United States Patent [19]

Streck

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[54] **INSERT FOR TREATING FLUIDS AND GASES**

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[73] Assignee: **Rigips-Stempel GmbH & Co. KG**, Dietzenbach, Germany

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[52] **U.S. Cl.** **261/95**, 261/112

[51] **Int. Cl.** **B01f 3/04**

[58] **Field of Search** 261/112; 210/150; 161/68

[56] **References Cited**

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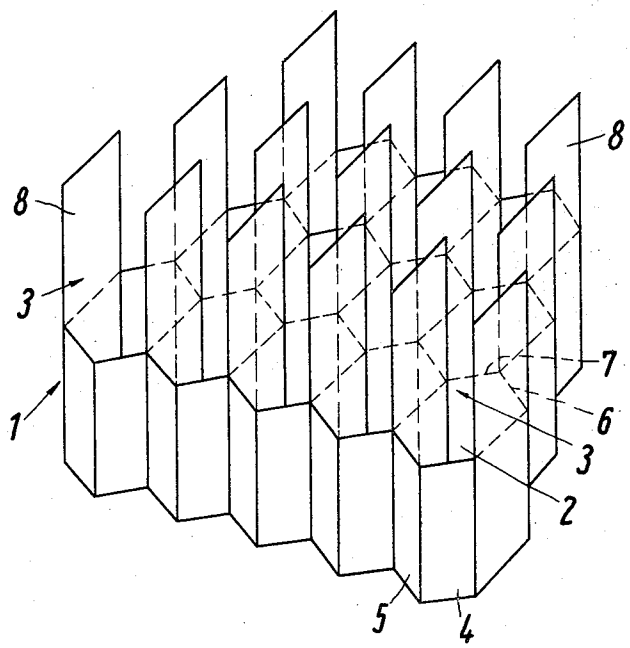
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Assistant Examiner—Steven H. Markowitz
Attorney—McDougall, Hersh & Scott

[57] **ABSTRACT**

Insert body for contact tower for fluids and gases comprising honeycombed channels separated by walls formed with recesses for cross flow of fluid or gaseous streams.

4 Claims, 11 Drawing Figures



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SHEET 1 OF 2

Fig.1

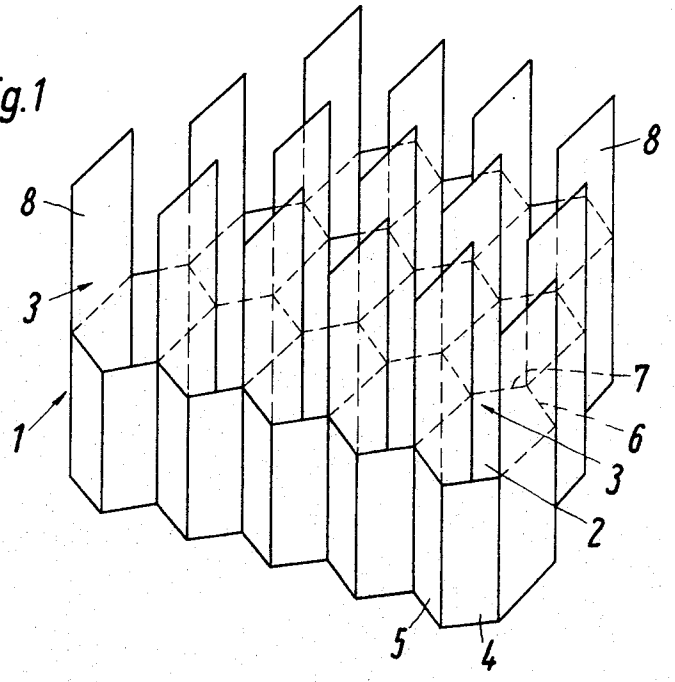


Fig.2

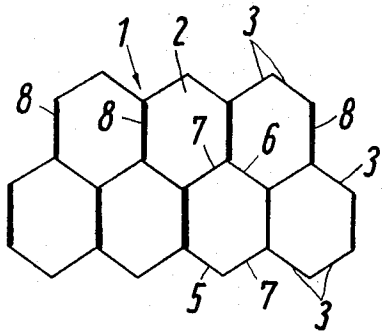


Fig.4

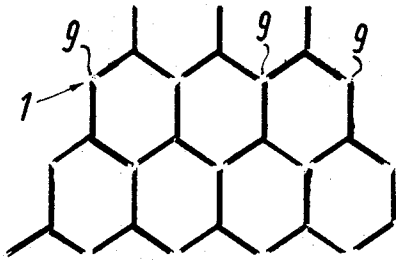


Fig.3a

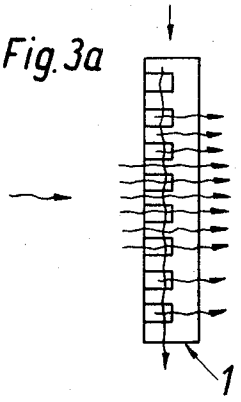
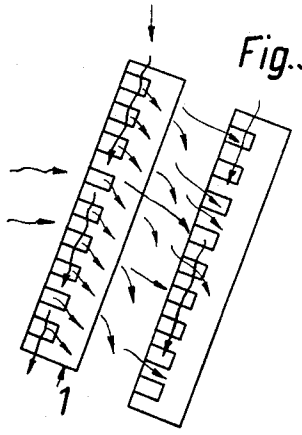


Fig.3b



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Fig.5

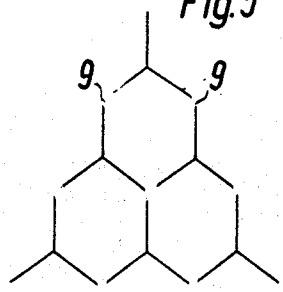


Fig.6

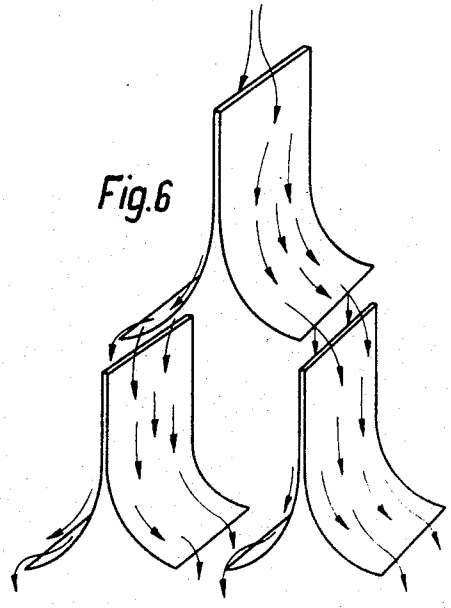


Fig.7

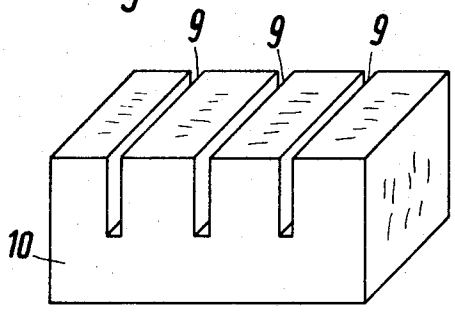


Fig.8

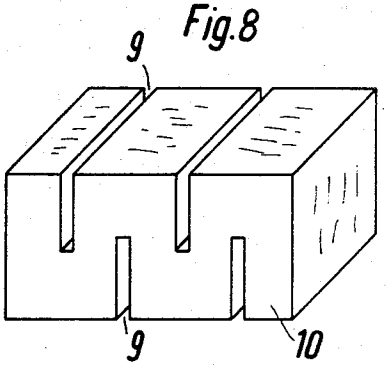


Fig.9

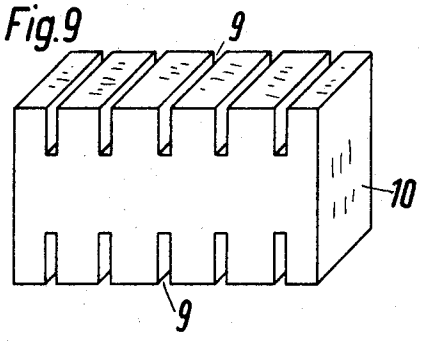
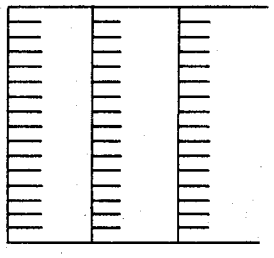


Fig.10



INSERT FOR TREATING FLUIDS AND GASES

This invention relates to an insert for use in the gaseous treatment of fluids and comprises an insertion body in the form of honeycombed channels separated by means of thin walls.

It is known from the prior art to make use, as inserts in apparatus in which a material and/or heat exchange is adapted to take place between a fluid and a gas, especially in cooling towers with irrigation cooling, honeycombed insert bodies having channels, preferably of hexagonal shape. In such insert bodies, the fluid trickles over the walls of the channels from top to bottom and is brought into contact with an ascending gas, air or the like gaseous medium. One disadvantage in inserts of the prior art is that no contact occurs between the gas and liquid in a cross-current direction because the channels limit both of the media to parallel flow in direct current or counter current flow.

It is an object of this invention to design inserts having channels extending in one direction but in which cross-current cooling and/or treatment can be effected with transverse gas flow and it is a related object to produce such inserts for cooling towers and the like.

These and other objects and advantages will hereinafter appear, and for purposes of illustration but not of limitation, embodiments of the invention are shown in the accompanying drawings in which:

FIG. **1** is a perspective elevational view of an insertion body embodying the features of this invention;

FIG. **2** is a plan view of the insertion body shown in FIG. **1**;

FIGS. **3** and **3***a* are schematic elevational view of insertion bodies of this invention illustrating the cross-current flow of the fluid and/or gas;

FIG. **4** is a plan view of an insertion body with Y-shaped wall means;

FIG. **5** is a plan view similar to that of FIG. **4** on an enlarged scale;

FIG. **6** is a partial perspective elevational view of the Y-shaped wall means;

FIG. **7** is a perspective view of a honeycomb body package with recesses;

FIG. **8** is a perspective view similar to that of FIG. **7** showing a modification of the honeycomb body package with modification in the recess arrangement;

FIG. **9** is a perspective view showing a still further modification in the recess arrangement for the honeycomb body package; and

FIG. **10** is a schematic view which shows three insertion bodies of this invention in an assembled relation.

Solution to the problem in prior art insertion bodies is effected in accordance with the practice of this invention by providing the wall means with recesses.

The recesses in the wall means of the channels makes it possible for two media such as liquid and/or gas, to contact one another in cross-current flow. Such cross-current treatment is particularly effective for many practical cases. Preferably the fluids flow in the direction of the force of gravity, whereby the longitudinal axes of the channels extend in the direction of the water perpendicular or almost perpendicular thereto, in which the gases also flow.

In accordance with the practice of this invention, it is also advantageous to install the insert bodies so that the longitudinal axes of the channels extend parallel to the direction of the forces of gravity. By selecting correspondingly large recesses and alignment of the insertion bodies, the treatment time and intensity can be influenced without change in flow rate of the media. The inserts find advantageous use in treatment of sewage water to produce a "biological lawn" wherein the inserts are used in counter-current application. As a result of the recesses in the wall means, the path of flow of the fluid is extended, the time of sojourn of the dirty water during treatment is increased, and the admixture with oxygen is improved.

In another desirable embodiment of this invention, the walls are removed from at least part of the insert body, and in each case, only a double wall in staggered rows remains. The staggered rows of double walls operates to break up the fluid current and enhance the intimate contact between the media in treatment.

In another embodiment, the recesses scan partial areas of the wall means and the remaining honeycomb body walls are of Y-shape which are effective to break up the fluid current by change of direction and thereby increase the effectiveness of the system.

An advantageous method for producing the insertion bodies of this invention consists in providing the honeycomb body package with recesses and then subsequently expanding and fixing the expanded sections. It is possible to cut the recesses in the honeycomb body package with precise dimensions and depth or to mill the recesses into the package without debilitation of the insert body.

In a further embodiment of the invention, at least two insertion bodies are interconnected by friction and/or form lock. The insertion bodies can be easily assembled and can be arranged in several layers superposed one on another and/or juxtaposed in side by side relation. If, in this connection, the individual channels are staggered in relation to one another, the cooling or treatment effect is further enhanced by breaking up the transverse flow of the cooling or fluid medium.

Referring now to the drawings, FIG. **1** illustrates a honeycomb insertion body **1** in which the lower portion is provided with channels **2** having non-discontinuous wall means. The wall means of the upper portion of the insert **1** are partially fragmented to provide recesses **3**. In the embodiment shown in FIG. **1**, the recesses **3** are so large as to eliminate side walls **4**, **5**, **6**, and **7**. This provides a structure consisting of parallel double walls **8** arranged in staggered rows.

FIG. **2** is a plan view of honeycombs **2** in which only the double walls **8**, which are present only in the front portion, are marked by a thick solid line.

FIGS. **3***a* and **3***b* represent two examples of an assembly of honeycomb bodies of this invention. As shown in FIG. **3***a*, the fluid and gas engage one another in cross-current flow. This gives a very good cooling effect by reason of the good intimate contact between the media. Even better cooling or contact is achieved when the honeycomb bodies are installed to incline against each other, as in FIG. **3***b*. In this arrangement, the fluid current is broken up more frequently. One part flows almost vertically downwardly while another part flows through that portion of the honeycomb bodies having solid wall means and then to the subsequent honeycomb body.

The insert described in the above embodiments is also applicable to the designs illustrated in FIGS. **4**, **5**, and **6**.

In the design of FIG. **4**, the bottom portion consists of honeycomb sections with solid wall means. The upper portions have recesses **3** and **9**. The wall means are Y-shaped in each case as represented more clearly in FIG. **5**.

FIG. **6** is a perspective view which shows the breaking up of the fluid stream at three Y-shaped structures of the invention. The channels **2** of the honeycombs with nondiscontinuous wall means located behind the Y-shaped structures are now shown.

FIGS. **7**, **8** and **9** illustrate honeycomb body packages **10** prior to expansion. The recesses **9** are cut or milled in spaced rows along one side in FIG. **7**, or alternatively in both sides with the recesses in one side offset from the recesses in the opposite side, as shown in FIG. **8**, or in both sides with the recesses aligned, as in FIG. **9** in which instance the recesses are of lesser depth than when staggered in order to maintain the integrity of the body.

The depth of the recesses can be varied but it is undesirable to provide for a depth that will interfere with the ability of the remaining portion of the non-discontinuous wall means to provide the insert body with sufficient solidity or rigidity.

The structures shown in the figures will result or other structures of the discontinuous wall means will result from the packages shown, depending somewhat on the width of the recesses.

FIG. **10** shows several honeycomb bodies arranged in a cross-current cooler. The individual layers are preferably staggered, assembled against each other and compressed whereby the individual layers grip each other by way of friction or form locking to provide an assembled relation.

The honeycomb bodies may be formed of cellulose, paper, metal or plastic foil or laminates or other such material impregnated or coated with synthetic resins.

It will be understood that changes can be made in the construction and arrangement without departing from the spirit of the invention, especially as defined in the following claims.

I claim:

1. An insert for treating fluids with gases comprising an insert body formed of honeycombed cells and opposing spaced wall means extending longitudinally from and integral with the cells to define recesses therebetween to permit cross-current flow in the recesses.

2. An insert as defined in claim **1** wherein the cells are formed with double walls integral with the wall means, with the wall means including a double wall portion defining a Y cross-section.

3. An insert as claimed in claim **1** in which at least two insert bodies are interconnected in side by side and/or superposed relation.

4. An insert as claimed in claim **1** in which the insertion bodies are formed of a material selected from the group consisting of cellulose, paper, metal foil, plastic film, laminate, and other sheet stock impregnated or coated with synthetic resin.

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