H. PETERSEN.

FILLING MATERIAL FOR REACTION CHAMBERS.

APPLICATION FILED SEPT. 26, 1907.

899,899.

Patented Sept. 29, 1908.

Fig. 1.

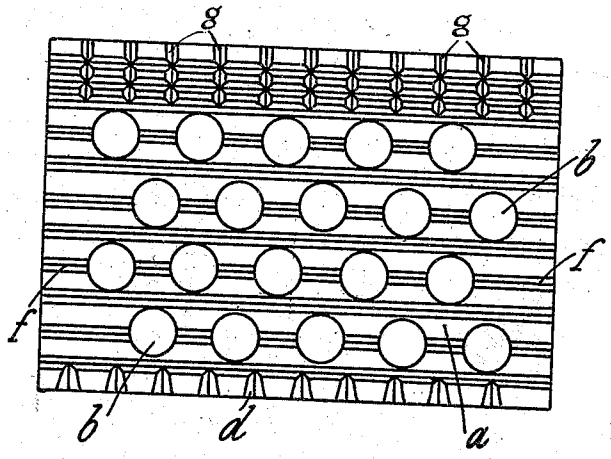
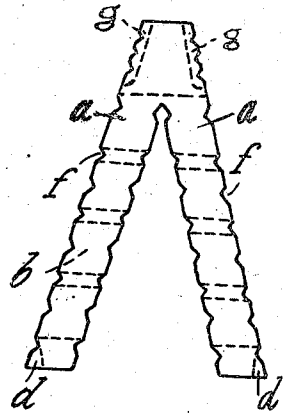


Fig. 2.



Witnesses

Ernst Koeni.

Adolf Schäfer

Inventor

Hugo Petersen.

UNITED STATES PATENT OFFICE.

HUGO PETERSEN, OF WILMERSDORF, NEAR BERLIN, GERMANY.

FILLING MATERIAL FOR REACTION-CHAMBERS.

No. 899,899. Specification of Letters Patent. Patented Sept. 29, 1908.

Application filed September 26, 1907. Serial No. 394,714.

To all whom it may concern:

Be it known that I, HUGO PETERSEN, a chemical engineer, and a subject of the German Emperor, and a resident of 181 Kaiser-Allée, in the city of Wilmersdorf, near Berlin, Kingdom of Prussia, and German Empire, have invented a certain new and useful Filling Material for Reaction-Chambers, of which the following is a specification.

This invention has for its object to provide a packing or filling material for reaction chambers, absorption chambers, gas purifiers and the like, constructed and adapted to be arranged in such manner that gases and liquids may be brought into intimate contact each with the other, so that each will permeate and be caused to react perfectly upon the other.

The invention is intended to secure the highest degree of efficiency in the absorption of vapors or gases by liquids, to cause the removal of solid impurities from gases or vapors, and to avoid the possibility of obstructions by flue dust and the like.

The packing material, forming the subject of this invention, is composed of perforated plates arranged in pairs at an angle, or oppositely inclined with relation to each other, the plates of each pair being either separable or permanently connected to each other, and presenting a roof shaped structure, the top or meeting edges of the plates forming a substantially horizontal ridge.

The oppositely-inclined plates are provided with horizontal perforations, and their end faces are preferably so arranged as to permit the plates to stand inclined against the horizontal, and to be supported against each other. The plates of each pair may either be detachable from each other or they may be made in one piece, so as to constitute an integral roof-shaped structure. A large number of such oppositely-inclined pairs may be arranged side by side, all being integrally connected if desired, and forming a single corrugated structure made up of a plurality of pairs of plates. The perforations in the plates which lie in a plane parallel to the top ridge of the roof, are preferably arranged at right angles to said ridge, though my invention is not confined to such particular arrangement of perforations. The perforations permit the liquid which drips down upon the outer sides, to flow through upon the inner sides, so that both the outer and the inner sides of the plates are fully utilized, and at the same time the gases are free to flow upon both surfaces. The inclination of the plates compels the ascending gases to impinge against the inner sides of the plates and to flow through the perforations and along the outer sides, thereby becoming intimately mixed with the liquid, which in its turn, rebounds from the outer inclined surfaces of the plates, and thereby becomes sprayed into atoms. An intimate reaction and mixture of said spray with the jets of gases emanating from said perforations is therefore insured, the said jets being directed against each other by impinging against the inclined surfaces, so as to produce a whirling motion, and repeatedly subdivide and reunite the different particles of the gases and liquid. The ascending gases are reflected by the oppositely-inclined surfaces of the adjacent plates to a large extent, and rebound from one surface against the opposite surface, so that they are compelled to flow several times through the same space and to pass through the holes in the plates during the whirling motion imparted to them. By this means an intimate contact of the reagents is produced, and a large area of acting surface is provided. Any flue dust carried along with the gases is either reflected on the inclined surfaces or is compelled to slide down the inclines, so that deposits of flue dust which might interfere with the operation of the chambers filled with said packing material, are prevented. There is therefore no liability of any injurious reduction of draft.

The pairs of plates may be arranged at any desired distance from each other, so that it is possible to change the distance between the pairs in several parts of the reaction chamber, without any liability of the upper rows dropping or breaking down, even when arranging the said bodies at a considerable distance from each other. In case some liquid should collect at the lower edges of the plates, the then descending jet of liquid will be reflected and converted into a spray by the plates just below. In order to further restrict the liquid from collecting at the lower edges of the plates, the said lower edges may be provided with downwardly directed notches or the like. The edges of the perforations of the plates are preferably rounded off, in order to facilitate the passage of the liquid from one surface to the other. The surfaces of the plates may be provided with flutings or the like, for the purpose of pre-

venting the coating of the surfaces with liquid, and in order to divide and reunite the current of liquid as many times as possible.

On the accompanying drawing one of the preferred forms of construction of the packing material according to my invention is shown, Figure 1 being a front elevation, and Fig. 2 an end elevation.

In the drawings, *a a* represent the two oppositely-inclined plates, which are so arranged relatively to each other as to form a roof with a substantially horizontal ridge.

b b represent the horizontal perforations of the plates.

f f represent the flutings on the surfaces of the plates.

d d represent the downwardly directed notches in the lower portions of the outer surfaces of the plates.

g g are notches in the upper portions of the outer surfaces of the plates.

My improved packing bodies may be made of any length and they may be built up in parallel rows, preferably arranged so as to alternate with each other, or in rows crossing each other to form a grating, no special supports being required. There is no possibility of the gases or liquids flowing directly and unimpeded through the chamber, tower or the like, the liquid which runs down from any of the rows or layers of packing material, being sure to be converted into spray in the next succeeding lower layer. As compared with the usual Lunge plates, the new packing material presents the advantage of a frequent change of direction of movement of the reagents, of a uniform wetting of both surfaces of the plates, and of an increased duration of contact of the various reagents. The plates are preferably given such an inclination that the liquid will trickle down in a uniform stream both at the outside as well as at the inside of the plates.

My improved packing material is distinguished from angular packing material heretofore employed, in which the connecting edges or ridges are vertically arranged, the sides which meet to form said ridges being moreover not inclined so as to present a roof-shaped structure. The said prior packing material, which, on account of the substantially rectangular inclination of its narrow end surfaces with relation to its front sides, could not be horizontally arranged, and was very deficient in stability, so that special supports, brackets, supporting rods or the like were required to secure them in place in the reaction chamber. Moreover the assemblage and building up of the said prior packing was difficult, and no abutting surfaces or resistances from which the jets of liquid and of gas or vapors could rebound and become disintegrated, were provided, the liquid and gas on the contrary flowing through the reaction chamber in a substantially vertical direction and without reacting sufficiently upon each other.

As compared with the usual Lunge plates for filling reaction chambers, the following advantages are presented by the new filling bodies:

1. The manufacture of the new packing material is very easy and simple.

2. No special supports are necessary for packing the material, as the bodies of one row will constitute a perfectly stable support for the succeeding upper rows.

3. The entire packing is more stable than with other plates; the packing may be effected, so as to constitute a net shaped structure.

4. The said bodies present more than double free sectional area than the plates.

5. For the same space of reaction chamber there is three times the acting surface, the distance of the layers of plates in the usual plate tower of Lunge being taken to amount to about four inches only.

6. The liquid is retained in the chamber for a considerably longer time, inasmuch as the dripping down from a certain height, a drawback in the plate tower, is dispensed with. By this means the duration of the time of reaction of gases and liquid is prolonged.

7. The gas current does not ascend vertically, but it is always deflected sidewise, also resulting in a longer duration of the gas reaction.

8. In the Lunge plates most of the liquid remains on the top side of the plates, that is to say, at the points where a minimum of gas can pass, while on the lower side, where the gas impinges with great force, there is the least amount of liquid. In the new packing body, both parts are equally wetted.

9. In the Lunge plates the several jets of gas are directed parallelly upward, while in the new packing material the gas jets are directed against each other, resulting in a more thorough mixture and an increased mutual reaction.

The packing material described may of course also be employed for gas washing purposes, in the manufacture of alcohol and spirit and the like, and also for filling the chambers employed for heating air and gases in the operation of gas producer plants.

I claim:

1. Packing material for reaction and absorption chambers, etc., comprising oppositely-inclined perforated plates which meet at their upper edges to form a substantially horizontal ridge.

2. Packing material for reaction and absorption chambers, etc., comprising two oppositely-inclined perforated side walls forming a roof-shaped body, the ridge at the in-

tersection of said walls and the base edges of the walls being in substantially parallel planes.

3. Packing material for reaction and absorption chambers, etc., comprising two oppositely-inclined perforated side walls forming a roof-shaped body, the ridge at the intersection of said walls and the base edges of the walls being in substantially paral el planes, the outer surfaces of the walls having downwardly directed notches.

4. Packing material for reaction and absorption chambers, etc., comprising two oppositely-inclined perforated side walls forming a roof-shaped body, the ridge at the intersection of said walls and the base edges of the walls being in substantially parallel planes, the outer surfaces of said walls being fluted.

5. Packing material for reaction and absorption chambers, etc., comprising oppositely-inclined perforated plates which meet at their upper edges to form a substantially horizontal ridge, the perforations and bases of the plates being horizontal whereby they meet the inclined faces of the plates at other than right angles.

6. Packing material for reaction and absorption chambers, etc., consisting of plates united to form a roof-shaped structure having horizontal top ridges and provided with perforations which are horizontal when said structure is set in upright position for use.

In witness whereof I have hereunto set my hand in presence of two witnesses.

HUGO PETERSEN.

Witnesses:
META PETERSEN,
MARIA PORUMBER.