

No. 709,527.

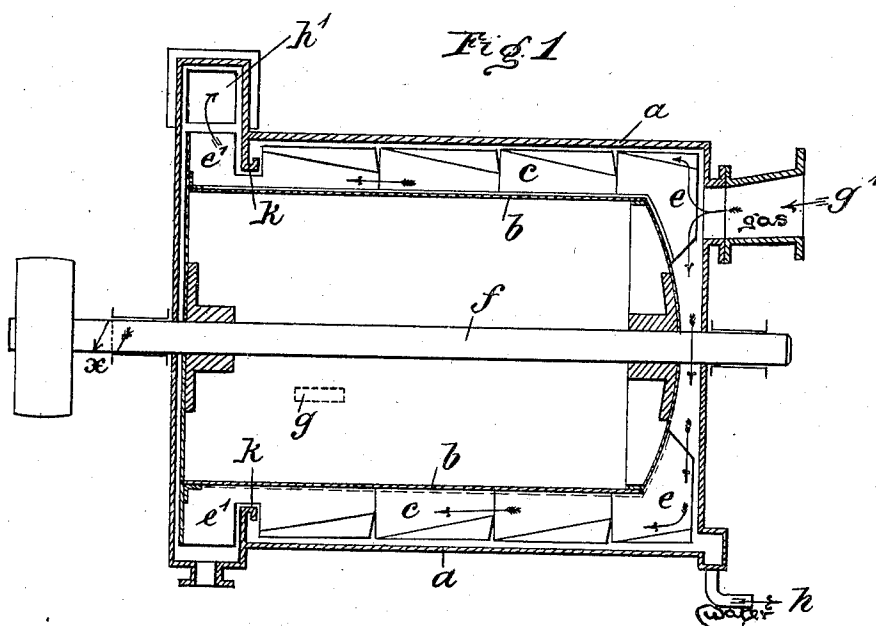
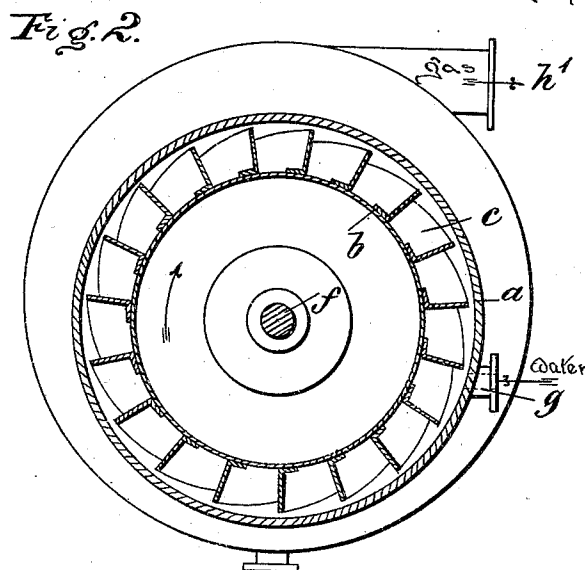
Patented Sept. 23, 1902.

E. THEISEN.
PROCESS OF TREATING GASES.

(Application filed Nov. 15, 1901.)

(No Model.)

2 Sheets—Sheet 1.



Witnesses
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John L. K.

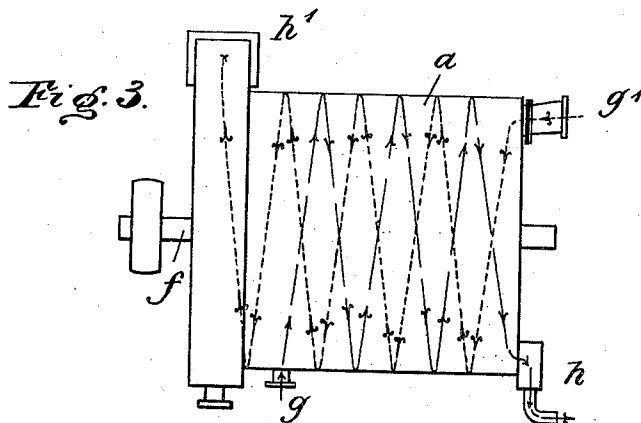
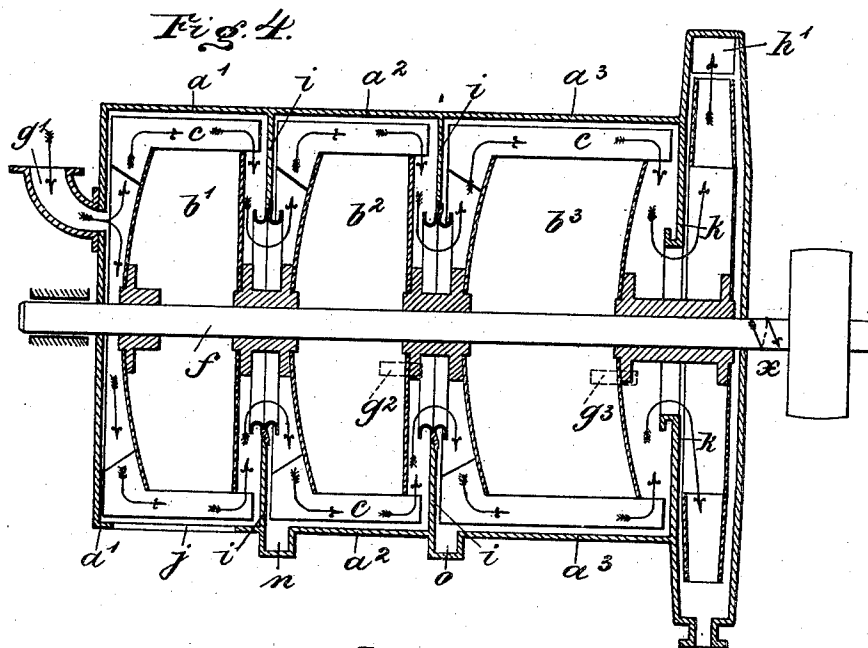
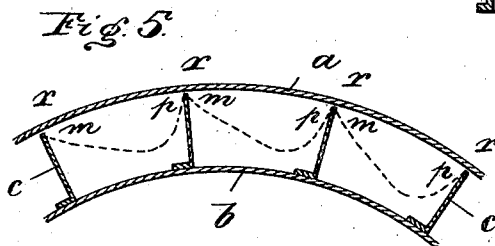
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(Application filed Nov. 15, 1901.)

(No Model.)

2 Sheets—Sheet 2.



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UNITED STATES PATENT OFFICE.

EDWARD THEISEN, OF BADEN, GERMANY.

PROCESS OF TREATING GASES.

SPECIFICATION forming part of Letters Patent No. 709,527, dated September 23, 1902.

Application filed November 15, 1901. Serial No. 82,339. (No specimens.)

To all whom it may concern:

Be it known that I, EDWARD THEISEN, mechanical engineer, residing at Yburgstrasse No. 1, Baden-Baden, in the Grand Duchy of Baden, Germany, have invented new and useful Improvements in the Treatment of Gases, of which the following is a specification.

My invention relates to processes in which gases and liquids are caused to move in contact with each other in opposite directions, and particularly to methods in which the gases are thrown outward by centrifugal force, and are thus brought in contact with the liquid, which is caused to flow in a thin film upon a surface surrounding the means which impart the centrifugal motion to the gas. Heretofore the motion of the gas and the liquid in opposite directions has been secured by various means. For instance, the drum or casing on which the liquid flows was caused to turn in the opposite direction to the centrifugal machine. In my present invention the liquid is caused to flow in a spiral path on the fixed casing by the action of the wings of the centrifugal machine, and in contradistinction to prior inventions the liquid in the present case moves in the opposite direction to the gases. I have ascertained that if the entire body of gas is itself moved by other means outside the said wings in the opposite direction to the liquid there still can be obtained the characteristic action of obliquely-disposed centrifugal wings placed on a rotating drum, which consists in a spiral motion of a thin liquid film on the casing of the centrifugal machine, which spiral motion is due to the influence of the gases acting by friction and pressure on the surface of the liquid. This motion of the gas body can be obtained by giving said body an impulse either before it is admitted to the centrifugal machine or after its outflow therefrom, the motion being sufficiently strong to overcome the oppositely-directed axial component of the movement determined by the spiral action above referred to. The gases pass through the space between the rotating drum and the case in a spiral path, and the liquid flows in a spiral motion on the surface of the casing the axial component of which is opposite to that of the gases.

Reference is to be had to the accompanying drawings, in which—

Figure 1 is a longitudinal section of a centrifugal apparatus such as may be used in carrying out my improved process. Fig. 2 is a cross-section thereof. Fig. 3 is a diagrammatic side elevation illustrating the path of the liquid and of the gas. Fig. 4 is a sectional elevation of another form of apparatus. Fig. 5 is a partial cross-section illustrating the action of the rotating wings.

In Figs. 1 and 2, *a* is the casing, *b* the rotary drum secured to the shaft *f*, and *c* indicates the obliquely-disposed wings secured to the periphery of the drum *b*. *g* and *h* are the inlet and outlet for the water or other liquid adapted to flow on the inner surface of the casing *a*, and *g'* and *h'* are the inlet and outlet, respectively, for the gas. The wings or blades are provided at that end of the drum *b* which is adjacent to the inlet *g'* with extensions *e*, projecting toward the axis or the shaft *f*, and these extensions are of such a form as to create considerable suction at the inner side and pressure at the periphery and to propel the air or other gas in the direction indicated by the arrows when the drum rotates in the direction indicated by the arrow *x*. The wings *c* are placed obliquely on the drum in such a manner as to counteract the tendency of the air or gas to flow in the direction just mentioned, without, however, being able to entirely arrest this movement. I prefer to provide, in addition to the extensions *e* of the wings at the inlet end of the casing, similar blades *e'* at the outlet end, which project outward beyond the periphery of the wing *c* on the middle of the drum and propel the gas in the same direction as the extensions *e* do. Under these conditions the water entering at *g* will by the mere action of the current of gas be propelled in a thin film in a spiral path on the inner surface of the casing *a* in a direction opposite to that in which the gas travels, so as to finally reach the outlet *h*. To secure this result, I find that a circumferential speed of from fifteen to sixty meters per second is advisable for the outer edge of the wings. In Fig. 3 the dotted lines indicate the path of the air and the solid lines the path of the liquid. I prefer to provide a

flange *k* at the discharge end of the casing, projecting into the current of gas. Hereby the pressure exerted by the gas on the film of fluid is materially increased and the action improved. The propelling action exerted on the gas must of course be increased correspondingly by properly increasing the blades *e* and *e'* or some other means.

In Fig. 4 I have shown a construction in which instead of a single continuous drum *b* are provided three separated drums or a partitioned drum *b'* *b''* *b'''*. The casing *a* is accordingly divided into three compartments *a'* *a''* *a'''*, separated from each other by inwardly-projecting flanges *i*. The path of the gases is indicated by arrows. The apparatus shown by Fig. 4 may be employed—*e. g.*, in the purification of gas for the purpose of separating tar and ammonia, whereby the tar will leave the apparatus by the opening *j*, the cooling liquid by the opening *n*, and the ammonia liquor by the opening *o*. The cooling liquid enters the apparatus by *g''* and the absorbing liquid by *g'''*. The operation of this construction is the same as stated above, whereby the flanges *i* and *k* will materially increase the effect.

The peculiar action resulting from the constructions described will be understood best by reference to Fig. 5. When the wings *c* rotate in the direction indicated by the arrow, the gas in front of the wings will obviously be compressed, as indicated at *m*, while immediately in the rear of each wing there will be a partial vacuum, as indicated at *p*. There will be a passage of gas over the edge *r* of the wings *c* from the portions *m* to the portions *p*, the strength of this current passing over the edges *r* corresponding to the difference between the speed of the edge *r* and that of the gas itself. In the neighborhood of the edge *r* the gas within the space *m* will be displaced only in so far as this is allowed by the considerable friction on the wing and by the friction on the casing *a* or on the liquid which covers said casing. The suction or pressure

exerted on the gas at the inlet or outlet will be of but slight influence in determining the strength of the gas-current passing over the edges *r*. Thus the gas will be given movement in a spiral path, which path is determined by the obliquity of the wings and by the direction of the rotation. It will be obvious that those particles of the gas which are relatively far away from the surfaces *a*, *b*, and *c*, and particularly those particles contained in the portions *p*, will be subjected much less or not at all to the influence of friction, but they will be subject more strongly to the action of the suction or pressure device which causes the gases to travel lengthwise of the drum. Thus these portions or particles of the gas will move lengthwise of the drum in the channels formed by the wings *c*, the drum *b*, and the casing *a*.

Having described my invention, what I claim, and desire to secure by Letters Patent, is—

The process of causing gases and liquids to flow in opposite directions in contact with each other, which consists in imparting a longitudinal motion to a body of gas, exposing said gas during its longitudinal travel to centrifugal action, and simultaneously applying to said gas a force tending to produce a motion in a contrary direction to that of the main longitudinal motion of said gas, interposing a liquid film in the path of the gas projected outwardly by centrifugal action and holding said liquid against outward movement under the influence of said gas, whereby the gas thrown outward with a tendency to travel in a direction opposite to its main flow, will cause the liquid to travel spirally in a direction opposite to the main flow of the gas.

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

EDWARD THEISEN.

Witnesses:

A. OBERMAYER,
THEKLA NENNER.