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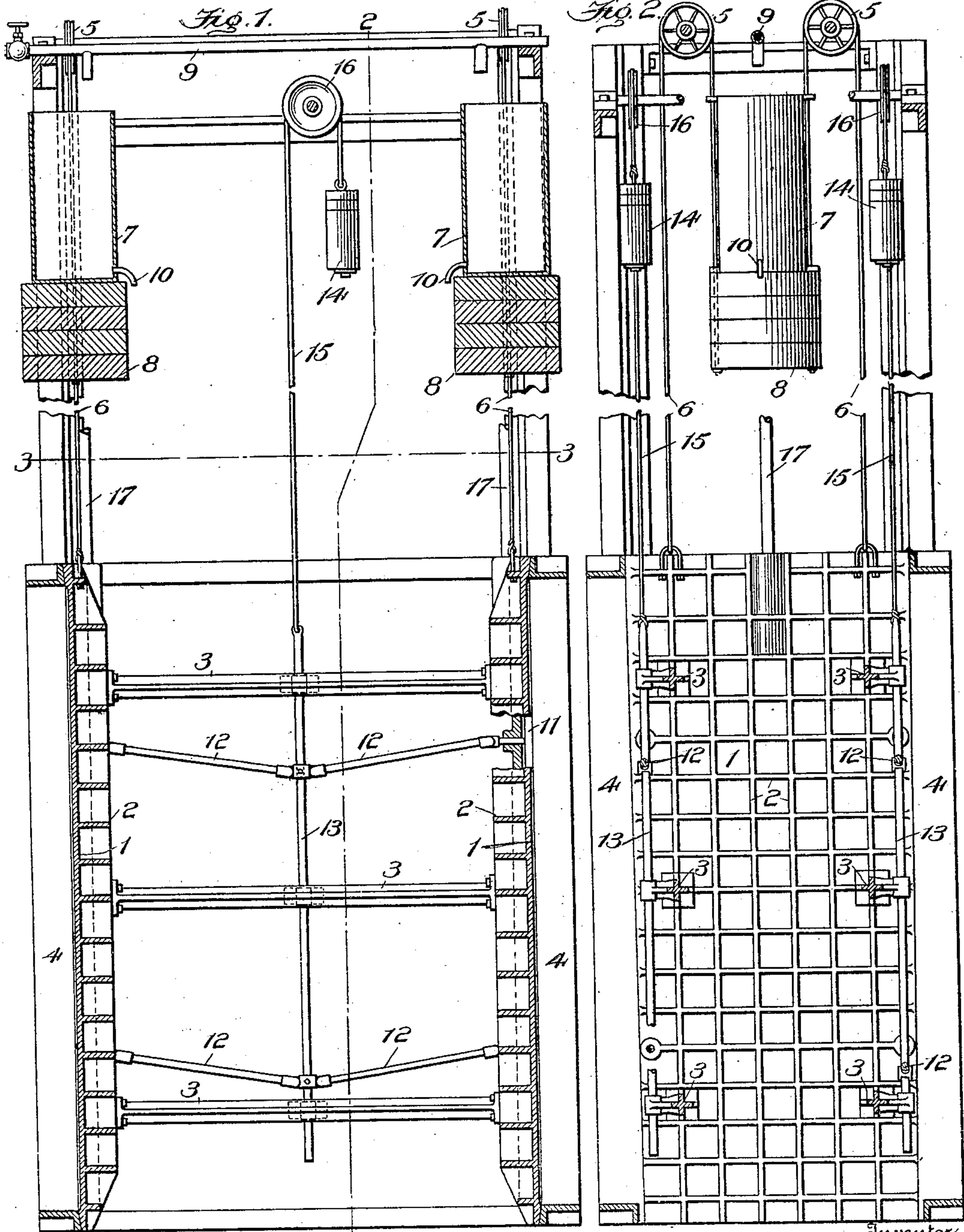
PATENTED OCT. 15, 1907.

D. W. ROSS.

GATE FOR WATERWAYS.

APPLICATION FILED JAN. 12, 1907.

3 SHEETS—SHEET 1.



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3 SHEETS—SHEET 2.

Fig. 3.

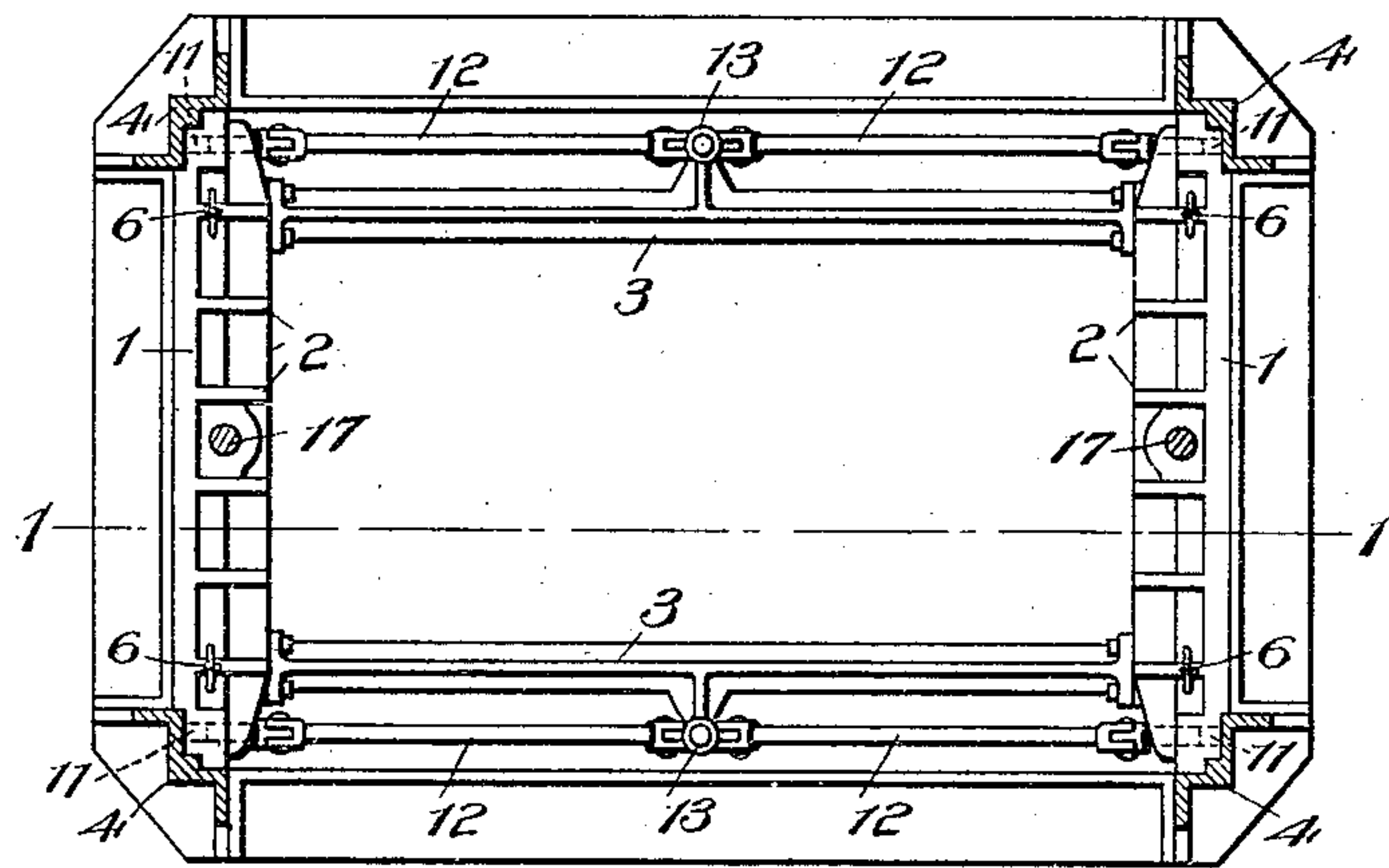


Fig. 4.

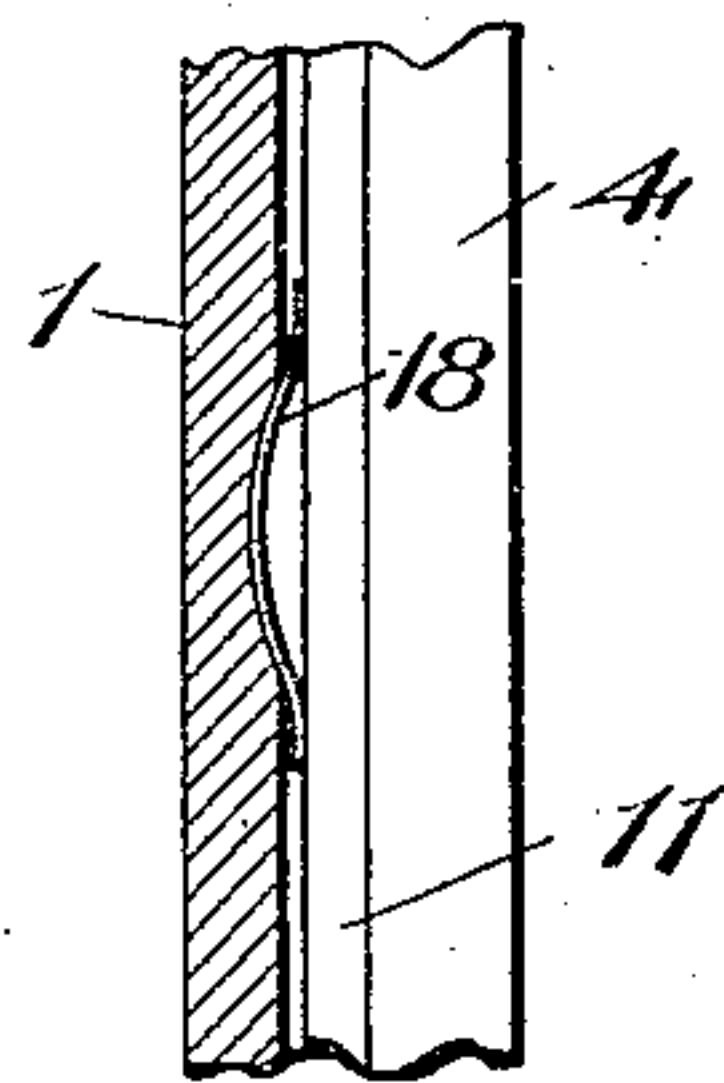


Fig. 6.

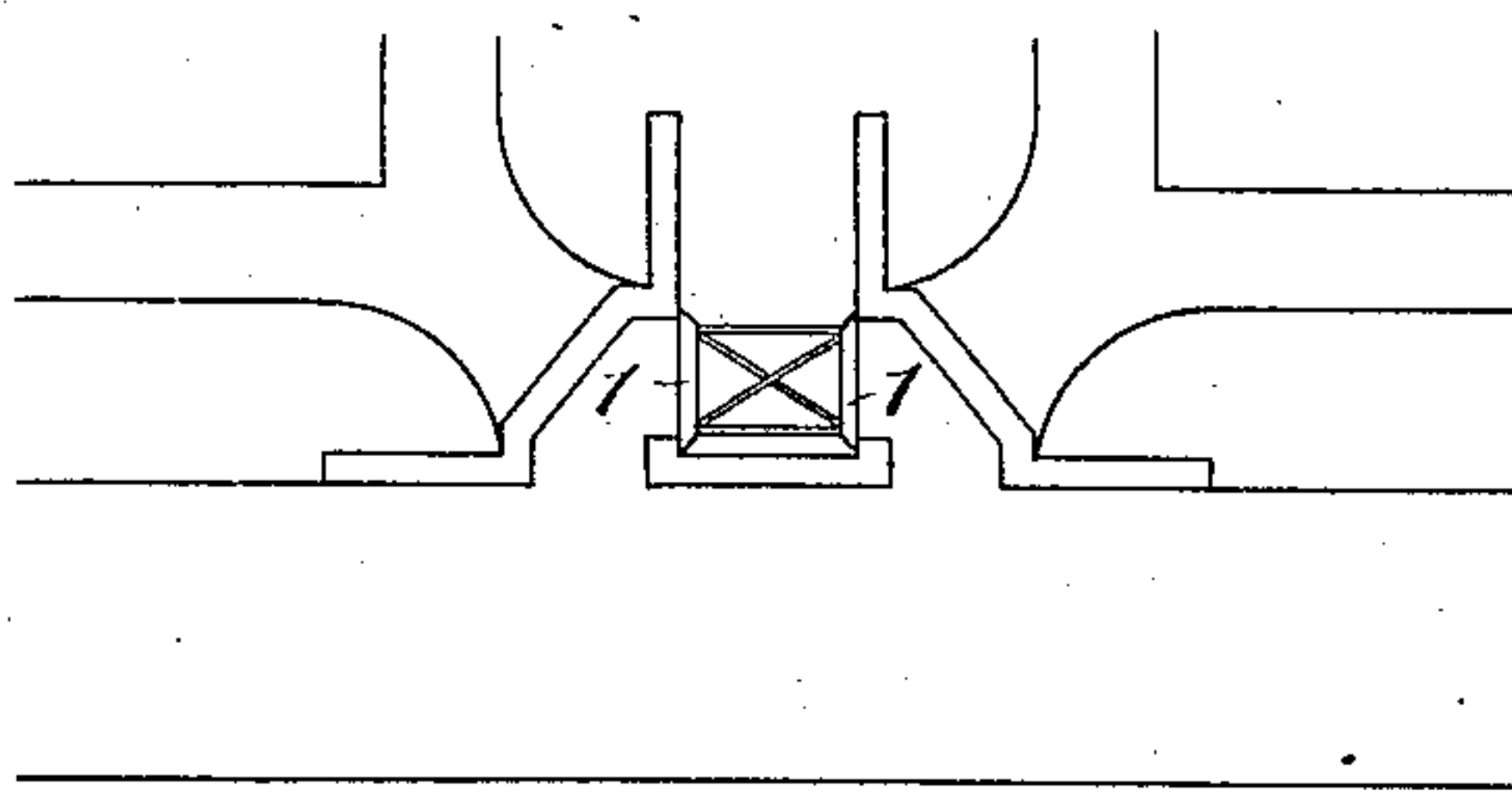


Fig. 5.

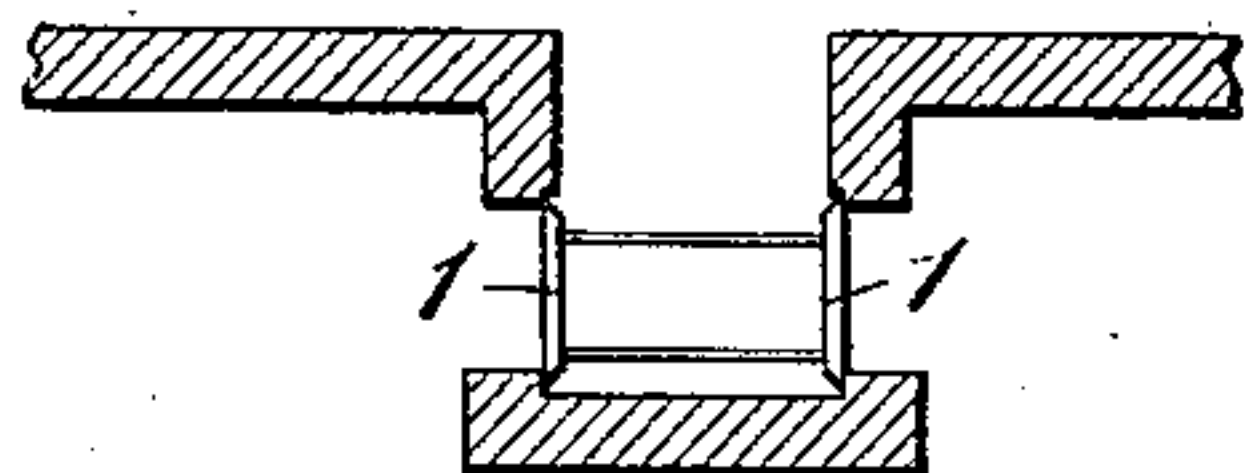
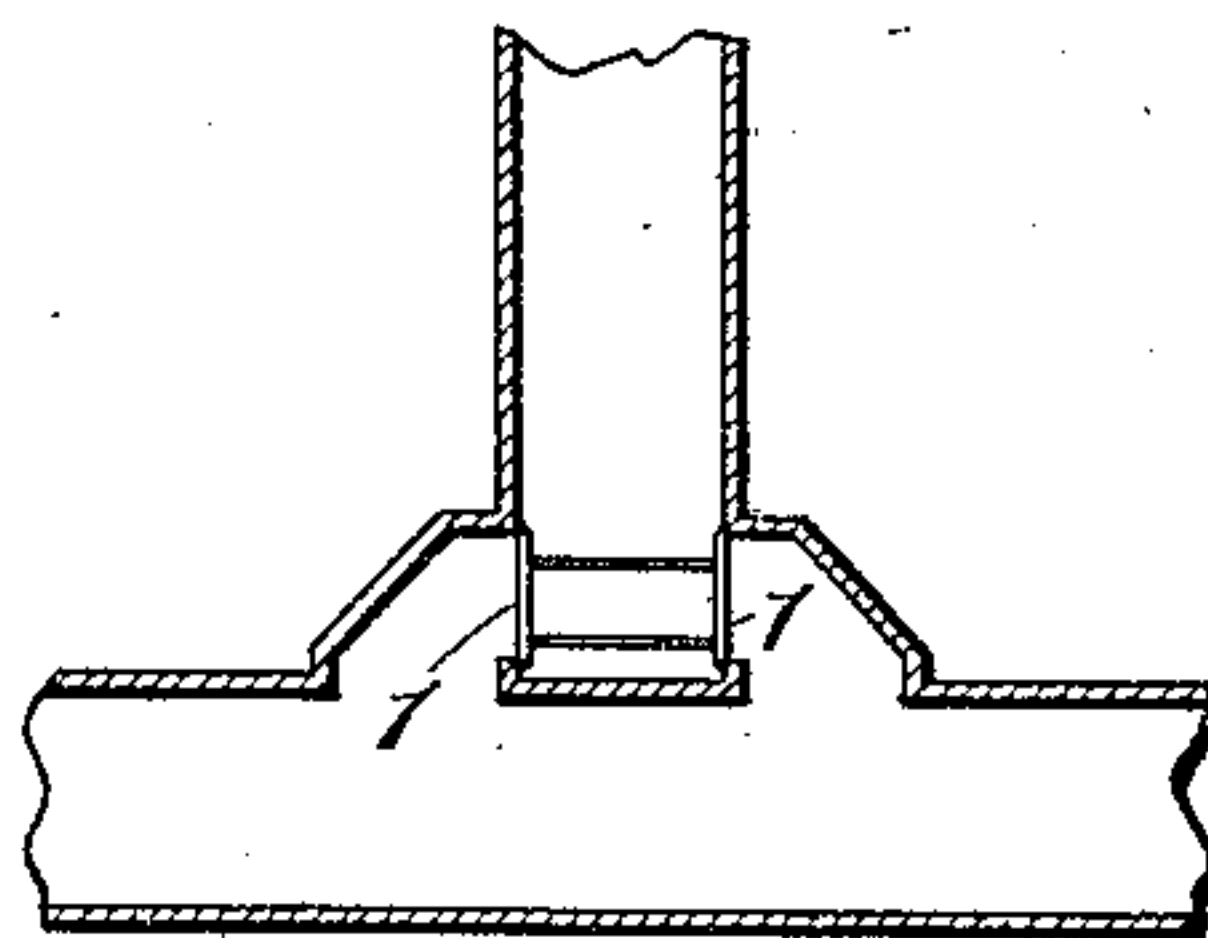


Fig. 7.



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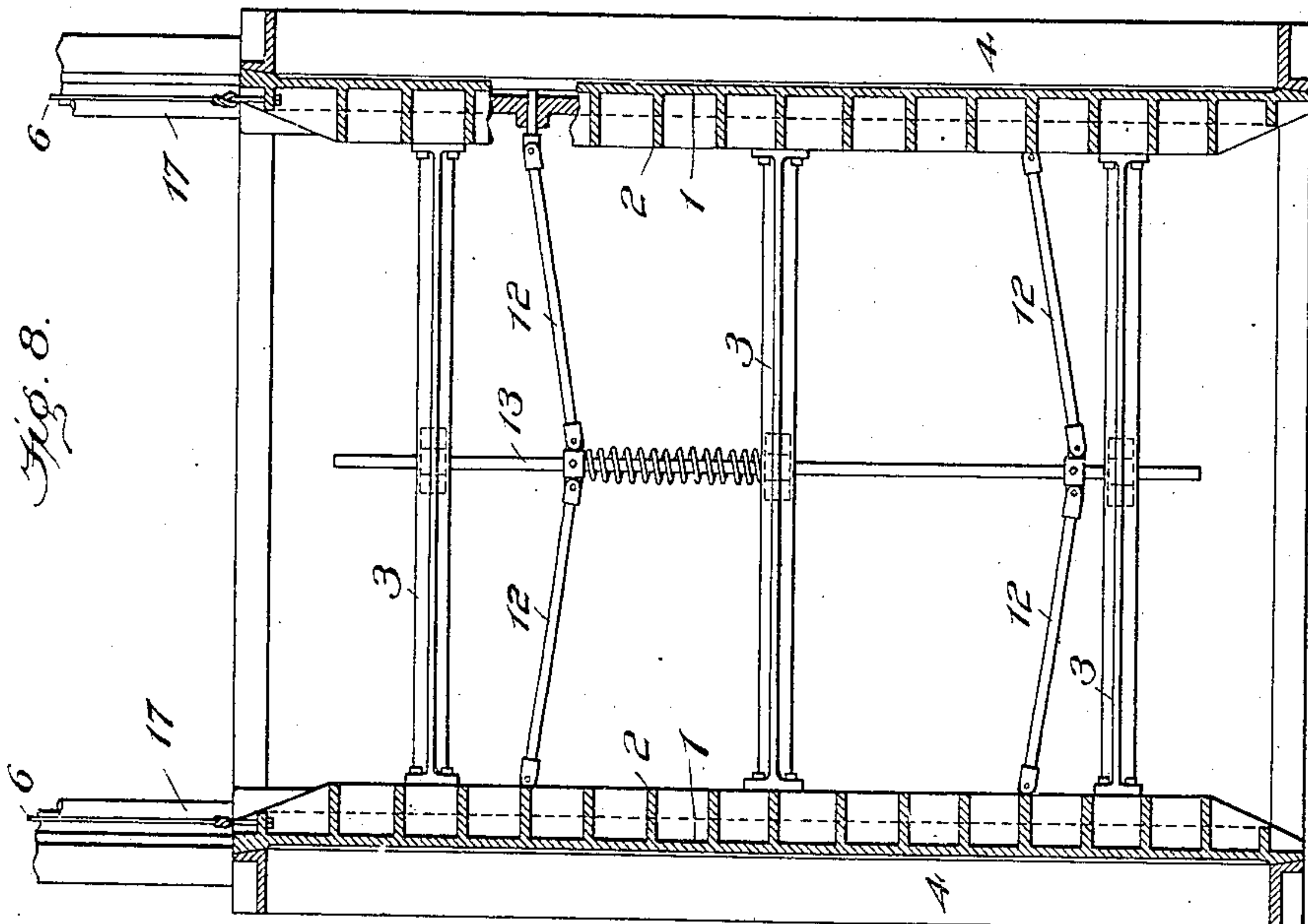
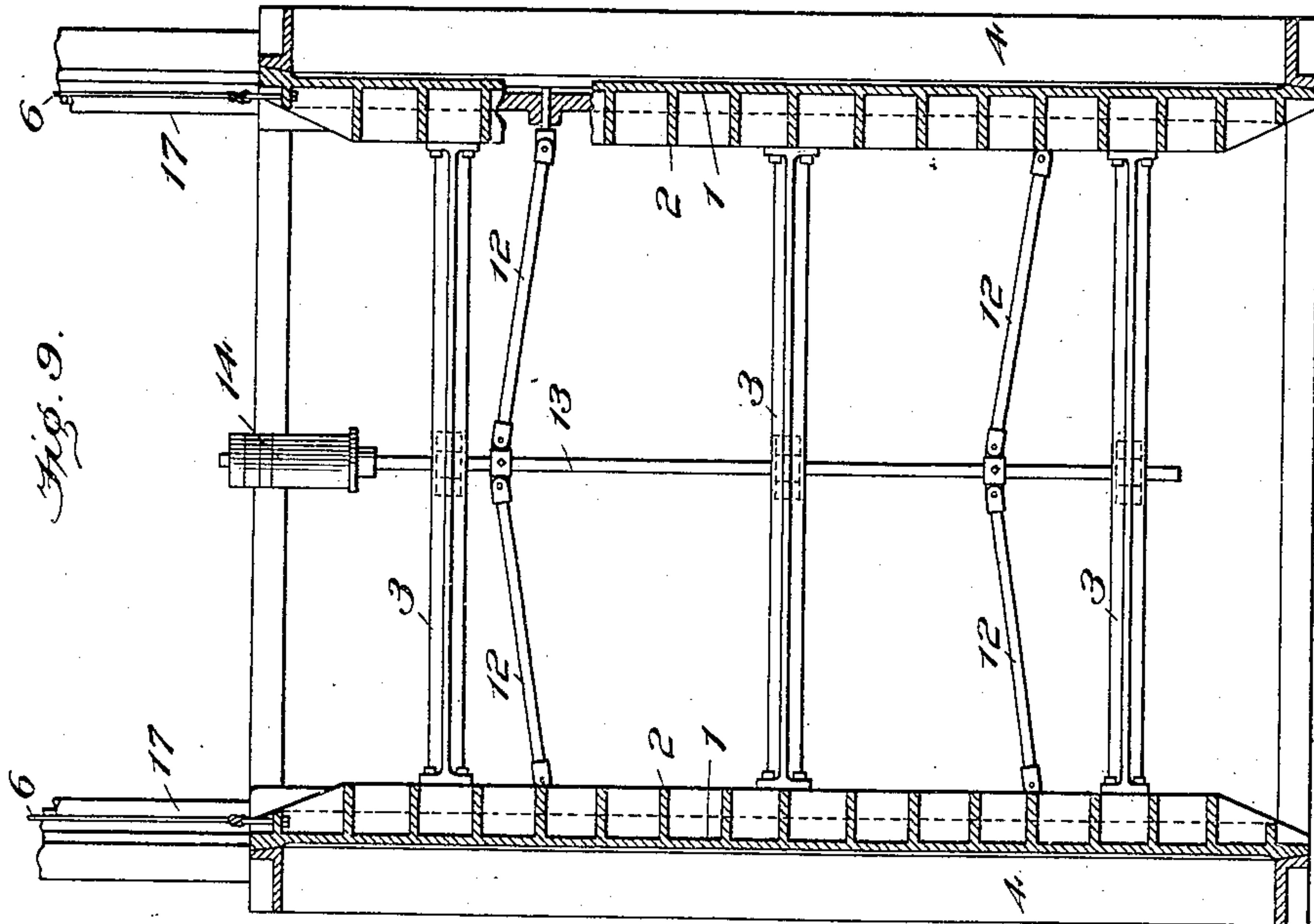
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UNITED STATES PATENT OFFICE.

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GATE FOR WATERWAYS.

No. 868,489.

Specification of Letters Patent.

Patented Oct. 15, 1907.

Application filed January 12, 1907. Serial No. 351,967.

To all whom it may concern:

Be it known that I, DOUGLAS W. ROSS, a citizen of the United States, residing at Boise, in the county of Ada and State of Idaho, have invented certain new and useful Improvements in Gates for Waterways; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to slide gates or valves for waterways, such for example as reservoir outlets, canal headgates, wasteway gates, taps in pipe lines, and water gates in general, automatic or otherwise.

More particularly stated it comprises a balanced gate, this term being intended to imply a gate in which all external forces tending to cause or resist its movement are practically in equilibrium.

The invention has for its object therefore, the construction of a gate, for either high or low pressure, so balanced that only a small degree of power is required for its operation.

As a further object it contemplates a simplification of the actuating and regulating mechanisms employed in such hydraulic structures, a reduction in the cost of construction, installation and maintenance; also greater general efficiency.

It furthermore specially provides against leakage, undue wear of the moving parts, and the very serious results incident to the vibration heretofore common to gates of this character during passage of water there-through, especially when working under a high head.

As a further object this invention provides means whereby the velocity of water through the gate may at all times be absolutely controlled, thus guarding against the injurious consequences of sediment passing in suspension, which, under undue velocity frequently cuts out the bearings of ordinary gates, thus causing leakage.

It also provides specially designed and arranged gate-actuating counterweights whereby the variable weight of a column or columns of water may be utilized to overbalance and open the gate.

Generally speaking, these results are accomplished by means of two plain sliding cast iron gates, rigidly connected back to back by suitable struts, the whole moving vertically in an iron guide-frame properly set and sealed in masonry. A suitable counterbalance or counterbalances for the gates which employ variable and controllable bodies of water as the lifting power. And means for automatically packing said sliding gates against leakage, by agency of outwardly pressed packing strips interposed between them and their guide frames.

The invention will be hereinafter particularly described and pointed out in the claims following.

In the accompanying drawings which form part of this application and whereon corresponding numerals

refer to the same parts in the several figures: Figure 1 is a vertical longitudinal section taken on line 1—1, Fig. 3, through the gate members forming part of my invention. Fig. 2 is also a vertical section taken at right angles to Fig. 1 on the line 2—2 thereof. Fig. 3 is a plan view of the invention taken on the line 3—3, Fig. 1. Fig. 4 is a fragmentary view representing in side elevation a modified form of spring pressed packing strip, Figs. 5, 6 and 7 are diagrammatic plan views on a reduced scale, illustrating the application of this invention to a reservoir outlet, a canal headgate, and a tap in a pipe line respectively, and Figs. 8 and 9 are vertical longitudinal sections of gate members embodying modified forms of toggle levers for actuating the packing strips.

Reference being had to the drawings and numerals thereon, 1, 1 indicate two sliding gate-members constituting a double structure, preferably made of cast iron and arranged to move vertically. As here shown, gates 1, 1 present plain smooth outer surfaces, but upon the reverse or inside are reinforced by standing ribs 2, 2, for the purpose of strengthening them. They are also rigidly and positively connected back to back by struts 3, 3, 3, the gates and struts adapted to move bodily up and down in a guide frame 4, 4, 4, 4 also of metal properly set in masonry, and so arranged that said double gate always presents to the pressure of water equal and opposite areas, thus balancing the effect of the water pressure and practically eliminating same as a factor to be considered.

Attached to each gate member 1, 1, and passing over suitable pulleys 5, 5 above, are cables or chains 6, 6 secured to opposite sides of a counterbalance for each gate, which arrangement practically eliminates the weight of the gates as a factor to be considered in their operation. Thus the effect of both external forces, water pressure and weight, which ordinarily tend to resist movement may be placed in equilibrium. These counterbalances each comprise a tank 7 which may be augmented by weights 8 secured beneath said tanks as shown, or placed within the tank if preferred. Above the counterbalancing tanks 7 are valved supply pipes 9, by means of which a sufficient weight of water may be introduced at any time to overbalance the weight of the gates and cause them to rise. At or near the bottom of tanks 7 is an open discharge cock 10 of smaller area than delivery pipes 9, whereby the tanks are drained, before the gates can be permitted to gravitate to a closed or normal position.

The gate members 1, 1 present a smooth outer or water surface, but for purposes of strength, are reinforced upon the inner faces by rectangular flanges, as shown, and each gate member as a whole is formed upon a slight downward taper so as to insure a slight wedge action in seating, as a partial safeguard against leakage. An additional provision against leakage is furnished by

vertically arranged and automatically adjustable packing strips 11 at the sides of each gate member 1, bearing upon the guide frame 4 at the corners of the gate well. These strips 11 may be made of bronze or other suitable material, they are arranged in pairs at opposite sides of each gate member, and are constantly pressed outwardly in opposite directions by toggle-levers 12, 12 interposed between the strips 11 of opposite gate members. Each set of toggles 12, 12 are pivotally connected to and uniformly spaced by vertically arranged lifting rods 13 which in turn are slidingly mounted in the struts 3, 3, 3, while said rods and their respective toggles are constantly subjected to an upward tension by agency of small variable counterweights 14 attached to cables 15 passing over pulleys 16 and secured to the upper end of said rods.

Rising from each gate member 1 is a lifting stem 17, which, as usual, is threaded upon its upper end and provided with an ordinary hand-wheel revolubly mounted in a fixed pedestal or other support upon the masonry top of the gate-well (said wheel, pedestal and top of gate-well not shown, being of usual and well known construction).

In Fig. 4 I have shown a modified means for actuating the packing strips 11, comprising a simple leaf spring 18, one or more of which may be recessed into the sides of the gate members 1 for normally forcing the said strips 11 into contact with the guide frame 4.

Similarly, many other changes may be made and adopted without in the least departing from the spirit of my invention hereinafter claimed; for example, a compression spring surrounding rods 13 with a fixed support may be employed for actuating the toggles 12, in place of the counterweight 14, or, if desired, a still simpler method of accomplishing the same results would be that of reversing the position of toggles 12, and weighting the upper end of rods 13, so that the weight applied in a downward direction would tend to straighten out said toggle levers.

Figs. 5, 6 and 7 are diagrammatic exemplifications of other hydraulic structures to which my invention is adapted by reason of the ease with which this type of gate can be operated, showing respectively reservoir outlets, taps in pipe lines, and main and lateral canal head gates.

The operation, briefly stated, is as follows: Water introduced to tanks 7 from a supply pipe or pipes 9 augments weights 8 until the gates and attending parts are overbalanced, whereupon the latter are readily lifted by action of the usual hand-wheels above, which latter thereupon serve to retain them in any predetermined position. The water in tanks 7 now draining off through cocks 10 again disturbs the balance, and permits the gates to close by gravity when released by a reverse action of the hand-wheel or wheels aforesaid. Thus, when open and in operation, practically all resistance to movement of the gates due to the weight thereof is eliminated as above, and, it will be further noted, the friction ordinarily due to pressure of the passing head of water is likewise overcome, so that all tendency of the

gate to vibrate is destroyed, owing to the fact that any vibratory motion tending to develop in one opening will be counteracted by that tending to develop in the opposite opening. And, in the meantime the individual members 1, 1 are continually guarded against leakage by the automatic action of packing strips 11, as hereinbefore described.

Having thus described my invention I claim as follows:

1. A gate for waterways, in combination with means for counterbalancing all external forces tending to cause or resist its movement, substantially as described. 70
 2. A gate for waterways, in combination with means for counteracting all friction due to water pressure, and means for counterbalancing the weight of the gate, substantially as described. 75
 3. In a gate for waterways, the combination with individual gate members of equal area counterbalanced as against the water pressure, of struts for rigidly connecting said members back to back, substantially as described. 80
 4. In a slide gate for waterways, the combination with individual gate members rigidly connected back to back, and means for counterbalancing said gate, substantially as described.
 5. In a slide gate for waterways, the combination with oppositely arranged and rigidly connected gate members, of a variable counterbalance for said gate, substantially as described. 85
 6. In a slide gate for waterways, the combination with oppositely arranged and rigidly connected gate members, of a counterbalancing tank for lifting said gate, substantially as described. 90
 7. In a slide gate for waterways, the combination with a counterbalancing tank for lifting said gate, of a supply pipe for said tank, an outlet of less area than the supply, and means for sustaining the gate in any predetermined position, substantially as described. 95
 8. In a balanced slide gate for waterways, the combination with its supporting frame, of outwardly pressed packing strips carried by said gate, for automatically sealing the gate against leakage, substantially as described. 100
 9. In a balanced slide gate for waterways, the combination with its supporting frame, of side packing strips interposed between said gate and frame, and means for continuously projecting said strips in opposite directions, substantially as described. 105
 10. In a double gate for waterways, the combination with its supporting frame, of individual gate members, oppositely arranged packing strips interposed between said members and the frame, and a toggle lever for continuously projecting said strips to seal the structure against leakage, substantially as described. 110
 11. In a double gate for waterways, the combination with its supporting frame, of means for automatically sealing the individual gate members against leakage comprising yielding packing strips, carried by said members, toggle levers interposed between said strips, and a weight for maintaining tension upon said levers, substantially as described. 115
 12. In a double gate for waterways, the combination with packing strips yieldingly mounted in each gate member, toggle levers interposed between opposing packing strips, and a counterweight for maintaining tension upon said levers to project their respective packing strips in opposite directions, substantially as described. 120
- In testimony whereof I affix my signature, in presence of two subscribing witnesses. 125

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