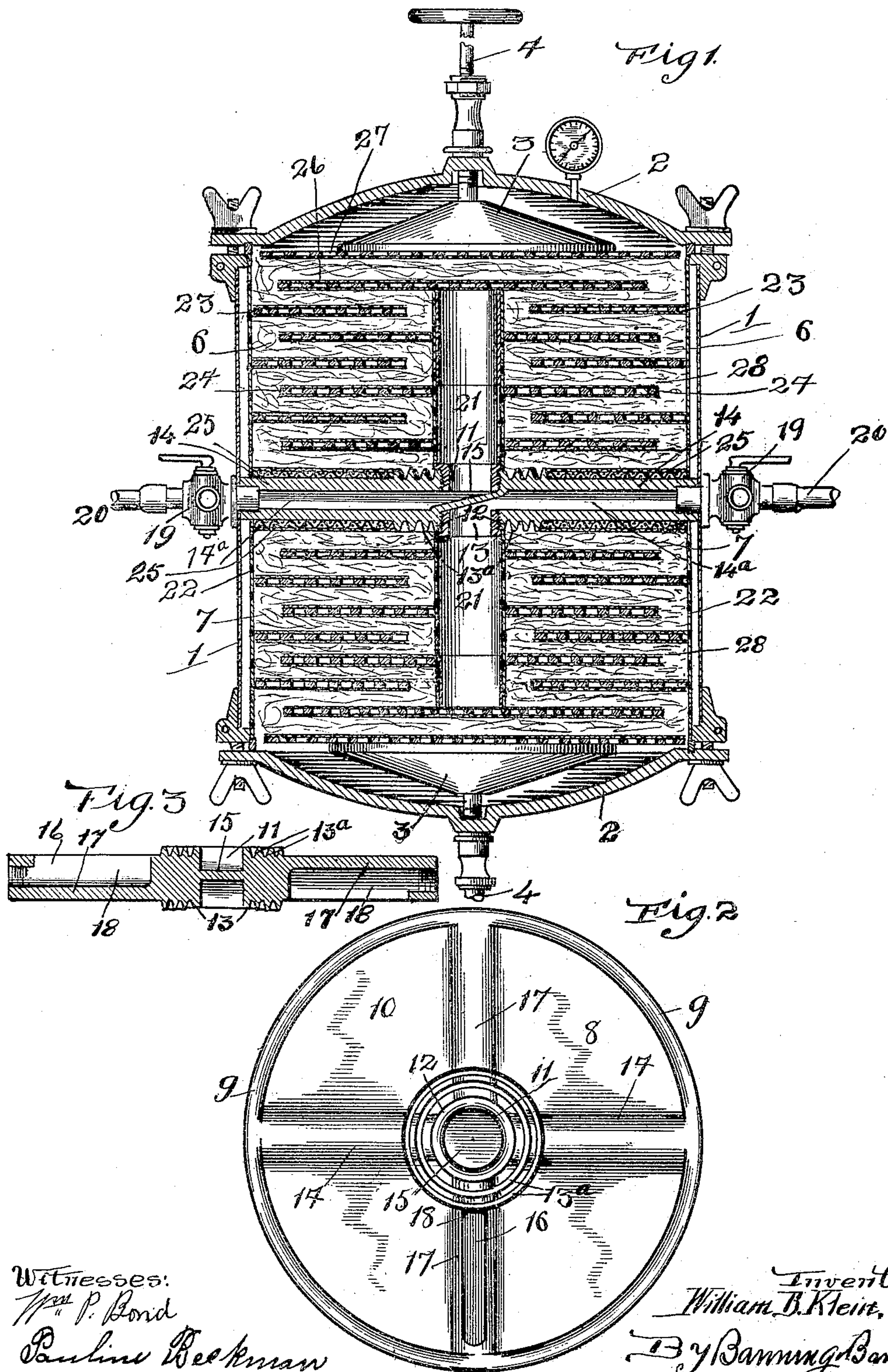


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W. B. KLEIN.
FILTER.

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FILTER.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, WILLIAM B. KLEIN, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Filters, of which the following is a specification.

My invention relates to liquid-filters; and the invention consists in the construction and combination of parts substantially as shown and described, and particularly pointed out in the claims.

In the filtering of beer it is frequently the practice to pass the beer through a primary filter, which serves to filter or strain out coarser impurities, and afterward pass the beer through a second filter called the "polisher," thus giving a tandem and more perfect filtration.

The object of the present invention is to construct a filter of the ordinary shape and proportions which is capable of performing the two filtering operations by itself, one-half only of which it is necessary to cleanse in order to enable it to perform its functions.

The filter of the present invention is constructed in two equal divisions or sections which correspond in function to the primary and secondary filters hitherto employed and which enable the beer to be passed continuously through the filter and delivered therefrom in perfect condition without the necessity for additional filtering. The construction is one which enables either or both of the divisions of the filter to be employed singly or tandem and at the same time serves to reinforce the filter as a whole and the component parts thereof.

In the drawings, Figure 1 is a vertical section of the entire filter; Fig. 2, a top or plan view of the dividing-wall, and Fig. 3 a cross-sectional view of the division wall or plate.

The filter as a whole is constructed in the usual manner, having an outer drum 1, closing-caps 2 at top and bottom, and pressing-heads 3, adapted to be actuated by screw-wheels 4. The drum is divided into two substantially equal chambers 6 and 7 by means of a circular division-wall 8, which is of suitable size to closely abut against the interior face of the outer drum and is symmetrically constructed on top and bottom. The division wall or plate is provided around its periphery on both sides with circular flanges 9 of greater thickness than the body or web 10 of the plate, and the flanges provide a close abut-

ment for the outer drum to fit against the division wall or plate. In the center of the plate are circular sockets 11, having flanged walls 12, which are screw-threaded on their inner faces and are adapted to have entered thereinto bushings 13. Around the central flanges are concentric rings or flanges 13^a, which are intended to prevent leakage to the center discharge-column. Leading from the sockets in opposite directions are outlet-ribs 14, one for each of the central socket-openings, which ribs are cored throughout their length and provide outlet-ducts 14^a, leading outwardly to the periphery of the central plate or wall. The outer surfaces of the ribs are flush with the peripheral flanges 9 to provide a supporting-surface for the inner filter-plates, hereinafter described. The outlet passages or bores are separated from each other by means of a diagonally-extending cross-wall 15, which likewise separates the central socket-openings from one another, causing one of the bores or passages to open outwardly through the lower face of the division plate or wall and causing the other passage to open outwardly through the upper face of the division plate or wall. In addition to the outlet-passages hitherto described are a pair of inlet-passages 16, which are formed in ribs 17, which extend at right angles to the cored outlet-ribs and are of substantially equal dimensions therewith, and the inlet-passages are in the form of troughs 18, one of which opens to the lower face of the cross wall or plate and the other of which is open to the upper face of the cross wall or plate. The inlet and outlet passages have entered thereinto valves 19 of suitable construction for controlling the flow of beer to and from the passages, and, if desired, hose can be connected at one end to one of the outlet-valves and at its opposite end to one of the inlet ends for providing a continuous passage for the beer from one section of the filter to the other. The bushings 13 have secured thereto sections of cylindrical pipe 21, which serve as receiving-columns for the discharge-openings, and said pipes lead from opposite directions to the companion outlet-passages in opposite sides of the central division wall or plate.

Near the outer wall of the filter is a cylindrical perforated wall 22, between which wall and the inner conveyer pipes or columns are arranged a series of outer circular filter-plates 23, abutting against the outer perforated wall

22, and inner circular filter-plates 24, abutting against the inner perforated column 21, said plates being in the form of rings, the outer filter-plates having a greater interior and exterior diameter than the inner filter-plates. Central filter-plates 25 are provided, which rest upon the radially-extending ribs in the central wall or plate and abut at their inner edges against the concentric rings 13. In addition to the inner filter-plates inner and outer end plates 26 and 27 are provided, the latter of which is of sufficient diameter to extend over substantially the entire inner area of the filter and abut against the presser-head 23 in the usual manner. The spaces between the filter-plates are filled with packing 28 of the usual character, and the plates are adapted to be removed from the filter for the purpose of cleaning and packing.

In use we may assume that the upper section of the filter is intended for the primary or coarser filtering and the lower section for the secondary or finer filtering, in which case the beer will be initially admitted through the upwardly-opening inlet-passage in the center plate or wall and will pass therefrom through the center filtering-plates 25 into the packing and also into the annular space between the outer drum and the outer perforated plate. The outer annular space serves as a distributing-space for the series of outer filtering plates or rings, the beer passing from the annular space back into and along the rings and being discharged therefrom into the packing, whence it finds its way into the inner filtering rings or plates and is conveyed through and along the plates to the upper cylindrical column, passing thereinto through the perforated wall 21. The beer in the upper cylindrical column is carried down into the discharge-passage in the central division wall or plate and through the outlet-valve controlling such passage into the rubber pipe or hose, whence it is conveyed to the inlet-passage for the lower section of the filter, which may be considered as the polisher. The operation in the lower section of the filter is similar to that hitherto described with respect to the upper section, and after passing through the polisher the beer is delivered from the final discharge-outlet in completely-filtered condition and ready for the package. After the operation above described has been continued for a considerable length of time the primary filter or rougher will become fouled or clogged to such an extent as to require cleansing, which cleansing can be performed by flushing out the primary or upper filter. This flushing is performed by forcing water through the outlet-passage, reversing the flow through the filter, which serves to rinse out or wash out the impurities or sediment collected during the filtering operation. By rinsing out the upper section or rougher daily the filter is enabled to perform its work

for a considerable space of time without repacking; but it becomes necessary from time to time to repack the filter in order to remove dirt or sediment which cannot be washed out by the flushing operation. It is only necessary to repack the section of filter used as the primary filter or rougher, which repacking can be done by removing the closing-head for the upper section of the filter and taking out the packing and filter-plates therein preparatory to a secondary packing. After the upper section has been thus repacked it is advisable to reverse the filtering operation and use the section of the filter which had previously been used as the polisher for the primary filtering operation, allowing the secondary or finishing operation to be performed by the section of filter freshly packed. Such impurities or sediment as have been collected in the polisher will not impair the subsequent operation of the polisher as a rougher, while it is always desirable that the polishing operation be performed by a freshly-packed section of the filter. It will be understood that both sections or halves of the filter are constructed and operated in exactly the same manner and that either one may be used as a polisher or as a rougher and that in reversing the filtering operation hitherto referred to no change or modification of the filter or the divisions thereof is required.

By constructing the filter as above specified the packing operation is much simplified for the reason that the filter can be packed from either end without the necessity for disarranging the packing of the other end. In other words, one section of the filter can be continuously operated while the other section is being packed. The packing operation is further simplified for the reason that the depth of each of the sections is equal to only one-half of the entire filter, so that it is not necessary to work down into the filter to the extent necessary in packing filters of the ordinary type.

It will be observed that the two sections of the filter serve as two division-filters which may be operated either independently or tandem, the beer being conveyed continuously through the two sections when desired and being discharged therefrom in finished condition. The arrangement of passages in the central plate or wall is one which provides an easy and convenient means for securing the valves and connecting-pipes to the filter, and the wall itself affords a firm reinforcement for the filter in its center, which is necessary in packing the ends of the filter independently. The ribs in the plate serve to provide a rigid reinforcement for the plate and enable it to withstand the pressure of the packing operation without danger of breakage.

It will be understood that the particular style, shape, or construction of the filter-body is immaterial, and that the present in-

vention relates more particularly to the method of dividing the filter into two chambers or compartments and to the method of arranging the inlet and outlet passages therein rather than to the construction, location, and arrangement of the filter-plates, valves, and similar mechanism, which may be of any usual and well-known construction.

What I claim as new, and desire to secure by Letters Patent, is—

1. A filter, consisting of a tank having in its center a cross-wall provided with inlet and outlet passages on opposite sides of the cross-wall opening into the companion chambers, filtering means in each of the chambers, and a detachable connection between the outlet-passage of one chamber and the inlet-passage of the companion chamber for operating the chambers independently or simultaneously, substantially as described.

2. In a filter, the combination of a tank provided with a cross wall or plate having sockets in its opposite faces, separated outlet-passages connecting with the oppositely-disposed sockets, oppositely-opening inlet-passages in the central wall or plate, perforated central passages in the companion chambers of the filter entered into the oppositely-disposed sockets, and packing surrounding the perforated central passages, substantially as described.

3. In a filter, the combination of a tank provided with a cross wall or plate having sockets in its opposite faces, separated outlet-passages connecting with the oppositely-disposed sockets, oppositely-opening inlet-passages in the central wall or plate, perforated central passages in the companion chambers of the filter entered into the oppositely-disposed sockets, packing surrounding the perforated central passages, and a detachable connection leading from the outlet from one of the chambers to the inlet of the companion chamber for enabling the chambers to operate independently or in combina-

tion with one another, substantially as described.

4. In a filter, the combination of a substantially cylindrical tank having near its center a circular cross-wall provided with four radially-extending ribs, two of the ribs being cored out to provide outlet-passages, and the two other ribs being channeled on opposite sides of the wall or plate to provide inlet-passages, oppositely-opening separated central sockets one for each of the outlet-passages, perforated tubes in the companion chambers of the filter entered into the oppositely-opening sockets, and packing surrounding the tubes, substantially as described.

5. In a filter, the combination of a substantially cylindrical tank having near its center a circular cross-wall provided with four radially-extending ribs two of the ribs being cored out to provide outlet-passages, and the two other ribs being channeled on opposite sides of the wall or plate to provide inlet-passages, oppositely-opening separated central sockets one for each of the outlet-passages, perforated tubes in the companion chambers of the filter entered into the oppositely-opening sockets, packing surrounding the tubes, and a detachable connection leading from the outlet from one of the chambers to the inlet of the companion chamber for enabling the chambers to operate independently or in combination with one another, substantially as described.

6. In a filter, the combination of a tank, removable caps or covers at opposite ends of the tank, a cross wall or plate having therein separated outlet-passages leading from the divisions of the tank, central passages in the companion chambers of the filter leading to the outlets, and packing surrounding the central passages, substantially as described.

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