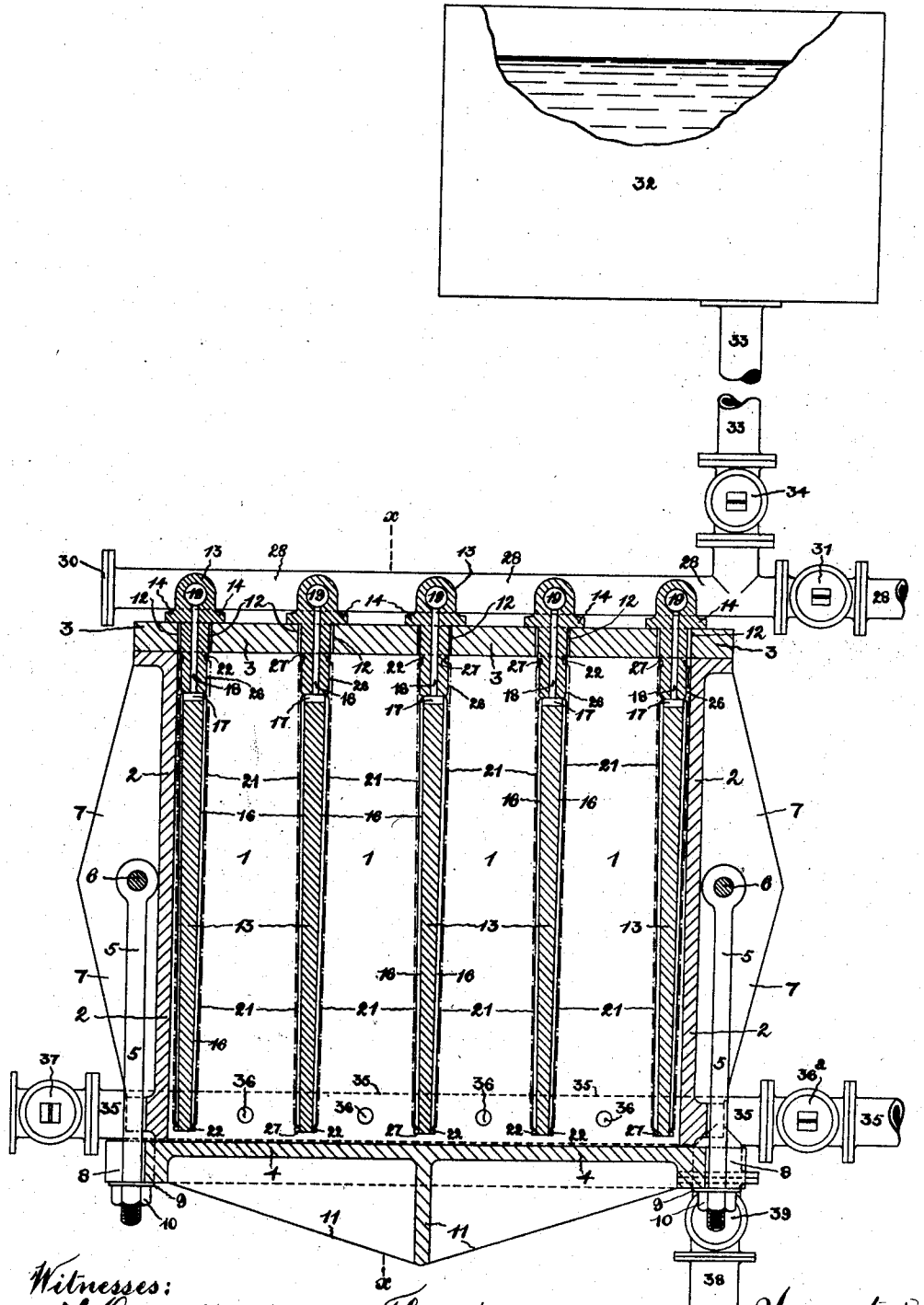
No. 859,749. PATENTED JULY 9, 1907.

A. E. DAVIS.

PRESSURE FILTER.

APPLICATION FILED JUNE 27, 1905.

8 SHEETS—SHEET 1.



Witnesses:
F. Orendale.
A. Orendale.

Fig. 1.

Inventor:
Alfred Edwin Davis
by Chas. Orendale.
His Attorney

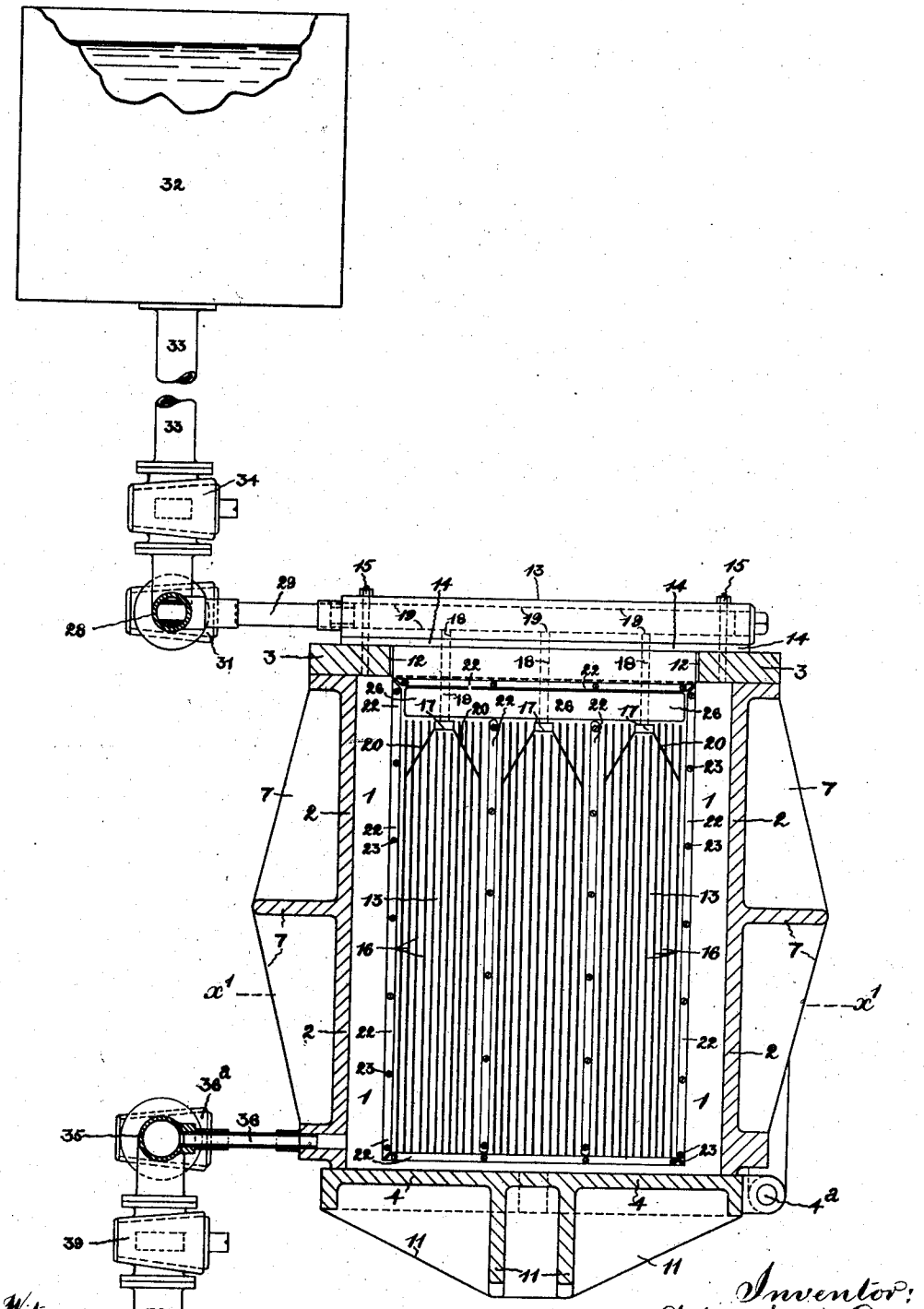
No. 859,749. PATENTED JULY 9, 1907.

A. E. DAVIS.

PRESSURE FILTER.

APPLICATION FILED JUNE 27, 1905.

8 SHEETS—SHEET 2.



Witnesses:
F. Verndale
R. Verndale

Fig. 2.

Inventor:
Alfred Edwin Davis
by Chas. Verndale
His Attorney

No. 859,749. PATENTED JULY 9, 1907.

A. E. DAVIS.

PRESSURE FILTER.

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8 SHEETS—SHEET 3.

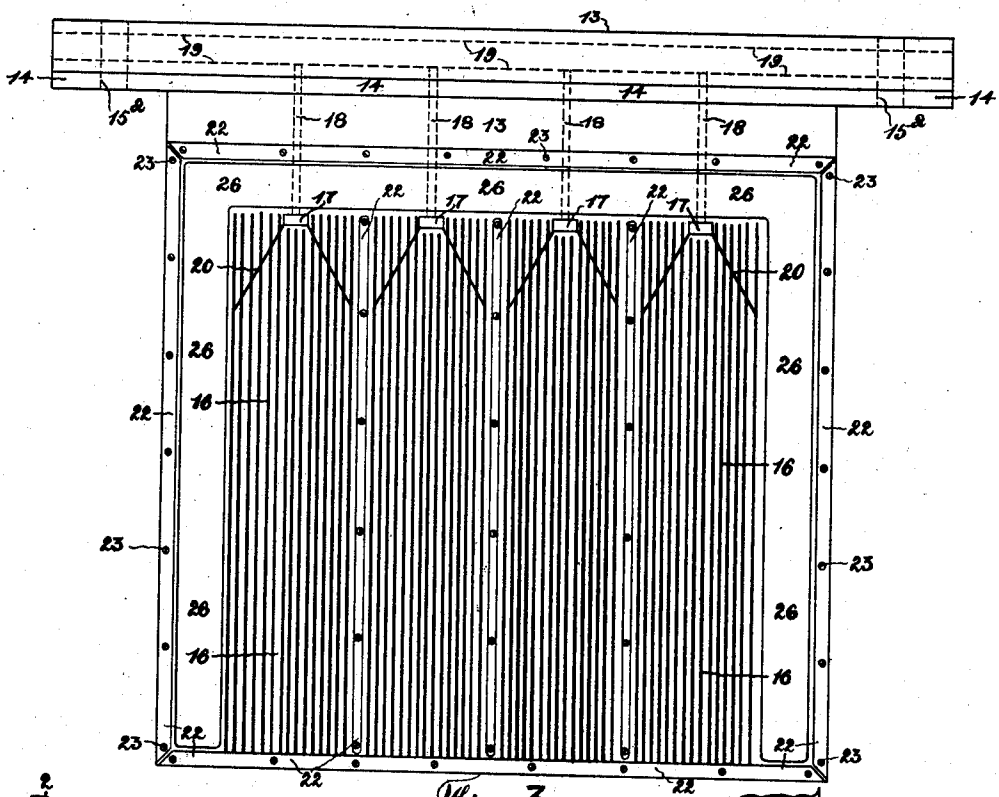


Fig. 3.

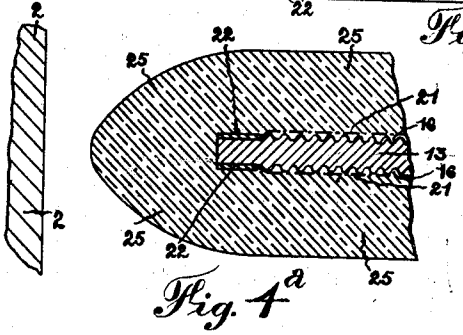


Fig. 4a

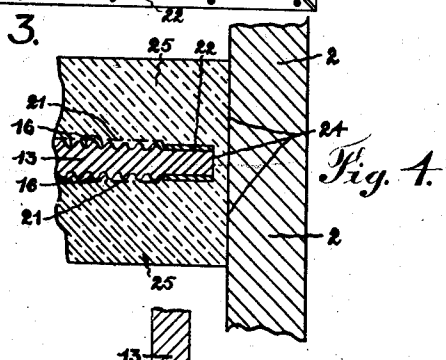


Fig. 1.

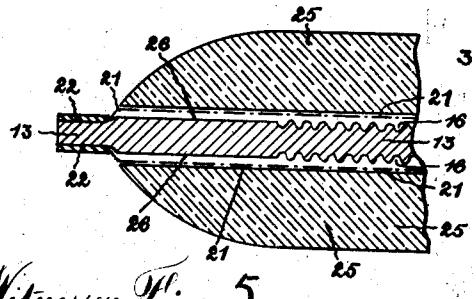


Fig. 5.

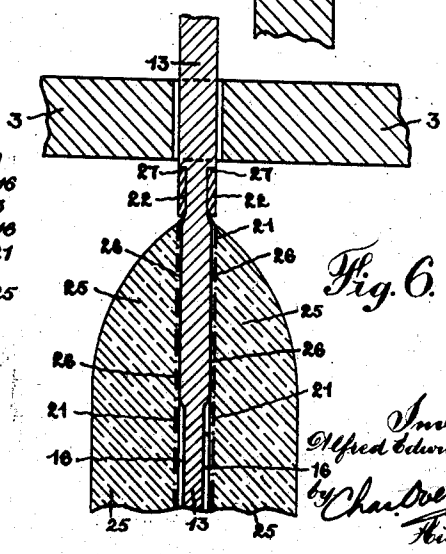


Fig. 6.

Witnesses:
F. Ovendale.
A. Ovendale

Inventor:
Alfred Edwin Davis
by Chas. Ovendale
His Attorney

No. 859,749. PATENTED JULY 9, 1907.

A. E. DAVIS.

PRESSURE FILTER.

APPLICATION FILED JUNE 27, 1905.

8 SHEETS—SHEET 4.

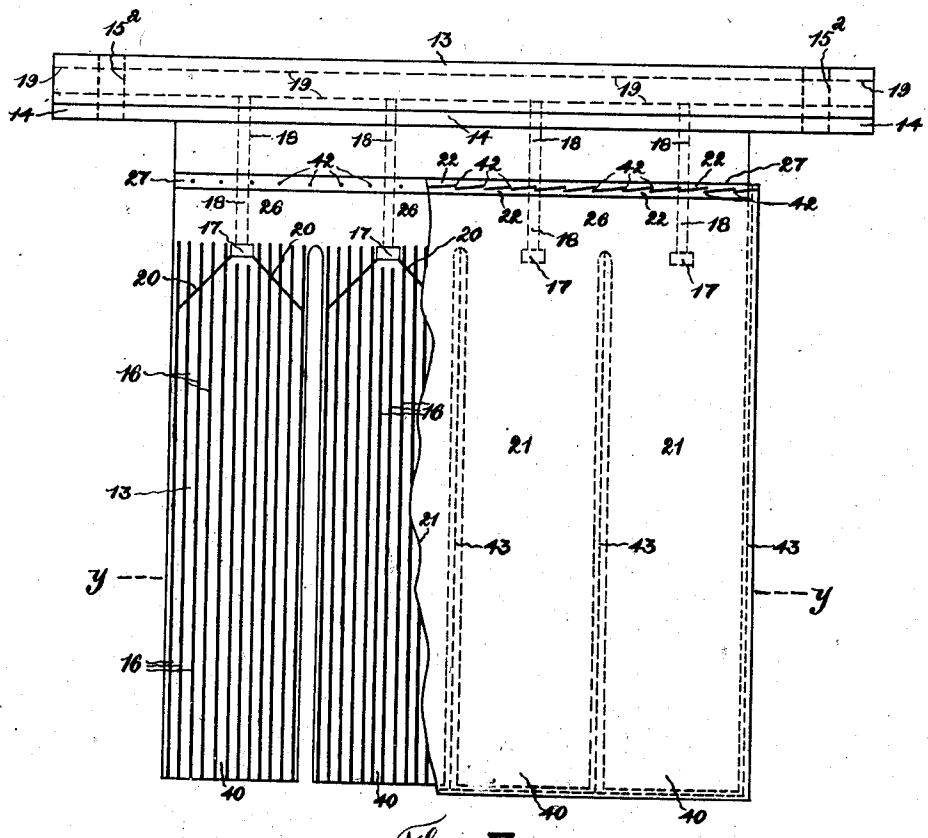


Fig. 7.

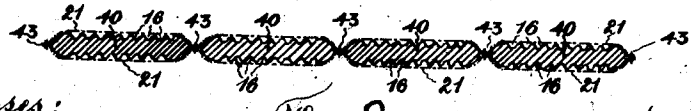


Fig. 8.

Witnesses:
F. Orendale
R. Orendale

Inventor:
Alfred Edwin Davis
by Chas. Orendale
His Attorney.

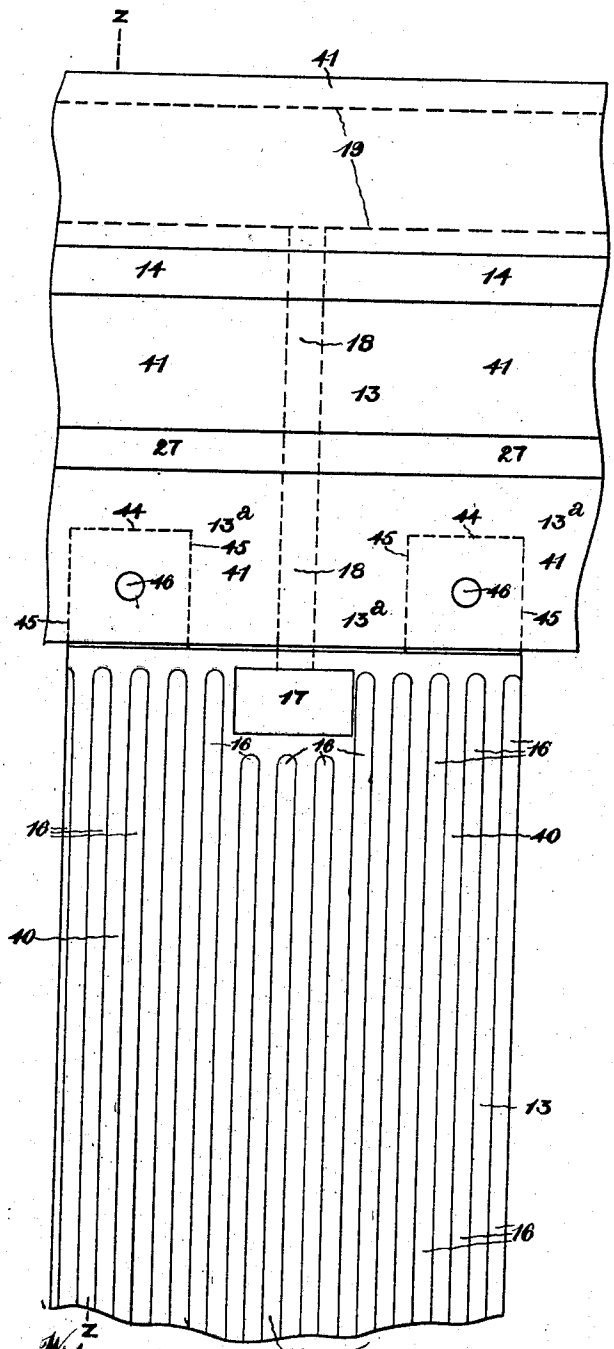
No. 859,749. PATENTED JULY 9, 1907.

A. E. DAVIS.

PRESSURE FILTER.

APPLICATION FILED JUNE 27, 1905.

8 SHEETS—SHEET 5.



Witnesses:
F. Ovendale.
R. Ovendale.

Fig. 9.

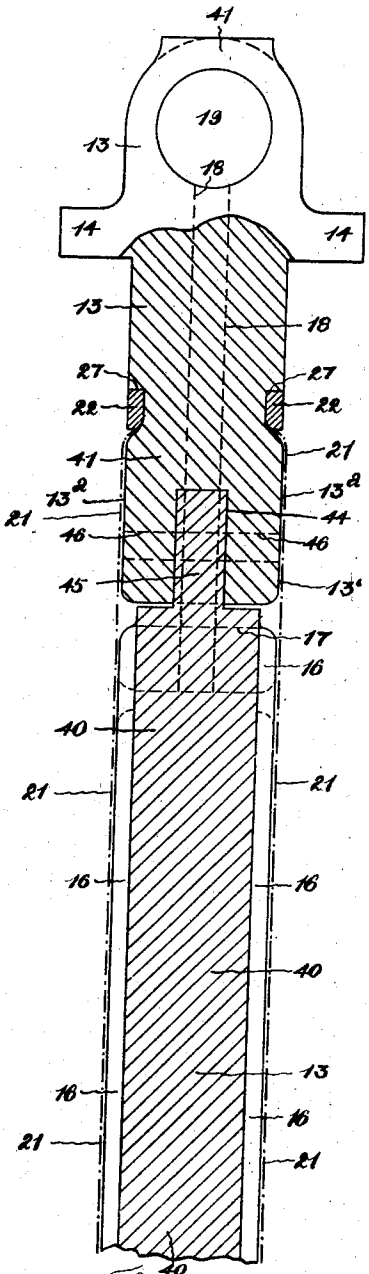


Fig. 10.

Inventor:
Alfred Edwin Davis
by Chas. Ovendale.
His Attorney

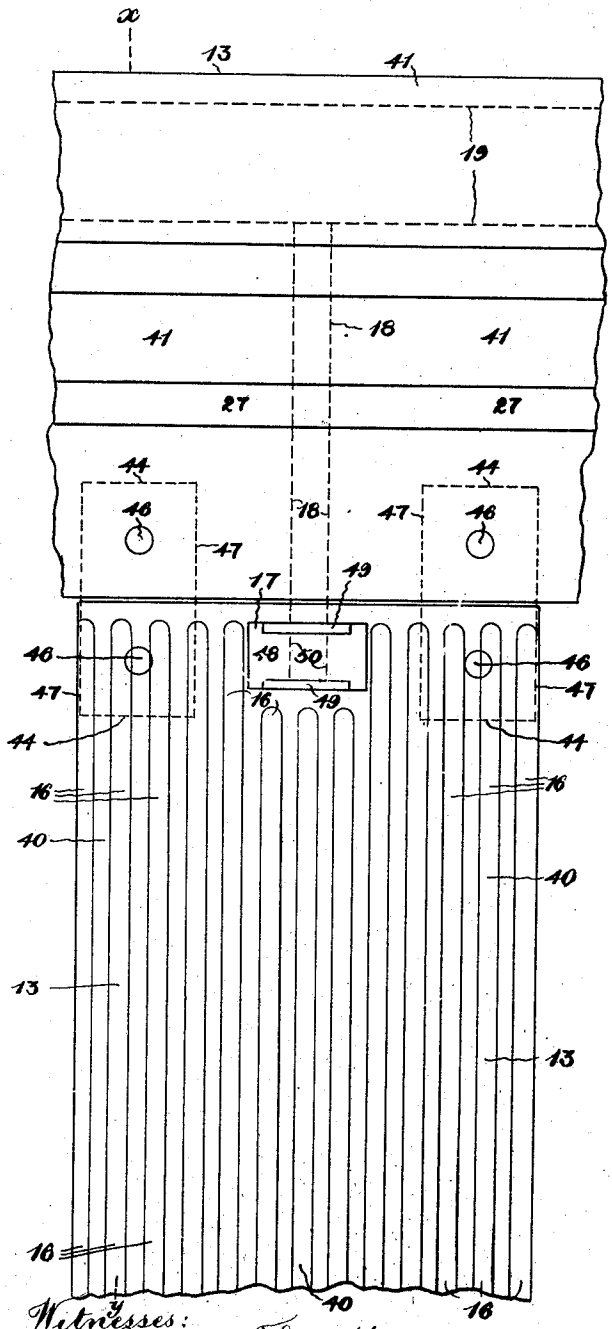
No. 859,749. PATENTED JULY 9, 1907.

A. E. DAVIS.

PRESSURE FILTER.

APPLICATION FILED JUNE 27, 1905.

8 SHEETS—SHEET 6.



Witnesses:
F. Chendale.

Fig. 11.

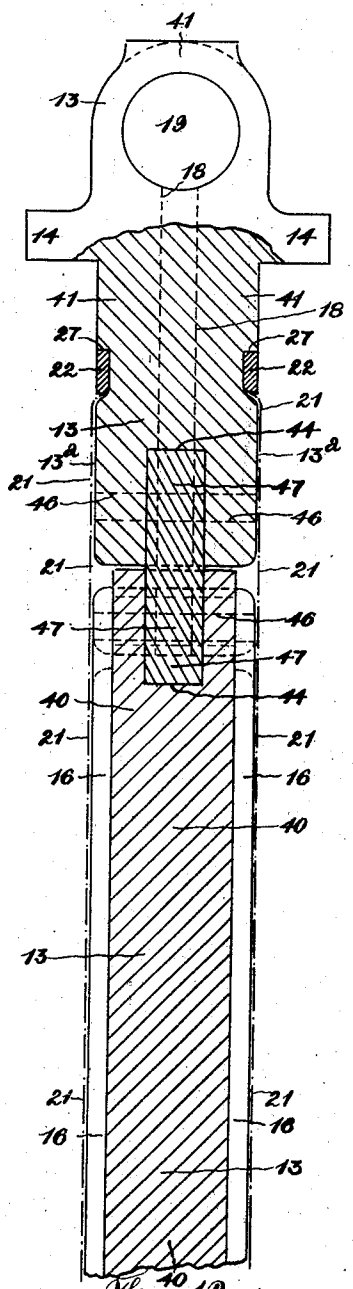


Fig. 12.

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No. 859,749. PATENTED JULY 9, 1907.

A. E. DAVIS.

PRESSURE FILTER.

APPLICATION FILED JUNE 27, 1905.

8 SHEETS—SHEET 7.

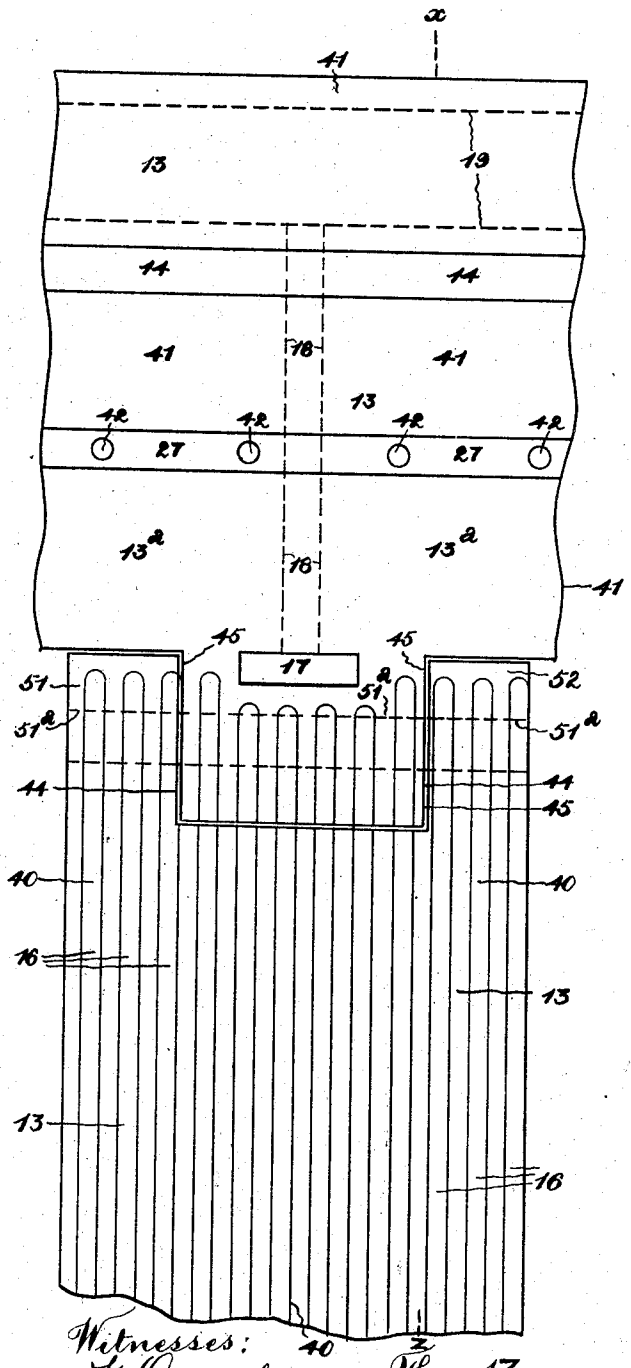


Fig. 13.

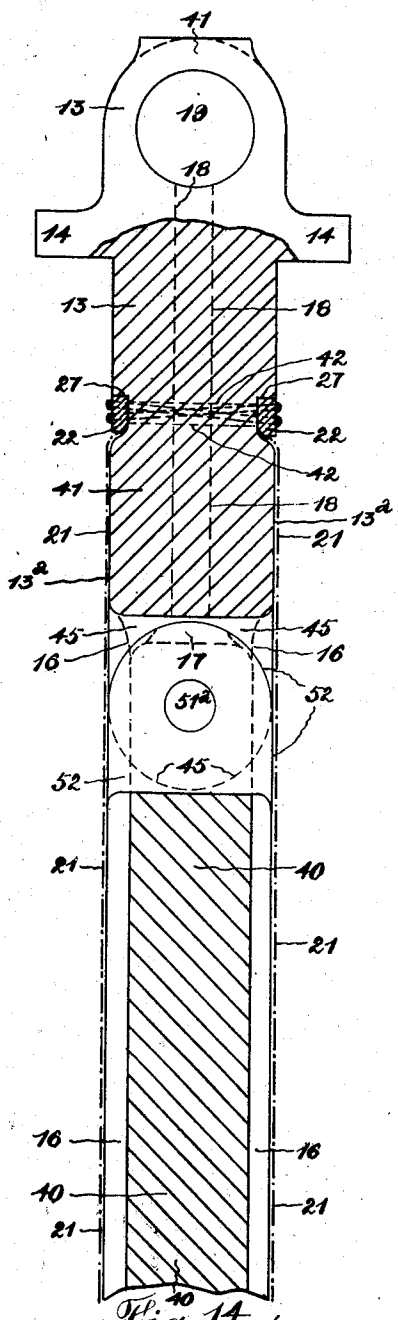


Fig. 14.

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Alfred Edwin Davis
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His Attorney.

No. 859,749. PATENTED JULY 9, 1907.

A. E. DAVIS.

PRESSURE FILTER.

APPLICATION FILED JUNE 27, 1905.

8 SHEETS—SHEET 8.

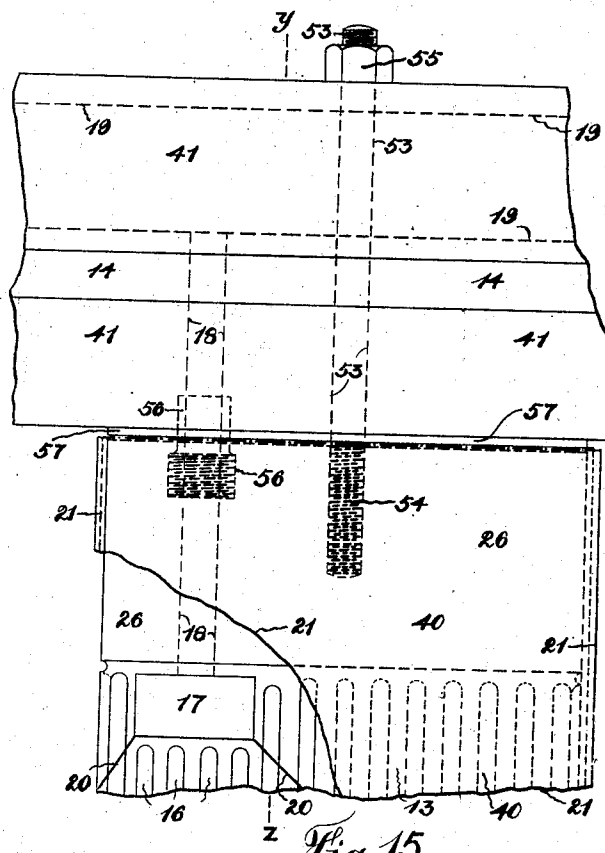


Fig. 15.

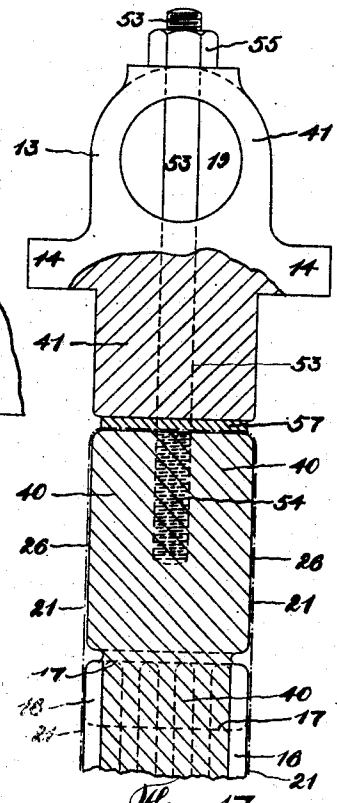


Fig. 17.

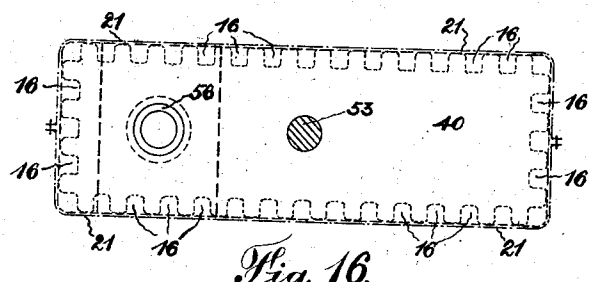


Fig. 16.

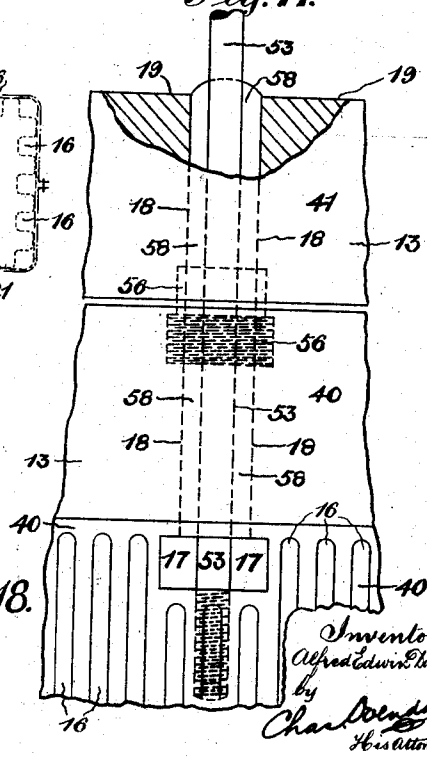


Fig. 18.

As Witnesses:

F. Orendale.

R. Orendale.

Inventor:
Alfred Edwin Davis
by
Chas. Orendale
His Attorney

UNITED STATES PATENT OFFICE.

ALFRED EDWIN DAVIS, OF JOHANNESBURG, TRANSVAAL.

PRESSURE-FILTER.

No. 859,749. Specification of Letters Patent. Patented July 9, 1907.

Application filed June 27, 1905. Serial No. 267,182.

To all whom it may concern:

Be it known that I, ALFRED EDWIN DAVIS, a subject of the King of Great Britain, residing at Johannesburg, in the Colony of the Transvaal, have invented certain new and useful Improvements in Pressure-Filters, of which the following is a specification.

This invention has reference to pressure filters or apparatus employed in the process of treating auriferous or other metalliferous ores for the recovery of the precious or other metals for filtering or separating the liquids from the solids such as slimes and the like.

The invention has particular reference to that form of pressure filter in which a series or number of vertically disposed filter-plates are arranged inside a receptacle into which the slimes or other material to be filtered, is passed the separation or filtration of the solid matter being effected by the deposition of the particles of solid matter on the superfices of cloth or other filtering media covering the surfaces of said plates, the separated liquid flowing along grooves or flutes in the surfaces of the plates to a common outlet or delivery.

As heretofore constructed considerable difficulty has been experienced in discharging the pressure filters, that is to say it has been found difficult if not impossible to detach the deposited solid matter or cakes of slime which form on the outer surfaces of the filtering media owing to the adhesion of the solid matter to the edges of the plates and the adjacent surfaces of the receptacle in which said plates are arranged. The displacement of the solid matter from the surface of the filtering media has been effected by causing a flow of liquid between the plates and said filtering media and the deposited matter or cake of slime formed thereon, in the reverse direction to that in which the apparatus operates in the process of filtration or separation of the liquids (cyanid or other solvent solutions of the gold or other metal, wash waters or the like) but owing to the adhesion of the solid matter or cake of slime to certain portions of the plates and top and sides of the receptacle in which said plates are arranged, said solid matter has not been easily detached and its removal in the manner proposed has not been practicable.

The invention relates also to the construction of the receptacle in which the filter-plates are arranged, to facilitate the discharge of the separated solid matter and to allow of said discharging being effected without necessitating the removal of the filter plates or disturbing the filtering material surrounding said plates so that all that is necessary in the operation of discharging the filter is the removal or opening of a bottom discharge door and the passage through the filtering media of a suitable fluid, either liquid or gaseous, in the reverse direction to that of the filtering flow.

The invention further relates to the method of construction of the filter plates and to the means for attaching or securing thereto the filtering media so that the operation of attaching the same and arranging same inside the receptacle is performed more expeditiously than with the present arrangements.

My invention further contemplates other structural alterations in the details of the machine as will be hereinafter more particularly described.

In order to facilitate the description of the present invention I append drawings illustrative thereof which are marked with letters of reference corresponding to the following description.

In the drawings: Figure 1 represents a view of the complete filter showing the filter plates in vertical transverse section. Fig. 2 is a view of the complete filter showing the receptacle in section and one of the plates in side elevation with the filtering media removed, or representing a section on line x—x Fig. 1. Fig. 3 represents a side elevation of a slightly modified form of filter plate with the filtering media removed. Fig. 4 is a horizontal section taken through a portion of one of the filter plates as at present constructed showing the manner in which the solid matter or cake of slime is deposited on the surface of the filtering media and how it adheres to the sides and top of the receptacle. Fig. 4^a is a horizontal section on line x^1—x^1 of one side of the filter plate shown in Fig. 2. Fig. 5 shows a horizontal section of a portion of one of the filter plates with my improvement applied thereto for preventing the solid matter being deposited on the sides of the receptacle. Fig. 6 shows a vertical section of a portion of one of the filter plates with my improvement applied thereto for preventing the deposition of the solid matter on the top or cover of the receptacle. Fig. 7 is an elevation with portion of the filtering media removed, of one of the filter plates detached showing a modified construction of the plate and means of attaching the filtering media thereto. Fig. 8 is a horizontal section on line y—y Fig. 7. Fig. 9 is a side elevation illustrative of one arrangement for securing the lower portion of the filter-plate to the upper portion and also one arrangement for fixing the filtering media over the surface of said plate. Fig. 10 is a transverse section on line z—z Fig. 9. Fig. 11 is a side elevation illustrative of a slightly modified arrangement for securing the lower portion of the filter plate to the upper portion. Fig. 12 is a transverse section on line x—y Fig. 11. Fig. 13 is a side elevation showing a further modification of the arrangement for securing the lower portion of the filter plate to the upper portion. Fig. 14 is a transverse section on line x—z Fig. 13. Fig. 15 is a side elevation of a portion of one of the filter plates with part of the filtering media removed showing a further means for fixing the lower portion to the upper portion of the filter plate. Fig. 16 is a plan of the lower portion

of the plate shown in Fig. 15. Fig. 17 is a transverse section on line y—z Fig. 15, and Fig. 18 is a front elevation of a portion of one of the filter plates showing a further modification of the means for fixing the lower portion of the plate to the upper portion.

In the several figures of the drawings the same or corresponding parts are indicated by the same letters of reference.

The general arrangement of the apparatus is shown more particularly in Figs. 1 and 2 of the drawings, it comprises the filter proper or the receptacle 1 consisting of the four side plates 2 and the top and bottom plates 3 and 4. The top plate or cover 3 may be bolted or otherwise secured to the sides 2 of the filter 1. The bottom plate or door 4 is hinged along one edge 4^a (see Fig. 2) to one side of the receptacle or filter 1 and it is maintained in its closed position by means of two or more swing bolts 5 which at their upper ends are free to move on pins 6 fitted between the strengthening ribs or webs 7 formed on the outside of the side plates 2. The bottom 4 is constructed with open ended slots 8 in which the supporting swing bolts 5 are located when the filter is closed. On the ends of the bolts 5 beneath the slots 8 are arranged a washer 9 and nut 10, which serve for closing the bottom 4 against the lower edges of the sides 2. The bottom 4 is also constructed with the strengthening ribs or webs 11 similar to the side plates 2.

In the top plate or cover 3 of the filter 1 are formed a number of parallel slots 12 which serve for supporting the filter plates inside the receptacle 1. The filter plates 13 are as seen in Fig. 1, constructed with longitudinal projections or ribs 14 forming shoulders in their upper portions which rest along the edges of the slots 12 in the top plate 3. The filter plates 13 are secured to the top plate 3 by means of bolts 15 which pass through the upper portions, at or in proximity to either end as seen in Fig. 2.

The filter plates 13 (see Fig. 2) are constructed on both sides with parallel and vertical grooves 16. In the top of the plate 13 holes 17 are formed at suitable distances apart which holes 17 communicate with vertical ports 18 in communication with the main port 19 formed in the upper portion of the filter plates 13. The holes 17 are placed in communication with the whole series of grooves 16 by means of the inclined grooves 20 so that any liquid flowing along the grooves 16 is conducted to the holes 17 and port 18 to the main port 19. The several filter plates 13, as shown in Fig. 1, are made taper from the top to the bottom, although they may if preferred be made parallel. Over the grooved surfaces of the plates 13 a filtering medium 21 of cloth or other suitable fabric or material is stretched. The filtering cloth 21 or other media may be secured over the surfaces of the plates 13 by means of the fixing strips or laths 22 located round the edges of the plates 13, and in any desired intermediate position, and fixed to the plates by means of screws or the like 23, as shown in Fig. 2.

With the object of preventing the settlement or deposition of the solid matter on any portion of the filter plate 13 adjacent to the sides or top of the filter, the sides or top of the filter plates may be made with a non-filtering strip or ungrooved portion 26. In Fig. 4 a horizontal section of a portion of a filter plate 13 as at present constructed is shown. In this case the grooves 16 along which the separated liquid flows to the exterior of the filter, are formed over practically the entire surface of the plate 13. At one edge 24 of the plate 13 I illustrate the form more or less that the deposited matter or cake of slime or other solid matter 25 assumes in the working of the press. In Fig. 4 it will be noticed that the solid matter is deposited and accumulates on the fixing strips 22 over the filtering media 21 and round the edge of the plate 13. When the edges of the plates 13 are adjacent to the sides 2 or top 3 of the press 1 the solid matter is deposited on the sides and top of the filter as is indicated at 24 in Fig. 4, the adhesion of which solid matter, as previously explained, impedes the discharging of the filter 1 and interferes with its proper working.

In Fig. 2 the filter plates 13 are shown constructed with the non-filtering strip 26 along the top or adjacent to the cover or top plate 3. In this case the vertical edges or sides of the plate 13 are removed sufficiently far from the sides 2 of the press to prevent the solid matter being deposited thereupon in the working of the apparatus, as seen more particularly in Fig. 4^a.

In Fig. 6 I illustrate the non-filtering strip 26 formed on the upper edge of the plate 13. 3 represents the top plate or cover, 13 the filter plate formed with the filtering grooves 16 over which is arranged the filtering media 21 secured by the fixing strips 22, and 25 represents the cake of slime or other deposited matter as it is found to form over the non-filtering strip 26.

In Figs. 3 and 5 I illustrate the application of this feature of my invention to the sides of the filtering plate 13 as well as to the top. Fig. 5 is a horizontal section of one side of the plate 13 showing the non-filtering strip 26 beyond the grooves or corrugations 16. In Fig. 3 the plate 13 is (as in Fig. 2) formed with the vertical grooves or corrugations 16 and with the inclined grooves 20 at the top placing the vertical grooves 16 in communication with the holes 17, the latter communicating with the ports 18 leading to the main port 19 in the upper portion of the plate 13. 15^a are the bolt holes for fixing the plate 13 to the top or cover 3. It will be noticed that the non-filtering strip 26 is in each case also covered by the filtering media 21 and that the fixing strips or laths 22 are arranged along the outer edge of said non-filtering strip or strips 26.

The filter plates 13 as shown at 27 in Figs. 1 and 6, are preferably formed with grooves for the reception of the fixing strips 22 in order the more effectually to prevent the passage of any of the solid matter between the filtering media 21 and the plate 13. The main ports 19 in the upper portions of the several filter plates 13 are placed in communication with the outflow or delivery pipe 28 for the separated water or other liquid, by means of small branch pipes 29 (see Fig. 2). The delivery pipe 28 is in Fig. 1 shown fitted with a blank flange or cover 30 at one end. The delivery pipe 28 between the filter 1 and the point of discharge is fitted with a valve 31 for regulating or controlling the outflow. For the purpose of obtaining the reverse flow I provide a tank or other receptacle 32 for water or other fluid which may be either in a gaseous or liquid form, which tank 32 is placed in communication with the delivery pipe 28 by means of

the pipe 33. In the pipe 33 is fitted a valve 34 for closing or opening the tank 32 to the delivery pipe 28 between the valve 31 and the filter 1. This valve 34 serves for regulating the flow of the water from the tank 32 to the delivery pipe 28, branch pipes 29, main ports 19, ports or passages 18, and between the grooves or corrugations 16 in the filter plates 13 and the filtering media 21.

At or in proximity to the filter 1 is arranged the inlet or admission pipe 35, through or along which the slimes or mixture of liquids and solids flows to the interior of the filter 1. This admission pipe 35 is placed in communication with the interior of the filter 1 by means of the small branch pipes 36 (see Fig. 2) which pipes 36 pass through the side and preferably communicate with the interior of the filter 1, midway between the filter plates 13 at the bottom so as to obtain a better distribution of the mixture inside the filter 1. The admission pipe 35 is fitted at either end with a valve 36^a, 37, the one 36^a for regulating or controlling the admission of the mixture of liquids and solids and the other 37 for admitting water or other liquid for a purpose to be hereinafter more fully explained. A draining pipe 38 which communicates with the admission pipe 35 between the filter 1 and the valve 36^a is provided for draining off any of the liquid or mixture that may be contained in the filter before the separated solid matter is discharged. This draining pipe 38 is also fitted with a valve 39 for closing it to the interior of the filter 1.

In Figs. 7 and 8 illustrating a modified construction of the filter plate and an alternative means for fixing the filtering media 21 on the surface thereof, the plate 13, as in the construction previously described, is constructed in its upper portion with the main outlet port 19 in communication with the holes 17, which latter holes 17 are placed in communication with the vertical grooves 16 by means of the inclined grooves 20. The plate is also shown provided with the bolt holes 15^a for fixing it to the cover 3 of the filter 1. In the construction illustrated in these figures the plate 13 is made in the form of a number of vertical sections 40 joined at the top by the non-filtering strip 26, and in its upper portion above the non-filtering strip 26 it is formed at either side with a horizontal groove 27. Through the plate 13 between the grooves 27 are formed a number of holes 42. The filter cloth 21 or other filtering media is drawn up over the several sections 40 of the plate 13 having been previously laced or sewed along the outside and bottom edges and also up between the several sections or parts 40 of the plate 13 as is clearly indicated at 43 in Fig. 8. It is then secured at the top by lacing it through the holes 42 and flexible fixing strip 22 as shown more particularly in Fig. 14. Instead of lacing the cloth 21 at the top it may be secured by means of the fixing strip 22 in the manner previously explained.

In Figs. 9 and 10 illustrating one modification of the construction of the filter plate 13 adapted to simplify the manufacture of the same, the plate 13 is constructed in sections 40, the upper part 41 being constructed with the shoulders 14 for resting on the top of the cover 3 at either side of the slots 12, and with the main port 19 and port or passage 18. A portion 13^a of the plate is not grooved while the filtering media 21 covers it for a portion of its width, said covered portion forming the non-filtering strip 26 on the plate. 22 are the fixing strips located in the grooves 27 for securing the filtering media 21 to the plate 13. The upper portion 41 of the plate along its bottom edge is formed with recesses 44. The other and lower part 40 of the plate (which may form the whole or one section of the grooved portion of the plate) which is formed with the filtering grooves 16 and with the holes 17 through which the separated liquid passes from the filtering grooves 16 to the main port 19, is constructed with lugs 45 which fit into the recesses 44 formed in the underside of the top portion 41 of the plate 13, which lugs 45 are secured therein by means of pins, bolts or the like passed through holes 46 formed in the top portion of the plate and through the lugs 45, thus attaching the two parts of the plate. The hole 17 to which the filtered liquid passes from the grooves 16, is placed in communication with the port or passage 19 by means of the hole or port 18 formed in the top of the part 41.

In the modification illustrated in Figs. 11 and 12, the filter plate 13 is constructed in sections 40, similar to the last described construction. Instead of forming the lugs 45 on the lower portion 40, the lower portion is attached to the upper portion 41 by means of flat tongues 47 which fit into recesses 44 formed in the under side of the top portion and in the top edge of the lower portion 40 as shown, the sections 40 forming the lower portion of the plate being connected to the upper portion 41 by means of pins, bolts or their equivalent passed through the holes 46 in the upper and lower portions of the plate, which pins or bolts pass through coincident holes in the tongues 47. In the construction shown in Fig. 11 the hole 17 to which the separated liquid passes from the grooves 16 is fitted with a plug 48 formed with grooves 49 at the top and bottom, said grooves 49 being placed in communication by means of the vertical hole 50.

In the further modification shown in Figs. 13 and 14, the top portion 41 of the plate is again made separate from the several sections 40 forming the lower or grooved portion of the plate. It is also provided with the main port 19 and the port or passage 18 communicating with the hole 17 and with the grooves 27 formed with the holes 42 for lacing or otherwise securing the preferably flexible retaining strips 22 for fixing the filtering media 21. In this construction the top portion 41 is formed with projections or lugs 45 while the lower portion 40 forming one section of the grooved portion of the plate is formed with a recess 44 or two side projections 51, 52, between which the lug 45 on the upper portion 41 of the plate 13 fits, the section 40 of the plate being hinged to the upper portion 41 by means of a pin or bolt passed through holes 51^a in the projections or lugs 51, 52, on the upper portion of the grooved section 40 and the projection 45 on the upper portion 41 of the plate. This construction insures that the plates will always hang in a truly vertical plane.

In the construction illustrated in Figs. 15, 16, and 17, which is also designed for use when the grooved or filtering portion of the plate 13 is made in sections 40, the top portion 41 is made separate from the bottom portion or portions 40 and fixed thereto by means of the bolts 53 which pass vertically through the top portion 41 and are screwed into the top edge of the bottom por-

tions or sections 40, as shown at 54. A nut 55 screwed on the outer extremity of the bolt 53 above the top portion 41 of the plate 13 serves for connecting the section 40 to the top portion 41. One or more bolts may be used for each section 40 of the plate 13. As shown the sections 40 are constructed with the non-filtering strips 26 across the top, and the grooved portion 40 as also the non-filtering portion, is also covered by the filtering media 21, which may be sewed or otherwise secured thereon. As shown in the plan view Fig. 16, the sections 40 are constructed with the grooves 16, at the ends. The hole 17 in the grooved portion of the plate 13, which is placed in communication with the grooves 16 by the angular grooves 20 as previously described, is placed in communication with the port 19 in the upper portion 41 of the plate 13 by means of the port or passage 18 in a similar manner to that previously described. Round that portion of the port 18 formed in the top of the part 40 of the plate, is screwed a ferrule or nipple 56. This nipple 56 projects for a suitable distance above the top of the part 40 and that portion projecting above the top of the part 40 is turned to a smooth surface. The portion of the ferrule or nipple 56 above the plate 40 fits closely into the outer end of the hole 18 in the top part 41 of the plate. A piece of insertion 57 of any suitable material is placed between the top of the part 40 and the bottom of the part 41, to make a tight joint when the bolt 53 is screwed up, and packing rings are placed round the projecting nipple 56 and the bolt 53, for the same purpose. By this construction any section 40 of the filtering plate 13 can be easily removed and replaced or renewed without necessitating the removal of the whole of the plate.

In Fig. 18 illustrating a slight modification of the arrangement shown in Figs. 15 to 17, the bolt 53 which serves for fixing the sections or parts 40 of the plate 13 to the top part 41, is located in the port or hole 18 which places the hole 17 in the top of the plates 40 in communication with the main port 19 in the top portion 41. In this construction the hole 18 is made of larger diameter. The bolt 53 projects down the hole 18 and is screwed into the part 40 of the plate in the bottom of the hole 17 as shown. It projects up through the top part 41 and may be secured by means of the nut 55 as shown in Figs. 15 and 17. An annular space 58 is formed by the hole 18 round the bolt 53 which serves for connecting the hole 17 with the port 19. The nipple 56 is screwed round the hole 18 in the top edge of the plate 40 and projects into the bottom end of the hole 18 in the top part 41 of the plate. The piece of insertion and packing ring are inserted between the parts 40 and 41 and round the nipple 56 as in the arrangement last described.

In the operation of the apparatus the valves 34, 37 and 39 are closed to the filter 1, and the valves 31 and 36[a] opened to the filter as shown in Figs. 1 and 2. The slimes or mixture of solids and liquids is then pumped or otherwise forced under pressure along pipe 35 and branch pipes 36 into the filter 1. The liquid portion of the mixture then passes through the interstices of the filtering media 21 and along the grooves 16 and inclined grooves 20 to the hole 17 and from the latter along the port 18 to the main port 19, thence through branch pipes 29 to the delivery pipe 28 and through the valve 31. This is continued until the cakes of slime or other solid matter are fully formed on the surfaces of the filtering media 21, that is to say until the interior of the filter is practically full of the solid matter. As by my improved construction the cakes of slime or solid matter deposited on the surfaces of the filter plates 13 do not come into contact with the top 3 and sides 2 of the filter 1, it will be understood that when the cakes are fully formed and required to be discharged, a quantity of the mixture of slime and water or other mixture of solids and liquids will be contained in the space in the filter adjacent to the top 3 and sides 2, not occupied by the cakes of slime or deposited solid matter. After closing the valve 36[a] on the inlet pipe 35 and opening the valve 39 on the drain pipe 38 the slime and water or solution or mixture of solids and liquids contained in the space aforementioned is drained off by the pipe 38, and the valve 39 then closed. If desired clean water or a weak cyanid or other solvent solution may be passed through the filter for displacing any solution that may remain or be contained in the cakes of slime deposited on the surfaces of the filter plates 13. In this event the mixture remaining in the box when the valve 36[a] is closed to shut off the supply need not be first drained off. For this purpose the valve 37 on the opposite end of the inlet pipe 35 is provided. This valve 37 is then opened, the valve 31 on the delivery pipe 28 still remaining open, and the clean water or weak solution is then pumped or otherwise forced through the valve 37, inlet pipe 35 and branch pipes 36 into the filter and through the cakes of slime and grooves 16, 20, hole 17, and ports 18, 19, and pipes 29 to the delivery pipe 28 and through the valve 31. When this operation has been performed for a sufficient length of time to displace or wash out the solvent solution in the cakes, the valve 37 is closed. The valve 39 is then opened to draw off the wash water or weak solution remaining in the space at the top 3 and sides 2 of the filter 1, and the valve 39 thereupon closed. It will be evident that instead of having only the one valve 37 several such valves may be provided and arranged so that each admits a solution of different strength, or several wash waters if such be found necessary for the complete treatment of the slime or other material. In such a case the several valves may be attached to the filter in a similar manner to that described in connection with the valve 37. After draining away the water wash from the filter, the nuts 10 on the bolts 5 are loosened and the bolts 5 swung out of the slots 8 in the bottom 4, thereby allowing the bottom 4 to swing on the hinged edge 4[a]. The valve 31 on the delivery pipe 28 having been closed and the valve 34 on the pipe 33 communicating with the tank 32 opened allows the water from the tank 32 to flow through the filter in the reverse direction to that of the filtering flow, or along the pipe 28, through the branch pipes 29, ports 19, 18 and holes 17 to the grooves 20 and from the latter to the grooves 16 on the inside of the filtering media 21 or between the filtering media 21 and the surface of the plates 13. This displaces the solid matter sufficiently to allow a film of water to pass between the solid matter or cake of slime and the filtering media 21, whereupon the cakes of slime or solid matter fall out of the box 1. This is the complete cycle of operations and it is repeated each time the filter is filled and discharged.

What I claim as my invention and desire to protect by Letters Patent is:—

1. In apparatus of the nature indicated, the combination of the filter or receptacle constructed with a bottom door, a plurality of filter plates suspended in said receptacle, each of said filter plates communicating with a common discharge or outlet pipe for the filtered liquid, a valve for closing said common outlet, a branch pipe communicating with the outlet pipe between the plates and valve and a valve located in said branch pipe, said branch pipe communicating with a source of supply of fluid under pressure for passing through the filtering media a fluid in the reverse direction to the filtering flow, substantially as described.

2. In apparatus of the nature indicated, the combination of the filter or receptacle constructed with a bottom door, a plurality of filter plates suspended from the top of said receptacle, each of said filter plates communicating with a common discharge or outlet pipe for the filtered liquid, an inlet pipe for introducing into the receptacle the mixture to be separated, a valve on said inlet pipe for shutting off the supply and another valve for opening said pipe to a source of supply of water or solution for washing the strong solution out of the cakes of solid matter deposited on the filter plates, substantially as described.

3. In apparatus of the nature indicated, in combination the filter or receptacle fitted with a hinged bottom discharge door, a plurality of grooved plates covered with a filtering material said plates being constructed with ports or passages placing them in communication with a common outlet pipe for the separated liquid, a valve on said outlet pipe a branch pipe communicating with said outlet pipe between the filter and valve, a valve fitted in said pipe through which a quantity of a fluid can be admitted to the filter in the reverse direction to that of the filtering flow for removing the solid matter from the surface of the filtering material, a feed pipe for introducing the mixture into the receptacle, and branch pipes between said feed pipe and the receptacle communicating with the latter at the bottom between the filter plates, a valve on said feed pipe for shutting off the supply, a drain pipe communicating with the feed pipe between the filter and valve, said drain pipe being fitted with a valve for drawing off any of the mixture that remains in the filter after the supply valve is closed and another valve fitted on the feed pipe for admitting a water wash or solution to pass through the cakes of the solid matter on the surfaces of the filtering material to wash out the strong solution, substantially as described.

4. In apparatus of the nature indicated a filter plate provided with a plain or non-filtering strip across the top for preventing the solid matter deposited on the filtering material adhering to the top of the receptacle substantially as described.

5. In apparatus of the nature indicated a receptacle, a filter plate constructed with a non filtering strip at the top said plate being arranged inside the receptacle so that a space is left between the sides of the receptacle and the edges of the filter plate to prevent the deposition of the solid matter on the top and sides of said receptacle, substantially as described.

6. In apparatus of the nature indicated, a receptacle, a filter plate constructed with a non-filtering strip across the top and along the sides or vertical edges of the plate, to prevent deposition of solid matter on the top and sides of said receptacle, substantially as described.

7. In apparatus of the nature indicated, a filter plate constructed with vertical filtering grooves and a plain or ungrooved strip at the top of said grooves, a filtering material secured over the filtering grooves and extending over the plain or ungrooved portion, substantially as described.

8. In apparatus of the nature indicated, a filter plate constructed with vertical filtering grooves and a plain or ungrooved strip at the top and at the sides of said grooves, a filtering material secured over the filtering grooves and extending over the plain or ungrooved portions of the plate at the top and sides, substantially as described.

9. In apparatus of the nature indicated, the combination with the filter or receptacle provided with a bottom discharge door, of a plurality of filter plates suspended from the top of said receptacle in such manner that the discharging of said receptacle may be effected through the bottom without necessitating the removal of the filter plates, said filter plates being so constructed that the solid matter deposited on their surfaces is prevented from adhering to the inside of the receptacle around said plates, substantially as described.

10. In apparatus of the nature indicated, the combination with the receptacle fitted with the bottom discharge door, filter plates arranged and secured in said receptacle in such a manner that the discharging of said receptacle can be effected through the bottom without necessitating the removal of the filter plates, said filter plates being so constructed that the solid matter deposited on their surfaces is prevented from adhering to the inside of the receptacle around said plates, and means for passing through the filtering media a fluid in the reverse direction to that of the filtering flow, substantially as and for the purposes described.

11. In apparatus of the nature indicated, the combination with the receptacle fitted with the bottom discharge door of a plurality of filter plates constructed and arranged in said receptacle in such a manner that the discharge may be effected without necessitating the removal of said filter plates, said filter plates being so constructed and arranged that the solid matter deposited on their surfaces is prevented from adhering to the inside of the receptacle around the edges of the plates, means for draining off any of the mixture remaining in the press after the cakes are formed, means for passing through the filtering media and cakes of solid matter deposited thereon, a water wash or weak solution, and means for passing through the filtering media a fluid in the reverse direction to that of the filtering flow to detach the solid matter, substantially as described.

12. In apparatus of the nature indicated, a filter plate constructed with filtering grooves and a plain or ungrooved portion across the top and along the sides of said plate, grooves or recesses formed in the plate beyond the plain or ungrooved portion and fixing strips for securing the filtering material over the grooved and ungrooved portions of said plates, substantially as described.

13. In apparatus of the nature indicated, a filter plate constructed of a number of vertical grooved sections joined across the top by a plain or ungrooved portion, a covering of filtering material covering the several sections of the filter plate and joined at the sides, between the sections and along the bottom, grooves in the sides of the plate above the plain non-filtering strip and fixing strips in said grooves for securing the filtering material on the surfaces of the several sections of the plate, substantially as described.

14. In apparatus of the nature indicated, a filter plate constructed of a number of vertical grooved sections joined across the top by a plain or ungrooved part, a covering of filtering material for the several sections of the plate said material being joined at the sides, between the sections and along the bottom, grooves in the sides of the plate above the non-filtering strips, holes through the plate placing the grooves in communication, flexible fixing strips in said grooves and means threaded through the holes in the grooves for fixing the strips and filtering material to the top of the plate, substantially as described.

15. In apparatus of the nature indicated, a filter plate having filtering grooves therein and comprising an upper portion and a lower portion, said parts being connected by means of bolts screwed into the lower portion and projecting through a hole in the upper portion, the upper portion being constructed with a main outlet port 19, the lower portion provided with a hole 17 to which the separated liquid passes from the filtering grooves, and the upper and lower portions with coincident ports 18 placing said hole 17 in the lower portion in communication with the main outlet port 19 in the upper portion, a nipple

screwed into said port in the one part and projecting into the coincident port in the other part, and packing located in the junction between the two parts of the plate for forming a tight joint round the bolt and nipple, substantially as described.

16. In apparatus of the nature indicated a filter plate having filtering grooves therein and comprising an upper and lower portion, the upper portion formed with a main outlet port and the lower portion with a hole in communication with the filtering grooves and the two parts with coincident ports placing the hole in the lower portion in communication with the main port in the upper portion, a bolt passing through the upper portion down the coincident ports and screwed into the lower portion at the bottom of the hole an annular space round the bolt placing the hole in communication with the main port, and a nipple screwed into the port in the one part and projecting into the coincident port in the other part and packing round said nipple between the upper and lower parts of the plate, substantially as described.

In witness whereof I have hereunto set my hand in the presence of two subscribing witnesses.

ALFRED EDWIN DAVIS.

Witnesses:
CHAS. OVENDALE,
R. P. OVENDALE.