H. E. THEISEN.

LIQUID SEPARATOR.

APPLICATION FILED JUNE 10, 1913.

1,088,187.

Patented Feb. 24, 1914.

3 SHEETS—SHEET 1.

Fig. 1

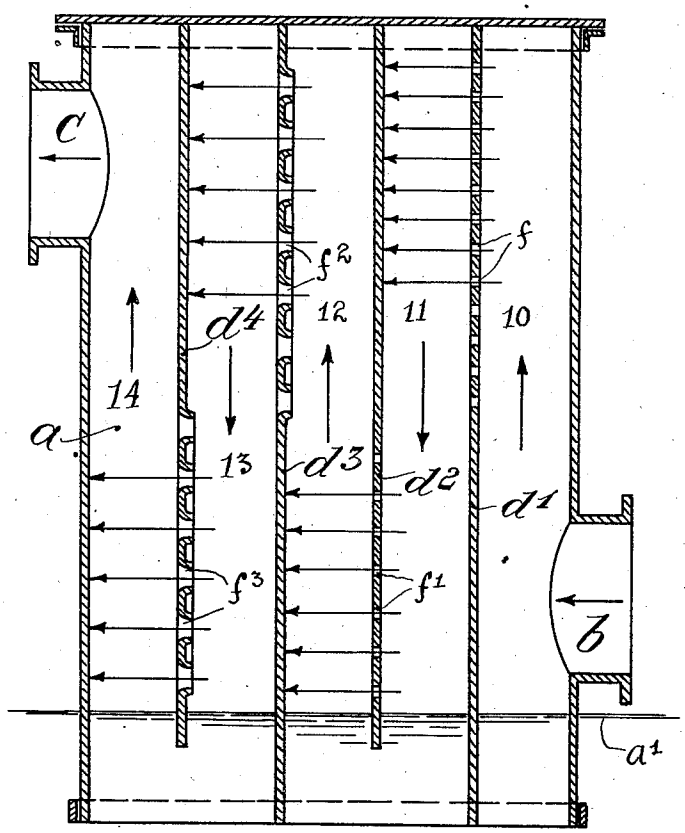


Fig. 2

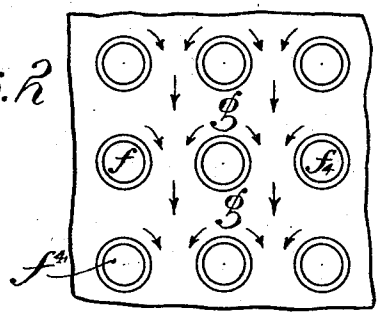
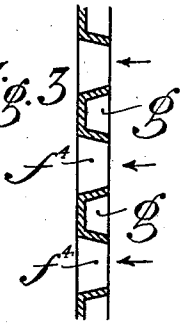


Fig. 3



Witnesses:

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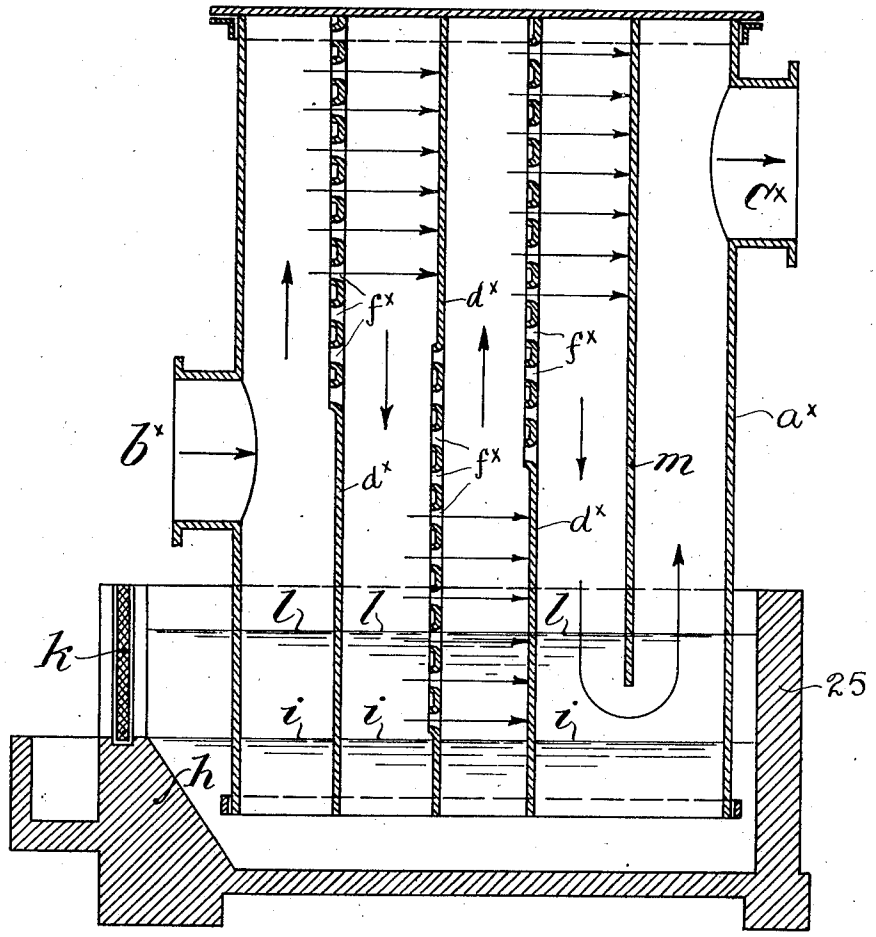
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3 SHEETS—SHEET 2.

Fig. 4



Witnesses:

Inventor

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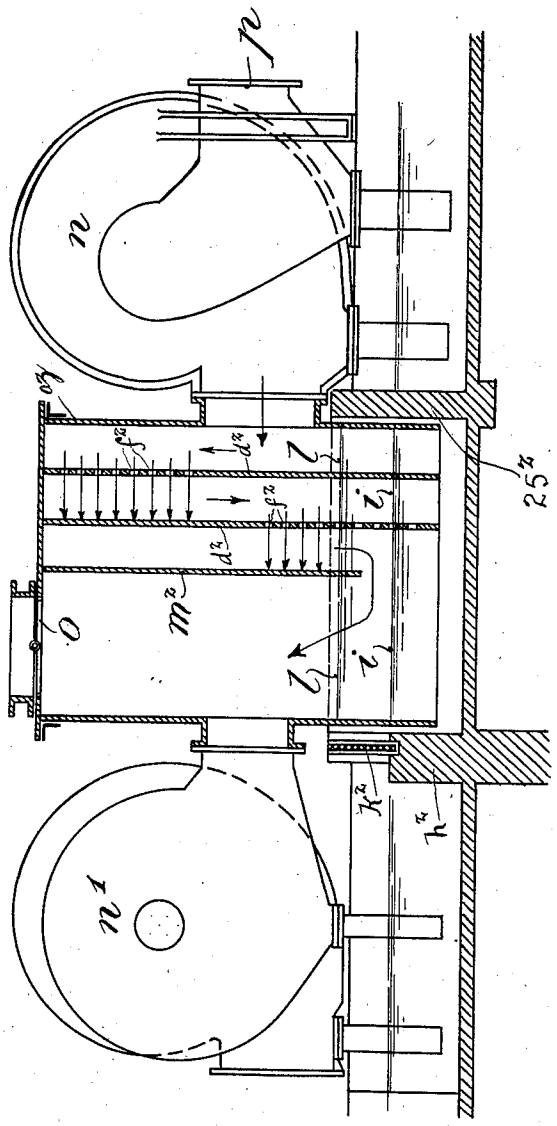
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3 SHEETS—SHEET 3.

Fig. 5



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UNITED STATES PATENT OFFICE.

HANS EDUARD THEISEN, OF MUNICH, GERMANY.

LIQUID-SEPARATOR.

1,088,187. Specification of Letters Patent. Patented Feb. 24, 1914.

Application filed June 10, 1913. Serial No. 772,821.

To all whom it may concern:

Be it known that I, HANS EDUARD THEISEN, a citizen of the United States of America, residing at Elisabethstrasse 34, Munich, Germany, have invented certain new and useful Improvements in Liquid-Separators, of which the following is a specification.

My invention relates generally to liquid separators, and has especial reference to means for separating liquid from gas or the like.

The principal object of the invention is to provide a simply constructed apparatus by means of which an effective separation of the liquid from the gas is secured.

The invention is illustratively exemplified in the accompanying drawing, wherein—

Figure 1 is a vertical sectional view of one form of the invention; Fig. 2 is a fragmentary plan view of one of the partitions employed in the construction of the device; Fig. 3 is a fragmentary sectional view thereof; Fig. 4 is a vertical sectional view of a modified form of separator; and Fig. 5 is a part elevational and part sectional view of a plant having the separator installed therein.

In all forms of the invention shown in the drawings, the separator is so constructed that the current of gas from which the liquid is to be separated, flows in a tortuous path contacting alternately with contact and perforated portions of the partitions within the separator. By this arrangement a most effective separating action results, and by the time the gas reaches the emission side of the separator, it has been freed of substantially all its liquid content.

Referring by reference characters to the drawings, and particularly to Fig. 1 thereof, the character *a* denotes a preferably cylindrical casing or container such as a stand pipe, which may have its lower end open and capable of being closed by a water seal *a'*. The gas admission opening is designated *b* and the outflow or emission opening for the gas, (after separation of the liquid therefrom) is designated *c*. Arranged within the stand pipe *a* and extending longitudinally thereof is a series of successive partitions *d'*, d^2, d^3, and d^4, which divide the interior of the stand pipe *a* into a plurality of compartments 10, 11, 12, 13 and 14. Each of the partitions *d'* to d^4 includes a contact portion and a perforated portion, the partitions, being so arranged within the stand pipe that the contact and perforated parts, respectively, of the partitions are in staggered relation to each other, *i. e.* the contact part of one partition is opposite the perforated part of an adjacent partition and vice versa. From Fig. 1 it will be noted that the gas entering the stand pipe through the admission port *b* impacts against the contact part of the partition *d'* whereby a considerable portion of the dirty water carried by the stream of gas is precipitated to the bottom of pipe *a*. The contact part of partition *d'* deflects the gas stream from its initial course, causing it to flow in compartment 10 in the direction of the arrow therein. The gas then reaches and flows through the perforations *f* in partition *d'*, whereby it is freed from a further portion of its liquid content. After issuing through the perforations *f* in the partition *d'* it impacts against the contact part of partition d^2 by which it is deflected and caused to flow downwardly in the compartment 11, whence it flows through the perforations *f'* in partition d^2 against the contact part of partition d^3. The stream of gas is again deflected and caused to flow upwardly in the compartment 12 until it reaches and passes through the perforations f^2 in the partition d^3. As the gas emerges from the perforations f^2 it impacts against the contact portion of partition d^4 being deflected downwardly in compartment 13, then flowing through the perforations f^3 in partition d^4 and upwardly in compartment 14 and out through the outflow passage *c*. Each time the gas impacts against a contact part of a partition, and flows through a series of perforations, it is freed of some of its liquid content, so that by the time the stream of gas passes out through the emission port *c* it is practically entirely dehydrated. The area of each orifice or perforation in each partition is such that the total area of all the orifices is somewhat less than the cross sectional area of the several compartments through which the gas flows in alternate directions. It will also be noted that the orifices are preferably differently formed, and of different areas, in the several partitions, as I have found this expedient to be very effective in producing satisfactory results.

In Figs. 2 and 3 I have shown a modified form of perforation f^4 in one of the partitions. The orifice is shaped somewhat like a jet or nozzle, and when the gas flows

through the orifices in the direction of the arrows in Fig. 3, the liquid particles separated out of the gas flow about and through the channels g, resulting from forming the perforations f^4, the flow of liquid being indicated by the arrows in Fig. 2.

I have found that by a very simple structural modification, the separator may have the additional function of cutting off the supply of gas, as desired, and in Fig. 4 I have illustrated one form in which these two functions are present in the apparatus. The stand pipe a^x, having the admission port b^x, the admission port c^x and the partitions d^x provided with the perforations f^x, has arranged therein an imperforate depending baffle wall m shorter than the partitions and positioned adjacent the emission port c^x. The bottom of the stand pipe rests in a casing or trough 25, provided with a dam h, so that during normal operation the level of the liquid in the trough 25 may be maintained at about the line i i. Slidable in the vertical wall of the casing 25 is a gate k designed to prevent the liquid from flowing over the dam h. When the device is to be used to cut off the supply of gas to the service system, the gate k is lowered whereby the level of liquid in the casing 25 is caused to rise to the line l, l, and seal the lower end of the baffle wall m. The gas can thus pass through the perforated walls d^x until it reaches the baffle wall m, where its flow is stopped, and in this way all mechanical valves can be dispensed with in cutting off the gas supply from the service main.

In Fig. 5 I have illustrated a plant wherein a separator, having also the function of cutting off the gas supply from the service pipe, is interposed between two gas washers or scrubbers n and n'. The stand pipe a^z is set into a casing 25^z provided with a dam wall h^z adapted to be closed off by the gate k^z. During normal operation, the gate k^z is raised so that the liquid level in casing 25^z is at the line i i. The gas is admitted at p through the scrubber n, passing through the perforations f^z of the partitions d^z and out through the second scrubber n'. If, for example, it is desired to cut the scrubber n out of service and have gas pass directly from the source of supply through the scrubber n' out to the service main, the gate k^z is lowered whereby the liquid level rises to l l, sealing the lower end of baffle wall m^z. The gas may then be admitted through the slide o, which may be raised by suitable float controlled means (not shown) governed by the rise of level of the liquid in casing 25^z. The gas enters through o and passes directly out through the scrubber n', its passage in the other direction being barred by the water sealed baffle wall m^z.

While I have illustrated and described my invention in considerable detail, it will be understood that modifications, within the scope of the appended claims, may readily be introduced by those skilled in the art.

What I claim is:—

1. A liquid separator, embodying a casing adapted to contain a fluid, a second casing having an open end set into the fluid-containing casing, admission and discharge ports in said second casing, and a plurality of fixed vertical partitions in said second casing, each of said partitions having a perforated portion and a contact portion, the perforated portion of one partition being opposite and in line with the contact portions of adjacent partitions, and there being uninterrupted communication between adjacent partitions.

2. A liquid separator, embodying a casing adapted to contain a fluid, a second casing having an open end set into the fluid-containing casing, admission and discharge ports in said second casing, a plurality of vertical partitions having uninterrupted communication therebetween fixed in said second casing, and nozzle shaped perforations formed in a part of each of said partitions, said nozzle shaped perforations being directed opposite to the direction of flow and the perforated portion of one partition being opposite and in line with the imperforate portions of adjacent partitions.

3. A liquid separator, embodying a casing adapted to contain a fluid, a second casing having an open end set into the fluid-containing casing, admission and discharge ports in said second casing, a plurality of fixed vertical partitions in said second casing, each of said partitions having a perforated portion and a contact portion, the perforated portion of one partition being opposite and in line with the contact portions of adjacent partitions, and there being uninterrupted communication between adjacent partitions, an imperforate baffle wall adjacent said discharge opening, and means for raising the level of the fluid in said first named casing to form a fluid seal.

In testimony whereof I have affixed my signature in presence of two witnesses.

HANS EDUARD THEISEN.

Witnesses:
A. V. W. Cotter,
Richard Lemp.