

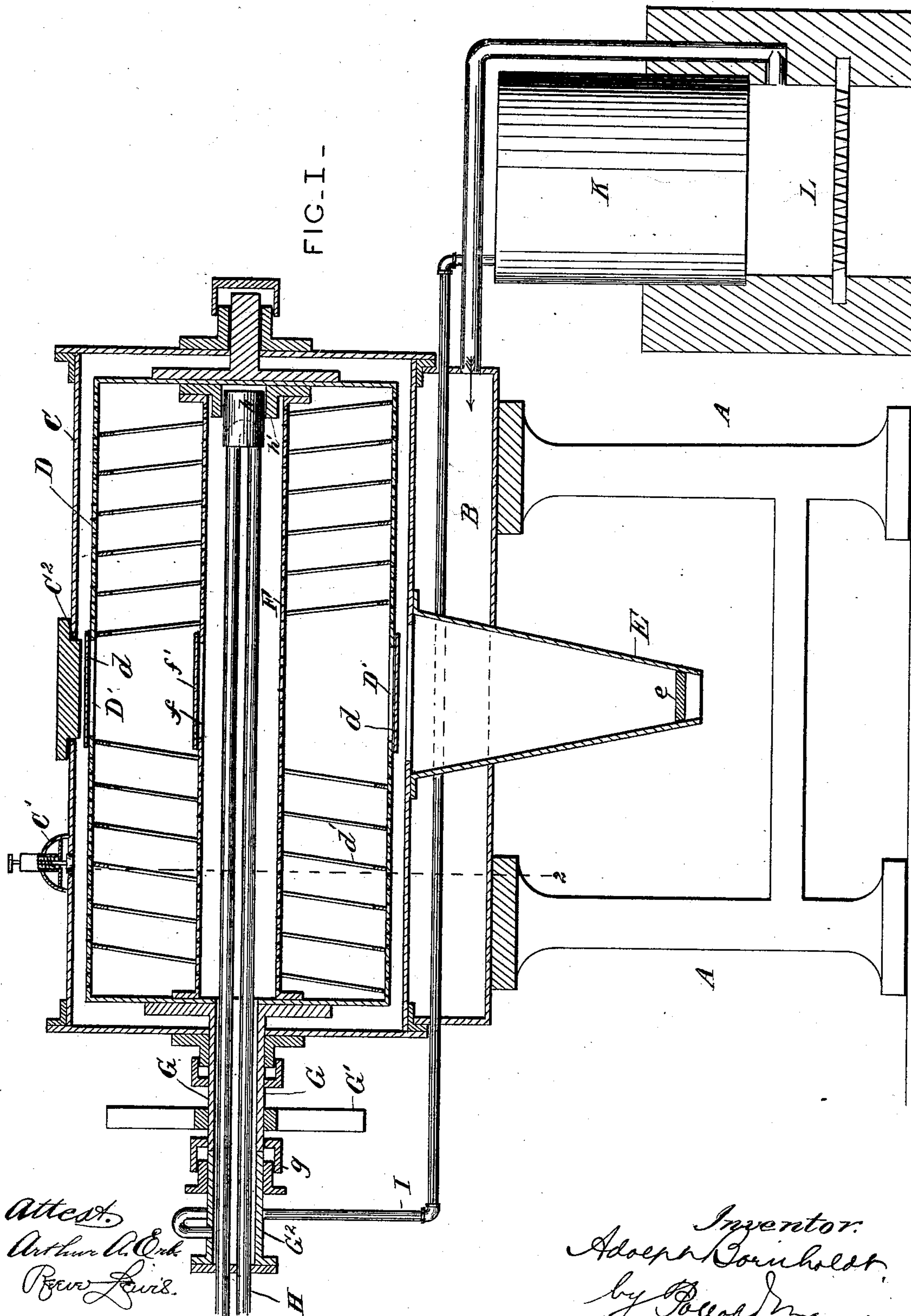
(No Model.)

2 Sheets—Sheet 1.

A. BORNHOLDT.
DRIER.

No. 506,901.

Patented Oct. 17, 1893.



Attest.
Arthur A. Oak
Per Lewis.

Inventor:
Adolph Cornholdt,
by Robert James
his attorney.

(No Model.)

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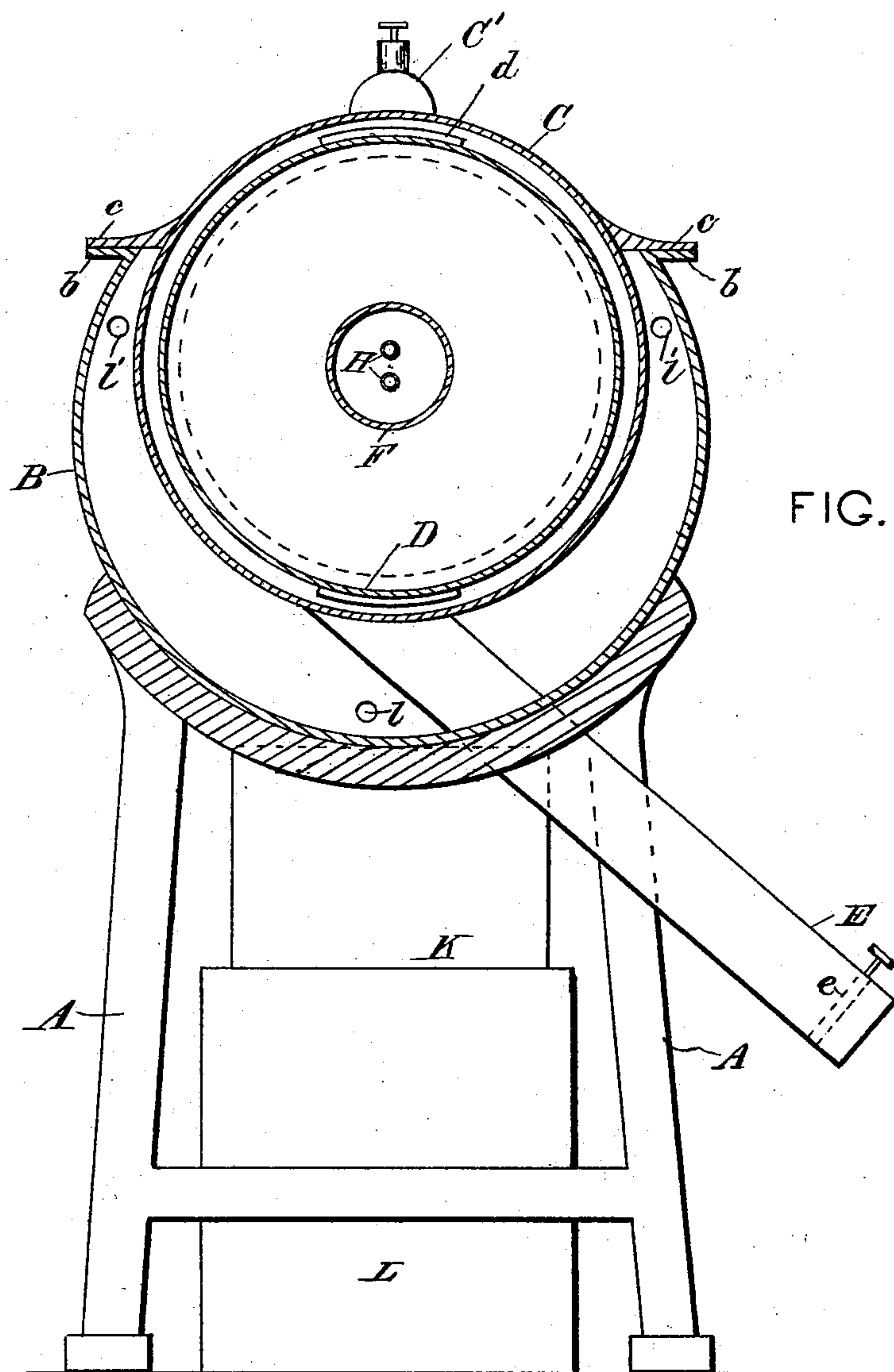


FIG. II.

Attest
Arthur A. Orb.
Reverend Lewis.

Inventor:
Adolph Bornholdt,
by Edward Manno,
his attorney.

UNITED STATES PATENT OFFICE.

ADOLPH BORNHOLDT, OF BROOKLYN, NEW YORK, ASSIGNOR TO THE
NATIONAL VACUUM DRYING AND AIR DISTILLING COMPANY, OF SAME
PLACE.

DRIER.

SPECIFICATION forming part of Letters Patent No. 506,901, dated October 17, 1893.

Application filed August 5, 1892. Serial No. 442,248. (No model.)

To all whom it may concern:

Be it known that I, ADOLPH BORNHOLDT, of Brooklyn, New York, have invented a new and useful Improvement in Driers, which is
5 fully set forth in the following specification.

This invention has reference to the construction of driers, and more particularly to such as are used for drying exhausted vegetable substances, such as brewers' mash, although it is applicable to both organic and in-
10 organic substances.

Malt driers usually employ stirrers which stir the whole mass, requiring considerable power and being also attended with other in-
15 conveniences. The use of a rotating drum for drying purposes is also quite common, but the operation thereof is quite slow.

This invention is based upon the employment of air under pressure as the drying medium, and is in some respects analogous to the invention described in my application for an improvement in pneumatic presses, filed February 26, 1892, No. 422,920.

The main feature of novelty in the construction of the apparatus is in the use of a revolving drum provided with spirally arranged ribs running in opposite directions from the ends of the drum to points near the middle of the same. These ribs act to stir the grain
25 or other material, and when it is desired to empty the drum, the rotation thereof causes the contents to be carried to the middle of the same, where suitable inlet and discharge openings are provided.

35 Another important feature is the means employed for heating the air or drying medium.

These together with other novel details of construction will be fully described in connection with the accompanying drawings which form part of this specification, and in which—

Fig. I, represents a sectional view of my apparatus, and Fig. II, is a view taken on line
45 2—2 of Fig. I.

A represents a suitable frame-work or support upon which rests the jacket B, which partly incloses and supports the high pressure cylinder C, having ears c resting upon the
50 flanges b, formed at the upper edges of jacket

B. The cylinder C is provided with a pressure valve C', and man-hole C² having an airtight cover for the introduction of the grain, or other material into the perforated receiving drum D, through openings D' which have
55 suitable covers d. When it is desired to discharge the contents of the drum one of the openings D' may be brought into communication with a trough or chute E leading into the lower part of the pressure cylinder near
60 the middle thereof, and having a suitable airtight gate-valve e at its outer end. Upon the inner face of the drum D running in opposite directions from the ends thereof to points near the middle are spirally arranged ribs d',
65 which stir and turn the material exposing all particles thereof equally to the action of the heat and compressed air.

F is a perforated cylinder inclosed by drum D, and secured thereto, access to the interior
70 of the former being made through an opening f by the removal of cover f'.

The drum D is rotated in suitable air tight bearings formed in the ends of the cylinder C, the bearing at one end being in the form
75 of a sleeve G secured at its inner end to the drum and projecting through the end of cylinder C, the drum being rotated by a pulley G' carried by said sleeve.

To the end of sleeve G is connected, by a
80 packing box g, an extension G², through the closed outer end of which passes the looped steam pipe H, the same passing into and extending the length of the cylinder F, the looped end thereof being secured in a block
85 h which rests in a bearing h'. The steam pipe H is connected with any suitable source of supply. Heated air under pressure is admitted into the cylinder F through a pipe I, which communicates with air reservoir K, in
90 which air under suitable pressure is stored.

The air in the reservoir is heated by furnace L, the products of combustion from the furnace passing into the jacket B, through an opening l and passing out of the same through
95 openings l'. The pipe I passes from the air reservoir through the jacket B and communicates with the interior of the stationary sleeve extension G².

The operation of the device is as follows:— 100

The air under pressure in the reservoir K, is properly heated by furnace L, passes out through pipe I, being superheated by the products of combustion in the jacket B, passes 5 through sleeve G, into the interior perforated cylinder F, from whence it distributes itself through the grain in drum D, vaporizing the liquids or juices in the same and escaping through pressure regulating valve C', which 10 may be set as desired. The air on passing through sleeve G and cylinder F is heated by contact with the steam loop. The required temperature in the rotating, drying vessel or drum is also maintained by the products of 15 combustion in jacket B. During the above described circulation of the air, the grain, which has been previously introduced into the receiving drum D, through man-hole C² and openings D', is being continually stirred 20 up and exposed to the action thereof by the revolution of the drum. When the grain has been under treatment for a sufficient period of time one of the openings D' is brought to a position over the chute E, and the cover d 25 removed, and gate-valve e opened, allowing most of the grain to run out; that remaining being discharged by rotating the drum in such direction that the spirally arranged ribs will feed the material toward chute E. This op- 30 eration can be performed with rapidity and thoroughly dries the material treated, requiring but little power to rotate the drum and a minimum expenditure of fuel. For some operations less heat is required than for others, 35 and it will not be necessary in all cases to circulate steam through pipe H. When it is required to reduce the temperature in the drum this pipe can be used to circulate cold water, or other cooling medium.

40 It will be obvious that other modifications can be made in details of construction without departing from the spirit of the invention.

Having now fully described my invention, 45 what I claim is—

1. The combination with an air reservoir

and heater of a pressure cylinder, a jacket partly surrounding the same and through which the products of combustion circulate, a rotatable perforated receiving drum in the 50 said cylinder a concentrically arranged perforated drum in said receiving drum and suitable communication between the interior of said receiving drum and the air reservoir, substantially as described. 55

2. The combination with the air reservoir containing air under pressure, the heater and pressure cylinder, of a jacket through which the products of combustion circulate partly 60 surrounding the pressure cylinder, two concentrically arranged perforated drums in said cylinder and rotating in bearings in the same, means for introducing the air under pressure from the reservoir into the inner of the concentric drums, and a steam loop projecting 65 into the latter, substantially as described.

3. The combination of a closed cylinder provided with a pressure regulating valve, a rotary drier comprising two perforated drums one within the other, between which the grain 70 is confined during the operation the outer drum having internal spirally arranged ribs, projecting inwardly a short distance and means for admitting heated compressed air within said cylinder, substantially as de- 75 scribed.

4. The combination of a closed cylinder provided with a pressure regulating valve, a rotary drier comprising two perforated drums one within the other, means for admitting 80 heated compressed air, and a looped steam pipe entering through one of the bearings of the drier and extending lengthwise of the inner drum, substantially as described.

In testimony whereof I have signed this 85 specification in the presence of two subscribing witnesses.

ADOLPH BORNHOLDT.

Witnesses:

PETER LUGER,
JAS. GLATOP.