Oct. 21, 1924. 1,512,776

G. A. LOUGH

DRYING APPARATUS

Filed May 10, 1921

Fig. 1.

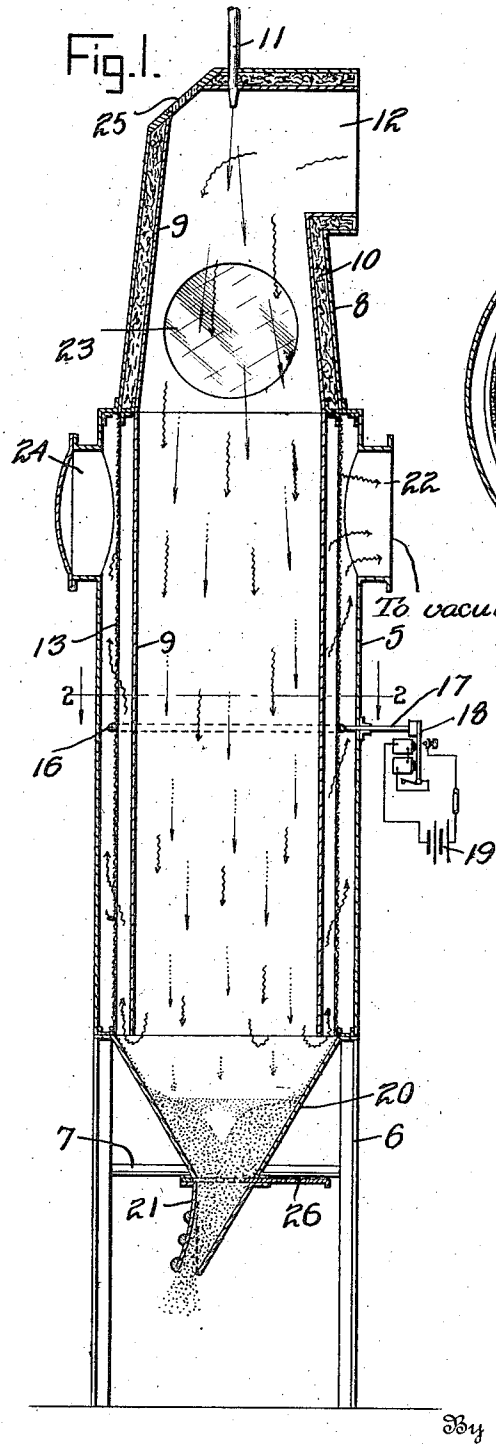

Fig. 2.

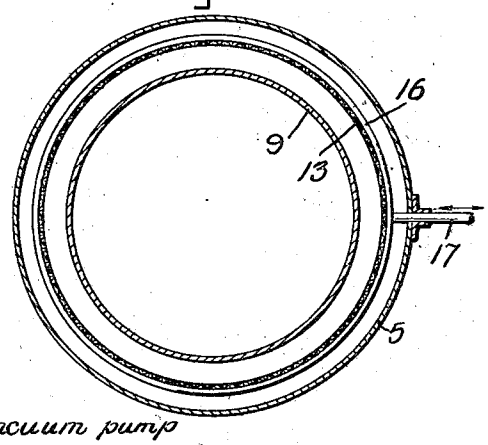

Fig. 3.

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By

Attorney

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UNITED STATES PATENT OFFICE.

GERALD A. LOUGH, OF PLAINFIELD, NEW JERSEY.

DRYING APPARATUS.

Application filed May 10, 1921. Serial No. 468,367.

To all whom it may concern:

Be it known that I, GERALD A. LOUGH, residing at Plainfield, in the county of Union and State of New Jersey, have invented certain new and useful Improvements in Drying Apparatus, of which the following is a specification.

My said invention relates to a spray drying device for drugs, chemicals, milk and other fluids or semi-fluids whereby the solid constituents can be separated from the liquid. It is an object of the invention to provide a device which can be made in small sizes to provide for the needs of drug manufacturers and others who have occasion to dry relatively small quantities of numerous materials.

It is also an object of the invention to provide such a device which shall be compact and efficient and yet simple in structure, comparatively inexpensive to install and not liable to get out of order.

Referring to the accompanying drawings which are made a part hereof and on which similar reference characters indicate similar parts,

Figure 1 is a central vertical section of my device,

Figure 2 a horizontal section on line 2—2 of Figure 1, and

Figure 3 a detail section of a screen used in my device.

In the drawings 5 indicates the outer shell or casing of the device which is preferably cylindrical and which may be supported in any convenient manner as by means of posts 6 and braces 7. At the upper end of the body or casing 5 I have provided a member comprising an outer shell 8 and an inner shell 9 with heat insulating material 10 between them. At its upper end this member has one or more atomizer nozzles 11 and a side extension provides a passage at 12 for heated air to contact with the fine spray of milk or other material to be evaporated.

The inner shell 9 of the upper portion of the device may, and preferably does, extend downwardly through the shell 5, terminating on a level with the lower end of the shell. Between the casing members 5 and 9 is a concentric cylindrical screen 13 which extends from top to bottom of the shell 5 and is fastened at each end to the holding means by which parts 5, 8 and 9 and the insulation 10 are held in position relative to each other. This screen consists of an inner cloth layer 14 and an outer layer of woven wire 15. One or more rings 16 surround the screen approximately midway between its ends and these rings are provided with any desirable or conventional vibrating means. I have illustrated electrical mechanism comprising a radial extension 17 on the ring passing through an opening in the shell 5, a vibrator 18 and conventional means operated by a battery 19 for reciprocating the extension 17 and thus constantly vibrating the screen.

At the lower end of the screen is a funnel 20 with a discharge opening having a gate 21. The upper end of the funnel may rest on or be otherwise supported by the upper ends of posts 6 and may close the space between shell 5 and screen 13 or this may be closed in any other convenient manner. The funnel 20 may be attached to and partially supported by the braces 7. The shell 5 has a suction opening 22 which may communicate with any preferred means for drawing air through the device. Manholes are provided at 23 and 24 for access to the interior, and a window at 25 permits inspection of the interior at the upper end of the device, or access thereto as may be desired.

A single unit such as shown may be set up for operation by itself or a plurality of such units may be set up for operation as a battery all drawing their heat from a common source. The number of nozzles 11 may also be varied at will and various other details of construction may be varied without departing from the scope of my invention.

In the operation of my device the liquid to be evaporated falls into the casing as a fine spray from the nozzle or nozzles 11 and contacts with heated air which is drawn in at 12. In passing down through the casing the aqueous content of the spray will be vaporized and the solid constituents thereof will be deposited in large measure at the lower end of the shell. On reaching the bottom of the shell the current of air will change its course and pass upwardly between parts 9 and 5, carrying with it as an entrainment a portion of said solids which will be carried up along the screen and will be separated thereby from the air passing through the screen to the exits 22. The powder that settles on the screen is detached by the vibrating action of the ring 16 and connected parts and also falls into the hopper.

It will be seen that the air at its highest temperature will contact with the liquid where the spray is densest and where, by reason of the rapid evaporation, the solid constituents are least likely to suffer from high temperatures and also that the product is collected at the coolest portion of the chamber. The entire solid constituents of the liquid are recovered within the drier and not in a succession of secondary equipment as has been customary and the powder of uniform character is deposited and removed from one central point of discharge. The operation of the gate 21 is automatic since it will remain closed by the suction until this effect is overcome by the weight of the powder collected in the funnel when the gate will open and the powder will be discharged, whereupon the gate will again be closed by the suction. It will be understood that the action of suction on the gate may be supplemented by a spring or by gravity, due to either of which it may be normally closed but suction is relied on to hold the gate shut while a considerable quantity of material accumulates in the funnel. A fixed gate or damper 26 will be provided in practice by which the flow of powder may be entirely prevented while changing containers or for any other reason.

While I have shown a preferred form of my device it will be evident to those skilled in the art that many changes may be made therein without departing from the scope of my invention as defined in the appended claims. For example, various mechanical or other electrical means than those shown may be used for operating the ring 15, various other devices may be used to spray the liquid into the drier, screens of different kinds may be used, such for example as the beating means shown in my co-pending application No. 427,149, filed November 29, 1920, and the lower cylinder portion of the member 9 may be partially or entirely omitted in which latter case the exit opening must be formed near the bottom of the outer shell. Therefore I do not limit myself to the specific device shown in the drawings and described in the specification but only as indicated in the appended claims.

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

1. In a spray drier, a chamber, a funnel below the chamber for collecting the residue of solids one wall of the funnel sloping continuously toward the lower end of the funnel and the opposite wall having a lateral opening at its lower end, and a gate for said opening pivoted along its upper side to swing outward, substantially as set forth.

2. In a spray drier, a chamber, a funnel below the chamber for collecting the residue of solids one wall of the funnel sloping continuously toward the lower end of the funnel and the opposite wall having a lateral opening at its lower end, a gate for said opening pivoted along its upper side to swing outward, and a horizontal gate above said opening for interrupting the flow of solids, substantially as set forth.

In witness whereof, I have hereunto set my hand and seal at Washington, District of Columbia, this 2nd day of May, A. D. nineteen hundred and twenty-one.

GERALD A. LOUGH. [L. S.]

Witnesses:
FRANK W. DAHM,
MARIE A. SHAW.