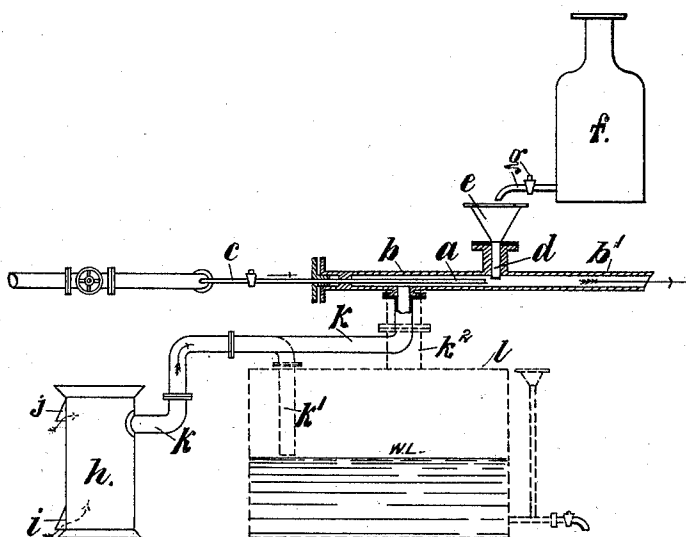


(No Model.)

E. V. GARDNER.
APPARATUS FOR VAPORIZING ACIDS IN THE MANUFACTURE OF
WHITE LEAD.

No. 477,527.

Patented June 21, 1892.



WITNESSES.

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UNITED STATES PATENT OFFICE.

EDWARD VINCENT GARDNER, OF LONDON, ENGLAND.

APPARATUS FOR VAPORIZING ACIDS IN THE MANUFACTURE OF WHITE LEAD.

SPECIFICATION forming part of Letters Patent No. 477,527, dated June 21, 1892.

Application filed September 10, 1891. Serial No. 405,306. (No model.) Patented in England March 25, 1885, No. 3,839; in France April 2, 1885, No. 168,046; in Germany May 22, 1885, No. 36,319; in Belgium February 12, 1886, No. 71,964, and in Italy October 24, 1888, XXII, 24,346, XLVIII, 185.

To all whom it may concern:

Be it known that I, EDWARD VINCENT GARDNER, a subject of the Queen of Great Britain and Ireland, residing at London, in the county of Middlesex, England, have invented new and useful Improvements in Apparatus for Vaporizing Acids in the Manufacture of White Lead, (for which I have obtained Letters Patent in Great Britain, No. 3,839, dated March 25, 1885; in Belgium, No. 71,964, dated February 12, 1886; in France, No. 168,046, dated April 2, 1885; in Germany, No. 36,319, dated May 22, 1885, and in Italy, Registro General Vol. XXII, No. 24,346, Registro Attestati Vol. XLVIII, No. 185, dated October 24, 1888,) of which the following is a specification.

My present invention relates to apparatus for the vaporizing of acids and supplying them in a vaporized state, along with other acids and vapors—such as carbonic-acid gas, air, and the vapor of water—to the converting-chambers employed in making white lead.

The apparatus consists of a steam pipe or nozzle disposed within a pipe or chamber, a pipe or funnel opening into said pipe or chamber in front of the discharge-orifice of said nozzle and through which the acid or acid mixture is introduced, a pipe or conduit opening into the pipe or chamber in which the nozzle is disposed and behind the discharge-orifice of the steam-nozzle and through which carbonic-acid gas is introduced or air and carbonic-acid gas, and a carbon-burner, the air to supply such burner to burn the fuel to carbonic acid being moved and such acid introduced into the steam-pipe chamber by the exhaust or rarefaction created by the steam-jet.

This apparatus constitutes what I term a "combined injector, evaporator, and exhaust apparatus." At the same time it vaporizes the acid or acid mixture supplied to it, it keeps the carbon-burner—*i. e.*, the carbonic-acid generator—in action and causes the introduction of carbonic acid made by such generator, it introduces air, and it supplies steam or watery vapor, and, mixing the whole of the acid vapors, gases, air, and vapor of water, it supplies them and forces them into the converting-chamber.

The practical application of my invention

in effecting the vaporization of acids and supplying the vapors so produced with the other gases and vapors hereinbefore mentioned—that is to say, the performance of the several functions involved in the vaporization of the acids and the introduction of them with other gases and vaporous fluids into the white-lead-converting chamber—is exemplified in and will be explained by reference to the parts shown in the accompanying drawing, which is a sectional elevation showing an apparatus illustrating my invention.

In this instance *a* is the steam-nozzle, from the orifice at the end of which steam issues. *b* is the pipe in which said steam-nozzle *a* is centrally disposed.

c is the steam-supply pipe.

d is the tube opening at its lower end into the pipe *b* and just in front of the discharge-orifice of the nozzle *a*, by which the acetic acid or oxide of nitrogen, preferably nitric acid or a mixture of same or others, are supplied or fed into the pipe *b*. *e* is the enlarged mouth of said tube *d*, adapted to receive the acid or acid mixture from the source of supply.

f is a vessel containing the acid or acid mixture being fed to the mouth *e*, it being provided with a regulating tap or valve *g*.

b' is a mixing chamber or pipe, being a continuation of *b*.

h is a carbon-burner and adapted to contain and burn solid fuel, and is provided with an air-inlet regulator at *i*, at which point the air employed to burn the fuel in it to carbonic acid is admitted, with an air-regulator at *j*, at which point air is admitted above the fuel, and a pipe *k*, by which the carbonic acid made by the air admitted at *i* and passed through red-hot coke or other suitable fuel in *h* and the air admitted at *j* is conveyed to the pipe *b*, the opening of the pipe *k* into the pipe *b* being disposed behind the discharge-orifice of the nozzle *a*.

The vessel designated *l* and shown in dotted lines represents a moistening and purifying vessel, which may in some cases be used where it is desirable to purify the carbonic acid. This vessel when used is partly filled with water or other suitable liquid, say, up to

the level marked "W. L.," and the gas and air from the burner *h* is led into the vessel by the pipe *k* and downwardly-extended part *k'* thereof. It then passes from the vessel *l* into the tube *b* by the pipe *k*².

The action will now be plainly seen. The steam coming from the nozzle *a* behind the falling drops or fine stream of acid or acids from the acid-supply tube *d* vaporizes said acid or acids. At the same time it exhausts the gases behind the nozzle within the pipes *b* and *k*, and thereby causes air to pass through the fuel in the burner *h* and produce carbonic-acid gas, and if the valve at *j* be open it also causes the introduction of atmospheric air. These (carbonic acid and air) it causes to flow up into the pipe *b* and then forces them along it and causes them to mix with itself and the acid-vapors it has produced and form a homogeneous mixture, the mixing taking place in the mixing or front pipe portion *b'*, leading to the converting-chamber, where they act upon the lead, which is arranged in any known way, and convert the lead to white lead.

What is claimed as this invention is—

Apparatus for effecting the vaporization of acids such as specified, the production of carbonic acid, the introduction of air, and the providing of the vapor of water, the mixing of same, and the forcing and introduction into

a lead-converting chamber of same, consisting of the combination of the steam-nozzle *a*, fed with steam from a steam-supply pipe *c*, a pipe *b*, inclosing said nozzle *a*, which discharges steam axially along said pipe, a supply-pipe *d*, disposed in front of the discharge-orifice of the nozzle *a* and opening out into the pipe *b* and adapted to deliver acids into the jet of steam which issues therefrom, a carbonic-acid burner *h*, a pipe *k*, connecting said burner and said pipe *b* together and opening out in the latter at the rear of the nozzle *a* and wherethrough carbonic acid is introduced into the pipe *b*, an atmospheric-air-inlet device *j*, and a mixing pipe or chamber *b'*, wherein said steam or vapor of water, acid-vapors, carbonic-acid gas, and air become mixed by the action of said jet of steam and from which they are forced thereby forward into the converting-chamber, all substantially as set forth with reference to the drawing.

In testimony whereof I affix my signature in presence of two witnesses.

EDWARD VINCENT GARDNER.

Witnesses:

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