possess the ability to remove petroleum products and other lubricants from articles and any machinery within the vessel. This advantageous characteristic with respect to cleaning textiles and other articles has a detrimental effect with respect to any mechanism subjected to a cyclic load or bearings that must operate, or rotate, under a load. The lubricants contained within such bearings would be quickly depleted.

[0065] To alleviate this problem and according to another embodiment of the present invention the bearings supporting the rotation of the basket are positioned outside of the pressurized environment. Figure 7 is a side cut away view of a bearing / actuator mechanism for supporting a movable basket within a pressure vessel. As shown in this depiction the basket 120 is supported by a pair of rotatable and translatable support actuators, one associated with each end of the basket. Each rotatable actuator includes a shaft 740 that traverses a respective scalable door 220, 230 to interface with and be supported by a set of bearings 745 positioned on the outside portion of the door. Associated with the shaft is a set of seals 750 that allows the shaft to rotate but nonetheless maintains the pressure of the pressure vessel 110. In another embodiment of the present invention the bearings supporting the shaft 740 and by which the shaft 740 rotates can be positioned within the pressurized vessel 110. Moreover and as further described below, the shaft 740 and actuator plate 710 translates longitudinally toward the interior of the pressure vessel to engage the basket.

[0066] While the shaft and the drive mechanism incorporate seals to isolate the environment within the pressure vessel from that of the mechanisms that rotate and translate the actuator, one skilled in the relevant art will recognize that over time and due to normal wear and tear the seals are likely to develop leaks. The interior environment of the pressure vessel during a cleaning cycle includes, pressurized gas, such as carbon dioxide. The differential in pressure (and temperature) between the pressure vessel and the outside environment determines

which states of carbon dioxide will occur. For example certain conditions can result in a leak of carbon dioxide forming dry ice. Dry ice (the solid state of carbon dioxide) can be detrimental to mechanical components. Similarly other differential environmental conditions can result in a leak of liquid carbon dioxide. Liquid carbon dioxide is a very effective solvent of petroleum products such as the lubricants found in bearings. Carbon dioxide gas however is essentially inert. Therefore a seal leak resulting in either the solid or liquid form of carbon dioxide near mechanical components can be detrimental. According to one embodiment of the present invention a secondary pressure environment is formed around the actuator drive mechanisms (both rotational and translational) as well as the bearings supporting the actuator shaft so that should a seal leak occur the components within this secondary pressurized environment will experience gaseous carbon dioxide and not liquid or solid carbon dioxide.

[0067] Returning to Figure 7 and as mentioned above, the rotatable support actuator includes an actuator plate 710 having, in one embodiment, a set of actuator ramps 730 that, when interfaced with complementary ramps 720 associated with the basket, align the basket's central axis with the fixed axis of the shaft 740. At rest and with the door(s) open the actuator is withdrawn from contact with the basket. By doing so the basket rests on a support (or directly on the pressure vessel wall) slightly out of alignment with the central axis of the shaft with ample access to the interior portions of the basket for loading and unloading. In a preferred embodiment of the present invention the actuator plates 710 are retracted from engagement with the basket prior to the opening of either sealable door 220/230. Upon closing of both doors the actuator plates 710 extend the respective actuator ramps 730 to engage with the basket ramps 720 to raise the basket's central axis into alignment with the shaft fixed axis. With both doors closed and with the actuators extended so as to engage the basket, the basket's only contact with the pressure vessel is via the actuators.

embodiment of the present invention the actuator ramps are comprised of a material possessing a greater hardness rating respective to the basket ramps. Moreover a coating or lubrication material such as DLC (Diamond Like Carbon) and the like can be placed on the basket or actuator ramps to enhance the ability of the actuators to engage and lift the basket. In another embodiment of the present invention the actuator pivots to allow the lower ramps to engage first and more effectively. For example in its non-engaged state the basket rests, in one embodiment, on the floor of the pressure vessel. In this position the central axis of the basket is not aligned with the central axis of the actuator shaft. If the actuator plate 710 translated toward the interior of the pressure vessel so as to engage the basket in its resting state, the lower actuator ramps 730 would engage the basket prior to upper ramps. Accordingly there is a significant moment on plate as is translates and engages the basket. In one embodiment of the present invention the actuator plate is operable to pivot slightly downward such that the upper and lower actuator ramps engage the basket ramps in concert. As the actuator continues to translate or stroke the coning effect of the ramps lifts the basket and eliminates any actuator plate pivot.

[0071] As discussed the compression of the ramps, or the stroking of the actuator, engages the basket from both ends and squeezes it into proper alignment by virtue of a simple machine; that machine being a series of concentric wedges approximating concentric cones. The stroking / compression can be accomplished by a variety of forces including compressed gas, mechanical forces (leverage), hydraulics, and electrical motors.

[0072] While the previous example describes a sealable door through which an actuator translates so as to engage and center the basket, another contemplated design of the present invention is to combine the centering functionality of the actuator plate and ramps with the door itself. In such an embodiment closing of the sealable door acts to position and drive the actuator ramps so as to lift and center

We Claim:

1. A densified fluid barrier cleaning system, comprising:

a pressure vessel operable to hold a densified fluid having a first sealable opening that interfaces with a first environment and a second sealable opening that interfaces with a second environment, the first environment and the second environment being separated by a barrier; and

an agitation basket positioned within the pressure vessel.

2. The densified fluid barrier cleaning system of claim 1, wherein the agitation basket is operable to create a mechanical interaction with the densified fluid.

3. The densified fluid barrier cleaning system of claim 1, wherein the pressure vessel is substantially cylindrical.

4. The densified fluid barrier cleaning system of claim 3, wherein the agitation basket includes two or more outer rings wherein each outer rings includes a plurality of wheels mounted about an outer circumference of the agitation basket operable to support rotation of the agitation basket on a fixed axis.

5. The densified fluid barrier cleaning system of claim 1, wherein the pressure vessel is substantially spherical.

6. The densified fluid barrier cleaning system of claim 1, wherein access to an interior region of the agitation basket can be gained through the first sealable opening and the second sealable opening.

7. The densified fluid barrier cleaning system of claim 1, further comprising at least one rotatable engagement mechanisms that can rotate around a fixed axis.

8. The densified fluid barrier cleaning system of claim 7, wherein the first sealable opening and the second sealable opening align respectively with a first agitation basket opening and second agitation basket opening.

9. The densified fluid barrier cleaning system of claim 7, wherein each rotatable engagement mechanism includes a basket interface for engagement of the agitation basket.

10. The densified fluid barrier cleaning system of claim 9, wherein the basket interface engages the agitation basket and aligns the agitation basket with the fixed axis.

11. The densified fluid barrier cleaning system of claim 9, wherein the basket interface includes one or more beveled surfaces that engage with corresponding one or more reciprocal beveled surfaces on the agitation basket so as to align the agitation basket with the fixed axis.

12. The densified fluid barrier cleaning system of claim 7, further comprising a drive system that rotates at least one of the actuators about the fixed axis.

13. The densified fluid barrier cleaning system of claim 1, further comprising a drive system that rotates the agitation basket about a fixed axis.

14. The densified fluid barrier cleaning system of claim 1, wherein the densified fluid includes liquified carbon dioxide.

15. The densified fluid barrier cleaning system of claim 1, wherein the densified fluid includes supercritical carbon dioxide.

16. The densified fluid barrier cleaning system of claim 1, wherein the first environment is a dirty environment and wherein the second environment is a clean environment.

17. The densified fluid barrier cleaning system of claim 1, wherein the pressure vessel includes a heat exchanger apart from the basket.

18. The densified fluid barrier cleaning system of claim 1, further comprising a distillation unit coupled to the pressure vessel, wherein the distillation unit is operable to distill the densified fluid.

19. The densified fluid barrier cleaning system of claim 18, wherein the distillation unit includes a boiling vessel operable to hold the densified fluid in a two phase (gas, liquid) state.

20. The densified fluid barrier cleaning system of claim 19, wherein the pressure vessel includes a heat exchanger submerged in the densified fluid.

21. The densified fluid barrier cleaning system of claim 1, wherein the agitation basket rotates about a fixed axis within the pressure vessel.

22. A method for densified fluid article processing, comprising:

spanning a pressure vessel across a barrier wherein the barrier separates a first environment and a second environment and wherein the pressure vessel includes a first sealable opening that interfaces with the first environment and a second sealable opening that interfaces with the second environment;

positioning an agitation basket within the pressure vessel.

introducing to the agitation basket from the first environment through the first sealable opening one or more soiled articles;

transforming the one or more soiled articles to one or more processed articles using a densified fluid; and

responsive to a completed article process cycle, removing the one or more processed articles from the agitation basket through the second sealable opening into the second environment.

23. The method for densified fluid article processing according to claim 22, wherein the first environment is a dirty environment and the second environment is a clean environment.

24. The method for densified fluid article processing according to claim 22, wherein the pressure vessel is substantially cylindrical.

25. The method for densified fluid article processing according to claim 22, further comprising moveably mounting the agitation basket within the pressure vessel using a plurality of wheels mounted about an outer circumference of the agitation basket operable to rotate the agitation basket within the pressure vessel on a fixed axis.

26. The method for densified fluid article processing according to claim 22, wherein the first sealable opening and the second sealable opening each include a rotatable actuator that can rotate around an actuator fixed axis.

27. The method for densified fluid article processing according to claim 26, wherein the agitation basket includes an agitation fixed axis and wherein positioning includes aligning the agitation fixed axis with the actuator fixed axis.

28. The method for densified fluid article processing according to claim 27, further comprising driving the agitation basket about the agitation fixed axis.

29. The method for densified fluid article processing according to claim 22, further comprising creating within the agitation basket a mechanical interaction between one or more soiled articles and the densified fluid.

30. The method for densified fluid article processing according to claim 22, wherein transforming includes cleaning.

31. The method for densified fluid article processing according to claim 22, wherein the densified fluid includes supercritical carbon dioxide.

32. The method for densified fluid article processing according to claim 22, wherein the densified fluid includes liquified carbon dioxide.

33. The method for densified fluid article processing according to claim 22, wherein transforming includes particle removal and reduction, electro-static charge reduction, bacterial inactivation, disinfection or sterilization.

34. The method for densified fluid article processing according to claim 22, further comprising inhibiting opening of the second sealable opening into the second environment prior to the completed article process cycle.

AMENDED CLAIMS
received by the International Bureau on 15 October 2013 (15.10.2013).

1. A densified fluid barrier cleaning system, comprising:

a pressure vessel operable to hold a densified fluid having a first sealable opening that interfaces with a first environment and a second sealable opening that interfaces with a second environment, the first environment and the second environment being separated by a barrier;

an agitation basket positioned within the pressure vessel, wherein the agitation basket is operable to create a mechanical interaction with the densified fluid within the agitation basket apart from the pressure vessel.

2. The densified fluid barrier cleaning system of claim 1, further comprising a drive mechanism operable to manipulate the agitation basket within the pressure vessel and wherein the drive mechanism exits in a secondary pressure environment such that a leak of the densified fluid into the secondary environment is non-detrimental to the drive mechanism.

3. The densified fluid barrier cleaning system of claim 1, wherein the pressure vessel is substantially cylindrical.

4. The densified fluid barrier cleaning system of claim 3, wherein the agitation basket includes two or more outer rings wherein each outer rings includes a plurality of wheels mounted about an outer circumference of the agitation basket operable to support rotation of the agitation basket on a fixed axis.

5. The densified fluid barrier cleaning system of claim 1, wherein the pressure vessel is substantially spherical.

6. The densified fluid barrier cleaning system of claim 1, wherein access to an interior region of the agitation basket can be gained through the first sealable opening and the second sealable opening.

7. The densified fluid barrier cleaning system of claim 1, further comprising at least one rotatable engagement mechanisms that can engage the agitation basket and rotate the agitation basket around a fixed axis.

8. The densified fluid barrier cleaning system of claim 7, wherein the first sealable opening and the second sealable opening can be configured to align respectively with a first agitation basket opening and second agitation basket opening.

9. The densified fluid barrier cleaning system of claim 7, wherein each rotatable engagement mechanism includes a basket interface for engagement of the agitation basket.

10. The densified fluid barrier cleaning system of claim 9, wherein the basket interface engages the agitation basket and aligns the agitation basket with the fixed axis.

11. The densified fluid barrier cleaning system of claim 9, wherein the basket interface includes one or more beveled surfaces that engage with corresponding one or more reciprocal beveled surfaces on the agitation basket so as to align the agitation basket with the fixed axis.

12. The densified fluid barrier cleaning system of claim 7, further comprising a drive system that rotates at least one of the actuators about the fixed axis.

13. The densified fluid barrier cleaning system of claim 1, further comprising a drive system that rotates the agitation basket about a fixed axis.

14. The densified fluid barrier cleaning system of claim 1, wherein the densified fluid includes liquified carbon dioxide.

15. The densified fluid barrier cleaning system of claim 1, wherein the densified fluid includes supercritical carbon dioxide.

16. The densified fluid barrier cleaning system of claim 1, wherein the first environment is a dirty environment and wherein the second environment is a clean environment.

17. The densified fluid barrier cleaning system of claim 1, wherein the pressure vessel includes a heat exchanger apart from the basket.

18. The densified fluid barrier cleaning system of claim 1, further comprising a distillation unit coupled to the pressure vessel, wherein the distillation unit is operable to distill the densified fluid.

19. The densified fluid barrier cleaning system of claim 18, wherein the distillation unit includes a boiling vessel operable to hold the densified fluid in a two phase (gas, liquid) state.

20. The densified fluid barrier cleaning system of claim 19, wherein the pressure vessel includes a heat exchanger submerged in the densified fluid.

21. The densified fluid barrier cleaning system of claim 1, wherein the agitation basket rotates about a fixed axis within the pressure vessel.

22. A method for densified fluid article processing, comprising:

interfacing with a pressure vessel wherein the pressure vessel spans across a barrier and separates a first environment and a second environment and wherein the pressure vessel includes a first sealable opening that interfaces with the first environment, a second sealable opening that interfaces with the second environment, and an agitation basket positioned within the pressure vessel;

introducing to the agitation basket from the first environment through the first sealable opening one or more soiled articles;

transforming the one or more soiled articles to one or more processed articles using a densified fluid wherein transforming includes manipulating the agitation basket within the pressure vessel; and

responsive to a completed article process cycle, removing the one or more processed articles from the agitation basket through the second sealable opening into the second environment.

23. The method for densified fluid article processing according to claim 22, wherein the first environment is a dirty environment and the second environment is a clean environment.

24. The method for densified fluid article processing according to claim 22, wherein the pressure vessel is substantially cylindrical.

25. The method for densified fluid article processing according to claim 22, further comprising moveably mounting the agitation basket within the pressure vessel using a plurality of wheels mounted about an outer circumference of the agitation basket operable to rotate the agitation basket within the pressure vessel on a fixed axis.

26. The method for densified fluid article processing according to claim 22, wherein the first sealable opening and the second sealable opening each include a rotatable actuator that can rotate around an actuator fixed axis.

27. The method for densified fluid article processing according to claim 26, wherein the agitation basket includes an agitation fixed axis and wherein positioning includes aligning the agitation fixed axis with the actuator fixed axis.

28. The method for densified fluid article processing according to claim 27, further comprising driving the agitation basket about the agitation fixed axis.

29. The method for densified fluid article processing according to claim 22, further comprising creating within the agitation basket a mechanical interaction between one or more soiled articles and the densified fluid.

30. The method for densified fluid article processing according to claim 22, wherein the pressure vessel includes a drive mechanism operable to manipulate the agitation basket within the pressure vessel and wherein the drive mechanism exits in a secondary pressure environment such that a leak of the densified fluid into the secondary environment is non-detrimental to the drive mechanism .

31. The method for densified fluid article processing according to claim 22, wherein the densified fluid includes supercritical carbon dioxide.

32. The method for densified fluid article processing according to claim 22, wherein the densified fluid includes liquified carbon dioxide.

33. The method for densified fluid article processing according to claim 22, wherein transforming includes particle removal and reduction, electro-static charge reduction, bacterial inactivation, disinfection or sterilization.

34. The method for densified fluid article processing according to claim 22, further comprising inhibiting opening of the second sealable opening into the second environment prior to the completed article process cycle.

possess the ability to remove petroleum products and other lubricants from articles and any machinery within the vessel. This advantageous characteristic with respect to cleaning textiles and other articles has a detrimental effect with respect to any mechanism subjected to a cyclic load or bearings that must operate, or rotate, under a load. The lubricants contained within such bearings would be quickly depleted.

[0065] To alleviate this problem and according to another embodiment of the present invention the bearings supporting the rotation of the basket are positioned outside of the pressurized environment. Figure 7 is a side cut away view of a bearing / actuator mechanism 755 for supporting a movable basket within a pressure vessel. As shown in this depiction the basket 120 is supported by a pair of rotatable and translatable support actuators, one associated with each end of the basket. Each rotatable actuator 755 includes a shaft 740 that traverses a respective sealable door 220, 230 to interface with and be supported by a set of bearings 745 positioned on the outside portion of the door. Associated with the shaft is a set of seals 750 that allows the shaft to rotate but nonetheless maintains the pressure of the pressure vessel 110. In another embodiment of the present invention the bearings supporting the shaft 740 and by which the shaft 740 rotates can be positioned within the pressurized vessel 110. Moreover and as further described below, the shaft 740 and actuator plate 710 translates longitudinally toward the interior of the pressure vessel to engage the basket.

[0066] While the shaft and the drive mechanism incorporate seals to isolate the environment within the pressure vessel from that of the mechanisms that rotate and translate the actuator, one skilled in the relevant art will recognize that over time and due to normal wear and tear the seals are likely to develop leaks. The interior environment of the pressure vessel during a cleaning cycle includes, pressurized gas, such as carbon dioxide. The differential in pressure (and temperature) between the pressure vessel and the outside environment determines

which states of carbon dioxide will occur. For example certain conditions can result in a leak of carbon dioxide forming dry ice. Dry ice (the solid state of carbon dioxide) can be detrimental to mechanical components. Similarly other differential environmental conditions can result in a leak of liquid carbon dioxide. Liquid carbon dioxide is a very effective solvent of petroleum products such as the lubricants found in bearings. Carbon dioxide gas however is essentially inert. Therefore a seal leak resulting in either the solid or liquid form of carbon dioxide near mechanical components can be detrimental. According to one embodiment of the present invention a secondary pressure environment is formed around the actuator drive mechanisms (both rotational and translational) as well as the bearings supporting the actuator shaft so that should a seal leak occur the components within this secondary pressurized environment will experience gaseous and/or liquid carbon dioxide and not solid carbon dioxide.

[0067] Returning to Figure 7 and as mentioned above, the rotatable support actuator includes an actuator plate 710 having, in one embodiment, a set of actuator ramps 730 that, when interfaced with complementary ramps 720 associated with the basket, align the basket's central axis with the fixed axis of the shaft 740. At rest and with the door(s) open the actuator is withdrawn from contact with the basket. By doing so the basket rests on a support (or directly on the pressure vessel wall) slightly out of alignment with the central axis of the shaft with ample access to the interior portions of the basket for loading and unloading. In a preferred embodiment of the present invention the actuator plates 710 are retracted from engagement with the basket prior to the opening of either sealable door 220/230. Upon closing of both doors the actuator plates 710 extend the respective actuator ramps 730 to engage with the basket ramps 720 to raise the basket's central axis into alignment with the shaft fixed axis. With both doors closed and with the actuators extended so as to engage the basket, the basket's only contact with the pressure vessel is via the actuators.

embodiment of the present invention the actuator ramps are comprised of a material possessing a greater hardness rating respective to the basket ramps. Moreover a coating or lubrication material such as DLC (Diamond Like Carbon), WC (Tungsten Carbide) and the like can be placed on the basket or actuator ramps to enhance the ability of the actuators to engage and lift the basket. In another embodiment of the present invention the actuator pivots to allow the lower ramps to engage first and more effectively. For example in its non-engaged state the basket rests, in one embodiment, on the floor of the pressure vessel. In this position the central axis of the basket is not aligned with the central axis of the actuator shaft. If the actuator plate 710 translated toward the interior of the pressure vessel so as to engage the basket in its resting state, the lower actuator ramps 730 would engage the basket prior to upper ramps. Accordingly there is a significant moment on plate as is translates and engages the basket. In one embodiment of the present invention the actuator plate is operable to pivot slightly downward such that the upper and lower actuator ramps engage the basket ramps in concert. As the actuator continues to translate or stroke the coning effect of the ramps lifts the basket and eliminates any actuator plate pivot.

[0071] As discussed the compression of the ramps, or the stroking of the actuator, engages the basket from both ends and squeezes it into proper alignment by virtue of a simple machine; that machine being a series of concentric wedges approximating concentric cones. The stroking / compression can be accomplished by a variety of forces including compressed gas, mechanical forces (leverage), hydraulics, and electrical motors.

[0072] While the previous example describes a sealable door through which an actuator translates so as to engage and center the basket, another contemplated design of the present invention is to combine the centering functionality of the actuator plate and ramps with the door itself. In such an embodiment closing of the sealable door acts to position and drive the actuator ramps so as to lift and center

We claim:

1. A densified fluid barrier cleaning system, comprising:

a pressure vessel configured to hold a densified fluid in a primary pressure environment having a first pressure, the pressurized vessel having a first sealable opening that interfaces with a first environment and a second sealable opening that interfaces with a second environment, the first environment and the second environment being separated by a barrier;

an agitation basket positioned within the pressure vessel wherein the agitation basket is configured to create a mechanical interaction with the densified fluid within the agitation basket apart from the pressure vessel; and

a drive system configured to movably suspend the agitation basket between the first sealable opening and the second sealable opening within the pressure vessel and within the primary pressure environment wherein at least a portion of the drive system exists in a secondary pressure environment having a second pressure apart from the primary pressure environment by a pressure seal and wherein the first pressure is distinct from the second pressure.

2. The densified fluid barrier cleaning system of claim 1, further comprising a drive mechanism operable to manipulate the agitation basket within the pressure vessel and wherein the drive mechanism exits in a secondary pressure environment such that a leak of the densified fluid into the secondary environment is non-detrimental to the drive mechanism.

3. The densified fluid barrier cleaning system of claim 1, wherein the pressure vessel is substantially cylindrical.

4. The densified fluid barrier cleaning system of claim 3, wherein the agitation basket includes two or more outer rings wherein each outer rings includes a plurality of wheels mounted about an outer circumference of the agitation basket operable to support rotation of the agitation basket on a fixed axis.

5. The densified fluid barrier cleaning system of claim 1, wherein the pressure vessel is substantially spherical.

6. The densified fluid barrier cleaning system of claim 1, wherein access to an interior region of the agitation basket can be gained through the first sealable opening and the second sealable opening.

7. The densified fluid barrier cleaning system of claim 1, further comprising at least one rotatable engagement mechanisms that can engage the agitation basket and rotate the agitation basket around a fixed axis.

8. The densified fluid barrier cleaning system of claim 7, wherein the first sealable opening and the second sealable opening can be configured to align respectively with a first agitation basket opening and second agitation basket opening.

9. The densified fluid barrier cleaning system of claim 7, wherein each rotatable engagement mechanism includes a basket interface for engagement of the agitation basket.

10. The densified fluid barrier cleaning system of claim 9, wherein the basket interface engages the agitation basket and aligns the agitation basket with the fixed axis.

11. The densified fluid barrier cleaning system of claim 9, wherein the basket interface includes one or more beveled surfaces that engage with corresponding one or more reciprocal beveled surfaces on the agitation basket so as to align the agitation basket with the fixed axis.

12. The densified fluid barrier cleaning system of claim 7, further comprising a drive system that rotates at least one of the actuators about the fixed axis.

13. The densified fluid barrier cleaning system of claim 1, further comprising a drive system that rotates the agitation basket about a fixed axis.

14. The densified fluid barrier cleaning system of claim 1, wherein the densified fluid includes liquefied carbon dioxide.

15. The densified fluid barrier cleaning system of claim 1, wherein the densified fluid includes supercritical carbon dioxide.

16. The densified fluid barrier cleaning system of claim 1, wherein the first environment is a dirty environment and wherein the second environment is a clean environment.

17. The densified fluid barrier cleaning system of claim 1, wherein the pressure vessel includes a heat exchanger apart from the basket.

18. The densified fluid barrier cleaning system of claim 1, further comprising a distillation unit coupled to the pressure vessel, wherein the distillation unit is operable to distill the densified fluid.

19. The densified fluid barrier cleaning system of claim 18, wherein the distillation unit includes a boiling vessel operable to hold the densified fluid in a two phase (gas, liquid) state.

20. The densified fluid barrier cleaning system of claim 19, wherein the pressure vessel includes a heat exchanger submerged in the densified fluid.

21. The densified fluid barrier cleaning system of claim 1, wherein the agitation basket rotates about a fixed axis within the pressure vessel.

22. A method for densified fluid article processing, comprising:

spanning a pressure vessel across a barrier, wherein the pressure vessel holds a densified fluid in a primary pressure environment having a first pressure and wherein the barrier separates a first environment and a second environment and wherein the pressure vessel interfaces with the first environment through a first sealable opening and interfaces with the second environment through a second sealable opening;

positioning an agitation basket within the pressure vessel;

introducing to the agitation basket from the first environment through the first sealable opening one or more soiled articles;

processing the one or more soiled articles using the densified fluid, wherein processing includes driving the agitation basket using a drive system wherein at least a portion of the drive system exists in a secondary pressure environment having a second pressure apart from the primary pressure environment by a pressure seal and wherein the first pressure is distinct from the second pressure; and

responsive to processing the one or more soiled articles, removing the one or more processed articles from the agitation basket through the second sealable opening into the second environment.

23. The method for densified fluid article processing according to claim 22, wherein the first environment is a dirty environment and the second environment is a clean environment.

24. The method for densified fluid article processing according to claim 22, wherein the pressure vessel is substantially cylindrical.

25. The method for densified fluid article processing according to claim 22, further comprising moveably mounting the agitation basket within the pressure vessel using a plurality of wheels mounted about an outer circumference of the agitation basket operable to rotate the agitation basket within the pressure vessel on a fixed axis.

26. The method for densified fluid article processing according to claim 22, wherein the first sealable opening and the second sealable opening each include a rotatable actuator that can rotate around an actuator fixed axis.

27. The method for densified fluid article processing according to claim 26, wherein the agitation basket includes an agitation fixed axis and wherein positioning includes aligning the agitation fixed axis with the actuator fixed axis.

28. The method for densified fluid article processing according to claim 27, further comprising driving the agitation basket about the agitation fixed axis.

29. The method for densified fluid article processing according to claim 22, further comprising creating within the agitation basket a mechanical interaction between one or more soiled articles and the densified fluid.

30. The method for densified fluid article processing according to claim 22, wherein the pressure vessel includes a drive mechanism operable to manipulate the agitation basket within the pressure vessel and wherein the drive mechanism exits in a secondary pressure environment such that a leak of the densified fluid into the secondary environment is non-detrimental to the drive mechanism.

31. The method for densified fluid article processing according to claim 22, wherein the densified fluid includes supercritical carbon dioxide.

32. The method for densified fluid article processing according to claim 22, wherein the densified fluid includes liquefied carbon dioxide.

33. The method for densified fluid article processing according to claim 22, wherein transforming includes particle removal and reduction, electro-static charge reduction, bacterial inactivation, disinfection or sterilization.

34. The method for densified fluid article processing according to claim 22, further comprising inhibiting opening of the second sealable opening into the second environment prior to the completed article process cycle.