No. 617,391. Patented Jan. 10, 1899.

F. BERNER, Jr.

DRYING APPARATUS.

(Application filed Apr. 12, 1898.)

(No Model.) 2 Sheets—Sheet 1.

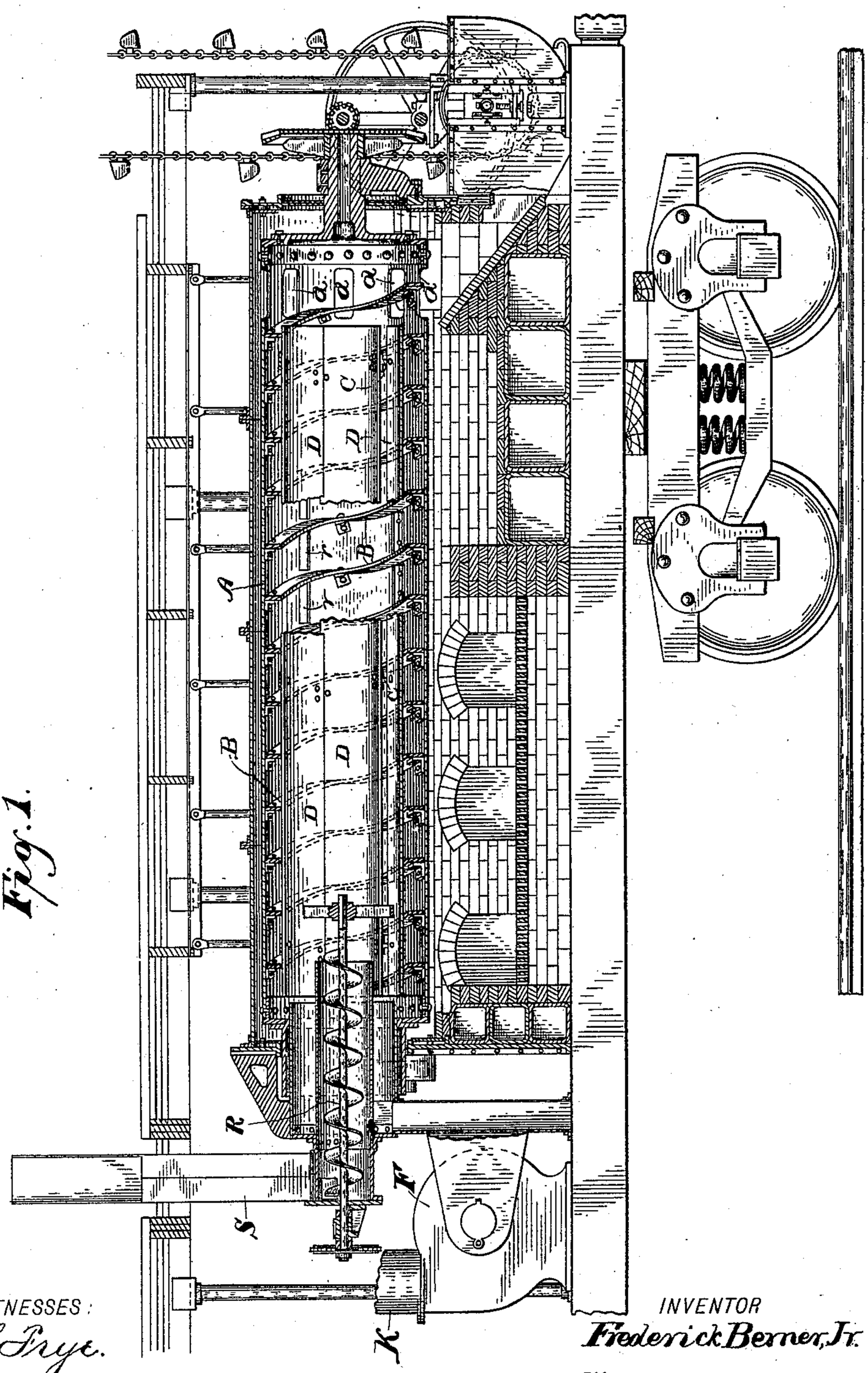

Fig. 1.

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Fig. 2.

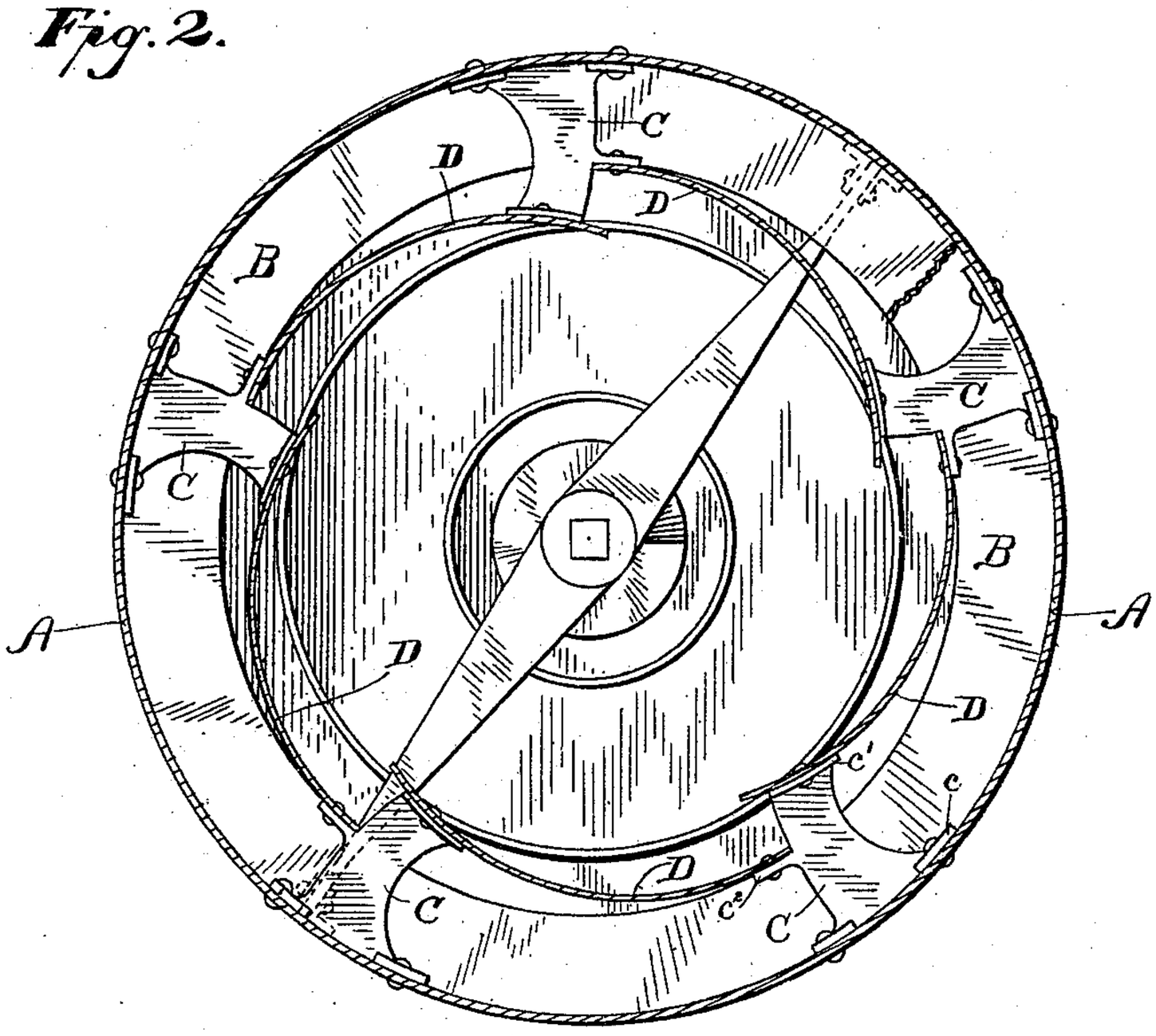
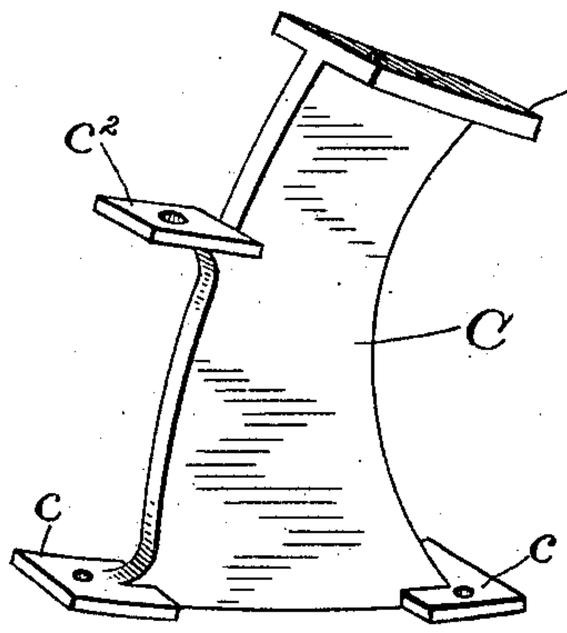


Fig. 3.



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UNITED STATES PATENT OFFICE.

FREDERICK BERNER, JR., OF INDIANAPOLIS, INDIANA.

DRYING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 617,391, dated January 10, 1899.

Application filed April 12, 1898. Serial No. 677,311. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK BERNER, Jr., a citizen of the United States, residing at Indianapolis, in the county of Marion and State of Indiana, have invented certain new and useful Improvements in Drying-Cylinders, of which the following is a specification.

My present invention relates to a revolving cylinder which forms a part of a drying apparatus. It is primarily designed as a sand-drier, and as it has so far been used it constitutes a part of a portable asphalt plant—such, for example, as forms the subject-matter of Letters Patent of the United States No. 540,912, dated June 11, 1895, and No. 585,867, dated July 6, 1897. It may, however, be used either in such an apparatus as that shown in said Letters Patent or in any other situation where rapid and effective drying of sand or any similar granular substance is desired to be effected.

Said invention principally consists in securing within the interior of the drying-cylinder and within the spiral ribs or "conveyer-flights," by which the sand or other substance is caused to move lengthwise of said cylinder, a series of overlapping plates having spaces between them, whereby the sand or other substance during its progress through the cylinder is more evenly distributed and thoroughly subjected to the action of the heat and at the same time prevented from dropping into the air-blast or forced draft, which in such a machine is caused to pass through said cylinder in an opposite direction to the movement of the sand or other substance being treated.

Referring to the accompanying drawings, which are made a part hereof and on which similar letters of reference indicate similar parts, Figure 1 is a longitudinal vertical section through the furnace and sand-drying cylinder of such a portable asphalt plant as is above referred to, said cylinder being provided with my invention; Fig. 2, a transverse sectional view of the cylinder separately, and Fig. 3 a perspective view of one of the struts by which the curved overlapping plates are supported.

As shown in Fig. 1, with the exception of said curved overlapping plates and their supporting-struts the construction of the apparatus is the same as has heretofore been used, and as the same forms no part of my present invention it will not be further described herein, except incidentally in describing the invention.

In the drawings, A represents the shell of the rotating cylinder; B, the spiral ribs or conveyer-flights; C, the peculiarly-formed struts used in my present invention, and D the plates which are mounted thereon.

The cylinder A, as shown in Fig. 1, is mounted to rotate within the furnace structure. By means of an exhaust-fan F a forced draft is created from the combustion-chamber through the cylinder to the smoke-stack K.

The spiral ribs or conveyer-flights B are secured within the cylinder and serve in the usual and well-known manner to cause the sand or other substance to move lengthwise the cylinder in operation while said cylinder is in motion. The sand enters through a suitable spout S, is conveyed to within the cylinder A by an ordinary conveyer R, and discharges through the same openings *a* that the products of combustion enter.

The struts C are provided with feet *c*, by which they are adapted to be strongly secured to the interior of the cylinder A, while their inner ends *c'* are formed to receive the innermost edges of the plate D, and at an intermediate point they are provided with shelf-like bearings c^2, upon which the outer edges of the plates D rest. As best shown in Fig. 2, the plates D are carried on the struts C in such a manner that one edge is considerably nearer the interior of the shell A than the other and also so that the edges overlap each other, but have a considerable space between them.

The plates D are disposed longitudinally parallel with the shell of the cylinder A, but circumferentially. While formed with a curvature similar to that of the cylinder-shell, they diverge therefrom, so that one edge of each is nearer the axis of the structure than the other. For want of a better term I will denominate those edges which are nearest the cylinder-shell as the "outer" edges and those which are nearest the axis as the "inner" edges. The struts C are designed to carry one edge of each of two plates, the outer edge of one and the inner edge of another, and the ar-

rangement is preferably such that the plates overlap each other, with a considerable space between the edges of any two adjacent plates. The sand when it is first introduced into the cylinder passes through these spaces to between the plates and the cylinder-shell. This it may easily do on account of the arrangement of the plates and the direction of rotation of the cylinder; but on account of the same facts little, if any, of it can return to within the space inside the plates during the subsequent progress of the operation of the apparatus. These plates being subject to the direct action of the products of combustion as they pass through the cylinder, become highly heated, and the sand is thus much more rapidly dried than in a cylinder which does not contain such plates, and so the capacity of the apparatus is much increased by their use, and the sand can be heated to a much higher temperature, as I have demonstrated by actual practical test.

The operation is as follows: The sand or other material shortly after being introduced into the interior of the cylinder A in its wet or damp state reaches a position where it rests upon the interior surface of said cylinder. The interior of the cylinder is provided with projecting ribs or lifting-plates *r*, as shown in the central portion of Fig. 1, where the plates D are broken away, and these continually raise the damp or wet sand from the bottom and carry it up to above the center of the cylinder, whence it falls down again, being at the same time continually moved lengthwise the cylinder by means of the spiral ribs or conveyer-flights B. In the construction shown, which embodies my improvement, the sand as it falls drops onto the outer sides of the plates D and as it strikes spreads over the surface of the plate with which it comes in contact. These plates being within the cylinder and directly subject to contact with the products of combustion as the same are drawn therethrough are highly heated, and the consequence is that the sand which comes in contact therewith is rapidly dried and heated to a high temperature. By said plates also the sand is prevented from dropping to within the center of the cylinder into the draft which propels the products of combustion toward the smoke-stack, and thus is not subject to the force of said draft. In driers unprovided with my invention a large proportion of the sand is carried out by the draft and wasted.

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

1. A rotary drier containing conveying devices whereby the material to be dried is caused to move longitudinally thereof, and a series of plates within the conveying devices the edges of which overlap each other and have spaces between them whereby the material being dried is prevented from falling into the center of the space within the cylinder where it would be drawn out by means of the blast and is at the same time distributed over more heating-surface whereby it is dried and heated more rapidly.

2. The combination, in a drier, of a rotating drying-cylinder, conveying devices within said cylinder, and a series of plates within said cylinder inside of said conveying devices and extending longitudinally of the cylinder, one edge of each of which is nearer the shell of the cylinder than the other and which overlaps the edge of the adjacent plate.

3. The combination, in a drier, of the rotary cylinder, supporting-struts within said cylinder having bearings at two points of elevation, and plates secured to said struts, one edge of each plate being thus held farther from the cylinder-shell than the other, substantially as shown and described.

4. The combination, in a drier, of a rotary cylinder A, spiral ribs or conveyer-flights B within said cylinder and next its shell, overlapping plates D within the cylinder and inside the ribs or conveyer-flights therein, and suitable supports for said last-named plates.

In witness whereof I have hereunto set my hand and seal, at Indianapolis, Indiana, this 5th day of April, A. D. 1898.

FREDERICK BERNER, JR. [L. S.]

Witnesses:
CHESTER BRADFORD,
JAMES A. WALSH.