

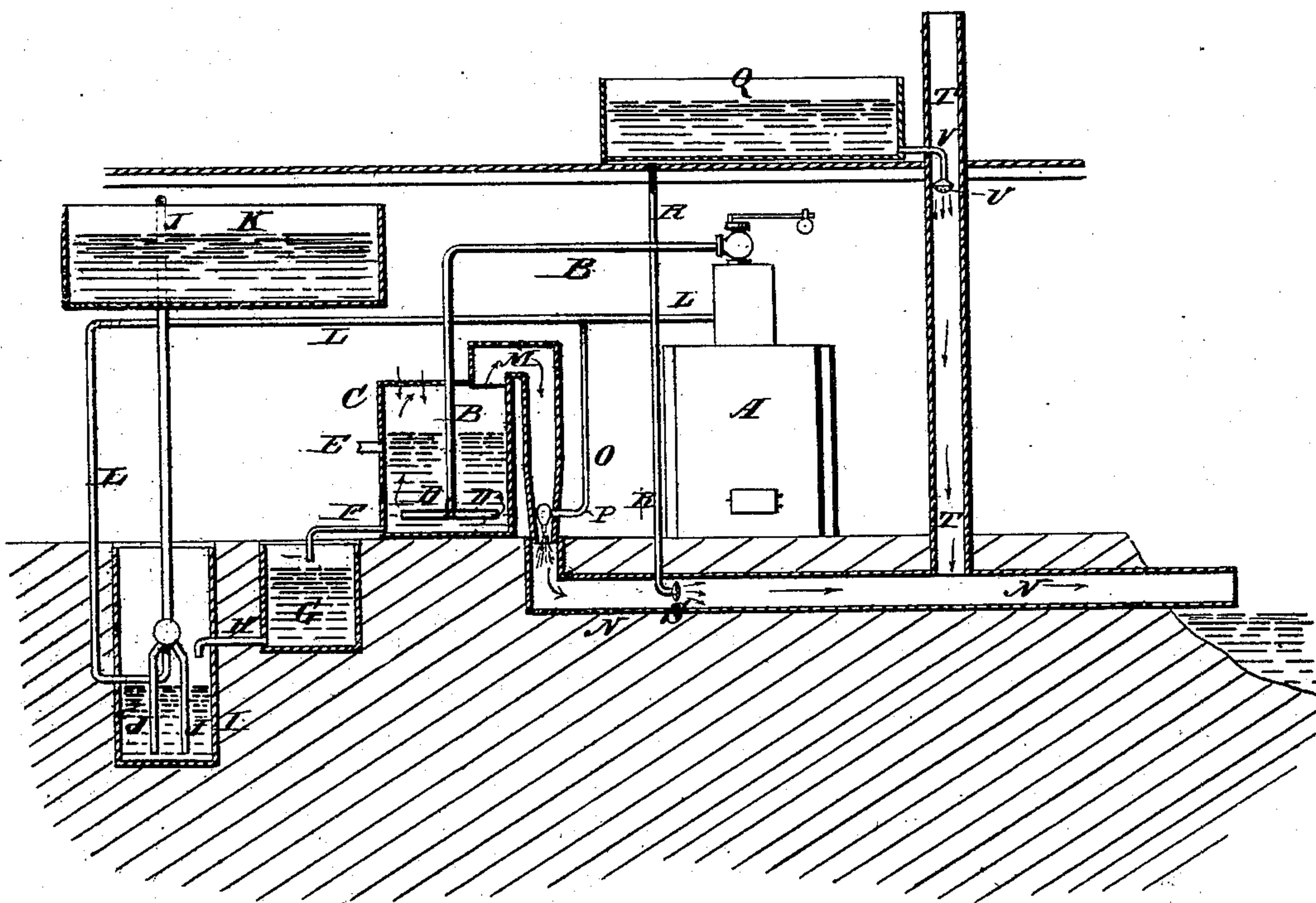
(No Model.)

E. CLARK.

Recovering Sulphuric Acid from Sludge Acid.

No. 232,685.

Patented Sept. 28, 1880.



WITNESSES:

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RECOVERING SULPHURIC ACID FROM SLUDGE-ACID.

SPECIFICATION forming part of Letters Patent No. 232,685, dated September 28, 1880.

Application filed May 6, 1880. (No model.)

To all whom it may concern:

Be it known that I, EDWARD CLARK, of Brooklyn, in the county of Kings and State of New York, have invented a new and Improved Method and Apparatus for Recovering Sulphuric Acid from Sludge-Acid, of which the following is a specification.

The drawing is a sectional elevation of the improvement.

10 The object of this invention is to furnish an apparatus for recovering the sulphuric acid from the sludge-acid from oil-refineries in such a manner as to prevent any unpleasant or unhealthy odors from escaping, and at the same
15 time obtain a sulphuric acid sufficiently pure for use in manufacturing superphosphates and analogous uses.

My invention consists, mainly, in combining two consecutive steps or operations, to wit,
20 First, passing into the sludge-acid steam, which bubbles up through the mass in direct contact therewith, and which effects the results of softening the mass and increasing its fluidity, stirring or agitating it, and separating the sulphuric acid from the tar with the evolution of
25 sulphurous-acid fumes and other offensive odors; and, secondly, creating a partial vacuum above the mass by an induced draft, whereby the offensive gases, which have a tendency to
30 creep through the crevices of the vessel, are carried off and disposed of, whereby, also, the mechanical agitation of the mass is facilitated by a reduction of the pressure above the surface of the same.

35 My invention also consists in the peculiar construction and arrangement of the apparatus for carrying out this process, as hereinafter more fully described.

In the drawing, A represents a steam-boiler,
40 from the dome or steam-space of which a pipe, B, leads to the separating-tank C. This pipe B enters the upper end of the tank C and descends nearly to the bottom of the said tank, where it connects with the inner ends of a number of radiating pipes, D, from the open outer
45 ends of which the steam escapes into the tank C and rises through the sludge-acid contained in said tank. This sludge-acid is taken as it comes from the refinery, and is poured or
50 pumped into the tank C, and as the steam rises through it the tar is softened and made

more fluid, and rising to the top is drawn off through the faucet E, while the sulphuric acid, by reason of its affinity for water, unites with or associates with itself a part of the water of
55 the steam and sinks to the bottom of the tank C and passes off through the pipe F into the cooling-tank G.

It will thus be seen that the combined effect of the heat, agitation, and affinity of the acid
60 for the water of the steam serves to quickly separate the acid from the tar. In the activity of this process of separation, however, fumes in considerable volumes are given off, which are of such an insidious character as to creep
65 through the crevices of the vessel, and are so strongly offensive as to render the process intolerable to the community. These fumes consist of sulphurous acid, or sulphuric acid partly reduced by the associated hydrocarbon, which
70 pungent fumes are mixed with others of an organic character. It has been proposed to carry these fumes to the furnace and burn them; but this will not effectually dispose of them. In my process I draw them off with an induced
75 current, producing above the level of the mass in the separating-vessel a partial vacuum, which prevents the fumes from creeping out of the crevices in the top of the vessel, and causes, on the contrary, an inward
80 draft of air, as shown by the arrows, in the top of vessel C. This partial vacuum serves also the good purpose of facilitating the agitation of the mass by reducing the pressure above it. For creating this blast and carrying away
85 these fumes a trunk, M, leads out from the top of the vessel C and down into a trough, N, and in the lower part of this trunk M, I place a steam-blower, P, communicating with a pipe,
90 O, which receives its steam from the boiler through pipe L or directly from the boiler, as may be most convenient.

I prefer to use a steam-blower in contradistinction to a fan or other mechanical blower, because as the sulphurous-acid gas passes out
95 mixed with the steam the said gas dissolves in the condensations of the steam and becomes heavy or deadened and falls to the ground, even if liberated in this state, and does not fly about and pervade the air in rarefied gaseous
100 form.

To further reduce the possibility of the es-

cape of these offensive fumes, I place at an elevated point a water-tank, Q, from which a pipe, R, descends, and terminates in a rose-sprinkler, S, on the trough N; and, again, I
 5 arrange a vertical tube, T, so as to communicate with the trough at right angles, and into this tube I shower a spray of water from the tank Q by another rose-sprinkler, V. Instead of these latter devices, however, I may run
 10 the outer end of the trough N into the creek, dock, or canal, and allow its end to dip beneath the water.

As the more or less purified sulphuric acid passes out through the pipe F into the tank
 15 G and becomes cool, any tar which may still remain in it rises to the top and is dipped out as it accumulates. The pure acid flows from the lower part of the tank G through the pipe H into the collecting-tank I. From the col-
 20 lecting-tank I a pipe, J, leads up to the upper part of the acid-receiving tank K. The lower end of the pipe J is branched, and the open ends of its branch pipes extend nearly to the bottom of the collecting-tank I. With
 25 the pipe J, at the point where its branches unite with it, is connected the end of a steam-pipe, L, leading from the dome or steam-space of the boiler A, to introduce a jet of steam, which acts as an injector and causes the acid
 30 to rise through the pipe J into the tank K, whence the acid is drawn off for use or into carboys, as desired.

The tanks C G I K are lined with lead to prevent corrosion.

35 The tar from the faucet E may be received upon a platform, where it hardens, and can then be broken up and used as fuel for the boiler-furnace, or it may be received into barrels when not required for immediate use.

40 What I claim as new is—

1. The process herein described of recovering sulphuric acid from the sludge-acid of oil-refineries and disposing of the offensive odors, which consists in exhausting by an induced
 45 blast the vapors arising from the sludge-acid while being agitated by the direct contact of steam, substantially as described.

2. The process herein described of recovering sulphuric acid from the sludge-acid of oil-
 50 refineries and disposing of the offensive odors,

which consists in exhausting by an induced steam - blast the vapors arising from the sludge-acid while the latter is being agitated by the direct contact of steam, substantially as described.

3. The combination of the tank C, having an outlet for the tar near the top and an outlet for the sulphuric acid near the bottom, with the boiler A and steam-pipe B, terminating in open steam-pipes in the bottom of said tank, 60 a discharge-trunk for the gases opening into the top of the tank, and a steam-blower located in said discharge-trunk, as and for the purpose described.

4. An apparatus for recovering sulphuric 65 acid from sludge-acid, constructed substantially as herein shown and described, consisting of the steam-boiler A, the separating-tank C, having faucet E and discharge-pipe F, the cooling-tank G, having discharge-pipe H, the 70 collecting-tank I, having discharge-pipe J, the acid-receiving tank K, the steam-pipes B L, the tube and trough M N, having upright tube T, the steam-pipe O, having steam-blower P, and the water-pipes R V and sprinklers S 75 U, as set forth.

5. In an apparatus for recovering sulphuric acid from sludge-acid, the combination, with a steam-boiler, A, of the separating-vat C, having the discharging-faucet E and acid-dis- 80 charging pipe F, the cooling-tank G, having discharge-pipe H, the collecting-tank I, having discharge-pipe J, the acid-receiving tank K, and the steam-pipes B L, whereby the acid is separated from the tar, as set forth. 85

6. In an apparatus for recovering sulphuric acid from sludge-acid, the combination, with the steam-boiler A and pipe B, the separating-tank C, and the water-tank Q, of the tube M, the trough N, the upright tube T, the steam- 90 pipe O, having steam-blower P, and the water-pipes R V, and sprinklers S U, substantially as herein shown and described, whereby the sulphurous-acid gas is condensed and rendered odorless, as set forth.

EDWARD CLARK.

Witnesses:

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