United States Patent [19]

Shettel

[11] **3,874,176**

[45] **Apr. 1, 1975**

[54] **IRRIGATION CONTROL**

[76] Inventor: **Ralph E. Shettel,** Rt. 1, Twin Falls, Idaho 83301

[22] Filed: **Jan. 21, 1971**

[21] Appl. No.: **108,434**

[52] **U.S. Cl.** **61/25,** 61/29

[51] **Int. Cl.** **E02b 7/42**

[58] **Field of Search** ..... 61/12, 22 A, 25, 29

[56] **References Cited**

UNITED STATES PATENTS

1,054,986	3/1913	Proctor	61/12 X
1,275,499	8/1918	Thorsby	61/25
1,330,957	2/1920	Shaw	61/29
3,168,814	2/1965	Hurlburt	61/25
3,693,357	9/1972	Shettel	61/29

FOREIGN PATENTS OR APPLICATIONS

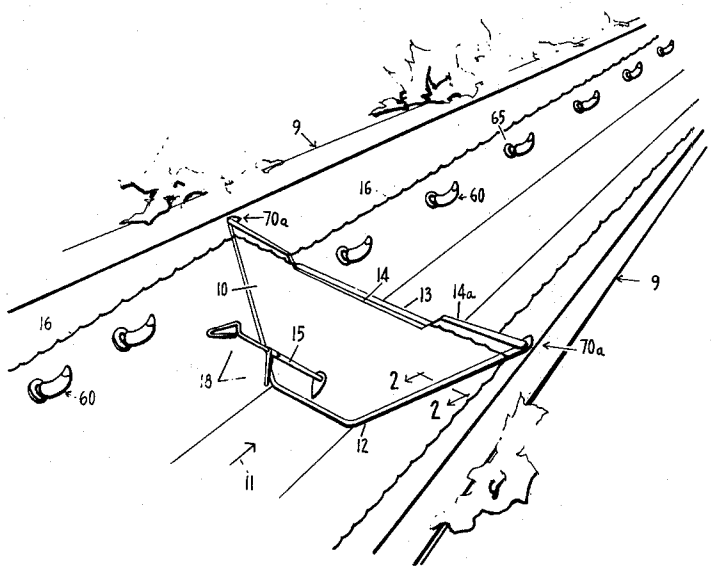
43,122	7/1910	Austria	61/25
358,386	12/1961	Switzerland	61/25

Primary Examiner—Mervin Stein
Assistant Examiner—David H. Corbin

[57] **ABSTRACT**

An irrigation apparatus for gravity systems having a control means balancing a diversion in combination with an opening and closing spill segment means for the stabilization of a checked water line disposed to complement ditch valve preset for the identification and maintenance of diverse flow volumes to the land.

13 Claims, 17 Drawing Figures



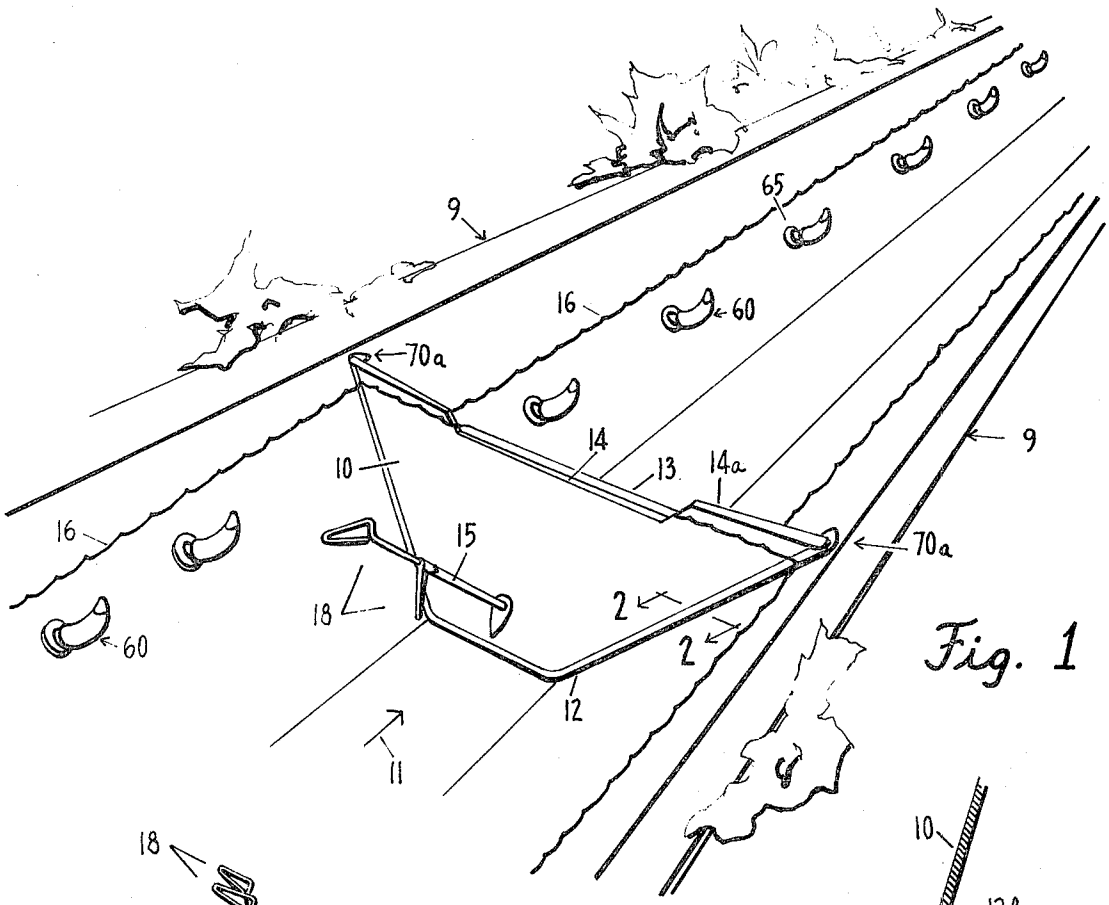


Fig. 1

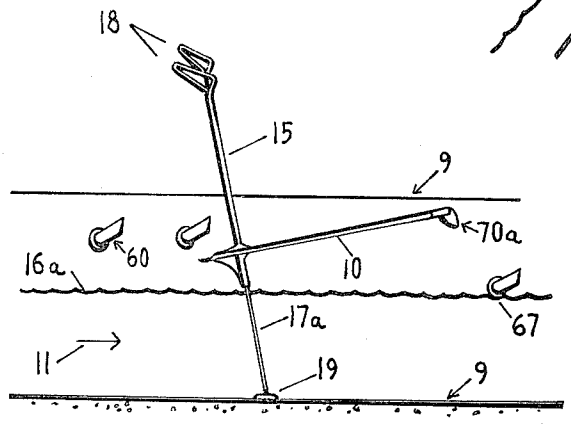


Fig. 1A

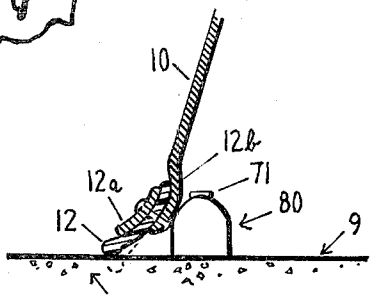


Fig. 2

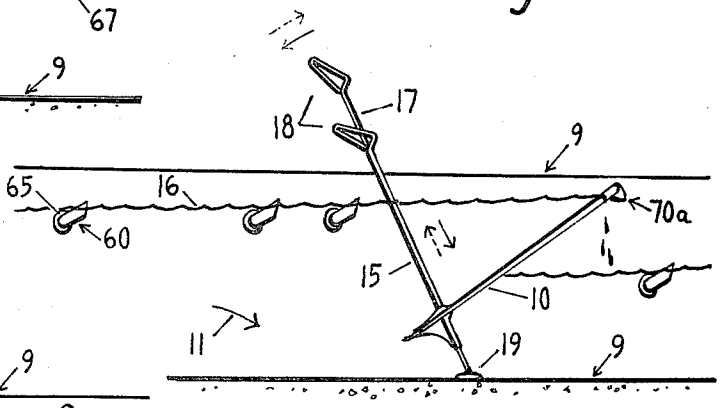


Fig. 1B

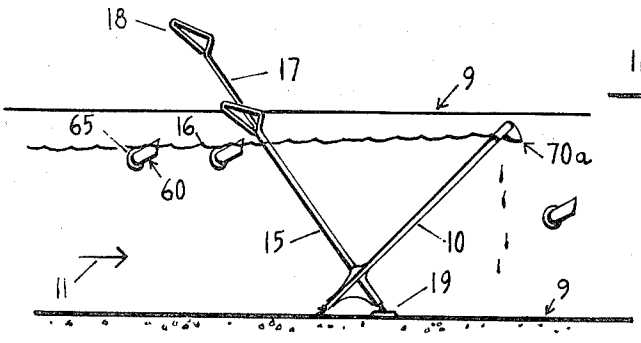


Fig. 1C

Ralph E. Sherry
INVENTOR

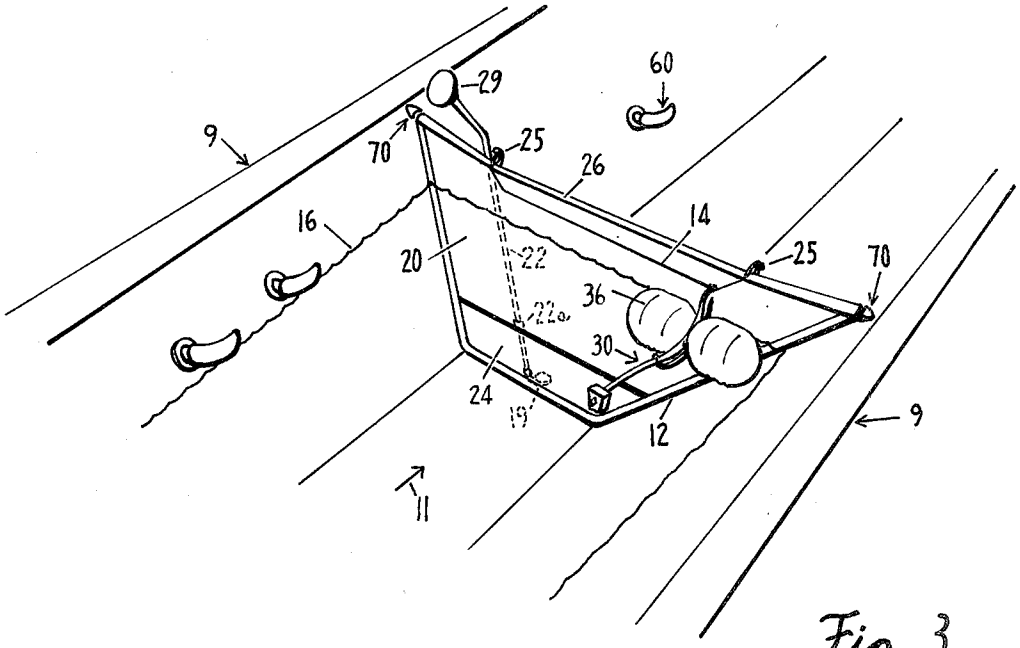


Fig. 3

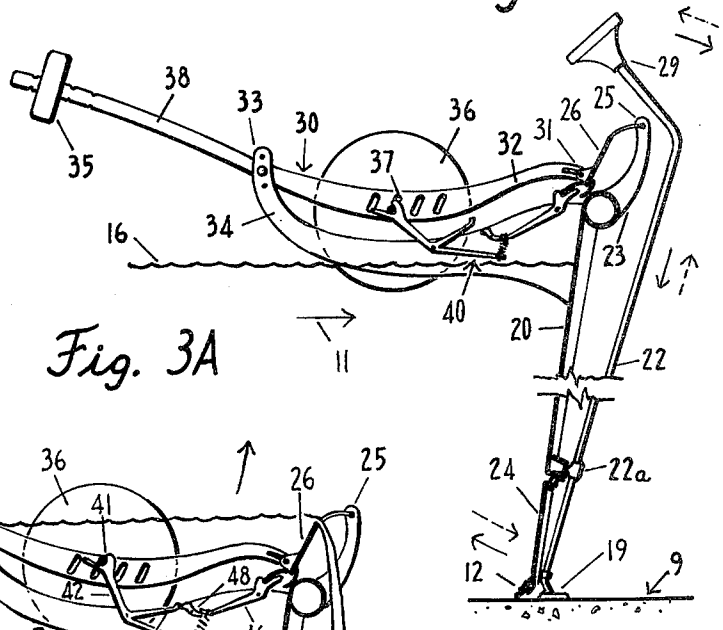


Fig. 3A

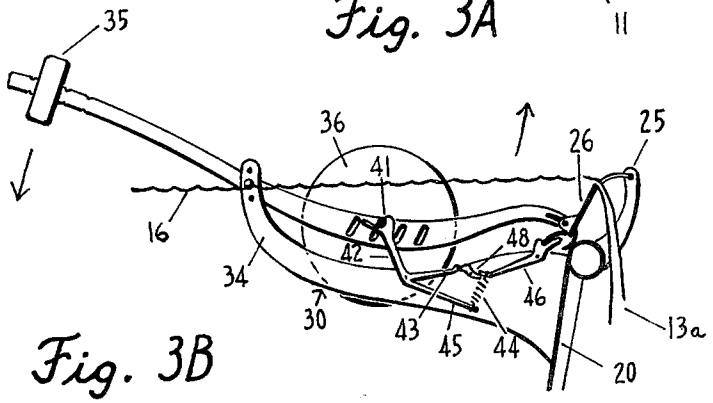


Fig. 3B

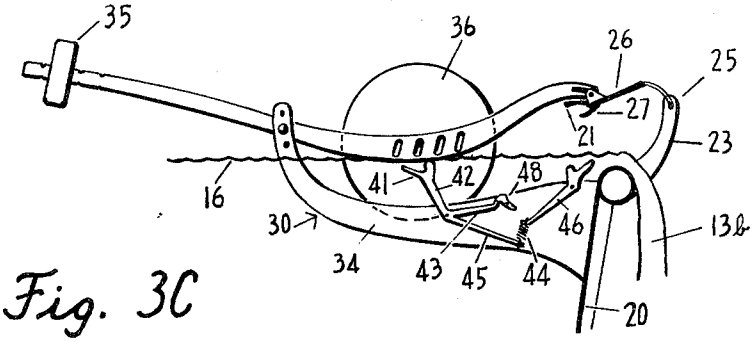


Fig. 3C

Ralph E. Shetley
INVENTOR

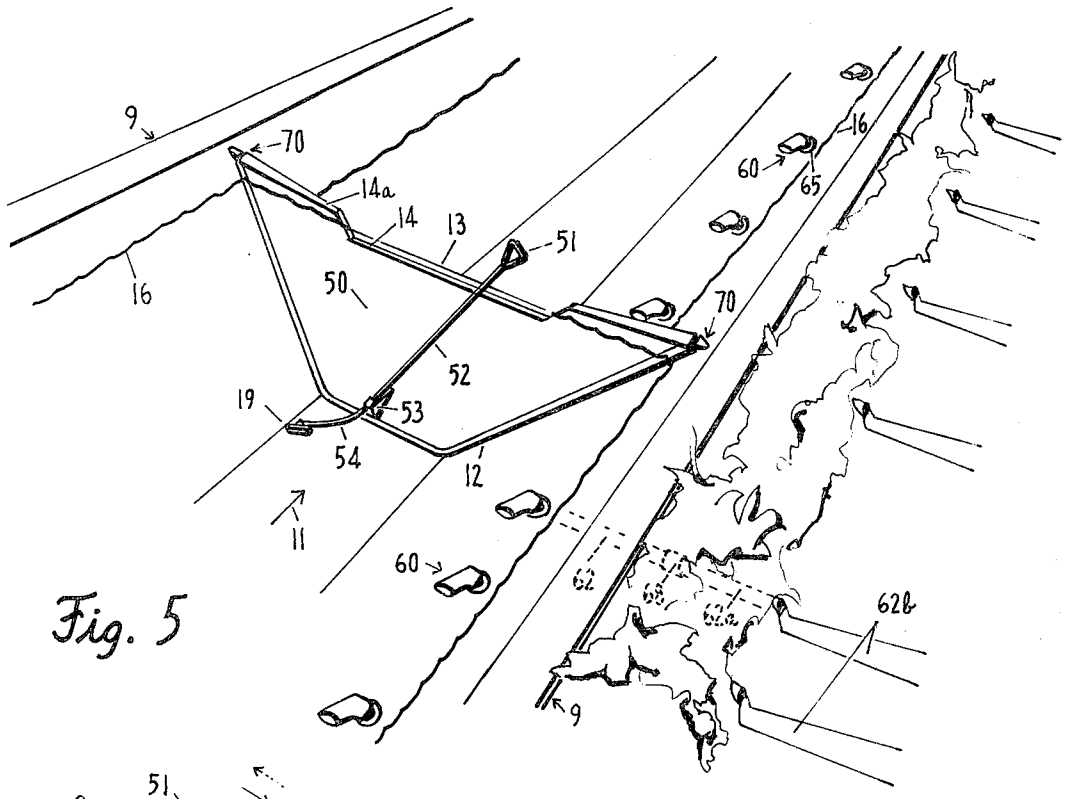


Fig. 5

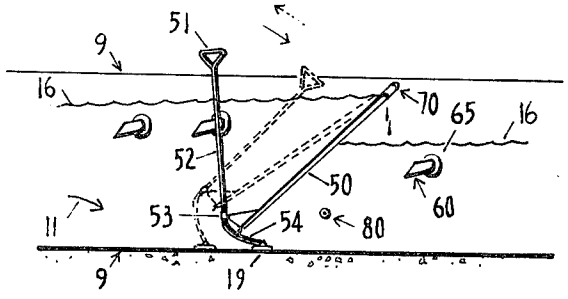


Fig. 5A

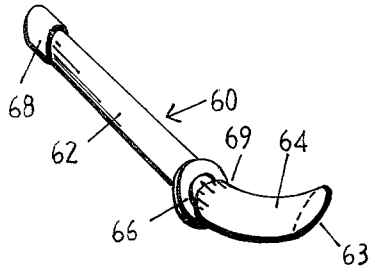


Fig. 4

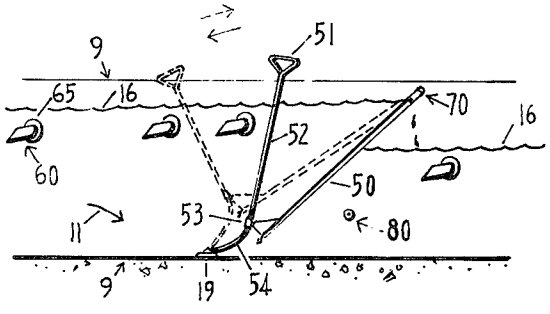


Fig. 5B

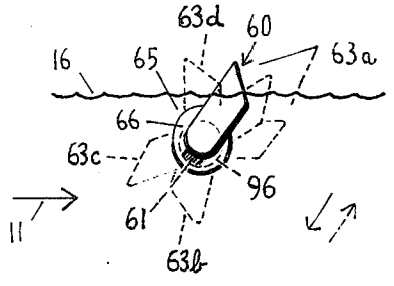


Fig. 4A

Ralph E. Sharp
INVENTOR

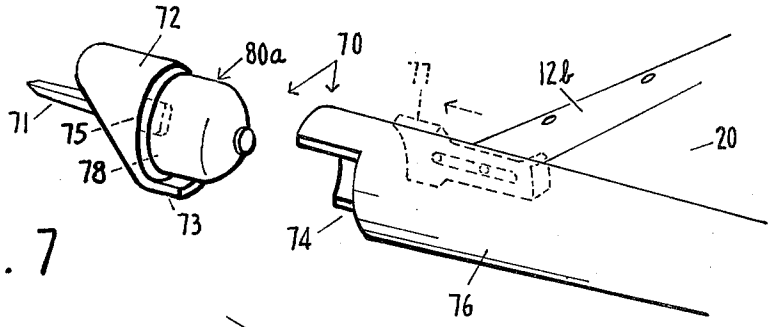


Fig. 7

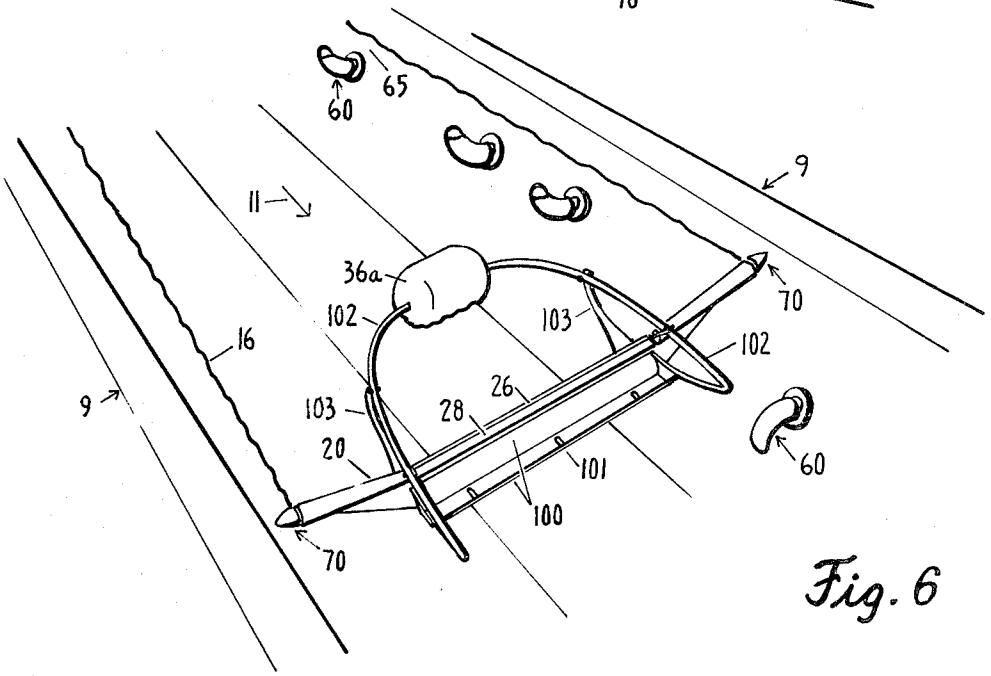


Fig. 6

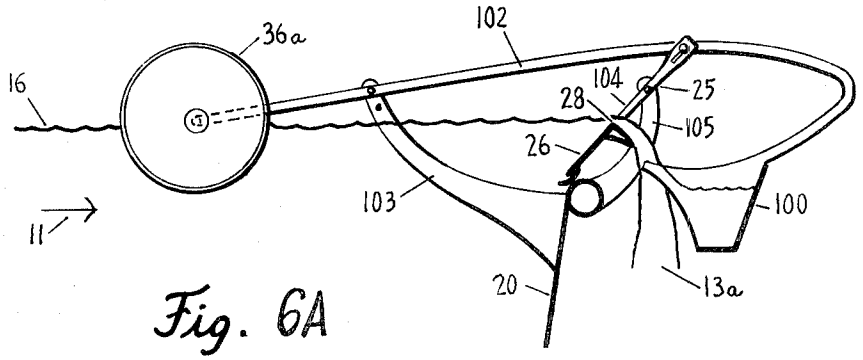


Fig. 6A

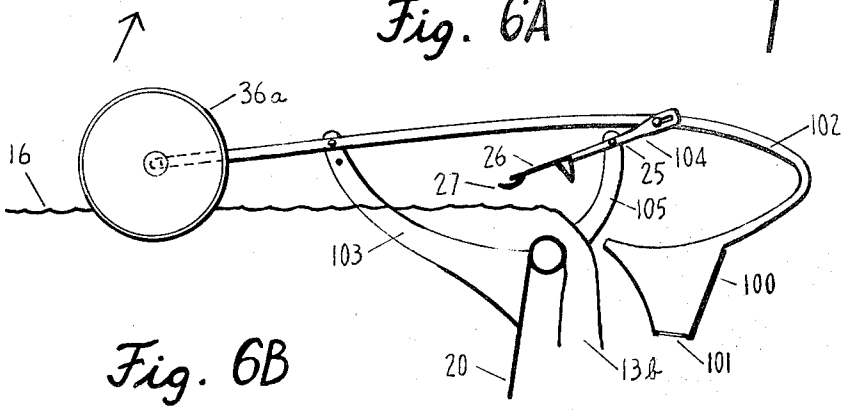


Fig. 6B

Ralph E. Shettel
INVENTOR

IRRIGATION CONTROL

The invention relates to equipment and structures sophisticating practices common to open channel irrigation systems, and more particularly, it relates to controlling waters for distribution over farm and ranch lands.

It is becoming increasingly necessary to achieve efficiency in the use of allotted waters. Too often, the irrigation exercise tends to be haphazard and wasteful in this respect, and reflects the human desire to minimize labor, even at the expense of waters wasted and a continuing erosion. Since depletion is fast becoming the word by strength of numbers, abuse of any resource must become an ignorance of the past and give way to alternative incorporating appropriate innovation, even though the better implementation waits on the disciplined irrigator.

Therefore, it would be the first object of the invention to innovate irrigation technique. Another object follows in that water regulation be progressed toward automation, as an effective labor saving means. Still another object of the invention is to produce mechanism installation and storage method.

Briefly, the above objects of the invention are best met through check and gravity conduit parts which work well together in lifting diverse head waters to feed 'preset' metering that can selectively deliver known and reproduced volumes attentive to crop need, be the 'preset' diverse or matched.

The basic embodiment of the invention will be revealed as the specification is applied to the cooperate drawing in which like numerals refer to like parts throughout, and in which:

FIG. 1 is a perspective view of a stilted balancing check installation;

FIG. 1A is a side elevational view thereof, check at rest;

FIG. 1B is a repeat view, check 'cracked' for balancing;

FIG. 1C is also a repeat view, check closed;

FIG. 2 is an enlarged sectional view taken along line 2, of FIG. 1;

FIG. 3 is a perspective view of a segmented balancing check installation;

FIG. 3A is a side elevational view of the spill actuator at rest;

FIG. 3B is a repeat view thereof, trip initiated;

FIG. 3C is also a repeat view, actuation initiated;

FIG. 4 is a perspective view of the ditch valve assembly;

FIG. 4A is an end view thereof showing rotation metering;

FIG. 5 is a perspective view of a levered balancing check installation;

FIG. 5A is a side elevational view thereof, check 'cracked' for balancing;

FIG. 5B is a repeat view, control reversed;

FIG. 6 is a perspective view of the segment balancing check incorporating spill trough activation and counterbalance;

FIG. 6A is a side elevational view thereof, segment closed for high spill; and

FIG. 6B is a repeat view, segment open for low spill.

FIG. 7 is a perspective view showing the check pivot means;

Referring now to FIGS. 1, 1A, 1B and 1C of the drawing, the balancing check installation depicted includes dam 10, control 15 and ditch valve 60. Dam 10 is slanting in its position within ditch 9 to thereby become stabilized by overriding waters, while progressing the function of control 15 for the regulation thereof. The check is transportable to any location in the ditch, and its use can be extended to include any of the related take out or turnout structures. It may be preferred, however, that the installation be spotted by pivot 70, FIG. 7, and positioned by bearing nodes 80, FIG. 2, to thereby fix its location relative to the conduit line. While this will be hereinafter more fully discussed, their use will be immediately seen as the better approach. Bead configuration 12*b* reinforces the perimeter structure of dam 10 to carry between the bearing nodes 80. Dam 10 is closed against channel 9 by seal 12 facing the perimeter thereof to escape being wedged between the structures by a closing. Reducing seal exposure through the use of overlay 12*a* minimizes the binding effect by water pressure. Seal 12 is brought against overlay 12*a* by a closing with the channel wall, and the check opening is thereby eased in anticipation of a coming automation. An alternate seal exists in a preferably bonded plastic or rubber adhesive depending the perimeter surface of dam 10 as a substantial outward welt extension stopped in a position of bearing with the pitch wall by the just before described nodes 80. Such an approach is allowed since the seal is spared the deterioration and distruction from excess shear and abrasion coming with a wedged closing.

A depression 14 is given the top surface of dam 10, which is more effective depending from extremity downward slant 14*a*, to thereby centralize water spill 13 and current 11, which is indicated typically throughout the drawing by an arrow. Checked water is given numeral 16 and passing water numeral 16*a*. The control exists as a telescoping actuation. Control tube 15 superimposes a perforation in dam 10 and is suitably attached thereto. Support stilt 17 is inserted therethrough and fixed with a flexible pad extremity 19 to selectively bear the channel floor. Both control and stilt extend uprightly to clear checked waters 16 with affixed grip portions 18 for manual operation. Stilt 17 is given extension for the travel of tube 15 to thereby selectively 'crack' an opening for the control and balancing of water. To regulate the check, control 15 is pushed or pulled against down pressure on stilt 17. Stilt 17, in turn, drifts over pad 19, which remains stationary, to compensate for the movement of dam 10. The tube itself provides a leak free operation. The check is removed from the irrigation channel by rolling it over extremity swiveled bearing glides 70*a* to clear any remaining water for transport and relocation. Or it is held suspended in place at rest, or storage, above passing waters 16*a* by stilt 17*a*, as seen in FIG. 1A. If a seasonal storage need arises, the control portion would best be removable for stacking.

An alternate balancing check installation is shown in FIGS. 3, 3A, 3B and 3C with dam 20 including the configuration and seal just described for dam 10. Dam 20, however, has near vertical position in channel 9 to thereby minimize the effect of overriding waters. This further eases an opening in anticipation of a coming automation. The inclusion of pivot 70 and bearing node 80, in this case, is required to prevent check dislocation and shift as responding an overpowering water pres-

sure. The check balancing means in lower segment **24** is included under U.S. Pat. No. to Shettel 3,693,357. Control **22,** shown in FIGS. **3** and **3A**, is laying over in its position to present knob **29** to the working ditch bank for easy use. An opposite extremity is permitted travel in its attachments to lower segment **24** and is tipped with pad **19** to selectively bear the channel floor for the positioning thereof. Pad **19** is deliberately located off center to cam variety in bearing elevation following the rotation of control **22.** A fulcrum is provided at **22***a* as depending from dam reinforcements for the support of control **22,** while permitting travel. In operation, the control arm levers segment **24** selectively to a first opening for the control and balancing of a water diversion.

Spill segment **26** exists out of and filling the top configuration of dam **20** and pivotly depends therefrom at **25.** Whatever the configuration of spill segment **26,** it will always be an upper portion acting against the dam to selectively change the structural height thereof and function to alter the spill of water. Specifically, this means the stabilizing of pressure head **65** over the conduits, or checked water line **16,** in response to diverse head water volumes. The segment is closed to raise the spill line and check waters, **13***a* of FIG. **3B**, or it is opened to lower the spill line and pass waters, **13***b* of FIG. **3C**. As an upward acting panel, it is seen to fluxuate between the two extremes, with the closing against the dam sealed water tight **27.** Segment **26** can be frictionally levered for manual operation, or modified to include solenoids timed by remote control or clock. A catch can be included to maintain segment closing while cooperating with a float or spill bucket activator means to time an opening to high water. Its automation, then, is an obvious and natural development benefitted by the passage of excessive water volumes through the check balancing manipulations.

Actuation of spill segment **26** is made automatic by the inclusion of actuator **30** and holding mechanism **40.** Actuator **30** comprises lever arm **32,** in mechanical advantage, interconnecting pivotal attachments to spill segment **26** at **31** and to support **34** at **33,** with the rearward extension thereof **38** selectively locating counterweight **35** therealong. Support **34** depends rearwardly from the face of dam **20.** Weight **35** works to counterbalance and thereby lighten the actuation load for float **36** attaching lever arm **32** apart from support pivot **33.** The dual floats shown level the actuation through balanced buoyancy and have a common stud connection that is allowed limited vertical travel within elongate hole **37.** The dual float means relates particularly to holding mechanism **40.**

As waters raise to high spill **13***a*, a premature opening is prevented by holding mechanism **40,** which pivotly depends from actuator support **34** in its entirety. A follower **42** has a clevis extremity **41** which cages the float travel to thereby activate opposite extremity upper **43** and lower **45** finger portions. Catch **46** is seen to selectively engage spill segment bar **21,** more easily seen in FIG. **3C**. Its opposite extremity is selectively held by trip **48.** Spring **44** interconnects lower finger **45** and catch **46** to thereby slow the travel of float **36** causing submergence for its loading. Extreme float travel is timed to high water spill when upper finger **43** impacts trip **48** for the release of catch **46.** The resulting release of spill segment **26** is simultaneous with the escape of float **36** which kicks finger **43** past the trip lobe to thereby hold the mechanism for a recycling coming with a closing. Float submergence not only aids the overcoming of segment water seal but the bobbing-up effect excellerates the opening in response to initial spill requirements. The float is free to follow the changing water line for the relative positioning of spill segment **26.**

The before named stabilizing duties of spill segment **26** can be specialized to time the cut-back of water volumes being sent through the field, because of its particular ability to automatically adjust the checked water line or pressure head. It is known that the larger volumes used to wet the ground can be later reduced, or cut-back, and still suffice the irrigation need. This, of course, further sophisticates the irrigation practice while extending water resource. Surely, soils are eroded sideways as well as down by water volume, and with less water it follows that there can be less erosion. The cut-back approach, though not widely used, apparently exists as a refinement biding its time.

Still another alternate check installation includes dam **50,** control **52** and ditch valve **60,** together locating in channel **9,** as depicted in FIGS. **5, 5A** and **5B**. Dam **50** enjoys the installation, configuration and seal described for dam **10,** but may be positioned upright. Control **52** interconnects a grab **51** for manual operation and an opposite extremity swivel attachment with dam **50** at **53** spaced apart therefrom to suffice its function. A curving or angled extension beyond swivel **53** is manipulated and locked to selectively bear the channel floor and thereby 'crack' an opening for the control and balancing of waters. Increasing extremity surface area **19** eases bearing wear and tear on the channel floor extension **54** drifts over the ditch floor for the selective elevation of dam **50.** Pad **19** is flexible and provides the required bearing. Extension **54** is also seen to be equally effective operating from two directions.

In operation, grab **51** can idle against the face of dam **50** or is held erect under load. In place rest or storage above passing waters can be provided by the control which is inverted to form a supporting leg. Control **52** can be positioned flat for seasonal stacking and storage.

The basic embodiment of the invention has been shown to encompass check structures that systematically raise waters for diversion, irregardless of diverse cropping demands, head volumes and checking sequence, or irrigation moxie, and produce and reproduce identity for conduit metering. With the changing of the irrigation set, the check structure has the second duty in controlling the release of accumulated waters.

The primary duty of the conduits is 'preset' metering directed at the automation of the diversion itself. Conduit **62,** as seen in FIGS. **4** and **4A**, is a section of stock tubing capped with an adjustable and removable head **64.** Any set of ditch valves **60** is alined level and, preferably, equally spaced behind the check to thereby effect a uniform distribution of waters. The lowest conduit clears passing waters **16***a* to thereby eliminate between irrigation dribble, **67** of FIG. **1A**. Head **64** curves or is angled to clear the ditch wall while finding selective position through 360° about the axis of conduit **62.** Reference marks **69** aid identity in ditch valve 'preset.' A slanted inlet can be seen to break water for relative metering which is continued through relative submersion **63***a*, locate deep to minimize the siphoning of surface trash **63***b*, utilize water current pressure to increase volume **63***c* or act as shutoff **63***d*. Flange **66** can

be mastic set to seal the installation against seepage. To meet field conditions, one extremity of the conduit is coupled **68** to selectively join an appropriate length of stock tubing **62***a* to thereby surface irrigate the land at **62***b*, FIG. **5.**

Ball and socket **70** is an example of the selective engagement desired. Obviously, only one of the pivots is required to include this provision. Since it has been shown that the position of the check structure is best fixed against dislocation and shift, while spotting the location relative to the conduit line, it is desirable, too, that removal and easy relocation be a consideration. In FIG. **7,** bearing node **80,** later described, is seated, as at **80***a*, on an appropriately tapered spacer **72** and hard nailed or ram set **71** to the channel wall to form a socket. The check beam **76** is cut away **74** to slip over node **80***a*, out of position as shown, and turned to be caught by tab override **73.** Any upward thrust is thereby contained. By substantially increasing the proportions of spacer **72,** for both pivots, tab **73** would then be able to carry the check structure on key **77,** shown in dotted line, through an alignment rotation permitting its selective engagement in slot **78.** The suspension of the check above passing waters as a cantilever has a certain convenience. Tab **75** would be added to hold the check from dropping away while in the position of rest.

It is better that the check structure be spaced from the channel to thereby eliminate excessive frictional involvement with the channel wall. The inclusion of bearing node **80,** of FIGS. **2** and **5**A, to stop the check short will accomplish this purpose and can depend from either check or channel, with the check node existing as a structural spacer. The channel mounted node is preferred, however, since both bearing surfaces are metal. Node **80** has a rounded configuration that sheds trash and is punched for hard nailing or installation set **71** to the channel wall. The installation of dam seal **12,** as before described, is already minimizing seal wedging, and the nodes eliminate structural wedging to further ease an opening in anticipation of a coming automation. It may prove advantageous to rest the check while in the closed position. Swiveling the node could cause a depending lobe to force the dam seal clear of the channel wall. It is offered as a possible alternative.

The innovation of the concrete ditch to a plastic one will be a welcome change as far as the installation of the conduits is concerned. The earth ditch bank is augered with the conduits finally installed and shimmed **61** tight to the channel perforation **96,** of FIG. **4**A, to trim and fix conduit elevation while lining-up the final installation.

Numerous alternatives, modifications and adaptations will easily come to those familiar to the art defined by the revealed structures and mechanisms. By way of example, it may be preferred that spill segment **26** be triggered to open, while innovating counterbalance, by the weight of waters directed to accumulate in trough **100,** as seen in FIGS. **6, 6**A and **6**B of the drawing. With perforations **101** providing leak, the dissipation of that weight is allowed by a segment opening which lowers the spill. Float **36***a* follows the water line to manipulate segment panel **26** for its position and a final closing. In more detail, lever arms **102** depend outwardly from float **36***a* and forwardly to work, in mechanical advantage, over supports **103** for the actuation of spill segment **26.** The lever arm extremity exists as a reflex bend to enhance the counterbalance of trough **100** affixed therebetween. Trough **100** locates under and alines segment lip **28** to catch high spill **13***a*. Lip **28** increases the separation between trough **100** and low spill **13***b*. Spaced apart, segment extension members **104** are given limited travel in their attachments to lever arm **102,** with segment arm pivot coincident with the spill segment pivot at **25.** This approach enjoys considerable efficiency and further progresses the novelty and function of spill manipulation.

While the before described and shown devices are considered a preferred form of the invention, it is by way of illustration only, with the broad principle of the invention being defined by the appended claims.

I claim:

1. A balancing assembly for controlling the diversion of water in a channel comprising;

dam means positioned in a channel means, the top surface of said dam means including a depression adapted to receive an opening spill segment,

pivot means permitting pivotal movement of said dam relative to said channel means,

seal means depending from the perimeter of said dam means for bearing against said channel means when said dam means is in the closed position,

control means for pivoting said dam means, attachment means secured to said dam means for attaching said control means thereto, said attachment means permitting relative movement between said control means and said dam, one extremity of said control means extending downwardly from said attachment means to bear against the channel means for support and another extremity of said control means extending upwardly from said attachment means to permit the actuation of said control means to selectively space said dam means apart from the channel means.

2. The balancing assembly of claim **1** wherein said pivot means includes a cutaway socket means secured to said dam means and disposed for selective engagement with a corresponding ball means depending from the channel.

3. the balancing assembly of claim **1** with said dam disposed to stop against a node means depending from the channel to prevent wedging of said dam means in the closed position.

4. The structure of claim **3** wherein said seal means is bonded to the perimeter surface of said dam means.

5. The balancing assembly of claim **1** with said control means extends through a perforation in said dam means, said control means and said attachment means having frictional telescoping movement selectively spacing said dam apart from the channel.

6. The structure of claim **5** wherein said attachment means is a tube means superimposing a dam perforate means and said control means extends therethrough bearing against the channel for support and in frictional telescoping movement therewith selectively spacing said dam apart from the channel.

7. The balancing assembly of claim **1** wherein said attachment means is a swivel means and the downward extension of said control means being an offset means bearing the channel for support while in selective position spacing said dam apart from the channel.

8. The balancing assembly of claim **1** including a spill segment being in pawled pivotal engagement with said dam and including intermediate catch means maintain-

ing the closing thereof, catch linkage means cooperating with a float activator means for the release of said spill segment.

9. The structure of claim **8** wherein the float activator means is a bucket activator means cooperating with the spill of water for the release of said spill segment.

10. The structure of claim **8** wherein the float activator means is a solenoid activator means.

11. The balancing assembly of claim **1** including spill segment and spill segment actuation means comprising;

a support member depending from the face of the dam,

movable lever arm means in mechanical advantage interconnecting said spill segment and said support while including rearward extension,

a counterweight selectively locating along said rearward extension,

a float means attaching said lever arm disposed to buoy the actuation of said spill segment.

12. The structure of claim **11** including dual float means and being further characterized by a holding means cooperating with said dual float means for leveling the actuation of said spill segment comprising;

elongate perforate means in said lever arm means permitting said dual float means limited vertical travel,

a follower means depending from said support member to cage float travel and including opposite extremity upper and lower finger portions depending from said follower means,

movable catch means depending from said support member to selectively hold said spill segment closed,

a spring means interconnecting said catch means and said lower finger, said spring means becoming loaded by the movement of said float,

movable trip means depending from said support member to hold said catch means and maintaining spill segment closure until impacted by said upper finger for the release thereof buoyed by said float.

13. The balancing assembly of claim **1** including a spill segment and spill segment actuation means comprising;

float means disposed upstream of said dam means,

a trough means aligned with the spill segment lip to thereby become weighted by water to initiate the opening thereof, trough perforate means being provided to leak and dissipate the weight of water,

upstream support members depending from the face of said dam,

movable lever arm means in mechanical advantage having intermediate engagement with said upstream support members while interconnecting said trough means and said float means,

downstream support members depending from said dam,

segment extension means in mechanical advantage having intermediate pivotal engagement with said downstream supports while interconnecting said spill segment and said lever arm for the actuation thereof.

* * * * *