

Search query (4): [SP]: cross-reference to related applications [0001] this application claims the benefit of u.s. prov. appl. 62/080,847, filed 17 nov. 2014, which is incorporated herein by reference. background of the disclosure [0002] fig. 1 shows a closed-loop drilling system 10 according to the prior art for controlled pressure drilling. the drilling system 10 has a rotating control device (rcd) 12 from which a drill string 14, a bottom hole assembly (bha), and a drill bit 18 extend downhole in a wellbore 16 through a formation f. the rotating control device (rcd) 12 atop the bop contains and diverts annular drilling returns to create the closed loop of incompressible drilling fluid.[0003] the system 10 also includes mud pumps 34, a standpipe (not shown), a mud tank 32, a mud gas separator 30, and various flow lines, as well as other conventional components. in addition to these, the drilling system 10 includes an automated choke manifold 20 that is incorporated into the other components of the system 10.[0004] finally, a control system 40 of the drilling system 10 is centralized and integrates hardware, software, and applications across the drilling system 10. the centralized control system 40 is used for monitoring, measuring, and controlling parameters in the drilling system 10. as such, the control system 40 can be characterized as a managed pressure drilling (mpd) control system. in this contained environment of closed-loop drilling, minute wellbore influxes or losses are detectable at the surface, and the control system 40 can analyze pressure and flow data to detect kicks, losses, and other events and can alter drilling parameters to control drilling operations in response.[0005] the automated choke manifold 20 manages pressure and flow during drilling and is incorporated into the drilling system 10 downstream from the rotating control device 12 and upstream from the gas separator 30. the manifold 20 has chokes 22, a mass flowmeter 24, pressure sensors (not shown), a local controller (not shown) to control operation of the manifold 20, and a hydraulic power unit (not shown) and/or electric motor to actuate the chokes 22. the control system 40 is communicatively coupled to the manifold 20 and has a control panel with a user interface and processing capabilities to monitor and control the manifold 20.[0006] the mass flowmeter 24 is used in the mpd system 10 to obtain flow rate measurements. during operations, for example, highly precise and accurate flow rate measurements are desired along an extended range of flow encountered during managed pressure drilling. however, the typical mass flowmeter 24 inherently loses accuracy at a low end of the flow measurement scale due to internal losses.[0007] a type of flowmeter with the highest accuracy over the full range of desired flow rates is a coriolis mass flowmeter. the coriolis flowmeter is valued for its precision and ability to measure volumetric flow rate, mass flow rate, and fluid density simultaneously. for this reason, the flowmeter 24 of the mpd system 10 tends to use a coriolis flowmeter rated to the highest expected flow rate.[0008] unfortunately, there are some disadvantages associated with the coriolis mass flowmeter 24. for example, the fluid connections of the coriolis mass flowmeter 24 tend to have a lower pressure rating than the rest of the equipment used in the mpd system 10. moreover, the coriolis flowmeter 24 is typically rated for a lower working pressure than the choke manifold 20 of the mpd system 10. in particular, the manifold 20 for the mpd system 10 as in fig. 1 may typically be rated for up to 10,000-psi pressure. however, even though the flowmeter's pressure rating depends on its size and materials, the coriolis flowmeter 24 is typically limited to a rating of less than 3,000-psi, and usually about 1,500 to 2,855-psi.[0009] for these reasons, the coriolis flowmeter 24 must be downstream of the chokes 22 due to this pressure limitation, and pressure relief equipment (not shown) is typically necessary should plugging occur in the flowmeter 24. additionally, the coriolis flowmeter 24 may be installed with a bypass valve 25 and pressure sensor (not shown). if a pressure limit of the flowmeter 24 is exceeded, the bypass valve 25 is actuated to bypass flow around the flowmeter 24 so drilling can continue at rates that may exceed the capacity of the flowmeter 24.[0010] in addition to some of the physical limitations, the coriolis mass flowmeter 24 used in mpd operations has some limitations related to its measurement capabilities. for example, even with the improved range of flow rates, the coriolis mass flowmeter 24 still has a lower accuracy at the lower range of flow rates.[0011] additionally, the coriolis mass flowmeter 24 is limited to taking measurements of fluid with low gas content. when too much gas is mixed with the liquid passing through the flowmeter 24, for example, the measurement error of the flowmeter 24 will increase.[0012] one of the causes of rising gas content within the drilling fluid in mpd operations can be cavitation gas breakout that occurs at the choke 22. valves, such as those used for the choke 22 to control the flow of fluids, have a certain upstream and downstream pressure ratio at which cavitation is likely to occur. this pressure ratio can be characterized by a cavitation index a , which is defined as follows:[ftimg=83239654] $s = \frac{p_u - p_v}{p - p_v} \cdot \frac{1}{2} \cdot \frac{v}{v_2}$ where:[0013] p_u =upstream pressure, psig[0014] p_v =vapor pressure for given temperature, psig[0015] p_d =downstream pressure, psig and[0016] s =cavitation index, dimensionless.[0017] the cavitation index a can change for a valve or choke while it is partially opening or closing. while a valve is closing and flow rate is constant, for example, the cavitation index s drops. when the cavitation index a drops to a certain value, cavitating bubbles form within the fluid as it passes through the valve. the specific value of the cavitation index a at which cavitation occurs can be empirically determined and plotted for all the positions of the valve's components (e.g., stem or the like). as the cavitation index a continues to drop below the known cavitating value, the quantity of gas that breaks out of the liquid increases.[0018] for these reasons, when the pressures upstream and downstream of the drilling chokes 22 of the mpd system 10 surpass the threshold of the cavitation index a , portion of the cavitating bubbles can travel along the flow path through the coriolis flowmeter 24 and can cause additional flow measurement error.[0019] in addition to the simple input-output cavitation index discussed above, critical cavitation index is a value that can characterize the effects of local velocity and pressure gradients through a valve, such as the chokes 22. the critical cavitation index can be characterized as:[ftimg=83239655] $s_i = \frac{(p - p_v)}{p_u - p_v} \cdot \frac{1}{2} \cdot \frac{v}{v_2}$ [0020] s_i critical cavitation index[0021] p static pressure in undisturbed flow[0022] p_v vapor pressure[0023] ρ liquid density[0024] v free stream velocity of the liquid this formula describes some of the primary physics behind cavitation.[0025] another cause of gas breakout in mpd operations is due to flash evaporation that can occur within or near the coriolis flowmeter 24. flash evaporation results from the pressure drop through a flow restriction where the downstream pressure is below vapor pressure and s_1 . cavitation occurs within a range below some critical cavitation number when s_1 . [0026] yet another cause of gas breakout in mpd operations can involve flashing that can occur within or near the coriolis flowmeter 24 when positioned at a higher elevation than the flow exit from the system. due to the design and layout of some drilling rig operations, for example, there may be difficulty in finding a place for positioning the coriolis flowmeter 24 at the same elevation or lower than the system's flow exit.[0027] flashing caused by elevation can be a factor if the drilling mud tank is on the ground level and the flowmeter 24 is located more than 34-ft above the tank. this places around 0-psig at the flowmeter 24 assuming a full, steady stream. even if the tank is less than 34-ft below the flowmeter 24, the fluid pressure can still drop lower than atmospheric pressure at the flowmeter 24. this makes it easier for small variations, steps, or protrusions within the pipe to cause localized flashing. to prevent flashing issues, manufacturers of coriolis type flowmeters 24 typically indicate that the system's flow exit should be above the flowmeter 24, which can also keep fluid from draining out of the flowmeter 24 if the flow stops.[0028] in an additional way for gas to enter the flowmeter 24, gas entrained in the fluid can be separated out as the fluid undergoes a pressure drop. for example, entrained gas in oil-based mud can break out during the pressure drop at the choke 22. the gas may not mix back into solution, and the gas bubbles can pass through the flowmeter 24, altering the readings.[0029] one solu

Results: 8

Search history

Search PN=(WO/2016/081448) (Results 1)

1:

Search [SP]: controlled pressure drilling system with flow measurement and well control a drilling system for drilling a wellbore has one or more valves or chokes to control the upstream pressure of drilling fluid flow in a controlled pressure drilling operation. a measurement is obtained of the drilling fluid flow from the wellbore. based on the obtained measurement, the drilling fluid flow is selectively distributed with a distributor through one or more of a plurality of flowmeters, such as coriolis meters. a reading of the drilling fluid flow is obtained from the selected flowmeter(s). upstream pressure in the drilling fluid flow is controlled with the one or more valve based at least in part on the reading from the one or more selected flowmeters. the reading can be a flow rate, a pressure, or the like compared to capacities of the flowmeters. additional valves downstream of the flowmeters can be controlled based on cavitation that the valves are estimated to produce. (Results 0)

Search [SP]: 1. a method of drilling a wellbore with a drilling system, the method comprising: obtaining a measurement of drilling fluid flow from the wellborecontrolling, with one or more valves of the drilling system, upstream pressure of the drilling fluid flow in the wellbore based at least in part on the obtained measurement andselectively distributing the drilling fluid flow from the wellbore through one or more of a plurality of flowmeters of the drilling system based at least in part on the obtained measurement. 2. the method of claim 1, wherein obtaining the measurement of the drilling fluid flow from the wellbore comprises obtaining, at least periodically, the measurement from the one or more selected flowmeters. 3. the method of claim 2, wherein obtaining, at least periodically, the measurement from the one or more selected flowmeters comprises obtaining a mass flow rate of the drilling fluid flow as the measurement using the one or more selected flowmeters. 4. the method of claim 1, wherein selectively distributing the drilling fluid flow from the wellbore through the one or more of the plurality of flowmeters based at least in part on the obtained measurement comprises determining which of the one or more of the plurality of flowmeters to select for distribution by comparing a flow rate of the obtained measurement to a flow capacity of each of the flowmeters. 5. the method of claim 1, wherein selectively distributing the drilling fluid flow from the wellbore through the one or more of the plurality of flowmeters based at least in part on the obtained measurement comprises determining which of the one or more of the plurality of flowmeters to select for distribution by comparing a pressure of the obtained measurement to a pressure capacity of each of the flowmeters. 6. the method of claim 1, wherein selectively distributing the drilling fluid flow from the wellbore through the one or more of the plurality of flowmeters based at least in part on the obtained measurement comprises minimizing a measurement error of the measurement obtained with the one or more of the plurality of flowmeters. 7. the method of claim 6, wherein minimizing the measurement error comprises determining which of the one or more of the plurality of flowmeters to select for distribution by comparing the obtained measurement to the measurement error of each of the flowmeters. 8. the method of claim 1, wherein controlling the upstream pressure and selectively distributing the drilling fluid flow comprises controlling the upstream pressure of the drilling fluid flow in the wellbore concurrently with the selective distribution of the drilling fluid flow through the one or more of the plurality of flowmeters. 9. the method of claim 1, wherein controlling the upstream pressure and selectively distributing the drilling fluid flow comprises controlling the upstream pressure of the drilling

fluid flow in the wellbore separately from the selective distribution through the one or more of the plurality of flowmeters. 10. the method of claim 1, wherein controlling, with one or more valves of the drilling system, the upstream pressure of the drilling fluid flow in the wellbore based at least in part on the obtained measurement comprises adjusting the upstream pressure by operating at least one first of the one or more valves upstream of at least one of the one or more selected flowmeters. 11. the method of claim 10, further comprising adjusting the upstream pressure at least inside the at least one selected flowmeter using at least one second of the valves downstream of the at least one selected flowmeter in response to the adjustment of the at least one first valve. 12. the method of claim 11, further comprising readjusting the at least one first valve in response to the adjustment of the at least one second valve. 13. the method of claim 11, wherein adjusting the upstream pressure at least inside the at least one selected flowmeter using the at least one second valve comprises determining a portion of gas breakout in the at least one selected flowmeter caused by the at least one first valve and adjusting the at least one second valve based on the determination. 14. the method of claim 13, wherein determining the portion of the gas breakout in the at least one selected flowmeter caused by the at least one first valve comprises comparing one or more operational parameters of the at least one selected flowmeter to empirical information associated with the at least one selected flowmeter. 15. the method of claim 11, wherein adjusting the upstream pressure at least inside the at least one selected flowmeter using the at least one second valve comprises calculating a cavitation index based on pressure measured relative to the at least one selected flowmeter and determining that the cavitation index differs from an expected value for the cavitation index for a current position of the at least one first valve. 16. the method of claim 1, wherein selectively distributing the drilling fluid flow through the one or more of the plurality of flowmeters of the drilling system based at least in part on the obtained measurement comprises distributing the drilling fluid flow through a first of the one or more selected flowmeters based on a first level of the obtained measurement and distributing the drilling fluid flow through a second of the one or more selected flowmeters and not the first flowmeter based on a second level of the obtained measurement. 17. the method of claim 16, wherein distributing the drilling fluid flow through the first flowmeter comprises having a first flow capacity for the first flowmeter and distributing the drilling fluid flow through the second flowmeter comprises having a second flow capacity for the second flowmeter different from the first flow capacity. 18. the method of claim 1, wherein selectively distributing the drilling fluid flow through the one or more of the plurality of flowmeters of the drilling system based at least in part on the obtained measurement comprises distributing the drilling fluid flow through a first of the one or more selected flowmeters based on a first level of the obtained measurement and distributing the drilling fluid flow through the first flowmeter and a second of the one or more selected flowmeters based on a second level of the obtained measurements. 19. the method of claim 18, wherein distributing the drilling fluid flow through the first flowmeter comprises having a first flow capacity for the first flowmeter and distributing the drilling fluid flow through the second flowmeter comprises having a second flow capacity for the second flowmeter the same as or different from the first flow capacity. 20. an apparatus for controlled pressure drilling of a wellbore, the apparatus comprising: a plurality of flowmeters in parallel fluid communication and a distributor in fluid communication between the wellbore and the plurality of flowmeters and operable to selectively direct drilling fluid flow from the wellbore to one or more of the plurality of flowmeters. 21. the apparatus of claim 20, wherein the flowmeters each comprise a same flow capacity or comprise at least two different flow capacities. 22. the apparatus of claim 20, wherein the flowmeters comprise a same type of flowmeter device or comprise at least two different types of flowmeter device. 23. the apparatus of claim 20, further comprising at least one first valve in fluid communication upstream of the distributor, the at least one first valve being operable to control upstream pressure in the drilling fluid flow. 24. the apparatus of claim 23, further comprising at least one second valve in fluid communication downstream of the distributor, the at least one second valve being operable to control pressure within the one or more selected flowmeters. 25. the apparatus of claim 20, wherein the distributor comprises a plurality of first valves each in fluid communication upstream of a respective one of the flowmeters. 26. the apparatus of claim 25, wherein each of the first valves is operable to control upstream pressure in the drilling fluid flow. 27. the apparatus of claim 25, wherein each of the first valves is operable to permit and deny the selective direction of the drilling fluid flow through the respective one of the flowmeters. 28. the apparatus of claim 25, further comprising a plurality of second valves each in fluid communication downstream of a respective one of the flowmeters, each of the second valves being operable to control upstream pressure in the respective one of the flowmeters. 29. the apparatus of claim 20, wherein the distributor comprises at least one valve in fluid communication downstream of one or more of the flowmeters, the at least one valve being operable to control upstream pressure in the respective one or more of the flowmeters. 30. the apparatus of claim 20, further comprising a control in operable communication with the distributor and operating the distributor to selectively direct the drilling fluid flow to the one or more (Results 0)

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the specific value of the cavitation index a at which cavitation occurs can be empirically determined and plotted for all the positions of the valve's components (e.g., stem or the like). as the cavitation index a continues to drop below the known cavitating value, the quantity of gas that breaks out of the liquid increases.[0018] for these reasons, when the pressures upstream and downstream of the drilling chokes 22 of the mpd system 10 surpass the threshold of the cavitation index a, portion of the cavitating bubbles can travel along the flow path through the coriolis flowmeter 24 and can cause additional flow measurement error.[0019] in addition to the simple input-output cavitation index discussed above, critical cavitation index is a value that can characterize the effects of local velocity and pressure gradients through a valve, such as the chokes 22. the critical cavitation index can be characterized as: [ftimg=83239655] $s_i = (p - p_v) / 2 \cdot v^2$ [0020] s_i critical cavitation index[0021] p static pressure in undisturbed flow[0022] p_v vapor pressure[0023] ρ liquid density[0024] v free stream velocity of the liquid this formula describes some of the primary physics behind cavitation.[0025] another cause of gas breakout in mpd operations is due to flash evaporation that can occur within or near the coriolis flowmeter 24. flash evaporation results from the pressure drop through a flow restriction where the downstream pressure is below vapor pressure and s_1 . cavitation occurs within a range below some critical cavitation number when s_1 . [0026] yet another cause of gas breakout in mpd operations can involve flashing that can occur within or near the coriolis flowmeter 24 when positioned at a higher elevation than the flow exit from the system. due to the design and layout of some drilling rig operations, for example, there may be difficulty in finding a place for positioning the coriolis flowmeter 24 at the same elevation or lower than the system's flow exit.[0027] flashing caused by elevation can be a factor if the drilling mud tank is on the ground level and the flowmeter 24 is located more than 34-ft above the tank. this places around 0- p_{sig} at the flowmeter 24 assuming a full, steady stream. even if the tank is less than 34-ft below the flowmeter 24, the fluid pressure can still drop lower than atmospheric pressure at the flowmeter 24. this makes it easier for small variations, steps, or protrusions within the pipe to cause localized flashing. to prevent flashing issues, manufacturers of coriolis type flowmeters 24 typically indicate that the system's flow exit should be above the flowmeter 24, which can also keep fluid from draining out of the flowmeter 24 if the flow stops.

[0028] in an additional way for gas to enter the flowmeter 24, gas entrained in the fluid can be separated out as the fluid undergoes a pressure drop. for example, entrained gas in oil-based mud can break out during the pressure drop at the choke 22. the gas may not mix back into solution, and the gas bubbles can pass through the flowmeter 24, altering the readings.[0029] one solu (Results 8)

Title: CORIOLIS VISCOMETER USING PARALLEL CONNECTED CORIOLIS MASS FLOWMETERS

Abstract: A pair of flowmeters having unequal flow carrying capabilities are effectively connected in parallel to receive a material flow. The material flow through the flowmeters supplies output signals to associated meter electronics which derives mass flow and other information for each meter. The meter electronics is pre-programmed with information regarding the physical characteristics of each flowmeter. The meter electronics uses the pre-programmed information and the derived material flow velocity for each meter and other information to determine the viscosity for the material in the flowmeters.

Classifications:

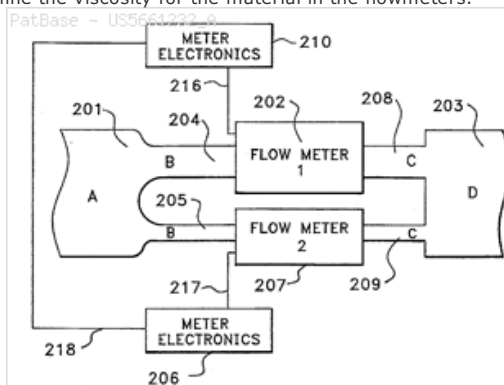
International (IPC 8-9): G01F1/84 G01N11/04 (Advanced/Invention); G01F1/76 G01N11/00 (Core/Invention)

International (IPC 1-7): G01F1/84 G01N11/02 G01N11/04 G01N11/08

CPC: G01F1/8436 G01F7/00 G01N11/04 G01F1/8459 G01F5/00

European: G01F1/84F4 G01F5/00 G01N11/04

US: 73/32R 73/54.05 73/540.5



Family:

Publication number	Publication date	Application number	Application date
AU199720634 A1	19970922	AU19970020634	19970303
CN1163736 C	20040825	CN19971094387	19970303
CN1217788 A	19990526	CN19971094387	19970303
DE69713074 D1	20020711	DE19976013074	19970303
DE69713074 T2	20021017	DE19976013074T	19970303
EP0885382 A2	19981223	EP19970908822	19970303
EP0885382 B1	20020605	EP19970908822	19970303
HK1019637 A1	20050506	HK19990104615	19991019
JP2000505557 T2	20000509	JP19970531872T	19970303
JP3313731 B2	20020812	JP19970531872T	19970303
US5661232 A	19970826	US19960611560	19960306
WO9733150 A2	19970912	WO1997US03280	19970303
WO9733150 A3	19971016	WO1997US03280	19970303

Priority:

US19960611560 19960306 WO1997US03280 19970303

Probable Assignee: MICRO MOTION INC

Assignee(s): (std): MICRO MOTION INC

Assignee(s): MICRO MOTION INC BOULDER

Inventor(s): (std): CLEVE C B VAN ; CLEVE CRAIG BRAINERD VAN ; LOVING C B VAN CLEVE R S ; LOVING R S ; LOVING SCOTT ; VAN CLEVE BRAINERD ; VAN CLEVE CRAIG BRAINERD ; ROGER SCOTT LOVING ; R S LOVING ; LOVING ROGER SCOTT ; CRAIG BRAINERD VAN CLEVE ; C B VAN CLEVE R S LOVING ; C B VAN CLEVE

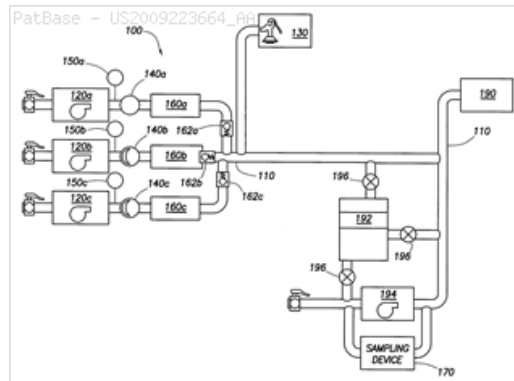
Designated states: AL AM AT AU AZ BA BB BE BF BG BJ BR BY CA CF CG CH CN CU CZ DE DK EE ES FI FR GB GE GH GR HU IE IL IS IT JP KE KG KP KR KZ LC LK LR LS LT LU LV MC MD MG MK MN MW MX NL NO NZ PL PT RO RU SD SE SG SI SK SZ TJ TM TR TT UA UG UZ VN

Title: ON-THE-FLY ACID BLENDER WITH SAMPLING EQUIPMENT

Abstract: Improved methods and systems of blending and analyzing well treatment fluids at a well site are disclosed. A first centrifugal pump pumps a first component of the well treatment fluid into a pipe and a first valve controls the flow of the first component into the pipe. A second centrifugal pump pumps a second component of the well treatment fluid into a pipe and a second valve controls the flow of the second component into the pipe. The pumps and the valves are then controlled in order to control the ratio of the first and second component of the well treatment fluid as they are delivered to the pipe and a sampling device is used to analyze the well treatment fluid.

Classifications:

International (IPC 8-9): B01F13/10 B01F15/04 E21B21/06 E21B21/10 E21B34/00 E21B43/00 E21B43/26 E21B43/267 E21B49/08 G01N1/20 (Advanced/Invention); B01F13/00 E21B21/00 E21B43/25 E21B49/00 (Core/Invention)
CPC: E21B21/062 B01F15/0416 E21B43/267 G01N1/2035 G01N2001/205 G01N2001/2064 G01N2001/2071
European: B01F15/04G2 E21B21/06M E21B43/267 G01N1/20B S01N1/20B3 S01N1/20B5 S01N1/20B7
US: 1/1 166/264 166/90.1 166/90.100S



Family:

Publication number	Publication date	Application number	Application date
AT555272 E	20120515	AT20090717529T	20090304
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BRPI0909355 A2	20150929	BR2009PI09355	20090304
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DK2276905 T3	20120723	DK20090717529T	20090304
EP2276905 A2	20110126	EP20090717529	20090304
EP2276905 B1	20120425	EP20090717529	20090304
MX2010009808 A1	20100930	MX20100009808	20090304
US2009223664 AA	20090910	US20080044228	20080307
US2011284220 AA	20111124	US20110195624	20110801
US9353585 BB	20160531	US20110195624	20110801
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WO09109758 A3	20091119	WO2009GB00606	20090304

Priority:

US20080044228 20080307 EP20090717529 20090304 WO2009GB00606 20090304
US20110195624 20110801

Probable Assignee: HALLIBURTON CO

Assignee(s): (std): CURTIS PHILIP ANTHONY ; HALLIBURTON CO ; HALLIBURTON ENERGY SERV INC ; HALLIBURTON ENERGY SERVICES INC ; HAYWORTH ROBERT ; HAYWORTH ROBERT DOUGLAS

Assignee(s): HALLIBURTON ENERGY SERVICES INC DUNCAN

Inventor(s): (std): HAYWORTH ROBERT ; HAYWORTH ROBERT DOUGLAS

Inventor(s): ROBERT DOUGLAS HAYWORTH

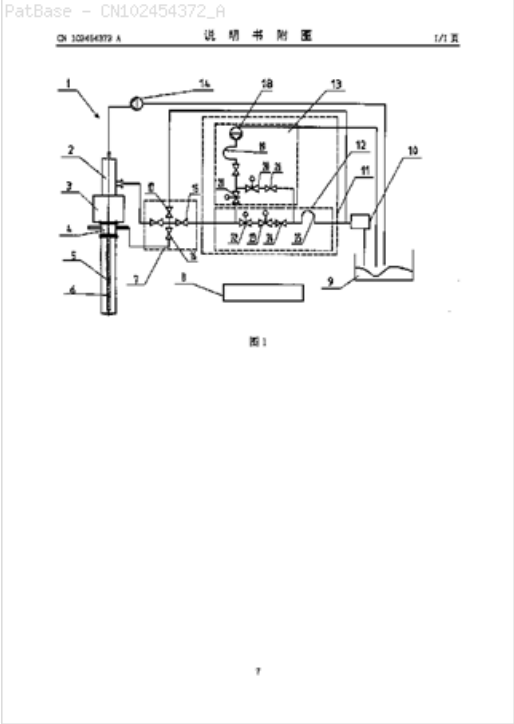
Agent(s): CALLINANS; FISHER ADAMS KELLY CALLINANS; NORTON ROSE CANADA SENCRL SRL LLP; CURTIS PHILIP ANTHONY; JOHN W WUSTENBERG; JOHN W; BAKER BOTTS LLP

Designated states: AE AG AL AM AO AT AU AZ BA BB BE BF BG BH BJ BR BW BY BZ CA CF CG CH CI CM CN CO CR CU CY CZ DE DK DM DO DZ EC EE EG ES FI FR GA GB GD GE GH GM GN GQ GR GT GW HN HR HU ID IE IL IN IS IT JP KE KG KM KN KP KR KZ LA LC LI LK LR LS LT LU LV LY MA MC MD ME MG MK ML MN MR MT MW MX MY MZ NA NE NG NI NL NO NZ OM PG PH PL PT RO RS RU SC SD SE SG SI SK SL SM SN ST SV SY SZ TD TG TJ TM TN TR TT TZ UA UG US UZ VC VN ZA ZM ZW

Title: SHAFT PRESSURE MANAGEMENT SYSTEM AND METHOD

Abstract: The invention discloses a shaft pressure management system and a shaft pressure management method. The system comprises a conventional drilling circulating system, an annulus back pressure system and a monitoring and controlling system, wherein back pressure in the drilling circulating process is controlled by a main throttling back pressure system of the annulus back pressure system; back pressure control and automatic grouting in the process of making a connection and in the tripping process are realized by an auxiliary pump back pressure system of the annulus back pressure system; drilling fluid is circulated and automatic switching in the circulating process is stopped by the main throttling back pressure system and the auxiliary pump back pressure system through hydraulic plate valves; and the monitoring and controlling system can monitor the conventional drilling circulating system, the annulus back pressure system and related information of mud, compare a predicted value of a control object with a set value, and control the annulus back pressure system. By the system and the method, the drilling control capability can be improved, bottom-hole pressure is kept constant in the whole drilling or completion process, and automatic grouting in the tripping process is realized.

Classifications:
International (IPC 8-9): E21B21/08 E21B21/10 E21B47/00 E21B47/06 (Advanced/Invention)



Family:

Publication number	Publication date	Application number	Application date
CN102454372 A	20120516	CN201010511423	20101019
CN201818257 U	20110504	CN201020566976U	20101019

Priority:

CN201010511423 20101019 CN201020566976U 20101019

Probable Assignee: DRILLING TECH ACAD SINOPEC SHE

Assignee(s): (std): CHINA PETROCHEMICAL CORP ; DRILLING TECH ACAD SINOPEC SHE ; SINOPEC GROUP CO
Assignee(s): DRILLING TECHNOLOGY ACADEMY SINOPEC SHENGLI PETROLEUM ADMINISTRATION BUREAU
Inventor(s): (std): ZONGQING LI ; YONGMING CHEN ; LAIJU HAN ; HUANGANG ZHU ; XIULIANG YAN ; QIANG CAO
Inventor(s): LI ZONGQING ; HAN LAIJU ; CHEN YONGMING ; CAO QIANG ; YAN XIULIANG ; ZHU HUANGANG

Title: DEBRIS REMOVAL SYSTEM AND METHOD FOR PRESSURE CONTROLLED WELLBORE DRILLING AND INTERVENTION OPERATIONS

Abstract: A wellbore debris screening system used with controlled annulus pressure wellbore intervention and drilling operations includes a wellbore annulus seal configured to pressure isolate an annular space between a conduit inserted into the wellbore and the wellbore wall. A first screening device is coupled to an output of the annulus seal. second screening device is coupled to the output of the annulus seal. Valves are provided that are operable to selectively divert flow out of the annulus to the first and to the second screening sections.

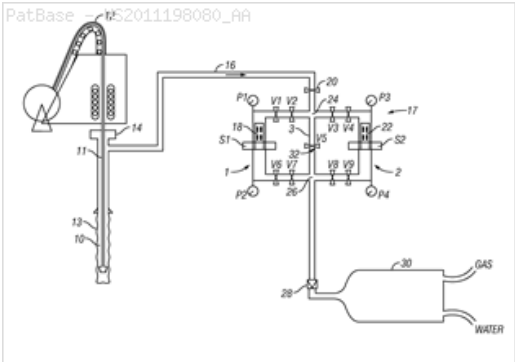
Classifications:

International (IPC 8-9): E21B21/01 E21B21/10 E21B43/02
E21B43/08 (Advanced/Invention)

CPC: E21B21/063 E21B21/08 E21B21/106

European: E21B21/06N E21B21/08 E21B21/10S

US: 166/227 166/227S 166/267



Family:

Publication number	Publication date	Application number	Application date
CA2715949 AA	20110818	CA20102715949	20100930
US2011198080 AA	20110818	US20100887870	20100922

Priority:

US20100305708P 20100218 US20100887870 20100922 CA20102715949 20100930

Probable Assignee:

APACHE CORP

Assignee(s): (std):

APACHE CORP ; DEMONG KARL

Inventor(s): (std):

DEMONG KARL

Agent(s):

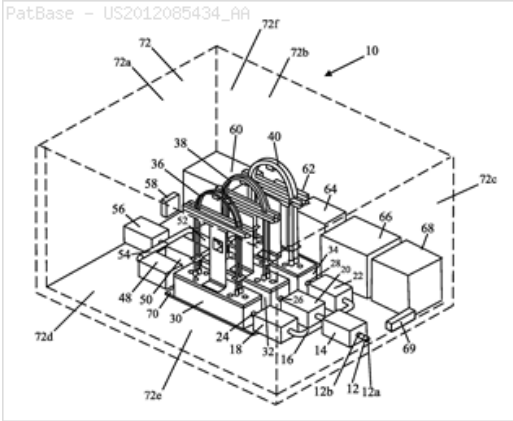
SHAPIRO COHEN

Title: METHOD AND APPARATUS FOR FLOW DEVICE

Abstract: An apparatus and method for controlling the flow of fluids such as liquids or gasses. The apparatus may include an input control valve, an input manifold, first, second, and third further control valves, first, second, and third flow meters, first, second, and third check valves, and an output manifold. The apparatus may further include a control central processing unit which controls the input control valve, the first, second, and third further control valves, and the output control valve. The control central processing unit may receive one or more signals concerning fluid flow through the first, second, and third flow meters and may control flow through the meters by controlling one or more valves. Each of the first, second, and third flow meters may be a coriolis flow meter.

Classifications:

International (IPC 8-9): F16K15/00 (Advanced/Invention)
CPC: G01F1/84 G01F15/005 G05D7/0641 G01F15/185 Y10T137/7722
US: 137/455



Family:

Publication number	Publication date	Application number	Application date
US2012085434 AA	20120412	US20100901601	20101011

Priority:

US20100901601 20101011

Probable Assignee:	IP TECHNOLOGIES INC
Assignee(s): (std):	POWANDA WILLIAM
Assignee(s):	IP TECHNOLOGIES INC
Inventor(s): (std):	POWANDA WILLIAM

Title: AUTOMATIC CHOKE OPTIMIZATION AND SELECTION FOR MANAGED PRESSURE DRILLING

Abstract: A choke valve assembly, system, and method can be used with a drill string in a wellbore to aid in controlling the bottom hole pressure during drilling of the wellbore. The choke valve assembly can have a primary choke and one or more supplemental chokes, where these choke valves each have a controllable range relative to the flow and pressure of drilling fluid passing through the assembly. A control unit can automatically actuate the primary choke and one or more supplemental chokes in order to both maintain the choke valves within their controllable ranges and concurrently maintain a consistent boom hole pressure in the connected wellbore.

Classifications:

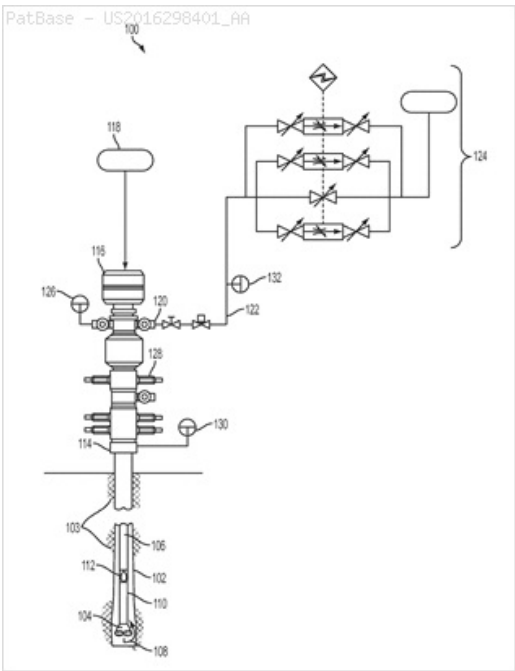
International (IPC 8-9): E21B21/08 E21B21/10 E21B34/02

G05B19/05 (Advanced/Invention)

CPC: E21B34/02 E21B44/00 E21B21/106 G05B19/05

G05B2219/13095 E21B21/08

US: 175/25



Family:

Publication number	Publication date	Application number	Application date
AR102141 AA	20170208	AR2015P103158	20150930
US2016298401 AA	20161013	US20140781967	20141212
WO16093859 A1	20160616	WO2014US70014	Pat41212

Priority:

US20140781967 20141212 WO2014US70014 20141212

Probable Assignee: HALLIBURTON CO

Assignee(s): (std): HALLIBURTON CO ; HALLIBURTON ENERGY SERVICES INC

Inventor(s): (std): CHARLES M POOL ; COTTEN NANCY SUZAN ; ERIC MILLER ; MILLER ERIC ; NANCY S DAVIS ; POOL CHARLES MICHAEL

Agent(s): RUSSELL DEAN W ET AL

Designated states: AE AG AL AM AO AT AU AZ BA BB BE BF BG BH BJ BN BR BW BY BZ CA CF CG CH CI CL CM CN CO CR CU CY CZ DE DK DM DO DZ EC EE EG ES FI FR GA GB GD GE GH GM GN GQ GR GT GW HN HR HU ID IE IL IN IR IS IT JP KE KG KM KN KP KR KZ LA LC LK LR LS LT LU LV LY MA MC MD ME MG MK ML MN MR MT MW MX MY MZ NA NE NG NI NL NO NZ OM PA PE PG PH PL PT QA RO RS RU RW SA SC SD SE SG SI SK SL SM SN ST SV SY SZ TD TG TH TJ TM TN TR TT TZ UA UG US UZ VC VN ZA ZM ZW

Title: AUTOMATIC EVENT DETECTION AND CONTROL WHILE DRILLING IN CLOSED LOOP SYSTEMS

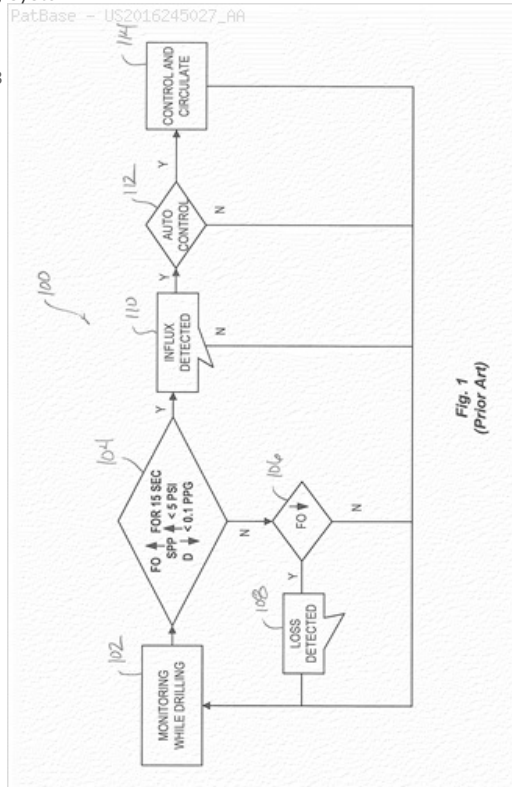
Abstract: Controlled pressure drilling of a borehole with a drilling system detects events and identifies the events as being one of a gas-at-surface event, a kick event, a high-pressure low-volume depletion event, and a gas expansion event. Parameters including flow-in, flow-out, density, and standpipe pressure are monitored. A volume increase is detected between the flow-in and flow-out, and an initiation point of the detected volume increase is identified. At this point, an event from the initiation point is identified based on the monitored parameters from the initiation point. To identify a kick event, for example, the standpipe pressure is determined to have increased from the initiation point without the density decreasing since the initiation point, and a cumulative volume value from the initiation point is determined to be above a first threshold. In response to the identified event, an action is initiated in the drilling system.

Classifications:

International (IPC 8-9): E21B21/08 E21B44/00 E21B47/06 E21B7/00 G05B19/04 (Advanced/Invention)

CPC: E21B7/00 E21B47/06 G05B19/041 G05B2219/45129 E21B21/08 E21B44/00

US: 175/48

**Family:**

Publication number	Publication date	Application number	Application date
AU2016222953 AA	20160901	AU20160222953	20160223
CA2976641 AA	20170814	CA20162976641	20160223
EA201791883 A1	20171229	EA20170091883	20160223
EP3262273 A1	20180103	EP20160709629	20160223
MX2017010718 A1	20171204	MX20170010718	20160223
US2016245027 AA	20160825	US20150628850	20150223
WO16137920 A1	20160901	WO2016US19023	20160223

Priority:

US20150628850 20150223 WO2016US19023 20160223

Probable Assignee: WEATHERFORD TECHNOLOGY HOLDINGS LLC

Assignee(s): (std): WEATHERFORD TECH HOLDINGS LLC ; WEATHERFORD TECHNOLOGY HOLDINGS LLC

Assignee(s): GUMUS FERHAT ; KINIK KORAY ; RING LEV

Inventor(s): (std): FERHAT GUMUS ; GUMUS FERHAT ; KINIK KORAY ; KORAY KINIK ; LEV RING ; RING LEV

Agent(s): SPRUSON AND FERGUSON; RIDOUT AND MAYBEE LLP; DOCHERTY ANDREW JOHN; MCDERMOTT SEAN P

Designated states: AE AG AL AM AO AT AU AZ BA BB BE BF BG BH BJ BN BR BW BY BZ CA CF CG CH CI CL CM CN CO CR CU CY CZ DE DK DM DO DZ EC EE EG ES FI FR GA GB GD GE GH GM GN GQ GR GT GW HN HR HU ID IE IL IN IR IS IT JP KE KG KM KN KP KR KZ LA LC LI LK LR LS LT LU LV LY MA MC MD ME MG MK ML MN MR MT MW MX MY MZ NA NE NG NI NL NO NZ OM PA PE PG PH PL PT QA RO RS RU RW SA SC SD SE SG SI SK SL SM SN ST SV SY SZ TD TG TH TJ TM TN TR TT TZ UA UG US UZ VC VN ZA ZM ZW