located in and movable along the main passage, a first direction chamber formed between the wall of the tubular body and the actuator, and at least one second direction chamber formed between the tubular body and the actuator, wherein the assembly is configured such that when a first pressure of fluid in one of the first direction chamber and the at least one second direction chamber exceeds a second pressure of fluid in the other of the first direction chamber and the at least one second direction chamber by a predetermined amount, the first pressure of fluid exerts a force on the actuator which acts to push the actuator in a first direction relative to the tubular body, when the first pressure is a pressure of fluid in the first direction chamber, and in a second direction relative to the tubular body, when the first pressure is a pressure of fluid in the at least one second direction chamber, and when the first pressure of fluid falls below the predetermined amount in excess of the second pressure of fluid the second pressure of fluid exerts a force on the actuator which acts to push the actuator in the second direction relative to the tubular body, when the first pressure is the pressure of fluid in the first direction chamber, and in the first direction relative to the tubular body, when the first pressure is the pressure of fluid in the at least one second direction chamber~~when the pressure of fluid in the first direction chamber exceeds the pressure of fluid in the or each second direction chamber by a predetermined amount, the pressure of fluid in the first direction chamber exerts a force on the actuator which acts to push the actuator in a first direction relative to the tubular body, and when the pressure of fluid in the or at least one of the second direction chamber(s) exceeds the pressure of fluid in the first direction chamber by a predetermined amount, the pressure of fluid in the second direction chamber(s) exerts a force on the actuator which acts to push the actuator in a second direction relative to the tubular body~~, characterised in that the exterior surface of the tubular body is provided with a first port which communicates with a passage extending through the wall of the tubular body from the first port to the first direction chamber, a second port which communicates with a passage extending through the wall of the tubular body from the second port to

the or one of the second direction chamber(s), and a third port which communicates with a passage extending through the wall of the tubular body from the third port to the or another one of the second direction chamber(s), the first port lying on a first plane, the second port lying on a second plane and the third port lying on a third plane, the first plane, second plane and third plane being generally parallel to one another and the first plane lying between the second plane and the third plane.

In one embodiment, the longitudinal axis of the tubular body extends generally normal to the first plane, second plane and third plane.

In one embodiment, one or both of the first and second directions is/are generally parallel to the longitudinal axis of the tubular body.

CLAIMS

1. A fluid pressure operated actuator assembly comprising a tubular body having a wall, with an interior surface and an exterior surface and enclosing a main passage which extends generally parallel to a longitudinal axis of the tubular body, an actuator located in and movable along the main passage, a first direction chamber formed between the wall of the tubular body and the actuator, and at least one second direction chamber formed between the tubular body and the actuator, wherein the assembly is configured such that when ~~the~~ a first pressure of fluid in one of the first direction chamber and the at least one second direction chamber exceeds ~~the~~ a second pressure of fluid in the other of the first direction chamber and the ~~or each~~at least one second direction chamber by a predetermined amount, the first pressure of fluid ~~in the first direction chamber~~ exerts a force on the actuator which acts to push the actuator in a first direction relative to the tubular body, when the first pressure is a pressure of fluid in the first direction chamber, ~~,~~ and ~~when the pressure of fluid in the or at least one of the second direction chamber(s) exceeds the pressure of fluid in the first direction chamber by a predetermined amount, the pressure of fluid in the second direction chamber(s) exerts a force on the actuator which acts to push the actuator~~ in a second direction relative to the tubular body, when the first pressure is a pressure of fluid in the at least one second direction chamber, and when the first pressure of fluid falls below the predetermined amount in excess of the second pressure of fluid the second pressure of fluid exerts a force on the actuator which acts to push the actuator in the second direction relative to the tubular body, when the first pressure is the pressure of fluid in the first direction chamber, and in the first direction relative to the tubular body, when the first pressure is the pressure of fluid in the at least one second direction chamber, characterised in that the exterior surface of the tubular body is provided with a first port which communicates with a passage extending through the wall of the tubular body from the first port to the first direction chamber, a second port which

communicates with a passage extending through the wall of the tubular body from the second port to the or one of the second direction chamber(s), and a third port which communicates with a passage extending through the wall of the tubular body from the third port to the or another one of the second direction chamber(s), the first port lying on a first plane, the second port lying on a second plane and the third port lying on a third plane, the first plane, second plane and third plane being generally parallel to one another and the first plane lying between the second plane and the third plane.

2. A fluid pressure operated actuator assembly according to claim 1 wherein the longitudinal axis of the tubular body extends generally normal to the first plane, second plane and third plane.

3. A fluid pressure operated actuator assembly according to any preceding claim wherein one or both of the first and second directions is/are generally parallel to the longitudinal axis of the tubular body.

4. A fluid pressure operated actuator assembly according to any preceding claim wherein the first direction is generally opposite to the second direction.

5. A fluid pressure operated actuator assembly according to any preceding claim wherein the actuator is connected to a main valve member in such a way that movement of the actuator in the first direction and second direction causes the valve member to move.

6. A fluid pressure operated actuator assembly according to claim 5 wherein the main valve member is movable between a closed position in which the main valve member closes the main passage of the tubular body and an open position in which the main passage of the tubular body is open.

7. A fluid pressure operated actuator assembly according to claim 5 or 6 wherein the movement of the main valve member caused by the movement of the actuator in the first direction and second direction comprises rotation.

8. A fluid pressure operated actuator assembly according to claim 5, 6 or 7 wherein the main valve member moves to the closed position when the actuator moves in the first direction and to the open position when the actuator moves in the second direction.

9. A fluid pressure operated actuator assembly according to claim 5, 6 or 7 wherein the main valve member comprises a ball valve member.

10. A fluid pressure operated actuator assembly according to any one of claims 5 to 9 wherein the actuator is connected to a main valve member by means of a track and pin arrangement whereby a pin extends from one of the valve member or actuator into a slot or groove provided in the other of the valve member or actuator, the pin moving along the slot or groove as the actuator slides in the tubular body and the valve member rotates.

11. A fluid pressure operated actuator assembly according to any preceding claim wherein the tubular body is provided with a side passage which extends through the wall of the tubular body from the exterior of the tubular body into the main passage, and the actuator is movable between a closed position in which the actuator substantially prevents flow of fluid along the side passage, and an open position in which flow of fluid along the side passage is permitted.

12. A fluid pressure operated actuator assembly according to claim 11 wherein movement of the actuator in the first direction brings the actuator into the open position, and movement of the actuator in the second direction may bring the actuator into the closed position.

13. A fluid pressure operated actuator assembly according to claims 11 or 12 where dependant on any one of claims 5 to 10 wherein movement of the actuator in the first direction may bring the actuator into the open position and the main valve member into the closed position, whilst movement of the actuator in the second direction brings the actuator into the closed position, and the main valve member into the open position.

14. A fluid pressure operated actuator assembly according to any preceding claim wherein the passage from the third port connects to the passage from the second port into the ~~or one of the~~at least one second direction chamber~~(s)~~.

15. A fluid pressure operated actuator assembly according to any preceding claim wherein the first direction chamber and the ~~or each~~at least one second direction

chamber are formed in a space between an exterior surface of the actuator and an interior surface of the wall of the tubular body.

16. A fluid pressure operated actuator assembly according to claim 15 wherein this space extends around the entire perimeter of the actuator.

17. A fluid pressure operated actuator assembly according to claim 15 or 16 wherein this space is divided into the first direction chamber and the at least one second direction chamber by means of a seal which substantially prevents flow of fluid between the chambers whilst allowing the actuator to move along the main passage of the tubular body.

18. A fluid pressure operated actuator assembly according to claim 15 or 16 comprising two second direction chambers, wherein this space is divided into the first direction chamber and the two second direction chambers by means of a seal arrangement which substantially prevents flow of fluid between the chambers whilst allowing the actuator to move along the main passage of the tubular body,

19. A fluid pressure operated actuator assembly according to claim 18 wherein the first direction chamber located between the two second direction chambers.

20. A fluid pressure operated actuator assembly according to claim 18 wherein the passages from the first port, second port and third port into their respective chamber extend through the tubular body generally perpendicular to its longitudinal axis.

21. A fluid pressure operated actuator assembly according to claim 18 wherein at least one of the passages from the first port, second port and third port into their respective chamber extends through the tubular body generally at an angle of less than 90º to its longitudinal axis

22. A fluid pressure operated actuator assembly according to any preceding claim wherein the actuator assembly is configured such that if the pressure of fluid in

the first direction chamber equals the pressure of fluid in the ~~or both~~ at least one second direction chamber~~(s)~~, there is no net force acting on the actuator, if the pressure of fluid in the first direction exceeds the pressure in the ~~or both the~~at least one second direction chamber~~(s)~~, there is a net force acting on the actuator pushing the actuator in the first direction, and if the pressure of fluid in the first direction chamber is less than the pressure of fluid in the ~~or either one of~~ at least one the second direction chamber~~(s)~~, there is a net force acting on the actuator pushing the actuator the second direction.

23. A fluid pressure operated actuator assembly according to any one of claims 1 to 19 wherein the actuator assembly is configured such that when the pressure of fluid in the first direction chamber equals the pressure of fluid in the ~~or both~~at least one second direction chamber~~(s)~~, there is a net force acting on the actuator.

24. A fluid pressure operated actuator assembly according to claim 23 wherein the actuator assembly is configured such that this net force tends to push the actuator in the second direction.

25. A fluid pressure operated actuator assembly according to claim 23 wherein the actuator assembly is configured such that this net force tends to push the actuator in the first direction. ~~substantially as hereinbefore described with reference to and as shown in the accompanying drawings.~~

~~26. Any novel feature or novel combination of features described herein and/or in the accompanying drawings.~~