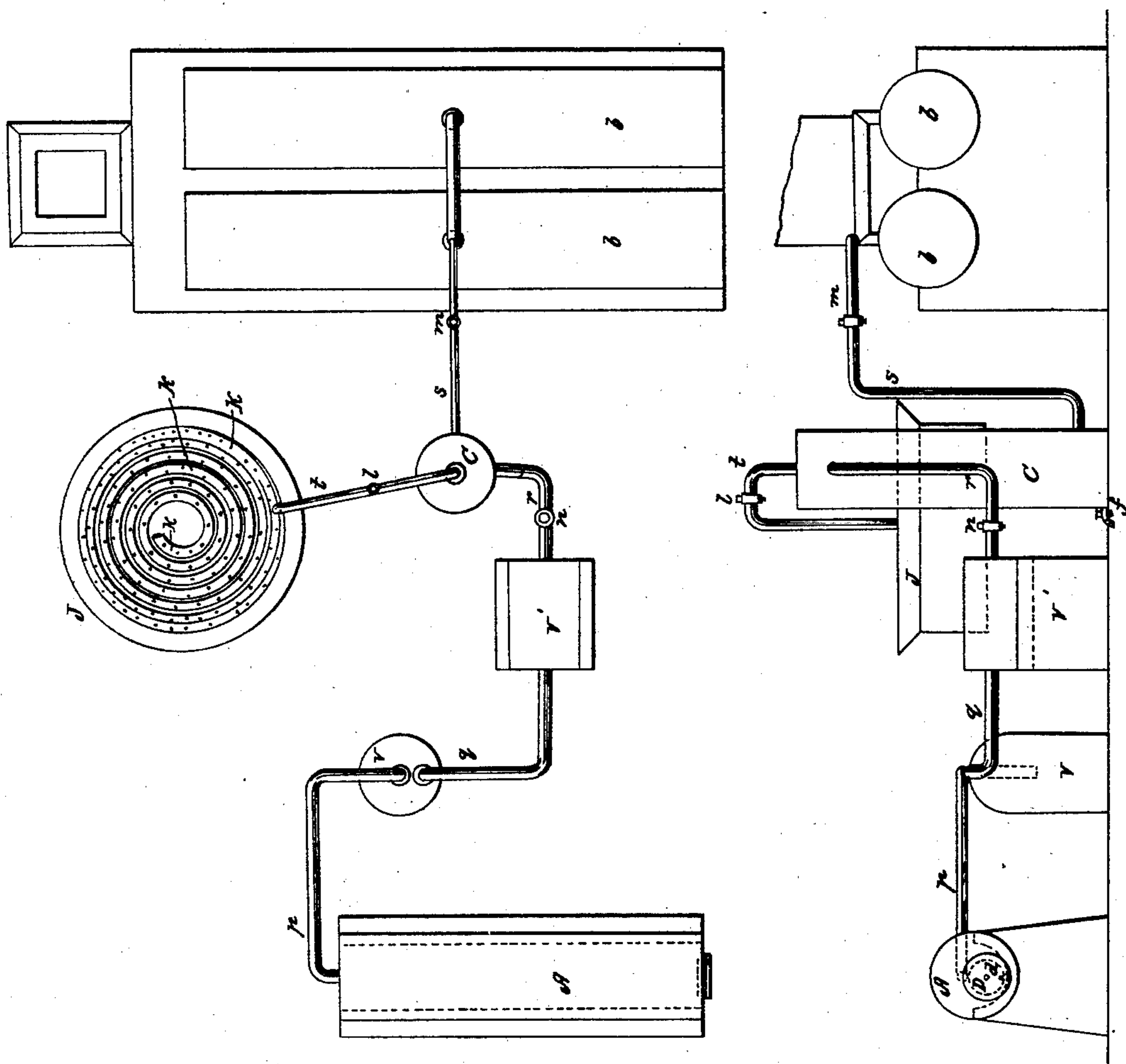


R. A. STEWART.

Clarifying and Defecating Cane Juice.

No. 24,961.

Patented Aug. 2, 1859.



Attest:

Henry Cline

Inventor:

Rich^d A. Stewart.

UNITED STATES PATENT OFFICE.

RICHARD A. STEWART, OF ST. BERNARD PARISH, LOUISIANA.

IMPROVEMENT IN APPARATUS FOR DEFECATING SUGAR.

Specification forming part of Letters Patent No. 24,961, dated August 2, 1859.

To all whom it may concern:

Be it known that I, RICHARD A. STEWART, of St. Bernard parish, State of Louisiana, have made new and useful Improvements in Apparatus for Defecating, Clarifying, and Bleaching Saccharine Liquids—such as Cane-Juice, Sirup, &c.; and I do hereby declare that the following is a full and clear description of the same, reference being had to the accompanying drawing, making a part thereof.

My process for defecating and clarifying cane-juice and other liquid or semi-liquid forms of saccharine matter consists in disseminating throughout the same sulphurous gas. For this I have already taken out Letters Patent of the United States, bearing date January 11, 1859, and the apparatus for carrying out this process, which I have devised and found effective, I now desire to secure by Letters Patent, in so far as the same is new and useful. My improvements are especially applicable in the manufacture of sugar.

In the accompanying drawing, A represents a horizontal cylindrical vessel or retort nearly closed, within along the bottom of which common brimstone is burned with a small supply of air, so that the product of combustion may be sulphurous gas instead of sulphuric acid, and the combustion may be slow and continuous.

V and V' are vessels containing water.

C is a vacuum-cylinder or condenser.

p is a pipe to conduct the sulphurous gas from the retort A to the water-vessel v.

q is a pipe to conduct said gas from v to v'.

r is a pipe to conduct said gas from the vessel v' to the vacuum-cylinder.

b b represent the steam-boilers of the sugar-house.

S is the pipe communicating between the boilers and the vacuum-cylinder.

J is the vessel containing the saccharine matter to be defecated or operated upon.

t is the pipe leading from the vacuum-cylinder to the perforated tube or coil in the bottom of the receiver J. This coil is represented at K K, &c.

M, N, and l represent plugs in the pipes, which are capable of being turned to close the communication through the pipes or open them at pleasure.

D represents a door in the end of the retort;

through which the brimstone may be fed, and d an opening through the door, through which the air may be slowly admitted to preserve slow and imperfect combustion continuously.

The retort A is for making the gas, and the other parts represented and referred to are for transferring the gas to the receiver containing the saccharine matter, and purifying it to a great extent on its way, and freeing it from the sulphuric acid which may be accidentally formed in the retort.

The operation is substantially as follows, viz: A thin charge of broken or pulverized brimstone is placed along the bottom of the retort, which should be made or lined wholly or partially of some substance which the burning sulphur will not seriously injure or rapidly destroy, and the sulphur or brimstone is ignited at the end nearest the door or opposite to the pipe p. The door should then be closed and only the small opening d left for the admission of air. The sulphurous gas will thus be produced. When the receiver J is charged with the cane-juice, the plug N being closed, the plugs M and l should be opened, when the steam will rush from the boiler to the vacuum-cylinder, and as the steam-pipe S enters the vacuum-cylinder near the bottom, and the discharge-pipe t is at the top, the air will be speedily discharged from the vacuum-cylinder, which will soon become filled with steam. When the vacuum-cylinder is filled with steam as nearly as can be judged, the plug M should be closed, and as soon as the bubbling substantially ceases in the receiver J, the plug l should be turned. As the vacuum-cylinder is then entirely closed, and the steam therein rapidly condenses, a vacuum, more or less perfect, will take place therein; and to make this vacuum more perfect and more promptly, jets of cold water may be injected into the cylinder by any of the known and convenient means used for producing condensation. When the vacuum is well commenced, the plug n should be opened, m and l continuing closed, when the gas from the retort A will rush through the pipes p, the vessel v, the vessel v', and the pipe r, to fill the vacuum of the cylinder C. These pipes and vessels should all be air-tight. The pipes which educt the gas from the vessels v v' should enter them above the water-line, and those which conduct the gas into them should also

be above the water, except that the lower end of one or both may so dip as to discharge the gas a very little below the surface of the water. As the gas will not rush from the retorts to the vacuum-cylinder with great force, it is well that its progress should be impeded as little as may be by the tubes and water-vessels. In passing over and through the water the sulphurous gas will be purified. Other substances which are known to absorb sulphuric acid readily might be placed in the water-vessels, and one water-vessel might be used instead of two or more. When the vacuum-cylinder is supplied with sulphurous gas, the plug *n* should be closed and the plug *t* and *m* opened. The gas not being able to pass into the receiver by its own force, and sometimes being insufficient to prevent the liquid saccharine matter from passing into the vacuum-cylinder, the steam from the boilers is admitted to force the sulphurous gas forward through the pipe *t*, and through the perforations in its coil at the bottom of the receiver, and thence it will rise, disseminating itself through the saccharine to the surface.

The receiver *J* may be entirely open at top, and may be placed outside of the sugar-house; or it may be within, and obvious means taken to conduct the gas arising from it out of the way.

The operation described may be repeated once or more on the same charge in the receiver. I have generally found one repetition sufficient.

The size of the apparatus may be very much varied, and the quantity of the gas sent through the charge will of course vary in each operation, according to the size of the apparatus. The retorts may be six to ten feet long, and the other dimensions of the apparatus may be in about the proportions thereto indicated in drawings; but these proportions are not absolutely essential, as is very obvious, but may be very much varied while the same principle

is preserved, and good results will still follow. The small air-opening *d* ought to have an adjustable damper to regulate the admission of air, the object being to continue the combustion and yet produce as little sulphuric acid as possible. At each operation, of course, water of condensation will be deposited in the vacuum-cylinder. It is necessary, therefore, that a cock should be provided for it at its bottom, by which this water may be drawn off. This cock is represented at *f*.

In the manufacture of sugar I prefer so to arrange my apparatus that I can operate directly upon the juice before it enters the boilers; but it obviously may be applied with similar effect at more advanced stages of the operation. It is also obvious that the coil form is not necessary for the reception and distribution of the gas in the bottom of the receiver; but perforated vessels of various forms would answer the purpose. The perforations, however, should be so small that all or nearly all of them will be required to allow the gas to pass out into the liquid, as it is forced forward by the steam. I will further remark that a piston may be used in the vacuum-cylinder to carry out its objects in modes which will readily suggest themselves to every engineer.

Having fully described my apparatus for defecating, clarifying, and bleaching saccharine liquid and explained the mode of operating the same, what I claim as new, and desire to secure by Letters Patent, is—

The combination of the retort, the vacuum-cylinder and receiver, substantially in the manner and for the purpose herein set forth, and these I also claim in combination with the steam-boiler, substantially operating as described, and for the purpose set forth.

R. A. STEWART.

In presence of—

T. VAMOURT,

B. G. BURNIT.