Claims

1. An apparatus (100, 200, 300) useable in an offshore drilling installation close to the seabed (110) for controlling well influx within a wellbore comprising:

a centralizer and flow constrictor assembly (128, 228) configured to centralize a drill string (112) within a drill riser (106) and regulate a return mud flow (118);

a sensor (154) located close to the centralizer and flow constrictor assembly (128, 228) and configured to acquire values of at least one parameter related to the return mud flow (118); and

a controller (157) coupled to the centralizer and flow constrictor assembly (128, 228) and the sensor (154), the controller (157) configured to control the centralizer and flow constrictor assembly (128, 228) to achieve a value of a control parameter close to a predetermined value, based on the values acquired by the sensor (154).

2. The apparatus (100, 200, 300) of claim 1, wherein the centralizer and flow constrictor assembly (128, 228) comprises:

at least one centralizer component (101); and

a flow constrictor component (103).

3. The apparatus (100, 200, 300) of claim 2, wherein the centralizer component (101) is comprised of a ram plate (142, 242) and an integrally formed flexible element bearing (130), the flexible element bearing (130) including a bearing surface (134) configured to seal about the drill string (112) while allowing for low friction rotation of the drill string (112).

4. The apparatus (100, 200, 300) of claim 3, wherein the flow constrictor component (103) is comprised of at least one throttle plate (148), including an opening (152) therein for the return mud flow (118), the throttle plate (148) operable to regulate the return mud flow (118).

5. The apparatus (100) of claim 4, wherein the centralizer and flow constrictor assembly comprises:

a first centralizer component (101);

a spaced apart second centralizer component (101); and

a throttle plate (148) disposed on an uppermost surface (150) of the second centralizer component (101),

wherein the first and second centralizer components (101) each comprise a ram plate (140) having an opening (146) therein for the return mud flow (118).

6. The apparatus (100) of claim 5, wherein the sensor (154) is disposed on the drill riser (112) between the first centralizer component (101) and the second centralizer component (101).

7. The apparatus (200, 300) of claim 3, wherein the centralizer and flow constrictor assembly (228) comprises a single centralizer component (101) and a bypass assembly (244) configured to provide a return mud flow (118) from a first side (255) of the single centralizer component (101) to a second side (257) of the single centralizer component (101).

8. The apparatus (200, 300) of claim 7, wherein the bypass assembly (244) comprises a conduit (246) having a valve (252) disposed between a conduit inlet (248) and a conduit outlet (250) and operable to regulate the return mud flow (118), wherein the valve(252) is comprised of a plurality of throttle plates (148) each including an opening (152) therein for the return mud flow (118).

9. The apparatus (200, 200) of claim 8, wherein the sensor (154) is disposed on the conduit (246) between the conduit inlet (248) and the valve (252).

10. An apparatus (100, 200, 300) useable in an offshore drilling installation close to the seabed (110) for controlling well influx within a wellbore comprising:

a drill riser (106) including a cavity extending from an annular space (120) through which a return mud flow (118) passes, the annular space (120) surrounding a drill string (112) through which mud flows (118) towards a top of the well ;

a centralizer and flow constrictor assembly (128, 228) comprising a centralizer component (101) configured to centralize the drill string (112) within the drill riser (106) and a flow constrictor component (103) configured to regulate the return mud flow (118);

a sensor (154) located close to the seabed (110) and configiured to acquire values of at least one parameter related to the return mud flow (118); and

a controller (157) coupled to the centralizer and flow constrictor assembly(128, 228) and the sensor (154), the controller (157) configured to control the centralizer and flow constrictor assembly (128, 228) to achieve a value of a control parameter close to a predetermined value, based on the values acquired by the sensor (154).

CLAIMS

1. An apparatus useable in an offshore drilling installation close to the seabed for controlling well influx within a wellbore comprising:

a centralizer and flow constrictor assembly configured to centralize a drill string within a drill riser and regulate a return mud flow, the centralizer and flow constrictor assembly comprising at least one centralizer component comprised of a ram plate and a flexible element bearing configured to seal about the drill string while allowing rotation of the drill string and a flow constrictor component;

a sensor located close to the centralizer and flow constrictor assembly and configured to acquire values of at least one parameter related to the return mud flow; and

a controller coupled to the centralizer and flow constrictor assembly and the sensor, the controller configured to control the centralizer and flow constrictor assembly to achieve a value of a control parameter close to a predetermined value, based on the values acquired by the sensor.

2. The apparatus of claim 1, wherein the flexible element bearing and the ram plate include high pressure fluid feeds formed therein and configured to provide lubrication to the bearing surface.

3. The apparatus of claim 2, wherein the flow constrictor component is comprised of at least one throttle plate, including an opening therein for the return mud flow, the throttle plate operable to regulate the return mud flow.

4. The apparatus of claim 3, wherein the centralizer and flow constrictor assembly comprises:

a first centralizer component;

a spaced apart second centralizer component; and

a throttle plate disposed on an uppermost surface of the second centralizer component,

wherein the first and second centralizer components each comprise a ram plate having an opening therein for the return mud flow.

5. The apparatus of claim 4, wherein the sensor is disposed on the drill riser between the first centralizer component and the second centralizer component.

6. The apparatus of claim 5, wherein the sensor is configured to measure at least one of a measured pressure or a mud flow density.

7. The apparatus of claim 3, wherein the centralizer and flow constrictor assembly comprises a single centralizer component and a bypass assembly configured to provide the return mud flow from a first side of the single centralizer component to a second side of the single centralizer component.

8. The apparatus of claim 7, wherein the bypass assembly comprises a conduit having a valve disposed between a conduit inlet and a conduit outlet and operable to regulate the return mud flow.

9. The apparatus of claim 8, wherein the valve is comprised of a plurality of throttle plates each including an opening therein for the return mud flow.

10. The apparatus of claim 9, wherein the sensor is disposed on the conduit between the conduit inlet and the valve.

11. The apparatus of claim 10, wherein the centralizer component further comprises an annular one-piece head.

12. An apparatus useable in an offshore drilling installation close to the seabed for controlling well influx within a wellbore comprising:

a drill riser including a cavity extending from an annular space through which a return mud flow passes, the annular space surrounding a drill string through which mud flows towards a top of the well;

a centralizer and flow constrictor assembly comprising:

a first centralizer component and a spaced apart second centralizer component configured to centralize the drill string within the drill riser and a flow constrictor component configured to regulate the return mud flow, the first and second centralizer components each comprising:

a flexible element bearing surface configured to seal about the drill string while allowing rotation of the drill string; and

a ram plate having an opening therein for the return mud flow;

a sensor disposed between the first and second centralizer components, located close to the seabed and configured to acquire values of at least one parameter related to the return mud flow; and

a controller coupled to the centralizer and flow constrictor assembly and the sensor, the controller configured to control the centralizer and flow constrictor assembly to achieve a value of a control parameter close to a predetermined value, based on the values acquired by the sensor.

13. The apparatus of claim 12, wherein the flow constrictor component comprises a throttle plate disposed on an uppermost surface of the second centralizer component and including an opening therein for the return mud flow, the throttle plate operable to regulate the return mud flow.

14. The apparatus of claim 12, wherein the flow constrictor component comprises a bypass assembly configured for the return mud flow, the bypass assembly including a conduit having a valve disposed between a conduit inlet and a conduit outlet and configured to regulate the return mud flow.

15. The apparatus of claim 14, wherein the valve is comprised of a plurality of throttle plates each including an opening therein for the return mud flow and operable to regulate the return mud flow, and wherein the sensor is disposed on the conduit between the conduit inlet and the valve.

16. An apparatus useable in an offshore drilling installation close to the seabed for controlling well influx within a wellbore comprising:

a drill riser including a cavity extending from an annular space through which a return mud flow passes, the annular space surrounding a drill string through which mud flows towards a top of the well;

a centralizer and flow constrictor assembly comprising:

a first centralizer component;

a spaced apart second centralizer component;

a sensor disposed between the first and second centralizer components; and

a flow constrictor component comprising a throttle plate disposed on an uppermost surface of the second centralizer component and including an opening therein for the return mud flow, the throttle plate operable to regulate the return mud flow,

wherein the first and second centralizer components each comprise:

a flexible element bearing including a bearing surface configured to seal about the drill string while allowing rotation of the drill string; and

a ram plate having an opening therein for the return mud flow, the sensor located close to the seabed and configured to acquire values of at least one parameter related to the return mud flow; and

a controller coupled to the centralizer and flow constrictor assembly and the sensor, the controller configured to control the centralizer and flow constrictor assembly to achieve a value of a control parameter close to a predetermined value, based on the values acquired by the sensor.

17. The apparatus of claim 16, wherein the flexible element bearing and the ram plate include high pressure fluid feeds formed therein and configured to provide lubrication to the bearing surface.

18. The apparatus of claim 16, wherein the sensor is configured to measure at least one of a measured pressure or a mud flow density.