

No. 666,222.

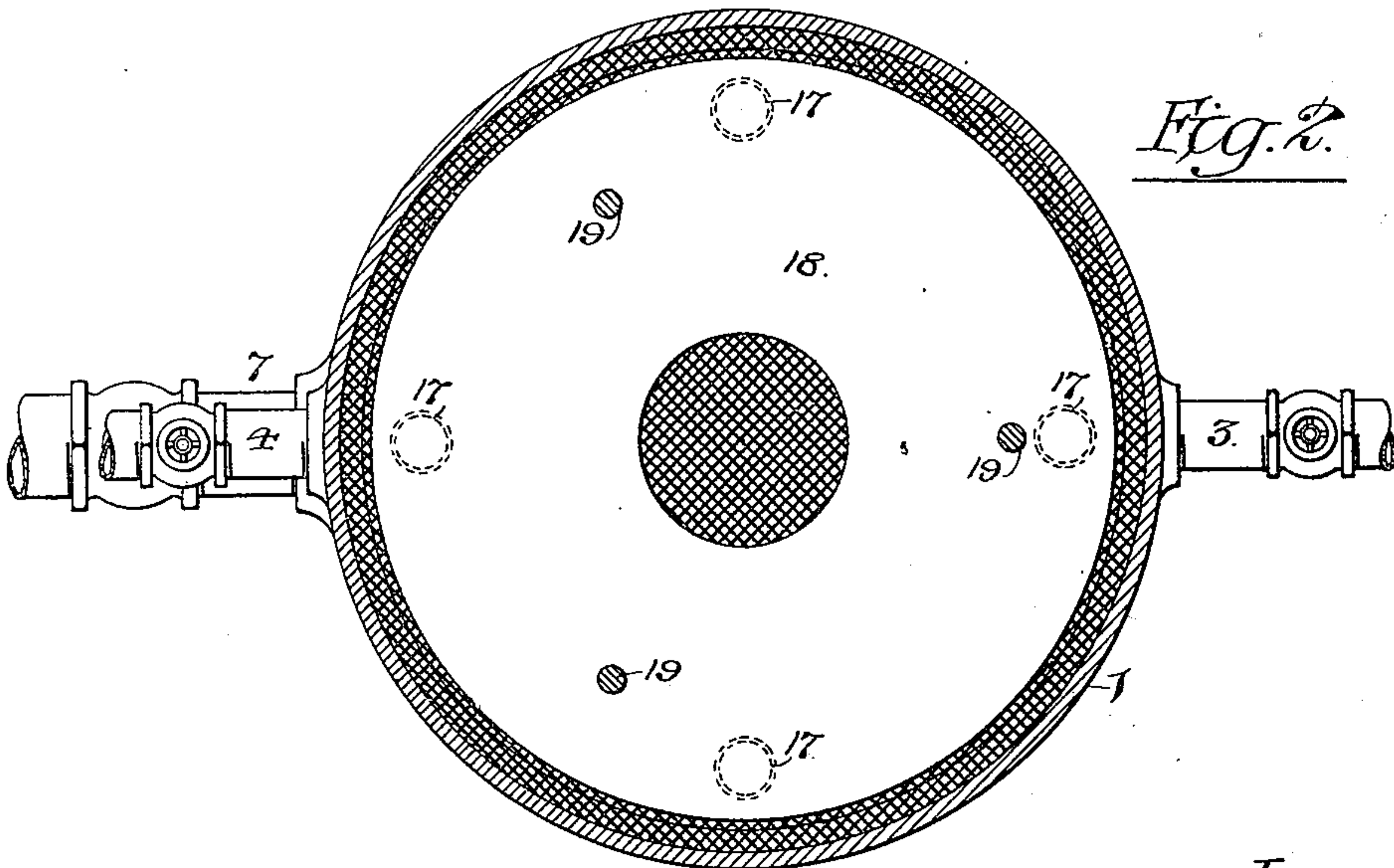
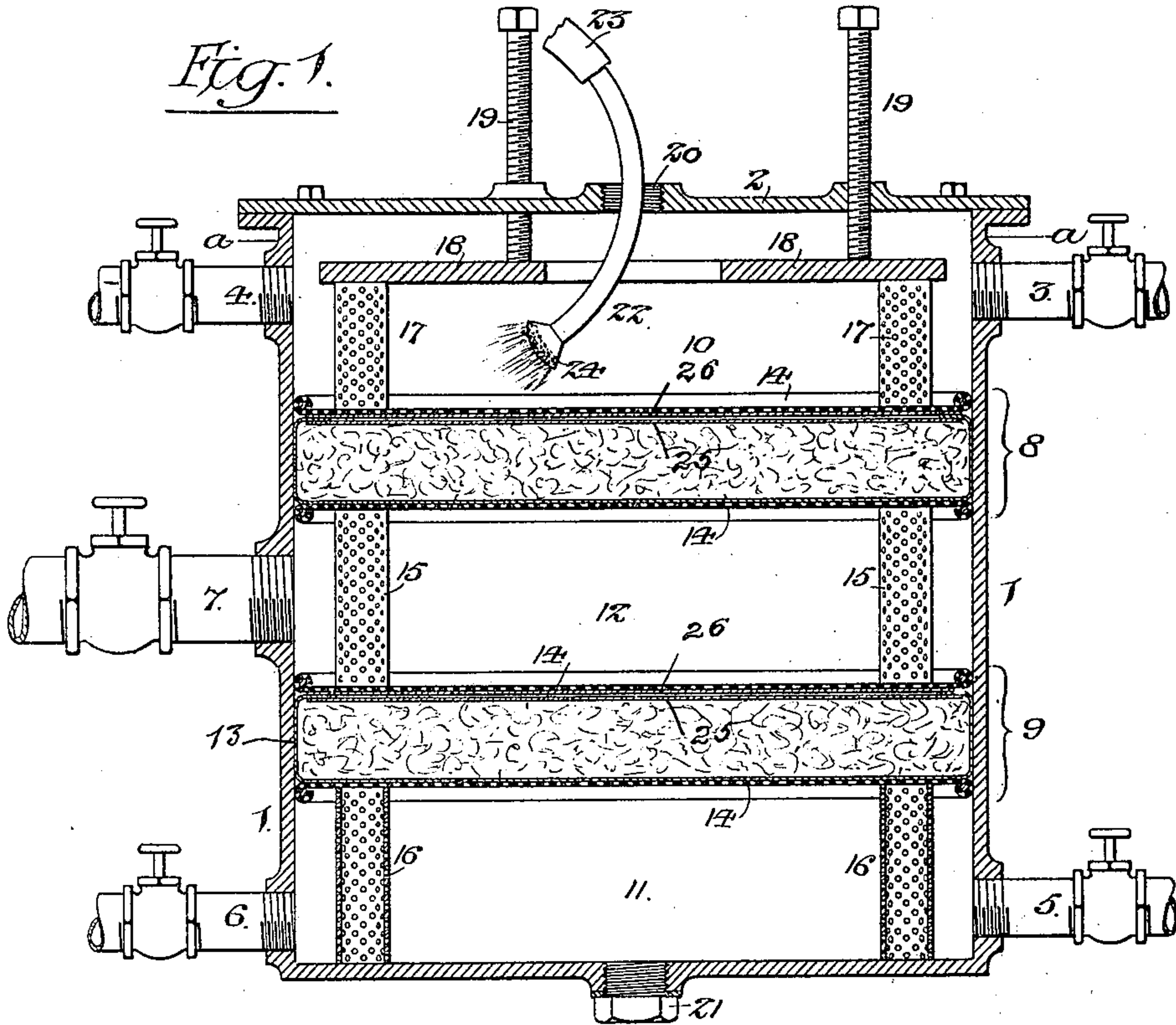
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W. JONES.

FILTER.

(Application filed Aug. 12, 1899.)

(No Model.)



*Witnesses:-*

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# UNITED STATES PATENT OFFICE.

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## FILTER.

SPECIFICATION forming part of Letters Patent No. 666,222, dated January 15, 1901.

Application filed August 12, 1899. Serial No. 726,961. (No model.)

*To all whom it may concern:*

Be it known that I, WOODRUFF JONES, a citizen of the United States, residing in Philadelphia, Pennsylvania, have invented certain Improvements in Filters, of which the following is a specification.

My invention consists of certain improvements in that class of filters in which the filtering material is subjected to mechanical pressure, the object of my invention being to so construct a filter of this class that the same will be composed of but few parts, which can be readily put together or taken apart, and which provide for the uniform application of pressure to the filtering material without materially restricting the filtering area.

A further object of the invention is to provide for readily cleansing the surfaces of the filter-beds when such cleansing becomes necessary.

In the accompanying drawings, Figure 1 is a vertical section of a filter constructed in accordance with my invention; and Fig. 2 is a section on the line *a a*, Fig. 1.

The filter consists of a casing 1 of any desired cross-sectional shape and dimensions, but preferably circular, this casing having at either or both ends a detachable head 2, so as to permit ready access to its interior. With the casing, near one end, communicate a valved inlet-pipe 3 and a valved outlet-pipe 4, similar valved inlet and outlet pipes 5 and 6 communicating with the casing near the opposite end of the same. A valved outlet-pipe 7 also communicates with the casing at or near the center.

The filter shown in the drawings contains two filter-beds 8 and 9, whereby the interior of the filter-casing is divided into three chambers 10, 11, and 12, the end chambers 10 and 11 receiving the liquid to be filtered, and the central chamber 12 receiving the filtered liquid after it has been passed through the filter-beds. Each filter-bed consists of a mass of powdered or granular filtering material of any desired character, either natural or manufactured, which is inclosed in a textile casing or cover 13, the latter in turn being confined between two perforated plates or wire-gauze disks 14, the edges of which are preferably strengthened by wiring or otherwise, or both plates and disks may be used, if de-

sired, for the purpose of giving additional strength and rigidity under pressure. Each of the filtering-beds fits snugly to the interior of the casing 1, so as to prevent passage of any liquid around them, and the two beds are separated from each other to the desired extent by means of short sections of tubing 15, similar tubes 16 being interposed between one of the filtering-beds and one end of the casing, and other tubes 17 being interposed between the other filtering-bed and an annular disk or ring 18, upon which bear a series of compressing-screws 19, which are adapted to threaded openings in the cap or cover 2 of the casing. A plate or frame may be used in place of the ring, if desired.

The textile casing or cover 13 consists of a bag having its edges turned in for a short distance over a disk or sheet 25 of textile material, which lies on the top of the filtering material, and overlapping this disk is another disk 26, likewise of textile material, which overlaps the inturned edges of the bag, as shown in Fig. 1. By this means the filtering material has a textile covering of uniform thickness throughout substantially the entire area, whereas if the filtering material is covered by turning the projecting edges of a bag until they meet at the center of the bed the cover will vary in thickness at different points, owing to the overlapping folds of the inturned portion, and the water will in such case seek the portions of least thickness, and hence some portions of the filter-bed will be called upon to perform excessive duty while others will have a comparatively less amount of duty to perform. One of the disks 25 or 26 may be omitted, if desired; but the use of both is preferred.

In preparing the filter for use the tubular supports 16 are first introduced into the bottom of the casing, and the lower filtering-bed, composed of powdered or granular material, with its textile covering and upper and lower perforated or wire-gauze disks, is placed upon the top of said supports. The separating-tubes 15 are then placed on top of the lower filtering-bed and the upper filtering-bed is deposited upon them, after which the tubular pressure-transmitting devices 17 and ring 18 are inserted and the cap 2, with its compression-screws, is applied and secured



in place. Pressure imparted to the ring 18 by means of the screws 19 is through the medium of the ring 18 and tubular separating, supporting, and transmitting devices 15, 16, and 17 transmitted to both of the filtering-beds, and the granular material of each filtering-bed is compressed to the desired extent. This compression of the incased filtering material causes lateral expansion of the same, so that the textile covering 13 is pressed tightly against the inner wall of the filter-casing and any flow of unfiltered water between the two is effectually prevented. The textile casing also prevents the washing away of the filtering material and itself provides a filtering agent. The valves in both of the pipes 4 and 6 being closed, the valves in the pipes 3 and 5 are opened and water or other liquid to be filtered is permitted to enter the end chambers 10 and 11 of the filter and is caused to pass through the filtering-beds 8 and 9, accumulating in the central chamber 12, from which it can be drawn off as desired by opening the valve in the outlet-pipe 7.

In order to provide for washing the outer surface of either filtering-bed, the valve in the outlet-pipe 4 or 6 communicating with the chamber beyond said bed is opened, so as to provide for a flow of water directly through said chamber and across the outer face of the filtering-bed presented thereto, and in case it is desired to wash the mass of filtering material in either filtering-bed the valve in the inlet-pipe 3 or 5 communicating with the chamber beyond said bed is closed, and filtered water is thus caused to pass through the filter-bed from the central chamber 12 and to escape through the outlet-pipe 4 or 6.

In order to provide for the more thorough cleansing of the outer surfaces of the filtering-beds than can be effected by the mere flow of water across the same through the chambers 10 or 11, I form in each end of the casing 1, or in the detachable cap with which either end of the casing may be provided, a central opening 20, which is normally closed by means of a screw-plug 21 or other available closure. When it is desired to wash the outer face of either filtering-bed, this plug can be removed and a curved pipe, such as represented at 22 in Fig. 1, may be introduced through the opening, this pipe communicating at its outer end through a hose 23 or other flexible connection with any available supply of water under pressure and having at its inner end a nozzle or distributor 24, whereby the water may be forcibly projected against the outer face of the filtering-bed. By causing the curved pipe to project more or less into the casing and by turning it in the opening the jets of water may be directed to any desired part of the surface of the filtering-bed, so as to effectually wash away from the same any accumulations of foreign matter which may have been deposited thereon, the wash-water and the foreign matters in suspension therein escaping through the outlet-

pipe 4 or 6. By this means the thorough cleaning of the filter can be effected in a short time and without taking the filter apart.

In carrying out my invention any desired number of filtering-beds may be employed in the casing and the filter may be used as a vacuum-filter by connecting to the central discharge-pipe 7 a pump or other suitable exhausting device.

If desired, the tubular elements 15, 16, and 17 of the filter may be perforated, as shown, so as to permit of the flow of liquid there-through, and thus render available for filtering purposes the areas of each filter-bed which would otherwise be covered by said tubes; but such perforations are not essential, nor is it necessary to the broader embodiment of my invention that the separating, supporting, and pressure-transmitting devices for the filter-beds should be tubular, as blocks or filling-pieces of any desired character may be employed for the purpose in place of the tubes.

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

1. The combination, in a filter, of a casing, a series of filtering-beds in said casing, whereby it is divided into outer chambers and an intermediate chamber, valved pipes communicating with each of said chambers, compression-screws at one end of the casing, and supporting, separating and transmitting devices whereby the compressive power of said screws is exerted upon the filtering-beds, and is resisted by the opposite end of the casing, substantially as specified.

2. The combination, in a filter, of a casing, a series of filtering-beds, whereby said casing is divided into outer chambers and an intermediate chamber, valved pipes communicating with each of said chambers, a series of compression-screws carried by one end of the casing, and supporting, separating and pressure-transmitting devices whereby the compressive power of the screws is exerted upon said filtering-beds, and is resisted by the opposite end of the casing, one of the elements of said pressure-transmitting devices being a disk upon which the compression-screws act, substantially as specified.

3. The combination in a filter, of a casing, a series of filtering-beds therein, a series of compression-screws carried by one end of the casing, and supporting, separating and pressure-transmitting devices for said filter-beds consisting of perforated tubes, substantially as specified.

4. The combination in a filter, of a series of filtering-beds dividing the interior of said filter into end and intermediate chambers, with a filter-casing having in each end an opening for the reception of a cleaning-pipe, substantially as specified.

5. The combination in a filter, of an internal filtering-bed, with a casing having an opening in the end, and a curved pipe adapt-



ed to be passed through said opening and having at its inner end a nozzle whereby a jet or jets of water may be directed upon any portion of the face of the filtering-bed, substantially as specified.

5 6. The within-described filtering-bed, the same consisting of a mass of powdered or granular material, a disk of textile material resting on said powdered or granular material, a textile covering or casing therefor,  
10 consisting of a bag having its upper edges in-

turned and slightly lapping said disk of textile material, and upper and lower perforated inclosures confining said incased material between them, substantially as specified. 15

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WOODRUFF JONES.

Witnesses:

WILL. A. BARR,

JOS. H. KLEIN.