No. 850,398. PATENTED APR. 16, 1907.

A. RAMOS.

DRIER.

APPLICATION FILED MAR. 30, 1906.

2 SHEETS—SHEET 2.

Fig. 3.

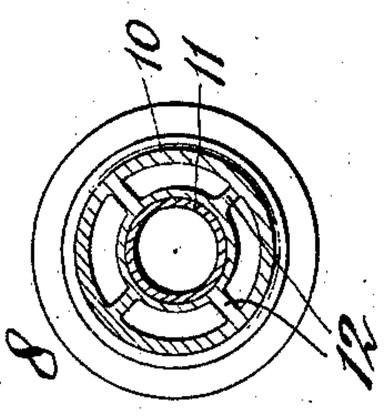
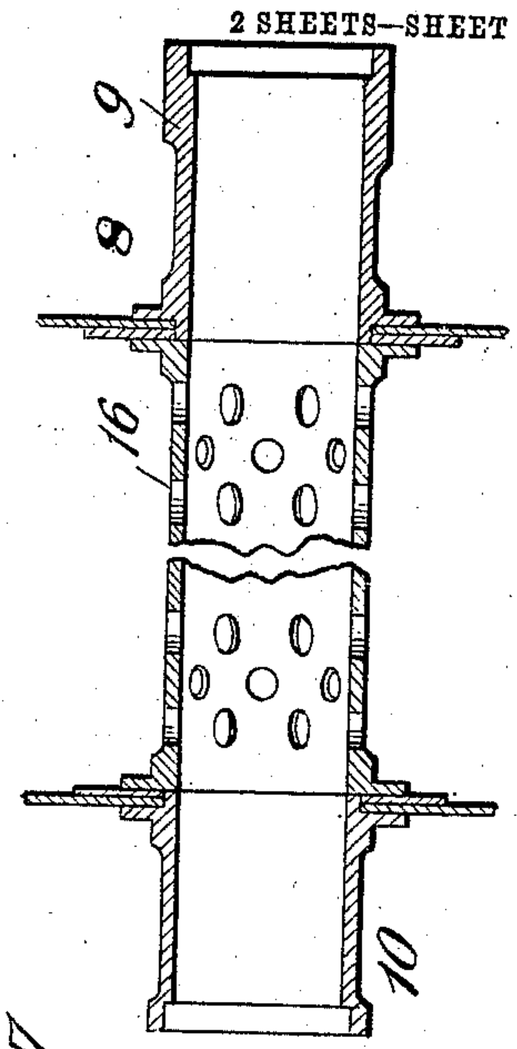


Fig. 4.



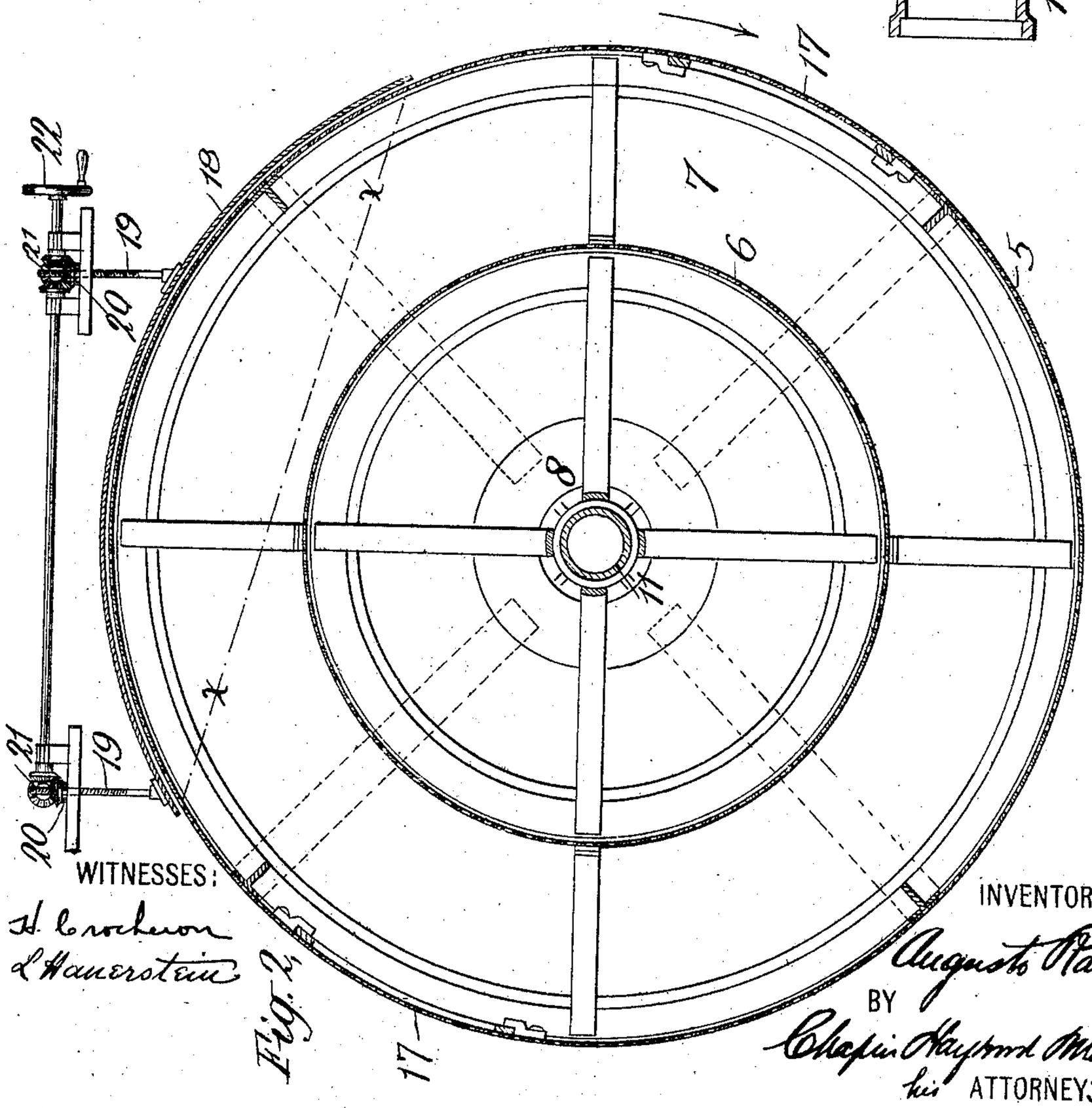


Fig. 2.

WITNESSES:

H. C. Crocheron

L. Hauerstein

INVENTOR

Augusto Ramos

BY

Chapin Hayford Marble

his ATTORNEYS

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2 SHEETS—SHEET 1.

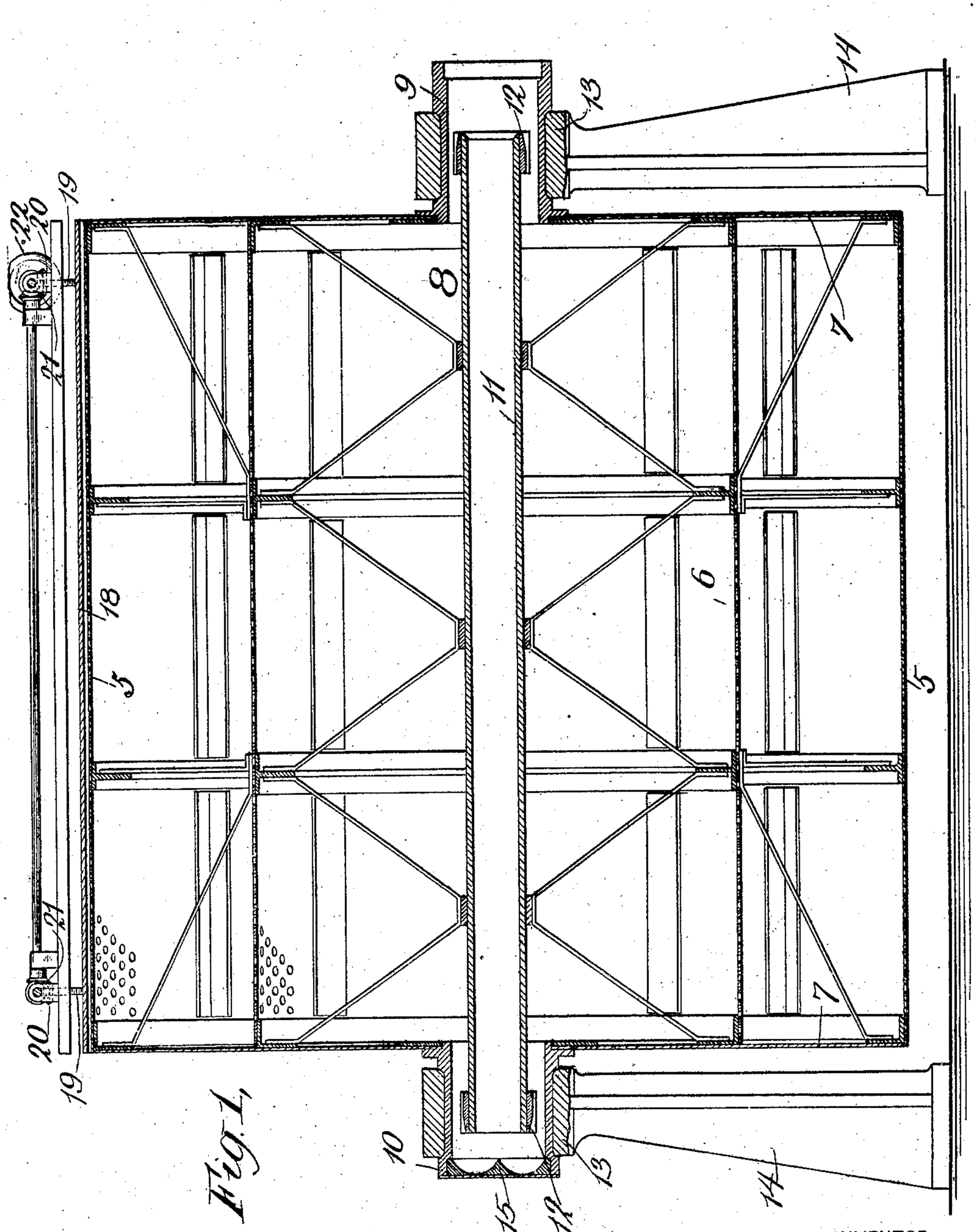

Fig. 1.

WITNESSES:

S. Donnelson

L. Hauerstein

INVENTOR

Augusto Ramos

BY

Chapin Rayford Marble

his ATTORNEYS

UNITED STATES PATENT OFFICE.

AUGUSTO RAMOS, OF SAO PAULO, BRAZIL, ASSIGNOR TO MARCUS MASON & COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

DRIER.

No. 850,398. Specification of Letters Patent. Patented April 16, 1907.

Application filed March 30, 1906. Serial No. 308,835.

To all whom it may concern:

Be it known that I, AUGUSTO RAMOS, a citizen of Brazil, and a resident of the city and State of Sao Paulo, Brazil, have invented certain new and useful Improvements in Driers, of which the following is a specification, reference being had to the accompanying drawings, forming a part thereof.

My invention relates to apparatus for drying grains, berries, and the like, and particularly to coffee-driers.

My invention consists in a novel form of drier comprising two perforated concentric cylinders, one within the other, adapted to receive a charge in the annular space between them, the diameter of the two said cylinders being so proportioned with respect to the normal shrinkage of a charge during drying as to cause the upper surface of the inner cylinder to be almost, but not quite, uncovered as the charge dries during a drying operation, together with means for admitting air to within the inner cylinder.

My invention also consists in novel means for controlling the exit of air at the upper portion of the outer cylinder, comprising a shield or guard arranged above the outer cylinder and means for moving the shield or guard toward and away from the said cylinder.

In operation the annular space between the two cylinders is substantially filled—that is to say, it is filled as full as it can be while leaving the material free to move. The drier is then revolved, as is usual, in the direction of the arrow in Fig. 2. Air is admitted under pressure within the inner cylinder, and this air forces itself away through the mass of material in the drier, finally escaping through the perforations of the outer cylinder. The charge gradually shrinks during the drying operation, and as the charge shrinks a greater space is gradually exposed at the top of the annular chamber. This space gradually increases until finally the upper surface of the inner cylinder is nearly, but not quite, exposed. The air-blast gradually becomes more and more effective opposite this open space, for the reason that the charge becomes notably thinner or less deep at this point. The result of this is to increase the efficiency of the air-blast at this point while a certain amount of air is still being forced through the other parts of the drier. The drier being revolved continuously, every particle of the charge is brought from time to time opposite this point, and I have found that a drier thus arranged is exceedingly efficient and the drying operation more rapid than in an ordinary drier, where the relative depth of the charge remains substantially unaltered. The amount of air which is permitted to pass through this space may be regulated by raising and lowering the shield or guard arranged in proximity to the outer and upper surface of the outer cylinder.

In order that my invention may be fully understood, I will now describe an embodiment thereof with reference to the accompanying drawings, illustrating same, and will then point out the novel features in claims.

In the drawings, Figure 1 is a view in central longitudinal section through a drier embodying my invention. Fig. 2 is a view in central transverse section through the same. Fig. 3 is a detail transverse sectional view through one of the trunnions. Fig. 4 is a detail view, in longitudinal central section, showing a modified form of shaft employed.

The drier comprises an outer perforated cylinder 5, an inner perforated cylinder 6, end heads 7, and a shaft 8. The several parts are rigidly secured together and are suitably provided with brace-rods, &c., as will be well understood. The shaft 8 in the form shown in Figs. 1, 2, and 3 comprises hollow trunnion portions 9 10 at opposite ends of the drier and a central hollow portion 11. The hollow portion 11 is of less diameter than the trunnion portions 9 and 10, but is rigidly secured thereto by spiders 12. The trunnions 9 and 10 are received in suitable bearings 13, carried by standards 14, the device as a whole being arranged to revolve freely in said bearing. The trunnion 9 is open at its outer end and is arranged to be connected with a suitable air-supply. The trunnion 10 is closed by means of a deflector-plate 15, as shown. Currents of air entering the trunnion 9 will divide, some portions entering directly into the space within the inner cylinder 6, between it and the central portion 11 of the shaft 8, and other portions passing through the inner portion 11 of the shaft to the other end of the drier, where they will strike the deflector-plate 15, by which they will be deflected back to within the inner cylinder through the annular passage between

the trunnion 10 and the central portion of the shaft 11 at the said opposite end of the drier.

I make no claim herein to this specific form of air-distributing arrangement thus shown and described, as the same forms no part of the present invention, but I have illustrated the same herein as constituting the preferred form of my present drier. I may, however, use any desired form of construction for this purpose, and in Fig. 4 I have shown a form in which air is admitted to opposite ends of the drier through the hollow shaft 8, whose central portion 16 is of the same diameter throughout as the trunnions. Both trunnions 9 and 10 are open for air to be admitted at each end, the central portion 16 of the shaft being perforated to permit clear passage therethrough of air to the interior of the cylinder 6.

The outer cylinder 5 is provided with suitable doors 17 for admitting a charge.

18 designates the guard or shield, which is arranged above the outer cylinder in proximity thereto. This guard or shield is provided with screw-threaded bolts 19, by which it may be raised and lowered to carry it nearer to or farther from the said cylinder 5. The bolts are fitted into nuts 20, operated by miter-gearing 21 under the control of an operating-wheel 22.

In operation the drier is charged through the doors 17 until the annular space inclosed between the cylinders 5 and 6 is substantially filled. At this time the shield 18 may be adjusted away from the surface of the cylinder 5, as during the first part of the operation the said shield or guard is not necessary. Air is introduced under pressure to within the inner cylinder, preferably at both ends thereof, so that the entire chamber within the cylinder 6 becomes filled with air under pressure. This pressure becomes considerable, because the material in the annular space between the cylinders 5 and 6 offers considerable resistance to its escape. This resistance is substantially equal throughout the entire annular space during the first part of the drying operation. The air of course is gradually forced out first through the perforations in the inner cylinder 6 to the annular space between the cylinders 5 and 6 and then out through the perforations in the cylinder 5. As the charge becomes gradually dry a certain shrinkage takes place, and this shrinkage increases and in doing so exposes a space in the annular chamber near the upper end thereof. The level of the charge in the annular space does not remain horizontal, but becomes oblique, owing to the rotative action, the angle of such obliquity being, for instance, such as is shown by the line $x\ x$ in Fig. 2 of the drawings. The depth of the space thus exposed gradually increases until finally the upper surface of the inner cylinder is almost, but not quite, exposed. The level of the charge when substantially dry is illustrated by the line $x\ x$ in Fig. 2. The diameters of the cylinders are carefully proportioned for the foregoing purpose, and I have found so far that it is necessary for the most efficient operation that the diameter of the inner cylinder shall be not less than one-half of the diameter of the outer cylinder. In fact, in practice I have so far made the diameter of the inner cylinder somewhat larger than half the diameter of the outer cylinder, such a proportion being shown in the drawings. As the charge becomes reduced I adjust the shield 18 to its proper position, so as to regulate the amount of air permitted to be discharged opposite this point. It will be understood that as the shield more nearly approaches the cylinder 5 greater resistance will be offered to the escape of air, so as to force more air out through other parts of the drier, and as the shield is retracted from the cylinder 5 less resistance will be offered to the outcoming air at this point, and hence a greater quantity will be permitted to discharge.

What I claim is—

1. In a drier, the combination with two concentric perforated cylinders, arranged one within the other, the diameter of the inner cylinder being not less than one-half that of the outer cylinder and the annular space between them being substantially clear, whereby said space is continuous and the material contained therein will be capable of moving freely therein, of heads secured fast to both said cylinders, and a shaft carrying said heads and cylinders, said drier having means for admitting air under pressure through said shaft to the interior of the inner cylinder.

2. In a drier, the combination with two concentric perforated cylinders arranged one within the other, of means for admitting air under pressure to the interior of the inner cylinder, and means coacting with the outer cylinder for controlling the passage of air by restricting the discharge through the said outer cylinder.

3. In a coffee-drier, the combination of two concentric perforated cylinders, arranged one within the other, and adapted to receive a charge of coffee-berries in the annular space between them, the width of said annular space being about equal to, but slightly greater than, the depth of the space exposed by the normal shrinkage during drying, of a full charge, and means for admitting air to the interior of the inner cylinder.

4. In a coffee-drier, the combination of two concentric perforated cylinders, arranged one within the other, and adapted to receive a charge of coffee-berries in the annular space between them, the width of said annular space being about equal to, but slightly greater than, the depth of the space exposed

by the normal shrinkage during drying, of a full charge, and means for admitting air to the interior of the inner cylinder, at opposite ends thereof.

5. In a drier, the combination with two concentric perforated cylinders arranged one within the other, and means for admitting air to within the inner cylinder, of a shield arranged above the outer cylinder partially surrounding the same.

6. In a drier, the combination with two concentric perforated cylinders, arranged one within the other, and means for admitting air to within the inner cylinder, of a shield arranged above the outer cylinder partially surrounding the same, and means for adjusting the shield toward and away from the cylinder.

AUGUSTO RAMOS.

Witnesses:
A. SICILIAUS,
JOSE A. CAWAYO.