July 11, 1967 K. H. ANDRAE 3,330,530

SLUICE VALVE OPERATING MECHANISM

Filed July 30, 1964 2 Sheets-Sheet 1

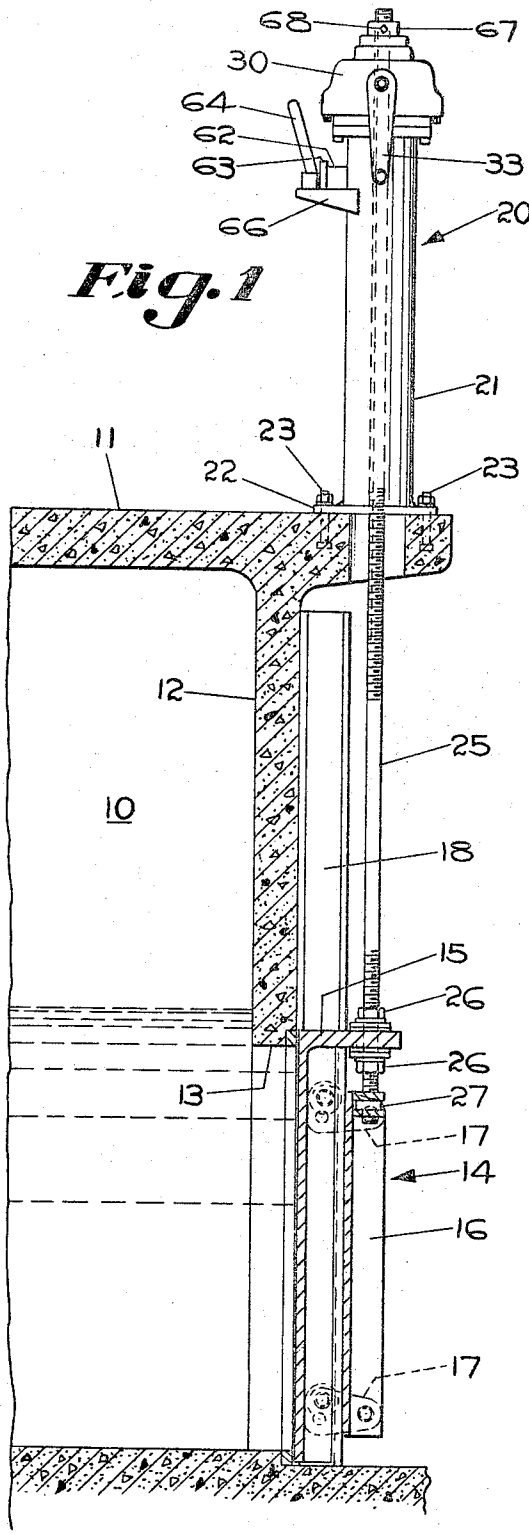

Fig. 1

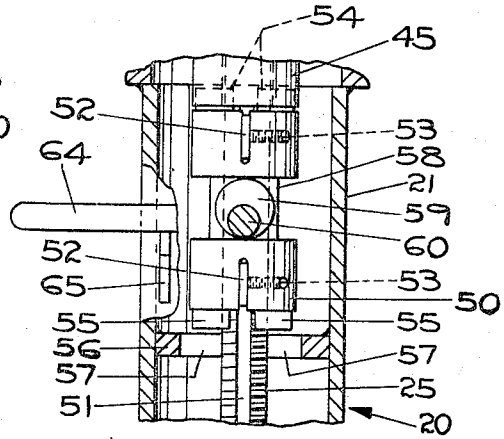

Fig. 4

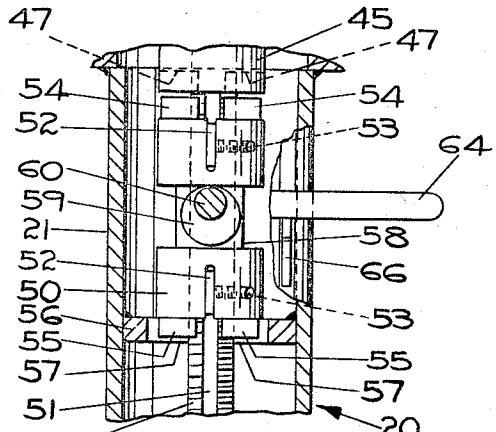

Fig. 5

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SLUICE VALVE OPERATING MECHANISM

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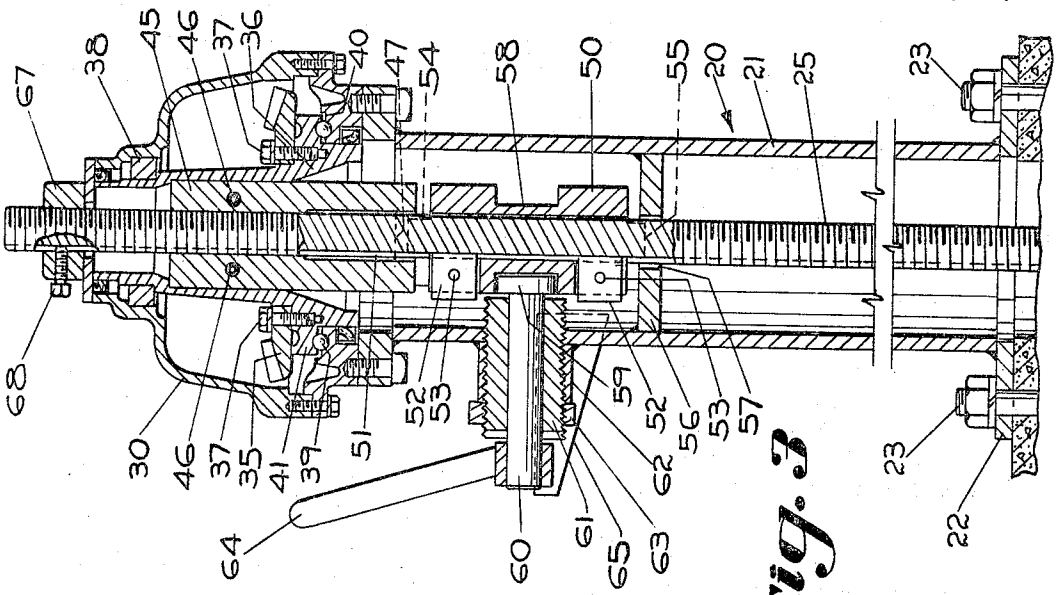

Fig. 3

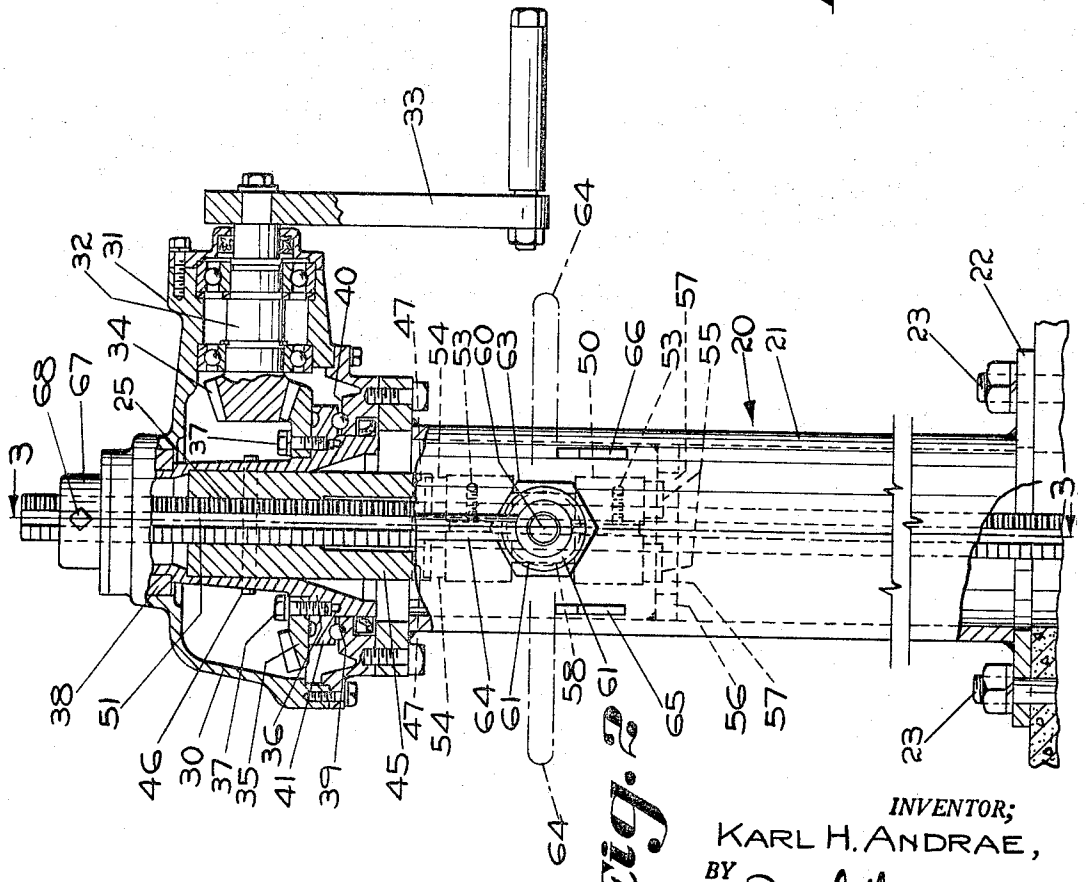

Fig. 2

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United States Patent Office 3,330,530
Patented July 11, 1967

3,330,530

SLUICE VALVE OPERATING MECHANISM

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Filed July 30, 1964, Ser. No. 386,156
12 Claims. (Cl. 251—158)

The instant invention relates to sluice valves, and more particularly, to an operating mechanism by which a sluice valve may be released from its seated position and raised to open the flow channel, or alternatively, the sluice valve may be lowered and seated to close the flow channel.

It is an object of the instant invention to provide an improved operating mechanism for opening and closing a sluice valve.

It is another object of the instant invention to provide an improved sluice valve operating mechanism, in which a single operating element is operative to seat and unseat the sluice valve and also to raise and lower the sluice valve.

It is another object of the instant invention to provide an improved sluice valve operating mechanism in which the application of a relatively small force is sufficient to open and close the sluice valve.

It is still another object of the instant invention to provide an improved sluice valve operating mechanism in which there is a simple adjustment for the operating element, by which the operating element may be alternatively operated to seat and unseat the sluice valve, or to raise and lower the sluice valve.

Other objects of the instant invention will appear hereinafter, the novel features and combinations being set forth in the appended claims.

In the drawings:

FIG. 1 illustrates a sluice valve installation, including the operating mechanism of this invention;

FIG. 2 is an elevational view, partially in section, of the sluice valve operating mechanism;

FIG. 3 is a sectional view of the sluice valve operating mechanism, taken on the line 3—3 in FIG. 2;

FIG. 4 is a sectional view of a portion of the sluice valve operating mechanism, showing the selector in its first position; and

FIG. 5 is a sectional view of a portion of the sluice valve operating mechanism, showing the selector in its second position.

In the drawings, there is illustrated in FIG. 1 a sluice valve installation in a flow channel **10**, which may be formed of concrete, at the top of which there is provided a floor **11**. A transverse wall **12** is formed with a flow outlet **13**, which is closed by a sluice valve **14**, of which the valve member **15** is seated against the flow outlet **13**, thereby closing the latter.

The sluice valve **14** includes a valve actuator **16**, which is connected to the valve member **15** by a plurality of cranks **17**. The valve actuator **16** is raised a short distance to rotate the cranks **17**, thereby disengaging the valve member **15** from the flow outlet **13** by lateral movement of the valve member **15**. Thereafter, the sluice valve **14** is raised in a longitudinal direction along tracks **18**, disposed one at each side of the sluice valve **14**, to clear the flow outlet **13**. By the reverse operation, the flow outlet **13** is closed to stop the flow of liquid therethrough. Thus, the sluice valve **14** is first lowered in a longitudinal direction to a position in front of the flow outlet **13**, and then the valve actuator **16** is lowered to rotate the cranks **17**, thereby moving the valve member **15** laterally to seat it against the flow outlet **13**.

Above the sluice valve **14** there is provided an operating mechanism **20**, by which the sluice valve **14** is operated to open and close the flow outlet **13**. The operating

mechanism **20** comprises a tubular member **21**, to the lower end of which there is secured a flange **22**, and together forming a floor stand for the operating mechanism **20**. The operating mechanism **20** stands upright on the floor **11** and is secured thereto by a plurality of bolts **23** which extend through the flange **22** and are anchored in the floor **11**.

An operator or operating element **25** extends through the tubular member **21** of the floor stand and through the floor **11**, downwardly to the sluice valve **14**. The lower end of the operator **25** is formed with screw threads. A pair of nuts **26**, **26** are threadedly engaged with the lower threaded end of the operator **25** and secure the same to the valve member **15**. The operator **25** is rotatable relatively to the valve member **15**; however, its position is fixed in a longitudinal direction relatively to the valve member **15** by the nuts **26**, **26**.

The lowermost end of the operator **25** is threadedly engaged with a nut **27**, which is fixedly secured to the sluice valve actuator **16**. By rotation of the operator **25**, the valve actuator **16** is raised or lowered, which produces rotation of the several cranks **17**, thereby unseating or seating the valve member **15**, as previously described. The sluice valve **14**, including the valve member **15** and the valve actuator **16**, are raised or lowered in a longitudinal direction by longitudinal movement of the operator **25**.

From the foregoing description, it is seen that the operator **25** has two movements, one being a rotational movement for operating the valve actuator **16**, and the other being a longitudinal movement for raising and lowering the sluice valve **14**. The respective movements of the operator **25** are alternative, which is to say that the operator **25** remains longitudinally fixed when it is rotated, and the operator **25** is not rotated when it is moved in a longitudinal direction.

Referring now to FIGS. 2 and 3, a drive housing **30** is disposed at the top of the tubular member **21**, of the floor stand. Within a lateral extension **31** of the drive housing **30**, a shaft **32** is rotatably supported by suitable anti-friction bearings. A hand crank **33** is secured to the outer end of the shaft **32** for manually rotating the latter. The inner end of the shaft **32** is formed with a bevel pinion **34**.

Within the drive housing **30**, there is a bevel gear **35** which is disposed on an upright axis that is coincident with the axis of the operator **25**. The bevel gear **35** is secured to a sleeve **36** by a plurality of bolts **37**. The upper end of the sleeve **36** is rotatably supported in the housing **30** by a bushing **38**. The lower end of the sleeve **36** is rotatably supported by a plurality of ball bearings **39**, which are disposed between a land **40** of the housing **30** and a flange **41** of the sleeve **36**. The bevel pinion **34** is engaged with the gear **35**, whereby the latter may be rotated by use of the hand crank **33**.

A driving element **45** is disposed within the sleeve **36** and is fixedly secured thereto by several roll pins **46**. The driving element **45** has a longitudinally extending bore, the upper portion of which is formed with screw threads for threaded engagement with the screw threads which are formed along the upper portion of the operator **25**. The lower portion of the bore of the driving element **45** is of somewhat larger diameter than the operator **25**, and therefore, is not engaged with the latter. At the lower end of the driving element **45** there are two notches **47** which are disposed at opposite sides of the driving element **45**.

Below the driving element **45**, there is a selector **50**, which is a sleeve-like element having a longitudinal bore through which the operator **25** extends. The bore of the selector **50** is of somewhat larger diameter than the operator **25**, so that there is no engagement between the se-

lector bore and the operator 25. A keyway 51 extends along the operator 25. The selector 50 has a pair of keys 52, 52, which are seated in the keyway 51. Each key 52 is fixedly secured to the selector 50 by a set screw 53. The keys 52 cause the selector 50 to be rotatably fixed, or nonrotatable, relatively to the operator 25. However, the keys 52 permit sliding movement of the selector 50 relatively to the operator 25.

At the upper end of the selector 50 there are a pair of integral ears 54, 54, which are complementally formed with respect to the notches 47, to be engaged therewith by upward sliding movement of the selector 50 towards the driving element 45. The lower end of the selector 50 has a pair of ears 55, 55 that are disposed at opposite diametral positions. Below the selector 50, there is a cross-member 56 that is secured to the tubular member 21 of the floor stand. The cross-member 56 is formed with a pair of notches 57, 57, as best seen in FIGS. 4 and 5. The notches 57, 57 are complementally formed with respect to the lower ears 55, 55 and are adapted to receive the latter when the selector is slidably moved downwardly towards the cross-member 56.

The selector 50 includes an annular groove 58. An eccentric 59 is disposed in the annular groove 58, in engagement with the selector 50. A shaft 60 extends outwardly from the eccentric 59. The shaft 60 is supported in a bushing 61 which is threaded into a laterally extending sleeve 62 and fixedly secured therein by a nut 63. A handle 64 is secured to the outer end of the eccentric shaft 60. By manipulation of the handle 64, the shaft 60 and the eccentric 59 are rotated, thereby raising or lowering the selector 50 by slidably moving it along the operator 25.

The tubular member 21 is formed with stops 65, 66 which determine the two selective positions of the selector handle 64. In the first position of the selector handle 64, as seen in FIG. 4, it abuts the stop 65, and the selector 50 is in its uppermost position in which the ears 54, 54 are interengaged with the notches 47, 47 of the driving element 45. In the second position of the selector handle 64, it abuts the stop 66, and the selector 50 is in its lowered position, in which the ears 55, 55 are engaged with the notches 57, 57 of the cross-member 56.

In the operation of the operating mechanism 20, the selector handle 64 is moved to its first position, which raises the selector 50 into engagement with the driving element 45. Then the hand crank 33 is turned, thereby rotating the pinion 34 and the gear 35. The rotating movement is transmitted through the sleeve 36 to the driving element 45. By engagement of the driving element 45 with the selector 50 through the interengaging notches 47, 47 and ears 54, 54, the driving element 45 is nonrotatably secured to the operator 25, since the selector 50 is non-rotatable with respect to the operator 25. Thus, rotation of the driving element 45 produces rotation of the operator 25, which acts on the nut 27 of the valve actuator 16, to cause the latter to unseat the valve member 15 by lateral movement thereof, as has been previously described.

After the valve member 15 has been unseated, the selector handle 64 is moved to its second position, in which the selector 50 is lowered into engagement with the cross-member 56 by interengagement of the ears 55, 55 and the notches 57, 57. In this condition of the operating mechanism 20, the selector 50 is non-rotatable by reason of being secured to the cross-member 56, which is a fixed member. Since the operator 25 and selector 50 are non-rotatable relatively to each other, the operator 25 is non-rotatable in the second position of the selector 50. Then upon rotation of the driving element 45, the operator 25 will move longitudinally relatively to the driving element 45, thereby producing longitudinal movement of the sluice valve 14, to raise the latter, thereby to open the flow outlet 13.

Reverse operation of the selector 50 and the driving element 45 and the operator 25 causes the sluice valve 14 to be lowered longitudinally to the flow outlet 13, and the valve member 15 to be seated laterally against the flow outlet 13, for shutting off the flow therethrough. A collar 67 may be secured to the upper end of the operator 25, by means of a bolt 68, to limit the lowermost position of the operator 25.

The various elements of the operating mechanism 20 are suitably enclosed within the tubular member 21 and the housing 30, so as to be weather-tight, and thereby maintain the lubrication of the parts so that the mechanism may be easily operated at any time. When the sluice valve 14 is raised, the operator 25 projects upwardly above the top of the housing 30. The operator 25 may be provided with suitable markings, or other indicia, for indicating the position of the sluice valve 14. Thus, the sluice valve 14 may be partially raised or lowered to partially open or close the flow outlet 13. The operating mechanism 20 of this invention provides a simple mechanism by which there may be produced the several operating movements of the operator 25, which are required for opening and closing the sluice valve 14. If desired, the operating mechanism 20 may include a motor, or other power means may be provided for operating the same, particularly in such installations where the sluice valve 14 is of such large size and weight as to require a greater magnitude of force for raising and lowering the same, than can be applied manually.

Obviously those skilled in the art may make various changes in the details and arrangement of the parts without departing from the spirit and scope of the invention as defined by the claims hereto appended, and applicant therefore wishes not to be restricted to the precise construction herein disclosed.

Having thus described and shown an embodiment of the invention, what it is desired to secure by Letters Patent of the United States is:

1. In combination with a sluice valve, an operating mechanism for said sluice valve, said sluice valve being movable laterally with respect to a flow outlet to seat and unseat the sluice valve and said sluice valve being movable longitudinally with respect to a flow outlet for opening and closing the flow outlet, an operating means that is selectively operable for moving said sluice valve laterally or longitudinally, a selector for said operating means, a first position for said selector in which said operating means is operable for moving said sluice valve laterally and a second position for said selector in which said operating means is operable for moving said sluice valve longitudinally, and means for moving said selector relatively to said operating means to said first position or to said second position for determining the selective operation of said operating means.

2. In combination with a sluice valve, an operating mechanism for said sluice valve, said sluice valve being movable laterally with respect to a flow outlet to seat and unseat the sluice valve and said sluice valve being movable longitudinally with respect to a flow outlet for opening and closing the flow outlet, an operating means that is selectively rotatable or movable longitudinally for moving said sluice valve laterally or longitudinally, a selector for said operating means, a first position for said selector in which said operating means is rotatable for moving said sluice valve laterally and a second position for said selector in which said operating means is movable longitudinally for moving said sluice valve longitudinally, and means for moving said selector relatively to said operating means to said first position for rotation of said operating means and for moving said selector to said second position for longitudinal movement of said operating means.

3. In an operating mechanism for a sluice valve as recited in claim 2, driving means connected to said operating means for rotating or longitudinally moving said operating means.

4. In combination with a sluice valve, an operating

mechanism for said sluice valve, said sluice valve being movable laterally with respect to a flow outlet to seat and unseat the sluice valve and said sluice valve being movable longitudinally with respect to a flow outlet for opening and closing the flow outlet, an operating means that is selectively rotatable or movable longitudinally for moving said sluice valve laterally or longitudinally, a selector non-rotatably engaged with said operating means, a first position for said selector in which said operating means is rotatable for moving said sluice valve laterally and a second position for said selector in which said operating means is movable longitudinally for moving said sluice valve longitudinally, and means for moving said selector relatively to said operating means to said first position in which it restrains said operating means to rotating movement and for moving said selector to said second position in which it restrains said operating means to longitudinal movement.

5. In an operating mechanism for a sluice valve as recited in claim 4, key means connecting said selector to said operating means for sliding movement of said selector relatively to said operating means, and said selector being slidably movable to said first position or to said second position.

6. In combination with a sluice valve, an operating mechanism for said sluice valve, said sluice valve being movable laterally with respect to a flow outlet to seat and unseat the sluice valve and said sluice valve being movable longitudinally with respect to a flow outlet for opening and closing the flow outlet, a screw operator that is selectively rotatable for moving said sluice valve laterally or movable longitudinally for moving said sluice valve longitudinally, a selector for said screw operator that is slidably and non-rotatably engaged with the screw operator, a first position for said selector in which said screw operator is rotatable for moving said sluice valve laterally and a second position for said selector in which said screw operator is movable longitudinally for moving said sluice valve longitudinally, and means for moving said selector relatively to said screw operator to said first position in which the selector restrains said screw operator to rotational movement and for moving said selector to said second position in which the selector restrains said screw operator to longitudinal movement.

7. In an operating mechanism for a sluice valve as recited in claim 6, rotatable driving means for said screw operator, said selector including a first means engageable with said rotatable driving means in said first position of the selector and a second means engageable with fixed structure in said second position of the selector.

8. In combination with a sluice valve, an operating mechanism for said sluice valve, said sluice valve being movable laterally with respect to a flow outlet to seat and unseat the sluice valve and said sluice valve being movable longitudinally with respect to a flow outlet for opening and closing the flow outlet, a threaded operator that is selectively rotatable for moving said sluice valve laterally or movable longitudinally for moving said sluice valve longitudinally, a driving element threadedly engaged with said threaded operator, means for rotating said driving element, a selector for said threaded operator that is slidably and non-rotatably engaged with the threaded operator, a first position for said selector in which said threaded operator is rotatable for moving said sluice valve laterally and a second position for said selector in which said threaded operator is movable longitudinally for moving said sluice valve longitudinally, and means for moving said selector relatively to said threaded operator to said first position in which the selector restrains said threaded operator to rotational movement and for moving said selector to said second alternate position in which the selector restrains said threaded operator to longitudinally movement.

9. In an operating mechanism for a sluice valve as recited in claim 8, in which said means for moving said selector includes an annular groove in said selector, an eccentric engaging said selector in said groove, and means for rotating said eccentric to move said selector to its first position or to its second position.

10. In an operating mechanism for a sluice valve as recited in claim 8, said selector including first interengaging means for engagement with said driving element and second interengaging means for engagement with fixed structure, and one of said interengaging means being disengaged when the other of said interengaging means is engaged.

11. In combination with a sluice valve, an operating mechanism for said sluice valve, said sluice valve being movable laterally with respect to a flow outlet to seat and unseat the sluice valve and said sluice valve being movable longitudinally with respect to a flow outlet for opening and closing the flow outlet, a stand, a screw threaded operator extending through said stand and being selectively rotatable for moving said sluice valve laterally or movable longitudinally for moving said sluice valve longitudinally, a driving element threadedly engaged with said screw threaded operator, rotating means connected to said driving element and rotatably supported on said stand to rotate the driving element, a selector for said screw threaded operator that is slidably and non-rotatably engaged with the screw threaded operator, a cross-member in said stand disposed laterally of said screw threaded operator, said selector being disposed between said driving element and said cross-member, means for slidably moving said selector along said screw threaded operator to a first position in engagement with said driving element in which the selector restrains said screw threaded operator to rotational movement and for slidably moving said selector to a second alternate position in engagement with said cross-member in which the selector restrains said screw threaded operator to longitudinal movement, said selector and said driving element including first interengaging elements which are engaged in said first position of the selector, said selector and said cross-member including second interengaging elements which are engaged in said second position of the selector, and said first interengaging elements and said second interengaging elements being alternately engageable.

12. In an operating mechanism for a sluice valve as recited in claim 11, a keyway in said screw threaded operator, key means in said selector engaged with said keyway and connecting the selector and said screw threaded operator, said means for slidably moving said selector comprising an annular groove in said selector, a rotatable eccentric disposed on a lateral axis and engaging said selector in said groove, means for rotating said eccentric for alternately moving said selector to said first position or to said second position, said first interengaging means comprising complementally formed lugs and notches, and said second interenegaging means comprising complementally formed lugs and notches.

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