

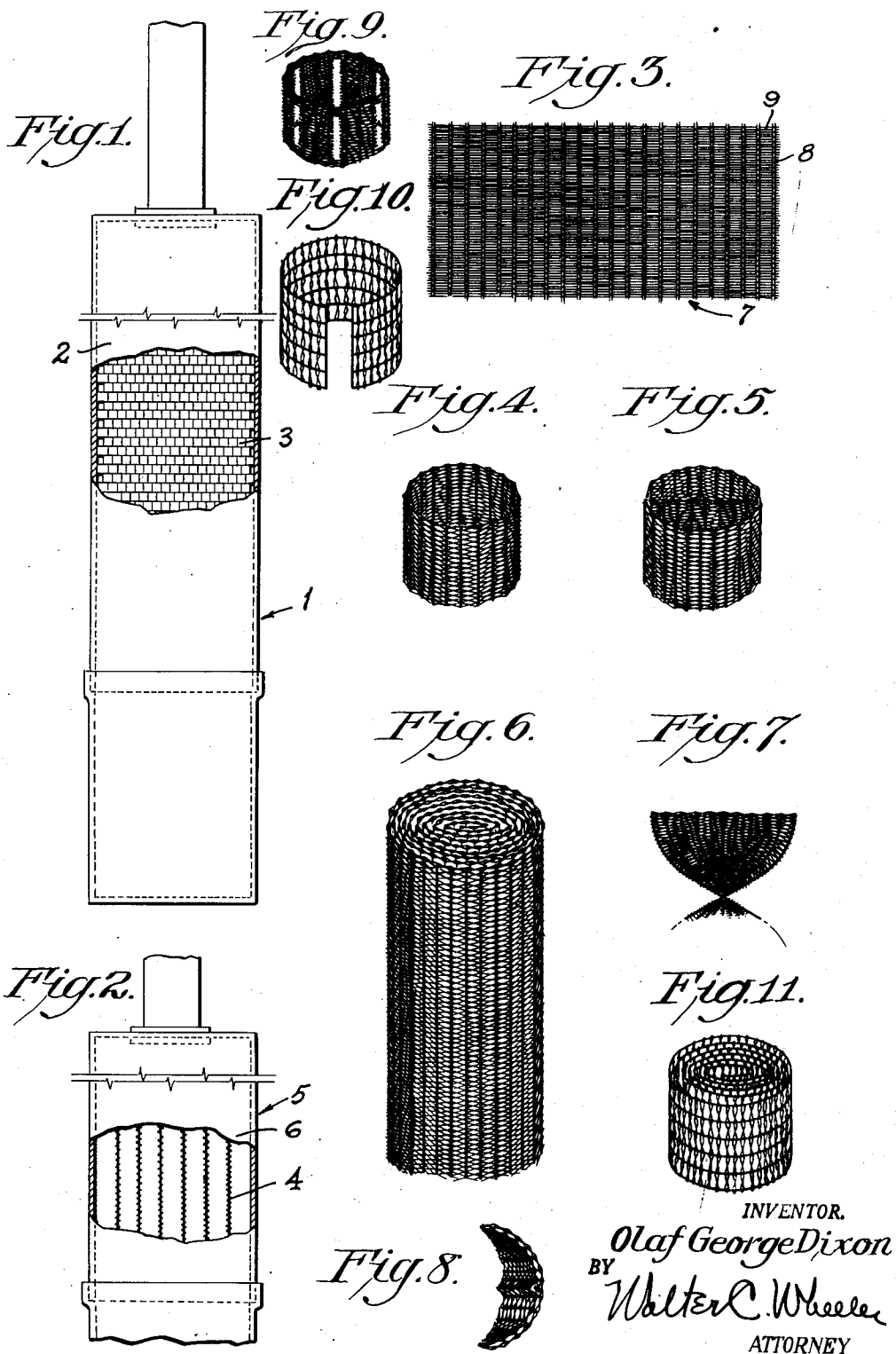
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CONTACTING LIQUIDS WITH GASES OR VAPORS

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CONTACTING LIQUIDS WITH GASES OR VAPORS

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4 Claims. (Cl. 261-101)

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This invention relates to contacting liquids with gases in such operations as performed in absorption, washing, and reaction towers, and condensers such as fractionating columns or the like.

It has as its general object, the formation of a new type of packing made of galloon netting which has a high efficiency for the purposes as used in the examples above and yet does not require the heretofore necessary preliminary flooding or preflooding of the tower or condenser and the subsequent carefully controlled operating conditions in order to initially thoroughly wet the packing with liquid to ensure continued intimate contact of the liquid and vapor phases during such operations.

In the drawings forming a part of the specification, examples of the use of the packing and various modifications of the shapes of the packing made of galloon netting are shown in which,

Figure 1 is a reduced scale side elevational view of a distillation device having a side wall thereof broken away to show one manner of disposing therein packing material such as shown in approximately full scale in Figures 3-5 and 7-11, inclusive, made in accordance with the present invention.

Figure 2 is a fragmentary view of an apparatus similar to Figure 1 showing a general arrangement of the new packing material arranged similar to that set forth in my copending application Serial No. 708,223.

Figure 3 is a side elevational view of a sheet of galloon netting, rectangular in shape, showing substantially the full size of one form thereof.

Figure 4 is a perspective view of a Raschig ring made of galloon netting, being hollow in nature.

Figure 5 is a perspective view of a Lessing ring made of galloon netting being hollow in nature.

Figure 6 is a perspective view of a section wound roll of galloon netting which is suitable for use as a packing unit and would completely fill the packing space of Figure 1, both Figure 1 and Figure 6 being reduced in size while Figures 3-5 and 7-11 are approximately full scale.

Figure 7 is a perspective view of a section of flat strip of galloon netting twisted about its longitudinal axis to provide a hollow propeller shaped filling unit for the vessel disclosed in Figure 2.

Figure 8 is a perspective view of a form of filler unit similar in shape to a Berl ring.

Figure 9 is a perspective view of a hollow cylindrical filler made in accordance with the pres-

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ent invention having longitudinal openings or gaps in its walls.

Figure 10 is a perspective view of a hollow filler, cylindrical in nature and having a longitudinal gap extending over its entire length, the galloon warp thread running circumferentially about the unit, and

Figure 11 is a perspective view of a wound roll filler having the warp thread running in a circumferential direction about its axis and would be one of the many units randomly packed in the packing space of Figure 1.

In this specification galloon netting refers, in particular, to woven material in which the warp threads are substantially straight instead of being bent as in the case of normal weaving while the weft threads are arranged closely against one another. The number of weft threads in a galloon netting is, therefore, always greater than the number of warp threads. Moreover, the warp threads are generally, but not necessarily, thicker and/or stronger than the weft threads.

Twilled galloon netting may be used but it is preferred to use galloon netting of normal weave.

The galloon netting made be made from one or more materials having sufficient mechanical strength, such as wire, glass wool, slag wool, or filaments of synthetic resins. For example, the netting may be made with warp threads of wire and weft threads of synthetic resin. It has been found convenient, however, to use galloon netting made from wires of suitable metals, such as copper, brass, Phosphor bronze, cupro-nickel and stainless steel.

In Figure 1 is shown a column or vessel generally indicated as 1 with the side wall 2 thereof broken away to show the packing material 3 thereof, which is shown in Figures 4-11, inclusive, arranged in an orderly manner in this example throughout the column. It is, of course, to be understood that the packing may be randomly packed if it is so desired.

In Figure 2 a plurality of galloon sheets 4 are arranged vertically in a rectangular tower or vessel 5 whose walls 6 are broken away to show this arrangement.

In Figure 3 is shown a sheet of galloon netting 7 having warp threads 8 and weft threads 9.

The galloon netting may be made up into filling bodies of any suitable shapes as shown in Figures 3-11, inclusive. Most of the shapes as set forth in these figures are well known as packing bodies and those that are not known are self-explanatory insofar as their particular shape is

concerned, no novelty as to their particular shape being claimed as part of this invention. It is also understood that the warp threads may run transversely to the direction shown in the various examples.

The novelty lies in the use of galloon netting to make up these particular bodies which, when packed in a column, produce a column of exceptionally high efficiency not requiring preflooding and subsequent meticulous adjustment of operating conditions in order to ensure intimate contact of the liquid which forms a film on the netting and the vapor phase in the column during operation.

It should be understood that the mesh of the galloon netting and the thickness of the individual threads may be varied within wide limits but it has been found convenient when using netting made from wire, to have seven warp wires per inch and forty-four weft wires per inch, the diameters of the wires being 0.036 inch for the warp and 0.022 inch for the weft.

Where the galloon netting is to be made up into filling bodies in the form of the so-called Raschig rings, Lessing rings, and the like it has been found convenient for the bodies to have a diameter not less than one inch and a length equal to the diameter.

The pronounced self-wetting properties of galloon netting depend only slightly on the direction of the warp threads relative to the flow of the liquid, it being best when the warp threads are parallel to the flow; that is, for sheets in a column it is preferable for the warp threads to be vertical. In a sheet, this direction is also preferable on account of the warp threads greater thickness and/or strength.

With regards to filling bodies made from galloon netting it is conceded that if such bodies of cylindrical form are stacked in a regular pattern layer by layer it is reasonable to suppose from the above remarks that in this case also the warp wires should be vertically disposed. It has been found preferable, however, for the rigidity of the filling bodies, particularly when these are randomly packed, to have the warp threads circumferentially disposed in cylindrically shaped bodies and longitudinally in the propeller and saddle shapes.

The packing of the present invention is suitable for use in a variety of processes where it is desirable to present a large surface area of liquid to gas or vapor, for example, in gas washing processes and particularly in distillation.

In the appended claims the term "gas," when used, designates both substances which are gase-

ous under normal conditions of temperature and pressure, and normally liquid substances in vaporized form.

I claim:

1. Apparatus for contacting liquids with gases comprising a vessel containing a packing of vertically disposed plain sheets of galloon netting, said sheets being spaced apart to provide between them at least one free and unobstructed path for the upward flow of vapor, and means for supplying liquid to the upper edges of the sheets, the weave of said galloon netting being sufficiently close to insure filming of the liquid across the apertures therein.

2. Apparatus for contacting liquids with gases as set forth in claim 1 wherein said vertically disposed sheets of galloon netting are substantially parallel.

3. Apparatus for the distillation of liquids which comprise a column containing a packing of vertically disposed plain sheets of galloon netting, said sheets being spaced apart to provide between them at least one free and unobstructed path for the upward flow of vapor, and means for supplying reflux liquid to the upper edges of the sheets, the weave of said galloon netting being sufficiently close to insure filming of said reflux liquid across the apertures therein.

4. Apparatus for the distillation of liquids as set forth in claim 3 wherein said vertically disposed sheets of galloon netting are substantially parallel.

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