W. FELD.

APPARATUS FOR SUBJECTING GASES OR VAPORS TO THE ACTION OF LIQUIDS.

APPLICATION FILED MAY 13, 1910.

983,037.

Patented Jan. 31, 1911.

2 SHEETS—SHEET 1.

Fig. 1.

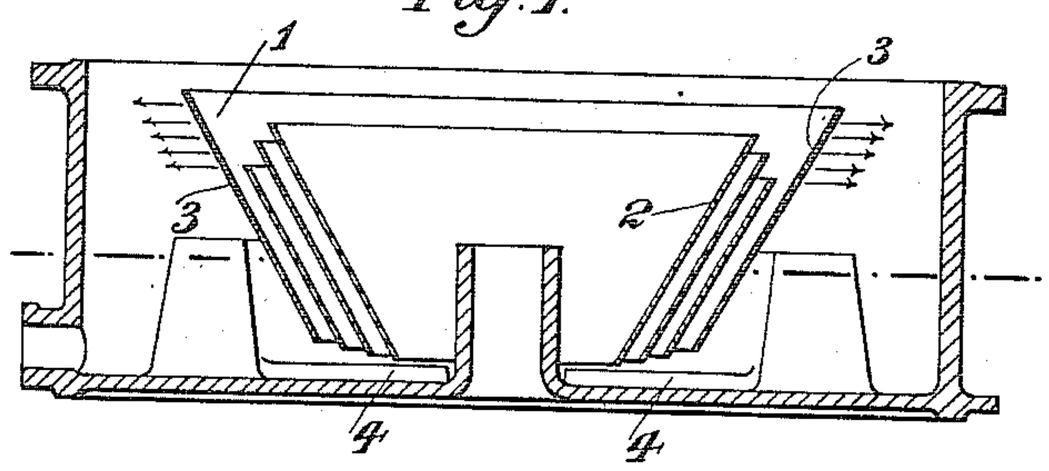


Fig. 5.

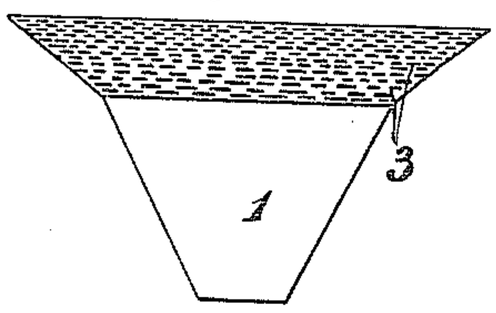


Fig. 6.

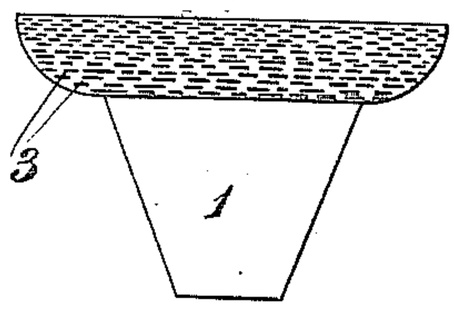


Fig. 7.

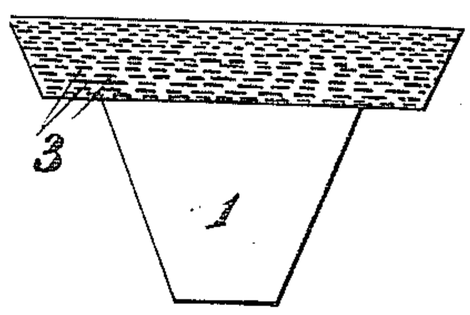
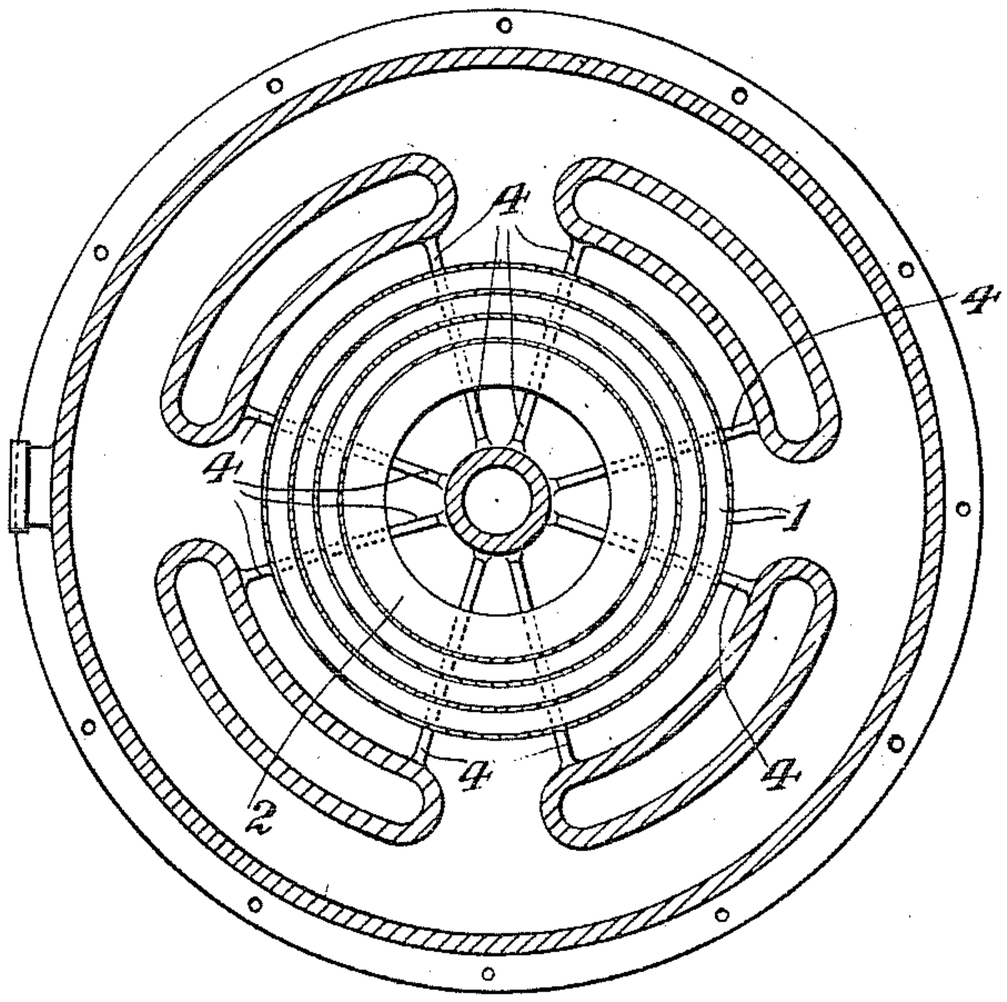


Fig. 2.



WITNESSES

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2 SHEETS—SHEET 2.

Fig. 4.

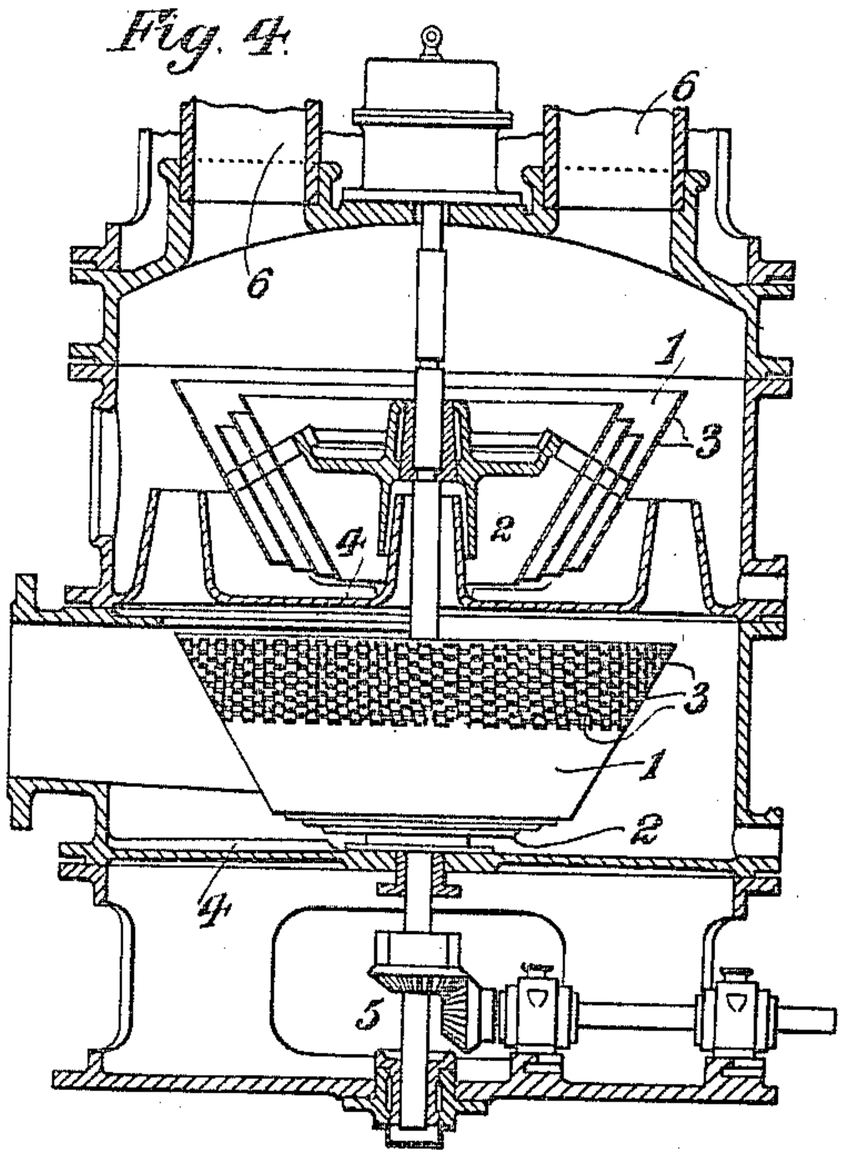
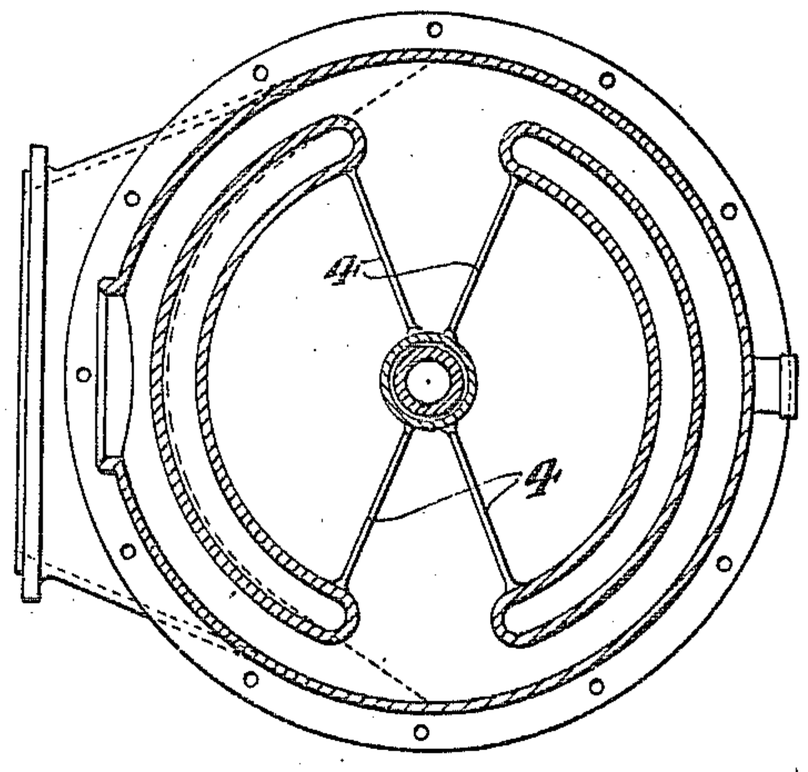


Fig. 3



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APPARATUS FOR SUBJECTING GASES OR VAPORS TO THE ACTION OF LIQUIDS.

983,037. Specification of Letters Patent. **Patented Jan. 31, 1911.**

Application filed May 13, 1910. Serial No. 561,124.

To all whom it may concern:

Be it known that I, WALTHER FELD, a subject of the King of Prussia and the German Emperor, of Hönningen-on-the-Rhine, in the Kingdom of Prussia and German Empire, have invented new and useful Improvements in Apparatus for Subjecting Gases or Vapors to the Action of Liquids, of which the following is a specification.

This invention consists in improvements in apparatus for subjecting gases, or vapors, to the action of liquids, the said apparatus to which my invention relates being of the kind in which, as hitherto constructed, a vessel, or vessels, is, or are, employed containing, or each containing, a rotatable device comprising a number of concentric funnels, or short conical pipes, (which I will hereinafter refer to as funnels), the upper peripheries of which are superposed to one another from outside to inside, the said funnels dipping into the liquid in the vessel and extending above the said liquid, so that, on rotating the funnels, they will, under centrifugal action, elevate the liquid and distribute it in the form of spray across the whole of the space through which the gases, or vapors, pass. This arrangement, although very effective, has disadvantages, which it is the object of my present invention to obviate. Supposing such device to have, say, for example, nine conical funnels arranged concentrically; the inner ones of course have a much smaller diameter than the outer ones, the diameter progressively increasing from the innermost funnel to the outermost funnel, so that, in rotating, the liquid-lifting power of the outer funnels is greater than that of the inner funnels, the lifting effect diminishing progressively from the outermost funnel to the innermost funnel, and the outer funnels are more effective in spraying than the inner ones. As the depth of the layers of liquid upon the outer funnel is so considerable that the velocity of the different layers of liquid ascending by centrifugal action is different according to the distance of the layers from the rotating funnel itself, the layer of liquid which is in contact with the funnel having, when it arrives at the upper periphery of the funnel nearly the same velocity as the funnel, which velocity is necessary to throw the liquid horizontally across the space. Those layers of liquid which are not in contact with the cone itself have far less velocity than the funnel and therefore as soon as they have come to the upper periphery of the funnel, instead of being thrown out horizontally, they have a tendency to be so acted upon by gravity that the liquid is not thoroughly spread horizontally, but is thrown out in large drops, which take a course inclined downward. This disadvantage gradually diminishes from the outermost to the innermost funnels, but the inner funnels have the disadvantage that, in consequence of their diameter being considerably smaller than the diameter of the outer funnels, the quantity of liquid lifted and also the peripheral velocity of the upper edges of the inner funnels are considerably less than is the case with the outer funnels, and therefore the spraying effect of the inner funnels is small compared with that of the outer funnels, and the spraying effect of the complete set of funnels as a whole is not the best possible. According to this invention, these disadvantages are overcome so that the amount of liquid lifted and distributed is, as much as possible, equally divided so that the liquid is practically equally sprayed across the whole of the space through which the gas passes and the whole of the spray has the same velocity as, or much more nearly the same velocity than, has hitherto been the case.

I will describe my invention with reference to the accompanying drawing.

Figure 1 is a vertical section of a vessel in which the funnels rotate. Fig. 2 is a sectional plan of the vessel; Fig. 3 is a modification; Fig. 4 shows a vertical section of two superposed vessels with a Pelouze tar separating apparatus superposed only the lower part of this apparatus being shown. Figs. 5, 6 and 7 show various modifications in the form of the improved funnel.

According to this invention the outermost funnel 1 is extended so that its outer periphery is nearly at the same level as, or at a higher level than, the upper periphery of the innermost funnel 2. The part of the outer funnel which extends above the water-level is perforated as shown at 3. This arrangement is so effective that only one perforated funnel without any inner funnel may be used, or, if the efficiency is to be increased, beyond that obtainable by one funnel, the number of the inner funnels can be

considerably diminished and, in any case, the spraying effect of the arrangement is considerably better than hitherto, the inner funnels when used merely serving the purpose of supplying the perforated upper part of the outer funnel with liquid. I have shown four concentric funnels as being used. In the case of two, or more, concentric funnels being used, the perforated extensions of the outer funnel may be less than is sufficient to extend above the upper periphery of the inner funnel, or funnels, 2. In this case, all, or part, of the inner funnels may be perforated at the parts which extend above the level of the liquid. Although the perforations may be of any shape, the best effect is obtained by using rectangular perforations, as illustrated. The perforated part of the funnel, or funnels, may be of any convenient shape. It may, for example, be concave, or more, or less, inclined than the lower part. Or it may have above the water level a horizontal part having an inclined superposed perforated part, extending above the liquid. Figs. 5, 6 and 7 show funnels made according to these modifications, Fig. 5 showing a perforated upper part more inclined than the lower part, Fig. 6 an enlarged curved perforated upper part, and Fig. 7 a horizontal part between the lower part and the enlarged upper part.

There is another disadvantage incidental to the rotating concentric funnels as hitherto used, by which the spraying efficiency is prejudicially affected, as, by the rotation of the funnels in the liquid, the liquid is also rotated and pressed, by centrifugal action, against the walls of the vessel so that the level of the liquid in the inner part of the vessel is lowered and therefore the liquid supply to the inner funnels is insufficient. According to my invention I overcome this disadvantage by the use of obstructers which suppress partially, or completely, the rotation of the liquid in the vessel. Such obstructers preferably each consist of a radial rib, or of radial ribs, 4, any suitable number of such ribs being formed on, or fixed to, the floor of the vessel and upstanding in the liquid sufficiently to partly, or wholly, prevent rotary movement of the liquid. In Fig. 2 I have shown eight radial ribs and in Fig. 3 four radial ribs, but any other suitable number and shape of radial ribs may be used. I have found that it is sufficient if the rotation of the liquid is prevented at the lower part of the vessel by a radial rib, or radial ribs, running from the center of the vessel underneath the innermost cone radially toward the wall of the passage for the gases, or vapors, as illustrated, being sufficient to obviate the disadvantageous change of liquid level, as with such rib, or ribs, the level of the liquid in the mid-part of the vessel is nearly the same when the device is rotating as when it is at rest, and the efficiency of the inner funnels is greatly increased.

There may be one vessel, or any suitable number of vessels, superposed, with spraying devices as described in each vessel, and the apparatus can be conveniently made up in sections, each carrying such an arrangement and superposed and luted together and driven by gear 5 as illustrated.

The apparatus may be used for any purpose in which gases, or vapors, are treated with liquids. If it be used for the extraction of tar from coal gas, or the like, there may be, connected with the vessel, or the top vessel of a number of superposed vessels, an apparatus known as the Pelouze, or Pelouze-Audoine, apparatus for the removal of the last traces of tar, this apparatus being conveniently superposed, the lower part of such an apparatus being indicated at 6 in Fig. 4.

What I claim is:—

1. An apparatus for subjecting gas to the action of liquid, said apparatus comprising a vessel for containing the liquid, a funnel for dispersing the said liquid and having the upper portion of its inclined surface perforated for the purpose specified, and means for rotating said funnel in combination with a gas inlet and a gas outlet for said vessel, said inlet and outlet being so arranged as to direct the gas from the inlet through only the sprayed liquid dispersed by said funnel, to the outlet, substantially as described.

2. An apparatus for subjecting gas to the action of liquid, said apparatus comprising a vessel for containing the liquid, concentric funnels arranged therein for dispersing the said liquid, and means for rotating said funnels, the inner funnels being stepped in size so as to present their upper edges in different planes all lying below that of the upper edge of the outermost funnel, and the latter having the upper portion of its inclined surface perforated for the purpose specified, in combination with a gas inlet and a gas outlet for said vessel, said inlet and outlet being so arranged as to direct the gas from the inlet through only the sprayed liquid dispersed by said funnel, to the outlet, substantially as described.

3. An apparatus for subjecting gas to the action of liquid, comprising a vessel for containing the liquid, with a passage therethrough for the gas to be washed, a centrifugal member dipping into the said liquid for spraying the same, means to obstruct the rotary motion of the liquid caused by the rotation of said centrifugal member, and means for actuating said centrifugal member.

4. An apparatus for subjecting gas to the action of liquid, comprising a vessel for con-

taining the liquid, with a passage therethrough for the gas to be washed, a centrifugal member dipping into the said liquid for spraying the same, means to obstruct the rotary motion of the liquid caused by the rotation of said centrifugal member, said means comprising stationary ribs on the bottom of said vessel, and means for actuating said centrifugal member.

5. An apparatus for subjecting gas to the action of liquid, comprising a washing chamber adapted to contain a washing liquid and provided with gas inlet and outlet ports in the bottom and top thereof, in combination with a perforated rotary dispersing screen arranged within said chamber and having its dispersing surface lying radially inside said inlet and outlet ports so as to permit the unobstructed passage of the gas through said chamber, together with means to rotate said screen whereby the washing liquid is dispersed through the gases as they pass unobstructed through the chamber.

6. An apparatus for subjecting gas to the action of liquid, comprising a washing chamber adapted to contain a washing liquid and provided with gas inlet and outlet ports in the bottom and top thereof, in combination with a funnel-shaped screen having its perforated dispersing portion lying above the surface of the liquid and radially inside said inlet and outlet ports so as to permit the unobstructed passage of the gas through said chamber, together with means to feed the liquid to said dispersing portion of the screen and means to rotate said screen whereby the said liquid is dispersed through the gases as they pass unobstructed through the chamber.

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

WALTHER FELD.

Witnesses:

LOUIS VANDORY,

ROBERT DUNLAP.