CLAIMS:

1. An valve for use in an air exchange panel of a transportation refrigeration system, comprising:

a valve cap positioned adjacent the air exchange panel and movable between a first position and a second position, the valve cap including a magnetic portion;

a resilient flexible member, separate from and coupled to the valve cap, the resilient flexible member being connected to the air exchange panel to bias the valve cap into a first position;

an electromagnet positioned inside the air exchange panel opposite the valve cap, and

a controller that selectively applies power to the electromagnet to move the valve cap between the first position and the second position.

2. The electro-magnetic check valve according to claim 1, wherein the valve cap is made of an iron based steel.

3. The electro-magnetic check valve according to claim 1, wherein the valve cap includes a permanent magnet.

4. The electro-magnetic check valve according to claim 1, wherein the resilient flexible member includes a plurality of grains such that the resilient flexible member has an increased flexibility parallel to the plurality of grains and an increased stiffness normal to the plurality of grains.

5. The electro-magnetic check valve according to claim 1, wherein the resilient flexible member is located within a plane when the valve cap is in the first position.

6. The electro-magnetic check valve according to claim 1, wherein the resilient flexible member extends from a plane in the direction of the electromagnet when the valve cap is in the second position.

7. A transportation refrigeration system comprising:

a container having a wall;

a sensor for detecting a state within the container;

an air exchange panel disposed within the wall of the container including an air intake duct;

an air exchange valve mounted to the air exchange panel adjacent the air intake duct including:

a valve cap movable between a first position and a second position, the valve cap being formed from a magnetic portion;

a resilient flexible member coupled to the valve cap to bias the valve cap into a first position;

an electromagnet disposed within the air exchange panel opposite the valve cap; and

a controller for selectively applying power to the electromagnet to move the valve cap between a first position and a second position in response to a signal from the sensor.

8. The transportation refrigeration system according to claim 7, wherein the valve cap is made of an iron based steel.

9. The transportation refrigeration system according to claim 7, wherein the valve cap includes a permanent magnet.

10. The transportation refrigeration system according to claim 7, wherein the resilient flexible member includes a plurality of grains such that the resilient flexible member has an increased flexibility parallel to the plurality of grains and an increased stiffness normal to the plurality of grains.

11. The transportation refrigeration system according to claim 7, wherein the resilient flexible member is located within a plane when the valve cap is in the first position.

12. The transportation refrigeration system according to claim 7, wherein the resilient flexible member extends from a plane in the direction of the electromagnet when the valve cap is in the second position.

13. The transportation refrigeration system according to claim 7, wherein the sensor detects an amount of oxygen within the container.

14. The transportation refrigeration system according to claim 7, wherein the sensor detects an amount of carbon dioxide within the container.

15. A method for operating a transportation refrigeration system having a container configured to store cargo, comprising:

detecting an oxygen level within the container;

applying power to an electromagnet if the oxygen level is greater than or equal to a threshold;

detecting the oxygen level within the container;

removing power from the electromagnet if the oxygen level is below the threshold; and

biasing a valve cap and resilient flexible member to a first position to allow a flow of oxygen into the container, the valve cap being formed from a magnetic material.

16. The method according to claim 15, wherein the oxygen level is detected by a sensor within the container.

17. The method according to claim 15, wherein a controller is coupled to both the sensor and the electromagnet.

18. The method according to claim 17, wherein the controller applies power to and removes power from the electromagnet in response to a signal from the sensor.

19. The method according to claim 15, wherein the resilient flexible member is coupled to the valve cap.

CLAIMS:

1. An electromagnetic check valve for use in an air exchange panel of a transportation refrigeration system, comprising:

a valve cap positioned adjacent the air exchange panel and movable between a first position and a second position, the valve cap including a magnetic portion;

a resilient flexible member, separate from and coupled to the valve cap, the resilient flexible member being connected to the air exchange panel to bias the valve cap into a first position;

an electromagnet positioned inside the air exchange panel opposite the valve cap, and a controller that selectively applies power to the electromagnet to move the valve cap between the first position and the second position wherein the resilient flexible member includes a plurality of grains such that the resilient flexible member has an increased flexibility parallel to the plurality of grains and an increased stiffness normal to the plurality of grains.

2. The electro-magnetic check valve according to claim 1, wherein the valve cap is made of an iron based steel.

3. The electro-magnetic check valve according to claim 1, wherein the valve cap includes a permanent magnet.

4. The electro-magnetic check valve according to claim 1, wherein the resilient flexible member is located within a plane when the valve cap is in the first position.

5. The electro-magnetic check valve according to claim 1, wherein the resilient flexible member extends from a plane in the direction of the electromagnet when the valve cap is in the second position.

6. A transportation refrigeration system comprising:

a container having a wall;

a sensor for detecting a state within the container;

an air exchange panel disposed within the wall of the container including an air intake duct;

an air exchange valve mounted to the air exchange panel adjacent the air intake duct including:

a valve cap movable between a first position and a second position, the valve cap being formed from a magnetic portion;

a resilient flexible member coupled to the valve cap to bias the valve cap into a first position;

an electromagnet disposed within the air exchange panel opposite the valve cap; and

a controller for selectively applying power to the electromagnet to move the valve cap between a first position and a second position in response to a signal from the sensor;

wherein the resilient flexible member includes a plurality of grains such that the resilient flexible member has an increased flexibility parallel to the plurality of grains and an increased stiffness normal to the plurality of grains.

7. The transportation refrigeration system according to claim 6, wherein the valve cap is made of an iron based steel.

8. The transportation refrigeration system according to claim 6, wherein the valve cap includes a permanent magnet.

9. The transportation refrigeration system according to claim 6, wherein the resilient flexible member is located within a plane when the valve cap is in the first position.

10. The transportation refrigeration system according to claim 6, wherein the resilient flexible member extends from a plane in the direction of the electromagnet when the valve cap is in the second position.

11. The transportation refrigeration system according to claim 6, wherein the sensor detects an amount of oxygen within the container.

12. The transportation refrigeration system according to claim 6, wherein the sensor detects an amount of carbon dioxide within the container.

13. A method for operating a transportation refrigeration system having a container configured to store cargo, comprising:

detecting an oxygen level within the container;

applying power to an electromagnet if the oxygen level is greater than or equal to a threshold;

detecting the oxygen level within the container;

removing power from the electromagnet if the oxygen level is below the threshold; and

biasing a valve cap and resilient flexible member to a first position to allow a flow of oxygen into the container, the valve cap being formed from a magnetic material;
wherein the resilient flexible member includes a plurality of grains such that the resilient flexible member has an increased flexibility parallel to the plurality of grains and an increased stiffness normal to the plurality of grains.

14. The method according to claim 13, wherein the oxygen level is detected by a sensor within the container.

15. The method according to claim 13, wherein a controller is coupled to both the sensor and the electromagnet.

16. The method according to claim 15, wherein the controller applies power to and removes power from the electromagnet in response to a signal from the sensor.

17. The method according to claim 13, wherein the resilient flexible member is coupled to the valve cap.