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SPRINKLING DEVICE FOR GAS SCRUBBERS, COOLING TOWERS, AND THE LIKE.

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To all whom it may concern:

Be it known that I, ARTHUR KUHN, a citizen of the German Republic, residing at Recklinghausen, Germany, have invented certain new and useful Improvements in a Sprinkling Device for Gas Scrubbers, Cooling Towers, and the like, of which the following is a specification.

My invention relates to a sprinkling device for gas scrubbers, cooling towers or similar apparatus for producing an interchanging effect between gaseous and liquid bodies passing through the filling of said apparatus which is provided for the purpose of splitting up the gas and liquids into fine streams. By means of this invention a continuous and uniform distributing of liquid onto the whole plane surface of the filling, irrespective to variations in the supplied quantity of liquid, is attained by a simply constructed arrangement, without movable parts and in a most advantageous way.

The sprinkling device is shown in the enclosed drawing, wherein Fig. 1 represents a vertical axial section and Fig. 2 a sectional plan view along the line A—B of Fig. 1, looking in downward direction. Fig. 3 gives a detail in a somewhat enlarged scale.

Fig. 1 shows the top part of a vertical, cylindrical gas scrubber *a* which contains a filling *b* say of wooden hurdles. The gas to be treated enters the scrubber-filling *b* at the bottom and travels in an upward direction, leaving through the branch connection *c* on top. The sprinkling device arranged above the filling *b* comprises as an essential part a liquid distributing tray *d* with a horizontally arranged base, suspended by adjustable suspension rods *s* and made of such a size that practically the whole plane surface of the filling to be sprinkled is covered by the tray, leaving only sufficient space between the tray *d* and the wall of the scrubber to enable the gas to travel through it. The horizontal base of the tray *d* is provided with a number of uniformly constructed, short, outlet pipes or nozzles *e* which are evenly distributed over its area. A preferred manner of fitting the nozzles *e* to the base of the tray *d* is illustrated by the Fig. 3 which by an enlarged section shows the pipes *e* as turned bodies loosely inserted into corresponding holes of said base from above. The free passages of the outlet pipes *e* are

so determined that, when in operation, an equilibrium in the tray *d* between the supply and discharge of the sprinkling liquid is maintained only when a stowed coherent layer of liquid has been formed within the tray over all the outlet pipes. Vertically under each nozzle *e* and at the top of the filling a small impact plate *t* is arranged for splitting-up the jet of liquid falling thereon.

As a further feature of the invention, a slightly tapered hood *h* of umbrella-like shape and resting on supports *k* is arranged inside of the tray *d* coaxially with it so that all outlet pipes *e* are covered. The circumferential edge of the hood *h* stands at a small uniform distance from the horizontal bottom of the tray *d* and in such a way that this edge is flooded by the liquid contents of the tray at practically any level thereof. Besides the top of the hood *h* should be a little higher than the rim of the tray *d* so that in all cases, even at the highest level of the liquid the top of the hood should project somewhat out the liquid. There is also provided a vent *r* arranged near the centre. The sprinkling liquid is conveyed from the feed pipe *f* hanging from the top of the scrubber *a* to the top of the hood *h*.

During the operation of the sprinkling device, when a continuous and uniform supply of liquid has been established, a state of inertia or equilibrium is created within the tray *d* which automatically produces a definite level of liquid depending upon the amount of flow per unit of time and upon the total free sectional area of the outlet pipes *e*. Corresponding to the available height limits within which the level of liquid in the tray *d* is permitted to vary, it is also possible to vary the proportion of the liquid supply and time in which a given quantity passes through. On the other hand, as the amount of liquid passing through the individual pipes *e* is determined by the area of the pipes and the height of the liquid above them, there must result through the uniform designing of all outlet pipes and for the horizontal position of the tray, independent of the variable liquid quantities passing through, a uniform discharge of liquid at all times through all the pipes *e* as long as the liquid remains at a uniform level over all the outlet pipes; that is, when the surface of the liquid is sufficiently undisturbed. To ensure this ef-

fect, the hood *h* offers a specially suitable means. It operates in such a manner that it receives the incoming current of the sprinkling liquid from the pipe *f* and protects the store of liquid beneath it and above the outlet pipes *e* from being objectionably disturbed through the liquid current entering at any individual point. The liquid leaving the feed pipe *f* is conveyed by means of the hood *h* around the periphery of the tray *d* and can here, in consequence of the ample passage space available along the circumferential edge of the hood *h*, flow into and mix with the existing body of the liquid at a very slow velocity. Apart from this, the initial velocity at which the incoming fresh liquid passes from the centre of the hood *h* to its periphery is, owing to mixing, destroyed by the liquid body which exists at the outer edge of the hood and which communicates with the liquid at the bottom from the interior. The stronger the inflow from *f* the higher will be the liquid layer under the hood *h* and above its edge and the nearer to the centre or top of the hood the outer liquid layer will approach. Thus, in case a stronger liquid supply should arise, at once also a larger accumulated liquid body will exist around the sides of the hood into which body the stronger liquid current may lose itself before joining the liquid body beneath the hood. The umbrella-like shape of the hood enables it in this way automatically to adapt itself to the various requirements of operation. Besides if, for any reason, owing to unforeseen circumstances, temporarily an exceptionally strong current of liquid should arrive through the feed pipe *f*, the excess of liquid not handled and consumed by the outlet pipes *e* would flow over the sides of the tray *d* and be distributed by its horizontal rim with a certain uniformity over the hurdle-filling *b* without causing any trouble in operation. On the other hand, in case that a very small inflow of liquid should occur which would render a regular stowing of the liquid in the tray *d* impossible, the small current of liquid entering would at least, by means of the hood *h*, distribute itself evenly over the whole periphery of the sprinkling tray *d* and reach uniformly those outlet pipes *e* situated in circle at the furthest extremity of its base thereby again ensuring a certain uniformity in the sprinkling of the scrubber filling *b*. Thus the sprinkling device is suitable for a very wide variety of operating conditions arising in practise.

A still much greater capacity of use can be obtained for the device described by making the outlet pipes or nozzles *e*, inserted in the base of the tray *d* as explained above with reference to Fig. 3, as exchangeable bodies, whereby new pipes of larger or smaller cross sectional area can be sub-

stituted at will for those used formerly. The preferred construction shown by Fig. 3 enables the operator to make such exchange or substitution and thereby alter the capacity of the apparatus without displacing the tray *d*, the chief part of the device, from its originally adjusted position. This is also an advantage of the invention which gives the same a great importance.

Having thus described my invention, what I claim is:—

1. A sprinkling device for gas scrubbers, cooling towers and the like, comprising a liquid distributing tray with a horizontally arranged base, a number of short outlet pipes distributed in its base evenly over the whole area and constructed uniformly with free passages of such size that in operation a coherent layer of liquid is stowed in the tray above all outlet pipes, and means for effecting a continuous supply of fresh liquid into the tray in a manner which practically avoids disturbance of the surface of the liquid stowed therein.

2. A sprinkling device for gas scrubbers, cooling towers and the like, comprising a liquid distributing tray with a horizontally arranged base, a number of exchangeably arranged short outlet pipes distributed in its base evenly over the whole area and constructed uniformly with free passages of such size that in operation a coherent layer of liquid is stowed in the tray above all outlet pipes, and means for effecting a continuous supply of fresh liquid into the tray in a manner which practically avoids disturbance of the surface of the liquid stowed therein.

3. A sprinkling device for gas scrubbers, cooling towers and the like, comprising a liquid distributing tray with a horizontally arranged base, a number of short outlet pipes distributed in its base evenly over the whole area and constructed uniformly with free passages of such size that in operation a coherent layer of liquid is stowed in the tray above all outlet pipes, and means for leading the fresh liquid to the peripheral portions of the liquid stowed in the tray in a manner which practically avoids disturbance of the surface of the said liquid.

4. A sprinkling device for gas scrubbers, cooling towers and the like, comprising a liquid distributing tray with a horizontally arranged base, a number of exchangeably arranged short outlet pipes distributed in its base evenly over the whole area and constructed uniformly with free passages of such size that in operation a coherent layer of liquid is stowed in the tray above all outlet pipes, and means for leading the fresh liquid to the peripheral portions of the liquid stowed in the tray in a manner which practically avoids disturbance of the surface of the said liquid.

5. A sprinkling device for gas scrubbers, 13

cooling towers and the like, comprising a liquid distributing tray with a horizontally arranged base, a number of short outlet pipes distributed in its base evenly over the whole area and constructed uniformly with free passages of such size that in operation a coherent layer of liquid is stowed in the tray above all outlet pipes, a slightly tapered hood of umbrella-like shape arranged inside the tray and covering all outlet pipes, the circumferential edge of said hood being flooded by the liquid layer of the tray at any level thereof, and a liquid supply at the top centre of said hood.

6. A sprinkling device for gas scrubbers, cooling towers and the like, comprising a liquid distributing tray with a horizontally arranged base, a number of exchangeably arranged short outlet pipes distributed in its base evenly over the whole area and constructed uniformly with free passages of such size that in operation a coherent layer of liquid is stowed in the tray above all outlet pipes, a slightly tapered hood of umbrella-like shape arranged inside the tray

and covering all outlet pipes, the circumferential edge of said hood being flooded by the liquid layer of the tray at any level thereof, and a liquid supply at the top centre of said hood.

7. A sprinkling device for gas scrubbers and the like comprising a tray having equally distributed outlets throughout its base and means for maintaining a coherent layer of practically undisturbed liquid above all outlets.

8. A sprinkling device for gas scrubbers and the like comprising a tray having equally distributed outlets throughout its base, a distributing hood supported within said tray and having its marginal edges outside said outlets and submerged in the liquid in said tray, and means for feeding liquid to said hood.

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

ARTHUR KUHN.

Witnesses:

GUSTAV LAMBERTZ,
HERMANN RUPPERT.