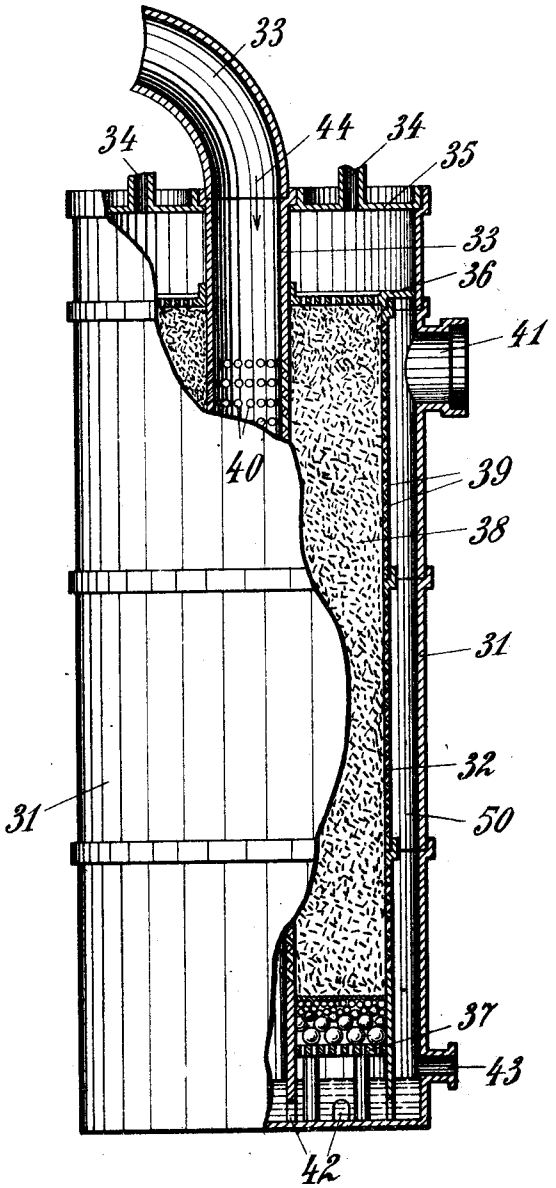
I. MOSCICKI.

APPARATUS FOR TREATING GASES OR VAPORS WITH LIQUIDS.

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1,097,870. Patented May 26, 1914.



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UNITED STATES PATENT OFFICE.

IGNACY MOSCICKI, OF FREIBURG, SWITZERLAND.

APPARATUS FOR TREATING GASES OR VAPORS WITH LIQUIDS.

1,097,870. Specification of Letters Patent. Patented May 26, 1914.

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To all whom it may concern:

Be it known that I, IGNACY MOSCICKI, citizen of Switzerland, residing at Freiburg, in Switzerland, have invented certain new and useful Improvements in Apparatus for Treating Gases or Vapors with Liquids, of which the following is a specification.

My invention relates to a method of and apparatus for treating gases or vapors with liquids, for such purposes as to absorb gases or vapors.

The object of my invention is to produce an apparatus of such construction that in a comparatively small space sufficiently large surfaces are obtained to effect the desired interchangeable action between the gas or vapor and the liquid. To this end I use a filling material composed of particles being of much smaller size than those of the filling materials used heretofore for similar purposes.

Tests have shown that with the use of a filling material, whose particles are of a size of only a few millimeters in diameter, the height of the individual layers can be reduced to 30 centimeters and less, without hereby impairing the completeness of the desired action. If layers of a greater height are used, the gas, which is passed through the moistened layers must flow with an increased velocity, in which case particles of the liquid that has been used for moistening the layers are carried away with the gas in the shape of a fine mist. Where, on the other hand, a filling material of large proportions is used, the apparatus must be made of correspondingly large dimensions, to offer sufficiently large surfaces to effect the interchangeable action referred to. In that way, of course, the expense in the construction of the apparatus and the space required for it are greatly increased. Moreover, in using layers of filling material of such large size, it is difficult to thoroughly and uniformly moisten the layers and a great deal of liquid is used.

In using a filling material composed of particles of small size, I am enabled to build up layers, which will occupy but little space and yet afford a sufficiently large surface to produce the desired action between the gas and the vapor and the liquid, and besides, the layers can be uniformly moistened. The layers being of small height, the apparatus can be made of small proportions, requiring little space and small expense.

An apparatus according to my invention is shown in the accompanying drawing, in which—

32 designates a hollow cylinder which is so arranged in the cylindrical apparatus 31, that a cylindrical space is left between the wall of the said hollow cylinder 32 and the shell of the apparatus 31. The cylinder 32 extends nearly to the bottom of the apparatus 31 and into the cylinder, in the center thereof, extends a tube 33, which passes through the perforated bottom plate 37, of the cylinder 32 and serves as a conduit for the gas, or vapor, to be passed through the filling material 38, which fills the entire hollow cylinder 32. Immediately on the perforated bottom plate 37 of the cylinder are supported balls made of clay, of successively smaller diameter, which balls shall prevent the filling material from falling through the openings of the perforated bottom plate 37. At its upper end the cylinder 32 is closed by a screen plate 36, the rim of which plate is solid and forms a closure for the cylindrical space between the cylinder 32 and the shell of the apparatus 31. The plate 36 is provided with a central opening for the passage of the tube 33, which is also held at its upper end by the lid 35 of the apparatus. The lid is provided with inlet passages 34, for the liquid which is used to moisten the filling material 38 in the hollow cylinder. The tube 33 is provided inside the cylinder 32 with a great number of fine openings 40, through which the gas, or vapor, entering the tube passes into the filling material 38. Likewise, the cylinder 32 is provided in its wall with a plurality of fine bores 39, through which the gas, or vapor, not retained by the liquid, passes out into the cylindrical space 50. The bores 39 in the wall of the cylinder 32 converge in the direction of the arrow 44, whereas the bores 40 in the tube 33 are arranged diverging. This arrangement has for its purpose to conduct the gas, or vapor, horizontally through the layer of filling material, through which the liquid supplied through the passages 34 in the lid 35 flows in a vertical downward path. The gas, which is not absorbed by the liquid and passes through the bores 39 into the space 50 passes out through the outlet opening 41 arranged at the top of the apparatus. Any liquid that may enter into the tube 33 through the bores 40 therein or into the space 50 through the bores 39 in

the cylinder wall runs down in said tube or on the outside of the cylinder and gathers with the other liquid passing through the filling material in the lower part of the apparatus. The cylinder 32 and the tube 33 are provided with recesses 42 at their bottom ends, through which recesses a communication is established between the spaces inclosed by the tube 33, the cylinder 32 and the shell of the apparatus 31, which latter is provided near its bottom with a discharge passage 43, through which the liquid can escape to be discharged or returned to the top of the apparatus. The level of the liquid gathering at the bottom of the apparatus must always be above the upper edges of the recesses 42 to prevent an escape of the gas, or vapor, at the bottom of tube 33, into the space 50. For the same reason, the bores 39 and 40, provided in cylinder 32 and the tube 33 respectively begin above the top layer of the clay balls provided at the bottom of cylinder 32, since the said balls have no sufficient resistance to prevent an escape of the gas, or vapor.

My new apparatus can be used in all cases, in which a liquid shall be brought in intimate contact with gases or vapors, as for instance for the purpose of absorption of gases or vapors by the liquids or for the purpose of drying gases or vapors by moistening the filling material with concentrated sulfuric acid or for the purpose of the oxidation of liquids by gases or vapors.

The apparatus, as has already been stated above, is used for absorbing gases or vapors by liquids. As a specific example, it may be stated that applicant's apparatus, may be used, for instance, for absorbing nitrous gases by water. When air is treated with, or subjected to, an electric arc, a mixture is obtained containing mostly air, which has remained unchanged, but containing also a small percentage of oxids of nitrogen. This mixture is passed through the apparatus, while, at the same time, the layers of the filling material are periodically moistened with water, which results in the production of nitrous acid and nitric acid. The former will afterward again decompose, while the nitric acid in solution in the water can be withdrawn for further treatment.

I claim:

1. An apparatus for absorbing gases or vapors by liquids, comprising three concentric cylindrical chambers, the inner and intermediate chambers inclosing a granular, non-absorbing filling material and both provided with perforations inclined toward the filling material, means in the cover of the outer chamber for pouring a liquid over the filling material, means at the bottom of said outer chamber for collecting the liquid enriched by the gases or vapors, and discharging the concentrated liquid, the inner chamber being constructed as a tube projecting through the cover of the outer chamber and adapted to conduct the gases or vapors to be absorbed into the apparatus for the purpose of causing them to be brought in intimate contact with the liquid in the filling material, and an exhaust in the wall of the outer chamber for the rest of the gases or vapors.

2. An apparatus for absorbing gases or vapors by liquids, comprising three concentric cylindrical chambers, the inner and intermediate chambers inclosing a granular, non-absorbing filling material and both provided with perforations inclined toward the filling material, means in the cover of the outer chamber for pouring a liquid over the filling material, means at the bottom of said outer chamber for collecting the liquid enriched by the gases or vapors, and discharging the concentrated liquid, the inner chamber being constructed as a tube projecting through the cover of the outer chamber and adapted to conduct the gases or vapors to be absorbed into the apparatus for the purpose of causing them to be brought in intimate contact with the liquid in the filling material, and an exhaust in the wall of the outer chamber for the rest of the gases or vapors, a perforated plate spaced from the bottom of the outer chamber and adapted to support the filling material, and a second perforated plate covering the filling material and tightly surrounding the tubular inner chamber, the rim of said second plate between the intermediate and outer chamber being imperforate and forming a gas-tight cover for the cylindrical space between the said intermediate and outer chambers, the exhaust for the rest of the gases being located beneath the last mentioned perforated plate.

3. An apparatus for absorbing gases or vapors by liquids, comprising three concentric cylindrical chambers, the inner and intermediate chambers inclosing a granular, non-absorbing filling material and both provided with perforations inclined toward the filling material, means in the cover of the outer chamber for pouring a liquid over the filling material, means at the bottom of said outer chamber for collecting the liquid enriched by the gases or vapors, and discharging the concentrated liquid, the inner chamber being constructed as a tube projecting through the cover of the outer chamber and adapted to conduct the gases or vapors to be absorbed into the apparatus for the purpose of causing them to be brought in intimate contact with the liquid in the filling material, and an exhaust in the wall of the outer chamber for the rest of the gases or vapors, a perforated plate spaced from the bottom of the outer chamber and adapted to support the filling material, and a second

perforated plate covering the filling material and tightly surrounding the tubular inner chamber, the rim of said second plate between the intermediate and outer chamber being imperforate and forming a gas-tight cover for the cylindrical space between the said intermediate and outer chambers, the inclined perforations in the walls of the inner and intermediate chambers terminating at such a distance from the said first mentioned perforated plate above the same and the perforations in the wall of the tubular inner chamber commencing at such a distance from the said second perforated cover plate below the same as to prevent the escape of the fresh gases or vapors from the apparatus before they have passed through the moistened filling material.

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

IGNACY MOSCICKI.

Witnesses:
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