

R. SAUERBREI.

EVAPORATOR.

APPLICATION FILED JAN. 4, 1909.

978,490.

Patented Dec. 13, 1910.

Fig.1.

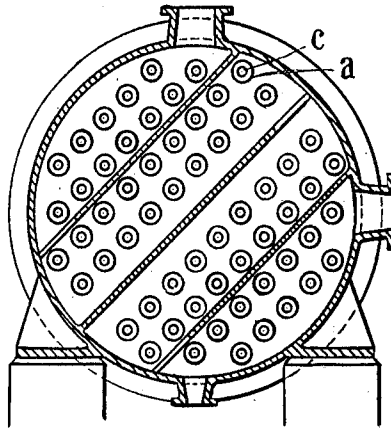


Fig.2.

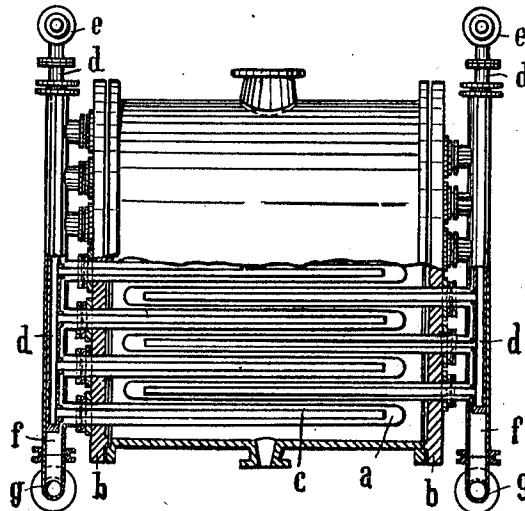
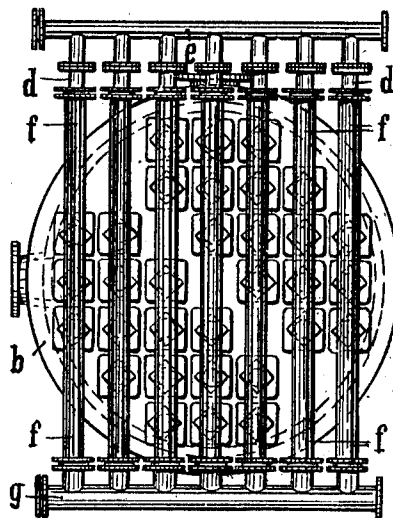


Fig.3.



Witnesses:

E. A. Bond
Thos. Glanz

Inventor:

Richard Sauerbrei
by *J. E. Sauer*
attorney

UNITED STATES PATENT OFFICE.

RICHARD SAUERBREI, OF STASSFURT, GERMANY, ASSIGNOR TO G. SAUERBREY
MASCHINENFABRIK, AKTIENGESSELLSCHAFT, OF STASSFURT, GERMANY.

EVAPORATOR.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, RICHARD SAUERBREI, engineer and director-general, a subject of the German Emperor, residing at 20 Atzen-
dorferstrasse, Stassfurt, Germany, have in-
vented new and useful Improvements in
Evaporators, of which the following is a
specification.

The present invention relates to evapora-
tors and a primary object is to provide an
improved cast-iron evaporator having tubes.

Certain lyes, such as caustic soda, caustic
potash, calcium nitrate and many other lyes,
are evaporated on a large scale in cast-iron
evaporators. When evaporating *in vacuo*,
moreover, as large a heating surface as pos-
sible must be provided in a relatively small
chamber. Now the construction of custom-
ary cast-iron evaporators is not only con-
nected with considerable difficulties, but the
material also necessitates the employment of
low steam pressure, since the usual chambers
and particularly the end walls are not suffi-
ciently resisting to high pressures. On the
other hand, however, the employment of
high steam pressures is not allowed because
the boiling-points of the highly concentrated
lyes even *in vacuo* are relatively high and
require temperatures of the heating steam
up to 160° C. The joints of the well-known
forms have also the great disadvantage that
they are situated in the lye-chamber and con-
sequently can not be examined as to the tight-
ness while the plant is in operation.

Now in accordance with the present in-
vention it is possible to provide large cast-
iron heating surfaces in small chambers,
when employing steam pressures up to ten
atmospheres for heating the liquid, by ar-
ranging tubes closed at the inner end in a
closed evaporator-shell in such a manner
that these tubes are connected in rows with
wrought iron steam pipes which, on their
part again are so connected to the steam
supply pipe, that the steam can only pass
into the heating tubes which are closed at
one end, whereby the end walls of the evap-
orator-shell are completely relieved of steam
pressure and have only to withstand the
pressure of liquid. In the case of this form
all of the joints are outside the lye-chamber
and consequently said joints are accessible at
any time during the running of the plant.
The new construction offers the further great
advantage that the steam distributing and

condensed water pipes may consist of
wrought-iron.

In order that the invention may be clearly
understood, reference will be made to the ac-
companying drawing, in which one embodi-
ment is represented by way of example, and
in which:

Figure 1 is a cross-section, Fig. 2 an ele-
vation, partly in section, and Fig. 3 an end
elevation of an evaporator having cylin-
drical shell.

Referring to the drawing, the cast-iron
heating tubes closed at one end, *i. e.*, the
tubes *a*, are passed from both sides through
the end walls *b, b* of the cylindrical evap-
orator-shell in such manner that they can ex-
pand freely. They are connected outside
the lye-chamber by means of flanges in rows
with one another and each row is connected
with the live steam pipe.

In the tubes *a* the tubes *c* are provided
which are connected in rows to the wrought-
iron steam supply pipe *d*, to which live
steam flows from the steam pipe *e*. The
steam passes from a steam generator through
the pipe *e*, the steam supply pipes *d* and the
tubes *c* to the closed ends of the tubes *a*,
here flows into the latter and along their
heating surface back to their open ends.
The condensed water formed is here re-
ceived by the collecting pipes *f* which sur-
round the live steam supply pipes *d*. Lastly,
the discharge pipe *g* receives the condensed
water.

As is evident no joints at all are situated
in the chamber inside the evaporator-shell
and moreover the tube plates are exposed
only to the pressure of the evaporating
liquid. Further, the live steam supply pipes
and also the exhaust steam pipes may be
made of wrought-iron since the same do not
come in contact with the lye.

What I claim is:

1. A cast-iron evaporator having tubes
closed at one end and open at the other, the
cast-iron heating tubes *a*, which are closed at
one end, being in communication with steam
pipes *d* which are arranged outside the
evaporating vessel and are connected with
the steam pipe *e*, whereby joints inside the
lye-chamber are avoided and the tube plates
of the evaporating vessel are completely re-
lieved from steam pressure, the heating
steam being conducted to and from the heat-
ing tubes arranged in rows by means of two

concentric pipes, out of the inner one *d* of
which live steam flows through admission
tubes *c* into a row of tubes closed at one end,
while the outer pipe *f* receives and leads
5 away the exhaust steam and the condensed
water out of the same row of tubes *a*.

2. In an evaporator of the character de-
scribed, the combination with the evapora-
tor-shell, of steam pipes arranged in rows by
10 means of two concentric pipes, admission
tubes through which live steam flows out
of the inner pipes, and outer pipes adapted

to receive and lead away the exhaust steam,
all the joints being disposed outside said
shell whereby the walls of said shell are re- 15
lieved of steam pressure.

In testimony whereof I have signed my
name to this specification in the presence
of two subscribing witnesses.

RICHARD SAUERBREI.

Witnesses:

WOLDEMAR HAUPT,
HENRY HASPER.