

July 2, 1968

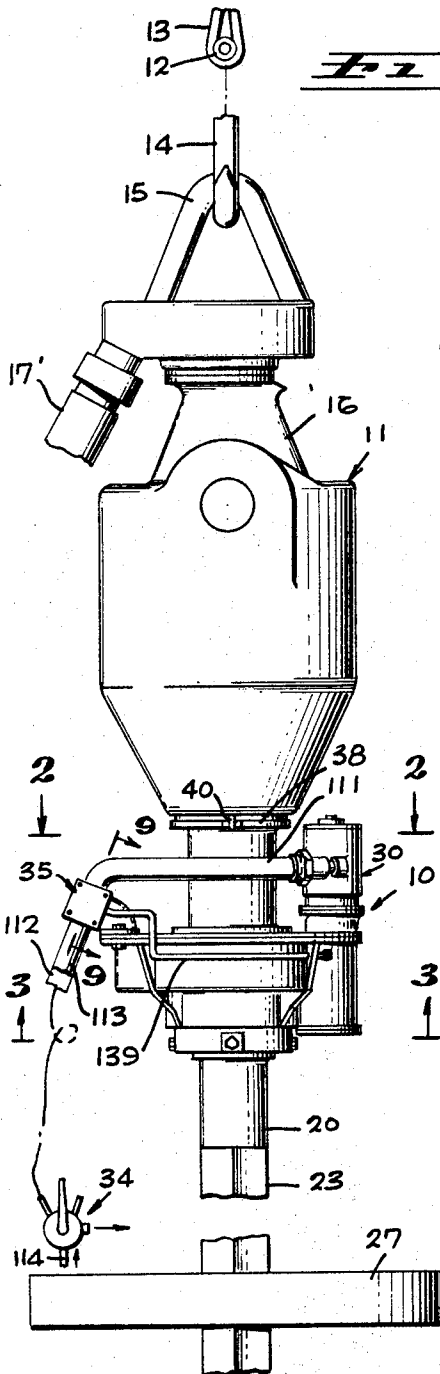
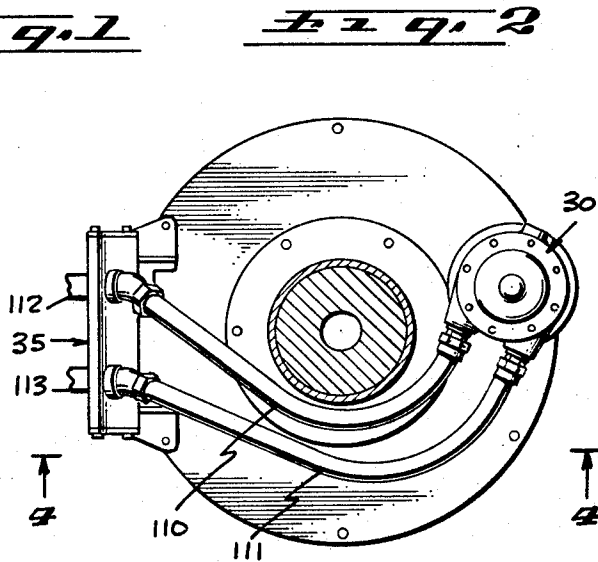
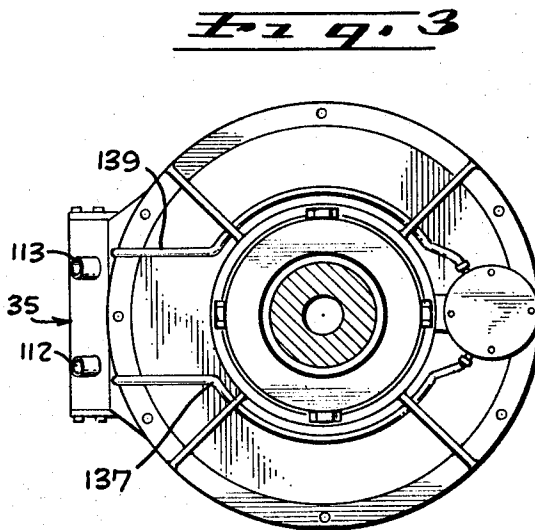
J. BARTOS

3,390,728

WELL PIPE SPINNER

Filed May 7, 1965

4 Sheets-Sheet 1



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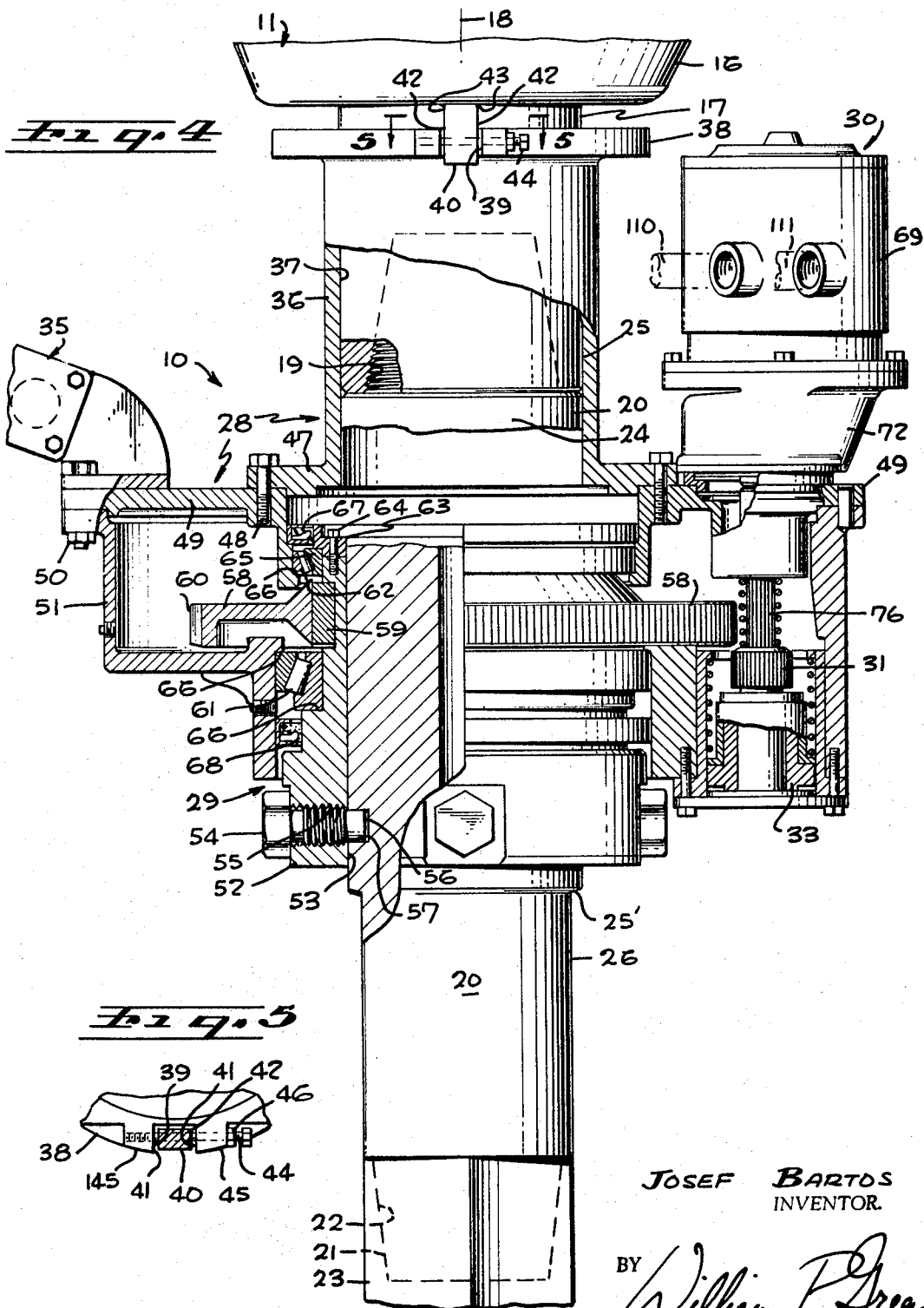
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Fig. 6

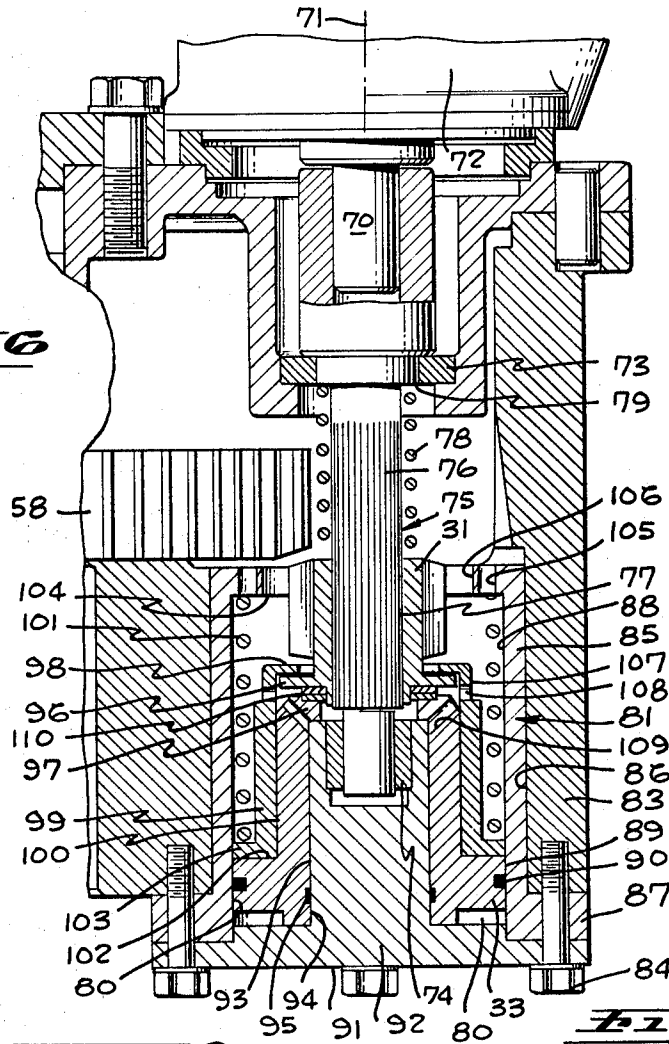


Fig. 9

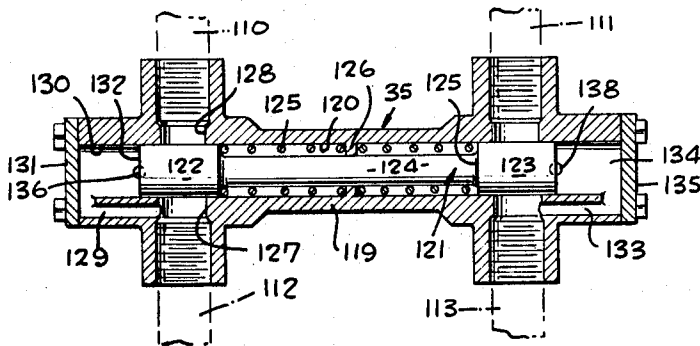
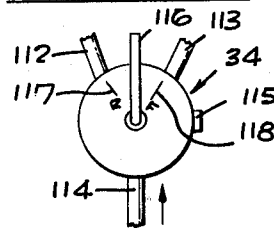


Fig. 10



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Fig. 7

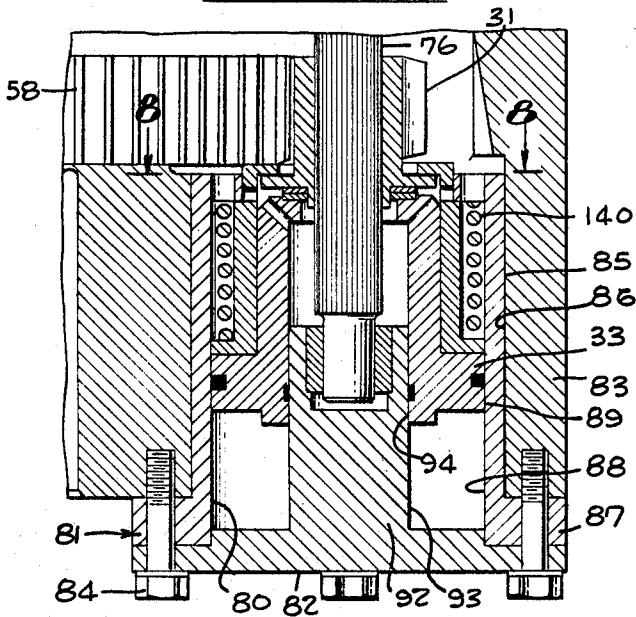


Fig. 8

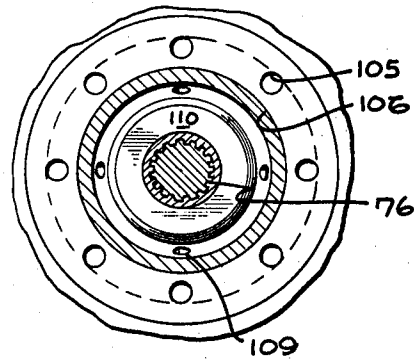


Fig. 12

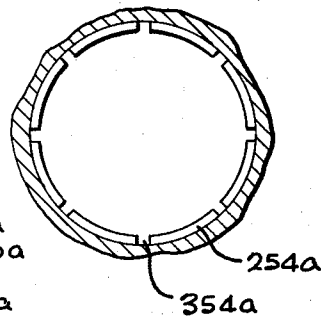
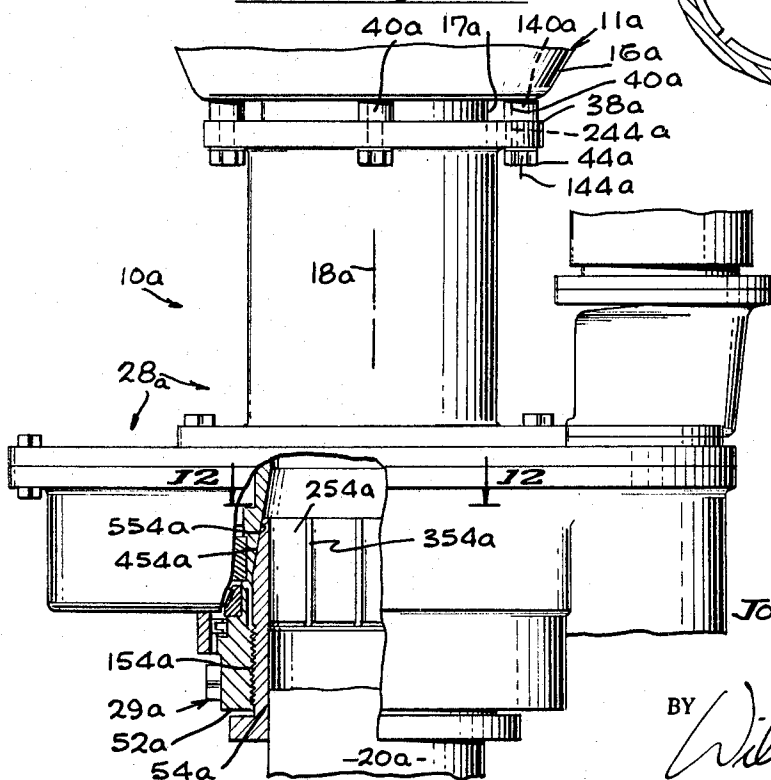


Fig. 11



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3,390,728

WELL PIPE SPINNER

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19 Claims. (Cl. 173-163)

ABSTRACT OF THE DISCLOSURE

A well pipe spinner to be connected to a well swivel, and having a motor for driving the stem of the swivel and a pipe suspended therefrom. The spinner has a non-rotating body whose weight is preferably supported at least partially by the stem of the swivel, through a thrust bearing.

This invention relates to an improved well pipe "spinner" device, for power rotating a section or stand of well pipe, relative to another section or stand of the pipe, as one of the stands is added to or removed from the drill string.

There have in the past been suggested certain well pipe spinner devices for serving the present purpose, and typically adapted to be connected to the swivel unit of a drill rig, for rotatably driving the stem of the swivel and a drill pipe connected to that stem. However, these prior art swivel-carried spinner devices have been very difficult to mount on the swivel, have been hard to align for properly centered rotation of their turning parts, and have in other respects been so inconvenient to use and handle as to prevent as wide spread use of the units as would be desired. In particular, such prior devices have usually consisted of two separate relatively rotatable sections, requiring separate mounting to the body and stem respectively of a swivel unit, and which had to be aligned relative to one another as they were being installed.

A major object of the present invention is to provide a swivel mountable spinner device which can be handled as a unit prior to and during installation of the drilling rig, and in which the rotating and non-rotating parts are pre-orientated or aligned to simplify the mounting of the unit on the drilling rig, and to assure proper relative positioning of the different parts of the unit upon such mounting. Thus, there is no possibility for improper or inaccurate alignment of the rotating and non-rotating sections of the spinner unit upon installation, and the entire installing procedure may be performed by less skilled personnel in much less time than in the case of the prior art spinner devices. Preferably, the entire assembly is accurately located relative to the swivel by reception about the rotary stem of the swivel, or a lower extension thereof typically formed by connection of a pipe sub to that stem. The non-rotating section of the spinner may have a tubular sleeve disposed about this stem or its extension, and connectible at its upper end to the housing of the swivel unit, while the rotating section of the apparatus may also have a tubular portion receivable about the stem or its extension, and rigidly connectible thereto by bolts or other fastening means. In one form of the invention the connection of the rotating section of the spinner to the stem or sub is made by a constrictible collet type connector structure.

The rotary portion of the device is driven by a suitable motor which may have a gear adapted to move axially into and out of meshing relation with a driven gear connected to the rotating section of the spinner. Certain particular features of the invention relate to the manner of actuation of the first mentioned gear axially to its driving position, and specifically in a manner such that the gear is in meshing relation with the second gear before

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rotation of the gears commences, or at least before the drive gear reaches or nears full speed, to thus prevent damage to the gears by movement into mesh after a high speed has been attained. Such controlled actuation of the gears into mesh may be attained by a delay valve structure, acting to first admit fluid to a piston for shifting the gears into meshing relation, and to then admit air or pressure fluid to a fluid driven motor for commencing rotation of the gears.

The above and other features and objects of the invention will be better understood from the following detailed description of the typical embodiments illustrated in the accompanying drawings, in which:

FIG. 1 is a fragmentary side view showing a spinner constructed in accordance with the invention as it appears when mounted on a drilling rig;

FIGS. 2 and 3 are enlarged horizontal sections taken on lines 2-2 and 3-3 respectively of FIG. 1;

FIG. 4 is a further enlarged fragmentary partially sectional view taken on line 4-4 of FIG. 2;

FIG. 5 is a fragmentary horizontal section taken on line 5-5 of FIG. 4;

FIG. 6 is a still further enlarged fragmentary vertical section showing in greater detail a portion of the drive gear mechanism of FIG. 4;

FIG. 7 is a view similar to a portion of FIG. 6, but showing the drive gear in its active condition;

FIG. 8 is a fragmentary horizontal section taken on line 8-8 of FIG. 7;

FIG. 9 is an enlarged section taken on line 9-9 of FIG. 1;

FIG. 10 is an enlarged representation of the control valve of FIG. 1;

FIG. 11 is a view similar to FIG. 4, but showing a variational form of the invention; and

FIG. 12 is a fragmentary horizontal section taken on line 12-12 of FIG. 11.

Referring first to FIGS. 1 through 10, and in particular to FIG. 1, I have shown at 10 a spinner device constructed in accordance with the invention, and illustrated as it appears when mounted on a well drilling rig and at a location beneath a conventional swivel 11. The swivel 11 is suspended from the vertically movable travelling block 12 of the drill rig, which travelling block is supported and movable vertically by the usual cable 13. The travelling block carries a hook represented at 14 which engages a bail 15 at the upper end of the swivel, to support the non-rotating body 16 of the swivel as shown. Drilling mud is introduced into the swivel through a flexible hose 17, and discharges downwardly from the swivel 11 through the usual downwardly projecting externally cylindrical tubular swivel stem 17. As will be understood, stem 17 is rotatable about the vertical axis 18 of the rig and drill pipe relative to the non-rotating housing 16 of the swivel, and forms in effect a short portion of rotary pipe which may have an internally threaded socket or box end recess 19 (FIG. 4) to which a pipe sub 20 may be connected. At its lower end, sub 20 may have a downwardly projecting externally threaded pin end 21, which is connectible into a mating upwardly opening or facing box end 22 of the usual kelly 23, or a drill pipe stand. Sub 20 has an outer cylindrical surface 24 which may be of a diameter corresponding to the diameter of outer cylindrical surface 25 of the swivel stem 17, down to a point 25' at which the diameter may be reduced to that shown at 26 (corresponding to the transverse dimension of kelly 23 and/or the connected drill pipe).

Referring again to FIG. 1, the kelly 23 extends downwardly through a conventional rotary table represented at 27, which table contains a non-circular drive recess shaped in correspondence with the non-circular horizontal cross-section of the kelly to rotatably drive the latter.

As seen best in FIG. 4, the spinner device 10 includes, in addition to the discussed tubular pipe section or sub 20, a non-rotating body structure or section represented generally at 28, and a rotating section 29. The section 29 is driven rotatably about vertical axis 18 by a power actuated motor 30, through an axially movable gear 31, whose movement into and out of mesh with a gear 58 forming a portion of the rotary section 29 is controlled by a fluid actuated piston 33. The delivery of pressure fluid to and from piston 33 is controlled by a manually operated valve 34 (see FIG. 1), and a delay introducing slide valve 35.

To describe first the stationary section of spinner device 10, this section may include an upper tubular sleeve 36 (FIG. 4) having an inner cylindrical surface 37 of a diameter corresponding approximately to, and closely fitting and engaging, the external surfaces 24 and 25 of elements 20 and 17 respectively. At its upper end, sleeve 36 has a horizontal, radially outwardly projecting essentially annular flange 38, which contains one or more notches 39 receiving lugs 40 which are rigidly secured to and project downwardly from the housing 16 of the swivel. Preferably, there are two such lugs, at diametrically opposite locations with respect to axis 18, and having the rectangular horizontal cross-section illustrated in FIG. 5. The notches 39 have a corresponding rectangular cross-section, to present two parallel vertical planar shoulders or surfaces 41 which are engageable with the parallel opposite side faces 42 of lug 40, to prevent rotation of flange 38 and sleeve 36 about axis 18 relative to the swivel housing 16 by which lugs 40 are carried. It is contemplated that the lugs may be secured to the swivel housing in any convenient manner, desirably by welding as represented at 43 in FIG. 4. Screws or bolts 44 may extend horizontally through each of the lugs 40, and through portions 45 and 145 of the flange 38 (see FIG. 5) at opposite sides of the lugs, to positively lock the flange to the lug in the illustrated relation. Each such screw 44 may have an end threadedly received within the corresponding flange portion 145, but may be externally cylindrical within portion 45 and lug 40, and be closely received within cylindrical and unthreaded bores therein. Lock nuts 46 on screws 44 may be tightenable against one of the portions 45, to assure against unwanted loosening of the bolts.

At its lower end, sleeve 36 has an outwardly projecting horizontal annular flange 47, which is peripherally bolted at 48 to an essentially annular horizontal second non-rotating body element 49, which is in turn peripherally bolted at 50 to a third essentially annular body part 51. Thus, elements 36, 49 and 51 form together a non-rotating body or housing structure within which the rotating parts of the spinner are contained.

The rotating section of the spinner is also formed of several parts, including first of all a vertically extending tubular member 52 which has an inner cylindrical surface 53 centered about axis 18 and of a diameter corresponding to the external diameter 24 of sub 20. Thus, part 52 is a close fit on the sub, and is rigidly secured to the sub by one or more bolts 54, preferably four such bolts as shown, which are threadedly connected into radial passages 55 in the side wall of part 52, and have inner end portions 56 extending into cylindrical recesses 57 formed in sub 20, to positively and rigidly connect the sub to element 52, for rotation therewith. Externally, element 52 rigidly carries an annular gear 58, which is keyed to element 52 at 59 for rotation therewith, and which has outwardly projecting gear teeth 60 formed about its periphery. Gear 58 turns with the rest of the rotating assembly about axis 18. The rotating section 29 is mounted for rotation about axis 18 relative to stationary body structure 28 of the spinner, and is retained against relative axial or vertical movement by suitable bearings, preferably taking the form of two roller type thrust bearings illustrated at 61 and 62 in FIG. 4. As will be apparent, thrust bearing assembly 61 supports the weight of the stationary body structure 28 from the rotating section 29 of the spinner, while the second and

typically smaller thrust bearing 62 prevents upward movement of the non-rotating section 28 relative to rotary section 29 of the spinner. A retainer ring 63, secured to element 52 by screws 64, may positively hold the inner race 65 of thrust bearing assembly 62 in its illustrated assembled position relative to element 52, while engagement of the other races of the two thrust bearings with shoulders 66 limits their movement relative to the engaged parts. Annular seal ring assemblies 67 and 68 between the rotating and non-rotating sections of the spinner prevent access of dirt, dust or other contaminants to the interior of the spinner assembly, and prevent the loss of lubricants from the gear and bearing structures.

Motor 30 may be any conventional power actuated motor, such as an electric motor or fluid pressure driven motor, but preferably is of an air driven type. The housing 69 of this motor is rigidly connected to the non-rotating section 28 of the spinner, and more particularly to element 49 as will be apparent from FIG. 4. The motor 30 has a driven shaft represented at 70 in FIG. 6, and which turns about an axis 71 extending vertically and parallel to the main axis 18 of the rig and spinner. Shaft 70 may be driven through a suitable reduction gear assembly represented at 72 in FIG. 4. The shaft 70 is keyed to or otherwise drives an extension shaft 72, which is journaled for rotation about axis 71 within bearings or bushings 73 and 74 (FIG. 6), and has a portion 75 carrying vertically or axially extending external splines 76 engaging an internally splined surface 77 formed within the drive gear 31. Gear 31 is movable vertically between the position of FIG. 6 and the position of FIG. 7, to thereby move into driving mesh or engagement with the larger gear 32 of rotary section 29 of the spinner. In either of its two positions of FIGS. 6 and 7, the splines 76-77 form a rotary drive connection between shaft 72 and gear 31. Upward movement of the gear from its FIG. 6 position to its FIG. 7 position may be yieldingly resisted by a compression coil spring 78 disposed about shaft 72, and engaging upwardly against a shoulder 79 on the shaft, and downwardly against gear 31.

The piston 33 which actuates gear 31 vertically is annular about vertical axis 71, and of the cross-sectional configuration illustrated in FIG. 6. An annular cylinder chamber 80 (see FIG. 7) movably contains piston 33, and is formed of two cylinder sections 81 and 82 secured together and to a portion 83 of body part 51 by a number of circularly spaced bolts or screws 84. Cylinder part 81 may have a cylindrical vertically extending side wall 85 received within a cylindrical vertical passage 86 in portion 83 of part 51, and terminating downwardly in a flange 87 through which screws 84 extend. Internally, part 81 has an inner cylindrical surface 88 which is slidably engaged by an external cylindrical surface 89 of piston 33, and by an annular sealing O-ring 90 received within a recess formed in surface 89. The second part 82 of the cylinder structure has a circular transverse bottom portion 91 through whose periphery screws 84 extend, and carrying an upwardly projecting central boss 92 having an external cylindrical surface 93 which is slidably engaged by internal cylindrical surface 94 of the piston 33, and by an annular seal ring 95 contained within a groove in that inner surface of the piston. Gear 31 is rotatably connected to piston 33 in any suitable manner, as by provision of a flange 96 on the lower end of the gear, which flange may be received axially or vertically between an upper inturned flange portion 97 of the piston and an inturned flange 98 of a retaining element 99 which is received about a reduced external diameter portion 100 of the piston. A compression coil spring 101 may be received about part 99, and may serve to both resist upward movement of piston 33, and hold element 99 downwardly against a horizontal shoulder 102 formed on the piston. For engaging spring 101, element 99 may have a flange 103 against which the spring bears downwardly, and which engages shoulder 102 of the piston, while the upper

end of spring 101 may engage upwardly against an inwardly turned flange portion 104 of outer cylinder section 81. Flange 104 may contain a series of circularly spaced restricted fluid passing apertures 105, and may have an inner cylindrical surface 106 defining the interior of the flange and of a diameter substantially the same as, or only very slightly greater than, that of an external cylindrical surface 107 formed on the upper portion of element 99. In the uppermost position of the piston, surface 107 is received within surface 106 of flange 104, as seen in FIG. 7. The side wall of part 99 contains a series of circularly spaced restricted fluid passing apertures 108, which communicate with circularly spaced inclined apertures or passages 109 formed in the upper portion of piston 33 in the manner seen in FIG. 6. Thrust washer parts 110 may be received axially between piston 33 and its controlled gear 31, to avoid excessive friction therebetween.

The pneumatically operated rotary motor 69 is adapted to be driven in either of two opposite directions by appropriate control of the admission of air to, and discharge of air from, either of two air lines 110 and 111 leading from slide valve assembly 35. Air is fed to the slide valve 35 through two flexible lines or hoses 112 and 113 (FIGS. 1, 2 and 9) which connect to the previously mentioned manually actuated control valve 34, which may take the form of a conventional rotary three position reversing valve. Air under pressure is supplied to valve 34 through an inlet line 114 (FIGS. 1 and 10), which may communicate with any suitable source of pressurized air, while air may discharge from the valve 34 through an outlet opening represented diagrammatically at 115 in FIG. 10. The actuating handle 116 of the valve may move between the position of handle 116 in which inlet 114 is not in communication with either of the lines 112 and 113, and two other positions of alignment with markings 117 and 118 respectively. When handle 116 is moved into alignment with the "Forward" marking 118, inlet 114 is placed in communication with line 113, while discharge outlet 115 is placed in communication with line 112, to drive motor 30 in a first direction. When handle 116 is swung to the "Reverse" position 117 of FIG. 10, the connections to lines 112 and 113 are reversed, to drive the motor in the opposite rotary direction.

With reference now to FIG. 9, I have illustrated in that figure the inner construction of slides valve 35, which has a valve housing 119 containing a cylindrical passage 120 within which a slide valve element 121 is slidably received. Element 121 has two enlarged heads 122 and 123 at its opposite ends, which are externally cylindrical to fit closely within passage 120, and which are interconnected by a reduced diameter portion 124 of the slide valve element. Two compression coil springs 125 bear against a shoulder or a reduced diameter portion 126 formed in the central portion of body 119, to yieldingly resist axial movement of the slide valve element 121 in either direction from the FIG. 9 normal position of that element. In this position, head 122 of the slide valve closes off communication between two transversely aligned or opposed passages 127 and 128 leading to lines 112 and 110 respectively, to thus close off communication between these lines. Similarly, the second enlarged diameter head 123 of the slide valve controls communication between the two lines 113 and 111. When pressure is admitted to the valve through line 112, some of the air under pressure flows through a by-pass passage 129 into an end chamber 130 in body 119, which chamber is closed by an end plate 131, so that this pressure is exerted against end face 132 of enlargement 122 to urge the slide valve to the right as seen in FIG. 9. In the same manner, pressure applied to the valve through line 113 flows through a passage 133 into an end chamber 134, closed by a plate 135, to actuate valve element 121 to the left.

In the neutral FIG. 9 position of the slide valve element, end chamber 130 is in restricted communication

with an aperture 136 formed in the side wall of passage 120, which aperture is approximately one-half covered by enlargement 122 of the slide valve element. Aperture 136 leads to a line 137 (FIG. 3) which connects into the lowermost portion of the cylinder chamber *a* which contains piston 33. A corresponding fluid passing aperture 138 at the opposite end of the slide valve of FIG. 9 is normally partially covered by enlargement 123 of the slide valve, and leads to a second line 139 communicating with the lowermost portion of cylinder chamber 80. As will be understood, if air is admitted through either of the lines 137 or 139 to chamber 80, such air will actuate the piston 33 upwardly, to bring gear 31 into mesh with its mating driven gear 58.

To now describe the actual use of the apparatus illustrated in FIGS. 1 through 10, assume first of all that the spinner device 10 has not as yet been connected to the rest of the rig apparatus, but that the swivel 11 is already in place, suspended in a manner illustrated in FIG. 1, with the stem 17 of the swivel projecting downwardly beyond its housing 16. The spinner may then be very easily mounted by first connecting sub 20 into the threaded socket 19 of stem 17, and then moving the entire remaining portion of spinner 10 upwardly about sub 20 and stem 17 to the position illustrated in FIG. 4. During such movement, the notches 39 of upper flange 38 move into interfitting relation with lugs 40 carried by the swivel, and the flange may then be connected to those lugs by screws 44, to retain the non-rotating section 28 of the spinner against rotary motion relative to the housing of the swivel. The rotating section 29 of the spinner device is connected to sub 20 by tightening of screws 54 to the position of FIG. 4, following which the kelly 23, or a drill pipe stand, may be connected to the lower end of the sub. As soon as the fluid connections have been made, the apparatus is ready for operation. When it is desired to make or break a particular joint of the drill string, the pipe stand just beneath that stand is supported in the rotary table 27, and the next upper pipe is turned by a tong device sufficiently to initiate the unscrewing rotation, and break the tight connection between the two stands. After the connection has thus been released by the tong device, an operator may turn handle 116 of the valve illustrated in FIG. 10 to a proper setting for energizing motor 30 to spin or rapidly rotate the stand in the same direction, and through enough turns to completely separate one of the threaded joint ends from the other mating joint end. More particularly, if handle 116 of FIG. 10 is moved to the position designated 118, air under pressure is admitted to line 113, to flow through passage 133 of FIG. 9 into chamber 134, and cause leftward movement of slide valve element 129 to a position in which air may then pass from line 113 into line 111, and thus to the motor for causing the desired rotation. Air discharging from the motor flows through line 110, and past the leftwardly displaced head 122 of the slide valve, into line 112, to discharge through that line and valve 34 to the outlet 115. When the pressurized air is first admitted to chamber 134, and prior to the leftward movement of slide valve element 121, some of this air may flow in restricted manner through aperture 138 and the connected line 139 to cylinder chamber 80 of FIG. 6, to thus force piston 33 upwardly from the FIG. 6 position to the FIG. 7 position. Thus, gear 31 is moved into mesh with gear 58 before the slide valve head 123 has moved to the left far enough to commence rotation of motor 30. After such upward movement of the piston and gear 31, and after the gears 31 and 58 are in engagement, the slide valve admits air to the motor through line 111 to cause rotation of the motor for turning gear 58 and the connected sub 20 and kelly 23. Thus, the delay introduced into the commencement of rotation of motor 30, relative to the upward actuation of gear 31, prevents damage to the gears which might otherwise occurs if gear 31 were moved upwardly

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after its rotation had commenced. When it is desired to spin the pipe in the opposite direction valve 34 is turned to its second position, and air is admitted through passage 136 to piston 33, to move bear 31 upwardly in the same manner previously discussed, prior to the admission of air to line 110 to cause rotation of gear 31 in the second direction.

During upward movement of piston 33 from the FIG. 6 position to the FIG. 7 position, air may flow through apertures 108 and 109 into the chamber 140 in the interior of the piston (see FIG. 7). When the piston nears its uppermost position, the upper extremity of element 199, at the location of external surface 107, reaches a position in which it commences to enter the cylindrical inner surface 106 of flange 104. Beyond this point, any air flowing into chamber 140 must pass through the restricted apertures 105 in flange 104, which apertures offer sufficient restriction to the flow of air to cause a limited dash pot effect acting to yieldingly resist further upward movement of the piston, to thus slow down the piston movement as it reaches its final upper position of FIG. 7. On subsequent downward movement of the piston, air leaves chamber 143 through apertures 103 and 107, and for a short initial period through apertures 105.

FIGS. 11 and 12 illustrate a variational form of the invention which may be considered as identical with that of FIGS. 1 through 10 except with respect to the changes specifically illustrated in FIGS. 11 and 12. In this second form, the non-rotating section 28a of spinner 10a may be the same as in the first form except as to the manner of connection of upper flange 38a to the housing 16a of swivel 11a. In this case, flange 38a may be connected to housing 16a by means of a series of circularly spaced downwardly projecting lugs 40a, which contain internally threaded passages 140a into which screws 44a may be threadedly connectible. Screws 44a may extend vertically along axes 144a which are parallel to the main axis 18a of the spinner, and may pass through apertures 244a formed in flange 38a.

The rotatable section 29a of the device of FIGS. 11 and 12 may be the same as that shown in FIGS. 1 through 10 except as to the manner of connection of the sub 20a, which as in the first form is threadedly attached at its upper end to rotary stem 17a of the swivel. In FIGS. 11 and 12, the rotating section 29a has a main part 52a which is externally the same as part 25 of FIG. 4, but which internally contains a tubular collet element 54a which is threadedly connected to part 52a at 154a. Above the location of this threaded connection collet part 54a has a series of internally cylindrical upwardly projecting constrictible fingers 254a which are separated by slits 354a extending downwardly into the material of the collet part 54a, and whose internal diameter corresponds substantially to the external diameter of sub 20a to be capable of tightly gripping that sub. Externally, fingers 254a have upwardly tapering frusto-conical surfaces 454a which are engageable with a corresponding internal upwardly tapering surface 554a formed in part 52a, to constrict or cam fingers 254a radially inwardly against the sub upon upward movement of collet part 54a in response to rotation of the collet part relative to element 52a. Thus, the collet may be tightened against the sub, to securely and frictionally fasten part 52 in fixed position relative to the sub. After such connection of the unit to the swivel housing and sub, the device 10a of FIGS. 11 and 12 will function in the same manner discussed in connection with the first form of the invention.

I claim:

1. A well pipe spinner unit to be connected to a swivel having a housing and having a relatively rotatable tubular fluid passing stem, said unit including a body section adapted to be connected to said swivel housing against rotation relative thereto, said body section having a portion of relatively large horizontal section, and having a tubular sleeve portion of smaller horizontal section pro-

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jecting upwardly therefrom and adapted to be received closely about and substantially fit said swivel stem in a relation locating said body section relative to said stem, a second section which is rotatable relative to said body section, means for connecting said second section to said swivel stem in a relation to drive the latter rotatably, a motor for rotatably driving said second section, and thereby said swivel stem, relative to said body section, and bearing means connecting said second section rotatably to said body section independently of any interconnection of the sections through said swivel so that the two sections may be connected to and detached from the swivel as a unit.

2. A well pipe spinner unit to be connected to a swivel having a housing and having a relatively rotatable tubular fluid passing stem, said unit including a body section adapted to be connected to said swivel housing against rotation relative thereto, said body section having a portion of relatively large horizontal section, and having tubular sleeve portion of smaller horizontal section projecting upwardly therefrom and adapted to be received closely about and substantially fit said swivel stem in a relation locating said body section relative to said stem, means at the upper end of said sleeve portion for connecting the sleeve portion to said swivel housing, a second section which is rotatable relative to said body section, means for connecting said second section to said swivel stem in a relation to drive the latter rotatably, a motor for rotatably driving said second section, and thereby said swivel stem, relative to said body section, and bearing means connecting said second section rotatably to said body section independently of any interconnection of the sections through said swivel so that the two sections may be connected to and detached from the swivel as a unit.

3. A well pipe spinner unit to be connected to a swivel having a housing and having a relatively rotatable tubular fluid passing stem, said unit including a body section adapted to be connected to said swivel housing against rotation relative thereto, said body section having a tubular sleeve portion adapted to be received closely about and substantially fit said swivel stem in a relation locating said body section relative to said stem, said sleeve portion having a flange at its upper end containing at least one notch for receiving a lug carried by said swivel housing to retain the sleeve portion against rotation relative to said housing, a second section which is rotatable relative to said body section, means for connecting said second section to said swivel stem in a relation to drive the latter rotatably, a motor for rotatably driving said second section, and thereby said swivel stem, relative to said body section, and bearing means connecting said second section rotatably to said body section independently of any interconnection of the sections through said swivel so that the two sections may be connected to and detached from the swivel as a unit.

4. A well pipe spinner unit to be connected to a swivel having a housing and having a relatively rotatable tubular fluid passing stem, said unit including a body section adapted to be connected to said swivel housing against rotation relative thereto, a second section which is rotatable relative to said body section, said second section having a tubular portion adapted to be received closely about a lower extension of said swivel stem, at least one threaded screw connectible into the side wall of said tubular portion of the second section and into a mating recess in said stem extension in a relation to drive the latter rotatably, a motor for rotatably driving said second section, and thereby said swivel stem, relative to said body section, and bearing means connecting said second section rotatably to said body section independently of any interconnection of the sections through said swivel so that the two sections may be connected to and detached from the swivel as a unit.

5. A well pipe spinner unit to be connected to a swivel having a housing and having a relatively rotatable

able tubular fluid passing stem, said unit including a body section adapted to be connected to said swivel housing adapted against rotation relative thereto, a second section which is rotatable relative to said body section, said second section having a tubular portion adapted to be received about a lower extension of said swivel stem, a constrictible collet structure received with said tubular portion of the second section and tightenable against said stem extension, a threaded connection between said tubular portion of the second section and said collet structure, and interengaging cam faces on said tubular portion of the second section and said collet structure for camming said collet structure against said stem extension in response to relative rotation of the collet structure and tubular portion, a motor for rotatably driving said second section, and thereby said swivel stem, relative to said body section, and bearing means connecting said second section rotatably to said body section independently of any intersection of the sections through said swivel so that the two sections may be connected to and detached from the swivel as a unit.

6. A well pipe spinner unit to be connected to a swivel having a housing and having a relatively rotatable tubular fluid passing stem, said unit including a body section adapted to be connected to said swivel housing against rotation relative thereto, said body section having a tubular sleeve portion adapted to be received closely about and substantially fit said swivel stem in a relation locating said body section relative to said stem, means at the upper end of said sleeve portion for connecting the sleeve portion to said swivel housing against rotation relative thereto, a second section which is rotatable relative to said body section, said second section having a tubular portion adapted to be received closely about a lower extension of said swivel stem and containing a stem receiving passage aligned vertically with and of a diameter corresponding approximately to a passage in said sleeve portion, means for connecting said tubular portion of the second section to said stem in a relation to drive the latter rotatably, a motor for rotatably driving said second section, and thereby said swivel stem, relative to said body section, and bearing means connecting said second section rotatably to said body section independently of any interconnection of the sections through said swivel so that the two sections may be connected to and detached from the swivel as a unit.

7. A well pipe spinner unit to be connected to a swivel having a housing and having a relatively rotatable tubular fluid passing stem, said unit including a body section adapted to be connected to said swivel housing against rotation relative thereto, said body section having a tubular sleeve portion adapted to be received closely about and substantially fit said swivel stem in a relation locating said body section relative to said stem, said sleeve portion having a flange at its upper end containing at least one notch for receiving a lug carried by said swivel housing to retain the sleeve portion against rotation relative to said housing, a second section which is rotatable relative to said body section, said second section having a tubular portion adapted to be received closely about a lower extension of said swivel stem and containing a stem receiving passage aligned vertically with and of a diameter corresponding approximately to a passage in said sleeve portion, at least one threaded screw connectible into the side wall of said tubular portion of the second section and into a mating recess in said stem extension in a relation to drive the latter rotatably, a motor for rotatably driving said second section, and thereby said swivel stem, relative to said body section, and bearing means connecting said second section rotatably to said body section independently of any interconnection of the sections through said swivel so that the two sections may be connected to and detached from the swivel as a unit, said bearing means including two thrust bearings for preventing axial movement of said

second section in either of two opposite directions relative to said body section.

8. A well pipe spinner unit to be connected to a swivel having a housing and having a relatively rotatable tubular fluid passing stem, said unit including a body section adapted to be connected to said swivel housing against rotation relative thereto, a pipe sub adapted to be threadedly connected to and project downwardly from said swivel stem, said body section having a tubular sleeve portion received closely about and substantially fitting said pipe sub, means at the upper end of said sleeve portion for connecting the sleeve portion to said housing, a second section which is rotatable relative to said body sections, means for connecting said second section to said swivel stem in a relation to drive the latter rotatably, a motor for rotatably driving said second section, and thereby said swivel stem, relative to said body section, and bearing means connecting said second section rotatably to said body section independently of an interconnection of the sections through said swivel so that the two sections may be connected to and detached from the swivel as a unit.

9. A well pipe spinner unit to be connected to a swivel having a housing and having a relatively rotatable tubular fluid passing stem, said unit including a body section adapted to be connected to said swivel housing against rotation relative thereto, a pipe sub adapted to be threadedly connected to and project downwardly from said swivel stem, said body section having a tubular sleeve portion received closely about and substantially fitting said pipe sub, means at the upper end of said sleeve portion for connecting the sleeve portion to said housing, a second section which is rotatable relative to said body section, said second section having a tubular portion received closely about said pipe sub, means for connecting said tubular portion of the second section to said sub, a motor for rotatably driving said second section, and thereby said swivel stem, relative to said body section, and bearing means connecting said second section rotatably to said body section independently of any interconnection of the sections through said swivel so that the two sections may be connected to and detached from the swivel as a unit.

10. The combination comprising a swivel having a housing and a relatively rotatable tubular fluid passing stem, a well pipe spinner carried by the swivel, a lug carried by said housing at the underside thereof and projecting therefrom, said spinner having a body section and a relatively rotatable second action for driving said stem, said body section having a portion at its upper end containing a recess into which said lug projects in a relation preventing rotation of the body section relative to said housing.

11. The combination comprising a swivel having a housing and a relatively rotatable tubular fluid passing stem, a well pipe spinner carried by the swivel, a lug carried by said housing at the underside thereof and projecting downwardly therefrom, said spinner having a body section and a relatively rotatable second section for driving said stem, said body section having a portion at its upper end containing a recess into which said lug projects in a relation preventing rotation of the body section relative to said housing, and a screw extending through said body section adjacent said recess and through said lug to lock the lug in the recess.

12. A well pipe spinner comprising a body section adapted to be suspended from a well drilling derrick, a rotary section mounted rotatably to said body section, said rotary section containing a passage passing a well drilling fluid downwardly therethrough, a fluid driven motor connected to one of said sections, gears driven by said motor for rotating said rotary section relative to said body section and including a first gear and a second gear driven by said motor and engageable in driving relation with said first gear, a gear advancing fluid actuated piston and cylinder mechanism for actuating one of said gears

axially relative to and into mesh with the other gear, and time delay control valve means for automatically commencing the flow of pressure fluid to said motor to commence rotation of said second gear in an automatically delayed relation to actuation of said gear advancing piston and cylinder mechanism so that said one gear is first advanced axially at least partially toward a position of mesh with the other gear prior to commencement of substantial rotation of said second gear by the motor, said time delay control valve means including a valve body and a slide valve element therein, two inlets for supplying pressure fluid to said valve body to drive the motor in either of two opposite rotary directions respectively, means for conducting fluid from said two inlets against the slide valve element oppositely to displace the latter in opposite axial directions respectively, conduit means leading to said motor and communicable with said inlets only after predetermined movement of the slide valve element, and additional conduit means for conducting said pressure fluid from said slide valve body to said piston and cylinder mechanism prior to movement of said slide valve element far enough to deliver driving fluid to the motor, to thereby introduce a delay between advancement of said one gear and commencement of substantial rotation of the motor.

13. A well pipe spinner as recited in claim 12, including a reversing valve for supplying pressure fluid selectively to either of said two inlets and for discharging fluid from the other inlet.

14. A well pipe spinner unit to be connected to a swivel having a housing and having a relatively rotatable tubular fluid passing stem, said unit including a tubular fluid passing sub adapted to be detachably connected to said stem, a sleeve carried by and about said sub and connectible thereto to drive the sub and stem, a non-rotating body section carried about said sleeve, motor means for driving the sleeve and thereby the sub and stem rotatably relative to said body section, and bearing means connecting said sleeve rotatably to said body section independently of any interconnection through said swivel housing, said bearing means including thrust bearing means for supporting a substantial portion of the weight of said body section from said sleeve and through it from said sub and said stem.

15. A well pipe spinner to be connected to a swivel having a housing and having a relatively rotatable tubular fluid passing stem structure projecting downwardly from the housing, said spinner including a circularly con-

tinuous tubular sleeve to be received about said stem structure and dimensioned and constructed to be slipped axially onto and off of the stem structure, means for connecting said sleeve to said stem structure in a position of reception thereabout and against axial removal therefrom and for rotation therewith to drive the stem structure rotatably, a body section, bearing means connecting said sleeve to said body section for rotation relative thereto and retaining said body section against axial separation from the sleeve so that the body section and sleeve may be slipped as a unit axially onto and off of said stem structure, motor means for driving said sleeve and thereby said stem structure rotatably relative to said body section, and means for retaining said body section against rotation so that said motor means may drive the sleeve.

16. A well pipe spinner as recited in claim 15, in which said bearing means include thrust bearing means supporting the weight of said body section from said stem structure through said sleeve.

17. A well pipe spinner as recited in claim 15, including a ring gear carried about said sleeve, said motor means being carried by said body section, and a gear driven by said motor means and releasably engageable with said ring gear in driving relation.

18. A well pipe spinner as recited in claim 17, in which said means for retaining said body section against rotation includes a tube projecting upwardly from said body section about said stem structure, and means connecting an upper portion of said tube to said swivel housing.

19. A well pipe spinner as recited in claim 15, in which said means for connecting said sleeve to said stem structure include a constrictible collet tightenable against the stem structure.

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