WHAT IS CLAIMED IS:

1. A hydraulic control valve, comprising:

a valve body at least partially defining a flow path from an inlet to an outlet;

a cover; and

a diaphragm-and-plug unit comprising a rim sealable by the cover, a plug and a flexible diaphragm extending between the rim and the plug, said flexible diaphragm having a portion of a first thickness adjacent to said plug and a portion of a decreased thickness further from said plug,

wherein said cover and said diaphragm-and-plug unit together define a hydraulic control chamber, and wherein, in a closed position of said diaphragm-and-plug unit, said plug blocks said flow path and, in an open position of said diaphragm-and-plug unit, said plug is raised so as to unblock the flow path,

wherein said thickness of said flexible diaphragm is configured to provide a non-linear integral spring biasing said plug towards said closed position such that, during a closing motion of the diaphragm-and-plug unit from a fully-open position towards said closed position, said portion of said diaphragm adjacent to said plug exerts a first closure force to displace the plug from a fully-open position, and said portion of decreased thickness generates a second closure force weaker than said first force during a terminal part of the closing motion, thereby resulting in a non-linear variation of a mechanical closing force across at least part of the closing motion between a fully-open and fully-closed position as a function of displacement of said diaphragm-and-plug unit,

the valve being configured so that at least a majority of the initial mechanical closing force acting to displace the diaphragm-and-plug unit from the fully-open position is supplied by the integral spring.

2. The hydraulic control valve of claim 1, wherein the valve is configured such that substantially all of the initial mechanical closing force

acting to displace the diaphragm--and--plug unit from the fully-open position is supplied by the integral spring.

3. The hydraulic control valve of claim 1, wherein in the fully-open position, the flexible diaphragm is urged against the cover.

4. The hydraulic control valve of claim 1, wherein the plug is in a central portion of the diaphragm -and -plug unit.

5. The hydraulic control valve of claim 1, wherein said portion of said first thickness circumscribes said plug adjacent to the plug and said portion of reduced thickness circumscribes said plug adjacent the rim.

6. The hydraulic control valve of claim 1 configured to be controlled by fluid pressure within a pressurized fluid control line,

wherein said cover is formed with an internal control passage in communication with said hydraulic control chamber and terminating in an orifice oriented towards said valve body, and wherein said valve body is formed with a supplementary control passage deployed for fluid interconnection with said orifice and terminating in an externally accessible connection port for attachment of the pressurized fluid control line, such that when the pressurized fluid control line is connected to said connection port, said cover is removable from said valve body without disconnecting the pressurized fluid control line from said connection port.

7. The hydraulic control valve of claim 6, wherein said orifice is located outside said rim of said diaphragm.

8. The hydraulic control valve of claim 6, wherein said supplementary control passage is referred to as a first supplementary control passage, said orifice coming into fluid interconnection with said first supplementary control passage when said cover is attached to said valve body in a first orientation,

wherein said valve body is formed with a second supplementary control passage deployed for fluid interconnection with said orifice when said cover is attached to said valve body in a second orientation.

9. The hydraulic control valve of claim 8, wherein in said first orientation of said cover, an opening of said internal control passage into said control chamber is located in an upper portion of said control chamber when the hydraulic control valve is deployed with said flow path horizontal, and wherein in said second orientation of said cover, an opening of said internal control passage into said control chamber is located in an upper portion of said control chamber when the hydraulic control valve is deployed with said flow path vertically upwards.

10. The hydraulic control valve of claim 1, wherein said diaphragm gradually diminishes in thickness from adjacent the plug to adjacent the rim.

WHAT IS CLAIMED IS:

1. A hydraulic control valve, comprising:

a valve body at least partially defining a flow path from an inlet to an outlet;

a cover; and

a diaphragm-and-plug unit comprising a rim sealable by the cover, a plug and a flexible diaphragm extending between the rim and the plug, said flexible diaphragm having a portion of a first thickness adjacent to said plug and a portion of a decreased thickness further from said plug,

wherein said cover and said diaphragm-and-plug unit together define a hydraulic control chamber, and wherein, in a closed position of said diaphragm-and-plug unit, said plug blocks said flow path and, in an open position of said diaphragm-and-plug unit, said plug is raised so as to unblock the flow path,

wherein said flexible diaphragm is configured to provide a non-linear integral spring biasing said plug towards said closed position such that, during a closing motion of the diaphragm-and-plug unit from a fully-open position towards said closed position, said portion of said diaphragm adjacent to said plug exerts a first closure force to displace the plug from a fully-open position, and said portion of decreased thickness generates a second closure force weaker than said first force during a terminal part of the closing motion, thereby resulting in a non-linear variation of a mechanical closing force across at least part of the closing motion between a fully-open and fully-closed position as a function of displacement of said diaphragm-and-plug unit,

wherein said plug is formed as a block having a cylindrical outer wall having a thickness at least twice a maximum thickness of said diaphragm, and wherein in the closed position said portion of said diaphragm adjacent to said plug emerges from an end surface of said cylindrical outer wall, the control valve being configured such that motion of the diaphragm-and-plug unit to the fully-open position deforms a region of said plug adjacent to the connection between said plug and said diaphragm so that said portion of said diaphragm

adjacent to said plug emerges outwards from an outer cylindrical surface of said cylindrical outer wall.

2. The hydraulic control valve of claim 1, wherein the valve is configured such that substantially all of the initial mechanical closing force acting to displace the diaphragm-and-plug unit from the fully-open position is supplied by the integral spring.

3. The hydraulic control valve of claim 1, wherein in the fully-open position, the flexible diaphragm is urged against the cover.

4. The hydraulic control valve of claim 1, wherein the plug is in a central portion of the diaphragm-and-plug unit.

5. The hydraulic control valve of claim 1, wherein said portion of said first thickness circumscribes said plug adjacent to the plug and said portion of reduced thickness circumscribes said plug adjacent the rim.

6. The hydraulic control valve of claim 1 configured to be controlled by fluid pressure within a pressurized fluid control line,

wherein said cover is formed with an internal control passage in communication with said hydraulic control chamber and terminating in an orifice oriented towards said valve body, and wherein said valve body is formed with a supplementary control passage deployed for fluid interconnection with said orifice and terminating in an externally accessible connection port for attachment of the pressurized fluid control line, such that when the pressurized fluid control line is connected to said connection port, said cover is removable from said valve body without disconnecting the pressurized fluid control line from said connection port.

7. The hydraulic control valve of claim 6, wherein said orifice is located outside said rim of said diaphragm.

8. The hydraulic control valve, comprising:

a valve body at least partially defining a flow path from an inlet to an outlet;

a cover; and

a diaphragm-and-plug unit comprising a rim sealable by the cover, a plug and a flexible diaphragm extending between the rim and the plug, said flexible diaphragm having a portion of a first thickness adjacent to said plug and a portion of a decreased thickness further from said plug, wherein said cover and said diaphragm-and-plug unit together define a hydraulic control chamber, and wherein, in a closed position of said diaphragm-and-plug unit, said plug blocks said flow path and, in an open position of said diaphragm-and-plug unit, said plug is raised so as to unblock the flow path,

wherein said flexible diaphragm is configured to provide a non-linear integral spring biasing said plug towards said closed position such that, during a closing motion of the diaphragm-and-plug unit from a fully-open position towards said closed position, said portion of said diaphragm adjacent to said plug exerts a first closure force to displace the plug from a fully-open position, and said portion of decreased thickness generates a second closure force weaker than said first force during a terminal part of the closing motion, thereby resulting in a non-linear variation of a mechanical closing force across at least part of the closing motion between a fully-open and fully-closed position as a function of displacement of said diaphragm-and-plug unit,

wherein said plug is formed as a block having a cylindrical outer wall having a thickness at least twice a maximum thickness of said diaphragm, and wherein in the closed position said portion of said diaphragm adjacent to said plug emerges from an end surface of said cylindrical outer wall, the control valve being configured such that motion of the diaphragm-and-plug unit to the fully-open position deforms a region of said plug adjacent to the connection between said plug and said diaphragm so that said portion of said diaphragm adjacent to said plug emerges outwards from an outer cylindrical surface of said cylindrical outer wall,

wherein the hydraulic control valve is configured to be controlled by fluid pressure within a pressurized fluid control line,

wherein said cover is formed with an internal control passage in communication with said hydraulic control chamber and terminating in an orifice oriented towards said valve body, and wherein said valve body is formed with a first supplementary control passage deployed for fluid interconnection with said orifice and terminating in an externally accessible connection port for attachment of the pressurized fluid control line, such that when the pressurized fluid control line is connected to said connection port, said cover is removable from said valve body without disconnecting the pressurized fluid control line from said connection port,

wherein said orifice comes into fluid interconnection with said first supplementary control passage when said cover is attached to said valve body in a first orientation,

and wherein said valve body is formed with a second supplementary control passage deployed for fluid interconnection with said orifice when said cover is attached to said valve body in a second orientation.

9. The hydraulic control valve of claim 8, wherein in said first orientation of said cover, an opening of said internal control passage into said control chamber is located in an upper portion of said control chamber when the hydraulic control valve is deployed with said flow path horizontal, and wherein in said second orientation of said cover, an opening of said internal control passage into said control chamber is located in an upper portion of said control chamber when the hydraulic control valve is deployed with said flow path vertically upwards.

10. The hydraulic control valve of claim 1, wherein said diaphragm gradually diminishes in thickness from adjacent the plug to adjacent the rim.