E. J. SWEETLAND.

FILTER.

APPLICATION FILED MAR. 30, 1915.

1,349,238. Patented Aug. 10, 1920.

FIG. 1

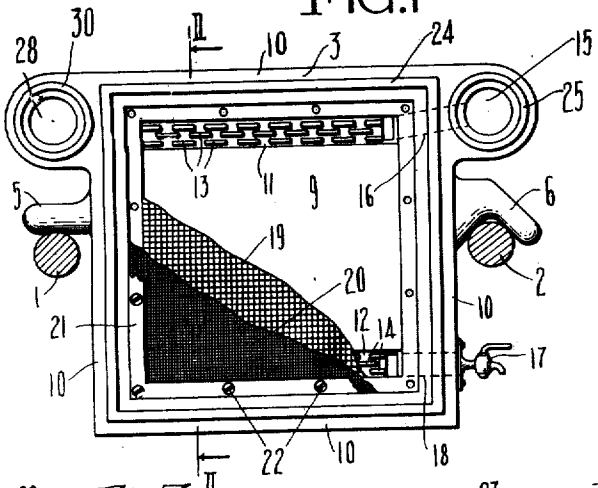


Fig. 3.

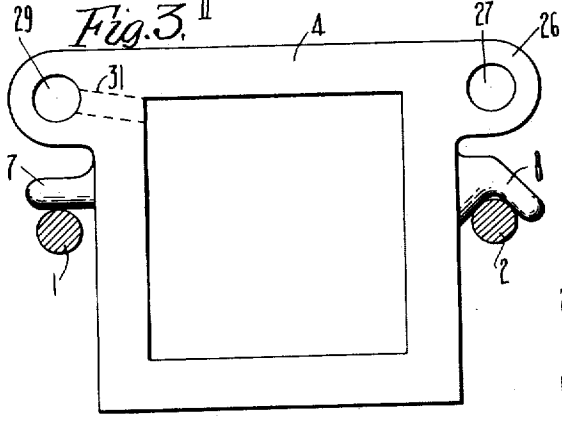
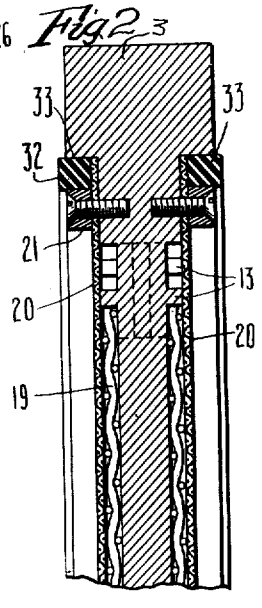


Fig. 2.



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FILTER.

1,349,238. Specification of Letters Patent. Patented Aug. 10, 1920.

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To all whom it may concern:

Be it known that I, ERNEST J. SWEETLAND, a citizen of the United States, residing in the town of Montclair, county of Essex, and State of New Jersey, have invented certain new and useful Improvements in Filters, of which the following is a specification.

My invention relates in general to filters of the plate and frame type, and has to do particularly with certain features of construction designed to solve problems which are most often present in this type of filter, although some phases of my invention are applicable to filters of other types. My invention is especially useful in connection with a plate and frame filter equipped with metallic filter cloth, and provides a construction in which such cloth is readily mounted in an efficient and economical manner in a plate and frame filter.

In the accompanying drawings, which form a part of this specification, Figure 1 is a front elevation of a filter plate constructed in accordance with my invention, parts of the filter fabric being broken away to disclose the internal construction. Fig. 2 is an enlarged fragmentary transverse sectional view through a slightly modified construction of filter plate. Fig. 3 is a view similar to Fig. 1 showing the frame which is adapted to be used in a filter of this type.

Referring to the drawings in detail, the numerals 1 and 2 designate the two longitudinal rods or bars which commonly form a support for filter plates and frames in this well known type of filter construction. Upon these supports are mounted in alternation the filter plates 3 and frames 4, the plates 3 being provided with lugs 5 and 6, engaging, respectively, the supports 1 and 2, and the frames 4 being provided with similar lugs 7 and 8. Means, not shown, are provided for clamping the plates and frames tightly together in the well known manner in order to secure a tight joint between them, as indicated in Fig. 2.

Each filter plate 3 consists of a substantially rectangular body portion provided with a central section 9 of less thickness than the surrounding flange 10. At the top and bottom of the filter plate, between the central portion and the flange, are located the two areas 11 and 12, comprising drainage channels between a plurality of staggered projections 13 and 14, respectively, the surfaces of which are flush with the surface of the portion 9. Each of the areas 11 communicates with the drainage manifold 15 by means of the passage 16, and each of the areas 14 communicates with the drainage pet cock 17, through the passage 18. On each side of the portion 9, and covering as well the areas 11 and 12, is placed a sheet of coarse screen 19, or other suitable reticulated fabric, over which in turn is placed a sheet 20 of filtering material which may be of any suitable character, either cloth or metal. The fabric which I prefer for this purpose is a woven fabric, at least one set of threads of which is composed of bundles of metallic wires, the fabric preferably being flattened under pressure, as by rolling. Such a fabric forms an excellent filter medium. I do not claim this fabric as part of my present invention, since it is fully described and claimed in my United States Letters Patent No. 1,147,379 granted July 20th, 1915. The drainage fabric extends beyond the areas 9, 11 and 12, as clearly shown in Figs. 1 and 2, and in the type of device illustrated in these figures, is clamped in place by means of a retaining frame or strip 21, which is held in place by means of screws 22 entering the body of the frame. The filter fabric 20 extends beyond the retaining strip 21, and a gasket 32 which engages the edge portions of the filter fabric is retained in position between the strip 21 and the wall 33 of a recess cut in the filter plate. This gasket 32 forms a tight seal between the filter frame and the edges of the filter fabric and prevents seepage of the liquid to be filtered around the edges of the said filter fabric. This gasket 32 also projects slightly beyond the face of the filter plate so that it will engage the filter frame and form a tight joint between the filter plate and the filter frame. Fig. 2 shows a slight modification in which the screen 19 does not extend completely over the area 11,

the staggered projections 13 extending outwardly into engagement with the inner surface of the filter fabric 20. A ring gasket 25 surrounds the drainage manifold 15 and is adapted to form a fluid-tight joint against the abutting face 26 of the corresponding filter frame, so that the passage 27 in the frame, which is adapted to aline with the passage 15 in the filter plate, forms a continuous outlet manifold. Similarly, passages 28 in the filter plates alining with passages 29 in the frame forms a continuous inlet manifold, the joints being sealed in a similar manner by means of ring gaskets 30. Each filter frame is provided with a passage 31 leading from the passage 29 through the frame into the space surrounded by it.

In the operation of the filter above described, the plates and frames are assembled in alternation upon the supports 1 and 2, in the usual manner, pressure being applied in the usual manner to force the plates and frames tightly together, thus sealing the various joints by means of the gaskets already described. The liquid to be filtered is then introduced in any suitable manner into the inlet manifold formed by the passages 28 and 29. It flows through the various passages 31 into the space bounded by the filter fabric 20, and the two facing filter plates, and by the filter frame 4 which supports them. It will be understood that this liquid is introduced under a suitable pressure. The only outlet for the liquid when thus introduced is through the filter fabric 20, by passing through which it is relieved of its solid content. The clear filtrate thus formed, being still under pressure, passes up between the interstices of the screen 19, over the area 9, until it reaches the drainage passage formed by the area 11, and passage 16, leading to the outlet manifold formed by the alining passages 15 and 27. It is then discharged from this outlet manifold in any suitable way. The continued passage of the sludge, or liquid to be filtered, in this manner results in the formation of a cake upon the outer surface of the various sheets of filter fabric 20. When this cake becomes so thick as to impede the further progress of the filtrate through it, the pressure holding the plates and frames together is withdrawn, and the plates and frames may then be separated for the purpose of removing the cake from the filter fabric. If it is desired, the cake may be first loosened from the filter fabric by the process known as "reversing the flow," that is, shutting off the supply of sludge or liquid to be filtered and introducing clear wash water into the outlet manifold under pressure so that it will force its way through the various parts of the filter in a direction which is the reverse of that in which the liquid flows in normally passing through the filter. The wash water thus reaches the inner surface of the various sheets of filter fabric 20, and on passing through the fabric encounters the cake deposited on the outer surface thereof and dislodges it. After this has been accomplished the flow of wash water may be discontinued, and the residual matter in the filter, and the cake dislodged from the filter plate may be removed by disassembling the parts and frames, as already set forth. The pet cock 17, in connection with the passage 18, and area 12, provides a means for draining any surplus wash water or clear filtrate which may remain in the interior of the filter plate after the supply of either wash water or liquid to be filtered has been cut off.

It will be obvious that certain features of my invention are useful in other than plate and frame filters, as, for instance, chamber filter presses. While I have illustrated and described only certain specific embodiments of my invention, I realize that it is susceptible of broad application and I do not desire to be limited to the precise structure shown and described.

Having thus described my invention, I claim:

1. In a filter of the plate and frame type, a filter plate having the central web portion thereof reduced in thickness to provide drainage areas on opposite sides thereof, a filter fabric section extending over each of the drainage areas, a sheet of reticulated spacing material arranged under each of the filter fabric sections, means upon the plate for positively clamping the edges of the filter fabric sections to the plate, and sealing means also extending around the edges of the filter fabric sections and engaging both the said edges and the plate to provide a tight joint, said sealing means being carried by the plate and providing means for sealing the joints between the plate adjacent filter frames.

2. A filter plate having a drainage area on one side thereof, filter fabric extending over said area, and a peripheral gasket engaging the edge portions of the filter fabric and the plate to form a tight joint between the members and also arranged to directly engage an adjacent plate to produce a tight joint therewith.

3. In a filter comprising a plurality of separable alined members, a filter plate provided upon one side thereof with a central drainage area, a section of filter fabric extending over the drainage area, means carried by the plate for positively securing the filter fabric in position upon the plate, and a peripheral gasket extending around the edge portions of the filter fabric and engaging the said edges and the plate to produce a tight joint, said gasket extending be-

yond the face of the plate to form a joint between it and the adjacent member of the filter.

4. A filter plate having the central portion thereof reduced in thickness to provide a drainage area, a filter fabric extending over the drainage area, clamping means carried by the plate and engaging edge portions of the filter fabric to positively secure it to the plate, and a peripheral gasket applied to the plate and engaging the filter fabric to provide a tight joint between the fabric and the plate, said gasket also serving to form a tight joint with an adjacent plate.

E. J. SWEETLAND.