

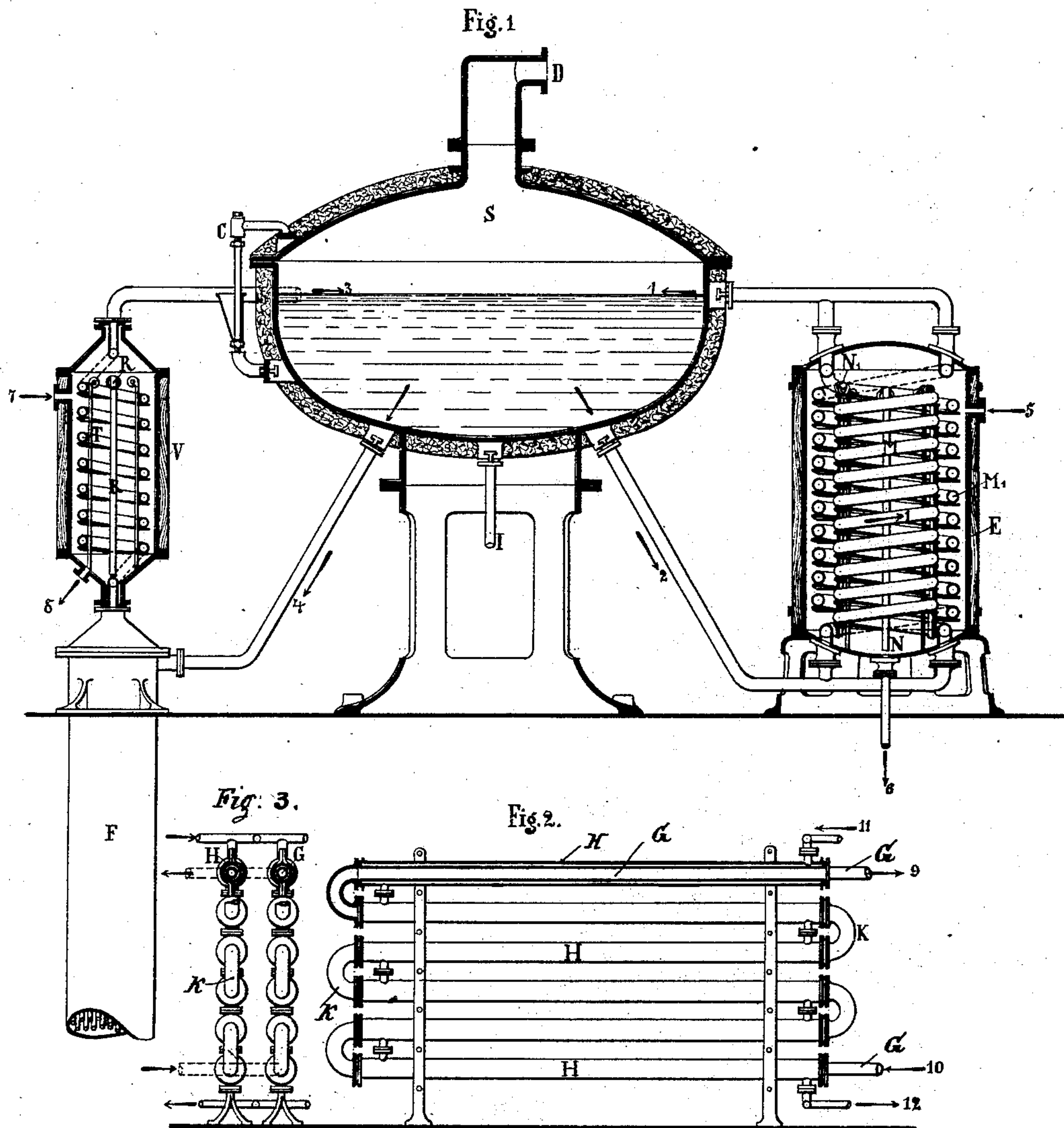
(No Model.)

H. PISCHON & R. PFENNIG.

APPARATUS FOR CONCENTRATING ACIDS.

No. 374,268.

Patented Dec. 6, 1887.



Witnesses.

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UNITED STATES PATENT OFFICE.

HUGO PISCHON AND RICHARD PFENNIG, OF BERLIN, GERMANY.

APPARATUS FOR CONCENTRATING ACIDS.

SPECIFICATION forming part of Letters Patent No. 374,268, dated December 6, 1887.

Application filed June 30, 1887. Serial No. 242,948. (No model.) Patented in Germany June 8, 1886, No. 38,015; in France June 19, 1886, No. 176,886, and in Austria-Hungary April 5, 1887, No. 45,357 and No. 10,190.

To all whom it may concern:

Be it known that we, HUGO PISCHON and RICHARD PFENNIG, both residents of the city of Berlin, German Empire, have invented a new and Improved Apparatus for Concentrating Acids, (for which we have obtained the following patents: Germany, No. 38,015, June 8, 1886; France, No. 176,886, June 19, 1886; Austria-Hungary, No. 45,357 and No. 10,190, April 5, 1887,) of which the following is a specification.

The invention relates to a new apparatus so constructed that acids may be heated and concentrated through leaden spiral pipes enveloped by steam under high pressure.

The invention consists in the various features of improvement more fully pointed out in the claims.

In the accompanying drawings, Figure 1 is a vertical section of our improved apparatus. Fig. 2 is an elevation showing a modification, partly in section. Fig. 3 is an end view and part section of Fig. 2.

The letter S represents an evaporating-vessel made of hard lead or other suitable material and covered by a poor conductor of heat. The vessel S has a steam-dome, D, and is provided with a rarefying-pump and an acid-gage glass. At some distance from the vessel S there is placed an acid-heater. This consists of a cylindrical vessel, E, made of sheet iron or copper, and containing a spiral coil of lead pipe, M M'. Each of the convolutions of this coil rests upon a winding or spiral support, N N'. By means of this support the lower coils of the pipe are relieved from the weight of the upper coils, each coil being carried by a corresponding convolution of the support. Thus the coils of the pipe are prevented from being bent out of shape. The steam enters the acid-heater at inlet 5, and is discharged at outlet 6. At the opposite side of evaporator S there is placed an acid-concentrator, which is employed to preheat the acid. This concentrator is constructed similar to the acid-heater E, being composed of a cylindrical vessel, V, with lead coil T and with steam-inlet 7 and steam-outlet 8.

The upper and lower parts of vessel E are

connected to evaporator S by pipes 1 2, and the upper and lower parts of vessel V are connected to such evaporator by pipes 3 4.

The operation of the device is as follows: The acid to be concentrated passes from a tank or interchanger, F, through the worm T, which is enveloped by live steam admitted into vessel V by inlet 7. The preheated acid on leaving the worm enters the evaporator S at 3. Owing to the removal of the aqueous vapors, the acid has become cooler and heavier, and enters the acid-heater E at the bottom through tube 2. In this heater the acid passes upward through worm M M', to be again heated by the steam admitted at 5. From the upper part of the worm the acid is again discharged into evaporator S by tube 1, when it may be made to again pass into concentrator V by means of tube 4, and in this way a continuous circular course can be maintained. The acid heated in this way evaporates on its surface in the evaporator, and thus loses part of the water it contains. The vapor either escapes into the open air or is condensed by means of suitable condensing contrivances. The concentration of acid may take place either continuously, as described, or intermittently. In the latter case it escapes, when sufficiently evaporated, through the outlet-pipe J, and the apparatus is then refilled with diluted acid. For vacuum ice-machines the acid is usually concentrated continuously. The supply and escape of the acid is regulated by the cocks in such a manner that the level of the fluid in the evaporator always remains the same.

In Figs. 2 and 3 we have shown a modification of the worm M M'. In this modification the pipe is not bent spirally, but is composed of a number of horizontal straight lead pipes, G, connected at the ends by means of hard-rubber elbows K. Each pipe G is inclosed by a wider copper or iron steam-pipe, H. The acid to be heated enters at inlet 10 and passes out and into the evaporator at 9. The steam enters at 11 and escapes at 12, thus circulating in a direction opposite to that of the acid.

We claim as our invention—

1. The combination of evaporator S, having

a rarefying-pump and steam-dome, with an acid-heater, E, containing a coil connected at the upper and lower ends by pipes 1 2 with the evaporator, the heater E being provided
5 with steam inlet and outlet, substantially as specified.

2. The combination of evaporator S with the acid-heater E, containing a coil that is connected at its upper and lower ends with the
10 evaporator and with a spiral support, N N', within heater E, and supporting the several convolutions of the coil, substantially as specified.

3. The combination of evaporator S with the heater E and concentrator V, each containing a coil that is connected at the upper and lower ends with the evaporator and with the tank F, substantially as specified.

In testimony whereof we have signed our names to this specification in the presence of
20 two subscribing witnesses.

HUGO PISCHON.

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Witnesses:

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