

June 19, 1923.

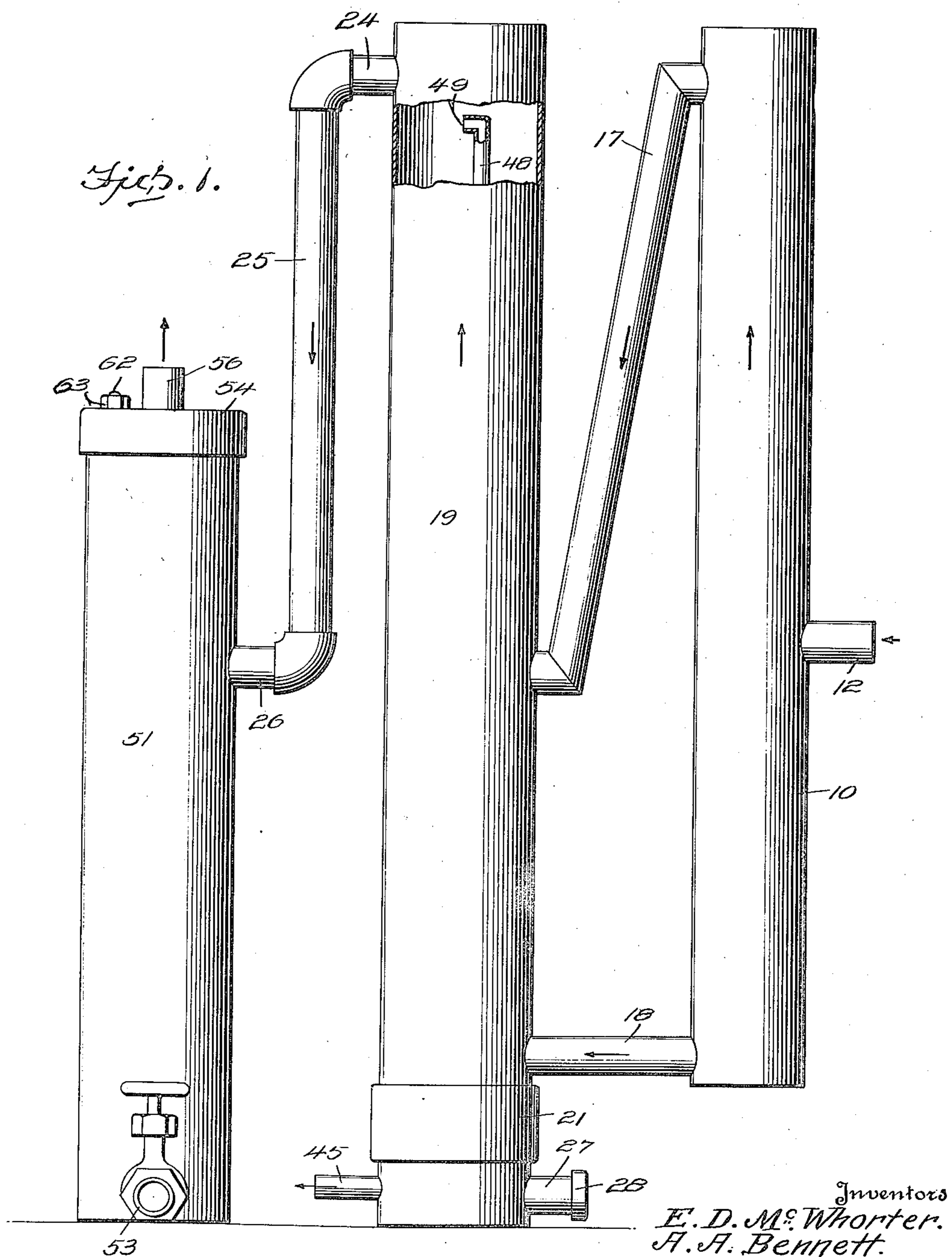
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E. D. McWHORTER ET AL

SEPARATOR

Filed Feb. 19, 1923

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By
Geo. P. Kimmel. Attorney

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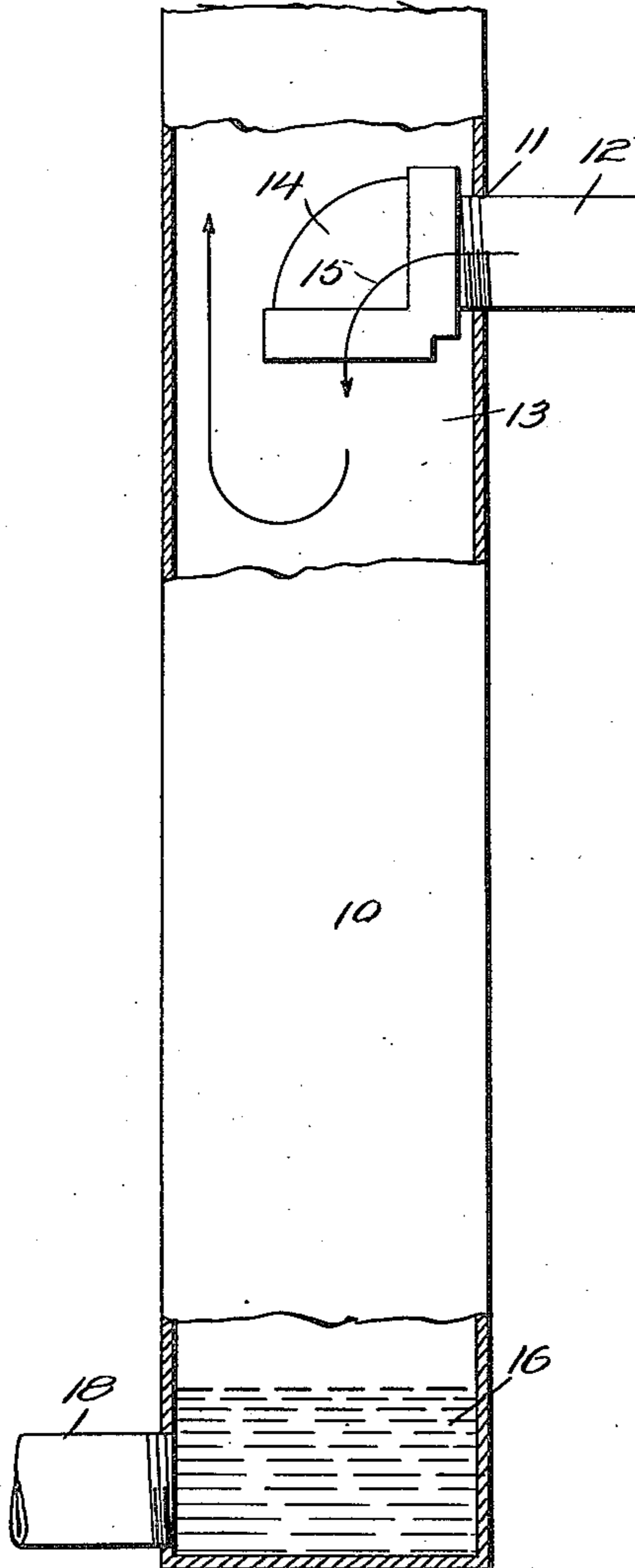
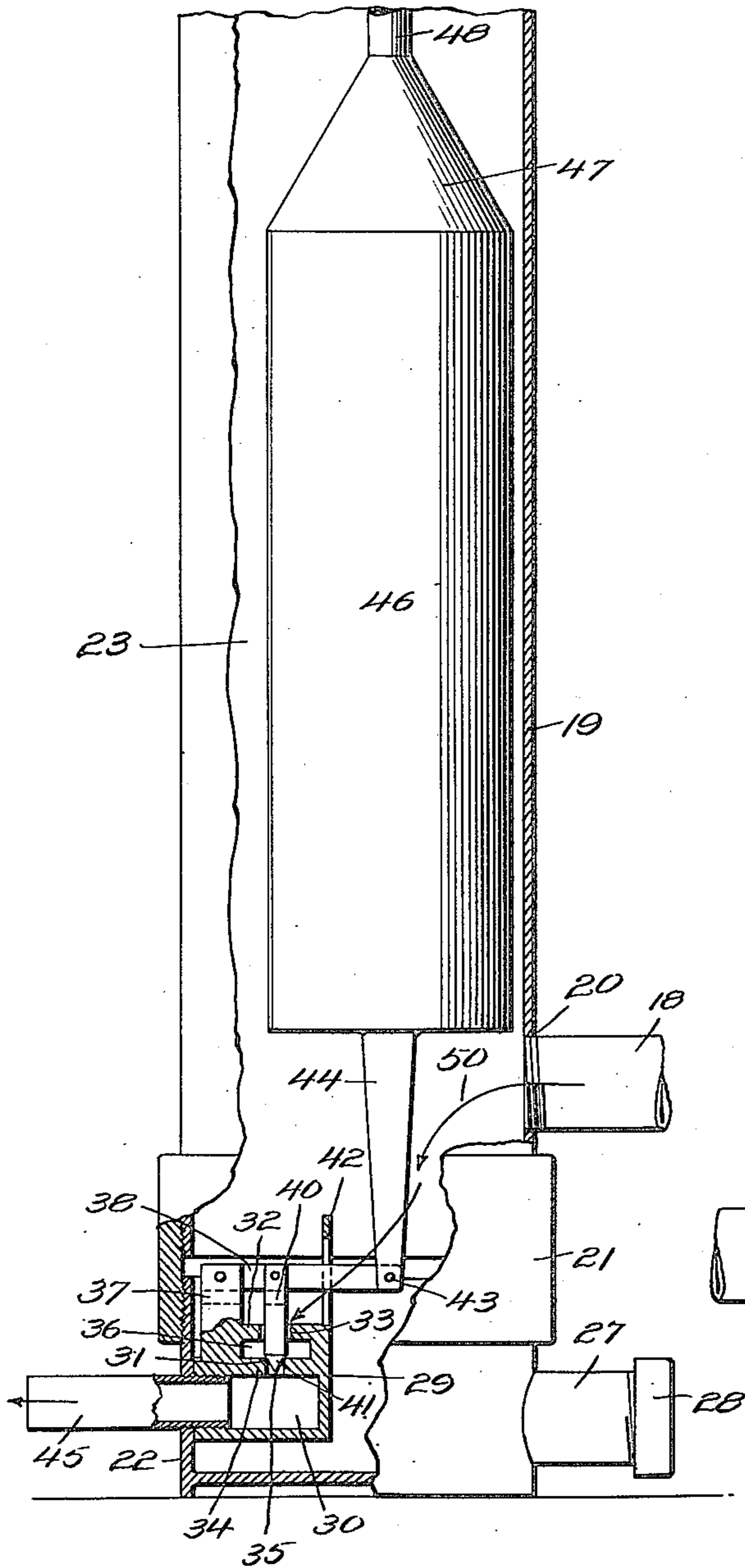
SEPARATOR

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Fig. 2.

Fig. 3.



Inventors
E. D. McWhorter
A. A. Bennett

By
Geo. P. Kimmel
Attorney

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E. D. McWHORTER ET AL

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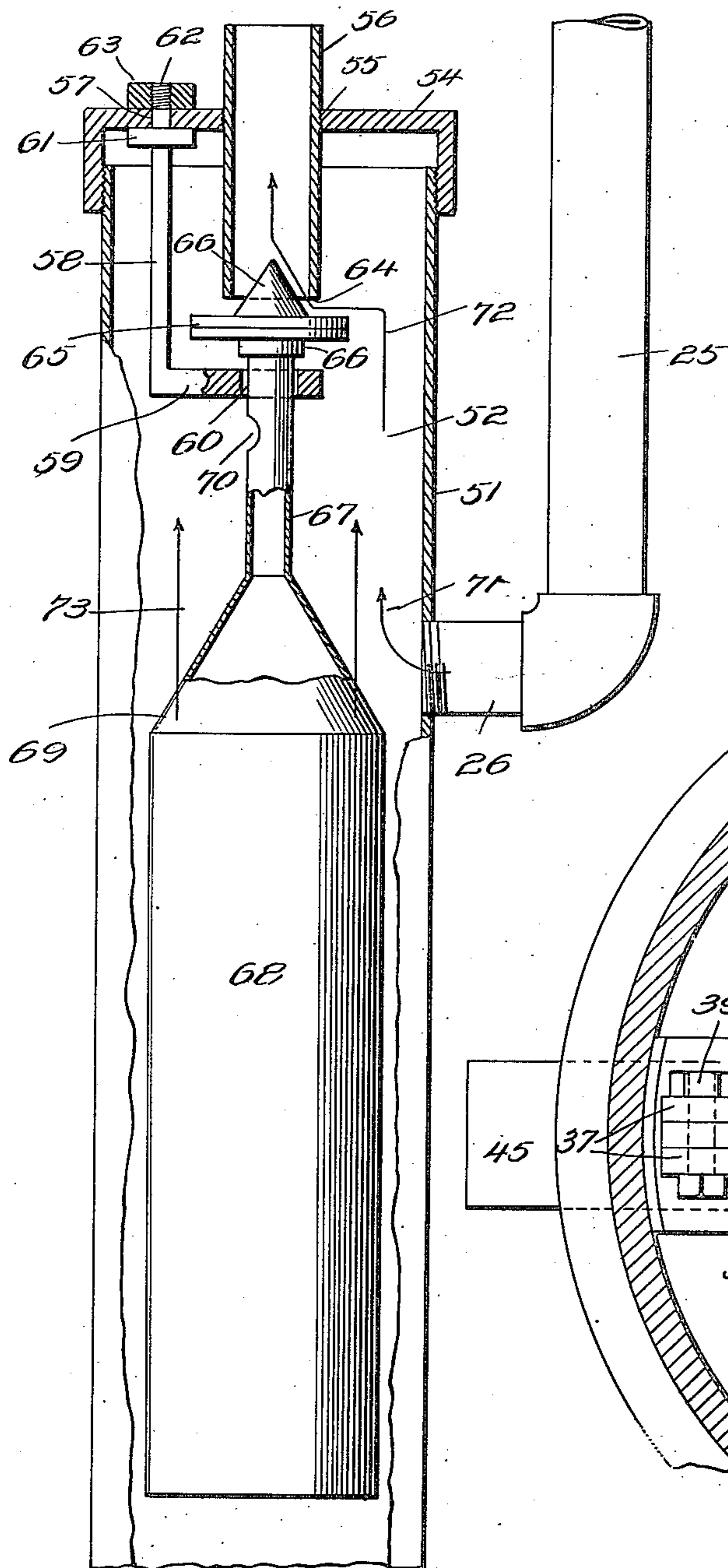
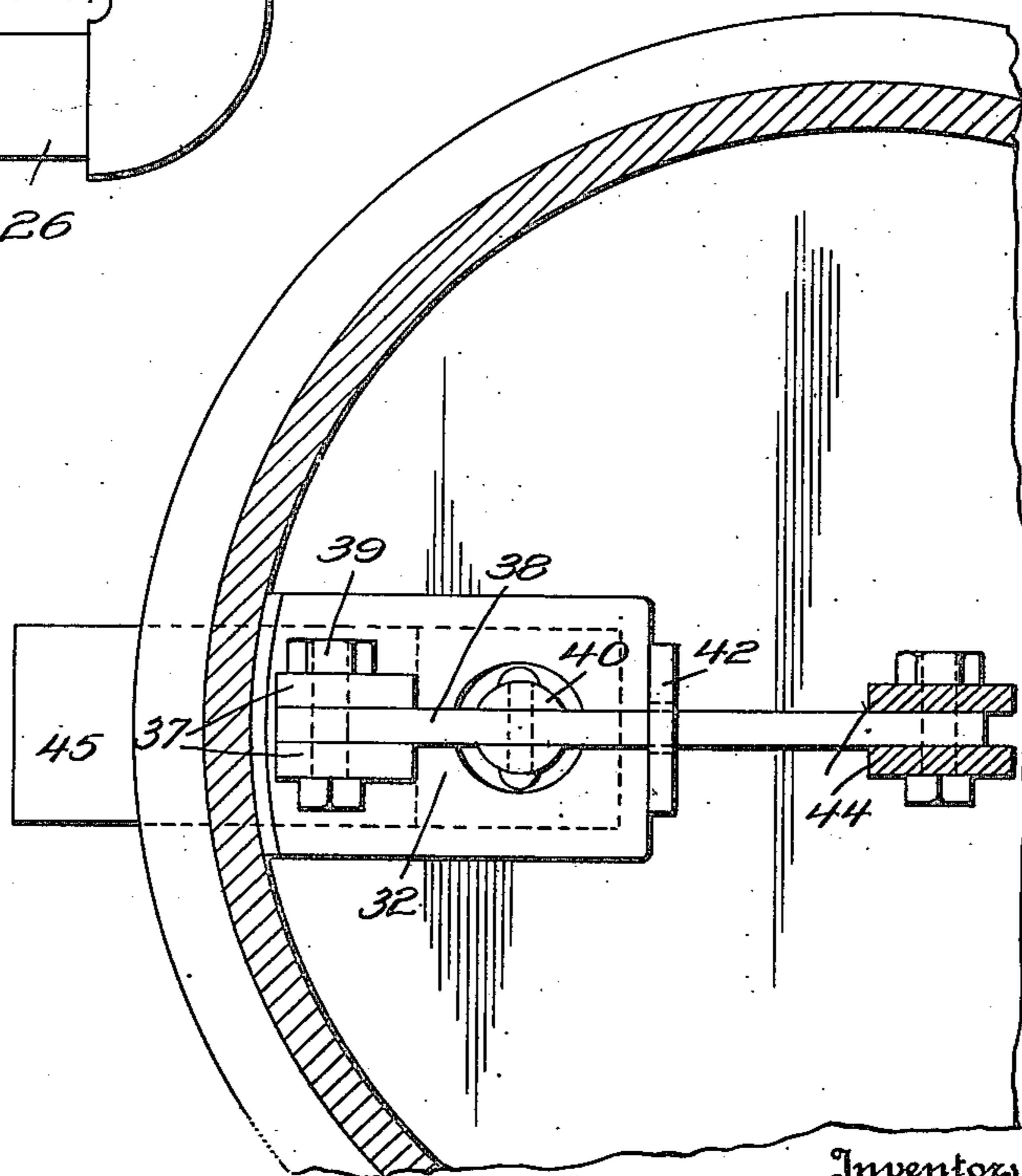


Fig. 4.

Fig. 5.



Inventors
E. D. McWhorter
A. A. Bennett

By
Geo. F. Kimmel Attorney

UNITED STATES PATENT OFFICE.

EMMETT D. McWHORTER AND AUGUSTUS A. BENNETT, OF COFFEYVILLE, KANSAS.

SEPARATOR.

Application filed February 19, 1923. Serial No. 620,007.

To all whom it may concern:

Be it known that we, EMMETT D. McWHORTER and AUGUSTUS A. BENNETT, citizens of the United States, residing at Coffeyville, in the county of Montgomery and State of Kansas, have invented certain new and useful Improvements in Separators, of which the following is a specification.

This invention relates to separators, designed primarily for use in connection with the separating of gas from water, although it is to be understood that a separator in accordance with this invention can be employed for any purposes wherein it is found applicable, and the invention has for its object to provide in a manner as hereinafter referred to, a separator having means for automatically and intermittently discharging water therefrom after a certain volume thereof has been collected or accumulated therein, and to further provide a separator with means for automatically shutting off the gas supply if the separator is not functioning properly.

Further objects of the invention are to provide a separator for the purpose referred to which is simple in its construction and arrangement, strong, durable, compact, very efficient in its use, conveniently installed, and inexpensively set up.

With the foregoing and other objects in view, the invention consists in the novel construction, combination and arrangement of parts, as hereinafter more specifically described and illustrated in the accompanying drawings, wherein is shown an embodiment of the invention, but it is to be understood that changes, variations and modifications can be resorted to which fall within the scope of the claims hereunto appended.

In the drawings wherein like reference characters denote corresponding parts throughout the several views:—

Figure 1 is a side elevation, partly broken away, of a separator in accordance with this invention.

Fig. 2 is a vertical sectional view, broken away, of the combined water separating and discharging element.

Fig. 3 is a like view of the intake element.

Fig. 4 is a vertical sectional view, broken away, of the controlling element.

Fig. 5 is a fragmentary view, in sectional

plan, of the combined separating and water discharging element.

A separator in accordance with this invention includes an intake element, a combined separating and water discharging element, and a controlling element. The said elements are connected together to provide for communication therebetween. The combined separating and water discharging element is of greater height than the intake element and controlling element.

The intake element consists of an upright substantially elongated cylindrical casing which is closed at its top and bottom and provided intermediate its ends, preferably at a point between its center and its bottom and in proximity to its center, with an opening 11, through which extends a supply pipe 12, the latter being suitably secured to the casing 10, and projecting into the separating chamber 13 formed by said casing 10. The inner end of the pipe 12 is provided with a downwardly opening elbow-shaped extension 14 which discharges the water and gas into the chamber 13, in the direction of the arrow 15. The water falls to the bottom of the chamber 13 and is indicated at 16. The rear side of the casing 10, in proximity to its upper end, has opening therein, a conducting pipe 17, which depends downwardly from the upper end of the casing 10, and is employed for conducting the gas from the intake element to the combined separating and water discharging element. Communicating with the lower end of the chamber 13, and projecting from the rear side of the casing 10, is a water conducting pipe 18, which is employed to conduct the water from the intake element to the combined separating and water discharging element.

The combined separating and water discharging element consists of a cylindrical casing 19 of substantial length and which is of greater height than the casing 10, and also of greater diameter than the diameter of the casing 10. The casing 19 is closed at its top and bottom, and is provided near its lower end with an opening 20 into which extends the pipe 18.

The casing 19 is formed of two sections, connected together by a coupling member 21. The sections of the casing 19 are arranged

in superposed relation and the lower section which is indicated at 22, is of less height than the upper section. The periphery of the upper section, at its lower end, is formed with threads, and the periphery of the lower section 22, at its upper end is provided with threads and engaging therewith is the coupling member 21. The pipe 18 is connected to the upper section in proximity to its lower end.

The said upper section of the casing 19, at a point intermediate its ends, has secured therewith the lower end of the pipe 17, and said pipe 17 opens into the chamber 23 formed by the casing 19. The upper section of the casing 19, in proximity to the top thereof, has communicating therewith, as well as opening thereto, the top section 24 of a gas conducting pipe. Depending from the section 24 of the gas conducting pipe is the intermediate section 25 of said pipe, and which is secured to a lower section 26. The sections 24 and 26 extend in opposite directions with respect to each other and at right angles to the intermediate section 25.

The lower section of the casing 19, has formed integral therewith, a cleaner pipe 27, which is normally closed by a removable cap 28.

Secured to the inner face of the lower section of the casing 19, or connected to said inner face in any suitable manner, or formed integral with said inner face, is a casting 29, formed to provide an outlet chamber 30, a valve seat 31, a valve guide 32, which is formed with an opening 33 in alinement with the seat 31. The valve seat 31 is formed on a partition member 34, having a port 35 leading to the chamber 30. The port 35 is in alinement with the opening 33, and said partition member 34 is spaced from the guide 32 thereby providing a chamber 36. Extended upwardly from the top of the casting 29, is a pair of spaced arms 37, between which is arranged one end of a valve shifting lever 38. That end of the valve shifting lever 38 which is arranged between the arm 37 is pivotally connected therewith as at 39. Fixed to the valve shifting lever 38, is a depending valve stem 40, having its lower end provided with a valve 41, which normally engages the seat 31. The valve shifting member 38 projects beyond the casting 29 and through a stop yoke 42, which extends upwardly from said casting 29. The outer end of the valve shifting member 38 is pivotally connected as at 43, to the lower end of a shifting rod 44, which depends from the bottom of a float element which is vertically movable within the chamber 23, and when in normal position is positioned in proximity to but above that end of the pipe 18 which is connected to the casing 19. Normally the float element maintains the valve 41 closed, to prevent the discharge

of water from the chamber 23, until the water has accumulated to an extent to elevate the float element, whereby the valve 41 will be shifted from its seat and the water can pass through the chamber 30, and from there discharge through the medium of a pipe 45, which is connected to the section 22 and opens into the chamber 30.

The float element consists of a substantially elongated hollow metallic body, preferably formed of copper, and includes a cylindrical body portion 46, closed at its bottom, and formed with a conoidal shaped upper portion 47, which opens into an elongated hollow stem 48, formed at its upper end with a right angular extension 49. The float element provides means for automatically and intermittently discharging the collected water from the chamber 23.

The bottom of the casing 10 is arranged above the lower section 22 of the casing 19 so that the water 16 accumulated in the chamber 13 will discharge through the pipe 18, into the casing 19 as indicated by the arrow 50.

The controlling element consists of a substantially elongated cylindrical casing 51, providing a chamber 52. The casing 51 is closed at its bottom and near its lower end has secured thereto, a normally closed draw-off valve 53. The upper end of the casing 51 is opened, and has connected therewith a flanged closure cap 54. The casing 51 is provided with peripheral threads which are engaged by internal threads formed in the cap 54 whereby the latter can be detachably connected to the upper end of the casing 51. The cap 54 centrally thereof, is formed with an opening 55, having the wall thereof threaded and extending through said opening 55, as well as engaging with the threads of the wall of said opening, is an outlet pipe 56. The pipe 56 is of substantial length, and has the greater portion thereof depending into the chamber 52 at the top of the casing 51. The cap 54 is furthermore provided with an opening 57, from which extends the vertical leg 58, of a combined guide and hanger member and which not only includes the leg 58, but also a horizontally disposed leg 59, which is integral with the lower end of the leg 58, and is provided with an opening 60. The leg 58 carries a collar 61, which abuts against the cap 54, and said leg 58 extends through the opening 57, a substantial distance above the cap 54 and is provided with threads 62, with which engage a clamping nut 63, whereby the combined hanger and guide is fixedly secured to the cap 54, and maintained in depending position with respect thereto, within the upper portion of the chamber 52. The inner end of the pipe 56, provides a valve seat 64, and associated therewith is a shut-off valve, consisting of a circular body

portion 65, provided with a cone-shaped extension 66, having its base of less diameter than the diameter of the body portion 65. The lower face of the body portion 65 has depending therefrom a collar 66, and secured by the collar 66 to the body portion 65, is a hollow stem 67, of a float element which operates in the chamber 52. The float element consists of a substantially elongated body, consisting of a hollow cylindrical portion 68 constructed of metallic material, preferably copper, and which has a cone-shaped upper portion 69, which opens into and is formed integral with the stem 67.

The stem 67 projects through the opening 60 and as the shut-off valve is arranged at the upper end of the stem 67, the said valve is interposed between the seat 64 and the horizontal leg 59 of the combined hanger and guide member. The stem 67 intermediate the ends thereof is provided with an opening 70. The gas enters the chamber 52 and travels therefrom in the direction of the arrows 71, 72. The float element moves in the direction of the arrows 73 to cause the seating of the shut-off valve against the pipe 56 thereby shutting off the supply of gas through the separator and the discharge of gas from the separator.

The pipe section 26 opens into the chamber 52, at a point between the center and upper end of the casing 51, and said casing 51 is of less height than the casing 19. The diameter of the casing 51 is substantially the same as the diameter of the casing 19, and the latter projects above the top of the casing 51. The bottom of the casing 51 is in alinement with respect to the bottom of the casing 19, but the bottom of the casing 10 is positioned above the bottom of the casing 51.

The intake element, as well as the combined separating and water discharging element, and also the controlling element, each provide a separating chamber, whereby the water will separate from the gas and fall to the bottom of each of said elements.

The gas enters the chamber 13, through the medium of the pipe 12 and elbow 15, and the gas being lighter, flows off from the top of the chamber 13, while the water falls to the lower part of the chamber 13 and is conducted by the pipe 18, into the lower portion of the chamber 23. The gas travels off the chamber 23 through the pipe section 24 and is conducted by the pipe sections 25 and 26 into the chamber 52 where the water falls to the bottom of the chamber, and the gas travels off from the chamber 52 through the pipe 56. The float element in the chamber 23 acts as a means for relieving the lower portion of the chamber 23 of accumulated water. In the event that something goes wrong with the separator, the water will accumulate in the bottom of the chamber 52,

causing thereby the elevation of the float element, and the seating of the shut-off valve against the pipe 56, and the travel of gas through the separator will be discontinued.

The controlling element not only performs the function referred to, but it also can be employed for testing wells to find out whether or not they produce water, and in this connection the casing 51 can be attached to any gas well and if it is producing water within a few minutes, gas will be shut off by the water which accumulates at the bottom of the cylinder, due to the fact that accumulation of water will cause the float element to operate the shut-off valve to seat against the pipe 56.

Although the preferred construction of separator is as described and shown, yet it is to be understood that changes in the details of construction can be had without departing from the spirit of the invention as claimed.

What is claimed is:—

1. A separator comprising an intake element providing a separating chamber and formed with an inlet, a combined separating and water discharging device providing a separating chamber and including a float operated normally closed water discharge valve mechanism, a controlling element providing a separating chamber and including a float operated normally opened shut-off valve mechanism, means for conducting water from said intake element to the lower portion of said device, means for conducting the body to be separated from said intake element to said device, and means for conducting the body to be separated from said device to said controlling element.

2. A separator comprising an intake element providing a separating chamber and formed with an inlet, a combined separating and water discharging device providing a separating chamber and including a float operated normally closed water discharge valve mechanism, a controlling element providing a separating chamber and including a float operated normally opened shut-off valve mechanism, means for conducting water from said intake element to the lower portion of said device, means for conducting the body to be separated from said intake element to said device, and means for conducting the body to be separated from said device to said controlling element, each of said mechanisms provided with a float element consisting of a substantially elongated hollow metallic body formed with a substantially elongated stem opening into a separating chamber.

3. A separator comprising means to provide an intermediate and a pair of outer separating chambers, means for establishing communication between said chambers

to provide for the circulation therethrough of the body to be separated, means for conducting water from one outer chamber to the intermediate chamber, a normally closed
 5 water discharge valve mechanism arranged at the lower portion of the intermediate chamber, a float operated element for opening said mechanism, a normally opened gas shut-off valve mechanism arranged in the
 10 upper portion of the other outer chamber, and a float operated element for closing said shut-off valve mechanism.

4. A separator comprising means to provide an intermediate and a pair of outer
 15 separating chambers, means for establishing communication between said chambers and to provide for the circulation therethrough of the body to be separated, means for conducting water from one outer to the
 20 intermediate chamber, a normally closed float operated water discharge valve mechanism arranged in said intermediate chamber, a normally opened float operated gas shut-off valve mechanism arranged in the
 25 other of said outer chambers, said first mentioned outer chamber provided with an inlet and said second mentioned outer chamber provided with an outlet with which said shut-off valve associates.

30 5. A separator comprising means to provide an intermediate and a pair of outer separating chambers, means for establishing communication between said chambers and to provide for the circulation therethrough
 35 of the body to be separated, means for conducting water from one outer to the intermediate chamber, a normally closed float operated water discharge valve mechanism arranged in said intermediate chamber, a
 40 normally opened float operated gas shut-off valve mechanism arranged in the other of said outer chambers, said first mentioned outer chamber provided with an inlet and said second mentioned outer chamber provided with an outlet with which said shut-

off valve associates, and a vertically movable float connected with each of said mechanisms and each consisting of a substantially elongated hollow metallic body portion provided with a substantially elongated stem
 50 opening into the separating chamber.

6. A separator comprising a hollow intake element forming the separating chamber and provided with an inlet, a cylindrical casing forming a separating chamber and
 55 provided with an outlet at the top thereof, means for establishing communication between the top of said element and the interior of said casing, a water discharge pipe leading from the lower end of said element to the lower end of said casing, a normally closed water discharge valve mechanism arranged within said casing, and a float connected with and opening said mechanism and including a substantially elongated hollow metallic body provided at its
 60 upper end with a substantially elongated hollow stem opening into the separating chamber formed by said casing.

7. A separator comprising means to provide a pair of separating chambers, means for establishing communication between said chambers, one of said chambers having a gas outlet at its top and the other of said chambers having a water outlet at its bottom, valves for controlling said outlets, a
 75 substantially elongated hollow float vertically movable in each of said chambers and provided with a substantially elongated hollow stem opening into the chamber, one of said floats having its bottom connected with one of said valves for operating it, and the other of said floats having its stem connected with the other of said valves for operating it.
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In testimony whereof, we affix our signatures hereto.

EMMETT D. McWHORTER.
 AUGUSTUS A. BENNETT.