CLAIMS

1. A tool trap system, comprising:

a housing, the housing defining a bore through the housing;

a shaft coupled to the housing;

a flapper coupled to the shaft, wherein the flapper is configured to rotate with the shaft between an open position and a closed position to control movement of a wireline tool through the bore;

an actuation system coupled to the shaft, the actuation system configured to rotate the shaft, the actuation system comprising:

a lever coupled to the shaft, wherein the lever is configured to rotate the shaft; and

a cylinder configured to contact the lever, and wherein the cylinder is configured to move axially along a longitudinal axis of the cylinder to rotate the lever.

2. The tool trap system of claim 1, wherein the cylinder defines a surface configured to contact and rotate the lever as the cylinder moves axially.

3. The tool trap system of claim 2, wherein the cylinder defines a recess that receives a first end of the lever, wherein the surface defines a portion of the recess.

4. The tool trap system of claim 2 or 3, wherein the lever comprises a cam roller configured to contact the surface.

5. The tool trap system of any preceding claim, comprising a piston rod configured to extend through the cylinder.

6. The tool trap system of claim 5, comprising a first bracket and a second bracket, wherein the first bracket and the second bracket are configured to respectively couple to a first end and a second end of the piston rod.

7. The tool trap system of claim 5 or 6, wherein the piston rod is configured to remain stationary as the cylinder moves axially.

8. The tool trap system of claim 5, 6, or 7, comprising a hydraulic cylinder configured to receive the piston rod, wherein a fluid pumped into the hydraulic cylinder is configured to axially move the hydraulic cylinder.

9. The tool trap system of any preceding claim, comprising a spring configured to contact the cylinder to bias the flapper to the closed position.

10. The tool trap system of claim 9, wherein the spring is configured to surround a piston rod.

11. The tool trap system of any preceding claim, comprising a spring coupled to the shaft, wherein the spring is configured to bias the flapper to the closed position.

12. The tool trap system of claim 1, comprising:

a first actuator coupled to the cylinder and configured to axially move the cylinder in a first direction.

13. The tool trap system of claim 12, wherein the first actuator comprises an electric actuator, pneumatic actuator, a hydraulic actuator, or a combination thereof.

14. The tool trap system of claim 12 or 13, comprising a gear coupled to the lever.

15. The tool trap system of claim 14, wherein the cylinder comprises rack teeth configured to engage the gear, wherein the movement of the cylinder enables the rack teeth to engage the gear to rotate the lever.

16. The tool trap system of any of claims 12-15, comprising a second actuator configured to bias the cylinder in a second direction opposite the first direction.

17. The tool trap system of claim 16, wherein the second actuator comprises a mechanical spring, an air spring, or a combination thereof.

18. The tool trap system of any preceding claim, comprising:

a first shaft configured to rotate in the housing;

a second shaft configured to rotate in the housing;

a first flapper coupled to the first shaft;

a second flapper coupled to the second shaft, wherein the first flapper and the second flapper are configured to rotate respectively with the first shaft and the second shaft between an open position and a closed position to control movement of a wireline tool through the housing;

an actuation system coupled to the first shaft and the second shaft, the actuation system configured to rotate the first shaft and the second shaft, the actuation system comprising:

a first lever coupled to the first shaft, wherein the first lever is configured to rotate the first shaft;

a second lever coupled to the second shaft, wherein the second lever is configured to rotate the second shaft;

a cylinder configured to couple to the first lever and to the second lever, and wherein the cylinder is configured to move axially along a longitudinal axis of the cylinder to rotate the first lever and the second lever; and

a first actuator coupled to the cylinder and configured to axially move the cylinder in a first direction.

19. The tool trap system of claim 18, wherein the first actuator comprises an electric actuator, pneumatic actuator, a hydraulic actuator, or a combination thereof.

20. The tool trap system of claim 18 or 19, wherein the cylinder defines a first surface configured to contact and rotate the first lever and a second surface configured to contact and rotate the second lever.