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ALIGNMENT FITTING FOR WELL TUBING HEADS

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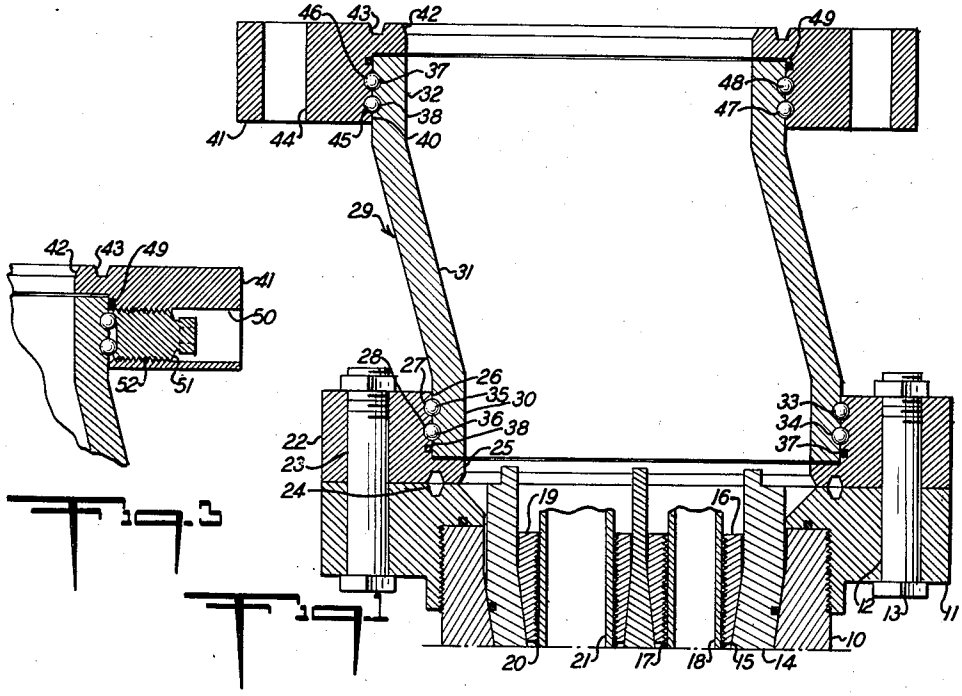



Fig. 3

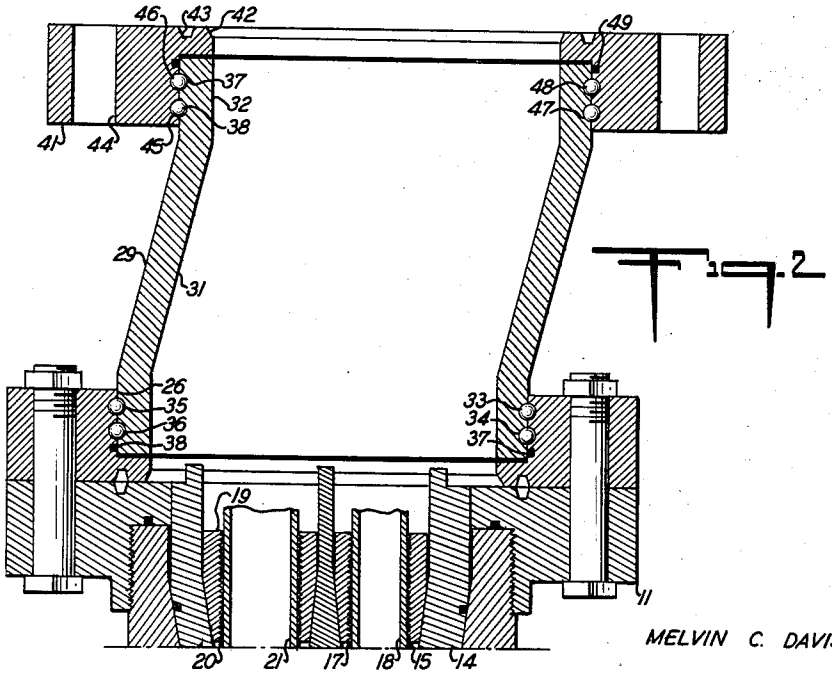



Fig. 2

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# ALIGNMENT FITTING FOR WELL TUBING HEADS

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1 Claim. (Cl. 166—75)

This invention relates to well equipment and more particularly to an alignment fitting for well tubing heads which may be utilized to locate a blowout preventer or other packing means in various offset positions above the well tubing.

As is well known, one or more strings of tubing are frequently disposed within a well tubing and frequently it is desired to introduce or remove such tubing strings while the well is under pressure. In order to accomplish this operation, the tubing string must pass upwardly through a blowout preventer or other packing means and in the case where two or more such tubing strings are disposed within the well tubing, these will, obviously, be displaced from the axial center of the well tubing. Since the packing means in a blowout preventer is normally disposed in the axial center thereof, it is difficult to utilize the same to accommodate tubing strings disposed off center and consequently, it has been found advisable and advantageous to provide some means whereby the blowout preventer or other packing means may be displaced radially, in order to locate the axial center of the same above the particular tubing string to be inserted or withdrawn from the well.

It is accordingly an object of the invention to provide an alignment fitting for well tubing heads which may be conveniently attached to the well tubing and to a conventional blowout preventer or other packing means in order to facilitate manipulation of a plurality of tubing strings within the well tubing.

A further object of the invention is the provision of an alignment fitting for well tubing heads which may be disposed between the well tubing and a blowout preventer or other packing means and will permit radial displacement of the blowout preventer or packing means, while at the same time, maintaining the axis thereof substantially parallel to the axis of the well tubing.

A still further object of the invention is the provision of an alignment fitting for well tubing heads which may be disposed between the head of the tubing and a blowout preventer or other packing means and which will permit radial displacement of such blowout preventer or packing means while maintaining pressure within the wall.

Another object of the invention is the provision of an alignment fitting for well tubing heads which may be conveniently and economically constructed from readily available materials and which may be secured to the head of a well tubing and to a blowout preventer or other packing means without necessitating modification of such blowout preventer or packing means or the well tubing head.

Further objects and advantages of the invention will be apparent from the following description taken in conjunction with the accompanying drawing wherein:

Fig. 1 is a longitudinal sectional view of an alignment fitting constructed in accordance with this invention attached to a well tubing head and shown in one position of orientation;



Fig. 2 a view similar to Fig. 1, but showing the fitting in another position of orientation; and

Fig. 3 a fragmentary sectional view showing the structure for permitting introduction of anti-friction balls to the bearing races and for retaining such balls therein.

With continued reference to the drawing, there is shown a more or less conventional well tubing head **10** having attached thereto a coupling flange **11** which is provided with a plurality of apertures **12** for receiving bolts **13** or other screw threaded fastening means to secure a fitting in place thereon. Disposed within the tubing head **10** is a tubing suspension means, including a cup or other suitable member **14** having a tapered inner surface **15** which is engaged by a plurality of tapered gripping jaws or slips **16** which are provided with a serrated inner surface **17** for engaging the outer surface of a string of tubing **18** to be suspended within the well tubing. Similarly, there may be provided other gripping jaws or slips **19** provided with serrated inner surfaces **20** for engaging the outer surface of another tubing string **21** to suspend the same within the well tubing. While two tubing strings **18** and **21** are shown, it is to be understood, that this is for purpose of illustration only and that any desired number of such tubing strings may be utilized, depending upon the size and nature of the well being operated upon and, of course, if desired, only a single tubing string may be disposed within the well tubing.

Where two or more tubing strings, as shown at **18** and **21**, are employed, obviously, the axes of these strings must be radially displaced from the axis of the well tubing and where the well being operated upon is under pressure and it is desired to remove or insert either one or both of the tubing strings **18** or **21**, it is necessary to provide some packing means to prevent release of pressure from within the well. Such packing means is commonly termed a blowout preventer and provides a stuffing box or gland for engaging the surface of the tubing being inserted or removed from the well and prevents leakage of pressure. Where two or more strings of tubing are involved, it is either necessary to provide a plurality of stuffing boxes or packing glands in the blowout preventer or provide some means for positioning a single stuffing box or packing gland in alignment with the tubing string being operated upon.

In accordance with the present invention, there is provided an alignment fitting which may well include a lower flange **22** provided with apertures **23** therein for receiving the fastening bolts **13** extending through the flange **11** secured to the well tubing head **10**. Conventional packing means **24** may be provided to seal the joint between the flange **11** and flange **22**. The flange **22** is provided with an axial bore having a shoulder **25** at the lower end thereof and the wall **26** of the bore is provided with a pair of vertically spaced annular grooves **27** and **28** which serve as outer bearing races.

An elongated sleeve **29** is provided with a lower vertically disposed cylindrical portion **30**, an intermediate inclined portion **31** and an upper vertical cylindrical portion **32** offset from the lower portion **30**. The lower portion **30** is provided on the outer surface thereof with vertically spaced annular grooves **33** and **34** which provide inner bearing races and, as clearly shown in Fig. 1, the lower portion **30** is disposed within the bore of the flange **22** and anti-friction balls **35** and **36** are disposed in the vertically spaced inner and outer bearing races in order to rotatably mount the sleeve **29** in the bore of the flange **22**. A suitable packing means, such as an O-ring **37** may be disposed in an annular groove **38** in the flange **22** and engage the outer surface of the lower portion **30** of the sleeve **29** to provide a suitable seal between the sleeve **29** and the flange **22**.

In a similar manner, the upper end portion 32 of the sleeve 29 is provided with a plurality of vertically spaced annular grooves 37 and 38 constituting inner bearing races and the upper end 32 of the sleeve 29 is received within a bore 40 of an upper flange 41 which is similar in all respects to the lower flange 22. The flange 41 is provided with a shoulder 42 adjacent the upper end of the bore and an annular groove 43 may be provided in the upper face of the flange to receive suitable packing means and apertures 44 may extend through the flange 41 to receive fastening members, such as bolts or the like.

The wall constituting the bore 40 in the upper flange 41 is provided with vertically spaced annular grooves 45 and 46 which constitute outer bearing races and, as clearly shown in Fig. 1, anti-friction balls 47 and 48 are disposed in the inner and outer bearing races to rotatably mount the upper flange 41 on the upper end 32 of the sleeve 29. Suitable packing means, such as an O-ring 49 may be provided between the flange 41 and the upper end 32 of the sleeve 29, in order to seal the same against leakage.

In order to facilitate introduction of the anti-friction balls into the inner and outer bearing races and to retain the same therein, there is shown in Fig. 3 a portion of the upper flange 41 in which there is provided a radial bore 50 extending through the inner and outer wall of the flange 41 and this bore 50 communicates with the bearing races in the flange 41 and upper end 32 of the sleeve 29. Anti-friction balls are introduced to the bearing races through the bore 50 and when such races have been filled, a plug 51 may be inserted in the bore 50 to retain the anti-friction balls in place and the plug 51 may be screw threaded, as shown at 52, or other suitable means may be employed to retain the same in place. While the structure for introducing and retaining the anti-friction balls has been shown in connection with the upper flange 41, it is to be understood, that the same structure is utilized in connection with the lower flange 22.

A blowout preventer or other packing means, not shown, may be secured to the upper flange 41 and as shown in Fig. 1, the axis of the bore in the upper flange 41 and also the axis of the blowout preventer or other packing means secured to such flange is positioned in alignment with the axis of the tubing string 21. In this position, such tubing string 21 may be removed or inserted into the well through the blowout preventer or other packing means thereby permitting the well to remain under pressure. When it is desired to operate on the other tubing string 18 to insert or remove the same, it is only necessary to rotate the sleeve 29 to the position shown in Fig. 2, which rotation it is to be noted, may be accomplished without rotating either the upper or lower flanges 41 or 22 and in the position shown in Fig. 2, the bore in the upper flange 41 and the blowout preventer or other packing means will be disposed in alignment with the axis of the tubing string 18 and such tubing string may be removed or inserted into the well. The apparatus would operate in the same manner for additional tubing strings merely by rotating the sleeve 29 to position the blowout preventer or other packing means in alignment with the axis of such tubing string.



It will be seen that by the above described invention, there has been provided a relatively simple apparatus which may be conveniently secured to a conventional well tubing head and to a conventional blowout preventer or other packing means and which by suitable manipulation permits positioning the blowout preventer or other packing means in various positions of alignment above the well tubing, or in other words, permits displacement of the axis of the blowout preventer radially while still maintaining such axis in a vertical position.

It will be obvious to those skilled in the art that various changes may be made in the invention without departing from the spirit and scope thereof and therefore the invention is not limited by that which is shown in the drawing and described in the specification, but only as indicated in the appended claim.

What is claimed is:

An alignment fitting for well tubing heads, said fitting comprising a lower flange for attachment to the upper end of a well tubing, an axial bore in said flange providing an inner wall, vertically spaced annular grooves in said wall providing outer bearing races, a sleeve having vertically spaced annular grooves in the outer surface adjacent the lower end providing inner bearing races, said lower end of said sleeve being disposed in the bore in said flange, ball bearings disposed in said bearing races to rotatably mount said sleeve in said flange, the wall of said sleeve being inclined and terminating in an upper end offset radially from said lower end, vertically spaced annular grooves in the outer surface of said sleeve adjacent said upper end providing inner bearing races, an upper flange having an axial bore providing an inner wall and received over the upper end of said sleeve, vertically spaced annular grooves in the inner wall of said upper flange providing outer bearing races, ball bearings disposed in said last mentioned bearing races to rotatably mount said upper flange on the upper end of said sleeve, said upper and lower flanges each having a radial bore extending through the inner and outer wall in alignment with said bearing races to permit insertion of ball bearings in said inner and outer races and a removable plug closing each radial bore to retain said ball bearings in said races, and packing means between the upper and lower ends of said sleeve and said upper and lower flanges whereby the longitudinal axis of said upper flange may be displaced radially with respect to the longitudinal axis of said lower flange while maintaining said flanges in spaced parallel relationship.

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