

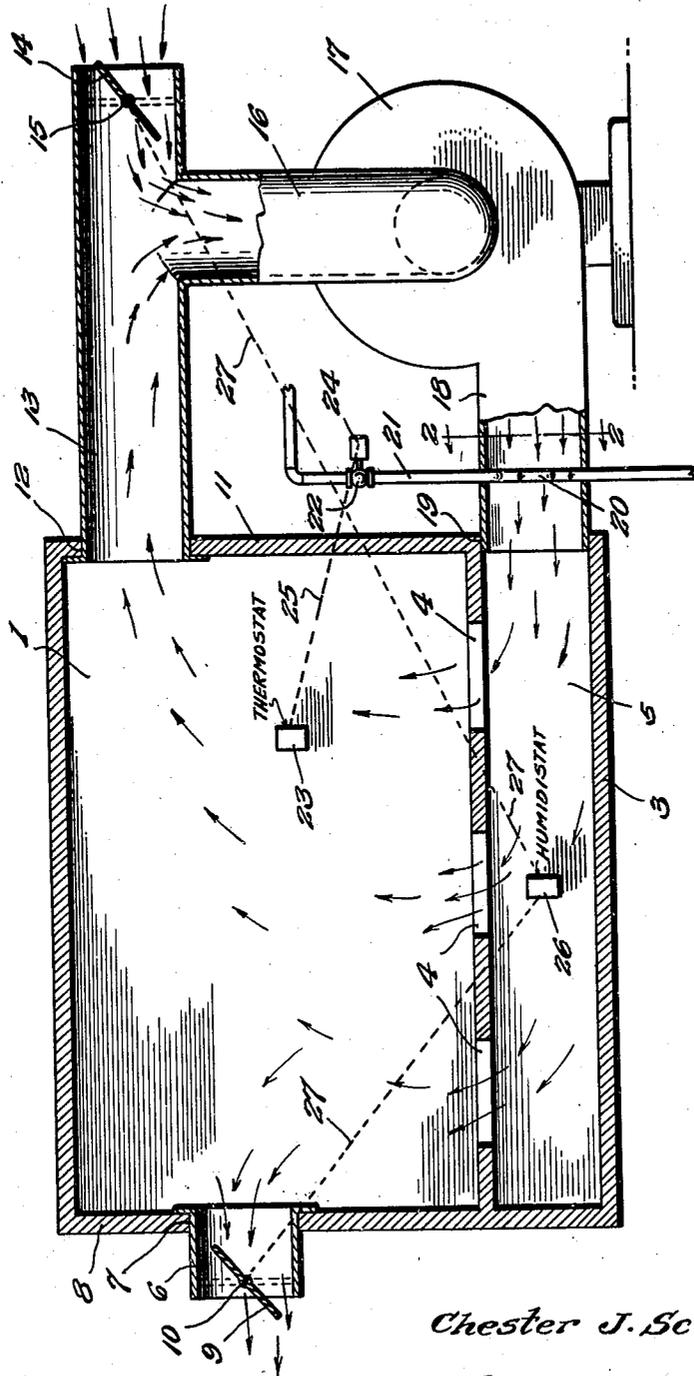
Dec. 26, 1939.

C. J. SCANLAN

2,184,473

DRIER

Filed Feb. 4, 1938



Inventor

Chester J. Scanlan.

*Lacey, Lacey*

Attorneys

## UNITED STATES PATENT OFFICE

2,184,473

DRIER

Chester J. Scanlan, Bloomington, Ill., assignor to  
The New York Blower Company, Chicago, Ill.

Application February 4, 1938, Serial No. 188,741

1 Claim. (Cl. 34—19)

This invention relates to a drier and more particularly to an apparatus for drying wood, grain and other materials.

One object of the invention is to provide a drying apparatus wherein the grain or other material to be dried is placed in a chamber and air circulated through the chamber so that the circulating air will absorb moisture from the material, means being provided for controlling the temperature of the air and also releasing air after it reaches a certain point of humidity and admitting a supply of fresh air. It will thus be seen that with this improved apparatus the air may be continuously recirculated through the drying chamber until a certain quantity of moisture has been absorbed, at which time a humidostat will effect opening of a damper or closure at an outlet for air so that moist air may escape from the drying chamber and at the same time open a damper in an inlet through which fresh air may enter a conduit leading to a circulating fan, the dampers being automatically closed by action of the humidostat when the humidity of the air has been reduced to a desired point regardless of temperature.

It is another object of the invention to provide an apparatus of this character wherein a valve for a steam pipe leading to a heating coil is adapted to be adjusted through the medium of a thermostat disposed within the drying chamber, thus permitting the heat to be adjusted and the temperature within the drying chamber maintained within predetermined limits. It will thus be seen that the temperature within the drying chamber and the humidity of the air passing through the drying chamber may be controlled and these two factors have a definite relation to each other which will permit the rate at which moisture is absorbed to be controlled and a relatively slow or rapid drying of the material in the drying chamber effected.

The invention is illustrated in the accompanying drawing, wherein the figure is a vertical sectional semi-diagrammatic view of a drier constructed in accordance with this invention.

The chamber 1 of the improved drying apparatus may consist of a room in a building or a specially erected structure. A false bottom or platform 2 extends horizontally in the chamber in vertical spaced relation to the bottom 3 thereof, and through this platform or false bottom are formed a suitable number of openings 4 through

which air passes upwardly from the space 5 between the platform and the bottom of the chamber. Any suitable means may be provided within the chamber for supporting grain or the like over the platform 2, or if lumber or similar bulky material is to be dried, it may be piled or stacked upon the platform in such a manner that air may pass upwardly through and around it and absorb moisture from the material to be dried. An air outlet neck or pipe 6 is fitted through an opening 7 formed in the wall 8 of the chamber, and in this pipe is disposed a damper 9 which is pivotally mounted, as shown at 10, for movement from the closed position, indicated by dotted line to the opened position shown in full line. The wall 11 at the opposite side or end of the chamber from the wall 8 is formed with an opening 12 through which a pipe or conduit 13 extends, and adjacent the open outer end of this conduit is a damper 14 which is pivotally mounted, as shown at 15, for movement from the opened position, shown in full line to the closed position indicated by dotted line. A branch pipe 16 extends downwardly from the conduit 13 intermediate the length thereof, and this branch pipe leads to the inlet of a blower 17 which is mounted externally of the drying chamber and provided with a discharge pipe or neck 18 snugly received in an opening 19 formed in the wall 11 below the platform 2. By this arrangement of parts air may be forced from the blower into the chamber below the false bottom or platform 2, and this air will then move upwardly through the openings 4 for passage upwardly through and about the grain or other material to be dried. The dampers 9 and 14 are normally closed and, when the air reaches the upper portion of the chamber, it will pass through the conduit 13 and then down through the branch pipe 16 back to the blower for recirculation through the drying chamber. The air must be heated before it is delivered into the space 5 below the platform 2, and in order to do so, there has been provided a heating coil 20 which extends vertically and transversely through the neck 18, as shown in the figure. This coil forms a portion of a steam pipe 21 through which steam flows from a suitable source to heat the coil, and in order to control flow of steam through the pipe and coil, there has been provided a valve 22. By opening and closing the valve flow of steam through the coil may be regulated and the temperature of the

air controlled. The valve is to be opened and closed in response to variations in a thermostat 23 mounted within the drying chamber, and there has been provided valve adjusting mechanism of a conventional construction, indicated in general by the numeral 24, and operatively connected with the thermostat, as shown by the dotted line 25. This valve adjusting mechanism is not illustrated in detail as it is of a conventional construction. There has also been provided a humidostat 26 of a conventional construction which is mounted within the space 5 under the platform 2 and operatively connected with the dampers, as indicated by the dotted lines 27, so that, when predetermined variations in humidity of the air takes place, the dampers may be opened or closed.

During use of the drier, the air which is driven into the casing under the platform 2 moves upwardly through the openings 4 and absorbs moisture from the material, after which it is returned to the blower and recirculated until sufficient moisture has been absorbed to cause the humidostat to be affected. When this takes place, the dampers are opened and moisture-laden air escapes through the pipe 6 while, at the same time, fresh air enters through the open outer end of the conduit 13 and flows to the blower 14. The humidity of the air will thus be reduced to a point at which it may again absorb moisture from the material being dried and the humidostat will then again be affected and cause closing of the dampers. The temperature of the air has a direct effect upon the amount of moisture which can be taken up and by properly setting the thermostat 23 the temperature of the air in the drying chamber may be maintained within predetermined bounds.

In order to define any condition of atmospheric air relative to its ability to absorb moisture, two temperatures must be designated, namely, the dew point temperature and the dry bulb temperature. For a given dry bulb temperature, the higher the dew point temperature the less the moisture absorbing capacity. This relationship between dew point and dry bulb temperature can be controlled by means of a humidostat controlling the relative humidity, which is defined as the actual moisture (in percent) content at any given dry bulb temperature in relation to the moisture content at saturation for the same dry bulb temperature.

For example: Let us assume a drying temperature of 110° F. D. B., which is used for seed corn and many other products, the following table

gives the drying rate or capacity based on dry air.

Relative humidity	Drying efficiency
0	Percent 100
10	80
20	60
30	48
40	38
50	30
60	22
70	16
80	11
90	5
100	0

<sup>1</sup> Maximum drying rate.  
<sup>2</sup> No drying.

Therefore, any method that controls the relative humidity as well as the dry bulb temperature of the air entering the drier controls the drying rate. The system I use is to raise the dry bulb temperature of the drier to the desired amount by recirculation of the air in the drier through the heating element. This heating element may be heated by steam or be a direct fired unit, such as a hot air furnace. This recirculation causes the relative humidity to build up as moisture is removed from the product to be dried. When the desired relative humidity is reached, corresponding to the required drying rate, a humidostat opens two dampers, one on the suction of the blower and one on the discharge. This operation may be by means of compressed air motor or an electric motor turned on and off by humidostat controlled actuating means.

Having thus described the invention, what is claimed as new is:

In a drier, a drying chamber, said drier having a false bottom defining an air inlet space, said false bottom having openings, an outlet pipe carried at one end of the drying chamber, a damper in the pipe, a conduit carried at the opposite end of the drying chamber, a damper in the conduit at its outer end, said conduit having a branch pipe, a blower connected with the branch pipe and having a discharge pipe communicating with the air inlet space, means for automatically effecting the opening and closing of the dampers, said means including a humidostat within the space beneath the chamber, means for heating air delivered through the forward discharge pipe, and means for automatically controlling said heating means, said last-mentioned means including a thermostat within the drying chamber.

CHESTER J. SCANLAN.