

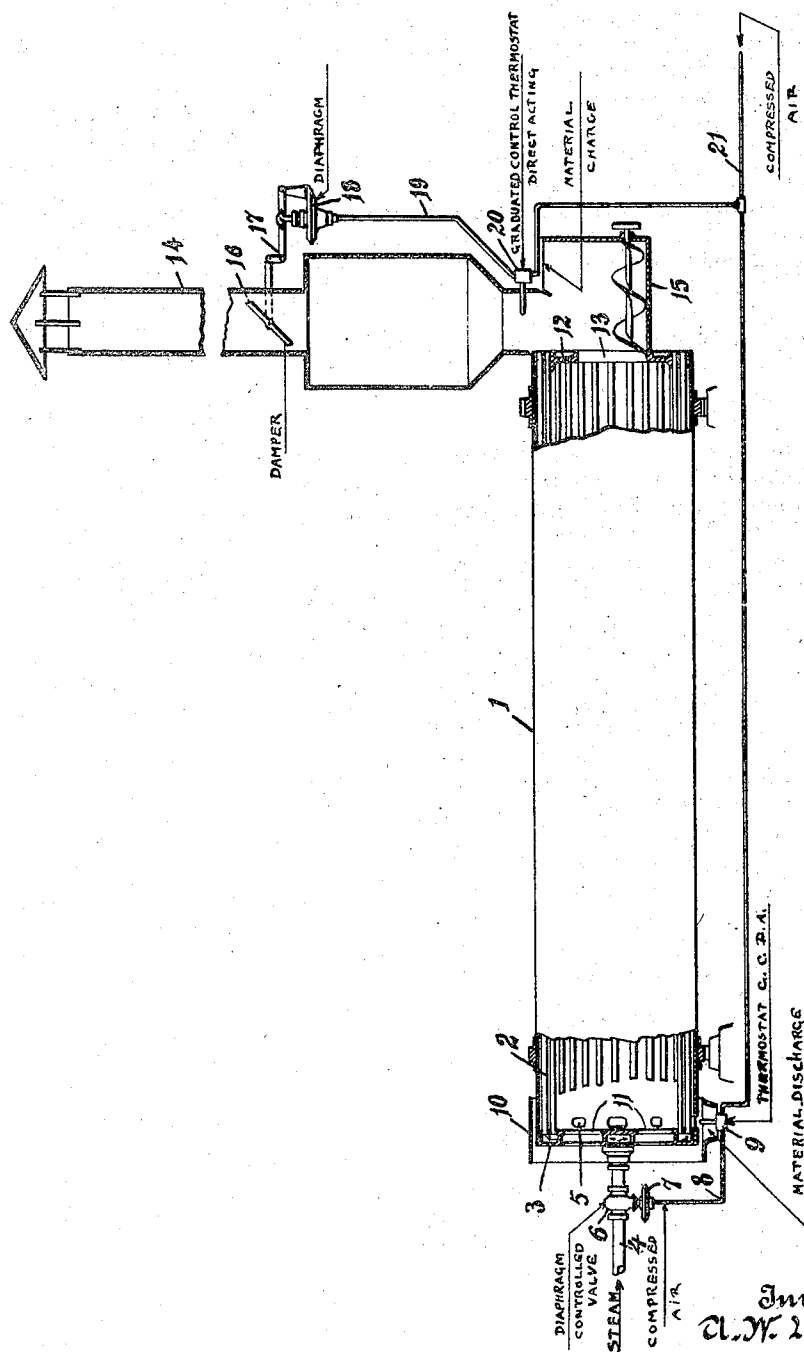
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A. W. LISSAUER

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DRIER CONTROL

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Inventor

A. W. Lissauer

By his Attorney

J. J. Joffe

UNITED STATES PATENT OFFICE.

ADOLPH W. LISSAUER, OF LOUISVILLE, KENTUCKY, ASSIGNOR TO LOUISVILLE DRY-
ING MACHINERY CO., INC., OF LOUISVILLE, KENTUCKY, A CORPORATION OF KEN-
TUCKY.

DRIER CONTROL.

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My invention relates to a method for controlling the drying in rotary driers of tubular type and the arrangement of the controlling means to carry out the said method.

5 An object of the invention is to deliver the material from the drier at a predetermined moisture content by varying the temperature of the heating medium through means affected by the temperature of the
10 material being delivered from the drier and also by varying the volume of the air passing through the drier by means affected by the temperature of the products of the evaporation leaving the drier.

15 Another object of the invention is to provide a thermostatic control for the drier of the type referred to, which is simple in construction and does not require skilled help for the operation of the drier.

20 In the appended drawing, forming part of this application, the figure illustrates a diagrammatic elevation of a drier partly in section and embodying my invention.

In this type of driers, the work of evaporation is done by transmitted heat which obviously is at the same temperature from one end of the drier to the other. However, as the condensation in the tubes, or the drop in the temperature of gases in the tubes is proportionate to the work done by them at each point, the tubes transmit considerably more heat units at the wet end of the drier than at the dry end. Only sufficient atmospheric
25 air is allowed to enter the drier by regulation of the damper in the vapor stack to carry off the steam which is evaporated by the action of the tubes. The vapors leave the drier practically saturated or normally about 95% of saturation. The air does no
30 drying, but acts merely as a vehicle for the evaporated water. For this reason, the vapors tend to be approximately at the temperature of atmospheric steam and if there is too much air passing through the drier, obviously the temperature of the vapors will drop. On the other hand, if there is not
35 enough air, the temperature of the vapors will rise.

40 If the material is discharged too dry, it tends to raise the temperature to correspond to the dry bulb temperature of the entering air, plus the unused heat in the drier, coming

from the tubes. If, on the other hand, the material is discharged too wet, it will be at the temperature of the wet bulb of the air, 55 a difference of often 20°.

Referring to the drawing, 1 is a rotary drier provided with tubes 2 through which the heating medium of the drier is circulated. Some of these tubes in the figure are broken away at the discharge end to better illustrate the discharge openings 5 of the
60 drier. The tubes are retained in heads 3 and 12 of the drier. The head 3 located at the discharge end has a suitable manifold to deliver steam or any other heating medium
65 from a pipe 4 to the tubes 2.

The pipe 4 is provided with a diaphragm controlled valve 6. The diaphragm 7 of the valve is connected by a conduit 8 to a thermostat 9. This thermostat is so located that
70 it is to be affected by the temperature of the material being discharged by the drier. The head 3 has also suitable openings 11 to admit atmospheric air necessary to carry
75 off the products of evaporation.

The head 12 at the receiving end of the drier has a central opening 13 through which the product of the evaporation escapes into a stack 14. Through this opening also material is charged into the drier from the stationary casing 15 which establishes the communication between the stack and the drier. A damper 16 is provided in the stack 14 and the same is operated through a series of levers 17 by a diaphragm 18. This diaphragm
85 is connected by a conduit 19 to a thermostat 20 located in the passage leading from the opening 13 of the drier to the stack 14. The two thermostats 9 and 20 are both connected
90 to a conduit 21 through which compressed air is supplied. Each of the thermostats has a graduated control and is direct acting.

As will be noted, the material to be dried passes in a direction opposite to the air
95 which is to carry off the products of evaporation. The thermostat 9 located at the discharge end of the drier is necessarily affected by the temperature of the material being discharged therethrough. In consequence,
100 with the rise of the temperature thereat, a reduction in the temperature of the heating medium admitted will necessarily occur. The reverse will be true when there is a drop

in temperature of the material being discharged. When the temperature of the vapors passing into the stack rises, the thermostat 20 will cause the operation of the diaphragm 5 tending to increase the volume of the atmospheric air through the drier. The reverse is the case when the temperature of the vapors passing into the stack drops.

I claim:

10 1. In a method of drying material in a drier steps which consist in controlling the temperature of the heating medium of the drier by the temperature of the material being discharged from the drier, and controlling 15 the volume of the atmospheric air passing through the drier by the temperature of the products of evaporation leaving the drier.

2. In a method of drying material in a drier steps which consist in supplying a heating medium to the drier, moving the material to be dried through the drier, passing atmospheric air through the drier in a direction opposite to that of the material, 25 controlling the temperature of the heating medium by the temperature of the material being discharged from the drier, and controlling the volume of the air passing through the drier by the temperature of the products of evaporation leaving the drier. 30

3. In a method of drying material in a drier steps which consist in supplying a heating medium to the drier, feeding the material to be dried through the drier, passing atmospheric air through the drier to carry off the products of evaporation, controlling the temperature of the heating medium by the temperature of the material being discharged by the drier, and controlling 35 the volume of the atmospheric air passing through the drier by the temperature of the products of evaporation. 40

4. In combination with a rotary drier having material charging and discharging

apertures and open to the atmosphere, of means for supplying a heating medium to the drier, a diaphragm valve controlling the flow of the heating medium, a thermostat located at the discharge aperture controlling the diaphragm valve, a stack for carrying off the products of evaporation, a damper in the stack for controlling the flow of atmospheric air with the products of evaporation, a diaphragm for operating the damper, and a thermostat for operating the diaphragm 45 and disposed to be influenced by the temperature of the products of evaporation leaving the drier. 50 55

5. In a rotary tubular drier a diaphragm valve for controlling the flow of a heating medium to the tubes, a thermostat for controlling the diaphragm valve disposed to be influenced by the temperature of the material being discharged from the drier, a damper for controlling the flow of products of evaporation from the drier, and a thermostat for operating the damper disposed to be influenced by the temperature of the products of evaporation leaving the drier. 60 65

6. In a method of drying material in a drier, steps which consist in circulating atmospheric air through the drier to carry off the products of evaporation and varying the volume of the air circulated in the drier by the temperature of the products of evaporation carried off by the air. 70 75

7. In a method of drying material in a drier, steps which consist in controlling the temperature of the heating medium of the drier by the temperature of the material being discharged from the drier, circulating air through the drier to carry off the products of evaporation and varying the volume of the air circulated through the drier through a control operated by the temperature of the products of evaporation carried off by the air from the drier. 80 85

ADOLPH W. LISSAUER.