Jan. 15, 1952 E. A. CRESWICK ET AL 2,582,311

FILTER HOUSING

Filed Dec. 22, 1949 3 Sheets-Sheet 1

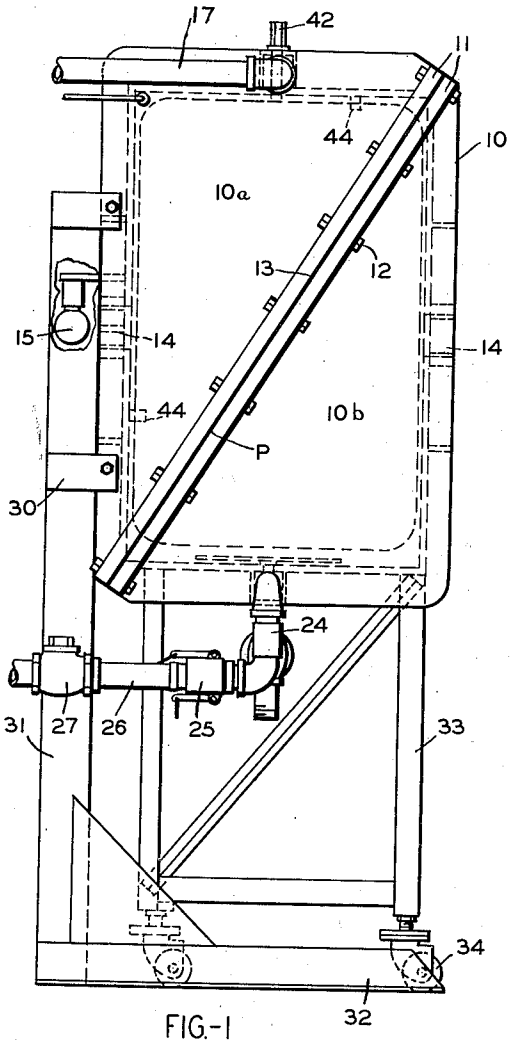


FIG.-1

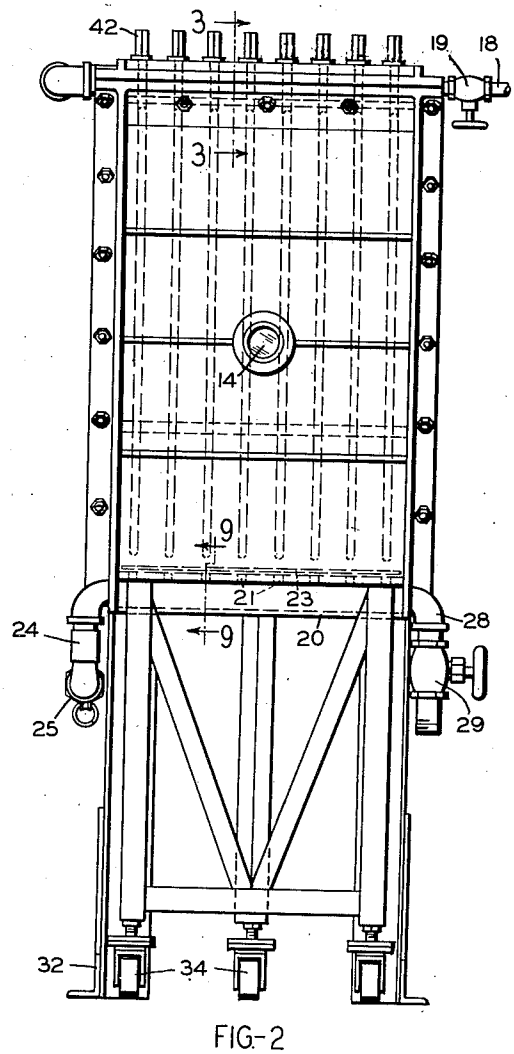


FIG.-2

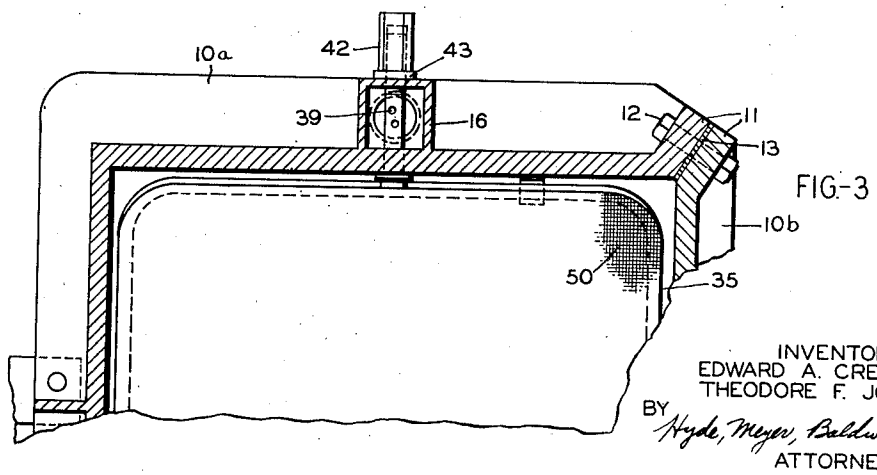


FIG.-3

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FILTER HOUSING

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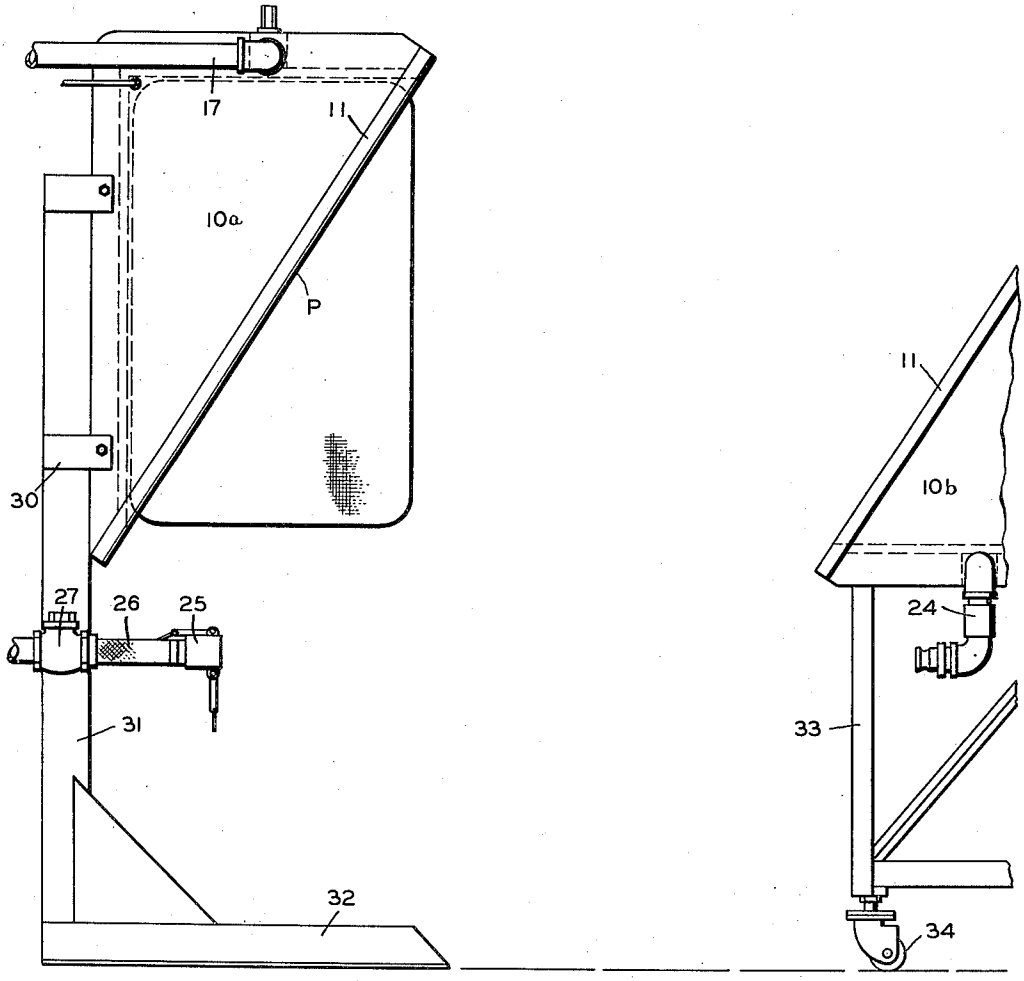


FIG.-4

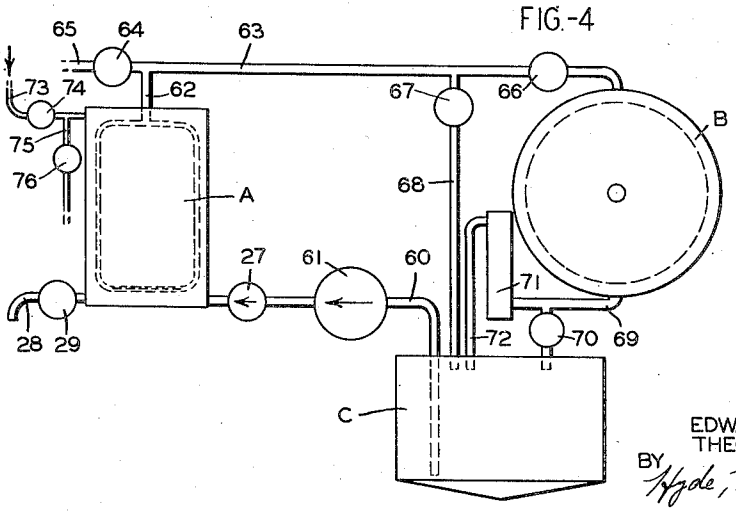


FIG.-5

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FILTER HOUSING

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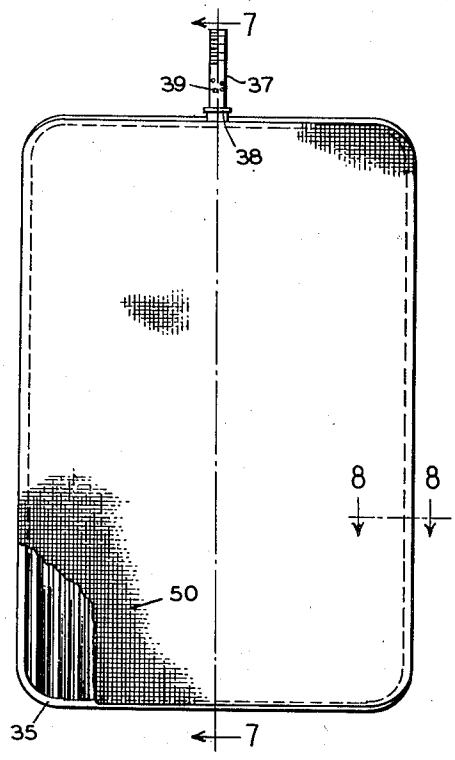


FIG.-6

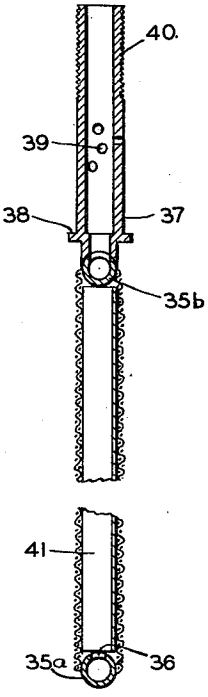


FIG.-7

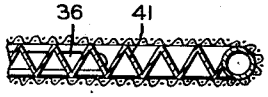


FIG.-8

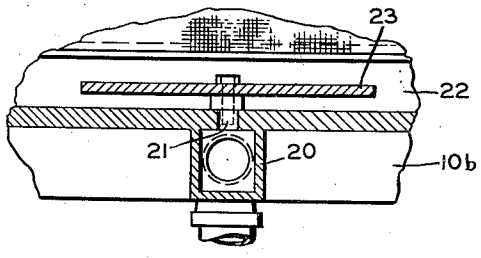


FIG.-9

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UNITED STATES PATENT OFFICE

2,582,311

FILTER HOUSING

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2 Claims. (Cl. 210—188)

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This invention relates to filters and more particularly to that type in which several flat filter bags or leaves are suspended within a tank or reservoir, to which the liquid to be filtered is supplied for flow through the pervious walls of the leaves and the filter-aid coating thereon to the spaces within the leaves and thence to an outlet.

One object of the invention is to simplify and improve generally the form and construction of the reservoir in which the filter leaves are mounted, enabling the reservoir to be opened and closed easily and in such manner as to provide full access to all leaves for cleaning, removal or like operations.

Still another object is to provide an improved filter reservoir divided into two parts joined along an inclined plane and capable of unusually convenient manipulation for both separating the two parts for leaf cleaning, repair or replacement, or for joining or assembling them for operation.

A further object of the invention is to provide a reservoir of the type characterized in the last preceding paragraph, and wherein the parting plane divides the reservoir into parts which are interchangeable, one for the other, so as to simplify fabrication problems and reduce the number of different stock items to be carried in the assembly of the reservoir.

A further object of the invention is to provide a reservoir of the type characterized in the last preceding paragraph, and wherein said reservoir may be opened by horizontal withdrawal of one part, preferably by rolling the supporting means along a floor or base.

Further objects of the invention in part are obvious and in part will appear more in detail hereinafter.

Referring to the drawings, which represent one suitable embodiment of the invention.

Fig. 1 is a side elevation, partly broken out to expose interior parts;

Fig. 2 is a front elevation;

Fig. 3 is a sectional elevation, on a larger scale, on the line 3—3, Fig. 2;

Fig. 4 is a side elevation, showing the two parts or halves of the reservoir separated from each other;

Fig. 5 is a diagram, illustrating a simple dry cleaning system in which the filter may be used;

Fig. 6 is a side elevation of one of the filter leaves, partly broken out;

Fig. 7 is a sectional elevation on the line 7—7, Fig. 6;

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Fig. 8 is a sectional plan view on the line 8—8, Fig. 6; and

Fig. 9 is a detail section on the line 9—9, Fig. 2.

The filter shown in the drawings includes a chambered casing or reservoir, marked generally 10, made in two parts or halves 10*a*, 10*b* which are generally alike. When assembled they form a generally six-sided rectangular hollow casing. The two parts are joined along an inclined parting plane, on either side of which each member of the reservoir is provided with a flange 11 through which securing bolts 12 are passed to compress a gasket 13 between the flanges and thus seal the chamber of the casing against leakage. Each half of the casing thus includes two triangular side walls and a top and back or bottom and front wall, as the case may be.

The front and rear walls of the two members are provided with aligned small windows 14, opposite the rear one of which an electric lamp 15 is mounted. When this lamp is energized it is possible to look through the reservoir from front to rear and thus observe the condition of the liquid undergoing filtration to determine whether it is clear or cloudy.

The upper member 10*a* includes as a part of its casing, a rectangular hollow manifold 16, to one end of which an outlet pipe 17 is connected, for conduction of the filtered liquid either to a place of use, as in a dry cleaning system to the washer, or to a place of storage or the like. An auxiliary outlet 18, controlled by valve 19, may be used for feeding filtered solvent from the tank either to a still or to a slurry tank, such as for filter-aid (not shown).

The lower member 10*b* is provided with a generally similar manifold 20 from which a series of small openings 21, distributed along its length, provide communication to the chamber 22 within the reservoir. Above the row of openings 21 is mounted a plate 23, spaced above the bottom of the tank, and serving as a baffle to assist in widely distributing throughout the horizontal area of the tank the mixture of liquid and solid to be filtered.

One end of manifold 20 communicates by pipe 24 with a suitable quick detachable coupling 25, the opposite end of which is connected to pipe 26 which includes a check valve 27 seating toward the tank. The function of the check valve will be explained later in connection with the operation of the apparatus. A secondary connection 28 to the opposite end of the supply manifold is controlled by valve 29 and permits drain-

ing out from the reservoir any small quantity of liquid that might remain in the bottom of the tank and draining of which is desirable.

The two reservoir members described are so mounted as to be movable horizontally relative to each other for opening and closing the reservoir. Both members may be movable, but as shown, one is stationary and the other is movable. As illustrated the upper member 10*a* is stationary, being secured to brackets or supports 30 carried by a suitable frame 31 having a base 32 which rests upon the floor or any other suitable support.

The second member 10*b* of the casing is mounted upon a support 33 provided with wheels or casters 34.

When the two parts are assembled, as shown in Fig. 1, the wheels or casters 34 lie within the flanges of the angle members shown as forming the base 32. By removing the several bolts 12 which clamp the two parts of the casing together, and separating the parts of the coupling 25, the lower member 10*b* of the reservoir, together with its supporting frame 33 may be moved away from the upper member 10*a*, and its supporting frame 31, as shown in Fig. 4, thus exposing to view, for purposes of inspection, repair or replacement all of the filter leaves later to be described.

Within the chamber 22 of the casing are mounted a series of filter leaves, any number may be used, eight being shown in dotted lines in Fig. 2.

Referring to Figs. 6, 7 and 8, each filter leaf consists of a strong rigid frame, marked generally 35, made of a piece of tube of proper length bent into generally rectangular form, with the corners curved, the two ends of the pipe being suitably permanently joined, as by a fitting, or by brazing, soldering, welding or the like. The lower horizontal stretch of the tubing of the frame, marked 35*a* in Fig. 7, is provided along its upper wall with an elongated slot 36 (see Fig. 8).

The upper stretch of the tubular frame, marked 35*b* in Fig. 7 has connected thereto a tubular fitting 37, the passage in which communicates with that in the hollow frame 35. Said fitting is provided, near the frame, with a collar or shoulder 38, with a series of small ports or openings 39 intermediate its ends, while its extreme end portion is threaded, as at 40. The tubular frame described is covered with a suitable foraminous filtering material, such as fine mesh wire screen, indicated at 50. One layer thereof may be sufficient, but two or more layers of various degrees of fineness may be employed. This pervious sheet is firmly secured to the tubular frame in any suitable manner. For example, a single sheet having twice the area of the frame may be folded along its middle to provide two layers, one for each side of the frame, the edges of the sheet being welded, brazed or otherwise secured to the tubular frame along three edges on each side of the frame, or, two sheets of gauze may be provided, one for each side of the frame, with the four edges of the sheet welded to the four tubular stretches of the frame. Within the leaf, housed between the two layers of gauze and surrounded by the tubular frame, we mount a sheet 41 of corrugated metal which serves as a backing to mechanically support the screen against the pressure to which it is subjected and also serves to provide channels for flow of the liquid.

Each leaf is suspended from its support by the upper member 10*a* of the casing. Its hollow stem 37 is inserted into an opening in the upper casing wall so that it extends upwardly into and through the space within the manifold 16. Collar 38 abuts the inner surface of the upper wall of the casing. The leaf is held in place by screwing upon the threads 40 at the upper end of its stem a hollow cap or closed cover 42, which presses down against a gasket 43 and seals the joint against leakage.

The several leaves are held spaced apart and in parallel relation with each other by blocks 44 fastened to or forming part of the top and back walls of the upper member, as shown in Figs. 1 and 3.

When the filter leaves are assembled within the upper casing member and secured in place, as shown in Fig. 3, the openings 39 in the fitting 37 are within the chamber of manifold 16 and provide communication thereto.

Referring now to the diagram, Fig. 5, a filter of the form described is indicated diagrammatically at A, together with connections thereof to other elements forming a complete dry cleaning system. In that view B conventionally illustrates a washing machine of any suitable form or description and C a tank or reservoir for the cleaning liquid, such as a petroleum derivative, or one of the many volatile solvents, such as carbon tetrachloride, trichloroethylene, or the like, used for the purpose.

Tank C communicates by a pipe 60 with a pump 61 which discharges through the check valve 27 into the bottom of the chamber within the filter or, in other words, to the space surrounding the filter leaves suspended therein. The outlet manifold of the filter communicates by pipe 62 with a pipe 63. This communicates by valve 64 with a pipe 65 leading to storage or to any suitable place, and also communicates by valve 66 with the washer B and by valve 67 and pipe 68 with the storage tank C. The washer B is provided with a drain pipe 69 communicating by valve 70 with the storage tank, and also with a button trap 71 and overflow pipe 72 with the storage tank C.

73 indicates a conduit communicating with the source of compressed air, which may be supplied by way of valve 74 to the upper part of the chamber 22 within the filter, pipe 73 having a lateral branch 75 provided with a valve 76 for relieving air pressure within the chamber when desired.

The filter described is usually used with any suitable filter-aid, such as finely divided silica. A suitable amount thereof may be thrown into the open lower member 10*b* of the casing before the two casing members are secured together along the parting plane between them as before described. Such dry filter-aid then mixes with the liquid supplied to the system and coats the leaves in the usual manner. However, the filter-aid may be added to the liquid in slurry form and thus delivered to the filter with the liquid. Assuming the latter, to fill the filter, drain valve 29 is closed, air valve 74 is closed and valve 76 is opened. The solvent pump is started and the solvent enters the filter case at the bottom. Rising, it expels the air within the casing through valve 76 until the solvent has filled the casing, after which the solvent flows through pipe 75, showing that the filter is filled. The reason for this arrangement is that the filter leaf opening (the slot 36) is at the bottom and the entrapped air would prevent complete filling of the filter case with solvent.

Valve 76 is now closed and the solvent circulates, flowing through pipe 62 and 63 and

valve 66 to the washer and thence through pipe 69 and button trap 71 and pipe 72 to the storage tank, to be resupplied to the filter as the cleaning operation proceeds.

In starting the system, the filter-aid is supplied to the outside of the filter leaves and builds up the usual coating thereon. This coating collects solid particles carried by the liquid, so that the liquid which passes through the filter-aid and into the leaves is clear. Liquid entering the space within the leaves flows through the slots 36 and then up through the vertical stretches of the tubular frame 35, and by way of the fittings 37 to the outlet manifold.

At any time the washer may be cut out of the system by closing valve 66, and then by-pass line 68 may be connected into the circuit by opening valve 67, thus continuously circulating the solvent supply through the filter.

At the end of a day's run, or at any suitable intervals, when the filter-aid has collected enough foreign matter to require cleansing, the circulating pump 61 is stopped and air pressure is simultaneously introduced into the filter chamber by way of pipe 73 and valve 74. This pressure drives the liquid down in the chamber of the filter and out through its outlet manifold from which it may be delivered to the storage tank C, or to a still, or to any other suitable place. Continuation of the air flow will dry the filter-aid, when that is desirable. In any case, when the filter is fully drained its two parts may be separated in the manner shown in Fig. 4, exposing all leaves, from which the filter-aid may be removed either by scraping, or by gently tapping, if the filter-aid is dry.

Referring particularly to Fig. 5, it will be noted that when the filter is being emptied by air pressure, check valve 27 prevents the solvent from being expelled from the casing directly to the storage tank. The solvent necessarily goes through pipes 63 and 68 to the storage tank.

Any filter leaf may be removed independently of others by very simple operations.

As best indicated in Figs. 1 and 4, the housing parts 10*a* and 10*b* are divided along a parting plane P so disposed that said parts are interchangeable, at least in preliminary fabricated form. Certain parts having to do with the liquid inlet and outlet arrangements have been modified by machining, etc., to accommodate their particular function, but in the original unmachined form the parts 10*a* and 10*b* are identical.

The parting plane P is substantially diagonally disposed, and of course may be very conveniently moved into or out of sealing relationship by horizontal movement of the part 10*b* to the right (Fig. 1). Other inclinations of the parting plane P can be selected so as to function similarly. The selected plane should be inclined so that the parts 10*a* and 10*b* are interchangeable, and so that ready access can be had to the filter leaves for cleaning, servicing, or replacing the leaves.

Further advantages of the invention will be apparent to those skilled in the art.

What we claim is:

1. A filter reservoir housing adapted for reception therein of a plurality of filter leaves disposed in parallel juxtaposed relationship, said housing consisting of an enclosure having top and bottom walls, a front wall, a rear wall, and two opposed side walls said front, rear and side walls being vertical whereby to define a housing substantially rectangular in cross-section, said housing being divisible into two parts along a parting plane, said parts consisting of a fixed part and a movable part, said fixed part supporting said filter leaves, said movable part being movable towards and from said fixed part, said fixed and said movable parts being substantially identical in size and shape, said parting plane being inclined to the horizontal so that movement of said movable part effects simultaneous sealing contact between both said parts when the movable part is moved into contact with said fixed part, supporting means for retaining said fixed part in laterally overhanging position with clearance therebelow whereby withdrawal of said movable part exposes said filter leaves for cleaning and provides clearance space beneath said filter leaves for the reception of precipitate-receiving means.

2. A housing as defined in claim 1 wherein said parting plane is diagonally inclined from the meeting zone of the top wall and a front wall to the meeting zone of the bottom wall and a rear wall.

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