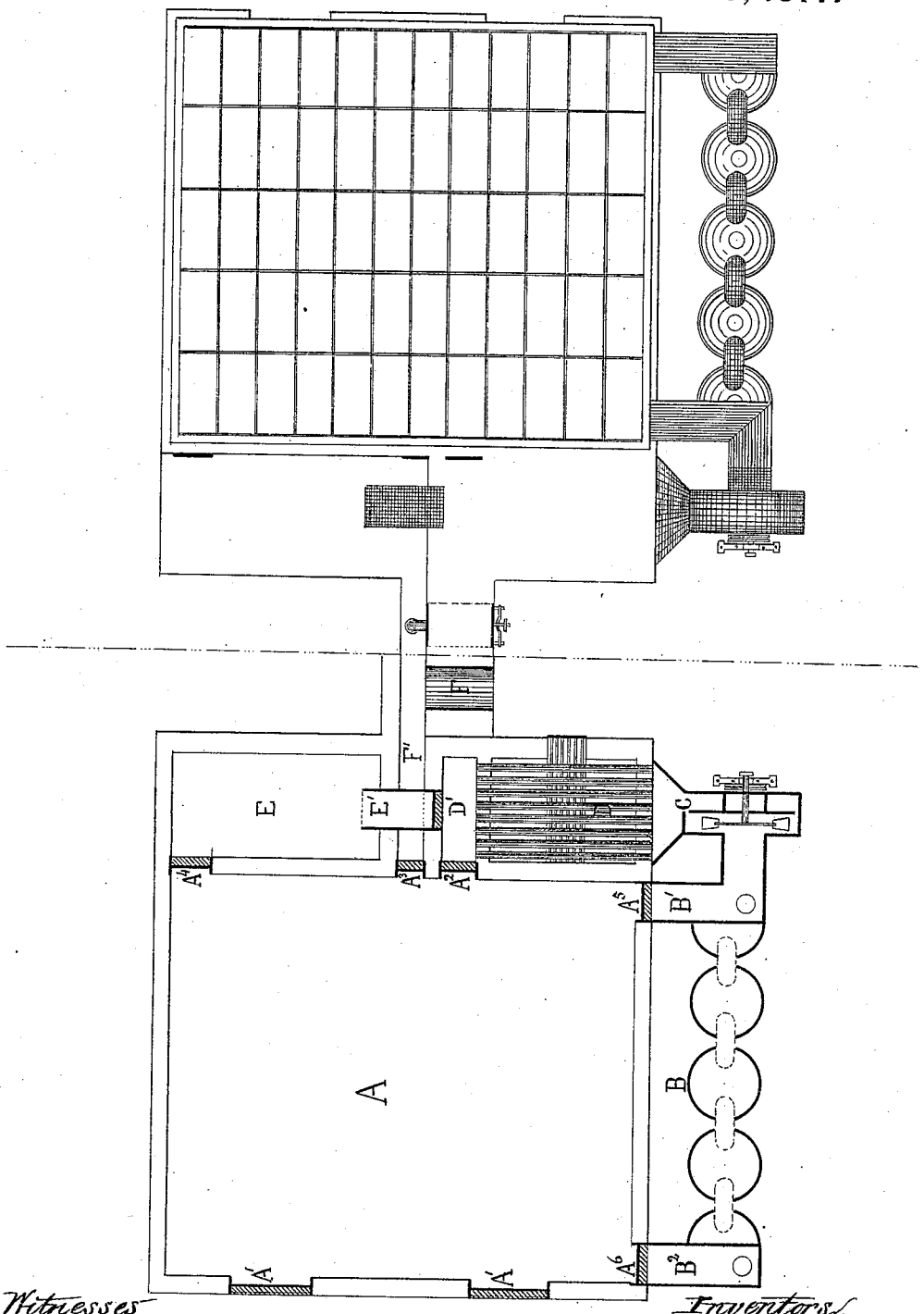
G. SIRTAINE.

Separating Vegtable Matter from Wool.

No. 196,257. Patented Oct. 16, 1877.



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UNITED STATES PATENT OFFICE.

GODEFROY SIRTAINE, OF VERVIERS, BELGIUM.

IMPROVEMENT IN SEPARATING VEGETABLE MATTER FROM WOOL.

Specification forming part of Letters Patent No. **196,257**, dated October 16, 1877; application filed March 6, 1875; patented in England, July 19, 1873, for fourteen years.

To all whom it may concern:

Be it known that I, GODEFROY SIRTAINE, of Verviers, in the Kingdom of Belgium, have invented an improvement in the application of gases produced in the manufacture of chemical products, manures, or otherwise, to the cleansing of wool from burr and seeds, and to any operation having for its object the disintegration of vegetable matter, of which the following is a specification:

To disintegrate vegetable matter, and especially for the cleansing of wool from burr and seeds, I use the acid and alkaline gases produced in any industrial process, more particularly those generated in the manufacture of chemical products and manures. By accelerating the simultaneous contact of acid gas and hot air with every part of the mass submitted to their action, I disintegrate vegetable matters, while the injurious effect on animal substances is reduced to a minimum. By the instantaneous discharge of the acid gas, and by immediately supplying its place with alkaline gas, which neutralizes the little acid remaining in the mass under treatment, I reduce the duration of the action of such remaining acid to a minimum. By the absorption of the acid and alkaline gases in water I collect any excess thereof, and prevent the annoyance to the workmen arising from their escape.

This invention, therefore, effects, first, simultaneously, the rapid contact of acid gas and hot air with every part of the mass submitted to their action; secondly, the instantaneous discharge of the acid gas; thirdly, the immediate substitution of alkaline gas in order to neutralize the last portion of acid that may remain in the mass under treatment; and, fourthly, the absorption of the gases in the interior of the apparatus hereinafter described, mechanical means, such as a ventilating-fan, being added to the attractive force the substances employed may have for each other, and combined with the use of cold water, by a Wolf apparatus, by water used in the form of spray, which the gases are compelled to traverse, or in any other manner.

The nature of my process will be readily understood by taking as an example a work erected for carrying on certain industrial operations—say, for instance, in one part, the manufacture of sulphate of soda, producing hydrochloric gas to be transformed into the liquid hydrochloric acid of commerce; in another part, the manufacture, by the treatment of manures, of ammoniacal gas to be made into liquid ammonia. In such an establishment I should, for the purpose of cleansing wool from burr and seeds, use the hydrochloric and ammoniacal gases, by forcing them to pass through the wool placed in a chamber hermetically closed, by means of mechanical ventilation adding its effect to the attractive force of water for the gases.

This chamber is closed by a cover or arch placed on the top. The interior is divided horizontally into two equal parts by a screen formed of wire, which has received a covering of lead, or of other suitable material. The upper part of this chamber is provided with two orifices, which can be opened or closed from the outside when required. One is used for the withdrawal of the acid gas, the other for the alkaline gas, each being in communication with a water-tank, in which the said gases are absorbed and hydrochloric or ammoniacal liquor formed.

The lowest part of the chamber has three orifices which can be opened or closed from the outside, as required. One is used to admit the hydrochloric gas, the second to admit the ammoniacal gas, the third to admit the air driven into the chamber by a ventilator or fan, through the tubes of a boiler charged with live-steam.

With this apparatus I operate in the following manner: The hydrochloric gas is first admitted singly. As soon as the chamber is filled with this gas the inlet is closed, that of the warm air is opened, and the ventilator is set in motion.

After the very short time required by the hydrochloric gas and the warm air to disintegrate the wool in passing through it, the outlet for the escape of the gas is opened. The gas having been expelled, the outlet is closed, and the ventilator is stopped, the inlet of warm air is closed, and that for the introduction of ammoniacal gas opened. This gas is blown into the chamber as it is generated by the action of a fan or ventilator, the blast of

which is forced through the solid or liquid excrement, or other substances, treated by milk of lime, and kept at a temperature of 35° Reaumur, (110° Fahrenheit.)

A sufficient quantity of this gas having been forced through the wool to neutralize the acid which may have remained in it, the outlet for its escape is opened.

In wool thus treated, the vegetable matters will be found disintegrated and easily got rid of by the simple process of beating, or even in those of the spinning only. In certain cases, however, it has been found that it is desirable that the acid gas, and also the hot air and the alkaline gas, should circulate during a certain time through the substances submitted to their action—on the one hand the acid gas and warm air, and on the other the alkaline gas—the circulation of each of the gases successively varying according to the nature of the substances. To effect this, it suffices to open a channel through which the blast from the ventilator can reach that part of the chamber into which the gases and the hot air are driven after having passed through the wool, so that by the blast of the ventilator these gases are forced back under the metallic screen, and forced to pass through the wool again, and that as often as may be found necessary to complete the operation.

It is, however, necessary, if this system be adopted, to substitute for the tubular steam-boiler another form of heating—a stove, for instance, but not made of iron, which does not resist the action of acid gas; and, for the same reason, the ventilator should have a coating of tar or varnish, or be coated with sheet-lead. Moreover, when I desire to increase the efficacy of the action of an alkaline gas—the use of which, for the purpose of neutralizing acid introduced into a substance undergoing the process of disintegration, by any method whatever, is one of the cardinal points of my invention, I pass through the wool, before admitting the gas, a jet of steam, which wets it in condensing.

The above-described series of operations can be carried on without interrupting the production of the hydrochloric acid or the liquid ammonia. The gases need only to be placed, when required, in direct communication with the water, as well as with the chamber above described, so that, when their admission to this last is cut off, they will flow through the direct channel to the water, and vice versa.

In the drawing, A is a chamber, six feet in height, with an air-tight cover of glass, and divided horizontally, at four and one-half feet from the ground, by a screen of lead-covered wire-cloth, or of india-rubber, or of horse-hair, or of glass rods, on which the wool to be treated is spread. The other dimensions of this chamber may vary according to the space at disposal, a convenient size being about twenty feet in length and fifteen in width. A^1 A^1 are entrances for workmen to spread the wool. A^2 is an inlet for hot air under the wire-cloth. A^3 is an inlet for acid gas under the wire-cloth. A^4 is an inlet for ammoniacal gas under wire-cloth; A^5, an outlet for the gases and air placed above the wire-cloth, and communicating with the ventilator or fan C by the pipe B^1; A^6, an outlet for the gases and the air placed above the wire-cloth, and communicating with the fan C by the channel B^2 and Wolf's apparatus B. All these inlets and outlets must be made steam, air, and water tight, by leaden slides, or by any of the suitable and well-known methods. B, a Wolf's apparatus for collecting gases in water; B^2, a channel for conducting gases and air into the apparatus B, by the opening A^6; C, fan drawing in air above the wire-screen, by either of the openings A^5 or A^6, and forcing it underneath the screen through the stove D, and the opening A^2, or through the channel E′, or the opening A^4; D, the stove; D′, the channel which receives the blast of the fan from the pipes of the stove D, and communicates it, as required, first, to the chamber A, through the opening A^2; second, to the cess-pool or recipient for fecal matter, E, by the channel E′. E, a receptacle in which is generated the ammoniacal gas, which penetrates into the chamber A through the opening A^4; E′, channel conveying blast of the fan into the contents of cess-pool E, treated with lime; F, retort for the production of chlorhydric acid in the manufacture of sulphate of soda; F^1, discharge-pipe for the gas from the retort F, passing under the pipe E′ to convey the acid gas into the chamber A, through the opening A^3. These channels are of masonry, or may be iron pipes lined with lead, or coated with a resinous substance to resist the action of acids.

The mode of working the apparatus is as follows:

First, warm the air in the chamber A, which contains the wool, through the openings A^2 and A^5, all the others being closed, and set the fan to work. The air passes from the chamber A, through the channel B^1, into the fan C, which blows it through the tubes of the stove D, and forces it to enter the chamber A in a warm state, through the channel D′ and the orifice A^2.

Secondly, let in to the wool the acid gas produced in the retort F. To effect this, open A^3. The gas conveyed through F′ enters the chamber A, mixes with the warm air, which the fan keeps in circulation, and goes with it through the wool.

Thirdly, collect the acid gas in the Wolf apparatus. To do this, open A^6, and close A^5 and A^3. The air, charged with acid gas, and sucked in by the fan, is forced to pass through the channel B^2 and the apparatus B, where it is purified from the acid it contained.

Fourthly, let in to the wool the ammoniacal gas generated in the cess-pool or recipient of fecal matter E, by opening A^4, A^5, and E′, and closing A^6 and A^2. The air drawn from the

chamber A through A^5 and B^1 is blown through D, D′, and E′ into the contents of the cess-pool E, where it is charged with ammoniacal gas, and re-enters the chamber A through the opening A^4.

Fifthly, collect the ammoniacal gas in the Wolf apparatus, by opening A^2 and A^6, and closing the openings A^4, A^5, and E′. The air, charged with ammoniacal gas and sucked in by the fan, is forced to pass through the pipe B^2 and the apparatus B, where it is purified from the ammonia it contained.

I am aware that it is not new, in removing burrs and vegetable matter from wool, to subject the same in close vessels to the action of acid gas, and to afterward neutralize the same by means of ammonia.

I claim as my invention—

1. The described method of cleaning wool, consisting, essentially, in the following series of steps: first, subjecting the mass to the joint action of currents of acid gas and hot air; second, withdrawing the acid gas; and, third, subjecting the mass to the action of alkaline gas.

2. The method described, consisting, essentially, in subjecting the wool to the action of acid and alkaline gases, and then recovering the acid and alkaline in solution, as set forth.

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