April 12, 1932. F. J. RUOT 1,853,180

SWIVEL

Filed Feb. 26, 1930

Fig. 1

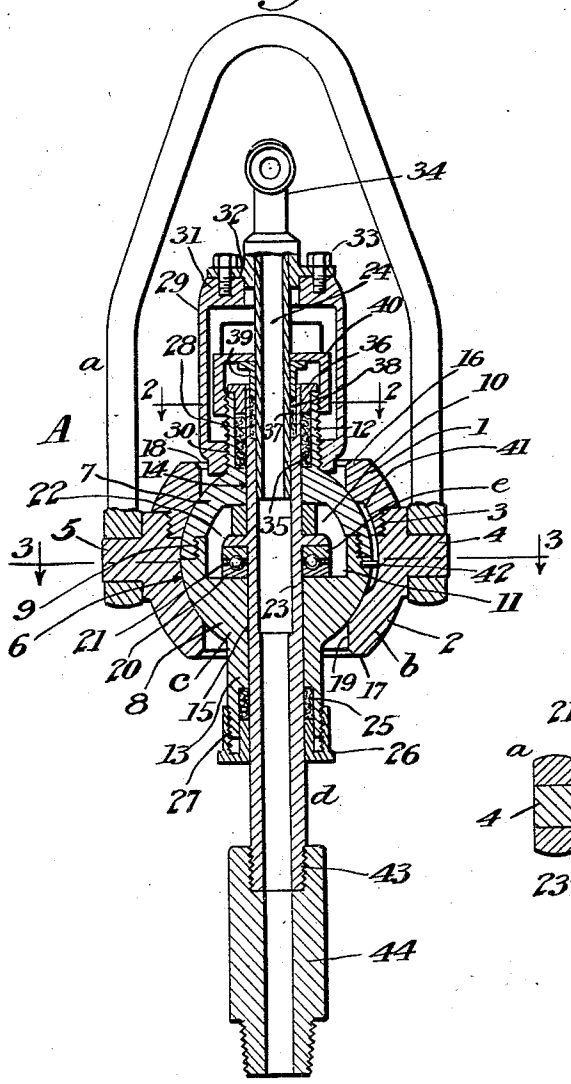


Fig. 2

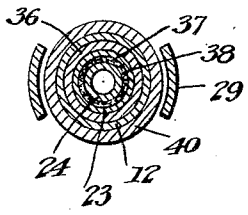
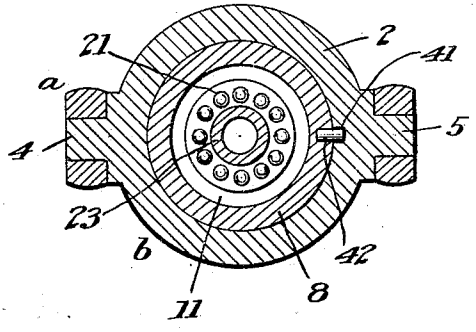


Fig. 3



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UNITED STATES PATENT OFFICE

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SWIVEL

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This invention relates to well drilling tools, and particularly to improvements in rotary swivels.

The invention has for an object the provision of a rotary swivel adapted to relieve strain from the swivel bearings.

At the present time, rotary swivels are utilized as the medium through which mud-laden fluid is pumped into drill tubing where the rotary system of drilling is utilized. Quite often, this drill tubing is of considerable length and if the tubing does not go straight downwardly within the hole from the said swivel, the swivel is twisted or a torsion is set up therein.

An object of the present invention is to relieve all strain from the bearings of the swivel, and likewise to provide a swivel adapted to equally distribute the weight of the drill tubing relative to the swivel.

Another object is the provision of a swivel which is self-centering in that the portions of the swivel which permit drill tubing to rotate is always in the plane of the drill tubing.

At the present time, it is not always possible in a large derrick to exactly center the swivel carrying the tubing directly over the well hole and strains are induced in said swivel first to one side and then the other, which is highly detrimental to the working parts of the swivel and of necessity shorten its life.

The present invention has been devised for the purpose of overcoming certain existing faults in swivels now on the market and yet to provide a swivel which is relatively inexpensive of manufacture, does not require special dies or machinery for its construction and which can compete in the market with inferior swivels and at the same or slightly under the price of such inferior products.

The swivel offers long life, durability, general all around efficiency and serviceability and is superior to many of the present swivels.

Objects other than stated above will be detailed as the specification proceeds, and with the above mentioned and other objects in view, the invention consists in the novel and useful provision, formation, construction, association, and relative arrangement of parts, members and features, all as shown in a certain embodiment in the accompanying drawings, described generally, and more particularly pointed out in the claims.

In the drawings:

Figure 1 is a vertical sectional elevation of the improved rotary swivel,

Figure 2 is a sectional view on the line 2—2 of Figure 1, and,

Figure 3 is a cross sectional view on the line 3—3 of Figure 1.

Referring to the drawings, the improved swivel is designated as an entirety by A and the same includes among its elements a bail *a* adapted to be associated with a housing *b*, a body *c* and a plurality of associated tubes *d* through which water or mud-laden fluid is adapted to be directed, and bearing means *e* whereby certain of the tubes *d* may rotate relative to the body, all of which elements may be utilized in practicing an embodiment of the invention.

The housing *b* is formed in two parts 1 and 2, the said parts being secured together in any ordinary manner, such as by providing threads for cooperative engagement between the parts, as shown at 3. The part 2 is provided with diametrically disposed trunnions 4 and 5, to which trunnions are secured the usual bail *a*. This housing is provided with a curved socket portion 6 within which socket portion is adapted to be confined an element of the body *c*. This element is composed of two parts 7 and 8, which may be secured together in any ordinary manner, such as by providing the parts with cooperative screw-threads 9. A portion of the periphery of the parts 7 and 8 is curved to conform with the curvature of the socket 6 of the housing. Both portions 7 and 8 are internally recessed or hollowed, as shown at 10 and 11. Both parts are provided with an annular extension, as shown at 12 and 13, and when the two parts are cooperating, as shown in Figure 1, these extensions are in alignment or diametrically opposite. In this connection, the parts 7 and 8 are provided with bores 14 and 15, these bores being in axial

alignment and likewise in alignment with the extensions 12 and 13. It will thus be seen that this construction provides a ball and socket joint and that the parts 1 and 2 of the housing do not form complete circles but that opposite segmental portions have been removed therefrom, thus providing plane surfaces 16 and 17. Furthermore, the openings as shown at 18 and 19 communicate with the socket portion of the housing and are of greater diameter than the diameter of the extensions 12 and 13. This, of course, allows for a given movement of the ball within the socket. Within the chamber portion of the part 8 of the housing is a ball race member 20 and bearing members 21 are received within said race. A further ball race 22 is adapted to cooperate with the race 20 in such a manner as to hold the bearings therebetween. There are two water tubes *d*, as shown at 23 and 24, and the ball race member 22 is secured to the tube 23. This tube 23 extends through the bores 14 and 15 and likewise through and beyond the members 12 and 13. The fit of this tube within the bores 14 and 15 may or may not be a close fit, it being the intention that the tube 23 should revolve and be guided more or less by the body *c*. Obviously, the weight of the tube and any part associated therewith is carried by the race member 22 which, in turn, contacts with the bearings 21, the bearings in turn communicating their weight to the race member 20 and to the body. The extension 13 may be internally recessed or enlarged as to internal diameter at the zone 25 and packing may be placed therein. A lock nut 26 may be screw-threaded at 27 to the extension and bear against the packing. The part 12 is externally screw-threaded at 28, and a cage 29 provided at one end with a screw-threaded portion 30, is secured to the threads 28. This cage is formed with an inwardly directed flange 31 to which is secured a clamping ring 32. This clamping ring may be provided with a plurality of transverse bores through which are passed headed bolts 33 adapted for screw-threaded engagement with the flange. The tube 24 is secured to the clamping ring and this tube 24 is telescopically received within the tube 23. This clamping ring likewise secures the goose neck 34, the goose neck being in communication with the tube 24. Adapted to be confined between the periphery of the tube 23 and the inner surface of the extension 12 is packing 35, this packing being maintained in position by a bushing 36. Likewise, packing 37 is placed between the periphery of the tube 24 and a portion of enlarged inner diameter 38 of the tube 23, and a packing nut or bushing 39 is adapted to bear against this packing 37. A cap nut 40 is adapted to have screw-threaded engagement with the threads 28 so that the bushings 36 and 39 may be held in work engagement with the packing. A portion of the inner surface of the housing is provided with a keyway 41 and a key or pin 42, secured to the part 8 of the body is received within said way. The lower end of the tube 23 may be screw-threaded, as shown at 43, for the purpose of securing a union or coupling 44, this coupling in turn being adapted to secure the pump tubing, not shown.

The operation, uses and advantages of the invention just described are as follows:

Quite obviously, a swivel is utilized for the purpose of permitting drill pipe to rotate without twisting the hose or other line communicating with the sump around the swivel. A well designed swivel will not bind and will have comparatively free action. However, it is not always possible to allow the swivel to hang in alinement with the pump tubing, with the result that a twist occurs. When this occurs, of course, the life of the swivel is immediately shortened, due to excessive wear of the parts. The present invention permits the swivel to accommodate itself to the end that there is no strain on the bearings and there is an equal distribution of the weight so far as the relationship between the housing and the body is concerned. The moving parts of this swivel, as is obvious, on inspection of the drawings are so related that sand, grit, or other deleterious substances cannot come in contact with the working parts. Assuming that the swivel is being used and that mud-laden fluid is being pumped through the goose neck into the tube 24 down through the tube 23, past the union or connection 44 and into the drill pipe or tubing, rotation of the tube 23 is permitted due to the fact that this tube is supported upon the bearings 21, and the extension plus the bores of the body, act to guide or hold this tubing in a given relation to the body. If any twist occurs, the body due to its ball like construction, may move within the socket of the housing. However, the body cannot rotate relative to the housing because of the keying therebetween. Deleterious substances cannot contact with the working parts due to the method of packing between the body and the tube 23 as well as the tube 24. The parts are readily accessible in that the housing may be readily disassembled, as may likewise the body, and the cage arrangement is such as to permit the cap nut 40 to be readily disengaged from the screw-threads of the extension 12 so that the glands or packing nuts may be removed. The cage may be disconnected from the extension 12 and upward pull upon the cage will remove the tube 24 from within the tube 23. It will thus be seen that all parts are readily accessible if for any reason it becomes necessary to either inspect or renew any working part. It is evident that the packing is arranged for ready accessibility so that packing may

be renewed at any time without unduly stopping operation of the rotary for a long period. It is evident that by providing this limited universal movement between the body and the housing that vibration which is ordinarily set up when the rotary is in operation will not contribute to rapid crystallization of the metal parts of the swivel which, of course, would occur if the parts were all rigidly connected.

It is evident from the specification that the body may be tilted in different planes relative to the housing. In other words, the body is permitted a gyratory movement within the socket of the housing. I might, of course, utilize some other means for permitting this gyratory movement but I have found the ball and socket to be very satisfactory in practice. I may provide lubricant openings whereby contact surfaces between the ball and socket may be lubricated.

It is obvious that various changes and modifications and variations may be made in practicing the invention in departure from the particular showing of the drawing without, however, departing from the true spirit of the invention.

I claim:

1. The combination in a rotary swivel for wells, of a housing, a bail secured thereto, said housing being formed with a curved socket and a body provided with a curved periphery confined within said socket, and fluid passage means carried by the body.

2. The combination in a rotary swivel for wells, of a housing formed with a curved socket, a body in part confined within said curved socket and adapted for gyratory movement therein, and a fluid passage tube rotatively secured to said body.

3. The combination in a rotary swivel for wells, of a tube through which fluid is adapted to be passed, a bail, and means of support between said bail and said tube, said means comprising a two-part housing, one part of which is swingingly secured to said bail, and a body within said housing, both parts of said housing being formed with a curved socket and both parts of said body being provided with a curved periphery; both parts of said body being internally recessed and means within the recess for rotatively securing the tube to the body; the said two-part housing and two-part body permitting ready assemblage and disassemblage of the parts of said rotary swivel.

4. The combination in a rotary swivel for wells, of a two-part body, the periphery of which is curved when the parts are in cooperation, both parts of said body being internally recessed, a tube adapted to be centrally passed through said body, and a bearing support within the recess of the body for said tube; a housing adapted to engage the curved periphery of both parts of said body, and a bail for said housing, whereby the body may have gyratory motion relative to the housing.

In testimony whereof, I have signed my name to this specification at Los Angeles, California, this 13th day of February, 1930.

FRANK J. RUOT.