No. 839,892. PATENTED JAN. 1, 1907.

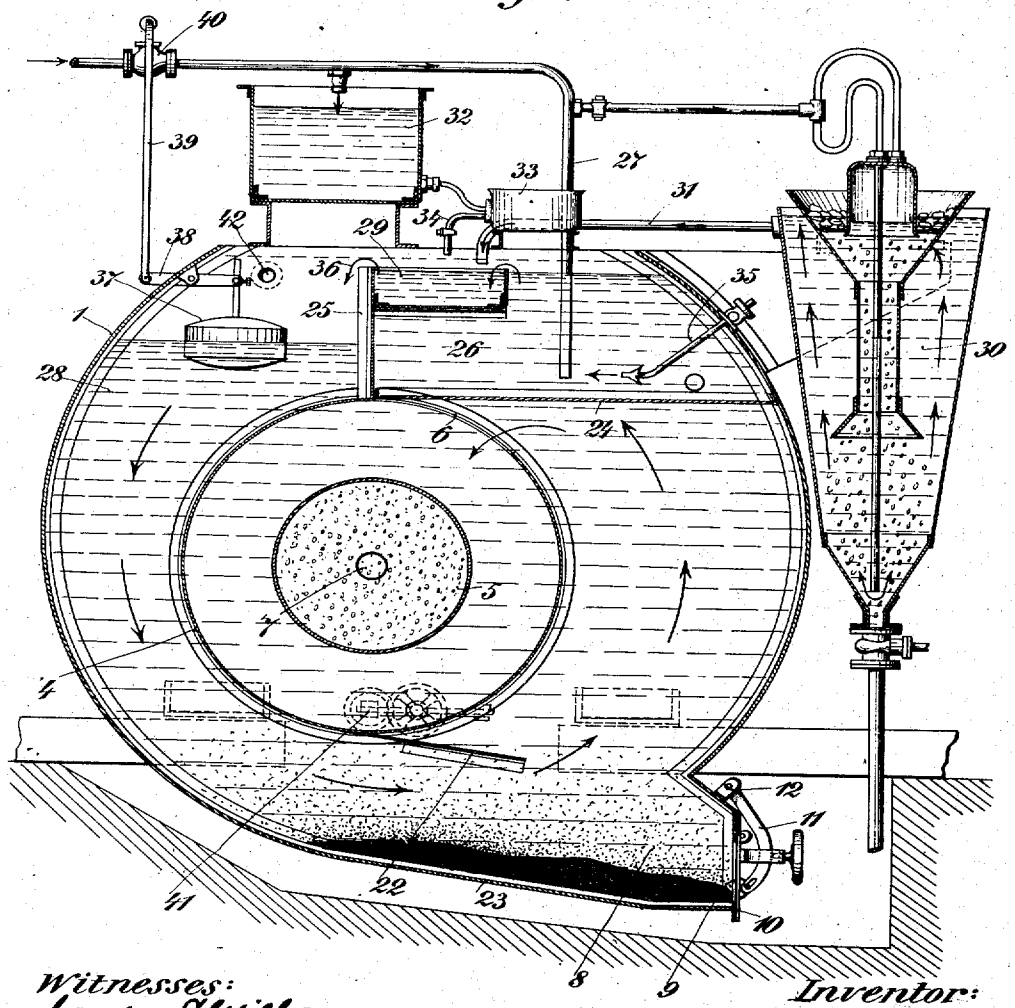
W. ROTTMANN.

APPARATUS FOR THE MECHANICAL CLASSIFICATION OF FLUIDS.

APPLICATION FILED APR. 2, 1906.

4 SHEETS—SHEET 1.

Fig. 1.



Witnesses:
Walter A. Miller
Paul Filler

Inventor:
Walter Rottmann

No. 839,892. PATENTED JAN. 1, 1907.

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4 SHEETS—SHEET 2.

Fig. 6.

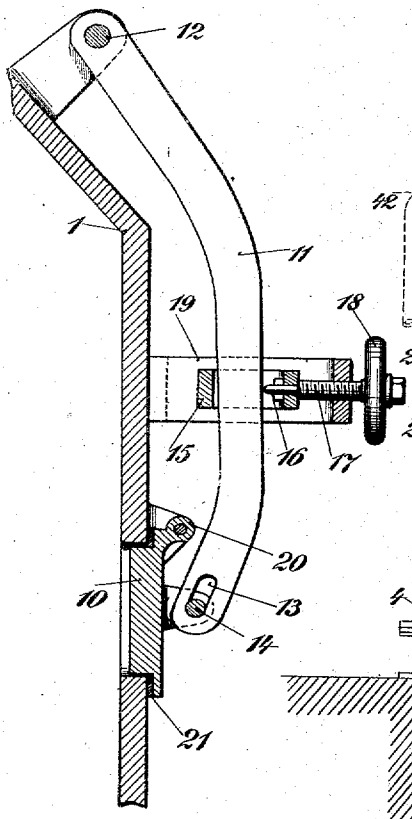
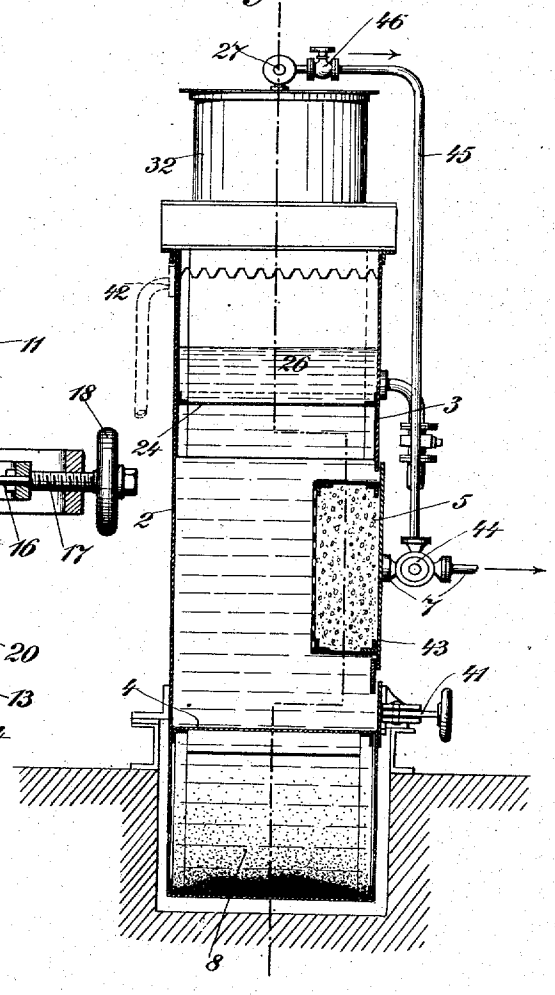


Fig. 2.



Witnesses:

Adalbert Miller

Paul Filler

Inventor:

Walter Rottmann

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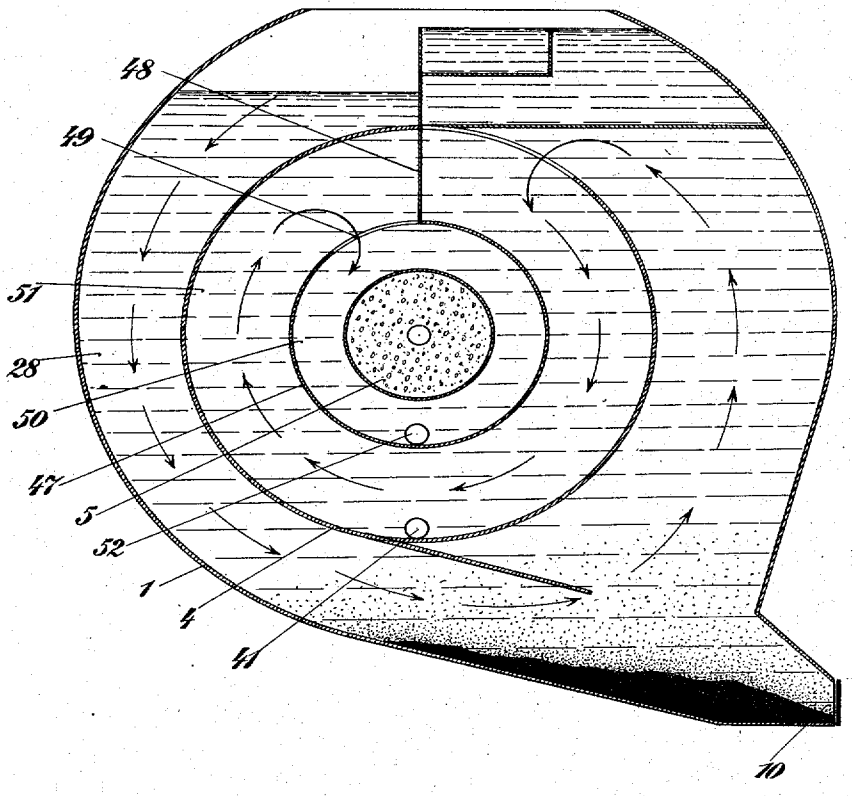
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4 SHEETS—SHEET 3.

Fig. 3.



Witnesses:
Albert Miller
Paul Fuller

Inventor:
Walter Rottmann

No. 839,892. PATENTED JAN. 1, 1907.

W. ROTTMANN.

APPARATUS FOR THE MECHANICAL CLASSIFICATION OF FLUIDS.

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4 SHEETS—SHEET 4.

Fig. 5.

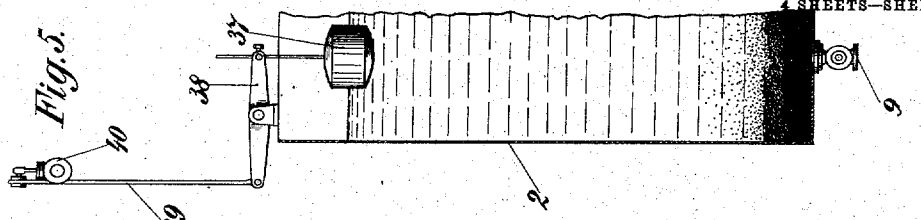
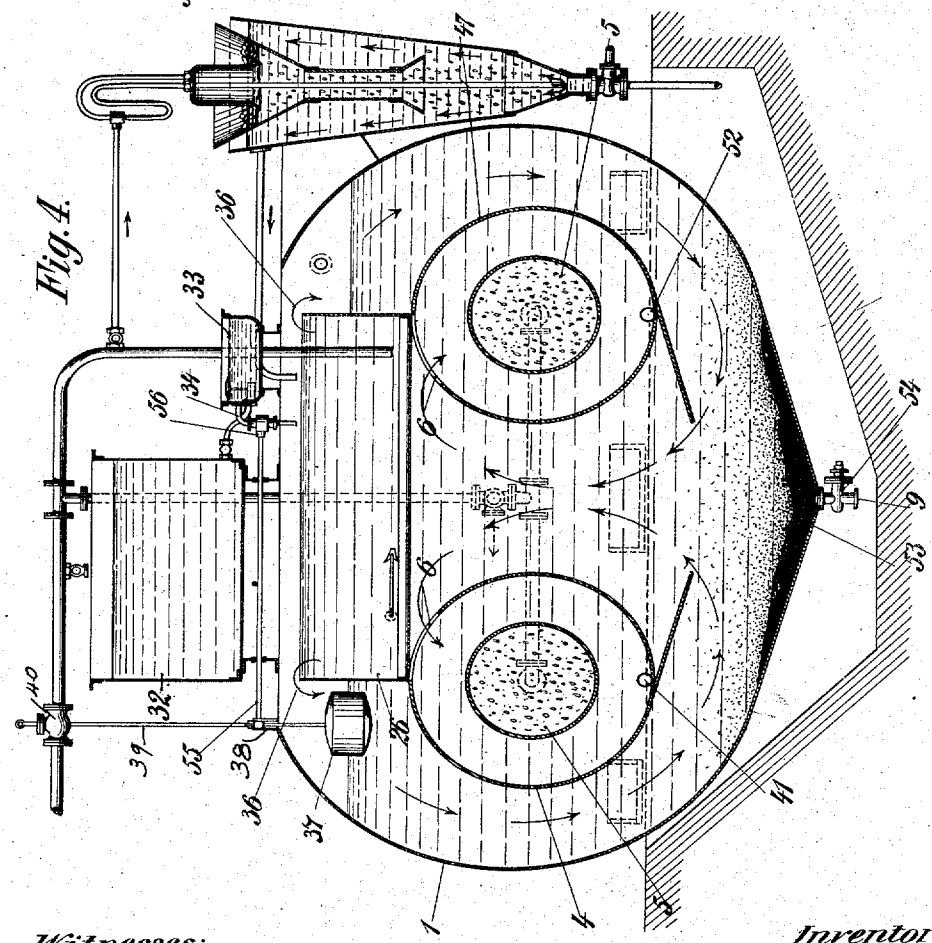


Fig. 4.



Witnesses:
Adalbert Müller
Paul Fuller

Inventor:
Walter Rottmann

UNITED STATES PATENT OFFICE.

WALTER ROTTMANN, OF BERLIN, GERMANY.

APPARATUS FOR THE MECHANICAL CLARIFICATION OF FLUIDS.

No. 839,892. Specification of Letters Patent. Patented Jan. 1, 1907.

Application filed April 2, 1906. Serial No. 309,538.

To all whom it may concern:

Be it known that I, WALTER ROTTMANN, a citizen of the German Empire, and a resident of Berlin, Germany, have invented certain new and useful Improvements in Apparatus for the Mechanical Clarification of Fluids, of which the following is a specification.

My invention relates to an apparatus for the mechanical clarification of fluids; and the special object of the same is to eliminate particles of mud and other foreign bodies from feed-water for boilers and water for other industrial purposes.

The water may be conveyed to the apparatus in a natural state or after being previously treated with chemicals. The clarification is effected by first conveying the water to be clarified in a bow downward and then upward. This process can be repeated several times in the apparatus. While the water sinks or rises in a stream the suspended particles are at the same time gradually turned out of the vertical sinking movement and forced to move in the opposite direction.

My apparatus has the special advantage that the formation of whirls on the liquid to be clarified passing through the apparatus is entirely avoided and that consequently the mud above the collecting place or places cannot be tossed or lashed up. I attain this by the apparatus shown on the accompanying drawings in three forms of construction, which in each case consists of a horizontally-arranged outside reservoir of a cylindrical or similar cross-section, which is divided into several compartments by one or several reservoirs also arranged horizontally in the same. The inner reservoirs are fastened by means of rivets to the outside walls of the outer reservoir and may be arranged in different ways. The fluid to be clarified enters from above into the space between the outer and inner reservoir and traverses the same in a descending and ascending bow. It thereupon passes into the inner cylinders and, if necessary, a filtering device, whereupon it is conducted to the place of consumption.

Figure 1 shows a vertical cross-section, and Fig. 2 a vertical longitudinal section, through an apparatus formed by two cylinders, the inner cylinder being eccentric to the outer. Fig. 3 shows in a diagrammatic view the cross-section of an apparatus formed by three cylinders, one inside of the other. The cylinder in the middle is eccentric to the outer cylinder. The inner cylinder and middle cylinder are concentric. Fig. 4 shows a cross-section, and Fig. 5 a partial longitudinal section, through an apparatus in which two inner cylinders are arranged in the outer cylinder, but not the one inside of the other. Fig. 6 shows in a detail view a vertical section through a device for letting out the mud.

Similar numerals refer to similar parts throughout the several views.

According to Figs. 1 and 2, 1 is the outer cylinder, which is closed on both sides by the walls 2 and 3. To the walls 2 and 3 is riveted the inner cylinder 4. This inner cylinder 4 lies eccentric to the outer cylinder 1 and surrounds a filter 5 of any construction. In the upper part of the inner cylinder 4 is an opening 6, through which the fluid passes from the outer into the inner cylinder and through the filter 5 to the outlet-socket 7. The outer cylinder 1 is at the bottom in the bay 8 provided with an opening 9 for letting the mud out. The opening 9 is closed by the lid 10, which can be moved by means of any suitable device. This device consists, according to Fig. 6, of a lever 11, which is at 12 movably fastened with one end to the outer wall of the cylinder 1. At the other end it engages with the slot 13 the bolt 14 of the lid 10.

15 is a frame which encompasses the lever 11. In the frame pivots at 16 the screw 17, with the hand-wheel 18. This screw 17 can be screwed forward and backward in the bent piece of metal 19, which is fastened to the wall of the reservoir 1. By turning the screw 17 the lid 10 can be moved away from the opening 9 or pressed upon it while it turns on its pivot 20 on the reservoir 1.

21 is an india-rubber packing by which a tight closure is effected.

From the outer wall of the inner cylinder 4 branches off toward the bay 8 the wall 22, which serves to conduct the particles of mud into the bay 9, through which the mud is let out. Also the slanting wall 23 of the bay 8 serves to let the mud out.

In the space between the outer reservoir 1 and the inner cylinder 4 there is formed, by the horizontal wall 24 and the vertical wall 25, a chamber 26, into which the fluid to be clarified is conducted through the pipe 27. The walls of the chamber 26 serve to separate

the opening through which the fluid enters into the outer space 28 from the opening 6, through which it leaves it.

29 is a reservoir in which the fluid to be clarified is mixed with chemicals.

30 is an apparatus serving to prepare the chemicals to be added to the water, which are conducted to the mixing-reservoir 29, in the form of a solution, through the pipe 31. 32 and 33 are likewise reservoirs for chemicals which are conducted to the mixing-chamber 29 through the pipe 34. It is further known that for the chemical treatment the water to be clarified is previously heated. To this end steam is conducted in the apparatus shown in the drawings through the pipe 35 into the chamber 26. The water, mixed with the chemicals, falls at 36 from the reservoir 29 into the chamber 28, in which the mechanical clarification commences. The float 37 automatically regulates in the known manner the admission of the fluid to be clarified by means of the rods 38 39 and the valve 40. In the inner reservoir 4 there is likewise provided an outlet 41 for the mud, which can in the same way be closed by a lid, as the above-described outlet 9. The outlet may, however, also be of a different construction.

42 is an opening through which the fluid can run over in case the automatic regulating device for admitting the fluid to be clarified should fail to work.

The filter 5 is fastened to the removable lid 43 of the outer reservoir 1, so that it can be easily taken out; but the same can also be cleaned by causing the fluid to be clarified to enter into the apparatus in the opposite direction. For this purpose there is inserted into the outlet-pipe 7, at 44, a three-way cock of a known construction, from which a pipe 45 leads to the conduit 27 for the raw water. In the pipe 45 is arranged a valve 46. Ordinarily the three-way cock 44 acts in a way that the clarified water passes from the filter 5 into the outlet 7; but the three-way cock 44 can also be turned in a way that the outlet 7 is closed, and the filter 5 is, after opening the valve 46, directly connected with the raw-water conduit 27 through the pipe 45. The raw water then passes in the opposite direction through the filter, whereby the latter is cleaned. The water entering in this way into the apparatus can at once be let off through the outlet 41 for the mud.

The eccentric arrangement of the inner cylinder in the outer cylinder, as shown in Fig. 1, has for its result a narrowing of the cross-section, and in consequence of the same an accelerated streaming down of the fluid to the collecting-place for the mud. On the other side, however, the cross-section is enlarged. The speed of the water is thereby lessened and in this way the depositing of the still-ascending particles of mud facilitated.

In the form of construction according to Fig. 3 the fluid to be clarified is forced to make a longer way in order to be able to effect a sure elimination of the particles of mud. To this end three cylinders are arranged one inside of the other. The construction of the outer cylinder 1 and of the middle cylinder 4, as well as of the other parts, is the same as above described. The filter 5 is arranged in the inner cylinder 47, which carries a cross-wall 48, which compels the fluid to enter the filtering-space 50 through the space 28 between the cylinders 1 and 4 and the space 51 between the cylinders 4 and 47. In the inner cylinder there is also provided an outlet 52 for the mud, which can be closed in a similar way as the outlets 10 and 41.

The form of construction according to Figs. 4 and 5 is specially suited for very large apparatus. The outer reservoir 1 is in this case of the cross-section shown in Fig. 4. To its walls 2 and 3 are riveted the inner cylindrical reservoirs 4 and 47 at some distance from each other, in which are arranged the filters 5, to which the fluid to be clarified passes through the openings 6 of the cylinders 4 and 47. The chamber 26 rests on the two inner cylinders 4 and 47 and is riveted to their walls. The inner cylinders 4 and 5 are provided with outlets 41 and 52 for the mud. The place where the mud collects in this case in the outer cylinder 1 is at 53. 54 is a slide which closes the mud-outlet and may be of the usual construction. The fluid to be clarified enters in this case into the clarifying device, properly speaking, on both sides of the chamber 26 at 36 and moves between the wall of the outer reservoir 1 and the mantles of the cylinders 4 and 47 in the first place toward the space 53, where the mud collects, from where it enters through the openings 6 into the filtering-spaces of the cylinders 4 and 47.

All other parts of the apparatus may be of the same construction as shown in Figs. 1 and 2. In this form of construction there is, however, also shown in which way the admission of the chemicals to the chamber 26 from the reservoirs 32 and 33 is automatically regulated. The float 37, which actuates by means of the rods 38 and 39 the valve 40 of the raw-water conduit, turns at the same time the shaft 55, which is connected to the cock 56 of the conduit 34 for the chemicals. If a float descends, the valve 40 and the cock 56 are opened at the same time, so that a larger quantity of raw water as well as larger quantities of chemicals can enter. When the level of the raw water rises, and consequently also the float, the action is the reverse.

I wish to remark that it will not alter my invention if the position of the inner cylinder with regard to the outer cylinder, the arrangement of the inlet and outlet for the wa-

ter and of the outlets for the mud, of the filtering device, and of the other parts of the apparatus is modified, as long as the fluid to be purified is caused to describe a bow between the walls of several reservoirs arranged one inside of the other.

What I claim as my invention, and desire to secure by United States Letters Patent, is—

1. In an apparatus for the mechanical clarification of fluids, the combination of a horizontally-arranged outer reservoir of a cylindrical or similar cross-section, of an inner reservoir arranged horizontally in this outer reservoir, of reservoirs arranged horizontally in the upper part of the outer reservoir, of an opening for letting in the fluid in the upper part of the inner reservoir and of a filtering device in the inner reservoir substantially as set forth.

2. In an apparatus for the mechanical clarification of fluids, the combination of a horizontally-arranged outer reservoir of a cylindrical or similar cross-section, of an inner reservoir arranged eccentrically and horizontally in the outer reservoir, of reservoirs arranged horizontally in the upper part of the outer reservoir, of an opening for letting in the fluid in the upper part of the inner reservoir, and of a filtering device in the inner reservoir, substantially as set forth.

3. In an apparatus for the mechanical clarification of fluids the combination of a horizontally-arranged outer reservoir of a cylindrical or similar cross-section, of inner reservoirs arranged horizontally in the outer reservoir, of reservoirs arranged horizontally in the upper part of the outer reservoir, of openings for letting in the fluid in the upper part of the inner reservoirs and of a filtering device in the central reservoir, substantially as set forth.

4. In an apparatus for the mechanical clarification of fluids the combination of a horizontally-arranged outer reservoir of a cylindrical or similar cross-section, of inner reservoirs arranged eccentrically and horizontally in the outer reservoir, of reservoirs arranged horizontally in the upper part of the outer reservoir, of openings for letting in the fluid in the upper part of the inner reservoirs and of a filtering device in the central reservoir, substantially as set forth.

5. In an apparatus for the mechanical clarification of fluids the combination of several reservoirs arranged horizontally one inside of the other, outlets for the mud in said inner reservoirs, a filtering device in the central reservoir, of a collecting-basin with a slanting bottom for the eliminated substances in the outer reservoir, of a closable outlet for the mud in this collecting-basin and devices for conveying the eliminated substances to this outlet, substantially as set forth.

6. In an apparatus for the mechanical clarification of fluids the combination of several reservoirs arranged horizontally one inside of the other, a filtering device in the central reservoir, and walls in the outer reservoir for forming one or several chambers and for separating the opening through which the fluid enters from the opening through which it leaves, substantially as set forth.

7. In an apparatus for the mechanical clarification of fluids the combination of several reservoirs arranged horizontally one inside of the other, a filtering device in the central reservoir, outlets for the mud in the walls of the said reservoirs devices for automatically regulating the quantity of fluid entering into these reservoirs, and devices for automatically regulating the inflow of chemical solutions, substantially as set forth.

8. In an apparatus for the mechanical clarification of fluids the combination of a horizontally-arranged outer reservoir of a cylindrical or similar cross-section, of inner reservoirs inclosing filtering devices, the cylindrical walls of which reservoirs are fastened to the front walls of the outer reservoir, and of a removable lid on the front wall of the outer reservoir, which carries on the inside the said filtering device, substantially as set forth.

9. In an apparatus for the mechanical clarification of fluids the combination of a horizontally-arranged outer reservoir of a cylindrical or similar cross-section, of an inner cylinder lying eccentrically in the said outer cylinder, whose cylindrical wall is riveted to the front walls of the outer cylinder, of a chamber over the inner cylinder which separates the opening through which the fluid enters from the opening through which it leaves, of a mixing-reservoir in the said chamber, devices for preparing chemical admixtures for the fluid, a float for the automatic regulation of the admission of these admixtures to the said mixing-reservoir and for the automatic regulation of the admission of the fluid to be clarified, a collecting-basin for the eliminated particles of mud at the bottom of the outer reservoir, a closable outlet for the mud in the said collecting-basin, an opening in the upper part of the inner cylinder, a filtering device in the inner cylinder, fastened to a removable lid on the front wall of the outer cylinder, an outlet for the mud in the inner cylinder, an outlet-pipe for the purified fluid, and devices for reversing the direction in which the fluid streams through the apparatus, substantially as set forth.

10. In an apparatus for the mechanical clarification of fluids the combination of a horizontally-arranged outer reservoir of a cylindrical or similar cross-section, of two inner cylinders lying separated in the said outer cylinder, whose mantles are suitably arranged in relation to the mantle of the outer cylinder and are riveted to the front walls of the outer cylinder, a chamber lying above the inner cyl-

inder which separates the opening through which the fluid enters from the opening through which it leaves, devices for preparing chemical admixtures for the fluid, a float for the automatic regulation of the admission of the fluid to be clarified, a collecting-basin for the eliminated particles of mud at the bottom of the outer reservoir, a closable outlet for the mud in the said collecting-basin, an opening in the upper part of each inner cylinder, a filtering device in each inner cylinder fastened to a removable lid on the front wall of the outer cylinder, an outlet for the mud in each inner cylinder, an outlet-pipe for the purified fluid and devices for reversing the direction in which the fluid streams through the apparatus, substantially as set forth.

11. In an apparatus for the mechanical clarification of fluids the combination of several horizontal reservoirs of a cylindrical or similar cross-section arranged suitably one inside of the other, whose cylindrical walls are riveted to the front walls of the outer cylinder, a chamber above the inner cylinder, which separates the opening through which the fluid enters from the opening through which it passes out, a mixing-reservoir in the said chamber, devices for preparing chemical admixtures for the fluid, a float for the automatic regulation of the admission of these admixtures to the said chambers and for the automatic regulation of the admission of the fluid to be clarified, a collecting-basin for the eliminated particles of mud at the bottom of the outer reservoir, a closable outlet for the mud in the said collecting-basin, an opening in the upper part of each inner cylinder, a filtering device in the inner cylinder fastened to a removable lid on the front wall of the outer cylinder, an outlet for the mud in each inner cylinder, an outlet-pipe for the purified fluid and devices for reversing the direction in which the fluid streams through the apparatus, substantially as and for the purpose set forth.

In testimony whereof I have hereunto signed my name, this 22d day of March, 1906, in the presence of two subscribing witnesses.

WALTER ROTTMANN.

Witnesses:

WOLDEMAR HAUPT,

HENRY HASPER.

Correction in Letters Patent No. 839,892.

It is hereby certified that in Letters Patent No. 839,892, granted January 1, 1907, upon the application of Walter Rottmann, of Berlin, Germany, the title of the invention in the headings to the four sheets of drawings was erroneously printed "Apparatus for the Mechanical Classification of Fluids," whereas the said title should have been printed *Apparatus for the Mechanical Clarification of Fluids;* and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 30th day of April, A. D., 1907.

[SEAL.]

F. I. ALLEN,

Commissioner of Patents.

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