~~WHAT IS CLAIMED IS:~~ CLAIMS

1. A gate valve system comprising:

a valve body having a bore to allow fluid to pass through the valve body, the valve body further having a cavity defined by substantially parallel valve body innerside walls;

a gate operationally disposed within the cavity, wherein the gate has a passage to allow fluid to pass, wherein at least one end of the gate is defined by a radius perimeter;

a bonnet removably coupled to a face of the valve body and comprising a connecting end, wherein a portion of an innerside of the bonnet includes a curved surface adapted to mate with the at least one end of the gate defined by the radius perimeter;

a first valve stem connected to an upper portion of the gate and a second valve stem connected to a lower portion of the gate; and

an actuation mechanism operationally positioned and removably connected to the gate by way of a thru-hole in the bonnet, whereby the actuation mechanism effectuates sufficient translational movement of the gate to substantially permit or to substantially impede fluid flow within the system,

wherein the actuation mechanism comprises a ball-screw drive assembly or a hydraulic stem engaged with the first valve stem, and a bearing cap threadedly engaged with the connecting end of the bonnet for removably connecting the actuation mechanism to the connecting end of the bonnet, and

wherein the actuation mechanism is configured to be removed and replaced by an operationally different actuation mechanism by detaching the ball-screw drive assembly or the hydraulic stem from the first valve stem, detaching the bearing can from the connecting end of the bonnet, and attaching the first valve stem to the operationally different actuation mechanism.

2. The gate valve system as in claim 1, wherein the gate further comprises a substantially parallel first and second face and substantially parallel opposing side portions.

3. The gate valve system as in claim 1, wherein the cavity is a substantially rectangular channel configured to permit translation of the gate.

4. The gate valve system as in claim 1, wherein the valve body is substantially symmetric about a center-line through the bore.

5. The gate valve system as in claim 1, wherein two ends of the gate have a radius perimeter.

6. The gate valve system as in claim 1, wherein the innerside of the bonnet is an arcuate concave dome.

7. The gate valve system as in claim 1, further having a second bonnet removably coupled to a second face of the valve body, wherein a portion of an innerside of the second bonnet includes a curved surface adapted to mate with the at least one end of the gate having the radius perimeter.

8. A gate valve system as in claim 7, wherein the innerside of the second bonnet is an arcuate concave dome.

9. The gate valve system as in claim 1, further having a detection mechanism for providing a user indication of the location of the gate within the valve body.

10. The gate valve system as in claim 7, further having a detection mechanism operationally positioned and removably connected to the gate by way of a thru-hole in the second bonnet, whereby the detection mechanism provides a user indication of the location of the gate within the valve body.

11. The gate valve system as in claim 10, wherein the attachment of the detection mechanism and the actuation mechanism are operationally interchangeable with the bonnet and the second bonnet.

12. A gate valve system as in claim 1, wherein the actuation mechanism is selected from the group consisting of a mechanical actuation mechanism, a hydraulic actuation mechanism, and a motorized actuation mechanism.

13. The gate valve system as in claim 7, wherein the actuation mechanism is selected from the group consisting of a mechanical actuation mechanism, a hydraulic actuation mechanism, and a motorized actuation mechanism.

14. The gate valve system as in claim 13, further having a second actuation mechanism, wherein the second actuation mechanism is selected from the group consisting of a mechanical actuation mechanism, a hydraulic actuation mechanism, and a motorized actuation mechanism, wherein the second actuation mechanism is operationally positioned and removably connected to the gate by way of a thru-hole in the bonnet, whereby the second actuation mechanism effectuates sufficient translational movement of the gate to substantially permit or to substantially impede fluid flow within the system.

15. The gate valve system as in claim 1, wherein the actuation mechanism is removable without substantially affecting the sealing capability of the bonnet.

16. The gate valve system of claim 9, wherein the detection mechanism is removable without substantially affecting the sealing capability of the second bonnet.

~~17. A gate apparatus for use in a fluid control system, the gate comprising:~~

~~a plate having a passage extending through the plate from a first planar face to a second planar face of the plate, wherein the first planar face and the second planar face are substantially parallel, the plate comprising:~~

~~at least one end defined by a radius perimeter; and~~

~~two substantially parallel opposing side portions, whereby the gate, when translated within the fluid control system between an open and closed position, controls fluid flow within the system.~~

~~18. The gate as in claim 17, wherein the plate has two ends defined by radius perimeters.~~

~~19. The gate as in claim 17, wherein the at least one end defined by a radius perimeter has a lug assembly, wherein the lug assembly comprises:~~

~~a groove in the gate disposed in the at least one end defined by a radius perimeter wherein the groove creates two opposing lugs; and~~

~~wherein each opposing lug comprises a substantially aligned hole with the hole in the opposing lug; and~~

~~a pin adapted to pass through the two opposing lugs for retainment of a stem.~~

~~20. The gate as in claim 19, wherein each end of the gate has a lug assembly.~~

~~21. The lug assembly of claim 19 further comprising a stem having a tongue with a hole adapted to mate with the groove at one end defined by a radius perimeter of the gate, wherein the pin is adapted to pass through the stem and opposing lugs such that the stem is retained between the opposing lugs.~~

~~22~~17. A gate valve bonnet for use in a fluid control system comprising:

an actuation mechanism comprising a ball-screw drive assembly or a hydraulic stem, and a bearing cap; and

a housing having a connecting end for threadably engaging with the bearing cap of the actuation mechanism such that the actuation mechanism is removably connected to the housing, and a thru-hole to allow passage of a valve stem coupled to a gate having at least one end defined by a radius perimeter such that the thru-hole is sealed to limit leakage of fluid inside the fluid control system, the housing further comprising:

an innerside portion within the housing, wherein the innerside portion includes a curved surface adapted to mate with the one end of the gate, wherein the gate has at least one end with a substantially congruent mated radius perimeter for fitment with the curved surface; and

a substantially planar face that sealably mates with a congruent face on the valve body of a fluid control system to limit leakage of fluid inside the fluid control system,

wherein the ball-screw drive assembly or the hydraulic stem is configured to be attached to the valve stem, and the actuation mechanism is configured to be removed and replaced by an operationally different actuation mechanism by detaching the ball-screw drive assembly or the hydraulic stem from the valve stem, detaching the bearing cap from the connecting end of the bonnet, and attaching the valve stem to the operationally different actuation mechanism.

~~23~~18. The gate valve bonnet as in claim ~~22~~17, wherein the innerside of the housing includes an arcuate concave dome.

19. The gate valve system of claim 1, further comprising the operationally different actuation mechanism having a connector, wherein in response to the actuation mechanism being disconnected from the connecting end of the bonnet during operation of the gate valve assembly, the connector of the operationally different actuation mechanism is capable of being attached to the connecting end of the bonnet to replace the actuation mechanism without interrupting the operation of the gate valve assembly.

20. A gate valve system comprising:

a valve body having a bore to allow fluid to pass through the valve body, the valve body further having a cavity defined by substantially parallel valve body innerside walls;

a gate operationally disposed within the cavity, wherein the gate has a passage to allow fluid to pass, wherein at least one end of the gate is defined by a radius perimeter;

a bonnet removably coupled to a face of the valve body and comprising a connecting end, wherein a position of an innerside of the bonnet includes a curved surface adapted to mate with the at least one end of the gate defined by the radius perimeter;

a first valve stem connected to an upper portion of the gate and a second valve stem connected to a lower portion of the gate; and

a mechanical actuation mechanism operationally positioned and removably connected to the gate by way of a thru-hole in the bonnet, whereby the mechanical actuation mechanism effectuates sufficient translational movement of the gate to substantially permit or to substantially impede fluid flow within the system, and the mechanical actuation mechanism comprises a ball-screw drive assembly engaged with the first valve stem, and a bearing cap

threadedly engaged with the connecting end of the bonnet for removably connecting the mechanical actuation mechanism to the connecting end of the bonnet,

wherein the mechanical actuation mechanism is configured to be removed and replaced by a hydraulic actuation mechanism by detaching the ball-screw drive assembly from the first valve stem, detaching the bearing cap from the connecting end of the bonnet, and attaching the first valve stem to the hydraulic actuation mechanism.

21. A gate valve system comprising:

a valve body having a bore to allow fluid to pass through the valve body, the valve body further having a cavity defined by substantially parallel valve body innerside walls;

a gate operationally disposed within the cavity, wherein the gate has a passage to allow fluid to pass, wherein at least one end of the gate is defined by a radius perimeter;

a bonnet removably coupled to a face of the valve body and comprising a connecting end, wherein a portion of an innerside of the bonnet includes a curved surface adapted to mate with the at least one end of the gate defined by the radius perimeter;

a first valve stem connected to an upper portion of the gate and a second valve stem connected to a lower portion of the gate; and

a hydraulic actuation mechanism operationally positioned and removably connected to the gate by way of a thru-hole in the bonnet, whereby the hydraulic actuation mechanism effectuates sufficient translational movement of the gate to substantially permit or to substantially impede fluid flow within the system, and the hydraulic actuation mechanism comprises a hydraulic stem engaged with the first valve stem, and a bearing cap threadedly engaged with the connecting end of the bonnet for removably connecting the hydraulic actuation mechanism to the connecting end of the bonnet,

wherein the hydraulic actuation mechanism is configured to be removed and replaced by a mechanical actuation mechanism by detaching the hydraulic stem from the first valve stem, detaching the bearing cap from the connecting end of the bonnet, and attaching the first valve stem to the mechanical actuation mechanism.