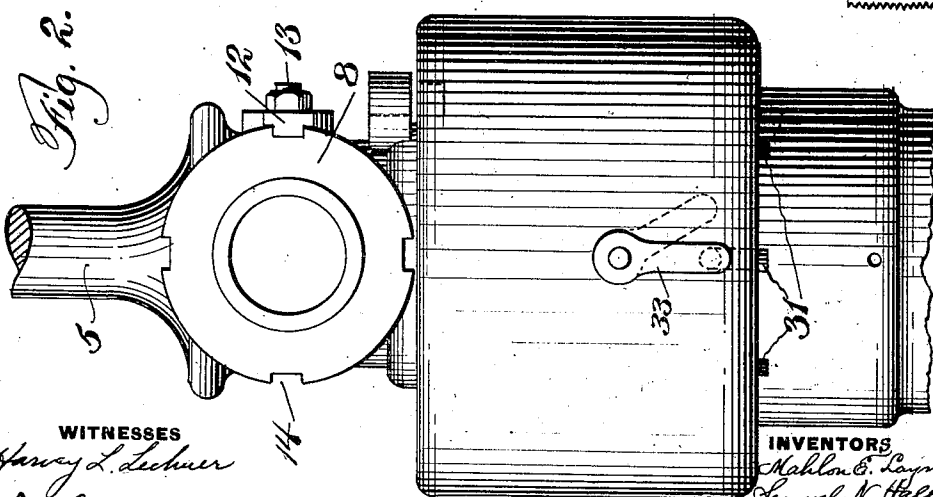
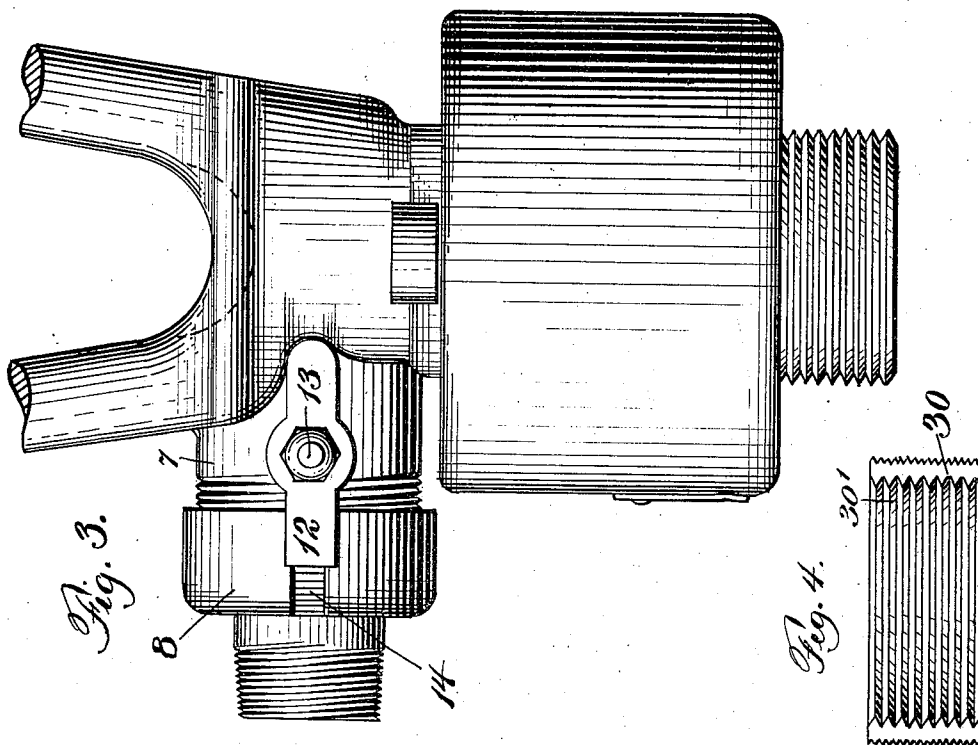
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UNITED STATES PATENT OFFICE.

MAHLON E. LAYNE, SAMUEL N. HALL, AND CHARLES F. LAYNE, OF HOUSTON, TEXAS.

HYDRAULIC SWIVEL.

992,363.

Specification of Letters Patent.

Patented May 16, 1911.

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To all whom it may concern:

Be it known that we, MAHLON E. LAYNE, SAMUEL N. HALL, and CHARLES F. LAYNE, citizens of the United States, residing at Houston, in the county of Harris and State of Texas, have invented certain new and useful Improvements in Hydraulic Swivels, of which the following is a specification.

The invention relates to swivels for use with well apparatus, and has for its main objects; the provision of a novel swivel construction of more compact form than those heretofore employed and one in which the cost of construction and weight of metal are reduced to a minimum; the provision of a swivel having improved means for protecting and lubricating the bearings; the provision of improved and conveniently arranged adjusting means for the packing between the swivel members; the provision of an improved form of self adjusting bearing bushings between the swivel members; the provision of a form of coupling means for the attachment of the hose whereby wear and twisting of the hose is avoided; and the provision of attaching means for the upper swivel member designed to prevent accidental disarrangements between such means and the means from which it depends. One embodiment of the invention is illustrated in the accompanying drawings, wherein:—

Figure 1 is a longitudinal section through the swivel,

Figure 2 is a partial side elevation of the swivel,

Figure 3 is a partial side elevation of the swivel taken at right angles to the elevation of Figure 2,

Figure 4 is a detail side elevation of one half of the swivel bushing employed, and

Figure 5 is a detail view of one of the divided bushings employed.

Referring to the drawings and particularly to Fig. 1, the supporting swivel member comprises the upper member 1 with the pipe 2 screw threaded to its lower end, and the lower swivel member comprises the upper section 3 and the lower section 4, which latter section is adjustably mounted upon the upper section in a manner to be hereinafter described. The member 1 is provided at its upper end with the engaging loop 5

for cooperating with the usual supporting hook, and in order to prevent the disengagement of the hook and loop during the vertical vibration of these parts, the recess 6 is provided, which recess 6 is adapted to receive the lower end of the hook and so prevent a lateral movement thereof tending to disengage the parts. The member 1 is provided at its central portion with a laterally projecting neck 7, upon which is screw threaded the member 8 for adjusting the gland 9 against the packing 9. In the stuffing box thus formed is mounted the coupling member 10, which coupling member is adapted to turn freely and is provided with the screw threaded end 11 for engagement with a hose coupling. This arrangement permits the hose to swing backward and forward in the operation of the device without any twisting of the material of the hose as has heretofore been the case wherein a non-rotatable coupling was used, and furthermore permits any twists in the hose to be easily removed. This arrangement greatly lengthens the life of the hose used in this type of apparatus, as the constant bending of the hose due to the vibration of the apparatus cracks and weakens the material of the hose causing it to leak after a limited period of use. The member 8 is held in adjusted position by means of the dog 12 shown most clearly in Figs. 2 and 3, which dog is mounted upon a bolt 13 and is adapted to engage the slots 14 in the member 8 at its outer end, while its inner end is intumed and engages a recess in the member 1. The lower end of the member 1 constitutes a shank and is screw threaded for engagement with the bearing collar 15, which bearing collar is held from rotation after positioning by means of a pin 16. The section 3 also carries at its upper edge a bearing collar 17, and a series of anti-friction balls 18 are interposed between the two bearing collars. A tapering bushing 19 is interposed between the inner surface of the collar 17 and the shank of the member 1. In order that this bushing may be self adjusting it is made in sections, and as these sections wear they work downward thus preventing any play between the collar 17 and the shank of the member 1 and holding such parts firmly in concentric position.

The packing 20 is interposed between the section 3 and the pipe 2 at a point beneath the bearing collar 15, which arrangement makes the cavity carrying the thrust bearing tight, so that such bearing may be flooded with oil and run an indefinite period without further attention. Oil may be placed in the bearing cavity through the opening which is closed by the bolt 21 (Figure 1).

The lower end of the swivel section 4 is screw threaded at 22, and it is from this portion of the device that the tubular drill casing is supported. A bearing for the lower end of this swivel member 4 upon the pipe 2 is provided by means of the ring 23 which carries at its inner surface a split tapering bushing 24 corresponding to the bushing 19 heretofore described. Immediately above this ring 23 and the bushing 24 is the annular member 25 for supporting the lower end of the packing 26, which packing 26 is designed to prevent the passage upward from the lower end of the swivel of water, which might otherwise be forced upward sufficiently to obtain access to the thrust bearing cavity. In order to still further safe-guard against this contingency, however, a vent 27 is provided to permit the outflow of any water which should be accidentally forced up past the packing 26. As there is still another packing 20 above this vent 27, there is very slight possibility of any fluid ever gaining access to the thrust bearing cavity. In order to tighten the packing the gland 28 is provided, which gland is screw threaded to the section 4 and is prevented from rotary movement with such section 4 by means of the pin 29 secured to the lower end of the section 3, and engaging a longitudinal slot in the gland. The section 3 is swiveled to the section 4 by means of the two part bushing 30 shown in detail in Figure 4. The interior of this two part bushing is provided with parallel V ridges 30', which ridges engage corresponding V grooves on the periphery of the lower end of the section 3. The outer surface of this divided bushing 30 is provided with screw threads for cooperating with corresponding threads on the interior surface of the upper end of the section 4. When the parts are in the position shown in Figure 1, a rotation of the section 4 will carry with it the two part bushing 30, and as the gland 28 is held against rotary movement it will be moved up and down depending upon the direction of rotation of the section 4. The upper edge of the section 4 is provided at intervals with the slots 31 (Figure 2), and the engagement of the pin 32 (Figure 1) with any one of these slots will hold the section 4 and consequently the gland 28 in adjusted position. The pin 32 is normally held in the position shown in Figure 1 by means of the swinging spring holder 33, which when moved to the position shown in dotted lines in Figure 2 permits of the retraction of the pin to permit a rotation of the section 4. If desired the pin 32 may be held in partially retracted position by causing the edge of the member 33 to engage with the slot 34 near the head of the pin. It will be seen from the foregoing that the packing 26 may be very easily and conveniently tightened or adjusted by merely rotating the lower swivel section 4. The two part bushing 30 makes a very convenient means for swiveling the lower section 4 to the upper section 3, but it will be apparent that other swiveling means might easily be employed without avoiding the invention, it being only necessary that the part 4 be swivelly mounted upon the part 3. The parts 3, 4 and 30 are preferably assembled before the pipe 2 or the gland 28 are placed in position, in order to prevent the two part bushing 30 from rotating while the section 4 is being screwed thereupon, a pair of alined openings 35 are provided in the bushing 30 and lower end of the section 3, in which a pin may be inserted until the member 4 is screwed up into the position shown in Figure 1, at which time the pin is removed and the pipe 2 and the gland 28 are placed in position.

It will be seen from the foregoing that a very compact arrangement of parts is secured, which compact arrangement is due primarily to the use of the shank of the member 1 as a support for the bearing collar 15, so that the center line of the bearing balls 18 are placed at a minimum distance from the axis of the swivel, and the cumbersome bails as heretofore employed in this class of devices, are done away with. A minimum amount of metal may thus be used, the old type of construction greatly simplified and stiffened, and the expense of machine work reduced, as all the machined surfaces are circular and may be handled by a lathe. The arrangement further provides for the perfect lubrication of the thrust bearing and the protection of such bearing from any fluid passing through the pipe and from all dust and dirt. The foregoing and other advantages which will be readily apparent to those skilled in the art are incident to the construction as illustrated and described.

Having thus described our invention and illustrated its use, what we claim as new and desire to secure by Letters Patent is the following:—

1. In combination in a hydraulic swivel, a hollow inner supporting member 1, a bearing collar 15 removably secured thereon, an outer hollow supported member 4 provided at its upper end with a casing 3 open at its upper end, a bearing collar 17 removably secured in the upper end of the casing 3 in opposition to the collar 15, and packing means below the collar 15 for preventing ac-

cess of fluid in the swivel to the bearing collars.

2. In combination in a hydraulic swivel, a hollow inner supporting member 1, a bearing collar 15 screw threaded thereon, an outer hollow supported member 4 provided at its upper end with a casing 3 open at its upper end, a bearing collar 17 removably screw threaded into the upper end of the casing 3 in opposition to the collar 15, and packing means below the collar 15 for preventing access of fluid in the swivel to the bearing collars.

3. In combination in a hydraulic swivel, a hollow inner supporting member 1, a bearing collar 15 removably secured thereon, an outer hollow supported member 4 provided at its upper end with a casing 3, a bearing collar 17 removably secured in the upper end of the casing 3 in opposition to the collar 15, a tube 2 secured detachably to the lower end of the member 1, and packing means between the outer supported member and the tube 2.

4. In a hydraulic swivel, the combination with a pair of swivel members one of which is mounted to rotate in the other member, of bearing means between the relatively movable vertical surfaces comprising a split downwardly tapering bushing.

5. In a hydraulic swivel, the combination with a pair of swivel members one of which is mounted to rotate in the other member, of bearing means between the relatively movable vertical surfaces comprising a plurality of sets of split downwardly tapering bushings.

6. The combination in a hydraulic swivel, of a supporting swivel member having a hollow shank provided with a bearing collar, a supported swivel member inclosing the shank and bearing collar and provided with a second bearing collar lying above the first bearing collar, packing between the swivel members below the bearing collars, and an outlet vent above the packing for permitting the discharge of any fluid forced upwardly past such packing.

7. The combination in a hydraulic swivel, of a supporting swivel member having a hollow shank provided with a bearing collar, a supported swivel member inclosing the shank and bearing collar and provided with a second bearing collar lying above the first bearing collar, a packing between the swivel members beneath the second bearing collar, a second packing spaced below the first packing and a vent between the two packings for permitting the discharge of any fluid forced upwardly past the lower packing.

8. In combination in a hydraulic swivel, an upper swivel member provided with an engaging means and a shank, a lower bearing block secured to the exterior of the

shank, a downwardly extending tube secured to the interior of the shank, an upper bearing block, a lower swivel member secured thereto, and packing interposed between the tube and the lower swivel member. 70

9. In a hydraulic swivel, an upper swivel member provided with an engaging loop and a recess at the lower extremity of the loop adapted to receive the end of the member from which the loop is suspended to prevent a disengagement thereof from the loop. 75

10. The combination in a hydraulic swivel, of an inner swivel member, an outer swivel member in two sections swiveled together and telescoping over the inner swivel member, packing between one of the said sections and the inner swivel member, and an adjusting ring for the packing screw threaded to the last mentioned section and having tongue and groove engagement with the other swivel section. 85

11. The combination in a hydraulic swivel, of an inner swivel member, an outer swivel member in two sections swiveled together and telescoping over the inner swivel member, packing between one of the said sections and the inner swivel member, an adjusting ring for the packing screw threaded to the last mentioned section and having tongue and groove engagement with the other swivel section, and engaging means for holding the sections in any desired relative rotative position. 95

12. The combination in a hydraulic swivel, of an inner swivel member, an upper outer swivel section, a lower outer swivel section, a split bushing swiveled on its interior to the lower end of the upper section and screw threaded upon its exterior to the upper end of the lower section, packing between the lower section and the inner swivel member, and an adjusting ring for the packing screw threaded to the lower section and having tongue and groove engagement with the upper swivel section. 100 105 110

13. The combination in a hydraulic swivel, of an inner swivel member, an upper outer swivel section, a lower outer swivel section, a split bushing swiveled on its interior to the lower end of the upper section and screw threaded upon its exterior to the upper end of the lower section, packing between the lower section and the inner swivel member, an adjusting ring for the packing screw threaded to the lower section and having tongue and groove engagement with the upper swivel section and engaging means for holding the lower section in any adjusted position. 115 120

14. In combination in a hydraulic swivel, a hollow inner supporting member 1, a bearing collar 15 detachably secured thereto, an outer hollow supporting member 4 provided at its upper end with a casing 3 surrounding the collar 15, a bearing collar 17 closing 125 130

the said casing and opposing the collar 15, antifriction means between the two collars, a packing tube 2 telescoping the member 4 and detachably secured to the member 1,
5 packing between the tube 2 and member 4, and means whereby the packing may be adjusted.

In testimony whereof we have hereunto

signed our names in the presence of the two subscribed witnesses.

MAHLON E. LAYNE.
SAMUEL N. HALL.
CHARLES F. LAYNE.

Witnesses:

C. D. WOODBURN,
R. E. GARRETT.