

ADVANCED BLOW-OUT PREVENTER

REFERENCES TO CO-PENDING APPLICATIONS

[0001] This application claims the benefit of priority to U.S. Provisional Patent Application No. 61/717,459 to Bryce Levett, Gerard Ludtka, and Mariana Dionisio filed on October 23, 2012 and entitled "Advanced Blow-Out Preventer," which is incorporated by reference in its entirety.

STATEMENT OF GOVERNMENT SUPPORT

[0002] This invention was made with Government support under Work for Others Agreement No. NFE-12-04104 awarded by the United States Department of Energy. The Government has certain rights in this invention.

BRIEF SUMMARY

[0003] Embodiments of the present invention provide a system and method for controlling wells and stopping blowouts once they have begun. An aspect of the invention provides an arrester section configured to restrict flow through a conduit that includes an arrester comprising blades moveable between a retracted position and an extended position in which flow is restricted moreso in the extended position~~a first arrester that extends downwardly towards a wellhead, a second arrester that extends downwardly towards the wellhead and is positioned above and in line with the first arrester; and a motor connected to the first arrester, the motor configured to maintain the blades in the retracted position open the first arrester when energized, wherein the blades are configured to move to the extended position when the motor is not energized.~~ Embodiments of the invention may further include an attachment point below the first arrester that is configured to be attached to a wellhead, shear section, existing BOP, or other common connector. The first arrester section may include blades configured to act together to close around a tubular member. The blades may be solid or include vents. For vented blades, at least some of the vents may be connected by veins.

[0004] Another aspect of the invention provides an advanced BOP configured to restrict flow through a conduit that extends longitudinally and that includes an arrester section comprising a first arrester; wherein the first arrester comprises one or more blades pivotable between a retracted position and an extended position in which flow is restricted moreso in the

extended position, wherein each blade has a first end and a second end, where the first end is longitudinally above the second end when in the retracted position and the pivot point of each blade is closer to the first end than the second end, and wherein at least one of the one or more blades includes one or more vents configured such that material flowing through the conduit flows through the one or more vents past the at least one blade when the at least one blade is in the extended position~~a shear section; and a gripping section; wherein the gripping section is positioned closest to a well head, followed by the shear section, and then the arrester section. The~~ arrester section may include a first arrester extending downwardly towards the wellhead. The first arrester may comprise a number of arrester blades shaped to close around a tubular member. In embodiments of the invention at least one of the arrester blades is vented. Further, all or some of the vented blades include veins connected to a fluid source. The fluid source in one configuration is

configured to hold coagulant, dispersant, or other material that might beneficially be supplied to vents. The arrester section of the advanced BOP may further include a second arrester positioned in line with said first arrester. The second arrester may include a number of vented arrester blades. It is also understood that the vents of the first arrester section define a first vented area; the vents of the second arrester section define a second vented area wherein the first vented area may be larger than the second vented area. The gripping section of the advanced BOP may include a pipe gripping cone extending upwardly from the wellhead. The advanced BOP may include a seal section positioned above the shear section that is designed to seal the well bore once tubular members extending into the well have been sheared. The advanced BOP may also include a retention section that is able to grip and suspend tubular members once they have been sheared.

[0004a] A third aspect of the invention provides a method of using an arrester section comprising blades and configured to restrict flow through a conduit, the method comprising, actively constraining the blades to a retracted position, wherein the blades are moveable between the retracted position and an extended position in which flow is restricted moreso in the extended position wherein the blades move to the extended position when released.

[0005] ~~Another aspect of the invention provides~~There is disclosed an advanced BOP with an arrester section that includes at least one downwardly extending arrester ring; a shear section positioned below said arrester section; and a gripping section positioned below the shear section, wherein the arrester section, shear section, and gripping section define a passage through the BOP large enough to receive a tubular member. The shear section may include inductive shearing blades. The advanced BOP may further include a sealing ring positioned between said arrester section and said shear section. The arrester ring may be configured with overlapping blades that can be actuated to constrict inwardly to reduce the passage through the BOP. The arrester section of the advanced BOP may also include a second arrester ring positioned above said first arrester ring.

[0006] The foregoing has outlined rather broadly the features and technical advantages of the present invention in order that the detailed description of the invention that follows may be better understood. Additional features and advantages of the invention will be described hereinafter which form the subject of the claims of the invention. It should be appreciated by those skilled in the art that the conception and specific embodiment disclosed

may be readily utilized as a basis for modifying or designing other structures for carrying out the same purposes of the present invention. It should also be realized by those skilled in the art that such equivalent constructions do not depart from the spirit and scope of the invention as set forth in the appended claims. The novel features which are believed to be characteristic of the invention, both as to its organization and method of operation, together with further objects and

CLAIMS

What is claimed is:

1. An arrester section configured to restrict flow through a conduit comprising,
~~a first arrester extending downwardly towards a wellhead;~~
~~a second arrester extending downwardly towards the wellhead, said second~~
~~arrester positioned above and in line with the first arrester; and~~
an arrester comprising blades moveable between a retracted position and an
extended position in which flow is restricted more so in the extended position
and
a motor connected to said first arrester, said motor configured to open said
first arrester maintain the blades in the retracted position when energized,
wherein the blades are configured to move to the extended position when
the motor is not energized .
2. The arrester section of claim 1, further comprising,

an attachment point below the ~~first~~ arrester that is configured to be attached to
a wellhead, shear section, existing BOP, or other common connector.
- ~~3. The arrester section of claim 1, wherein said first arrester include blades~~
~~configured to act together to close around a tubular member.~~
- ~~43.~~ 43. The arrester section of claim ~~31~~, wherein at least ~~some one~~ one of the blades
include one or more vents configured such that fluid flowing through the
conduit flows through the one or more vents past the blade when the blade is
in the extended position ~~vents.~~
- ~~54.~~ 44. The arrester section of claim ~~43~~, wherein ~~the one or more~~ one or more vented blades
include one or more veins disposed within the blade and configured to direct
a fluid ~~veins connected to at least some one of the one or more vents.~~

65. An advanced BOP configured to restrict flow through a conduit that extends longitudinally and that comprises,

an arrester section comprising a first arrester;

wherein the first arrester comprises one or more blades pivotable between a retracted position and an extended position in which flow is restricted more so in the extended position,

wherein each blade has a first end and a second end, where the first end is longitudinally above the second end when in the retracted position and the pivot point of each blade is closer to the first end than the second end, and

wherein at least one of the one or more blades includes one or more vents configured such that material flowing through the conduit flows through the one or more vents past the at least one blade when the at least one blade is in the extended position; and

a gripping section; wherein the gripping section is positioned closest to a well head, followed by the shear section, and then the arrester section.

- ~~76.~~ The advanced BOP of claim ~~65~~, wherein the one or more blades are configured to extend in a direction downward~~arrester section includes a first arrester extending downwardly towards the wellhead and inward towards an interior portion of the conduit when in the extended position.~~
- ~~87.~~ The advanced BOP of claim ~~76~~, wherein the one or more blades are configured such that together the one or more blades are closed~~first arrester comprises a number of arrester blades shaped to close around a tubular member that is extending through the conduit when the one or more blades are in the extended position.~~
- ~~9.~~ The advanced BOP of claim ~~8~~, wherein ~~at least one of the arrester blades is vented.~~
- ~~108.~~ The advanced BOP of claim ~~95~~, wherein the at least one vented arrester that is extending through the conduit when the one or more blades are in the extended position~~blades include veins connected to a fluid supply.~~
- ~~109.~~ The advanced BOP of claim ~~108~~, wherein the further comprising a fluid source is sized~~reservoir configured to hold an operable amount of coagulant or dispersant.~~
- ~~1210.~~ The advanced BOP of claim ~~95~~, wherein the arrester section includes a second arrester positioned in line fluid communication with said first arrester.
- ~~1311.~~ The advanced BOP of claim ~~1210~~, wherein the second arrester comprises one or more arrester blades where each blade of the second arrester comprise one or more vents configured such that material flowing through the conduit flows through the one or more vents past each blade when each blade is in a extended position~~a number of vented arrester blades.~~
- ~~1412.~~ The advanced BOP of claim ~~1311~~, wherein the vents of the first arrester ~~section~~ define a first vented area, the vents of the second arrester ~~section~~ define a second vented area, and wherein the first vented area is larger than the second vented area.

13. The advanced BOP of claim 5, further comprising a shear section and a gripping section, wherein the advanced BOP is configured such that the gripping section is positioned closest to a well head, followed by the shear section, and then the arrester section.
14. The advanced BOP of claim 5, further comprising a gripping section,
wherein the gripping section comprises one or more blades pivotable between a retracted position and an extended position in which flow is restricted moreso in the extended position, and
wherein each blade has a first end and a second end, wherein the pivot point of each blade is closer to the first end than the second end and wherein the second end comprises a gripping surface.
15. The advanced BOP of claim 714, wherein the gripping section includes pipe gripping blades moveable between retracted position and an extended position and configured to extend in a direction upward away from the wellhead and inward toward an interior portion of the conduit when in the extended position~~a pipe gripping cone extending upwardly from the wellhead.~~
16. The advanced BOP of claim 813, further comprising a seal section positioned above said shear section, said seal section designed to seal the well bore once a tubular members extending into the well~~have~~has been sheared.
17. The advanced BOP of claim 914, further comprising a retention section configured to grip and suspend tubular member once~~they have~~it has been sheared.

~~18. An advanced BOP comprising,~~

~~an arrester section that includes at least one downwardly extending arrester ring;~~

~~a shear section positioned below said arrester section;~~

~~and a gripping section positioned below the shear section, wherein the arrester section, shear section, and gripping section define a passage through the BOP large enough to receive a tubular member.~~

~~1918. The advanced BOP of claim 185, wherein the shear section includes inductive shearing blades.~~

~~20. The advanced BOP of claim 19, further including a sealing ring positioned between said arrester section and said shear section.~~

~~21. The advanced BOP of claim 20, wherein said arrester ring is configured with overlapping blades that can be actuated to constrict inwardly to reduce the passage through the BOP.~~

~~22. The advanced BOP of claim 21, wherein said arrester section includes a second arrester ring positioned above said first arrester ring.~~

19. A method of using an arrester section comprising blades and configured to restrict flow through a conduit, the method comprising:

actively constraining the blades to a retracted position, wherein the blades are moveable between the retracted position and an extended position in which flow is restricted moreso in the extended position,

wherein the blades move to the extended position when released.