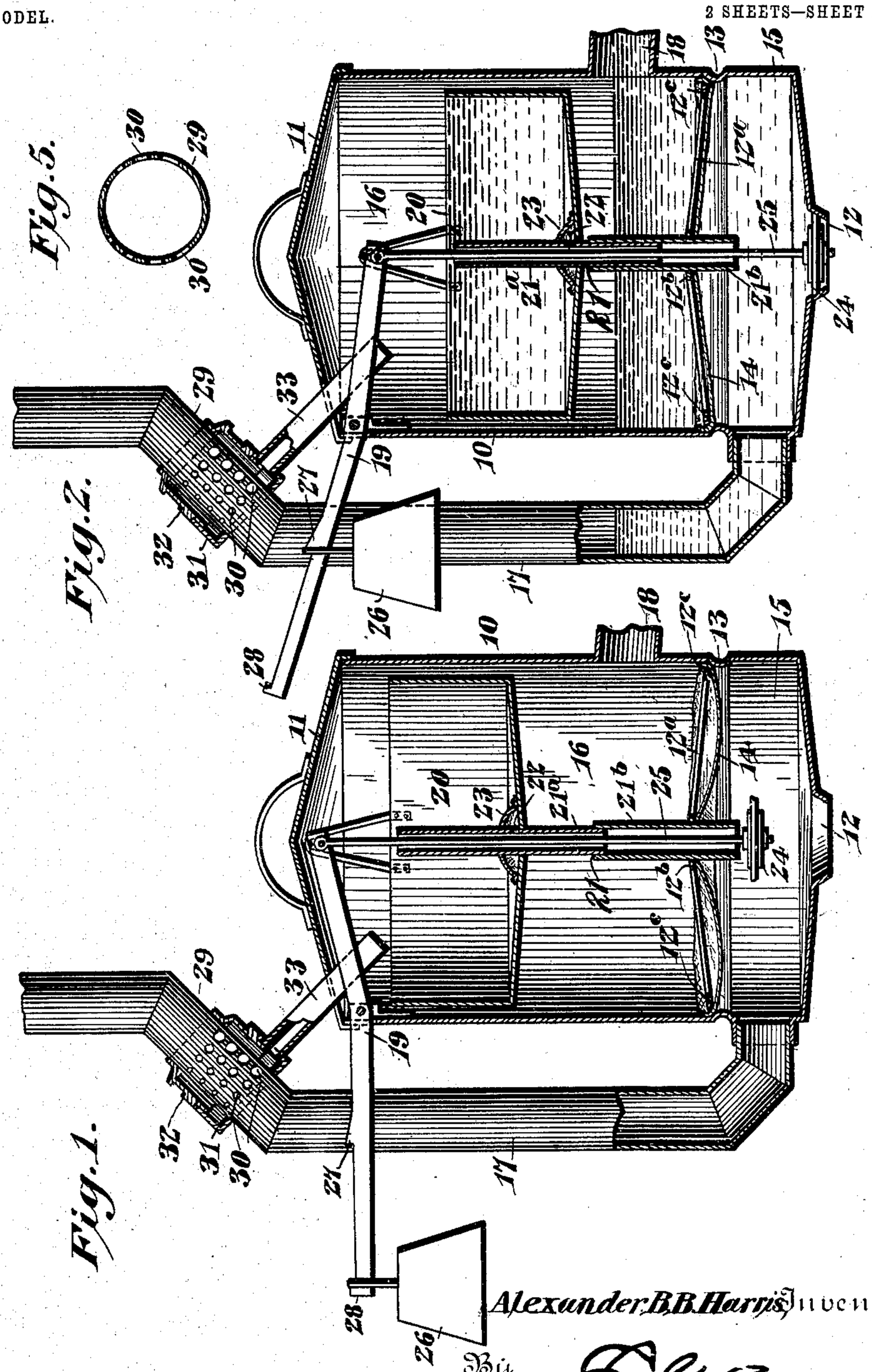
No. 736,388. PATENTED AUG. 18, 1903.

A. B. B. HARRIS.

AUTOMATIC CISTERN CUT-OFF AND SELF CLEANING FILTER.

APPLICATION FILED MAY 16, 1902.

NO MODEL. 2 SHEETS—SHEET 1.



Witnesses
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NO MODEL. 2 SHEETS—SHEET 2.

Fig. 3.

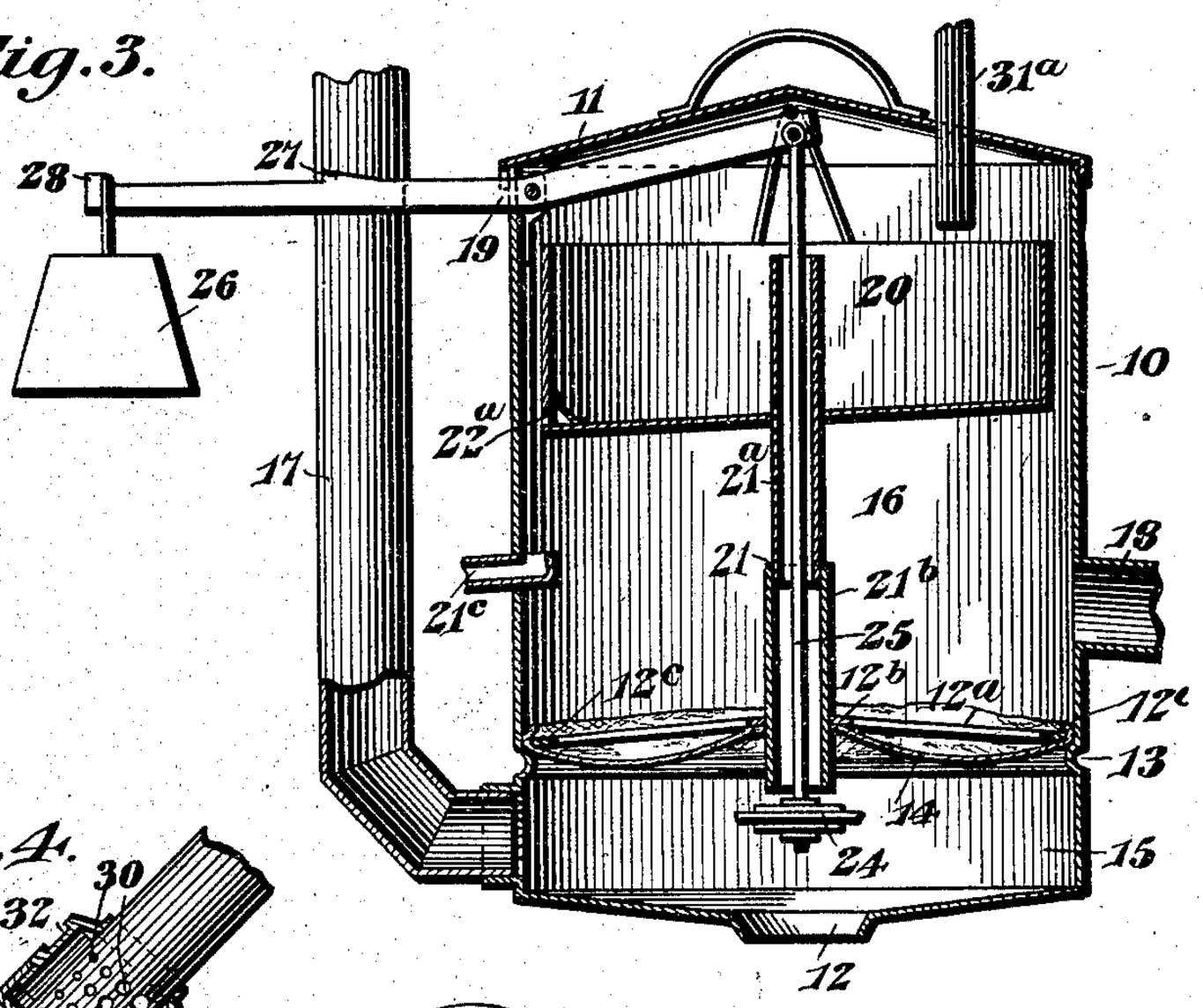
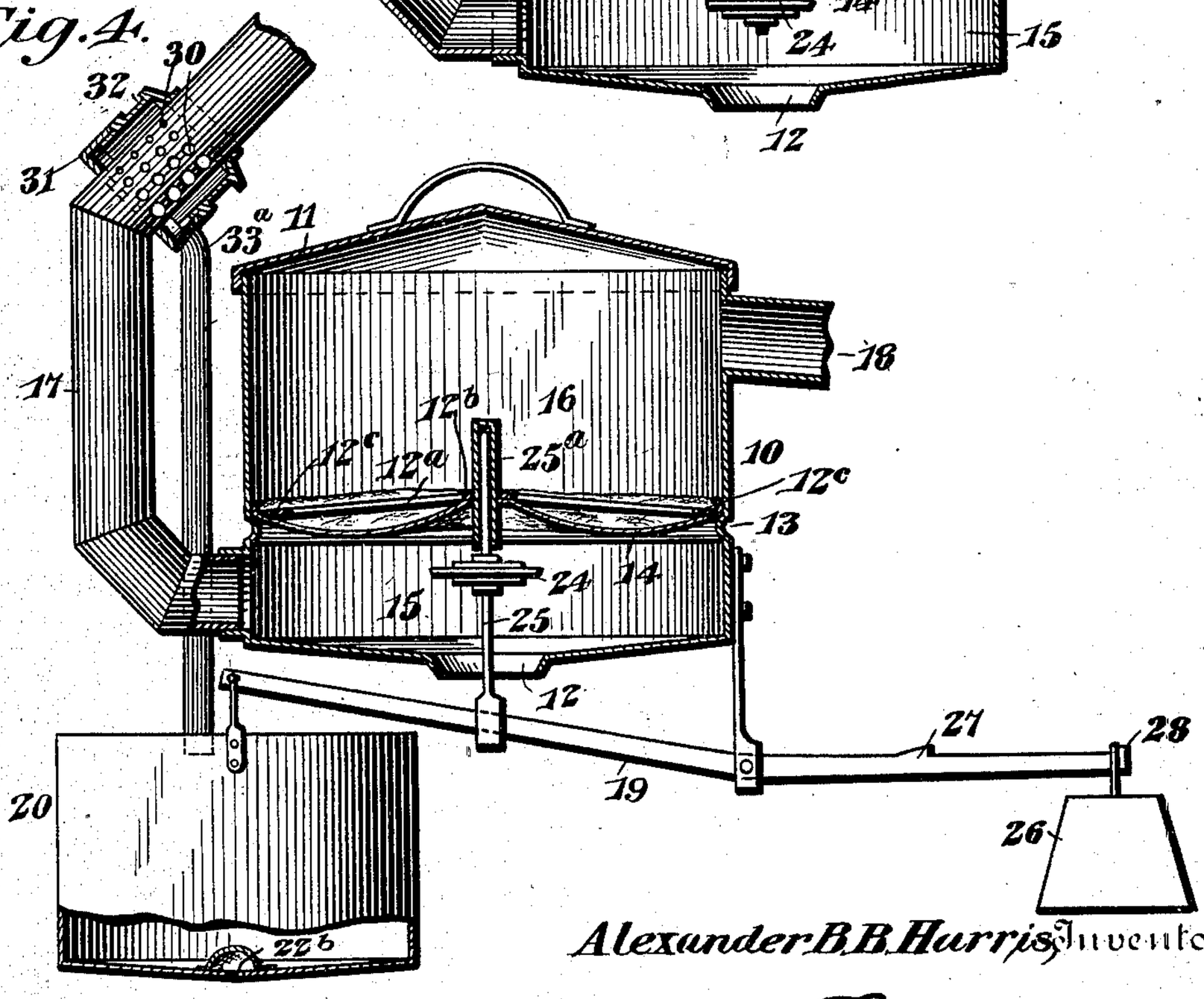


Fig. 4.



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UNITED STATES PATENT OFFICE.

ALEXANDER B. B. HARRIS, OF GEORGETOWN, SOUTH CAROLINA.

AUTOMATIC CISTERN CUT-OFF AND SELF-CLEANING FILTER.

SPECIFICATION forming part of Letters Patent No. 736,388, dated August 18, 1903.

Application filed May 16, 1902. Serial No. 107,640. (No model.)

To all whom it may concern:

Be it known that I, ALEXANDER B. B. HARRIS, a citizen of the United States, residing at Georgetown, in the county of Georgetown and State of South Carolina, have invented a new and useful Automatic Cistern Cut-Off and Self-Cleaning Filter, of which the following is a specification.

This invention relates to automatic cut-offs and self-cleaning filters for cisterns of that class described in a former patent granted to me on April 10, 1900, and numbered 647,259.

The principal object of the present invention is to improve these structures by providing novel means which will prevent the first of the rain-water that contains the dirt and trash of the roof from passing into the cistern, but will turn the water into said cistern after the roof is thoroughly washed, said means being, furthermore, arranged so that in case of closely-succeeding showers an undue amount of water will not be wasted.

In the accompanying drawings there are illustrated several forms or embodiments of the invention, the construction and operation of which are fully described in the following specification.

In said drawings, Figure 1 is a sectional view through the preferred form when not in use. Fig. 2 is a similar view showing the same in operation. Fig. 3 is a slight modification from the structure illustrated in Figs. 1 and 2, and Fig. 4 is still another modification. Fig. 5 is a detail cross-sectional view taken through the perforate portion of the inlet-pipe.

In all the drawings, however, similar reference-numerals refer to similar parts.

Taking up first the structure illustrated in Figs. 1 and 2, it will be noted that a receptacle 10 is employed, which is preferably formed of metal and has a removable cover 11 and a central discharge-opening 12 in its bottom. Extending across an intermediate portion of the receptacle is a removable frame 12^a, supported by suitable means—as, for instance, a rib 13—formed in the walls of the tank, as shown. Suspended beneath this frame is a strainer 14, preferably of some suitably textile material. This construction constitutes the filter, though it will be understood that other forms may be employed, as desired—as, for instance, the granular filter shown and described in the above-mentioned patent. This filter divides the interior of the receptacle into a lower compartment 15 and an upper compartment 16. An inlet-pipe 17, connected with the down-spout from an eaves-trough communicates with the lower compartment 15 below the filter, while the outlet-pipe 18 leads from the upper compartment 16 above the filter. Pivotally supported intermediate its ends upon the upper portion of the receptacle is a lever 19, the inner arm of which extends within the receptacle, the outer arm projecting from the same, said arms being preferably arranged in angular relation, as shown. Suspended from the inner end of the lever and arranged within the receptacle is a water-bucket 20, that is arranged above the filter and has an overflow-pipe 21, leading from its upper portion to a point below the filter. This pipe comprises telescoping sections 21^a and 21^b, the lower section 21^b passing through the filter and being secured thereto, the upper section being attached to the water-bucket and movable therewith. The upper end of the upper section 21^a extends nearly to the top of the bucket and communicates therewith, while a small opening 22, formed in the pipe contiguous to the bottom of the bucket affords communication between the interior of the lower portion of the bucket and the interior of the pipe. This opening is covered by a small piece of felt 23 or other material which will permit the water to pass slowly therethrough. A valve 24 controls the residue-discharge opening 12 and is provided with a stem 25, which passes through the overflow-pipe 21 and is also attached to the inner end of the lever, so that when the inner end of said lever is depressed the valve will be seated in the opening 12, and thereby close the same. In order to normally hold the valve in elevated position, a weight 26 is secured upon the outer end of the lever, being slidable thereon, so that when said outer end is elevated and the inner end depressed the weight will automatically slide toward the pivot, the sliding movement being limited by a stop 27, secured to the lever. The outward movement of said weight is also limited by a stop, as 28, secured to the end of the lever. The inlet-pipe 17 is provided at a point

above the receptacle with an offset inclined portion 29, which is perforated, as at 30, the openings being of any desired shape and size, and, if preferred, a single large opening may be employed. The perforate portion of the pipe is inclosed within a jacket consisting of a stationary cup-shaped member 31, which rigidly embraces the pipe and is of greater diameter thereof, the open top or upper end of the jacket-section 31 being closed by an endwise-shiftable jacket member 32, which has its outer end contracted to frictionally embrace the pipe, and its inner end portion enlarged, so as to lie out of contact with the pipe and telescope within the jacket-section 31, whereby an annular space is provided about the pipe, and the water escaping through the perforations 30 is designed to be collected in this space, from which it is conducted to the bucket 20 by means of a pipe or spout 33, which is carried by the jacket-section 31 and pierces the top or cover of the receptacle. The adjustable or shiftable jacket-section 32 is normally telescoped within the section 31, so as to close the normal water-space about the perforate portion of the pipe 17 to prevent loss of the water escaping through the perforations and is capable of being shifted out of engagement with the section 31, so as to expose the perforations for the purpose of removing any obstructions which may lodge therein. The operation of this structure may probably be best described as follows: Under normal conditions or when there is no rain the apparatus will be in the position shown in Fig. 1. When the weather has been dry and it is apparent that much dust and dirt has accumulated on the roof, the weight 26 is placed in its outermost position. It will therefore be apparent that when a shower takes place the first water descending through the inlet-pipe 17 will pass freely through the residue-discharge 12. At the same time a small proportion of the descending water will pass through the openings 30 into the branch pipe 33, and, passing therethrough, will gravitate into the water-bucket 20. If the rain is of sufficient duration and volume, the bucket will be filled or partially filled, thereby overbalancing the weight 26 and depressing the inner end of the lever, consequently seating the valve 24 in the discharge-opening 12. The water will now rise in the receptacle, pass through the filter, and discharge into the outlet-pipe 18, which is of course connected with the cistern. This is very clearly shown in Fig. 2. At the same time the outer end of the lever will be elevated, and consequently the weight 26 will slide toward the pivot, its movement in this direction, however, being limited by the stop 27. As long as the rain continues the water-bucket will remain filled, or partly so; but any overflow into the upper compartment is prevented by the pipe 21, which will convey the surplus water from said bucket to a point below the filter, so that said water must necessarily pass through said filter. When the rain has slackened or stopped entirely, the water in the bucket will gradually lower as it passes through the lower opening 22; but this will take considerable time, and therefore in the case of a closely-succeeding shower the valve will still be closed and no water wasted. If the length of time is such as to permit nearly all the water to discharge from the bucket, the valve will be elevated, thereby releasing the water within the lower portion of the receptacle and permitting it to discharge rapidly. This reverse movement of the water through the filter will thoroughly cleanse the same, and being of cloth it will soon dry. Should another shower fall after the valve has been again elevated, a small proportion of the water will pass through the discharge-opening 12; but as the weight 26 is now nearer the pivot and so arranged that it just counterbalances the combined weight of the bucket and the water therein, a comparatively small proportion of water entering the bucket will again close the valve. It will be observed that the weight can be adjusted to any desired position along the outer arm of the lever according to the length of time between the rains.

The structure illustrated in Fig. 3 is substantially the same as that already described, with the exception that the offset portion 29 of the inlet-pipe 17 is dispensed with, as is also the branch pipe 33. In this instance a separate conductor-pipe 31^a is employed, which may extend from an independent source other than the down-spout, such as the cistern-roof, or perhaps a specially-constructed roof, the area of which furnishes sufficient water to give the required result. In this instance there is also illustrated a slightly-different form of discharge from the bottom of the bucket, which may be employed when desired. In this form the opening 22 is dispensed with and an opening 22^a is formed in the lower edge contiguous to one side, the bottom of the bucket inclining to said opening. A discharge-spout 21^c is located directly beneath the opening 22^a and extends through the walls of the receptacle above the water-level or upper edge of the outlet-pipe 18.

In Fig. 4 there is illustrated still another modification. In this instance the lever 19 is suspended beneath the receptacle, the bucket being supported upon one end, preferably beneath the inlet-pipe, and water is carried from the jacket 31 by means of a pipe 33^a, which, instead of piercing the top of the receptacle, as in Figs. 1 and 2, passes downwardly at one side of the receptacle and discharges into the bucket 20. The bucket is furthermore provided with the usual outlet 22^b in its bottom. The valve-stem 23 in the present instance extends from the lever through the discharge-opening 12 and carries a valve upon its upper portion, the upper end of said stem being slidably mounted in a suitable guide 25^a. The sliding connection between the weight and lever is, however,

still maintained, as is also the general arrangement of the interior of the receptacle. The operation in both of these latter cases is of course precisely the same as that already described.

While various forms of filtering devices may be employed, I prefer to use that shown in the drawings as being the least expensive and the best adapted for the present form of apparatus, as it is readily applied and removed and therefore may be conveniently replaced when worn. In its specific aspect the filter consists of a frame having a central plate or body 12^b, which is provided with an opening through which the pipe-section 21^b is projected, and also has the arms 12^a, which are carried by and radiate from the body and are connected at their outer ends by a circumferential rim or band 12^c, which normally rests upon the annular shoulder 13. This frame is designed to support and stretch the textile material 14, which forms the filter proper, said textile material having a central opening for the reception of the lower projected end of the pipe-section 21^b, with the outer peripheral edge of the material clamped snugly between the outer rim or band 12^c, the supporting-flange 13, and the inner walls of the receptacle 10, whereby it is not necessary to fasten the textile material directly to the frame, and therefore the filtering material may be readily replaced when worn or damaged.

It is apparent that quick heavy showers will cause a much quicker closing of the residue-opening 12 by the valve 24 than lighter showers, but a quick heavy shower may not clean the roof in a proportionately short time, while the valve would be closed in a proportionately short time, and therefore there would be considerable irregularity in the closing of the valve with respect to the amount of water passing down the inlet-pipe. To overcome this disadvantage, it is designed to provide means whereby the rate of the supply of water to the water-bucket 20 bears a predetermined relation with respect to the amount of water passing down the inlet-pipe, so that the valve 24 will be closed at the proper time to prevent unnecessary loss of water and also to prevent dirty water from passing into the receptacle. In practice it is preferred to have the rate of supply to the bucket decrease as the main supply to the inlet-pipe increases in order that the valve may close slowly with respect to an increased water-supply through the inlet-pipe. For example, should the flow of rain in one instance be twice as heavy as in another instance, the valve would ordinarily close in half the time; but it is doubtful that the roof would be cleansed in half the time, and therefore it is designed to have the rate of increased supply to the bucket somewhat less than the increased supply through the inlet-pipe in order that it may take more than half the time to close the valve, whereby there will be plenty of time for the roof to become cleansed before the valve is closed and water is supplied to the filter. One means for carrying out this important feature consists in having the perforations 30 decrease in size from the lower side to the upper side of the inclined offset part 29 of the inlet-pipe, whereby as the surface of the water rises in the pipe-section 29 the increased rate of escape through the perforations 30 will be less than the increased rate of the total amount of water passing down the inlet-pipe. It is preferred to have the perforations 30 at one side of the pipe staggered with relation to the perforations on the opposite side of the pipe, as plainly indicated in Fig. 5 of the drawings, in order that as the level of the water rises in the pipe it will escape alternately at opposite sides—that is to say, it is not necessary for the level of the water to rise the entire distance between successive rows of perforations before it can escape, as there is an intermediate row of perforations upon the opposite side of the pipe. It will of course be understood that there are no perforations in the bottom of the pipe-section 29, so that the water from a very light shower which is not sufficient to cleanse the roof may pass down the inlet-pipe without affecting the valve.

While I have described the device in detail as a filter, it is of course apparent that the filtering device proper may be omitted and the device employed as an automatic cut-off, operating to permit of the dirty water escaping through the residue-opening 12 and to close said opening after the roof has been cleansed, so that all of the water that comes afterward may enter the receptacle 10 and pass off through the outlet 18 to the cistern.

The advantages of the construction may be summed up as follows: In the first place the first water that is fouled by the dirt and dust upon the roof is allowed to escape without even reaching and soiling the filter; but as soon as the roof is washed the clean water is automatically turned through the filter into the cistern. Should one shower be followed by another within a short time, very little, if any, water is wasted, and when the rain is over the valve is automatically opened. Further than this, the apparatus can be adjusted to different degrees of foulness of the roof, and in case of very light rain which is insufficient to even clean the roof no water will be passed into the cistern. The cloth filter described is believed to be advantageous, as it will cleanse itself more thoroughly than granular filters and will quickly dry out after a rain is over, this being an important factor for sanitary reasons.

From the foregoing it is thought that the construction, operation, and many advantages of the herein-described invention will be apparent to those skilled in the art without further description, and it will be understood that various changes in the size, shape, proportion, and minor details of construction

may be resorted to without departing from the spirit or sacrificing any of the advantages of the invention.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a structure of the class described, a receptacle having an inlet and an outlet communicating therewith, said receptacle being also provided with a residue-discharge, a pivoted lever, a valve connected to the lever and controlling the residue-discharge, a water-bucket also connected to the lever, means for conveying water to the bucket, and a counterweight movably mounted upon the lever, said counterweight being automatically movable toward the pivot of said lever when the bucket is filled.

2. In a structure of the class described, a receptacle having an inlet and an outlet, said receptacle being also provided with a residue-discharge, a lever pivotally supported intermediate its ends, a valve controlling the residue-discharge and a water-bucket connected to one end of the lever, means for conveying water to the bucket, and a counterweight slidably mounted upon the other end of the lever, said counterweight being automatically movable toward the pivot of said lever, when the bucket is filled with water.

3. In a structure of the class described, a receptacle having an inlet and an outlet, said receptacle being also provided with a residue-discharge, a lever pivotally supported intermediate its ends, a valve controlling the residue-discharge and a water-bucket connected to one end of the lever, means for conveying water to the bucket, a counterweight slidably mounted upon the other end of the lever, said counterweight being automatically movable toward the pivot of said lever when the bucket is filled with water, and a stop for limiting the inward movement of the counterweight.

4. In a structure of the class described, a receptacle having an inlet and an outlet, said receptacle being also provided with a residue-discharge, a lever pivotally supported intermediate its ends, a valve controlling the residue-discharge and a water-bucket connected to one end of the lever, means for conveying water to the bucket, a counterweight slidably mounted upon the other end of the lever, said counterweight being automatically movable toward the pivot of said lever when the bucket is filled with water, and spaced stops located upon the lever to limit the sliding movement of the counterweight in either direction.

5. In a structure of the class described, the combination with a receptacle, of a filter arranged within the receptacle, an inlet-pipe communicating with the receptacle on one side of the filter, said receptacle having a residue-discharge arranged on the same side of the filter as the inlet-pipe, an outlet-pipe leading from the receptacle from the other side of the filter, a lever, a valve connected with the lever and controlling the residue-discharge, a water-bucket also connected with the lever, and a counterweight slidably mounted upon the lever and automatically movable toward the pivot of the lever when the bucket is filled with water.

6. In a structure of the class described, the combination with a receptacle, of a filter arranged within the receptacle, an inlet-pipe communicating with the receptacle on one side of the filter, said receptacle also having a residue-discharge located on the same side of the filter as the inlet-pipe, an outlet-pipe leading from the receptacle upon the other side of the filter, a lever pivotally supported intermediate its ends, a valve controlling the residue-discharge and a water-bucket connected to one end of the lever, and a counterweight slidably mounted upon the other end of the lever and automatically movable when said latter end is elevated.

7. In a structure of the class described, an inclosed receptacle having a residue-discharge in its bottom, and a filter extending across an intermediate portion of the same, a water-inlet leading to the receptacle below the filter, a water-outlet leading from the receptacle above the filter, a lever pivoted intermediate its ends to the receptacle, a valve for controlling the residue-discharge and a water-bucket connected to the inner end of the lever, means for conducting water to the bucket, spaced stops carried by the outer end of the lever, and a counterweight slidably mounted upon said outer end between the stops, said counterweight being automatically movable upon the elevation of the lever by the filling of the bucket.

8. In a structure of the class described, a receptacle having an inlet and an outlet communicating therewith, said receptacle being also provided with a residue-discharge, a pivoted lever having one end disposed exteriorly of the receptacle, a valve connected to the lever and controlling the residue-discharge, a water-bucket also connected to the lever, means for conveying water to the bucket, and a counterweight movably mounted upon that portion of the lever which is disposed exteriorly of the receptacle, said counterweight being automatically movable toward the pivot of the lever when said lever is tilted by a preponderance in weight of water in the bucket, and also automatically movable in the opposite direction when the weight of water in the bucket has been reduced below the weight of the counterweight.

9. In a structure of the class described, a receptacle having an inlet and an outlet communicating therewith, said receptacle being also provided with a residue-discharge, a pivoted lever, a valve connected to the lever and controlling the residue-discharge, a water-bucket also connected to the lever, means for conveying water to the bucket, and a counterweight movably mounted upon the lever, said counterweight being automatically movable

toward the pivot of the lever when said lever is tilted by a preponderance in weight of water in the bucket, and also automatically movable in the opposite direction when the weight of the water in the bucket has been reduced below the weight of the counterweight.

10. In a structure of the class described, a receptacle having a residue-discharge, a water-bucket, a valve movable with the water-bucket and controlling the discharge, an upright inlet-pipe leading to the receptacle and having a transversely-disposed portion provided with a graduated discharge, and means to carry the water which escapes from the said discharge to the water-bucket.

11. In a structure of the class described, a receptacle having a residue-discharge, a water-bucket, a valve movable with the water-bucket and controlling the discharge, an inlet-pipe leading to the receptacle and provided with a perforate portion, a jacket surrounding the perforate portion of the pipe to collect the water which escapes therefrom, said jacket being formed in sections, one of which sections is movable away from the other to expose the perforations for removing obstructions therefrom, and a pipe leading from the jacket to the bucket.

12. In a structure of the class described, a receptacle having a residue-discharge, a water-bucket, a valve movable with the water-bucket and controlling the discharge, an inlet-pipe having an offset portion provided with an opening, a jacket of greater diameter than and embracing the perforate portion of the inlet-pipe and having a portion movable away from the perforations to expose the same, and a branch pipe leading from the jacket to the water-bucket.

13. In a structure of the class described, the combination with a closed receptacle having a residue-discharge, of a lever pivoted to the walls of the receptacle and extending within the same, a valve for controlling the residue-discharge connected to the inner end of the lever, a water-bucket located within the receptacle and connected to the inner end of the lever, a weight arranged upon the outer end of the lever, a water-conducting pipe leading to the receptacle and having an offset inclined portion provided with a plurality of openings, a jacket mounted upon the offset portion of the conductor-pipe and embracing the openings, and a branch pipe leading from the jacket, through the receptacle to the water-bucket.

14. In a structure of the class described, the combination with a receptacle, of an intermediate filter member dividing the receptacle into opposite chambers, an inlet and a residue-discharge for one of the chambers, a counterbalanced water-bucket in the other chamber, an outlet for said other chamber, means to supply water to the bucket to overbalance the same, a valve operated by the water-bucket and controlling the residue-discharge, and means to carry the overflow from the bucket to a point exterior of the receptacle.

15. In a structure of the class described, a receptacle having a residue-discharge, a valve controlling the discharge, a counterbalanced water-bucket for actuating the valve, and means to carry off water from the upper and lower portions of the bucket.

16. In a structure of the class described, a receptacle having a residue-discharge, a valve controlling the discharge, a movably-supported water-bucket for actuating the valve, and an overflow-pipe leading from the water-bucket, said pipe having communication with the interior of the bucket contiguous to its top and bottom.

17. In a structure of the class described, a receptacle having a residue-discharge, a valve controlling the discharge, a movably-supported bucket for actuating the valve, and a pipe leading from the bucket and comprising slidably-telescoped sections.

18. In a structure of the class described, a receptacle having a residue-discharge, a valve controlling the discharge, a movably-supported water-bucket for actuating the valve, and a pipe leading from the bucket, said pipe comprising a pair of telescoping sections, one of which is stationary with relation to the receptacle, the other being secured to and movable with the bucket.

19. In a structure of the class described, a receptacle having a residue-discharge in its bottom, a filter extending across an intermediate portion of the receptacle, a bucket movably supported within the receptacle above the filter, an overflow-pipe leading from the bucket, said pipe comprising telescoping sections, the lower of which is attached to and extends through the filter, the upper being secured to the bucket and movable therewith, and a valve controlling the residue-discharge opening, said valve having a stem that passes through the overflow-pipe.

20. In a structure of the class described, a receptacle having an inlet, an outlet, a residue-discharge, and an inner annular flange disposed between the inlet and outlet, a filter comprising an open frame supported upon the flange and provided at its center with an open-ended tube, a textile filtering material applied to the frame with its outer peripheral edge frictionally held between the outer edge of the frame, the inner walls of the receptacle and the flange, a valve for the residue-opening, a valve-stem working in the tube of the filter-frame, a counterbalanced water-bucket connected to the valve-stem, and means for conducting water to the bucket to overbalance the same.

21. In a structure of the class described, a receptacle having a residue-discharge, a water-bucket, a valve movable with the water-bucket and controlling the residue-discharge, an inlet-pipe leading to the receptacle and having an inclined or offset portion provided with a graduated discharge, the inlet-pipe

continuing beyond the said graduated discharge and communicating with the said receptacle above the residue-discharge, so that the water entering the inlet-pipe which does not pass through the graduated discharge empties into the residue-discharge, and means communicating with the graduated discharge of the inlet-pipe to carry the water which escapes from the said discharge to the water-bucket.

22. In a structure of the class described, the combination with a receptacle having an inlet, an outlet, and a residue-discharge, of a valve for the residue-discharge, a counterbalanced water-bucket connected to the valve, an inlet-pipe connected to the inlet and having an offset portion which is provided with a plurality of longitudinally-disposed sets of perforations which decrease in size from the lower side to the upper side of the pipe and means communicating with the said perforations and discharging into the water-bucket.

23. In a structure of the class described, the combination with a receptacle having an inlet, an outlet, and a residue-discharge, of an inlet-pipe connected to the inlet and having an inclined offset portion which is provided with an outlet which varies in size transversely of the pipe, a jacket spaced from and surrounding the outlet to receive water therefrom, a branch pipe leading from the jacket, a controlling-valve for the residue-discharge, and a counterbalanced water-bucket connected to the valve and disposed to receive the discharge from the branch pipe.

24. In a structure of the class described, the combination with a receptacle having an inlet, an outlet, and a residue-discharge, of a valve for the residue-discharge, a counterbalanced water-bucket connected to the valve, an inlet-pipe connected to the inlet and having an inclined offset portion which is provided with a plurality of longitudinally-disposed sets of perforations which decrease in size from the lower side to the upper side of the pipe, a jacket of greater diameter than and embracing the perforate portion of the pipe, and a branch pipe leading from the jacket to the water-bucket.

25. In a structure of the class described, the combination with a receptacle having an inlet, an outlet, and a residue-discharge, of a valve for the residue-discharge, a counterbalanced water-bucket connected to the valve, an inlet-pipe connected to the inlet and having an inclined offset portion which is provided with a plurality of longitudinally-disposed sets of perforations which decrease in size from the lower side to the upper side of the pipe, the sets of perforations upon one side of the pipe being staggered with respect to the sets of perforations upon the opposite side of the pipe, a jacket of greater diameter than and embracing the perforate portion of the pipe, and a branch pipe leading from the jacket to the water-bucket.

26. In a structure of the class described, a receptacle having an inlet and an outlet communicating therewith, said receptacle being also provided with a residue-discharge, an intermediately-pivoted lever having its opposite ends inclined toward the pivot, a valve connected to one end of the lever and controlling the residue-discharge, a water-bucket connected to the same end portion of the lever, means for conveying water to the bucket, and a counterweight slidably mounted upon the opposite end portion of the lever, said counterweight being automatically movable toward the pivot of the lever when the bucket is depressed by the weight of water therein.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

ALEXANDER B. B. HARRIS.

Witnesses:

JOHN H. SIGGERS,

GEORGE TATE.