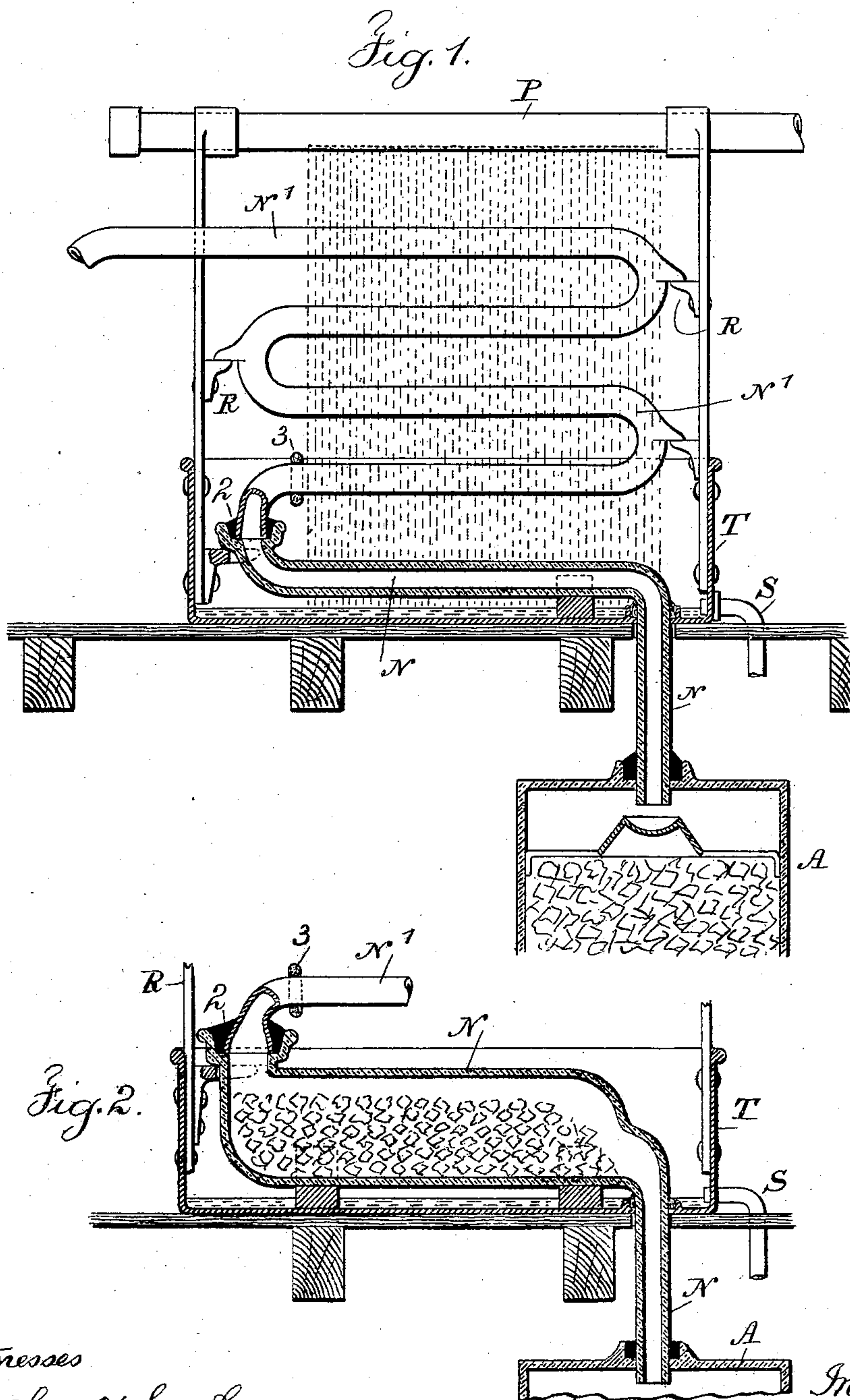


(No Model.)

J. V. SKOGLUND.
CONDENSER FOR NITRIC ACID.

No. 603,412.

Patented May 3, 1898.



Witnesses

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CONDENSER FOR NITRIC ACID.

SPECIFICATION forming part of Letters Patent No. 603,412, dated May 3, 1898.

Application filed October 19, 1897. Serial No. 655,656. (No model.)

To all whom it may concern:

Be it known that I, JEAN VILHELM SKOGLUND, a subject of the King of Sweden and Norway, residing at Bayonne, in the county of Hudson and State of New Jersey, have invented an Improvement in Condensers for Nitric Acid, of which the following is a specification.

In the manufacture of strong nitric acid it has heretofore been difficult to condense the hot nitric vapors on account of their corrosive nature. The materials which have been hitherto considered as adapted to resist the nitric vapors are only glass, pottery, or porcelain; but owing to their fragile nature and bad conductivity of heat it has always been very desirable to replace them by some other material more durable and a better conductor.

The object of the present invention is to provide for using lead in a condenser for nitric acid. Heretofore lead has been considered as easily attacked by hot nitric acid, and nitrate of lead is manufactured by dissolving lead in hot dilute nitric acid. I have discovered that substantially pure lead will resist strong nitric acid containing less than ten per cent. of water even when in a boiling condition, and the present invention relates to a nitric-acid condenser made in two parts, the primary portion of the condenser being of vitreous or acid-resisting materials, such as glass or pottery, and the secondary portion being of substantially pure lead. In consequence of the strong or concentrated acid volatilizing at a lower temperature than weak or diluted nitric acid the weak or dilute nitric acid will be condensed in the first part of the condenser and the strong nitric acid, containing less than ten per cent. of water, will pass into the secondary portion of the condenser and there be condensed in the lead portion, and this is accomplished without injury to the lead and much more perfectly than in the condensers heretofore used, because the lead is a better conductor than porcelain or earthenware and can be continued as a pipe to any desired length and without seam or joint, so that there is no risk of loss of any of the strong nitric acid or the vapors thereof by an ultimate escape of the same or in con-

sequence of leakage in the lead or secondary portion of the condenser.

In carrying out this invention the primary portion of the condenser is made of a pipe or vessel of the desired size, either plain or containing pieces of acid-proof material, over which the cold nitric acid flows, and there are an inlet and an outlet to this first portion of the condenser, and the secondary portion of the condenser, in the form of a lead pipe, is conducted directly to the primary part of the condenser and is advantageously laid or bent as horizontal pipes in a vertical range, there being return-bends in the lead pipe between the respective horizontal pipes, and the cooling-water is supplied to the upper pipe of the range, so that the portion of the condenser next the ultimate escape-opening is the coldest, and the lower portion of the condenser is maintained at a suitable temperature for effecting a condensation of the weaker or more diluted nitric acid, so that only the nitric acid containing less than about ten per cent. of water passes into the secondary portion of the condenser, that is made of lead and upon which the concentrated acid has no injurious effect.

In the drawings, Figure 1 is an elevation of this improved condenser with the primary portion thereof composed of pottery or vitreous material in the form of a pipe, and Figure 2 is a similar view with this portion of the condenser in the form of a box containing pieces of acid-proof material.

The pipe N is connected at its lower end to the upper end of the tower A, in which the nitric acid is caused to flow over vitreous material, and the vapors pass off by this pipe N and are condensed and run back into the tower. A condenser of this general character is set forth and claimed in my Patent No. 591,087, granted October 5, 1897. This pipe N in Fig. 1 is represented as forming the primary portion of the condenser, and it is to be of glass, porcelain, pottery, or similar material, and the pipe N' is connected to the upper end of the pipe N and is led backward and forward, forming a vertical range of substantially horizontal pipes, and these are suitably supported, as at R, and the joint between

the primary condenser N and the secondary condenser N' at 2 is made tight by suitable acid-proof material, and cooling-water is to be supplied into a trough or pipe P, that is perforated so that the water trickles down over the vertical range of pipes, keeping the same at the proper temperature for condensing the acid-vapors, and any uncondensed vapors may pass away from the upper end of the pipe N' into any suitable receiver.

The device illustrated in Fig. 2 is similar to that shown in Fig. 1, with the exception that the primary portion of the condenser is made larger and is represented as containing pieces of acid-proof material, so as to present an extended surface for the condensation of the nitric acid, and the sizes of the parts are to be such and the temperature so maintained that in the primary portion of the condenser the nitric acid will be condensed, and the uncondensed vapors passing from the primary portion of the condenser into the secondary portion will not contain more than ten per cent. of water, and thereby a more concentrated acid will be condensed in the secondary portion of the condenser, and this can be extended as desired, so that no useful vapors will pass away uncondensed, and the lead forming the pipe of which the secondary condenser is made will not be injuriously affected by the acid that is condensed therein, and such acid may all flow into the primary portion of the condenser, and being thoroughly cooled will aid in condensing the watery and acid vapors passing from the column or tower A.

By this improvement the condenser is rendered very durable and easy to construct and to keep in order, as there is but one joint, which is between the primary and secondary portions of the condenser. The condensing-water may be received into a tank T and be led away by a pipe S, and a ring may be applied at 3 to the pipe N', adjacent to the joint 2, to prevent the condensing-water running along the pipe N' and passing upon said joint.

I claim as my invention—

1. A condenser for nitric acid having a primary portion of acid-proof material, such as glass or pottery that is not injured by the weak acid, and a secondary portion directly connected to the primary portion and composed of lead, and means for cooling the exterior of the condenser, substantially as set forth.

2. A condenser for nitric acid having a primary portion of acid-proof material, such as glass or pottery that is not injured by the weak acid, and a secondary portion directly connected to the primary portion and composed of a lead pipe bent to form a vertical range of horizontal pipes and a water-supply vessel above the condenser for allowing cooling-water to trickle down over the vertical range of substantially horizontal pipes, substantially as set forth.

Signed by me this 25th day of September, 1897.

JEAN VILHELM SKOGLUND.

Witnesses:

GEO. T. PINCKNEY,
S. T. HAVILAND.