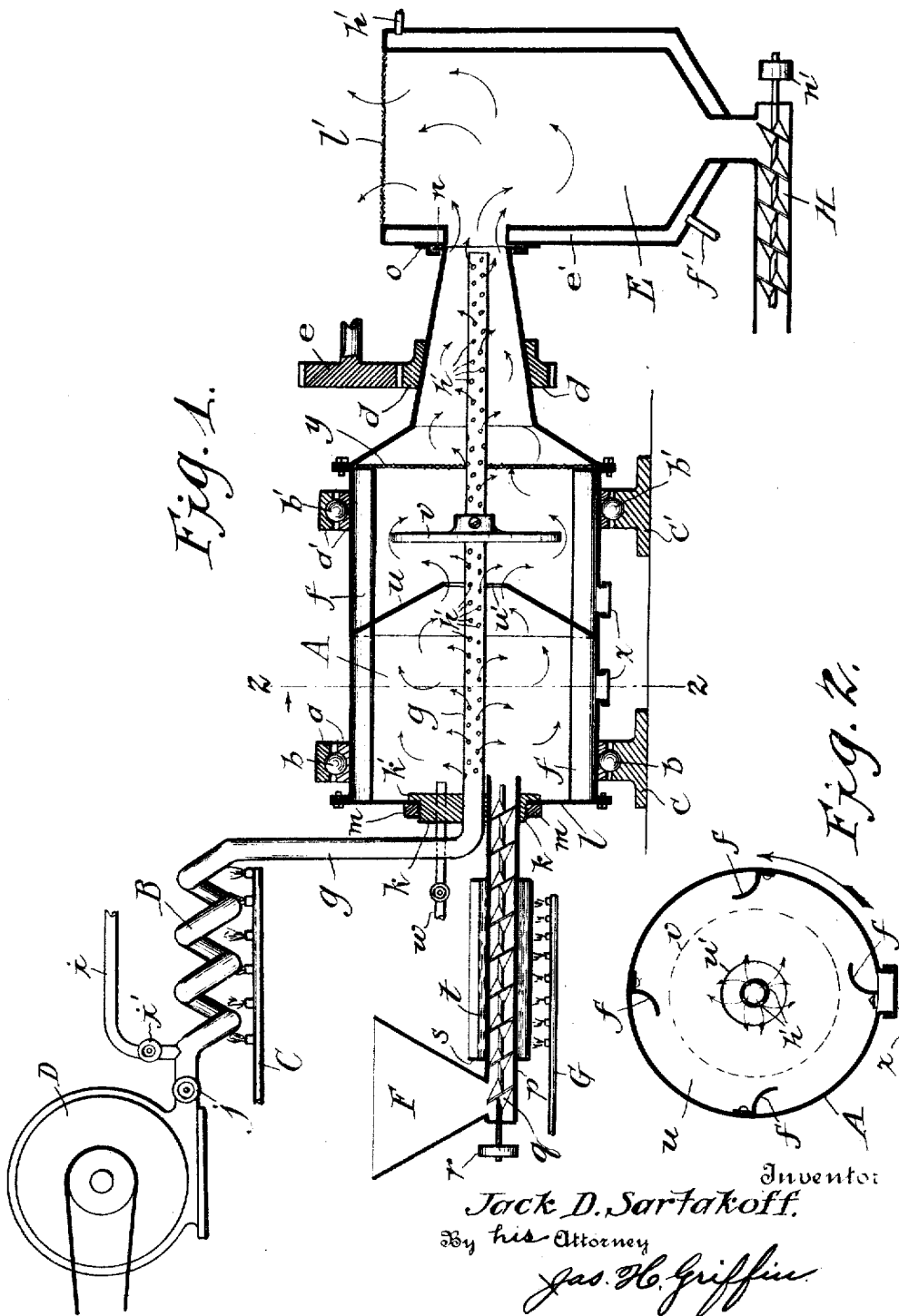


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 SUBLIMATION APPARATUS.
 APPLICATION FILED APR. 13, 1917.

1,284,787.

Patented Nov. 12, 1918.



UNITED STATES PATENT OFFICE.

JACK D. SARTAKOFF, OF NEW YORK, N. Y.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, JACK D. SARTAKOFF, a citizen of Russia, residing in the city of New York, borough of Manhattan, county and State of New York, have invented a certain new and useful Sublimation Apparatus, of which the following is a specification.

This invention is an apparatus for subliming such substances as salicylic acid, benzoic acid, sulfur, iodine, etc., for the purpose of refining or purifying the same in an expeditious, thorough and economical manner.

Speaking generally, the invention embodies a revolving drum or chamber into which the material to be sublimed is fed, said drum being provided, interiorly, with lifts or elevators, whereby the material to be sublimed is thoroughly agitated in order to uniformly expose it to the heating agent, in combination with means for preheating the material to be sublimed and a receiver or condensing chamber for the sublimed material. The heating agent employed may be either hot air or preheated steam, and it is introduced into the revolving drum by means of a perforated pipe running longitudinally of the drum, means being employed for filtering or straining the air or steam upon its escape from the condensing chamber, in order to completely free it from the sublimed product.

In the preferred embodiment of the invention, the material to be sublimed is continuously fed, automatically, to the revolving sublimation chamber, and the sublimed product is continuously withdrawn from the receiving chamber, thereby rendering the apparatus exceptionally economical in operation.

The accompanying drawing illustrates the preferred, practical embodiment of the invention, but the construction shown therein is illustrative, only, and not exclusive of the forms in which the invention, or some of the features thereof, may be embodied.

Referring to the drawing, Figure 1 is a transverse section, partly in elevation, of the complete apparatus, and

Fig. 2 is a section on the line 2—2 of the revolving drum.

The letter A designates the revolving

drum or sublimation chamber, the same being preferably provided with two pairs of circumferential rings *a a* and *a' a'* respectively, each pair of rings being provided with cooperating channels forming a raceway, for ball-bearings, *b b'*, the outer ring being provided with supporting legs *c c'*, respectively. Sweated or otherwise fixedly secured to a portion of the drum is a gear *d*, driven by a pinion *e*, whereby the drum A is rotated. The drum A is provided on its inner surface with lifts or elevators *f*, whereby, upon the drum being rotated, the material is elevated to the top of the drum and thereupon is showered downwardly, thereby keeping it thoroughly agitated and enabling it to be uniformly exposed to the heating agent, such as superheated steam or air, introduced interiorly of the drum.

The heating agent is introduced into the drum by means of a fixed pipe *g*, extending from a heater or superheater, shown in the form of a coil B, which is kept hot by means of a gas heater C, said coil, in the event hot air is employed as the heating agent, being supplied with a forced current of air by means of a blower or fan D. If it is desired to use superheated steam as the heating agent, the steam may be introduced into coil B through a steam pipe *i* provided with valve *j*, the fan D being discontinued in the meantime and the valve *j* closed, unless it is desired to employ a mixture of heated air and superheated steam, in which event the fan D is operated and the valve *j* kept open simultaneously with the introduction of steam through pipe *i*. The portion of pipe *g* which extends within the drum is perforated, as shown at *h'*, whereby the heated air or superheated steam is thoroughly distributed within the drum and brought into intimate and uniform contact with the material to be sublimed, as the latter falls in the form of a shower from the top of the drum to the bottom thereof.

In order to provide a sufficiently tight joint or stuffing box at the point of entrance of the pipe *g* into drum A, a ring of suitable packing material *k*, provided with a flange *k'*, is affixed to pipe *g* with its flange

pressing against the inner wall of the end member *l* of the drum A. This ring remains stationary while a cooperating packing ring *m* is attached to the outside of end member *l* and concentric with the ring *k*, and so positioned with relation thereto as to revolve thereon when the drum A is rotated.

The opposite end of drum A is preferably tapered, as shown, and is provided with packing ring *n* which rotates with the drum and cooperates with another packing ring *o* affixed to the receiving or condensing chamber E.

The raw material to be sublimed, such as crude salicylic acid, is introduced into a hopper F from which it is fed to drum A through a casing *p* by means of a worm-conveyer *q* operated through the medium of a pulley *r*, thereby providing, if desired, a continuous feed or supply of raw material to the drum or sublimation chamber. It is generally deemed advisable to preheat the material operated upon prior to its introduction into drum A, in order not to reduce the temperature within the drum, and this may be accomplished by surrounding the casing *p* of the worm-conveyer with a chamber *s*, in which is kept a supply of oil *t*, thereby constituting an oil bath, which latter may be heated in any suitable way, as by a gas heater G.

The interior of drum A is preferably provided with an inclined baffle member *u*, having an opening *u'*, and a cooperating vertical baffle *v* secured to the perforated portion of pipe *g*, whereby the gaseous fluid and sublimed agent which it carries is caused to take a circuitous path, thereby facilitating the separation and retention within the drum of any heavy impurities which might be picked up by the current of gaseous fluid. The drum A may be provided with an inlet pipe *w* for introducing water or other washing agent into the drum for cleansing the same, and suitable manholes *x* for removing the wash-water or residues from the drum.

The sublimed material escapes from the tapered end of drum A into the condensing chamber E, provided with a cooling jacket *e'*, which may be supplied with a cooling or refrigerating agent through pipe *f'*, which cooling agent finds an exit through pipe *h'*, thereby providing means for keeping the condenser or receiving chamber E at any desired temperature. The top of chamber F is closed by a suitable fabric *l'*, such as burlap, which permits the escape of the air or other heating agent, but prevents the escape of the sublimed product. The sublimed product accumulates in the condensing or separating chamber E and may be drawn off therefrom continuously or intermittently by means of a worm-con-

veyer H operated through the medium of a pulley *n'*.

From the foregoing description of the apparatus, its operation will be readily understood, but it may be described, briefly, as follows: The material to be sublimed, *e. g.*, crude salicylic acid, is introduced into hopper F, from which it is fed to drum A by means of the worm-conveyer *q*. In its passage from the worm-conveyer, it may be raised to any desired temperature, say 120° C., by means of the oil bath in which the casing of the conveyer is submerged. The preheated raw material having been introduced into drum A, it is elevated and allowed to fall in the form of a shower through the medium of the elevators or pockets *f*. As the material falls through the casing, it meets the current of heated air or preheated steam, or mixture thereof as circumstances require, introduced through the perforations *h'* of pipe *g*, and becomes thoroughly commingled therewith and heated to such temperature as to be vaporized, and, in conjunction, with the gaseous current, passes around the baffles *u* and *v*, out of the drum into the condensing or receiving chamber E, wherein the vaporized material is deposited, and may be removed therefrom, as required, through the traveling conveyer H, while the air or steam, freed of vapor escapes through the burlap covering *l'*. The temperature within the drum may be kept at from 150° C. to 200° C., and the drum is slowly rotated, say at the rate of about 6 revolutions per minute. The temperature at which the raw material is preheated, as well as the temperature within the drum, and also the temperature in the condensing chamber, will vary with the material treated, but these are factors well known to those skilled in the art, and will be modified to meet the particular conditions of operation.

It will be understood that slight changes and modifications may be made in the apparatus described, without departing from the spirit of the invention, and that parts of the apparatus may be used without employing all of the features described, and I desire it to be understood that the invention is as broadly novel as is commensurate with the appended claims.

Having thus fully described the invention, what I claim as new and desire to secure by Letters Patent, is:

1. In a sublimation apparatus, a revolvable drum, means for supplying a gaseous heating agent interiorly thereof whereby the temperature of the whole chamber is maintained substantially uniform, means for heating said agent exteriorly of the drum, a plurality of elevators interiorly of the drum, means for mechanically feeding solid

material to the drum, and means for condensing and collecting the vapors escaping from the drum.

2. In a sublimation apparatus, a revoluble drum, means for supplying a heating agent interiorly thereof, a plurality of elevators interiorly of the drum, a baffle plate within the drum, means for mechanically feeding solid material to the drum, and means for condensing and collecting the vapors escaping from the drum.

3. In a sublimation apparatus, a revoluble drum, a plurality of elevating buckets coöperating with the inner wall of the drum, whereby, when the latter is rotated, the material contained therein is first elevated and thereafter dropped to the bottom of the drum, a perforated pipe extending longitudinally of the drum for introducing a gaseous heating agent therein, means for heating said agent exteriorly of the drum, and means for continuously feeding solid material to the drum, in combination with a separating or condensing chamber for the vapors escaping from the drum.

4. In a sublimation apparatus, a revoluble drum, means for agitating material therein, means for heating said material directly by a gaseous agent, means for compelling the gaseous heating agent to traverse a tortuous path in its passage through the drum, means for continuously feeding solid material to the drum, and means for heating said material prior to its entry into the drum.

5. In a sublimation apparatus, a revoluble drum, a plurality of elevating buckets secured to the inner wall of the drum and extending longitudinally thereof, means for introducing a gaseous heating agent within the drum, a plurality of baffle plates within the drum for directing said gaseous heating agent in a circuitous path, and means for automatically feeding solid material to the drum, in combination with a receiving or condensing chamber provided with filtering or straining means which permits the gaseous agent to escape but precludes the escape of the vapors carried thereby.

6. In a sublimation apparatus, a sublimation chamber, means for agitating material therein, means for introducing a gaseous heating agent into the chamber, and a heater connected with said means, in combination with means for feeding solid material at one end of the chamber, and a receiving or condensing chamber wherein the sublimed product is deposited, said condensing chamber being positioned at the outlet of the sublimation chamber opposite the end at which the solid material is introduced.

7. In a sublimation apparatus, a sublimation chamber, means for agitating material

therein, means for supplying a gaseous heating agent to the means for heating said gaseous agent exteriorly of the chamber, means for continuously feeding solid material to the chamber, and means for heating said supply means whereby the material is preheated prior to its introduction into the chamber, in combination with a condensing chamber for receiving the sublimed vapors, said condensing chamber being provided with filtering means which permits the escape of the gaseous heating agent but precludes the escape of the vapors carried thereby, and means for automatically drawing off the sublimed material from the condensing chamber.

8. In a sublimation apparatus, the combination of a revoluble drum, means for elevating the material within the drum and depositing it in the form of a shower, a perforated pipe for supplying heated air to the drum, a heater connected with said pipe, a blower for supplying a current of air to the blower, means for continuously feeding solid material to the drum, means for preheating said material prior to its introduction into the drum, a receiver or condenser wherein the vapors escaping from the drum are condensed, and means for cooling the vapors within the condenser.

9. In a sublimation apparatus, a rotary drum, one end of which is substantially closed and the other end of which is provided with a tapering portion, a perforated pipe extending longitudinally of the drum for introducing a gaseous heating agent therein, means for supplying a gaseous heating agent to the said perforated pipe, means for feeding solid material to the drum and near the closed end thereof, means for heating said material prior to its introduction into the drum, in combination with means, connected with the tapered portion of the drum, for condensing the vapors which escape from the drum.

10. In a sublimation apparatus, a rotary drum, means for supplying a gaseous heating agent to the drum, interiorly thereof, and forcing it to traverse a circuitous path, means for feeding solid material to one end of the drum, means for drawing off and condensing the vapors at the opposite end of the drum, and means agitating the solid material within the drum.

11. In a sublimation apparatus, a rotary sublimation chamber, means for rotating same, means for feeding solid material near one end of the chamber, means for introducing a gaseous heating agent within the chamber and throughout its entire length, means for agitating the solid material within the chamber, and means for introducing a liquid into the chamber, and coöperating baffle plates for forcing the heating agent

and vapors produced to traverse a circuitous path in their passage through the chamber.

12. In a sublimation apparatus, a rotary sublimation chamber, a plurality of lifting
5 buckets associated with the inner wall of the chamber, for elevating and dumping material within the chamber, means for feeding solid material to one end of the chamber, a perforated pipe for introducing

a gaseous heating agent into the chamber, 10 baffle plates positioned concentrically with said pipe, and a tapering vapor exit from the chamber, and a condensing chamber connected with said exit.

In testimony whereof I have signed my 15 name to this specification.

JACK D. SARTAKOFF.