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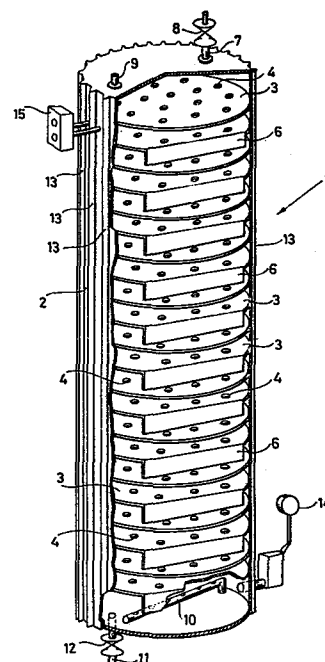
54 **Apparatus for producing and storing chloride water, particularly for a bleaching treatment in a washing machine.**

57 The invention relates to apparatus for the production and storage of chlorine water, particularly for use in a bleaching and sterilizing treatment in a washing machine.

The apparatus according to the invention (fig. 2) comprises a vessel (2) provided in its interior with a series of perforated partitions (3) defining lateral passages (5) for reducing the time required for emptying and filling the apparatus. A pressostat (14) or a sensor (15) ensure the maintenance of a proper water level within the apparatus.

The apparatus according to the invention permits the economical production and storage of chlorine water also during phases other than the phase of its use.

The apparatus is additionally designed to withstand shock loads caused by the possible combustion of explosive mixtures.



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1 Apparatus for Producing and Storing
 Chlorine Water, Particularly for a
 Bleaching Treatment in a Washing Machine

5 Description

 The present invention relates to apparatus for the product-
 ion and storage of chlorine water, particularly for a
10 bleaching and sterilizing treatment in a washing machine.

 Described in Italian Patent Application No. 45738 A/81 is
 a laundry washing machine equipped with an electrolytic
 diaphragm cell for generating gaseous chlorine to be intro-
15 duced into the washing water for obtaining an aqueous
 chlorine solution, generally referred to as "chlorine water"
 which is useful for a bleaching treatment.

 According to the cited Italian Patent Application, the
20 gaseous chlorine produced by the electrolytic cell is
 caused to pass through a perforated tube so as to be intro-
 duced directly into the rinsing water supplied to the
 interior of the laundry washing machine in the form of
 small bubbles.

25 The cited Italian Patent Application thus attains the ob-
 ject of providing a system for the production of chlorine
 water within a laundry washing machine. There remains still
 the problem, however, to achieve a more uniform distribut-
30 ion of the gaseous chlorine in the water, and to accumulate
 a supply of chlorine water preparatory to its being required
 for use during the rinsing phase.

 A main object of the invention is thus the provision of
35 apparatus for the efficient and economical production of
 an aqueous chlorine solution which is particularly useful
 for a bleachign and/or sterilizing treatment in a washing
 machine. As generally known, the absorption of gaseous

1 chlorine in water is on the one hand the most simple and
economical method for the production of chlorine water.
Due to the limited solubility of gaseous chlorine in water,
on the other hand, this method requires the employ of
5 complicated apparatus of considerable dimensions and thus
unsuitable for use in a washing machine.

In the process of introducing gaseous chlorine into water
for absorption it has also to be kept in mind that mixing
10 of the gaseous chlorine with hydrogen may result in an
explosive mixture.

A further object of the invention is therefore the provis-
ion of apparatus of the above defined type including the
15 necessary safety provisions, inter alia for avoiding the
loss of gaseous chlorine generated by the electrolytic cell.

A still further object of the invention is the provision of
apparatus for the absorption of gaseous chlorine in water
20 and for accumulating the thus formed chlorine water for
subsequent use as dictated by the washing programme.

For attaining these and other objects in an apparatus of
the above defined type comprising a closed outer vessel,
25 conduits for the supply of water and for discharging
chlorine water, conduits for supplying gaseous chlorine
to the interior of said vessel, and elements mounted in
the interior of said vessel for promoting contact between
the gaseous chlorine and the water, the invention provides
30 that said elements are in the form of perforated partit-
ions disposed transversely of the direction of the fluid
flow, the surface area of said partitions being smaller
than the cross-sectional area of said vessel so as to form
at least one lateral passage between a free edge portion
35 of each said partition and the adjacent interior wall port-
ion of said vessel, each said partition being formed ad-
jacent said lateral passage with a baffle portion extending
downwards therefrom at right angles, said apparatus being

1 further provided with means for controlling the water level within said vessel so as to avoid the loss of gaseous chlorine to the environment.

5 According to further characteristics of the invention, said control means comprise a pressostat and/or a conductivity water sensor or the like, and the surface of the vessel of the apparatus is formed with reinforcing ribs.

10 Embodiments of the invention shall now be described in detail by way of example with reference to the accompanying drawings, wherein:

fig. 1 shows a partially sectioned perspective view of
15 apparatus in a first embodiment of the invention,

fig. 2 shows a longitudinal sectional view of the apparatus shown in fig. 1,

20 fig. 3 shows a perspective view of a partition employed in the apparatus of fig. 1, and

fig. 4 and 5 show longitudinal sectional views of two further embodiments of the invention.

25 With reference to fig. 1 of the drawings, apparatus generally designated 1 comprises a cylindrical vessel 2 for contacting a liquid (tap water) and a gas (gaseous chlorine generated by an electrolytic cell installed in a washing
30 machine).

At this point it is noted that the shape of vessel 2 is not of critical importance. The vessel may be of any suitable configuration permitting it to be mounted, with
35 the aid of conventional fastener means (not shown), within the housing of a laundry washing machine or, depending on the employ of the apparatus, of a dishwashing machine.

1 The material of the vessel and of the other elements of
the apparatus to be described is of a type that is resist-
ant to the corrosive attack of chlorine, for instance poly-
ethylene.

5

Interiorly of vessel 2 there is mounted a series of part-
itions 3 (cf. fig. 3) each of which is fixedly attached to
the interior wall surface of vessel 2 along a certain port-
ion of its periphery. The surfaces of partitions 3 are
10 formed with a plurality of perforations 4 having a diameter
of about 1 to 3 mm for achieving a more intimate contact
between the gas and the liquid.

The partitions 3 are disposed transversely of the longi-
15 tudinal direction of vessel 2, and thus also transversely
of the direction of fluid flow. Their surface area is
smaller than the cross-sectional area of vessel 2 so as to
leave an open space, i.e. a lateral passage 5 between the
interior wall surface of vessel 2 and the free edge of each
20 partition 3.

These passages are provided for reducing the time required
for filling the vessel with water and for discharging the
chlorine water therefrom.

25

Adjacent passage 5 each partition is formed with a depend-
ing edge portion or baffle 6 extending downwards at right
angles for detaining the gaseous chlorine so as to promote
the formation of the aqueous chlorine solution.

30

The partitions 3 are disposed one above the other within
vessel 2 in such a manner that a closed partition wall port-
ion is located upstream and downstream in alignment with
each lateral passage 5.

35

Vessel 2 is closed, communicating with the exterior via a
conduit 7 for the supply of tap water intended for absorb-
ing the gaseous chlorine. Conduit 7 is located at the top

1 portion of vessel 2 and provided with a flow control
valve 8. Also provided at the top portion of vessel 2 is
a discharge conduit 9 for the liquid expelled by the gas,
the latter being supplied to vessel 2 adjacent the bottom
5 thereof through a perforated tube 10 located below the
lowermost partition 3.

The bottom of vessel 2 is further provided with a chlorine
water discharge conduit 11 suitably controlled by a valve
10 12.

In addition to being resistant to the corrosive attack of
the chlorine, the material of which the apparatus according
to the invention is made has also to be of a type capable
15 of absorbing the energy developed by a possible explosion
caused by the mixture $\text{Cl}_2 + \text{H}_2$.

This material thus has to be corrosion-resistant and at
the same time malleable and resilient, such as the above
20 mentioned polyethylene or a similar composition.

For improving the shock-resistant properties of the mater-
ial, the surface of vessel 2 is preferably formed with
reinforcing ribs 13.

25

The above described apparatus is also provided with safety
means for avoiding the escape of chlorine to the environ-
ment. For this purpose a pressostat 14 is disposed adjacent
the bottom of vessel 2, or the top portion of the apparatus
30 carries a conductivity sensor 15 or a similar device for
detecting the presence of water in the upper portion of
the apparatus.

These means thus ensure the presence of water within the
35 apparatus and thus the proper absorption of the gaseous
chlorine, so that the problem of preventing gaseous chlor-
ine from escaping to the environment is solved in a simple
manner.

1 The operation of the apparatus shown in fig. 1 is self-evident: After vessel 2 has been filled with water, for instance tap water or anteriorly treated water, the gas inlet is opened for introducing the gas in the form of
5 small bubbles. During their ascent, the gas bubbles are caused to follow a non-linear path, resulting in an extended time for contact with the water for improved absorption. During their ascent, the gas bubbles are brought into contact with water having a continuously decreasing concentration of absorbed chlorine and thus capable of increasing
10 absorption.

The described apparatus permits chlorine water to be produced at times other than during the rinsing phase,
15 thanks to its capability of storing the solution for use at the appropriate time.

The embodiment of fig. 4 differs from the one shown in fig. 1 mainly by the fact that the vessel 2 is of substantially rectangular cross-sectional configuration with its
20 greater dimension in the horizontal direction.

Common elements of the two embodiments are designated by the same reference numerals.

25

In the embodiment of fig. 5, the outer configuration of the apparatus is the same as in the embodiment of fig. 1, while the partitions 3 are formed with a continuous depending edge portion 6 defining an annular passage 5 for each
30 partition 3 in cooperation with the interior wall surface of vessel 2.

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20 Apparatus for Producing and Storing
Chlorine Water, Particularly for a
Bleaching Treatment in a Washing Machine

25 P a t e n t C l a i m s

1. Apparatus for the Production and storage of chlorine
water, particularly for a bleaching and sterilizing treat-
ment in a washing machine, of the type comprising a closed
outer vessel, conduits for the supply of water and for dis-
30 charging chlorine water, conduits for supplying chlorine
gas to the interior of said vessel, and elements mounted in
the interior of said vessel for promoting contact between
the gaseous chlorine and the water, characterized in that
35 said elements are in the form of perforated partitions (3)
disposed transversely of the direction of the fluid flow,
the surface area of said partitions being smaller than the
cross-sectional area of said vessel (2) so as to form at
least one lateral passage (5) between a free edge portion

- 1 of each said partition and the adjacent interior wall portion of said vessel, each said partition being formed adjacent said lateral passage with a baffle portion (6) extending downwards therefrom at right angles, said
5 apparatus (1) being further provided with means (14, 15) for controlling the water level within said vessel so as to avoid the loss of gaseous chlorine to the environment.
2. Apparatus according to claim 1, characterized in
10 that for each said partition (3) there is provided a single lateral passage (5) for the free flow of fluids, the passages associated with adjacent partitions being alternately offset diametrically opposite one another within said vessel (2), so that the fluids exiting from one said passage are
15 caused to cross the full diameter of said vessel before entering the subsequent lateral passage.
3. Apparatus according to claim 1, characterized in that for each said partition (3) there is provided a pair
20 of lateral passages for the free flow of fluids disposed at opposite locations.
4. Apparatus according to claim 1, characterized in that said baffle is formed as a continuous depending edge
25 portion along the periphery of said partition (3), said passage (5) being a continuous annular passage.
5. Apparatus according to any of claims 1 to 4, characterized in that said control means are in the form of a
30 pressostat (14) located adjacent the bottom of the apparatus (1) and/or of a conductivity sensor (15) or the like located adjacent the top of said vessel (2).
6. Apparatus according to any of the preceding claims,
35 characterized in that the surface of said vessel (2) is provided with reinforcing ribs (13).

1 7.. Apparatus according to any of claims 1 to 6,
characterized in that said vessel (2) and said partitions
(3) are of a resilient material resistant to shocks and
to the corrocive attack of chlorine.

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Fig. 1

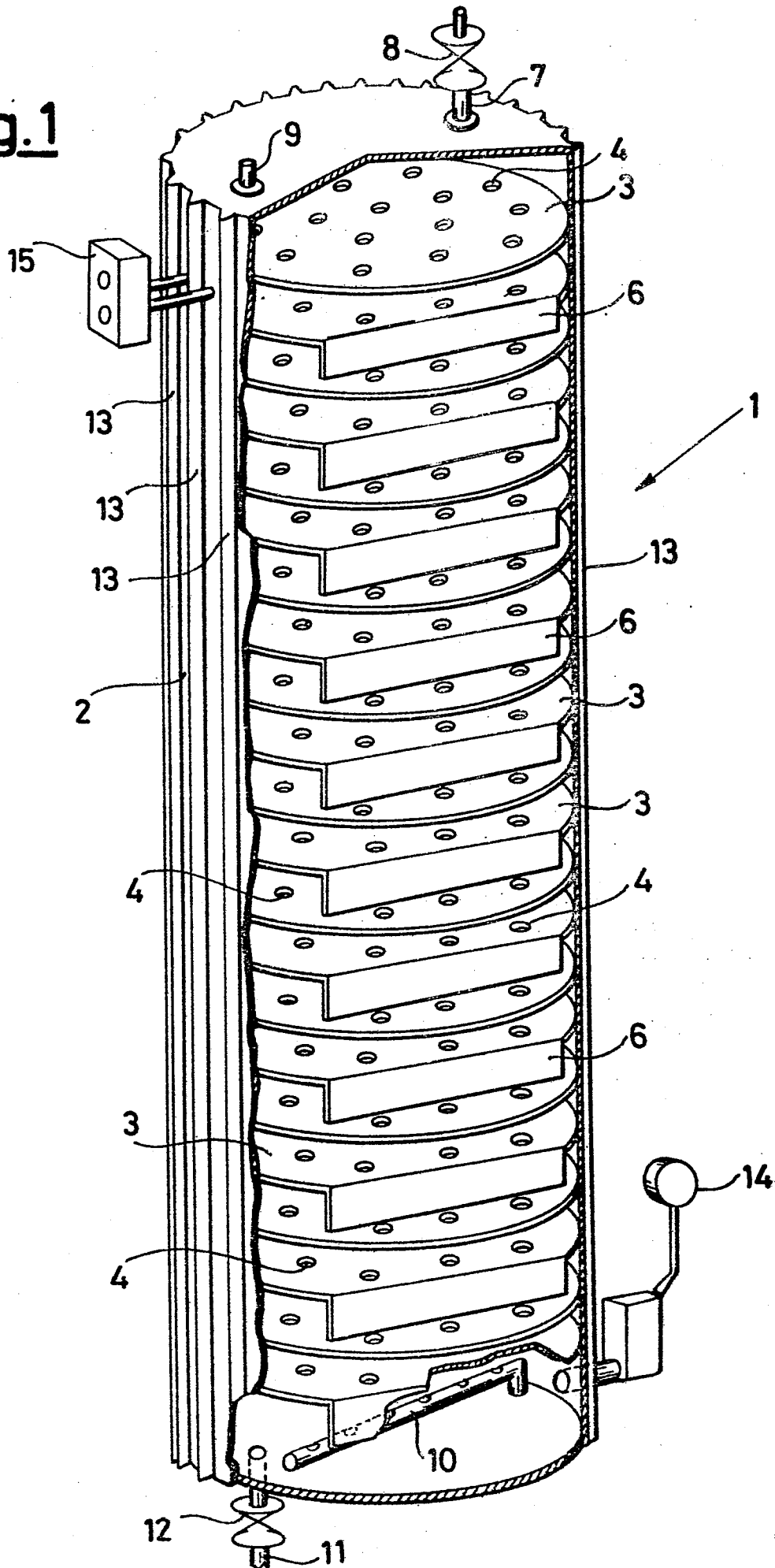


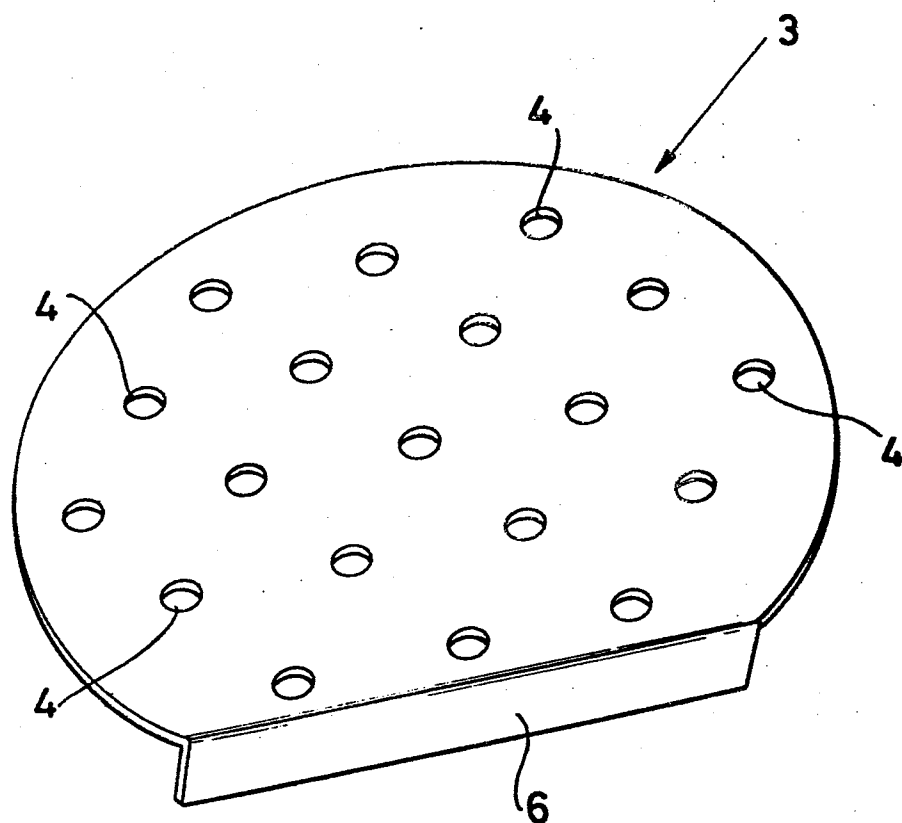
Fig. 3

Fig. 4

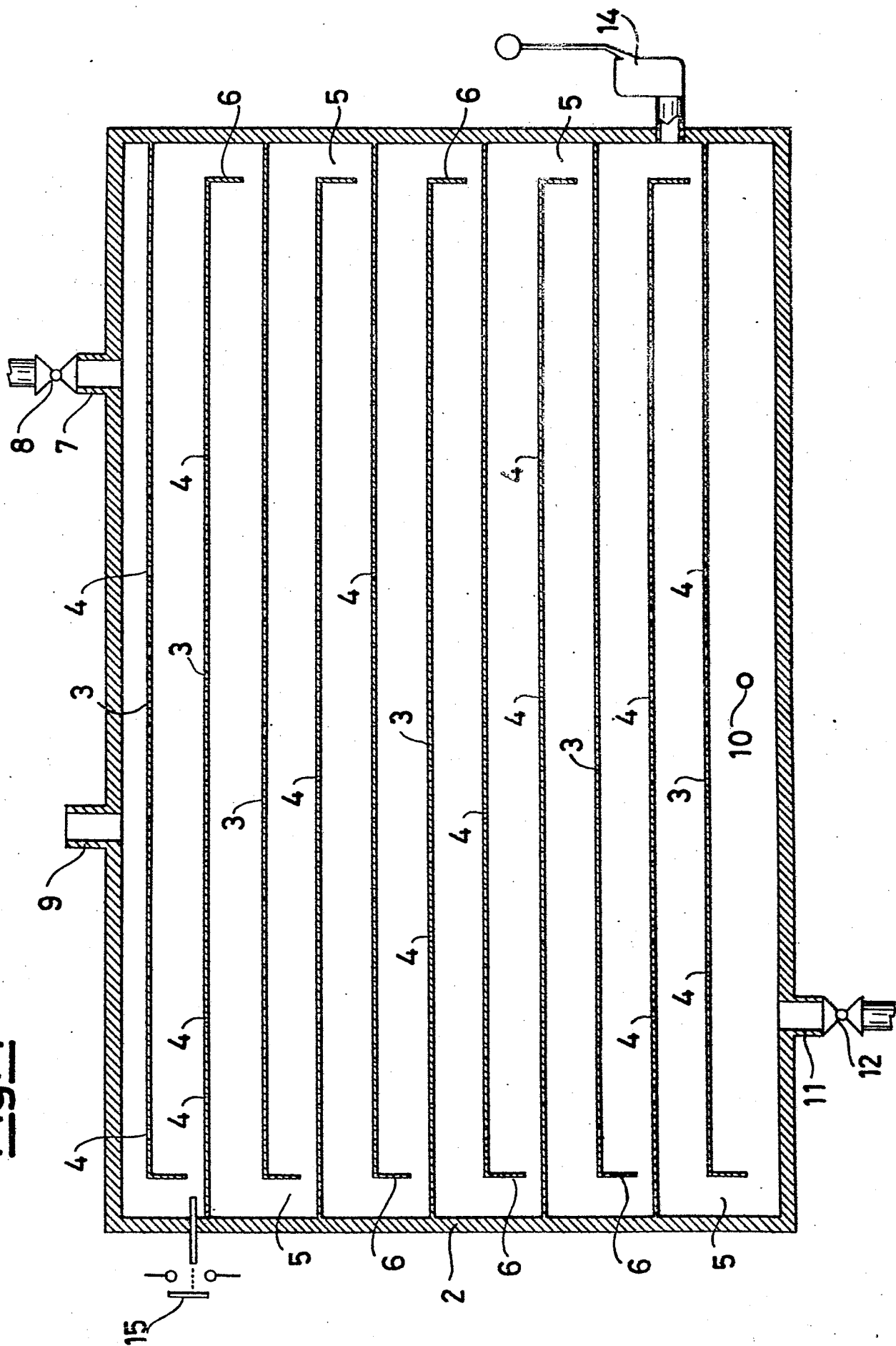
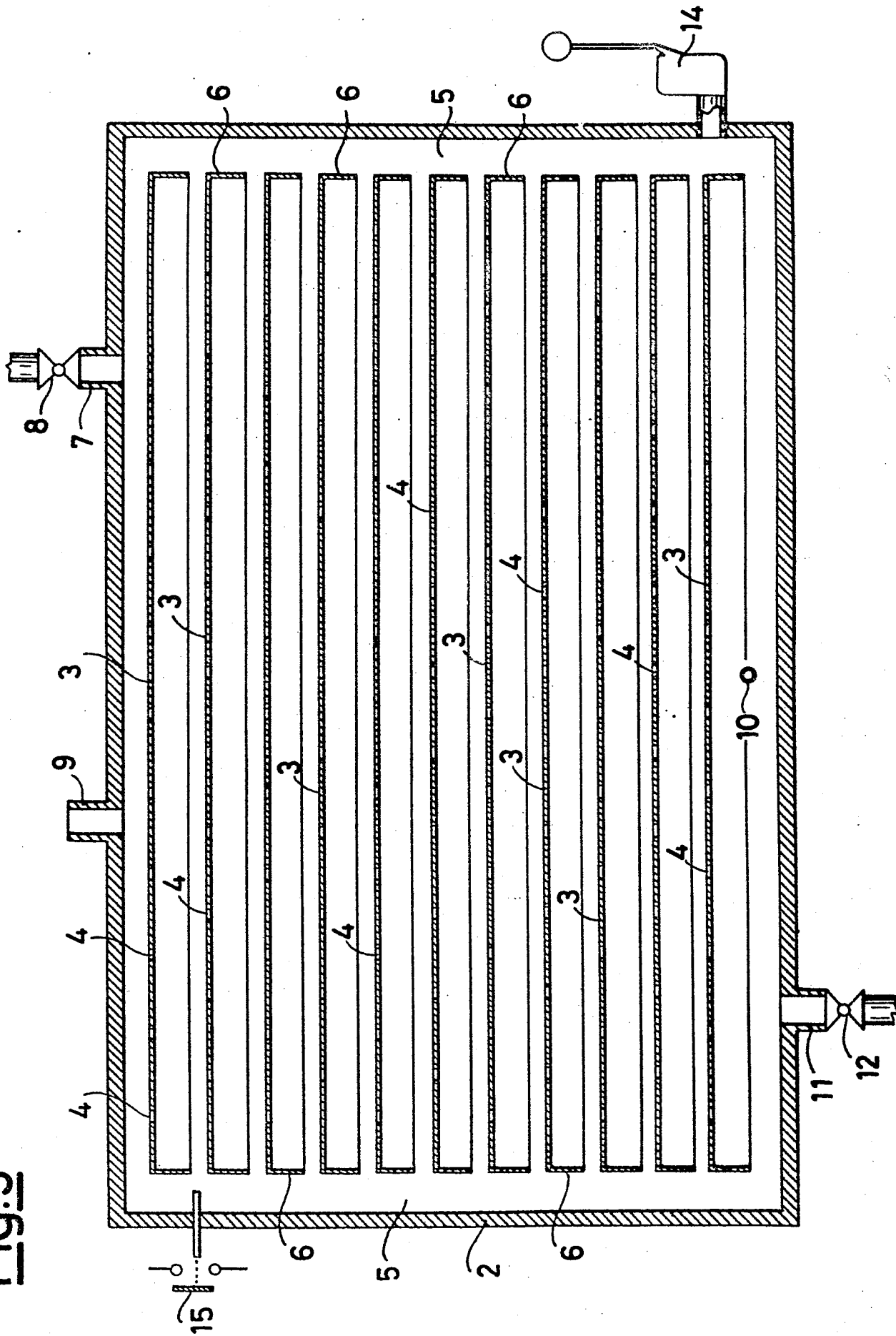


Fig. 5



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