E. C. HORST.

DRIER.

APPLICATION FILED JUNE 24, 1918.

1,294,805. Patented Feb. 18, 1919.

Fig. 1.

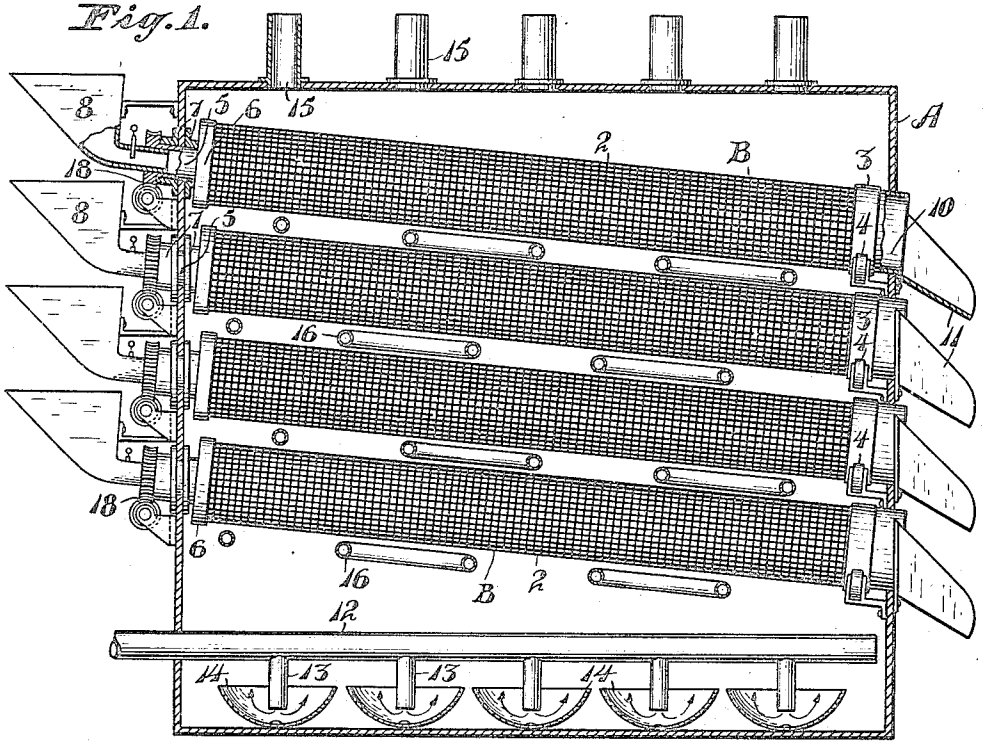


Fig. 2.

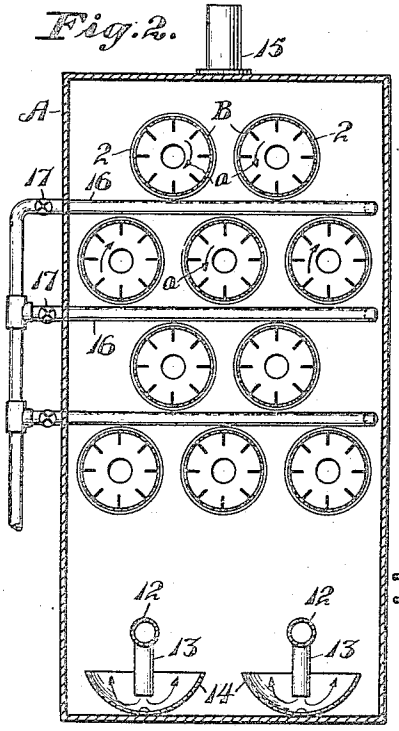


Fig. 4.

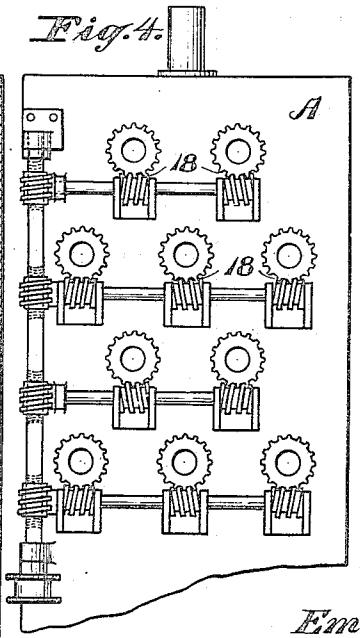
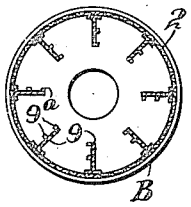


Fig. 3.



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DRIER.

1,294,805. Specification of Letters Patent. Patented Feb. 18, 1919.

Application filed June 24, 1918. Serial No. 241,476.

To all whom it may concern:

Be it known that I, EMIL CLEMENS HORST, a citizen of the United States, residing at the city and county of San Francisco and State of California, have invented new and useful Improvements in Driers, of which the following is a specification.

This invention relates to a drier and particularly to a drier of the rotary type.

One of the objects of the present invention is to provide a drier for food products such as fruits, vegetables and the like, which is simple and substantial in construction and capable of continuous operation. Another object of the invention is to provide a drier consisting of a plurality of screen covered or perforated cylinders through which the product is automatically and continuously fed during the drying operation. Another object of the invention is to provide means for elevating and turning the product over and over again during its passage through the cylinders to permit an even exposure and drying of the product. Further objects will hereinafter appear.

The invention consists of the parts and the construction and combination of parts as hereinafter more fully described and claimed, having reference to the accompanying drawings, in which—

Figure 1 is a central vertical, horizontal section through the drier.

Fig. 2 is a cross section of Fig. 1.

Fig. 3 is an enlarged detail cross section of one of the drying cylinders.

Fig. 4 is an end view of the drier diagrammatically illustrating a means for rotating the several cylinders employed.

Referring to the drawings in detail, A indicates in general a housing interior of which is mounted a plurality of drying cylinders, such as shown at B. These cylinders extend from end to end of the housing, and are placed one above the other; the cylinders being staggered to permit an even distribution and flow of the drying air between and through the cylinders as will hereinafter be described. Each cylinder consists of a frame work which may be covered with a wire screen such as shown at 2, one end of each cylinder being provided with a bearing ring 3 which is supported by rollers 4. The lower end of each cylinder is supported in this manner while the upper end is carried by a hollow shaft 5 forming a portion of the head 6. The hollow shaft extends through bearings 7, secured in one end of the housing. The product to be dried is fed from hoppers 8 through said hollow shaft extensions directly into the cylinders. The cylinders are slowly revolved during the drying operation, first to permit the product to be automatically fed therethrough and secondly, to elevate and turn the product during its passage through the cylinders, the automatic feeding of the product being accomplished by the rotation and incline of the cylinders, while the elevating and turning of the product is accomplished by providing wings 9. These wings extend from end to end of each cylinder and are secured in any suitable manner. These wings carry the product from the bottom and elevate it in an upward direction or to an opening where it slides or drops off the wings to the bottom of the cylinder. The product is in this manner continuously elevated and turned during its passage and is therefore evenly exposed and thoroughly dried before discharging at the lower ends of the cylinders indicated at 10, the product thus discharged being removed in any suitable manner by chutes 11, conveyer belts, or any other suitable means.

By referring to Fig. 2 it will be seen that the cylinders are positioned in superposed staggered rows and that the air by which the product is dried is admitted through pipes 12, positioned in the bottom of the housing, each pipe being provided with discharge nozzles 13 and deflectors 14 to permit an even distribution of the incoming air. The air after discharging through the nozzles 13 passes upwardly through and between the cylinders and is finally permitted to escape through the top of the housing as at 15. The air may be supplied by a blower or similar means not here shown and it may be heated to any desired temperature before it is admitted to the drier. In actual practice it is found that the air is rapidly cooled after being brought in contact with the product to be dried, it will therefore become cooler and cooler as it passes through the several superposed cylinders, if some means is not provided for gradually increasing the temperature of the air during its passage through

the cylinders. This is accomplished in the present instance by providing steam heating coils such as shown at 16. These coils are arranged in horizontal rows between the cylinders and as each horizontal row of heating coils is provided with a regulating valve 17 it becomes possible to supply the heat required or to obtain any temperature desired. In other words, the temperature of the entering air may be 80 degrees Fahrenheit, while the temperature of the air at the point of exit shown at 15 may be 160 degrees Fahrenheit. This is an important feature, as the moisture carrying capacity of the air increases enormously with a certain rise in temperature.

As previously stated it is necessary to revolve the cylinders to provide the automatic feeding operation desired. This is accomplished by a worm gear drive generally indicated at 18, see Fig. 4. The arrows shown at A in Fig. 2 indicate the direction of rotation, that is, the cylinders are rotated in opposite directions as much as possible to permit an even flow and distribution of the air, the opposite rotation being possible where a worm gear drive such as shown in Fig. 4 is provided. The wings 9 shown in Fig. 3 which are provided for the purpose of lifting and turning the product to be dried during its passage through the cylinders may be provided with cleats such as shown at 9^A to prevent the product from sliding off the wings before it has been elevated to a substantially vertical position. This is an advantage as it provides a means for increasing the lift of the product or the vertical distance through which it drops when released. The wings 9 may be solid if desired but they are preferably perforated as shown to permit a free passage of the air at all points. While the cylinders are here shown as arranged in horizontal rows, I wish it understood that they may be arranged vertically, horizontally or in any other suitable manner and that the exact position of the heating coils 16 may be varied to suit conditions. The only feature to be taken into consideration is that the air should pass at right angles through the cylinders and not longitudinally therethrough. Similarly that the heating coils be arranged so that the air may be progressively or gradually increased in temperature during its passage through the cylinders. A great variety of arrangements may therefore be provided without departing from the spirit of the invention.

The time period required in the drying of different products varies greatly. This may be taken care of in the present instance either by increasing the incline of the cylinders or by increasing the speed of rotation. Either operation will, of course, lessen the time required for the product to pass through, while lessening of the incline and the number of revolutions of the cylinders will lengthen the time required.

I also wish it understood that the materials and finish of the several parts employed may be such as the experience and judgment of the manufacturer may dictate and that while a specific mounting and drive is shown in connection with each cylinder, that any other suitable drive or mounting may be employed for the same.

Having thus described my invention, what I claim and desire to secure by Letters Patent is—

1. A drier comprising a housing, a plurality of perforated cylinders extending from end to end thereof, each cylinder having an independent feed opening and an independent discharge opening, means for transmitting a rotary movement to the cylinders and means for passing a current of hot air through and between the cylinders and transversely thereof.

2. A drier comprising a housing, a plurality of perforated cylinders extending from end to end thereof, each cylinder having an independent feed opening and an independent discharge opening, means for transmitting a rotary movement to the cylinders and means for passing a current of hot air through and between the cylinders and transversely thereof and a means within each cylinder for turning the product to be dried.

3. A drier comprising a housing, a plurality of superposed staggered screen covered cylinders, journaled within the housing and extending from end to end thereof, each cylinder having an independent feed opening and a discharge opening, means for delivering a product to be dried to each cylinder, means for slowly rotating the cylinders and means for passing a current of hot air transversely through the cylinders.

4. A drier comprising a housing, a plurality of superposed staggered screen covered cylinders, journaled within the housing and extending from end to end thereof, each cylinder having an independent feed opening and a discharge opening, means for delivering a product to be dried to each cylinder, means for slowly rotating adjacent cylinders in opposite directions, means within each cylinder for turning the product over and over during its passage through each cylinder and means for passing a current of hot air transversely through the cylinders.

5. A drier comprising a housing, a plurality of superposed staggered screen covered cylinders, journaled within the housing and extending from end to end thereof, each cylinder having an independent feed opening and a discharge opening, means for delivering a product to be dried to each cylinder, means for slowly rotating adjacent cyl-

inders in opposite directions, means within each cylinder for turning the product over and over during its passage through each cylinder, means for passing a current of hot air transversely through the cylinders, and means for gradually increasing the temperature of the air during its passage through the cylinders and the housing.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

EMIL CLEMENS HORST.

Witnesses:
W. W. HEALEY,
M. E. EWING.