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Kelly

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[54] **PIPE TONG POSITIONING SYSTEM**

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[73] Assignee: **Borg-Warner Corporation**, Chicago, Ill.

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[52] **U.S. Cl.** **81/57.35**; 166/66; 324/37

[51] **Int. Cl.** **B25b 13/50**

[58] **Field of Search** ..... 81/57.15–57.21, 81/57.33–57.35; 324/37; 91/361, 363 R; 166/65 R, 65 M, 66, 77.5

[56] **References Cited**

UNITED STATES PATENTS

2,714,874	8/1955	Hart	91/361
3,017,621	1/1962	Taborsky	324/37
3,103,976	9/1963	DeVries et al.	166/46
3,194,313	7/1965	Fanshawe	166/77.5 X R
3,229,099	1/1966	Schwinghamer et al.	91/459 UX
3,273,054	9/1966	Cook	324/37
3,361,961	1/1968	Zoellick	324/40
3,435,614	4/1969	Ledeen et al.	91/361 X R
3,465,241	9/1969	Metzger et al.	324/37
3,680,412	8/1972	Mayer et al.	81/57.34
3,780,815	12/1973	Barron et al.	81/57.16 X R

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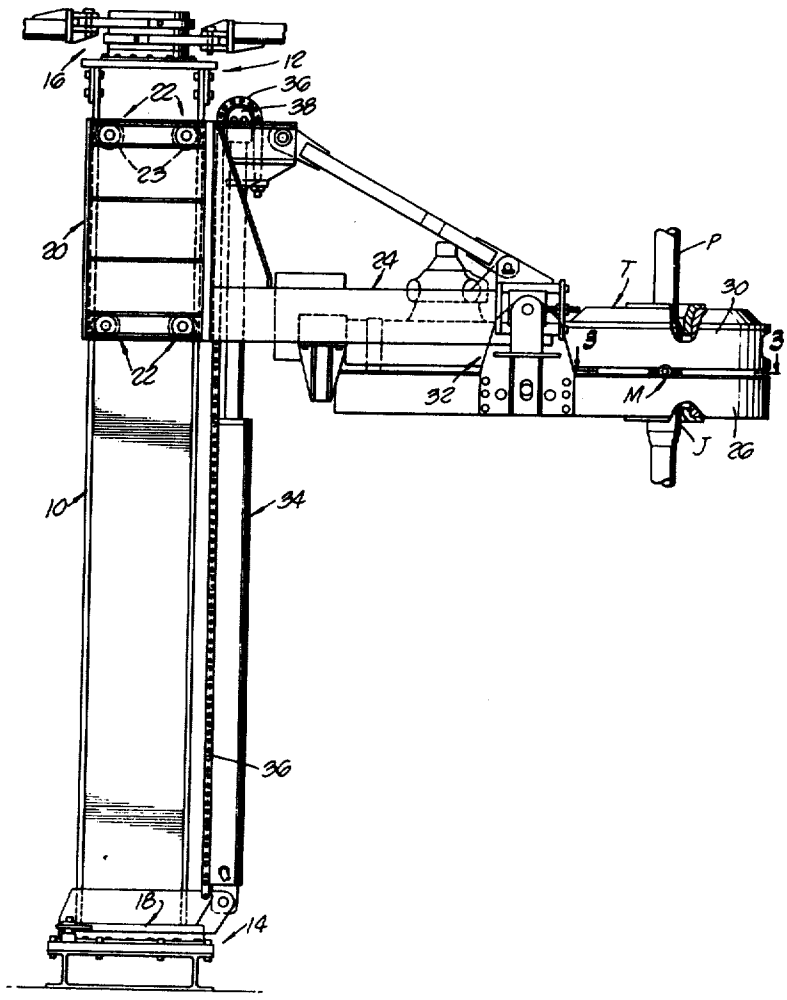
Assistant Examiner—K. J. Ramsey
Attorney, Agent, or Firm—Aubrey L. Burgess

[57] **ABSTRACT**

The combination of a power driven pipe tong and a backup tong is supported upon a hoist mechanism to be positioned vertically with respect to the tool joints of a string of drill pipe. A magnetic eddy current detector is disposed adjacent to the drill pipe and produces a command signal to control the hoist mechanism and stop motion when the tong assembly is in a position at which the tool joint engaging jaws of the power tong and the backup tong are properly engageable with the tool joints.

13 Claims, 8 Drawing Figures



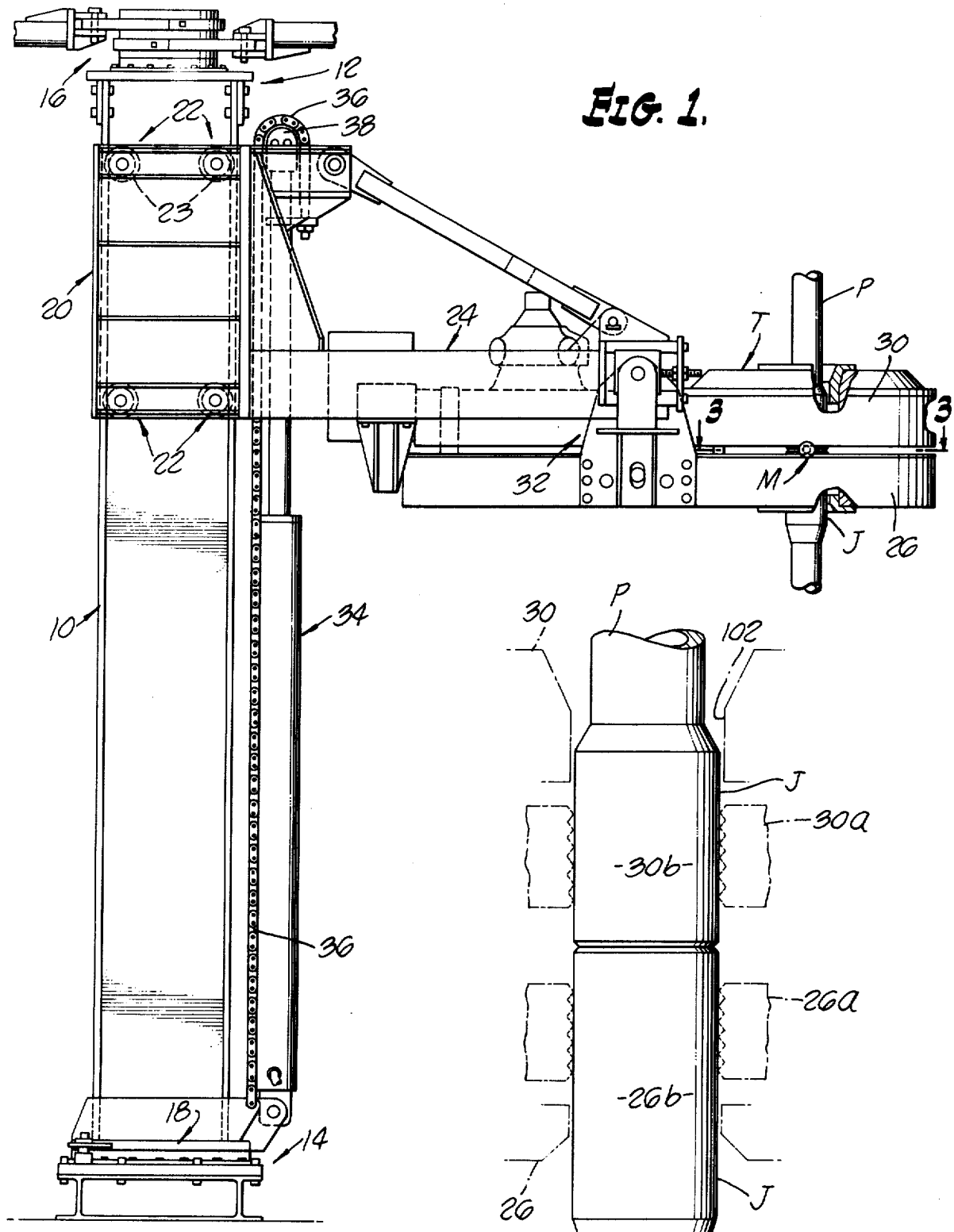

16
12
36
38
22
23
20
24
P
T
30
3
3
22
32
M
J
26
10
34
36
18
14

FIG. 1.

30
P
102
J
30a
30b
26a
26b
26
J

FIG. 2.

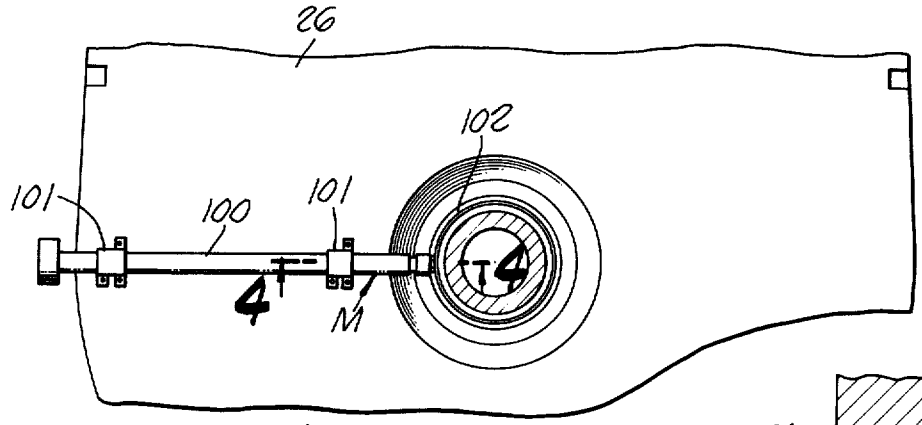
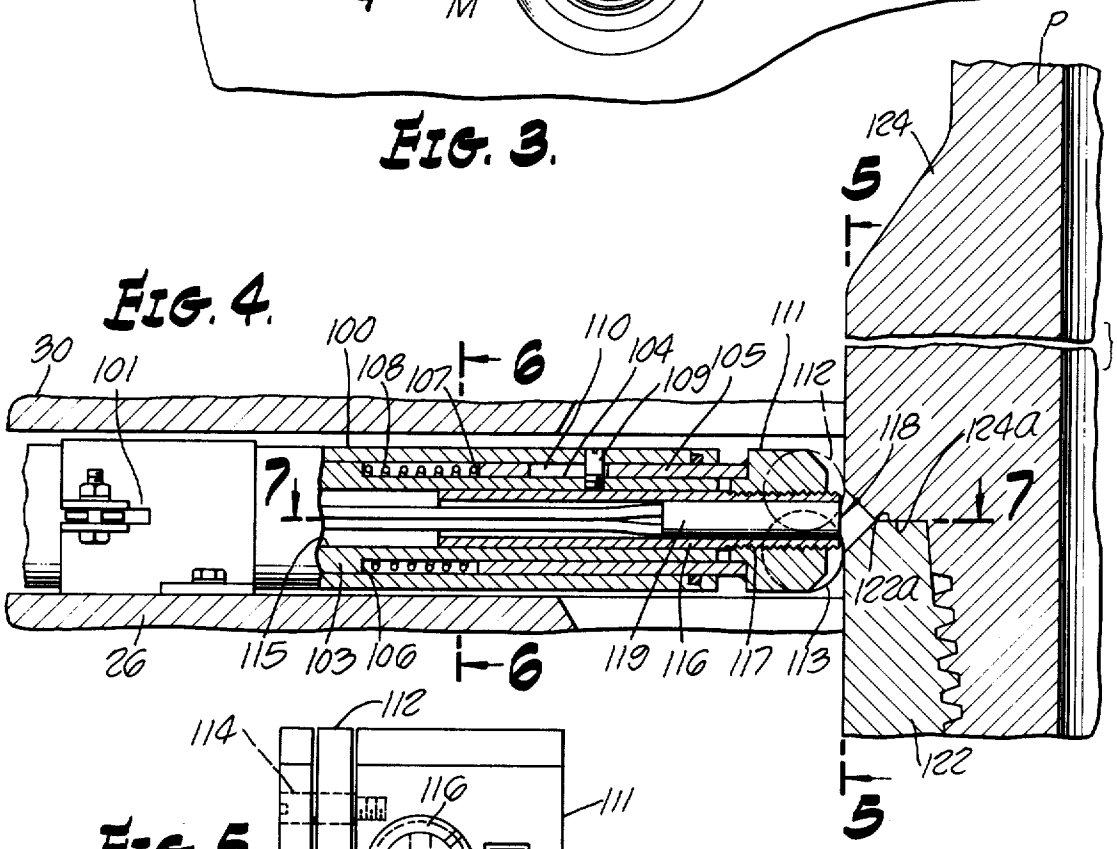

26
102
101
100
101
4
4
M

FIG. 3.


P
124
5
5
FIG. 4.
30
101
100
108
107
6
110
104
109
105
111
112
7
7
118
124a
122a
26
115
103
106
6
119
116
117
113
122

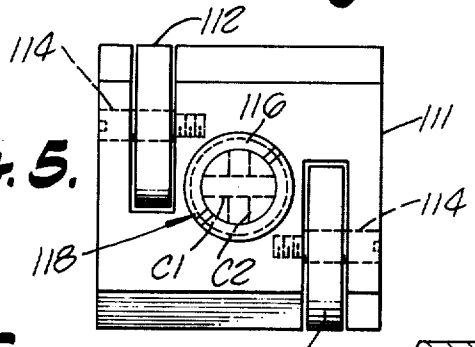


FIG. 5.
114
112
116
111
114
118
C1
C2
113

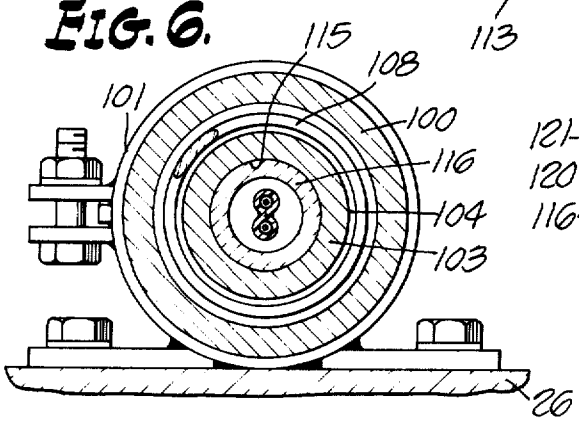


FIG. 6.
115
108
101
100
116
104
103
26

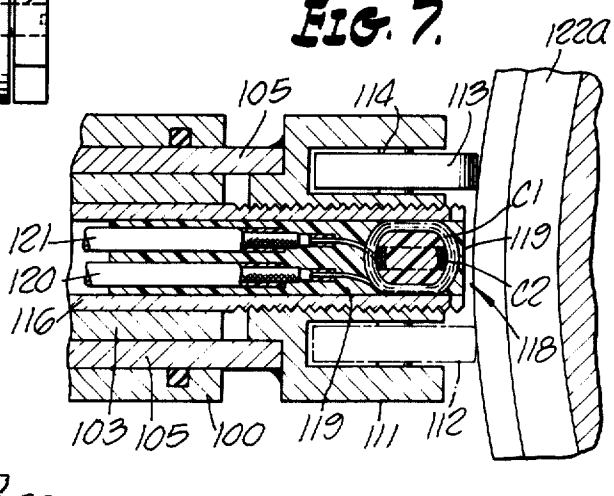


FIG. 7.
122a
105
114
113
C1
121
119
120
C2
116
118
103
105
100
119
111
112

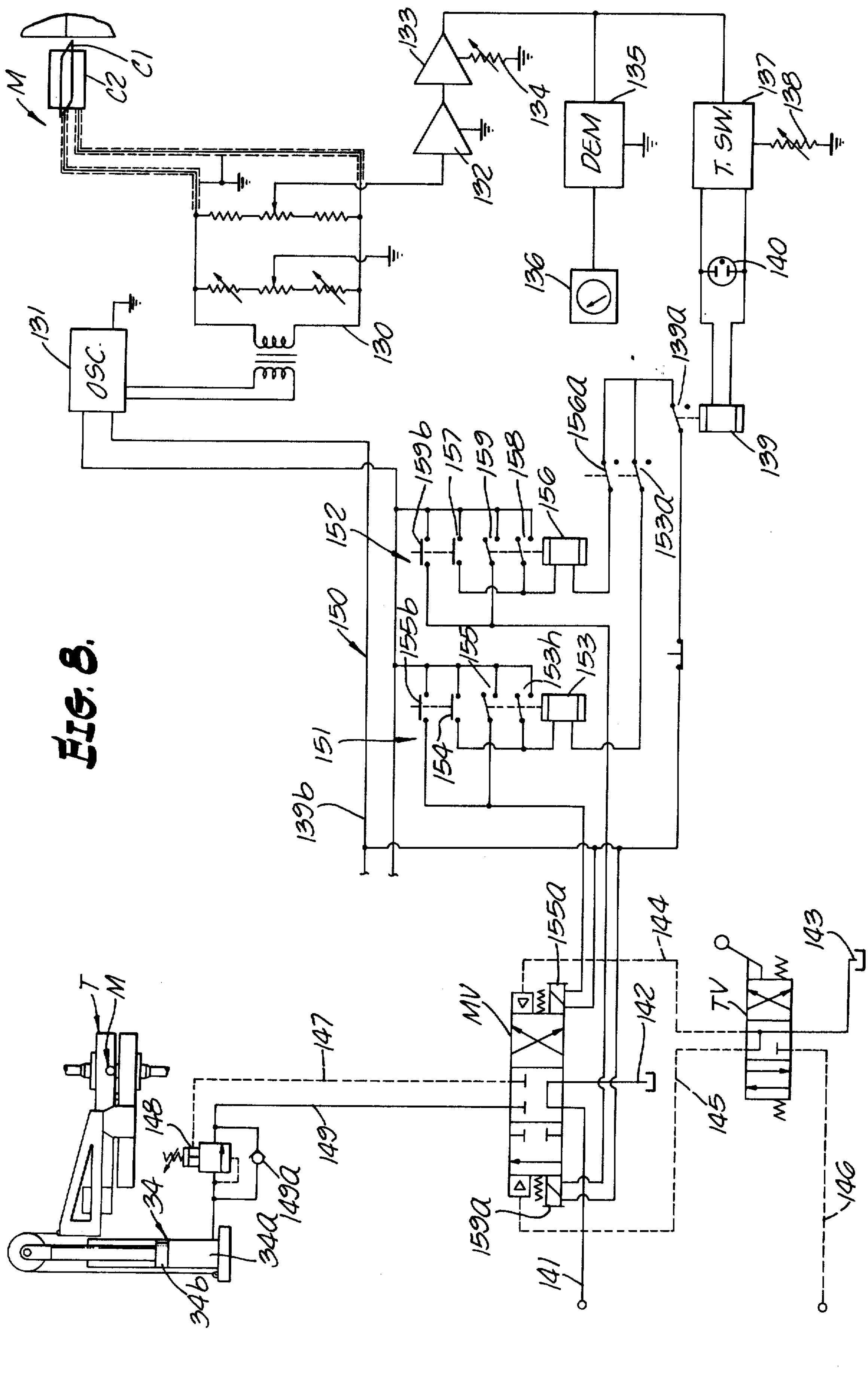

OSC.
DEM
T. SW.
M
C1
C2
T
MV
TV
130
131
132
133
134
135
136
137
138
139
139a
139b
140
141
142
143
144
145
146
147
148
149
149a
150
151
152
153
153a
153h
154
155
155a
155b
156
156a
157
158
159
159a
159b
34
34a
34b

FIG. 8.

PIPE TONG POSITIONING SYSTEM

BACKGROUND OF THE INVENTION

In the drilling of well bores, such as oil and gas wells, into the earth, and in other operations involving the completion, treatment or production of wells, a length of pipe is periodically round tripped. The drill string or string of pipe consists of stands which are made up of lengths of pipe, and the stands are successively made up or broken out of the string as the string is being run into and being removed from the well. During the drilling of the well, the well drilling pipe string is periodically round tripped for changing the bit at frequent intervals involving substantial labor and expense, and in order to facilitate the making up and breaking out of the so called tool joints between pipe stands, power tong apparatus has been developed comprising a power driven pipe gripping tong mechanism which is utilized in combination with a stationary backup pipe gripping tong mechanism engageable with the tool joint sections which are relatively rotatable to make up and break out the joints.

An example of such a combined power driven and backup tong is shown and described generally in the pending application for letters patent filed in the name of C. D. Barron, et al, Ser. No. 216,216, filed Jan. 7, 1962, for Power Tong Positioning Apparatus, now U.S. Pat. No. 3,780,815, issued Dec. 25, 1973, and assigned to the parent corporation of the wholly owned subsidiary corporation to which the present application is assigned, wherein the combined tong assembly is supported by a hoist mechanism so as to be positioned with respect to a string of drill pipe or the like, at a location at which the power operated pipe gripping mechanism and the backup pipe gripping mechanism are properly engageable with the tool joint sections.

In the manual control of such pipe tong positioning devices it is necessary that an operator visually correlate the tool joint with respect to the tong assembly as the latter is raised or lowered and be able to precisely position the tong assembly. However, it frequently occurs that the drilling and other well treating or producing activities are conducted during the night or during other periods when visibility is poor. Moreover, in the case of an automated drilling system it would be necessary that the tong assembly be properly positioned with respect to the tool joint in a pipe string in an automatic and accurate manner.

SUMMARY OF THE INVENTION

The present invention involves utilizing sensing means carried by or adjacent to the combined power driven and backup tongs of a vertically movable tong assembly, the sensing means being operable to provide a control signal whereby vertical movement of the tong combination is arrested at a location at which the power driven tong and the backup tong are properly positioned for engagement of the tool joint engaging tong jaws with the tool joint parts of the pipe joint.

More particularly, the present invention involves the utilization of a magnetic eddy current responsive sensing unit which is adapted to provide a control signal whereby the hoist mechanism for a combined power driven tong and backup tong is controlled to properly position the tongs with respect to the tool joint parts.

In a specific sense, in accomplishing the foregoing, a magnetic eddy current sensing means is carried by the combined power driven and backup tong assembly and includes a probe supported in close proximity to the pipe, whereby when the interface between a pair of tool joint parts is detected due to the discontinuity, a control signal is supplied to de-energize the hoist operating means so that the tongs will be properly positioned with respect to the tool joints.

The joint detector is biased to a position with respect to the pipe so that the sensing head is adapted to be uniformally closely positioned relative to the tool joint over a range of tool joint diameters to compensate for worn, under-sized joints.

The tool joint detecting means may be combined with a set of power driven and backup tongs which are supported, by way of example, by the hoist mechanism of the aforementioned application for letters patent, Ser. No. 216,216, or by other hoist mechanism which is adapted to be controlled in response to the control signal transmitted thereto by the sensing means.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a fragmentary view in side elevation with parts of the tong assembly broken away to disclose a tool joint therein;

FIG. 2 is an enlarged fragmentary detail view illustrating a typical drill pipe tool joint, portions of the tongs being shown in broken lines;

FIG. 3 is an enlarged horizontal section between the power tong and backup tong of FIG. 1, as taken on the plane of the line 3—3 of FIG. 1 and illustrating the disposition of the sensing means;

FIG. 4 is an enlarged fragmentary view in vertical section, as taken on the line 4—4 of FIG. 3;

FIG. 5 is an elevation of the end of the sensing means, as taken on the line 5—5 of FIG. 4;

FIG. 6 is a transverse section as taken on the line 6—6 of FIG. 4 and on a slightly enlarged scale;

FIG. 7 is a fragmentary detailed view in section as taken on the line 7—7 of FIG. 4 and on an enlarged scale; and

FIG. 8 is a schematic diagram showing the sensing means and the hoist controlling means.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to FIG. 1 there is shown hoisting apparatus for positioning a tong assembly T vertically with respect to a string of well pipe, such as well drilling pipe P having a joint J which interconnects the pipe stands. The hoist apparatus includes a vertically disposed column 10 formed, in the illustrative embodiment, of an I-beam having a lower or base support 14, and an upper brace or support 12 is connected to the top of the column 10. Upper bearing means 16 and lower bearings means 18 provide a pivotal connection for the beam so that it can be rotated on a vertical axis and to enable the tong assembly T to be swung to and from a position aligned with the well bore.

A generally hollow and elongated rectangular support collar 20 is slideably disposed about the column 10 and is adapted to be moved upwardly and downwardly on the column 10. The collar 20 is supported for vertical movement on the column 10 by roller assemblies 22 incorporated within the collar 20. As shown, a plurality of flanged rollers 23 are included in each roller assembly 22 and are engageable with the inner faces of the

flanges of the I-beam column **10** to maintain the collar **20** against cocking on the column.

A tong supporting yoke structure **24** is mounted on the collar **20** and projects horizontally therefrom, the yoke structure **24** supporting the pipe tong assembly T. This tong assembly, as is cutomary, includes a backup tong **26** and a power driven tong **30** interconnected together and mounted within a cradle assembly **32.** An example of a power tong assembly T of the type generally disclosed herein is more particularly shown and described in the application for U.S. letters patent Ser. No. 134,552, filed Apr. 16, 1972, in the name of Carl A. Wilms, and assigned to the parent corporation of the wholly owned subsidiary corporation to which the present application is assigned. In such an assembly, the backup tong **26** is adapted to hold one section of a joint J in the pipe P against rotation while the power driven tong **30** engages the other joint section and rotates the same in a selected direction depending upon whether the joint is being made up or broken out.

Disposed adjacent to and extending vertically along side the column **10** is a power source **34** shown in the form of a hydraulic piston and cylinder actuator unit. The power source **34** is pivotally mounted at its lower end to the lower support **14** and has at its upper end a roller or sprocket **38** over which one or more roller chains **36** extend, the chains **36** being anchored at their lower ends to the lower support **14** and extending upwardly over the sprocket **38** to provide a downwardly extending run which is connected to the yoke structure **24.** The arrangement of the hoist chain and piston cylinder unit is such that the movement of the tong assembly T is twice the movement of the power source so that the tong can be moved over a large vertical span without necessitating an equally long actuator.

In the use of the tong hoist when running the pipe string P, the tong is lowered to a location affording clearance for the pipe supporting elevator until the pipe in the well bore is supported by the usual slip mechanism and the elevator is released. A next stand of pipe is then stabbed into the upper end of the pipe string and the tong assembly T is elevated to a location at which the respective tongs are engageable with the tool joints. When retrieving or pulling the pipe string, the tong assembly T is also lowered to enable the elevator to be latched on or lowered onto the pipe string supported in the slips, and when successive joints are raised the tong assembly T is elevated by its hoist to enable the tongs to engage the tool joints, as more specifically described below.

The present invention is addressed to the problem of positioning the tong assembly T with respect to the pipe P so that the pipe gripping mechanism or jaws within the respective backup tong and power tong **26** and **30,** as shown in broken lines in FIG. **2** and designated **26*a*** and **30*a***, are adapted to engage the respective joint sections **26*b*** and **30*b*** of the pipe joint J, not only when the pipe string P is being pulled from the well, but also when the pipe string is being run back into the well. During the removal of the pipe string from the well, the tool joints in the pipe string must be broken out, and during running of the pipe string the joints in the pipe string must be made up. During the running in and retrieving of the pipe string from the well, it is, as pointed out above, hoisted or lowered in an elevator adapted to be hoisted by the usual drilling rig draw works, and the pipe string in the well is supported in the usual slip mechanism, while a length or stand of pipe is being broken out of or being made up in the pipe string. During the period that the pipe string is not supported in the slips but is being moved by the elevator, the tong assembly T is normally lowered to an out-of-the-way location, but when the pipe string is supported in the slips the tong assembly T must be elevated to a position at which the pipe gripping jaws **26*a*** and **30*a*** are adapted to engage the tool joint sections **26*b*** and **30*b***. Proper positioning of the tong assembly T with respect to the pipe P is difficult, at best, but the difficulty is increased when visibility is poor such as at night or during inclement weather.

Accordingly, the present invention involves the utilization of pipe joint detecting means M located between the backup tong **26** and power tong **30** so as to scan the pipe as the tong assembly T is being elevated and detect a joint so as to cause the hoist mechanism to be deenergized when the tong assembly T is at its proper location.

As seen in FIG. **7** the joint detector means M is a magnetic eddy current detector device, such as the model ED-400 "MAGNATEST" instrument of Magnaflex Corporation, referred to above, incorporated in an assembly whereby the device is adapted to closely follow the pipe joint sections.

More particularly, the instrument M includes an elongated hollow case **100** suitably mounted on the backup tong assembly **26** as by releasable clamps or brackets **101,** so that the overall disposition of the case **100** on the tong **26** can be adjusted radially with respect to the pipe opening **102** through the tong assembly.,Other modes of supporting the case **100** may be employed, including, if desired, means for retracting the case when the sensor is not in use and moving the case to an opperative position.

Within the outer case or body **100** of the instrument M is an inner elongated body **103** having a cylindrical outer surface **104** on which is longitudinally and slidably disposed a sleeve **105.** Interposed between opposed shoulders **106** and **107** on the inner body **103** and the sleeve **105,** respectively, is a coiled compression spring **108** which normally biases the sleeve **105** outwardly with respect to the case **100.** The sleeve **105** is maintained in a predetermined orientation within the case **100** by means of a suitable fixed pin **109** and pin receiving elongated slot **110** in the sleeve **105.** Suitably affixed to the outer end of the sleeve **105** is a sensing head **111,** this head **111** rotatably supporting a pair of vertically and laterally spaced rollers **112** and **113** on axles **114,** whereby the proximity of the head **111** to the pipe P and more particularly to the joint sections **26*b*** and **30*b*** is pre-determined, the spring **106** maintaining a bias on the sleeve **105** which causes the sleeve to be projected longitudinally from the case **100** to an extent limited by the length of the slot **110.** The length of the slot **110** may be such that the outward extension of the sleeve **105** with respect to the case **100** is so limited that the rollers **112** and **113** may not contact the reduced diameter or mid-section of the pipe P, but in any event the enlarged diameter coupling portions or tool joints **26*b*** and **30*b*** are engageably by the rollers **112** and **113,** notwithstanding variations in the diameter of the tool joints which may be caused by wear.

Carried by the head **111** and extending telescopically into a bore **115** within the inner body **103** is a tubular support **116** which is adjustably threaded at **117** into

the head **111** and contains a coil assembly **118** encapsulated within insulating body **119** and including coils C1 and C2 connected by conductors **120** and **121** respectively to the current inducing and detecting system hereinafter to be described, whereby the anomaly at the upper end shoulder **122***a* of the lower tool joint box **122** which is engageable with the anomaly at the downwardly facing shoulder **124***a* on the pin end **124** of the upper pipe section causes a variation in the eddy current in the tool joint, whereby to establish a signal for interrupting operation of the hoist power means **34** when the tong assembly T is in the proper relationship to the tool joint as shown in FIG. **4**, at which position, as seen in FIG. **2**, the jaws **26***a* and **30***a* of the backup tong and power tong **26** and **30** respectively are engageable with the tool joints **26***b* and **30***b*.

The coils C1 and C2 are in circuit with the control means, as typical of the ED-400 "MAGNATEST" instrument referred to above. Referring to FIG. **8** it will be noted that the coils C1 and C2 are connected to a bridge circuit **130** containing the usual fixed and variable balancing resistances and connected to a power source **131**. The output signal from the bridge circuit **130** is supplied to a tuned pre-amplifier **132**, the output of which is supplied to an amplifier **133** which is adjustable by sensitivity control potentiometer means **134**. The output from the amplifier **133** drives a demodulator **135** to produce an output signal which is supplied to a meter **136**. In addition, the undemodulated signal from the amplifier **133** is supplied to a threshold switch **137** containing a silicon rectifier which is adapted to be triggered when the undemodulated signal is at a predetermined level as, determined by a threshold switch adjustor potentiometer **138**. When the threshold switch **137** is triggered, a relay **139** is energized to control operation of the hoist power source **34**, and if is desired, a glow tube **140** may be in circuit with the relay **139** to indicate that it has been energized.

As also seen in FIG. **8**, the hoist means **34** is adapted to be elevated by hydraulic fluid pressure supplied to a cylinder **34***a* beneath the piston **34***b*, under the control of a combined manual and automatically operated valving system. The valving system includes a pilot operated main valve MV which is, for illustrative purposes, normally spring loaded to a position at which fluid pressure supplied from a supply conduit **141** is shut off from the actuator cylinder **34***a* and flows to tank at **142**. At the same time pilot fluid pressure is exhausted to tank at **143** through a normally closed throttle valve TV via the pilot conduits **144** and **145**, as shown in broken lines, and pilot pressure from a source conduit **146** is shut off at the valve TV.

When it is desired to exhaust pressure fluid from the actuator cylinder **34***a* the valve TV is shifted left, as seen in FIG. **8** to establish communication between the pilot pressure source **146** and the pilot conduit **144** so as to shift the main valve MV to the left as viewed in FIG. **8**, whereby fluid pressure from the source **141** is supplied via a conduit **147** to a normally closed pilot valve **148** to open the latter and allow fluid to exhaust from the actuator cylinder **34***a* through the conduit **149** and thence to the tank at **142** through the main valve MV. When it is desired to elevate the tong assembly T by applying fluid under pressure to the actuator cylinder **34***a*, the throttle valve TV is shifted to the right, thereby applying pilot fluid pressure to the main valve and thereby shift it to the right to establish communication between the source conduit **141** and the conduit **149** leading to a back flow preventing valve **149***a* bypassing the pilot valve **148**, which will effect elevation of the tong assembly T and hold it in the elevated position.

The main valve MV is also shiftable between its two positions from its center position by solenoid actuators under the control of a switching circuit generally denoted at **150** and including a down switching mechanism **151** and up switching mechanism **152**. The down switching mechanism includes a down relay **153** which is adapted to be energized by a manual switch **154** so as to be latched in the energized condition by a holding switch **153***h*, so that contacts **155** are maintained to energize the solenoid **155***a* and move the main valve MV to the left as seen in FIG. **8**. Correspondingly, the up switching mechanism **152** includes an up relay **156** adapted to be energized by a manual switch **157** which closes holding contacts **158** to maintain contacts **159** closed and energize the solenoid **159***a* of the main valve MV. Each of the down and up switching mechanisms **151** and **152** also includes a manual switch **155***b* and **159***b*, respectively adapted to manually energize the respective solenoids **155***a* and **159***a* in an overriding manner. Interposed in the circuit with the down and up relays **153** and **156** are respective switches **153***a* and **156***a* which may be suitably actuated to an open position to limit upward and downward motion of the tong assembly beyond a fixed range when the system is being controlled by the eddy current detector means M. Now it will be apparent that energization of the up and down switching circuitry **151** and **152** requires that the contacts **139***a* of the control relay **139** be closed to complete the circuit between a source conductor **139***b* and one side of the respective relays **153** and **156**. If desired, the detector operated relay **139** or some other signal responsive means which is energized when the joint J is properly positioned in the tong assembly T, may be operated to effect actuation of the tongs **26** and **30**.

What is claimed is:

1. In combination, pipe tong means engageable with the threadedly engaged joint portions of a tool joint of well pipe extending vertically into a well bore for making up and breaking out said tool joint portions, power actuated hoist means associated with said pipe tong means for vertically moving said pipe tong means along the well pipe between a first inoperative position in which said pipe tong means is below the tool joint and a second inoperative position in which said pipe tong means is above the tool joint, control means associated with said hoist means for controlling the movements of said pipe tong means between said positions, said control means including magnetic eddy current responsive detector means carried by said pipe tong means and sensitive to the tool joint for operating said control means to stop said hoist means when said pipe tong means moves into operative position adjacent to the tool joint in which position said pipe tong means is engageable with the joint portions, and wherein said detector means has a sensing head provided with spacing means for predetermining the space between said sensing head and said joint portions.

2. In combination, pipe tong means engageable with the threadedly engaged joint portions of a tool joint of well pipe extending vertically into a well bore for making up and breaking out said tool joint portions, power

actuated hoist means associated with said pipe tong means for vertically moving said pipe tong means along the well pipe between a first inoperative position in which said pipe tong means is below the tool joint and a second inoperative position in which said pipe tong means is above the tool joint, control means associated with said hoist means for controlling the movements of said pipe tong means between said positions, said control means including magnetic eddy current responsive detector means carried by said pipe tong means and sensitive to the tool joint for operating said control means to stop said hoist means when said pipe tong means moves into operative position adjacent to the tool joint in which position said pipe tong means is engageable with the joint portions, and wherein said detector means has a sensing head provided with spacing means for predetermining the space between said sensing head and said joint portions, said spacing means comprising vertically and laterally spaced joint portion engaging elements adapted to bridge the anomoly at said joint portions.

3. In combination, pipe tong means engageable with the threadedly engaged joint portions of a tool joint of well pipe extending vertically into a well bore for making up and breaking out said tool joint portions, power actuated hoist means associated with said pipe tong means for vertically moving said pipe tong means along the well pipe between a first inoperative position in which said pipe tong means is below the tool joint and a second inoperative position in which said pipe tong means is above the tool joint, control means associated with said hoist means for controlling the movements of said pipe tong means between said positions, said control means including magnetic eddy current responsive detector means carried by said pipe tong means and sensitive to the tool joint for operating said control means to stop said hoist means when said pipe tong means moves into operative position adjacent to the tool joint in which position said pipe tong means is engageable with the joint portions, and wherein said detector means includes a sensing head having a coil assembly, means supporting said sensing head for movement towards said joint portions, biasing means for urging said sensing head towards said joint portions, and means for positioning said coil assembly in spaced relation to said joint portions.

4. In combination, pipe tong means engageable with the threadedly engaged joint portions of a tool joint of well pipe extending vertically into a well bore for making up and breaking out said tool joint portions, power actuated hoist means associated with said pipe tong means for vertically moving said pipe tong means along the well pipe between a first inoperative position in which said pipe tong means is below the tool joint and a second inoperative position in which said pipe tong means is above the tool joint, control means associated with said hoist means for controlling the movements of said pipe tong means between said positions, said control means including magnetic eddy current responsive detector means carried by said pipe tong means and sensitive to the tool joint for operating said control means to stop said hoist means when said pipe tong means moves into operative position adjacent to the tool joint in which position said pipe tong means is engageable with the joint portions, and wherein said detector means includes a sensing head having a coil assembly, means supporting said sensing head for movement towards said joint portions, biasing means for urging said sensing head towards said joint portions, and means for positioning said coil assembly in spaced relation to said joint portions including spacer means carried by said sensing head and engageable with said joint portions.

5. In combination, pipe tong means engageable with the threadedly engaged joint portions of a tool joint of well pipe extending vertically into a well bore for making up and breaking out said tool joint portions, power actuated hoist means associated with said pipe tong means for vertically moving said pipe tong means along the well pipe between a first inoperative position in which said pipe tong means is below the tool joint and a second inoperative position in which said pipe tong means is above the tool joint, control means associated with said hoist means for controlling the movements of said pipe tong means between said positions, said control means including magnetic eddy current responsive detector means carried by said pipe tong means and sensitive to the tool joint for operating said control means to stop said hoist means when said pipe tong means moves into operative position adjacent to the tool joint in which position said pipe tong means is engageable with the joint portions, and wherein said detector means includes a sensing head having a coil assembly, means supporting said sensing head for movement towards said joint portions, biasing means for urging said sensing head towards said joint portions, and means for positioning said coil assembly in spaced relation to said joint portions including spacer means carried by said sensing head and engageable with said joint portions at vertically and laterally spaced locations.

6. In combination, pipe tong means engageable with the threadedly engaged joint portions of a tool joint of well pipe extending vertically into a well bore for making up and breaking out said tool joint portions, power actuated hoist means associated with said pipe tong means for vertically moving said pipe tong means along the well pipe between a first inoperative position in which said pipe tong means is below the tool joint and a second inoperative position in which said pipe tong means is above the tool joint, control means associated with said hoist means for controlling the movements of said pipe tong means between said positions, said control means including magnetic eddy current responsive detector means carried by said pipe tong means and sensitive to the tool joint for operating said control means to stop said hoist means when said pipe tong means moves into operative position adjacent to the tool joint in which position said pipe tong means is engageable with the joint portions, and wherein said detector means includes a sensing head having a coil assembly, means supporting said sensing head for movement towards said joint portions, biasing means for urging said sensing head towards said joint portions, and means for positioning said coil assembly in spaced relation to said joint portions including means adjustably supporting said head on said detector means.

7. In combination, pipe tong means engageable with the threadedly engaged joint portions of a tool joint of well pipe extending vertically into a well bore for making up and breaking out said tool joint portions, power actuated hoist means associated with said pipe tong means for vertically moving said pipe tong means along the well pipe between a first inoperative position in

which said pipe tong means is below the tool joint and a second inoperative position in which said pipe tong means is above the tool joint, control means associated with said hoist means for controlling the movements of said pipe tong means between said positions, said control means including magnetic eddy current responsive detector means carried by said pipe tong means and sensitive to the tool joint for operating said control means to stop said hoist means when said pipe tong means moves into operative position adjacent to the tool joint in which position said pipe tong means is engageable with the joint portions, and wherein said detector means includes a sensing head having a coil assembly, means supporting said sensing head for movement towards said joint portions, biasing means for urging said sensing head towards said joint portions, and means for positioning said coil assembly in spaced relation to said joint portions including means adjustably supporting said head on said detector means, and spacer means carried by said sensing head and engageable with said joint portions.

8. The combination of claim **1**, wherein said hoist means includes actuator means, means for supplying motive power to said actuator means, and said control means including manually operable means for controlling the application of motive power to said actuator means.

9. The combination of claim **1**, wherein said hoist means includes a fluid pressure operated actuator for raising said tong means, said control means including valve means shiftable between selected positions for controlling the application of pressure fluid to and the exhaust of pressure fluid from said actuator, and means responsive to said detector means for shifting said valve means to the position for the application of pressure fluid to said actuator.

10. The combination of claim **1**, wherein said hoist means includes a fluid pressure operated actuator for raising said tong means, said control means including valve means shiftable between selected positions for controlling the application of pressure fluid to and the exhaust of pressure fluid from said actuator, and means responsive to said detector means for shifting said valve means to the position for the application of pressure fluid to said actuator, and also including means responsive to said detector means for shifting said valve means to the position for the exhaust of pressure fluid from said actuator.

11. The combination of claim **1**, wherein said hoist means includes a fluid pressure operated actuator for raising said tong means, said control means including valve means shiftable between selected positions for controlling the application of pressure fluid to and the exhaust of pressure fluid from said actuator, and means responsive to said detector means for shifting said valve means to the position for the application of pressure fluid to said actuator, and also including means responsive to said detector means for shifting said valve means to the position for and the exhaust of pressure fluid from said actuator, and manual means for effecting movement of said valve means to said positions.

12. The combination of claim **1**, wherein said hoist means includes a fluid pressure operated actuator for raising said tong means, said control means including valve means shiftable between selected positions for controlling the application of pressure fluid to and the exhaust of pressure fluid form said actuator, and means responsive to said detector means for shifting said valve means to the position for the application of pressure fluid to said actuator, and also including means responsive to said detector means for shifting said valve means to the position for and the exhaust of pressure fluid from said actuator, and manual means for effecting movement of said valve means to said positions, said manual means being incorporated in said means responsive to said detector means.

13. The combination of claim **1**, wherein said hoist means includes a fluid pressure operated actuator for raising said tong means, said control means including valve means shiftable between selected positions for controlling the application of pressure fluid to and the exhaust of pressure fluid from said actuator, and means responsive to said detector means for shifting said valve means to the position for the application of pressure fluid to said actuator, and also including means responsive to said detector means for shifting said valve means to the position for and the exhaust of pressure fluid from said actuator, and manual means for effecting movement of said valve means to said positions, said manual means including pilot valve means for positioning the first mentioned valve means.

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