

No. 649,364.

Patented May 8, 1900.

F. SCHEIBLER.  
BAG FILTER.

(Application filed Mar. 20, 1900.)

(No Model.)

2 Sheets—Sheet 1.

Fig. 1.

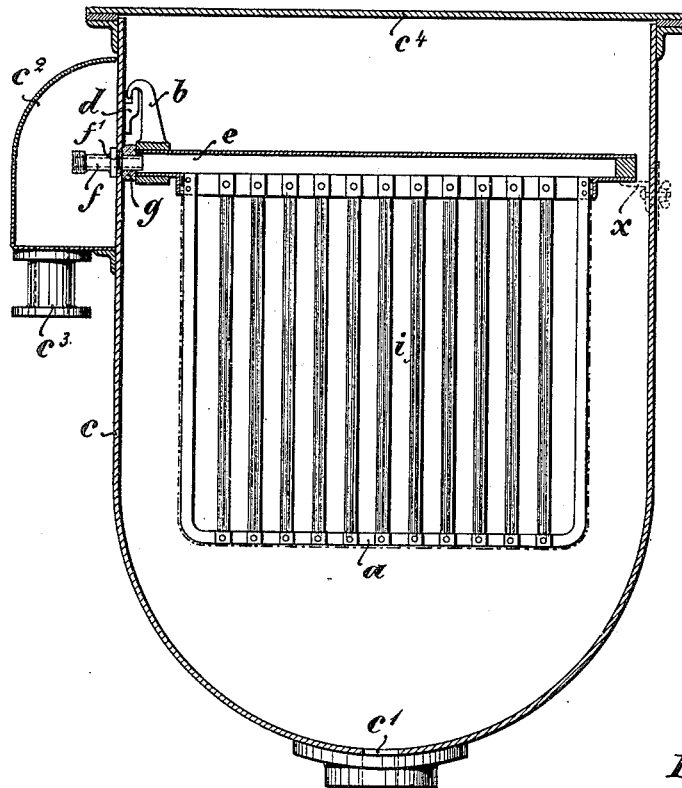


Fig. 2.



Fig. 3.

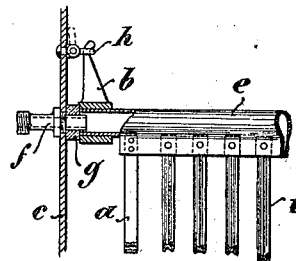


Fig. 1<sup>a</sup>.

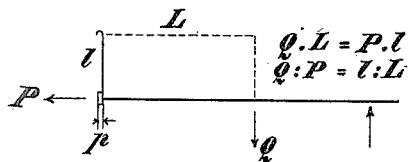
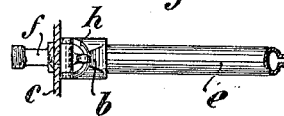


Fig. 4.



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2 Sheets—Sheet 2.

Fig. 5.

Fig. 6.

Fig. 7.

Fig. 8.

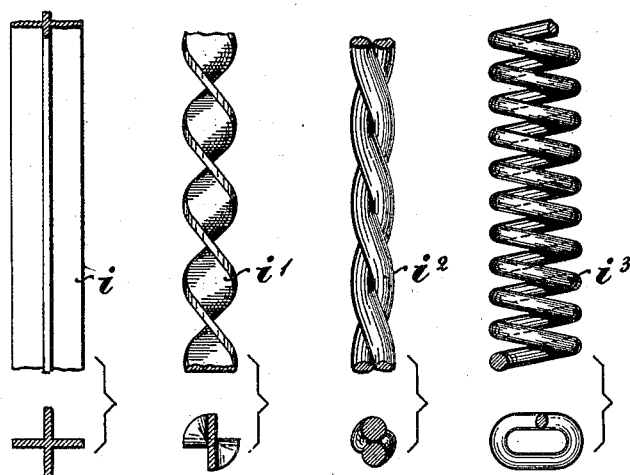


Fig. 5a.



Fig. 6a.



Fig. 7a.

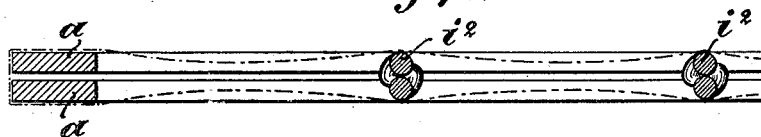
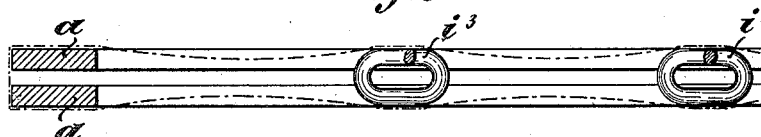


Fig. 8a.



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# UNITED STATES PATENT OFFICE.

FRITZ SCHEIBLER, OF AIX-LA-CHAPELLE, GERMANY.

## BAG FILTER.

SPECIFICATION forming part of Letters Patent No. 649,364, dated May 8, 1900.

Application filed March 20, 1900. Serial No. 9,422. (No model.)

*To all whom it may concern:*

Be it known that I, FRITZ SCHEIBLER, a subject of the King of Prussia, Emperor of Germany, residing at No. 3 Am Viaduct, Aix-la-Chapelle, in the Kingdom of Prussia, German Empire, have invented a new and useful Bag Filter, of which the following is a specification.

The present invention relates to bag filters or filters of which the filtering-surfaces are constituted by the sides of a permeable bag held apart from each other by means of a rigid frame and which bags are placed in the liquid to be filtered, so that the latter penetrates from the outside into the interior of the bag, whence it discharges, the interior of the bag communicating with a discharge-opening in the wall of the inclosing vessel, box, or casing.

More particularly my invention refers to the suspension of the filter in the inclosing box and to the structure of the frame supporting the bag, and has for its purpose, on the one hand, to render the filter self-tightening by means of its suspension, so as to obstruct any direct communication between its discharge-pipe and the box and between the latter and the outside, and, on the other hand, to so construct the frame that it allows the area of contact between it and the walls of the bag to be largely reduced without damaging the resistance of the bag to deformation and its durability.

Up to my present invention in bag filters the filter has been pressed by means of a set-screw, cam, or wedge against an elastic packing—for instance, an india-rubber ring or washer—inserted between the discharge-pipe communicating with the interior of the bag and connected with its frame and the inner wall of the inclosing vessel, box, or casing provided with an opening for cooperating with said discharge-pipe, so as to secure a hermetically-tight joint between said pipe and wall, such hermetical joint being indispensable in order to prevent the liquid to be filtered, which is fed into the box under pressure, from escaping to the outside otherwise than by passing through the filtering-bag into and out from the discharge-tube permanently communicating with the interior of the bag. According to my present invention said hermetical tightening is obtained by means of a peculiar

mode of suspending the filter, whereby the latter is rendered self-tightening—that is to say, by suspending the filter-frame on the discharge side after the manner of a hinge-joint, so that by its weight the filter has imparted to it the tendency of swinging downward, whereby a lateral pressure is caused to be exerted by the filter itself against the said packing. This self-tightening action of the filter may be brought about in a variety of ways. The most advantageous one will be more fully described hereinafter.

As regards the structure of the filter-frame, in order to obtain the result aimed at said frame is constructed as a grate with bars of such sectional shape as will keep the surfaces of the bag apart from each other at numerous places, so that the bag forms an unobstructed chamber throughout its entire extent without in the least augmenting, but considerably diminishing the extent to which the filtering-surfaces are obstructed by their contact with the grate-bars.

In the annexed two sheets of drawings, Figure 1 is a sectional elevation through a bag filter of my improved construction, and Fig. 2 a cross-section through the bag-frame. Figs. 3 and 4 show a modified form of the suspension of the filter respectively in elevation and plan. Figs. 5, 6, 7, and 8 relate to the bag-frame and illustrate some forms of grate-bars in elevation and horizontal section each. Figs. 5<sup>a</sup>, 6<sup>a</sup>, 7<sup>a</sup>, and 8<sup>a</sup> are cross-sections through the left-hand part of grates constructed with bars, as shown in Figs. 5, 6, 7, and 8.

Referring to Figs. 1 and 2, *a* is the grate-like bag-support, for instance, constructed with bars *i* of a cross-like section, as shown in Figs. 5 and 5<sup>a</sup>, and connected at its upper end with a pipe *e*, provided for this purpose with flanges along a slit in its under side, as clearly to be seen from Fig. 2. *c* is the casing, with the supply-opening *c'* in its bottom, a short tube *f* inserted in an opening of *f'*, its side wall in the line to be occupied by the discharge-pipe *e*, and a rail *d* fixed to said side wall above said opening *f'*. The short tube *f* projects with its inner end, on which is placed a packing-ring *g*, of india-rubber, into the box *c*, and with its outer end into a small box *c'*, fixed to the box *c* and provided

in its under side with a discharge-opening  $c^3$ . To the end of the discharge-pipe  $e$ , opposite the short connection-pipe  $f$  and rail  $d$ , is fixed a hook  $b$ , while the other end of discharge-pipe  $e$  is closed. The box  $c$  is hermetically closed with a lid  $c^4$ . The dotted line parallel to the outer contour of the frame  $a$  indicates the bag.

In placing the filter the same is first hung with its hook  $b$  on the rail  $d$ , so that the opening of the discharge-pipe  $e$  is in the vertical middle plane of the connection-pipe  $f$ , when the filter is gently let down so that the pipe  $e$  slips with its opening over the inner end of said connection-pipe and against the india-rubber ring  $g$ . Finally the filter is released, whereby it is caused to swing downward with the rail  $d$  as a fulcrum, the discharge-pipe  $e$  pressing its edge against the rubber ring  $g$ , and thereby the latter against the wall of the box, thus obstructing direct communication of the discharge-pipe with the box and of the latter with the outside. As to be seen from the diagram Fig. 1<sup>a</sup>, the lateral pressure  $P$  thus exerted by the weight  $Q$  of the filter is in an inverse ratio to the lever-arms  $L$  and  $l$ .

As already mentioned, provision may be made to regulate the tightening pressure of the filter at will—as, for instance, by arranging an adjustable support for the closed end of the discharge-pipe. Such a support (lettered  $x$ ) is shown in dotted lines in Fig. 1. It is supposed to be movable up and down in a vertical slit of the casing and combined with a set-screw to clamp it in the position desired.

In the modification shown in Figs. 3 and 4 the rail  $d$  is replaced by a chain-link  $h$ , movably secured to the box, and the hook  $b$  bent rearwardly, said link  $h$  being slipped over the hook, so as to catch under the same, or the hook may be fixed to the box and the link secured to the filter-frame. Instead of a single chain-link a chain may be used when desired.

The described improved suspension of the filter further affords the facility of enabling it to be arranged within a box of any desired shape, as the whole of the pressure for tightening the joint is taken up by one wall of the box. Therefore when a sufficiently-large box or casing is provided for a number of filters may be arranged on opposite sides of same, so that the discharge takes place on two or more sides. This arrangement is, for instance, preferred for large water-filters with open casings.

Referring now to the grate-like bag-support, Fig. 5 shows a grate-bar  $i$  whose sectional form is that of a cross, which shape combines great lightness with great stability.

Fig. 6 represents a grate-bar  $i'$ , consisting of wound or twisted flat iron, which also serves the purpose stated in a very effective manner.

Fig. 7 shows a grate-bar  $i^2$ , consisting of two wires coiled around each other, a shape which offers to the bag fewer points of contact than a smooth cylindrical rod.

Fig. 8 shows a grate-bar  $i^3$ , consisting of a spiral, which is permeable on all sides.

In Figs. 5<sup>a</sup>, 6<sup>a</sup>, 7<sup>a</sup>, and 8<sup>a</sup> the dotted lines indicate cross-sections of the bag.

The grate-bars above instanced are light and stable and insure the filtering-bag's surfaces being kept at such distances apart as to prevent them from coming into contact with each other. The bag therefore affords throughout a hollow space sufficient for the reception of the filtered material, while the extent to which the free filtering-surface is obstructed by the framework of the filtering-body is reduced to a minimum.

The advantages of the invention are as follows: The tightness of joint between the filter body or bodies and the casing surrounding them is insured without the aid of any special devices. The employment of the self-tightening arrangement does not subject opposite walls of the casing to any strain. Hence the casing is subjected to no pressure other than that of the liquid and is safe from any risk of being bent or bulged outward, because the whole of the pressure exercised to insure a tight joint is taken up by one of the walls only. In large-sized filter-cases two opposite sides or more than two may be fitted with filter-bodies. By the aforesaid grate-like construction of the bag-support an increased filtering effect is obtained and the simplest conceivable construction of all parts, both of the filtering-body and the filter-case, and the greatest simplicity in the handling of a filter made up of such parts are insured.

What I claim as my invention is—

1. In bag filters the combination with the box inclosing the bag, the bag-support, the discharge-pipe connected with the bag-support and communicating with the interior of the bag, the connection-pipe inserted in an opening of the box in the line to be occupied by the said discharge-pipe and having a diameter smaller than said discharge-pipe, and a packing arranged around the inner end of the connection-pipe, of a hinge-like suspension for the filter one member of which is fixed on the inner wall of the box above the connection-pipe, and the other member to the bag-support near the discharge end of the discharge-pipe, substantially as and for the purpose described.

2. In bag filters the combination with the box inclosing the bag, the bag-support, the discharge-pipe connected with the bag-support and communicating with the interior of the bag, the connection-pipe inserted in an opening of the box in the line to be occupied by the said discharge-pipe and having a diameter smaller than said discharge-pipe, and a packing arranged around the inner end of the connection-pipe, of a rail fixed to the inner wall of the box above the connection-pipe, and a hook fixed to the bag-support near the discharge end of the discharge-pipe, substantially as and for the purpose described.

3. In bag filters the combination with the

box inclosing the bag, the bag-support, the discharge-pipe connected with the bag-support and communicating with the interior of the bag, the connection-pipe inserted in an opening of the box in the line to be occupied by the said discharge-pipe and having a diameter smaller than said discharge-pipe, and a packing arranged around the inner end of the connection-pipe, of a rail, fixed to the inner wall of the box above the connection-pipe, a hook fixed to the bag-support near to the discharge-pipe, and an adjustable stop for the opposite end of the discharge-pipe, substantially as and for the purpose described.

4. In bag filters the combination with the box, the bag, the discharge-pipe from which the bag is hung, and a hinge-like connection between said box and discharge-pipe, of an inner bag-frame constructed as a grate, substantially as and for the purpose described.

5. In bag filters the combination with the box, the bag, the discharge-pipe from which the bag is hung, and a hinge-like connection between said box and discharge-pipe, of an inner bag-frame constructed as a grate with

the bars having a cross-like sectional form, substantially as and for the purpose described.

6. In filter-bags the combination of the box inclosing the filter, a bag-support constructed as a grate with bars having a cross-like sectional shape, a discharge-pipe arranged upon said support and communicating with the interior of the bag, a connection-pipe inserted in an opening in the wall of the box in the line to be occupied by the said discharge-pipe and having a diameter smaller than the discharge-pipe, a packing arranged around said connection-pipe, a hook fixed to the discharge-pipe near to the discharge end of same, a rail fixed to the inner side of the box above said connection-pipe, and an adjustable stop for the discharge-pipe, substantially as and for the purpose described.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

FRITZ SCHEIBLER.

Witnesses:

CONR. LOERSCH,  
G. SCOTT.