

UNITED STATES PATENT OFFICE.

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SAND FILTER.

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To all whom it may concern:

Be it known that I, GODFREY ENGEL, a citizen of the United States, and a resident of the city of Baltimore, State of Maryland, have invented certain Improvements in Sand Filters, of which the following is a specification.

My invention relates to certain improvements in filters; and it consists more particularly in an improved sand filter for use in connection with the treatment of sugar solutions.

The object of the invention is to provide a device which while being of relatively simple construction shall effectually and efficiently perform its functions, the construction, moreover, being such that the filtering medium can be cleansed after use without the necessity for its removal from the filter-casing. These objects I attain as hereinafter set forth, reference being had to the accompanying drawings, in which—

Figure 1 is a side elevation of my improved filter. Fig. 2 is a sectional elevation of the filter, showing the relative arrangement of its various parts. Fig. 3 is a sectional plan view on the line 3 3, Fig. 2; and Figs. 4, 5, and 6 are sectional elevations showing the detail construction of the joints between the filter-screens and the parts of the casing with which they contact.

In the above drawings, A is a substantially cylindrical casing, formed in the present instance of a sheet-metal section a , to which is riveted a cast top section a' and a substantially conical cast bottom section a^2 , this latter having an inlet-opening a^3 , a discharge-opening a^4 , and an opening a^5 , provided with a valve a^6 , through which the filtering medium may be removed. Each of the openings a^3 and a^4 is preferably flanged for the attachment of suitable pipes, and it will be seen that the valve a^6 is pivotally supported, there being a lever a^7 pivoted to the casing A at a^8 and having a threaded bolt a^9 pivotally attached to one of its ends whereby the valve may be locked or retained in its closed position. The upper section a' of the casing A is provided with projecting lugs a^{10} , whereby it may be hung or carried by any suitable support, and the top edge of said section is flanged and recessed, as shown in Fig. 4, there being in said recess any desired form of packing a^{11} .

A cover B is constructed to fit over and close the top of the casing A, its flanged edge b engaging with the packing a^{11} and the whole cover being retained in position by means of bolts b' , which are pivotally carried by lugs a^{12} on the casing a and are provided with nuts b^2 , having projections or handles whereby they may be turned. There is an annular recess in the under side of the cover B containing packing b^3 , whereby a tight joint is made between said cover and the upper end of a corrugated and perforated cylindrical screen C, whose lower end has riveted to it a conical section C' , which in turn is supported upon a packing-ring c , held in a recess in the lower section a^2 of the casing A. The corrugated screen C is reinforced by a number of annular bands c' , placed as shown in Fig. 2, the object of these being to aid in preserving the form of the screen by making its distortion when acted upon by the internal pressure practically impossible. The corrugations increase the resisting power of the structure to longitudinal compression when the cover is made to bear strongly upon the same in order to make tight joints between the screen and the packing, the bands being advisable in order to strengthen what would otherwise be a relatively weak device.

The portion of the casing A having the flanged opening a^4 is provided with an inwardly-extending tubular portion d , whose inner end is expanded into a conical flanged mouthpiece d' , the upper surface of the flanged portion being recessed and having a packing-ring d^3 therein, in addition to which there is a lug or projection d^2 , preferably formed integral with the conical section d' . A second cylindrical screen D bears upon the packing-ring d^3 and is supported by the inwardly-projecting tubular section d concentrically with the screen C, there being also a cover D' to the screen D, which is held in position by a bolt d^4 , extending through the screen D and entering a suitable opening in the lug d^2 . The upper end of the bolt d^4 is threaded and there is a nut or hand-wheel d^5 upon it, whereby the cover d' and consequently the screen D are held in position, it being understood that a tight joint between the cover and the said screen is secured by means of a packing-ring d^3 in the same manner as shown in Fig. 6.

In operation the space between the two screens C and D is filled with particles of sharp sand or ground silica of such size that they will not pass through the perforations 5 in said screens, and the solution to be purified or filtered is allowed to enter the casing through the opening a^3 . Rising between the casing A and the casing C this liquid passes through the said screen and the sand E, finally 10 passing through the screen D and flowing out to the discharge-opening a^4 .

When it is desired to clean the filter to remove any bacteriological or other objection-

ing material may be discharged, substantially as described.

3. The combination in a filter, of a casing, 70 with two substantially cylindrical screens within the same, one of said screens being corrugated longitudinally and having strengthening-bands around it in engagement with said corrugations, the casing being provided 75 with openings for the admission and discharge of liquid to be filtered, substantially as described.

4. The combination in a filter, of a casing

having a removable cover a screen confined 80