CLAIMS

What is claimed is:

1. A valve actuator comprising:

an annular actuator nut having threads on an outer surface and threads on an inner surface that are oriented in a same direction to the threads on the outer surface and having a greater pitch;

a latching sleeve circumscribing a portion of the actuator nut and selectively moveable along an axis of the valve actuator;

a linkage having an end attached to the actuator nut and threads that engage threads on an outer surface of the latching sleeve;

a profile on an inner surface of the latching sleeve having an engaged portion and a disengaged portion;

a lever slidable within the profile;

a collar threaded to the outer surface of the actuator nut that is rotatable with respect to the actuator nut when the lever is in the engaged portion of the profile and rotates with the actuator nut when the lever is in the disengaged portion of the profile; and

a valve stem threadingly engaged to the threads on the inner surface of the actuator nut.

2. The valve actuator of claim 1, wherein the linkage comprises an annular elevator nut having threads on an inner surface that engages the threads on the outer surface of the latching sleeve, a tubular housing telescopingly mounted over a portion of the elevator nut and end wall attached to the actuator nut.

3. The valve actuator of claim 2, further comprising a key attached to an inner surface of the housing that protrudes into an axial slot on an outer surface of the elevator nut, so that the elevator nut and housing are rotatingly coupled and axially slideable to one another.

4. The valve actuator of claim 1, wherein rotating the actuator nut urges the latching sleeve axially thereby axially moving the profile across the lever.

5. The valve actuator of claim 1, further comprising a ledge projecting radially outward from an outer surface of the collar, and pockets formed in the ledge for engaging the levers.

6. The valve actuator of claim 1, further comprising an inner sleeve in an annular space between the actuator nut and the latching sleeve, a lip projecting radially outward from an outer surface of the inner sleeve, and a pivot pin on the lip on which the lever is coupled.

7. The valve actuator of claim 1, wherein when the lever is in the engaged portion of the profile a torque input to the actuator nut generates a force on the valve stem at a force to torque ratio that is greater than a force to torque ratio when the lever is in the disengaged portion of the profile.

8. The valve actuator of claim 1, wherein when the lever is in the disengaged portion of the profile, each revolution of the actuator nut moves the valve stem an incremental distance

at a revolution to displacement ratio that is greater than a revolution to displacement ratio when the lever is in the engaged portion of the profile.

9. The valve actuator of claim 1, further comprising a transition portion in the profile between the engaged and disengaged portions, so that as the latching sleeve axially moves with respect to the collar, the collar selectively changes between engaged and disengaged configurations.

10. A valve actuator comprising:

an input shaft;

a series of threaded connections that selectively configurable as a differential screw and as a direct drive;

an input to the series of threaded connections that is coupled with the input shaft;

an output from the series of threaded connections that is coupled with a valve stem; and

a selector switch for changing the configuration of the series of threaded connections between a differential screw and a direct drive.

11. The valve actuator of claim 10, further comprising a sliding sleeve having a profile that engages the selector switch,

12. The valve actuator of claim 10, wherein the valve stem is connected to a valve that strokes between an open position and a closed position, and the profile is strategically dimensioned to manipulate the selector switch so that the series of threaded connections

is configured as a differential screw when the stroke of the valve is one of the open or closed position having the higher resistance to movement.

CLAIMS

What is claimed is:

1. A valve actuator comprising:

an annular actuator nut having threads on an outer surface and threads on an inner surface that are oriented in a same direction to the threads on the outer surface and the threads on the inner surface having a greater pitch;

a latching sleeve circumscribing a portion of the actuator nut and selectively moveable along an axis of the valve actuator;

a linkage having an end attached to the actuator nut and threads that engage threads on an outer surface of the latching sleeve;

a profile on an inner surface of the latching sleeve having an engaged portion and a disengaged portion;

a lever slidable within the profile;

a collar threaded to the outer surface of the actuator nut that is rotatable with respect to the actuator nut when the lever is in the engaged portion of the profile and rotates with the actuator nut when the lever is in the disengaged portion of the profile; and

a valve stem threadingly engaged to the threads on the inner surface of the actuator nut.

2. The valve actuator of claim 1, wherein the linkage comprises an annular elevator nut having threads on an inner surface that engages the threads on the outer surface of the latching sleeve, a tubular housing telescopingly mounted over a portion of the elevator nut and end wall attached to the actuator nut.

3. The valve actuator of claim 2, further comprising a key attached to an inner surface of the housing that protrudes into an axial slot on an outer surface of the elevator nut, so that the elevator nut and housing are rotatingly coupled and axially slideable to one another.

4. The valve actuator of claim 1, wherein rotating the actuator nut urges the latching sleeve axially thereby axially moving the profile across the lever.

5. The valve actuator of claim 1, further comprising a ledge projecting radially outward from an outer surface of the collar, and pockets formed in the ledge for engaging the levers.

6. The valve actuator of claim 1, further comprising an inner sleeve in an annular space between the actuator nut and the latching sleeve, a lip projecting radially outward from an outer surface of the inner sleeve, and a pivot pin on the lip on which the lever is coupled.

7. The valve actuator of claim 1, wherein when the lever is in the engaged portion of the profile a torque input to the actuator nut generates a force on the valve stem at a force to torque ratio that is greater than a force to torque ratio when the lever is in the disengaged portion of the profile.

8. The valve actuator of claim 1, wherein when the lever is in the disengaged portion of the profile, each revolution of the actuator nut moves the valve stem an incremental distance at a revolution to displacement ratio that is greater than a revolution to displacement ratio when the lever is in the engaged portion of the profile.

9. The valve actuator of claim 1, further comprising a transition portion in the profile between the engaged and disengaged portions, so that as the latching sleeve axially moves with respect to the collar, the collar selectively changes between engaged and disengaged configurations.

10. A valve actuator comprising:
an input shaft;

a series of threaded connections that are selectively configurable as a differential screw and as a direct drive;

an input to the series of threaded connections that is coupled with the input shaft;

an output from the series of threaded connections that is coupled with a valve stem;

a selector switch for changing the configuration of the series of threaded connections between the differential screw and direct drive configurations; and

a sliding sleeve having a profile that engages the selector switch.

11. The valve actuator of claim 10, wherein the valve stem is connected to a valve that strokes between an open position and a closed position, and the profile is strategically dimensioned to manipulate the selector switch so that the series of threaded connections is configured as a differential screw during the beginning of the stroke of the valve having a higher resistance to movement.