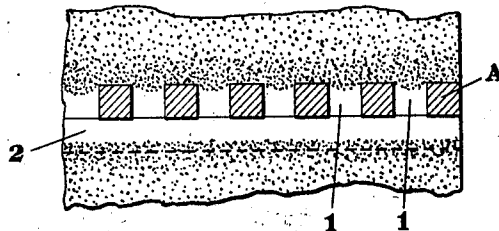
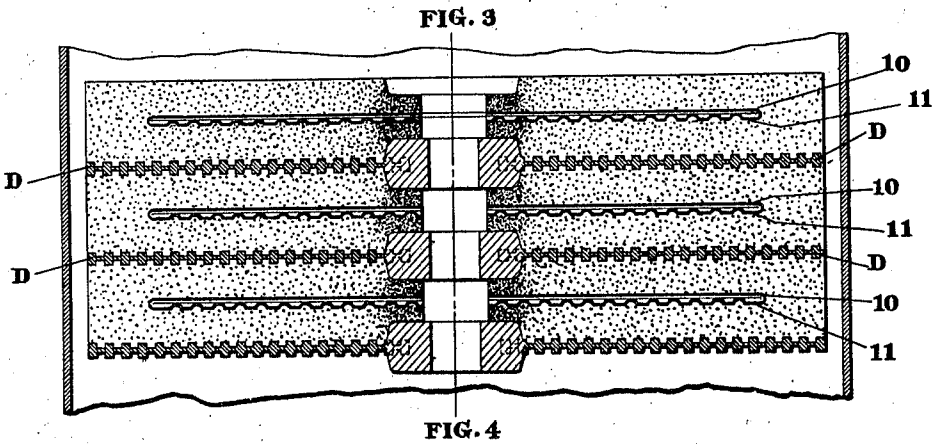
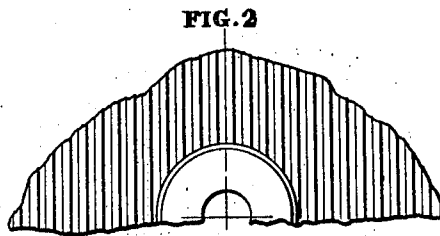
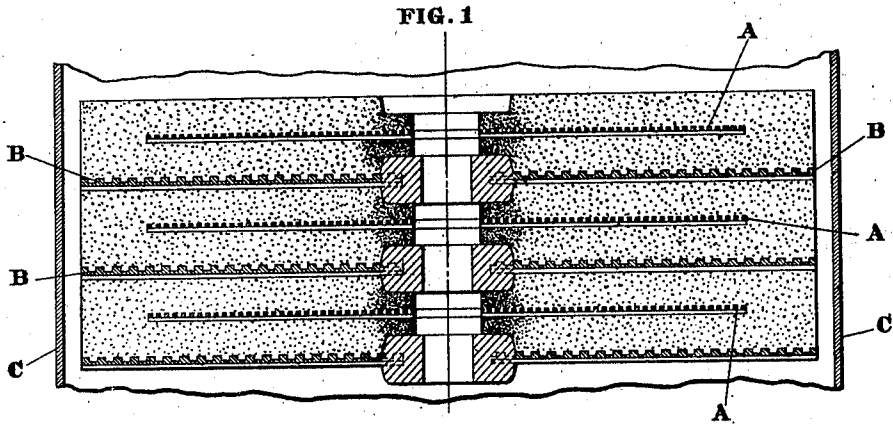


K. KIEFER.
FILTER.

APPLICATION FILED APR. 16, 1906. RENEWED FEB. 23, 1911.

993,780.

Patented May 30, 1911.



Witnesses.

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FILTER.

993,780.

Specification of Letters Patent.

Patented May 30, 1911.

Application filed April 16, 1906, Serial No. 311,972. Renewed February 23, 1911. Serial No. 610,387.

To all whom it may concern:

Be it known that I, KARL KIEFER, a citizen of the United States, and resident of Cincinnati, in the county of Hamilton and State of Ohio, have invented a new and useful Improvement in Filters, of which the following is a specification.

This invention pertains to filters in which compressed pulp in a semi moist condition is used, the moisture resulting from the packing of the filter plates shortly before using. The expression "compressed pulp" is used here as in the art commonly to specify such moist pulp in contra-distinction to any dried paper manufacture.

The object of my invention is to simplify such filters and especially to produce liquid conductors of extreme strength, simplicity and efficiency, showing other important advantages specified below.

The invention is illustrated in the accompanying drawings, of which—

Figure 1 is a cross section through the filter construction containing inlet liquid conductors in combination; Fig. 2 shows a partial top view upon one of the inlet liquid conductors; Fig. 3 shows a vertical cross section of the filter construction containing modifications of the invention in combination; Fig. 4 shows a detail cross section in combination with filter mass through one of the improved liquid conductors.

My improved liquid conductors are characteristic in that they are not woven structures, but at the same time their construction allows of milling, and therefore, cheap manufacture. Some of them are characterized by the combination of two systems of parallel channels or grooves that stand perpendicular to each other when in use. As most filters, for obvious reasons, are constructed circular with circular filtering layers, it is necessary that the liquid to be drained should be distributed at a circular line of ingress, or collected at a central point of egress. Liquid collectors therefore, must show "universal" conductivity, that is, they must be able to conduct the liquid in all directions. Such liquid conductors are for instance woven liquid conductors, as shown and patented to me in Patent No. 779,607, Jan. 10th, 1905. I attain a similar object, however, with the constructions which are the object of this patent in producing non-

woven liquid conductors, for instance as shown in Figs. 1 and 4 in detail.

A is an outlet liquid conductor, having a series of parallel channels of square construction perpendicular to a second similar series. Such a liquid conductor may be produced by milling into a sheet metal disk a series of parallel slots 1, Fig. 4, of preferably rectangular cross section, and of slightly more than one half the depth of the metal sheet, and by milling a second series 2 Fig. 4, at right angles on the other side of this disk. The most important part is the size of these slots. I have found in the course of my experiments, that these slots, as shown in Fig. 4 when not made any larger than 1/16" in diameter become fiber retaining to dissolved pulp as it is used in building up filter layers in a packing machine or in some filters, to as great a degree as fine screens, and show at the same time the advantage of not having any actual holes to be cleaned. The square holes that are formed by the meeting of the two perpendicular slots are of no height whatever, and by brushing in the direction of both systems of channels, these liquid conductors are cleansed at once. It is evident that this improved liquid conductor will conduct liquid from one point to any other point wanted like the castles on a chess board; every field of the liquid conductor is accessible by the liquid particles.

The inlet conductors in Fig. 1 are of somewhat different construction, and are marked by the reference letter B. They are different from the outlet liquid conductors A in that the grooves are not milled into the metal sheet to a depth as great as above described, leaving a solid impervious part between the two series of slots, shown in cross section in Fig. 5. This lends additional strength to the conductors, especially of advantage when they are used as supports for the filter elements, as shown in my patent No. 812,932.

I have discovered that absolute universal conductivity is not required in the inlet conductor. As shown in my Patent No. 812,932, the cloudy liquid ascends between the drum C and the filter elements and can enter at any point of the periphery of the inlet liquid conductor B, through either series of slots communicating with all points of the

filter layer. In fact, it is not necessary that the two series of slots should stand at right angles to each other for inlet conductors, and I have shown in Fig. 3 inlet liquid conductors D in which all the slots are parallel to each other. Fig. 2 shows a partial view upon these inlet liquid conductors B and D. My system of two series of capillary slots at right angles, may however, be applied to other structures.

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

1. In a filter, the combination with filter layers of compressed moist pulp, of a non-woven, imperforate liquid conductor of a single manufacture between them and in direct contact with the fibers of said pulp, with means for the admission of the cloudy liquid and for conducting the clear liquid away.

2. In a filter, the combination with filter layers of compressed moist pulp, in direct contact with the fibers thereof a liquid conductor consisting of a single, non-woven manufacture conducting liquid in all directions, means for the admission of cloudy liquid and for conducting the clear liquid away.

3. As a new article of manufacture, a liquid conductor in combination, consisting of a single disk having parallel slots of a width to be fiber retaining for moist pulp, and means for the admission of cloudy liquid and for conducting the clear liquid away.

4. In a filter, the combination with filter layers of compressed moist pulp, a liquid conductor consisting of a disk having two relatively perpendicular series of slots, one on each side and of a width to be fiber retaining for moist pulp, with means for the admission of the cloudy liquid and for conducting the clear liquid away.

5. In a filter, the combination with filter layers of compressed moist pulp, of a fiber-retaining liquid conductor consisting of a metal sheet containing fiber-retaining openings produced by crossing two parallel series of slots, with means for the admission of cloudy liquid and for conducting the clear liquid away.

6. As a new article of manufacture, in combination with filter layers of compressed moist pulp, a liquid conductor consisting of a metal disk, having square slots in its side, in direct contact with the fibers of said moist pulp, with means for the admission of cloudy liquid and for conducting the clear liquid away.

7. In a filter, in combination with filter layers of compressed moist pulp, and in direct contact with the fibers thereof a liquid conductor consisting of an imperforate disk having two relatively perpendicular series of slots, one on each side, with means for

the admission of cloudy liquid and for conducting the clear liquid away.

8. In a filter, the combination with filter layers of compressed moist pulp, of a fiber-retaining liquid conductor consisting of an imperforate disk containing fiber-retaining openings produced by crossing two parallel series of slots, with means for the admission of cloudy liquid and for conducting the clear liquid away.

9. As a new article of manufacture, in combination with filter layers of compressed moist pulp, a series of longitudinal strands spaced apart in direct contact with the fibers thereof, another series at right angles and above the first series, each series forming longitudinal channels between the strands, and each in contact with a different filter layer.

10. As a new article of manufacture, in combination with filter layers of compressed moist pulp, and in direct contact with the fibers thereof a substantially thin and flat disk having slots in its surface not substantially wider than one-eighth of an inch.

11. As a new article of manufacture, in combination with filter layers of compressed moist pulp, a substantially thin and flat disk having slots on both of its sides, said slots not substantially wider than one-eighth of an inch, in direct contact with the fibers of said pulp.

12. As a new article of manufacture, in combination with filter layers, a substantially thin and flat disk having slots in its surface not substantially wider than one-eighth of an inch.

13. As a new article of manufacture, in combination with filter layers, a substantially thin and flat disk having slots on both its sides, said slots not substantially wider than one-eighth of an inch.

14. In a filter, in combination with a casing, a series of filter layers, two of each being interlaced at their periphery in an annular area, and separated except at such annular area by liquid conductors consisting of single disks having parallel slots in their sides.

15. In a filter, in combination with a casing, a series of filter layers, two of each being interlaced in an annular area and separated except at such annular area by liquid conductors consisting of single disks having parallel slots in their sides.

16. In a filter, in combination with a casing, a series of filter layers, pairs of which are interlaced in an annular peripheral area, and an inlet liquid conductor entirely separating this pair from another neighboring pair, said inlet liquid conductors consisting of disks having slots in each side.

17. In a filter, in combination with an inclosing drum, a series of filter layers of freshly compressed pulp, with inlet liquid conductors consisting of disks having slots

in their sides, and a central compression hub.

18. In a filter, in combination with an inclosing drum, a series of filter layers of
5 freshly compressed pulp with liquid conductors consisting of disks having slots in their sides, and a central compression hub.

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

KARL KIEFER.

Witnesses:

G. W. WERDEN,
E. J. APPLETON.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."
