Claims

What is claimed is:

1. A safety valve usable in a wellbore, the safety valve comprising:

a piston configured for displacing a flow tube;

a flapper valve;

the flow tube for opening the flapper valve;

a plurality of outer magnets attached to the piston, at least some of the plurality of outer magnets having a non-alternating polarity with respect to one or more adjacent outer magnets of the plurality of outer magnets; and

a plurality of inner magnets attached to the flow tube, at least some of the plurality of inner magnets having the non-alternating polarity with respect to one or more adjacent inner magnets of the plurality of inner magnets such that a first force to decouple the plurality of inner magnets from the plurality of outer magnets is higher than a second force to recouple the plurality of inner magnets to the plurality of outer magnets, wherein:

the plurality of outer magnets comprises a first outer magnet of a first size, a second outer magnet of a second size, and a third outer magnet of a third size;

the plurality of inner magnets comprises a first inner magnet of the first size, a second inner magnet of the second size, and a third inner magnet of the third size; and

the first size is different from the second size or from the third size.

2. The safety valve of claim 1, wherein a complete coupling of the plurality of inner magnets to the plurality of outer magnets comprises the first outer magnet aligning with the first inner magnet, the second outer magnet aligning with the second inner magnet, and the third outer magnet aligning with the third inner magnet.

3. The safety valve of claim 1, wherein a polarity sequence of the plurality of outer magnets and the polarity sequence of the plurality of inner magnets are for the piston to extend into a portion of the safety valve such that as the piston extends, a jumping effect caused by a misalignment of at least one outer magnet and at least one inner

magnet contributes to the second force to recouple the plurality of inner magnets to the plurality of outer magnets.

4. The safety valve of claim 1, wherein the safety valve is a wireline retrievable safety valve.

5. The safety valve of claim 1, wherein the safety valve is a subsurface safety valve.

6. The subsurface safety valve of claim 5, wherein a complete coupling of the plurality of inner magnets to the plurality of outer magnets holds the piston in an extended position within the safety valve, thus holding the flow tube over the flapper valve to open the flapper valve, thus utilizing the complete coupling of the plurality of inner magnets to the plurality of outer magnets to resist a closing of the flapper valve.

7. A magnet assembly for a safety valve usable in a wellbore, the magnet assembly comprising:

a plurality of outer magnets attached to a piston of the safety valve, at least some of the plurality of outer magnets having a non-alternating polarity with respect to one or more adjacent outer magnets of the plurality of outer magnets,

a plurality of inner magnets attached to a flow tube of the safety valve, at least some of the plurality of inner magnets having a non-alternating polarity with respect to one or more adjacent inner magnets of the plurality of inner magnets such that a first force to decouple the plurality of inner magnets from the plurality of outer magnets is higher than a second force to recouple the plurality of inner magnets to the plurality of outer magnets, wherein:

the plurality of outer magnets comprises a first outer magnet of a first size, a second outer magnet of a second size, and a third outer magnet of a third size;

the plurality of inner magnets comprises a first inner magnet of the first size, a second inner magnet of the second size, and a third inner magnet of the third size; and

the first size is different from the second size or from the third size.

8. The magnet assembly of claim 7, wherein a complete coupling of the plurality of inner magnets to the plurality of outer magnets comprises the first outer magnet aligning with the first inner magnet, the second outer magnet aligning with the second inner magnet, and the third outer magnet aligning with the third inner magnet.

9. The magnet assembly of claim 7, wherein a polarity sequence of the plurality of outer magnets and the polarity sequence of the plurality of inner magnets are for the piston to extend into a portion of the safety valve such that as the piston extends, a jumping effect caused by a misalignment of at least one outer magnet and at least one inner magnet contributes to the second force to recouple the plurality of inner magnets to the plurality of outer magnets.

10. The magnet assembly of claim 7, wherein the magnet assembly is for use in a wireline retrievable safety valve.

11. The magnet assembly of claim 7, wherein the magnet assembly is for use in a subsurface safety valve.

12. A method comprising:

providing a plurality of outer magnets attached to a piston configured for displacing a flow tube, at least some of the plurality of outer magnets having a non-alternating polarity with respect to one or more adjacent outer magnets of the plurality of outer magnets, wherein the plurality of outer magnets comprises a first outer magnet of a first size, a second outer magnet of a second size, and a third outer magnet of a third size;

providing a plurality of inner magnets attached to the flow tube of a safety valve, at least some of the plurality of inner magnets having a non-alternating polarity with respect to one or more adjacent inner magnets of the plurality of inner magnets, wherein:

the plurality of inner magnets comprises a first inner magnet of the first size, a second inner magnet of the second size, and a third inner magnet of the third size; and

the first size is different from the second size or from the third size;

using a first force to move the piston to a retracted position, thereby moving the outer magnets by a mechanical linkage between the outer magnets and the piston, thereby moving the inner magnets by a magnetic coupling between the outer magnets and the inner magnets, thereby moving the flow tube coupled to the inner magnets away from a flapper valve, to close the safety valve; and

using a second force to move the piston to an extended position, thereby moving the outer magnets by the mechanical linkage between the outer magnets and the piston, thereby moving the inner magnets by the magnetic coupling between the outer magnets and the inner magnets, thereby moving the flow tube coupled to the inner magnets across the flapper valve, to open the safety valve, wherein the first force is higher than the second force.

13. The method of claim 12, further comprising coupling the plurality of inner magnets to the plurality of outer magnets by aligning the first outer magnet with the first inner magnet, the second outer magnet with the second inner magnet, and the third outer magnet with the third inner magnet.

14. The method of claim 12, further comprising contributing to the second force to recouple the plurality of inner magnets to the plurality of outer magnets by arranging a polarity sequence of the plurality of inner magnets and the polarity sequence of the plurality of outer magnets such that as the piston extends into a portion of the safety valve, a jumping effect results from a misalignment of at least one outer magnet and at least one inner magnet.

15. The method of claim 12, further comprising resisting a closing of the flapper valve by magnetically coupling the plurality of inner magnets to the plurality of outer magnets to hold the flow tube across the flapper valve as a result of the extended position of the piston.

16. The method of claim 12, further comprising recoupling the plurality of inner magnets to the plurality of outer magnets by a wireline or slickline.

17. The method of claim 12, further comprising closing the flapper valve by magnetically coupling the plurality of the inner magnets to the plurality of outer magnets to hold the flow tube away from the flapper valve as a result of the retracted position of the piston.

18. The safety valve of claim 1, wherein the second force to recouple the plurality of inner magnets to the plurality of outer magnets is applied after a slam closure.