

M. PASCHKA.
 APPARATUS FOR IMPREGNATING LIQUIDS WITH GASES.
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1,037,517.

Patented Sept. 3, 1912.

Fig. 1

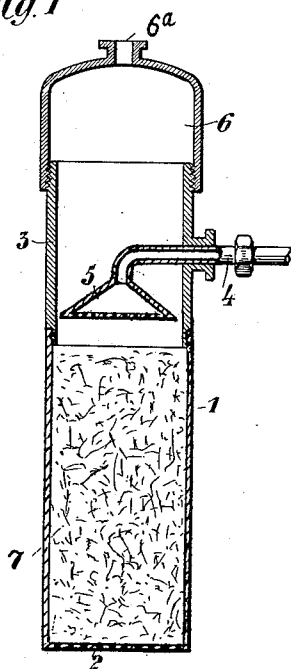
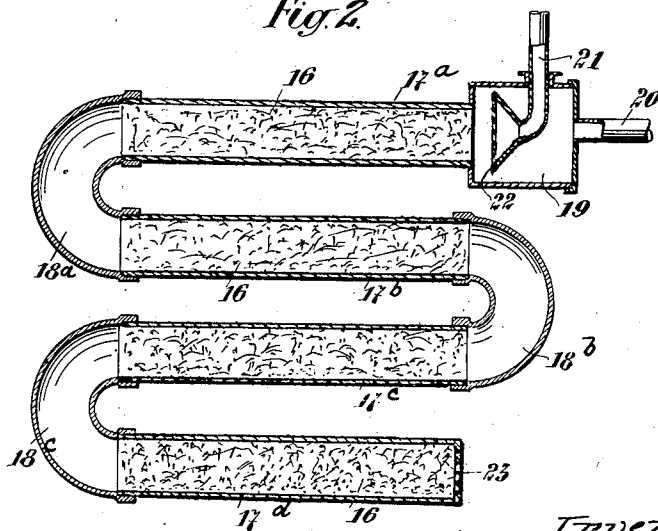


Fig. 2



Witnesses

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APPARATUS FOR IMPREGNATING LIQUIDS WITH GASES.

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Specification of Letters Patent.

Patented Sept. 3, 1912.

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To all whom it may concern:

Be it known that I, MAX PASCHKA, a subject of the Emperor of Austria-Hungary, residing at Vienna VI, in Austria-Hungary, have invented a certain new and useful Apparatus for Impregnating Liquids with Gases, of which the following is a specification.

This invention relates to apparatus for impregnating liquids with gases, and more particularly to a device for mechanically combining carbon-dioxid with water, for bathing purposes.

The main object of this invention is to provide a device of the class described which will combine carbon-dioxid with water to the greatest possible degree.

A further object of this invention is to have the device so arranged that it can be manufactured at a very low cost, and such that its construction will be as simple as possible in order to eliminate, as far as possible, any disarrangement in its parts for ordinary usage.

Another object is to arrange the device so that it may be readily inspected and repaired whenever the same is desirable.

A still further object is to have the apparatus arranged so that the same will be light, compact, and easily transportable, and further easily installable.

Other objects of this invention will become apparent as it is more fully set forth.

The particular apparatus in question includes a casing containing any suitable porous material, such as glass-wool, wood-wool, slag-wool, sponge, or woven plaited and knit fabrics of cotton, wool, flax, jute, straw, asbestos, horsehair, and other fibrous and filamentary materials or substances. I prefer to use some material after it has been split, cut or shaved so as to provide a fibrous mass having innumerable sharp points and cutting edges and so arranged as to permit the liquid and gas to readily pass there-through. Liquid and gas connections are made at the same end of the casing and contiguous to the spongy mass contained therein.

In the accompanying drawings which illustrate by way of example an embodiment

of this invention, Figure 1 represents a sectional elevation of a device embodying this invention. Fig. 2 is a similar view of a modification hereinafter specifically referred to.

In the construction shown in Fig. 1, 1 represents a casing or conduit having a screen or perforated plate 2 connected to one end thereof. Connected to the other end portion of the casing 1 is a chamber 3 having one side thereof provided with an opening therein, in order to permit a gas pipe 4 to extend therethrough, as is clearly shown in the drawings. A rose or sprinkler head 5 is connected to the end of the gas pipe so as to spray the gases into the casing 1. The upper portion of the rose is conical, as shown. A cap 6 is threaded on to the chamber 3, and is provided with an opening 6^a therein, in order to permit a liquid pipe (not shown) to be connected thereto.

7 is a mass of shavings, which are arranged so as to permit the fluids to pass readily therethrough, and yet at the same time break the same into an extremely finely divided state, and cause the same to thoroughly mechanically combine with one another. When this combination has properly taken place, the liquid will be saturated with the gas to a maximum degree. It is of course understood that the length of the casing 1 is sufficient to restrain and mix the fluids so that they will be sufficiently combined.

In the construction which is shown in Fig. 2, 17^a, 17^b, 17^c and 17^d are the casings used in connection with the apparatus, and which are filled with the porous material 16 and are joined together by means of the elbows 18^a, 18^b and 18^c. The first casing 17^a is attached to the chamber 19 into which the liquid is forced through a pipe 21, and the gas through the pipe 20 against rose 22. The last mentioned casing 17^d, is provided with a perforated plate 23 in order to prevent the porous material from being driven out of the device. It will be noted that the various casings and parts of this device can be readily disconnected wherever desired, so that they may be inspected, and the material therein renewed whenever necessary.

While other screens are not shown in the casings, particularly those indicated by the reference characters 8 and 8', 17^a, 17^b, 17^c and 17^d, it is of course understood that the same may be used at the ends of the casings in order to keep the porous material properly positioned within the same. However, under ordinary conditions, such screens are not necessary as the spongy and springy nature of the shavings used, serve to keep the mass of them, substantially within the casings. The particular feature for which the plurality of casings shown in Fig. 2 is provided, is in order to enable the casings to be provided with different porous materials in the various casings, in order to bring about the special results advantageous to special conditions, as well as to keep the device as compact as possible, particularly where a comparatively long passage of porous material should be interposed between the inlet and outlet.

The operation of the apparatus is as follows:—The liquid flows into the casing together with the sprayed gas, and there absorbs a slight amount of the same. This action is particularly accentuated when the liquid inlet is disposed above the rose on the gas pipe, as the liquid is caused to flow around the same and mingle with the gas trying to expand and pass through it. As the liquid and gas continue through the casing proper, and there engage with the spongy mass of shavings, they are thrown into all directions and caused to intermingle continuously with one another. At the same time, the sharp edges of the porous material cut the liquid into the finest particles and make the combination more complete, and yet at the same time the shavings do not offer a very great resistance to the passage of the fluids therethrough. It will also be noticed that the liquid and gas flow in the same direction so that they do not obstruct one another in any way but combine while flowing in the same direction, and thereby provide a more positive intermingling than any other arrangement would provide, mainly because the gas and liquid are kept longer in company with one another, thereby giving the liquid more opportunity to absorb the gas.

It is obvious that the process of impregnating the liquid or liquids introduced into the apparatus in question has several independent actions. These actions not only serve to mechanically intermingle the gases and liquids, but force the latter to absorb the former continuously, thereby making the impregnation as perfect as possible. Experiments have proven that this device will ordinarily cause one liter of water to absorb from 1300 to 1800 centimeters of carbon dioxid CO₂. The first action consists in in-

roducing the liquid and gas into a preliminary chamber of the device, so that they will be roughly mechanically mixed together. The next action consists in causing the liquid and gas to move in every direction, so as to more thoroughly mix together, and at the same time means are provided for cutting the particles so that the same will be divided into an extremely fine state. The action is further emphasized by reason of the pressure of the incoming fluids. Further the fluids are kept in continuous contact with one another for a comparatively long time, so that a thorough absorption action will take place in addition to the mechanical intermingling referred to. It will be noticed that the division of the fluid particles will be continued so that eventually their size will be practically infinitesimal, which makes the impregnation necessarily very thorough.

The gas is so thoroughly united with the liquid that separation of the gas therefrom takes place very slowly even when left standing for a lengthy period in a chamber under ordinary atmospheric pressure. This is so even when the impregnated liquid is thoroughly shaken. The liquid is so thoroughly impregnated by the device, that the amount of gas necessary for a certain amount of liquid is comparatively small, mainly because it is so perfectly combined with the liquid, and, also because practically none of the gas can escape without mixing with the liquid. This keeps down the cost of operation of the device, in the first instance, and also reduces the quantity of impregnated fluid necessary during bathing, as the same will remain fully charged during the ordinary time of usage.

It is to be particularly noted that the rear conical wall of the rose faces the water inlet and extends close to the wall of the casing with the face of the rose lying next to the porous mass, whereby the rose will force the water to pass around it as a film which will envelop the gas issuing from the rose, an intimate commingling of the gas and water being thus produced, as they together flow through the porous mass in the casing.

What I claim as my invention and desire to secure by Letters Patent of the United States is:—

A device for use in impregnating liquids with gases, comprising a casing, a porous mass contained within the casing, the casing being provided at one end with a water inlet opening and between said opening and the porous mass with a gas inlet opening and a gas inlet pipe extending into the casing through the second named opening and provided within the casing with a rose, the rear conical wall of which faces the water inlet opening and extends nearly to the wall

of the casing, the perforated face of the rose
lying next to the porous mass, whereby the
water which flows into the casing through
the water inlet opening will be caused to
5 spread around the rose and flow as a film
around the gas issuing from the rose, the
gas and water flowing in the same direction.

In witness whereof I have signed this
specification in the presence of two wit-
nesses.

MAX PASCHKA.

Witnesses:

AUGUST FUGGER,
HANS PAPPENHEIM.