CLAIMS

1. An emergency release system for a fluid transfer system having a first valve and a second valve that is selectively fluidly coupled to the first valve, the emergency release system comprising:

a breakaway coupler mechanism engageable with the first valve and the second valve to releasably couple the first valve and the second valve together;

an actuator mechanism defined by a dual rod having a first rod member and a second rod member releasably attached to the first rod member, the first rod member engageable with the first valve and the second rod member engageable with the second valve; and

a piston-cylinder assembly configured to engage the actuator mechanism to selectively and simultaneously close the first and second valves, and to disengage the breakaway coupler mechanism from the first valve and the second valve.

2. The emergency release system of claim 1, wherein the piston-cylinder assembly includes a piston coupled to the second rod member to move the actuator mechanism from a connected state in which the first and second rod members are coupled and a disconnected state in which the first and second rod members are separated from one another.

3. The emergency release system of claim 2, wherein the first rod member includes a stop to engageable with a bracket of the first valve, the stop limiting movement actuator mechanism.

4. The emergency release system of claim 1, wherein the first rod member has a first pin engaged with a first valve actuator of the first valve to rotate the first valve actuator about an axis of rotation between a first position and a second position, and the second rod member has a second pin engaged with a second valve actuator of the second valve to rotate the second valve actuator about an axis of rotation between a first position and a second position.

5. The emergency release system of claim 1, wherein a latch is disposed between and selectively couples the first rod member and the second rod member together.

6. The emergency release system of claim 5, wherein the latch includes a first end pivotably secured to the first rod member and a second end that selectively attached with the second rod member, the second end including a latch feature.

7. The emergency release system of claim 6, wherein the latch is coupled to the first rod member by a latch actuator having an eccentric pin with a post and an eccentric portion coupled to the post, the latch being mounted to the first rod member by the post.

8. The emergency release system of claim 7, wherein the first rod member and the second rod member are aligned along a first axis, the post defines a second axis that his perpendicular to the first axis, and the eccentric portion being rotatable about a third axis that is parallel to the second axis, the latch being rotatable with the post about the third axis.

9. The emergency release system of claim 2, wherein the breakaway coupler includes

a first clamp member engaged with the first and second valves, the first clamp member having a first end and a second end, and

a second clamp member engaged with the first and second valves, the second clamp member having a first end coupled to the first end of the first clamp member and a second end, and

a gate releasably coupled to between the second end of the first clamp member and the second end of the second clamp member.

10. The emergency release system of claim 9, wherein the gate has a first end hinged to the second end of the first clamp member and a second end removably coupled to the second end of the second clamp member.

11. The emergency release system of claim 10, wherein one of the first and second rod members further includes a gate actuator to engage the gate of the breakaway coupler as the dual rod moves from the connected state to the disconnected state to disconnect the second end of the gate from the second clamp member thereby decoupling the first and second clamp members.

12. The emergency release system of claim 11, further comprising a safety plate coupled and extending parallel to one of the first rod member and the second rod member, the safety plate being positioned adjacent to the gate when the first and second rod members are coupled.

13. The emergency release system of claim 1, wherein the piston cylinder assembly includes a cylinder having a housing with a first end coupled to one of the first valve and the second valve and a second end extending from the first end, a piston partially positioned within the housing,

the piston extending from the housing and being secured to one of the first and second rod members.

14. The emergency release system of claim 13, wherein the piston is movable between a first position in which the piston extends beyond the housing to a first distance, a second position in which the piston extends beyond the housing to a second distance that is greater than the first distance, and a third position in which the piston extends beyond the housing to a third distance that is greater than the second distance.

15. The emergency release system of claim 14, wherein when the piston moves in a first direction, the piston moves from the first position to the second position thereby causing the first rod member to engage a first valve actuator of the first valve to move the first valve actuator between a first position and a second position, and causing the second rod member to engage a second valve actuator of the second valve to move the second valve actuator between a first position and a second position.

16. The emergency release system of claim 15, wherein continued movement of the piston in the first direction moves the piston from the second position to the third thereby causing the first rod member to separate from the second rod member.

17. The emergency release system of claim 14, wherein when the piston moves in the second direction, the piston moves from the second position to the first position thereby causing the first rod member to engage the first valve actuator of the first valve to move the first valve actuator between the second position and the first position, and causing the second rod member to engage a second valve actuator of the second valve to move the second valve actuator between the second position and the first position.

18. A method of releasing a connection between first and second valves of a fluid transfer system, the method comprising:

detecting a first shut down condition;

actuating an actuator mechanism to close the first and second valves, the actuator mechanism including a first rod member coupled to the first valve and a second rod member coupled to the second valve, the first rod member being coupled to the second rod member;

detecting a second shut down condition; and

separating the first rod member from the second rod member and decoupling a coupler from the first valve and the second valve.

CLAIMS

1. An emergency release system (50) for a fluid transfer system having a first valve (54) and a second valve (58) that is selectively fluidly coupled to the first valve, the emergency release system comprising:

a breakaway coupler mechanism engageable with the first valve and the second valve to releasably couple the first valve and the second valve together;

an actuator mechanism (66) engageable with the first valve and the second valve; and

a piston-cylinder assembly configured to engage the actuator mechanism to selectively and simultaneously close the first and second valves, and to disengage the breakaway coupler mechanism from the first valve and the second valve;

wherein the piston-cylinder assembly comprises:

a cylinder (70) having a housing (400) with a first end (404) coupled to one of the first valve and the second valve and a second end extending from the first end; and

a piston partially positioned within the housing, the piston extending from the housing and being secured to the actuator mechanism;

wherein the piston is movable between a first position in which the piston extends beyond the housing to a first distance, a second position in which the piston extends beyond the housing to a second distance that is greater than the first distance, and a third position in which the piston extends beyond the housing to a third distance that is greater than the second distance; and

wherein the piston is a first piston (412) and the piston-cylinder assembly further comprises:

a second piston (416) arranged to assist the first piston in moving to at least one of the first position, the second position, or the third position.

2. The emergency release system (50) of claim 1, wherein the breakaway coupler mechanism includes

a first clamp member (120) engaged with the first and second valves, the

first clamp member having a first end and a second end, and

a second clamp member (124) engaged with the first and second valves, the second clamp member having a first end coupled to the first end of the first clamp member and a second end, and

a gate releasably coupled to between the second end of the first clamp member and the second end of the second clamp member.

3. The emergency release system (50) of claim 2, wherein the gate has a first end hinged to the second end of the first clamp member and a second end removably coupled to the second end of the second clamp member.

4. The emergency release system (50) of claim 3, wherein the actuator mechanism (66) includes a gate actuator (352) to engage the gate of the breakaway coupler mechanism as the actuator mechanism moves from a connected state to a disconnected state, wherein engagement of the gate actuator with the gate disconnects the second end of the gate from the second clamp member thereby decoupling the first and second clamp members.

5. The emergency release system (50) of claim 4, further comprising a safety plate (326) that is positioned adjacent to the gate when the actuator mechanism is in the connected state.

6. The emergency release system (50) of claim 1, wherein the actuator mechanism comprises a dual rod having a first rod member (300) and a second rod member (304) releasably attached to the first rod member, the first rod member engageable with the first valve and the second rod member engageable with the second valve.

7. The emergency release system (50) of claim 1, wherein when the piston moves in a first direction, the piston moves from the first position to the second position thereby causing the actuator mechanism to engage a first valve actuator (82) of the first valve and a second valve actuator (86) of the second valve, thereby

moving the first valve actuator and the second valve actuator between first positions and second positions.

8. The emergency release system (50) of claim 6 and 7, wherein continued movement of the piston in the first direction moves the piston from the second position to the third position thereby causing the first rod member to separate from the second rod member.

9. The emergency release system (50) of claim 7, wherein when the piston moves in a second direction, the piston moves from the second position to the first position thereby causing the actuator mechanism to engage the first valve actuator of the first valve and the second valve actuator of the second valve, thereby moving the first valve actuator and the second valve actuator between the second positions and the first positions.

10. The emergency release system (50) of claim 6, wherein the first piston (412) is coupled to the second rod member to move the actuator mechanism from a connected state in which the first and second rod members are coupled to a disconnected state in which the first and second rod members are separated from one another.

11. The emergency release system (50) of claim 6, wherein a latch (308) is disposed between and selectively couples the first rod member and the second rod member together.

12. The emergency release system (50) of claim 11, wherein the latch includes a first end pivotably secured to the first rod member and a second end that selectively attached with the second rod member, the second end including a latch feature.

13. The emergency release system (50) of claim 11, wherein the latch is coupled to the first rod member by a latch actuator (338) having an eccentric pin

(340) with a post (342) and an eccentric portion (344) coupled to the post, the latch being mounted to the first rod member by the post.

14. The emergency release system (50) of claim 6, wherein the actuator mechanism has a first pin (312) and a second pin (314), the first pin being engaged with a first valve actuator (82) of the first valve to rotate the first valve actuator about an axis of rotation between a first position and a second position, and the second pin being engaged with a second valve actuator (86) of the second valve to rotate the second valve actuator about an axis of rotation between a first position and a second position.

15. A method of releasing a connection between first and second valves of a fluid transfer system using an emergency release system (50) of any one of the preceding claims, the method comprising:

detecting a first shut down condition;

actuating an actuator mechanism (66) that is coupled to the first valve and the second valve to close the first and second valves;

detecting a second shut down condition; and

decoupling a coupler (62) from the first valve and the second valve.

16. The method of claim 15, wherein actuating the actuator mechanism comprises:

moving the first and second pistons from the first position to the second position, the second position causing the actuator mechanism to close the first valve and the second valve without actuating the breakaway coupler mechanism.

17. The method of claim 16, further comprising, wherein actuating the breakaway coupler mechanism comprises:

moving the first and second pistons from the second position to the third position such that the coupler is only decoupled subsequent to the first valve and the second valve being closed.