

No. 681,942.

Patented Sept. 3, 1901.

C. WHITE.
DRYING APPARATUS.

(Application filed Dec. 3, 1900.)

(No Model.)

2 Sheets—Sheet 1.

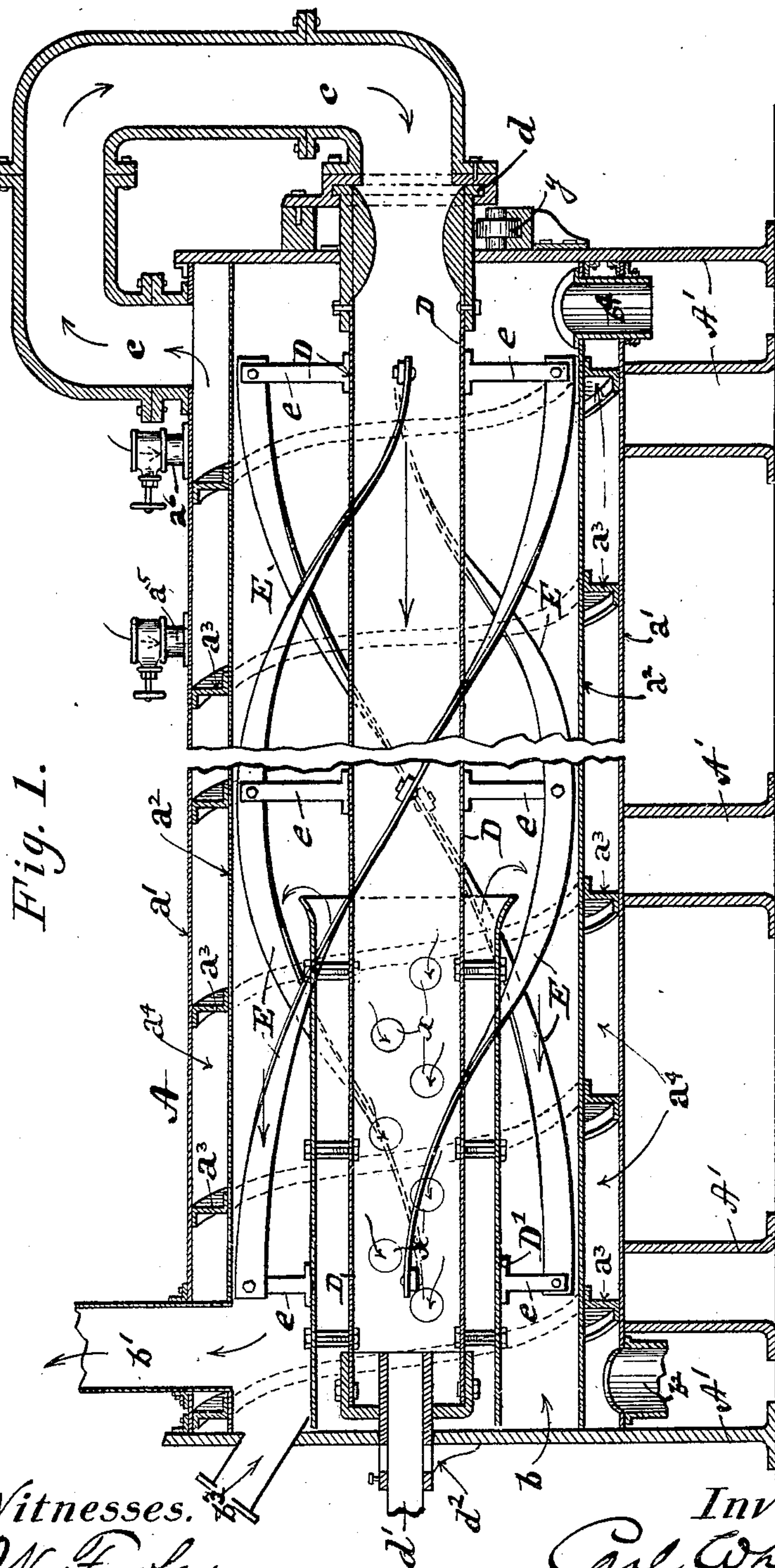


Fig. 1.

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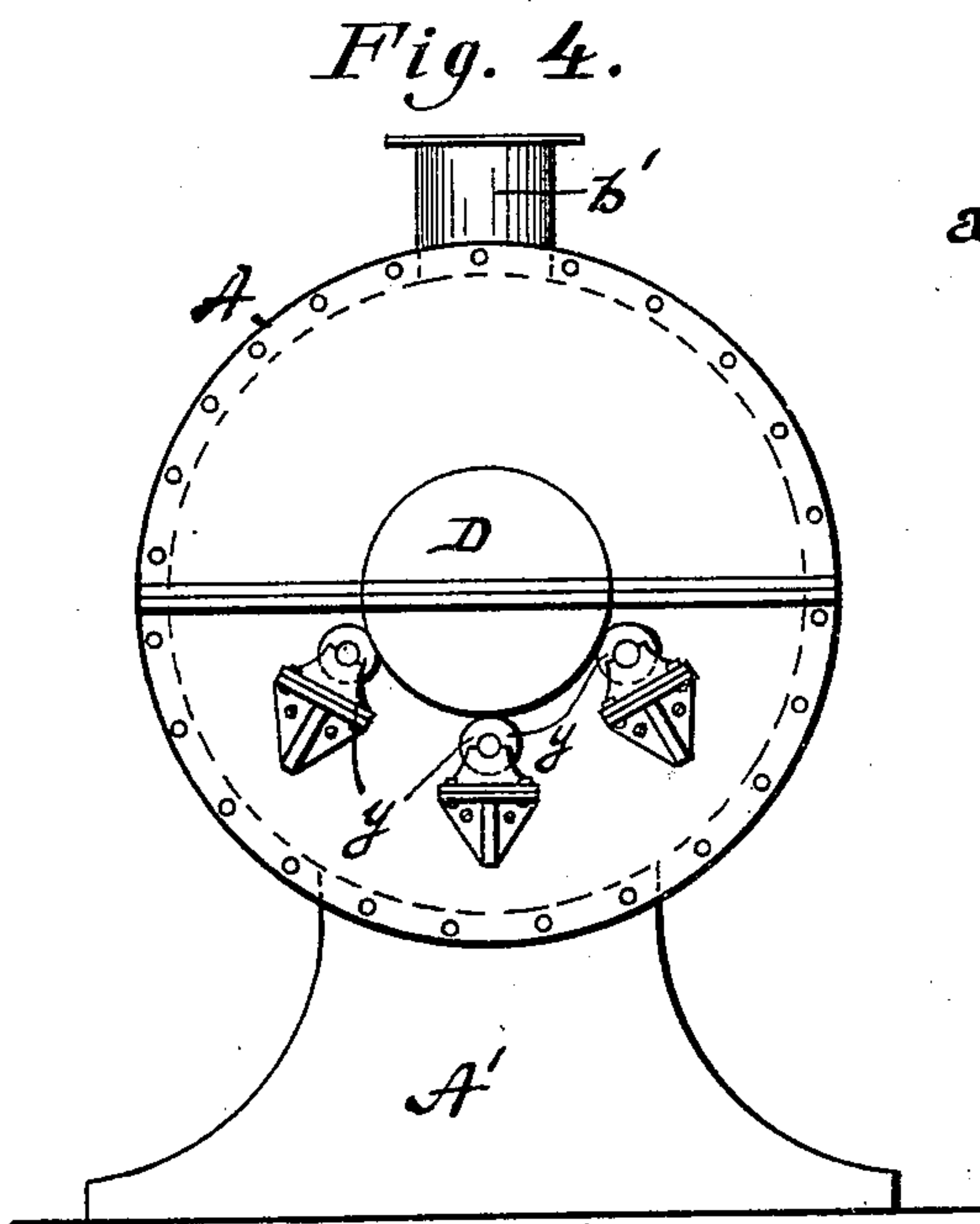
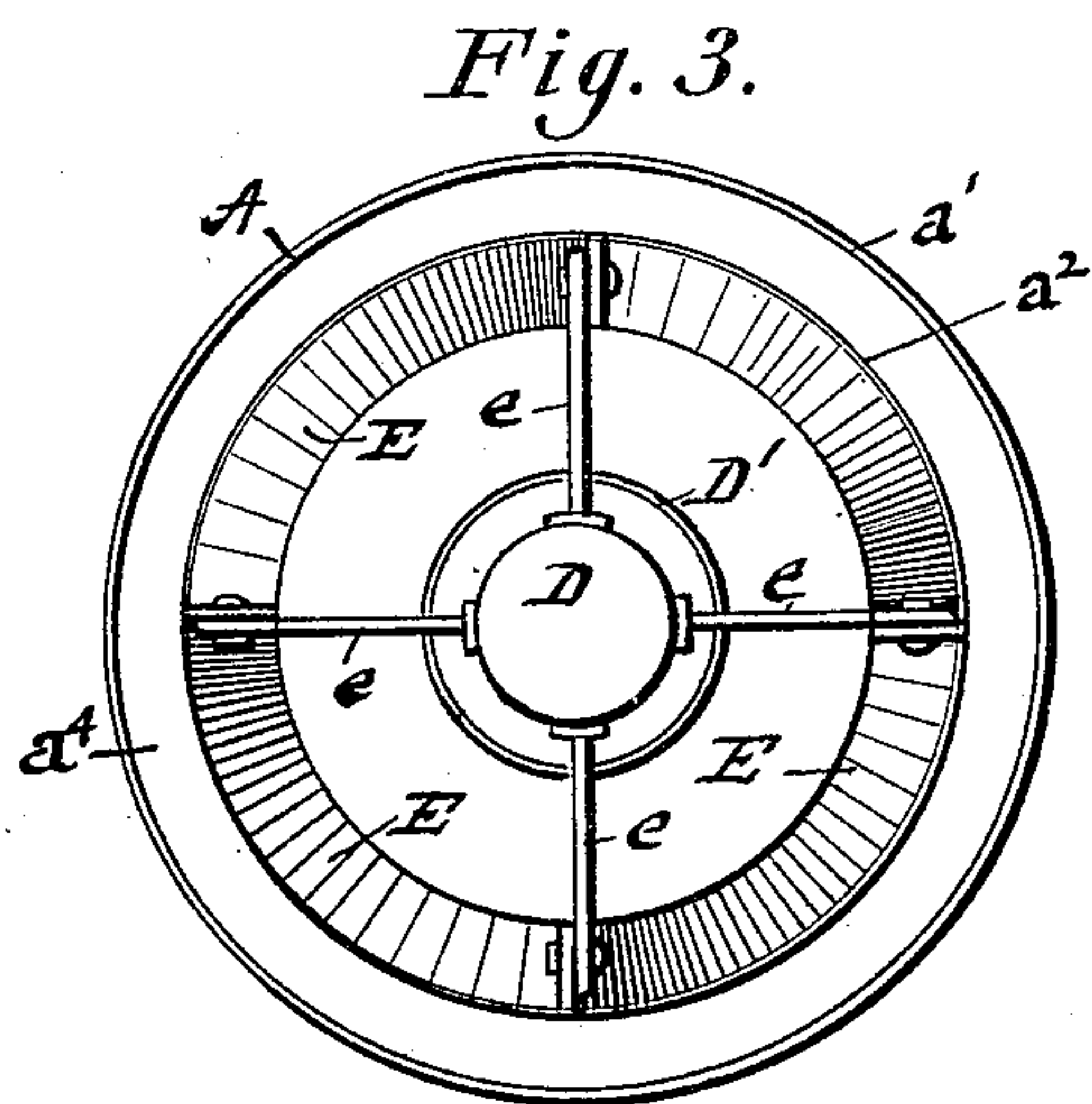
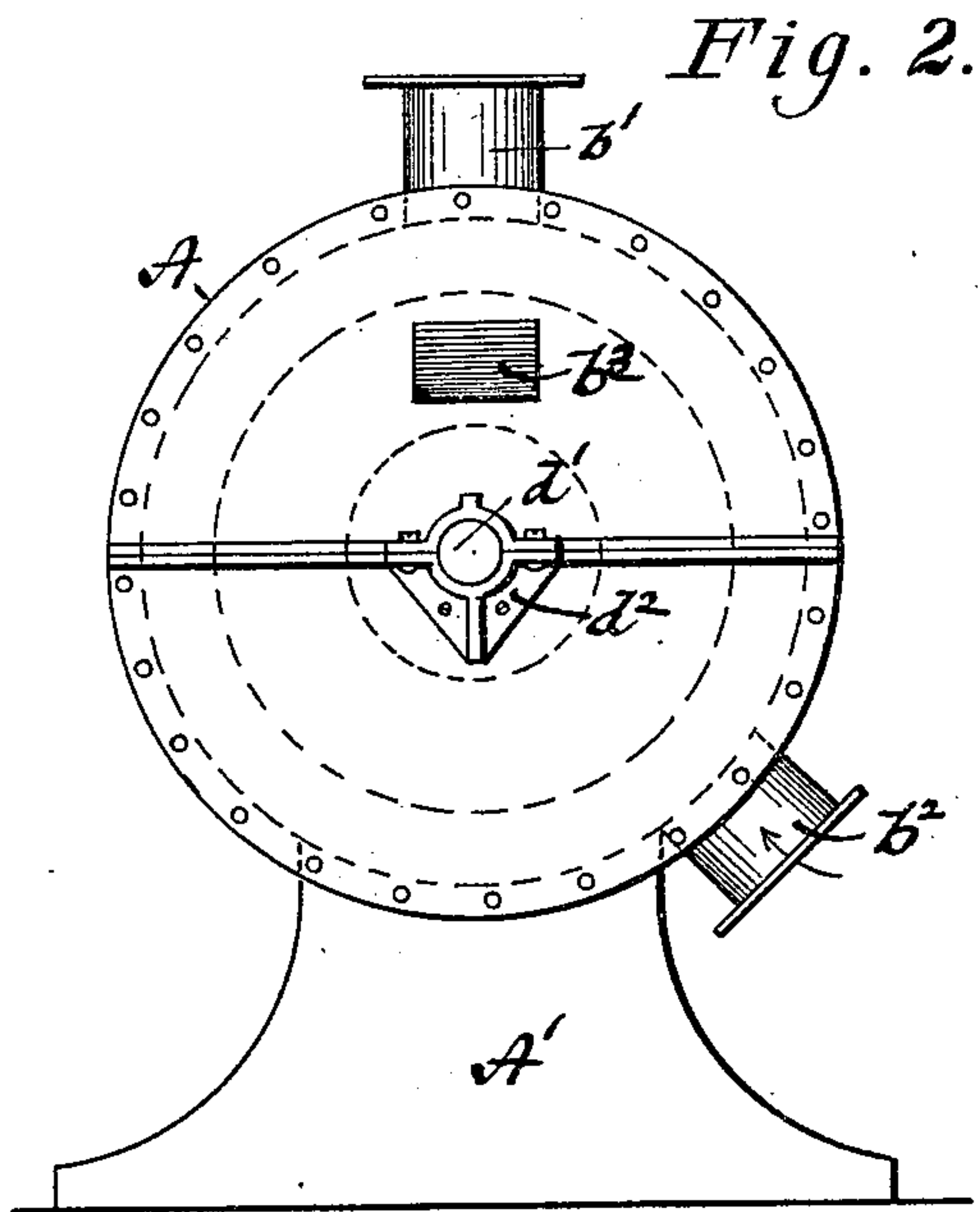
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2 Sheets—Sheet 2.



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UNITED STATES PATENT OFFICE.

CARL WHITE, OF NEWHOPE, KENTUCKY.

DRYING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 681,942, dated September 3, 1901.

Application filed December 3, 1900. Serial No. 38,486. (No model.)

To all whom it may concern:

Be it known that I, CARL WHITE, a citizen of the United States, residing at Newhope, in the county of Nelson and State of Kentucky, have invented new and useful Improvements in Drying Apparatus, of which the following is a specification.

My invention relates to an apparatus for drying or desiccating "slop," refuse from grain distillation, and similar products in order to reduce such products to the condition of a dry meal for convenience of transportation, &c., and distribution in such form for use as feed for stock, &c.

My invention consists of the parts and the constructions and combinations of parts substantially as I will hereinafter describe and claim.

A preferred form of apparatus is illustrated in the accompanying drawings, in which—

Figure 1 is an axial section, represented in side elevation, of a horizontal drum provided with a hot-air jacket and channels for the maintenance of heat and a current of hot air to carry off the vaporized moisture and an agitating and propelling apparatus for moving the material. Figs. 2 and 4 are opposite end elevations, and Fig. 3 an intermediate cross-section, of the same apparatus.

The containing vessel illustrated is a horizontal cylindrical drum A of appropriate length fixedly supported upon pillars and end walls A'.

The containing vessel A is composed of outer and inner shells a^1 a^2 , between which shells is a continuous spiral partition a^3 extending from end to end of the drum, converting the inclosed space between the shells and successive convolutions of the partition into a continuous spiral channel surrounding the inner shell. The spiral channel a^4 thus constituted opens at one end into an admission-pipe b^2 , connected to a source of supply of hot air, (not shown,) and at the opposite end is connected to tube c, which is carried exteriorly to the drum A to and connects with a rotating hollow shaft D, which projects through the drum and is provided with a suitably-packed joint d . At the opposite end the hollow shaft D is closed and supported by an axial pintle d' , projecting through the end of the drum, supported in a journal-bracket d^2

and provided with a belt-pulley or other means of rotation. At its said last-mentioned end within the drum the hollow shaft D is provided with a surrounding concentric shield D', extending a short distance forward from the end of the drum, and within the zone covered by the shield the shaft D is perforated, as at x . At the outer end the shield D' rotates in close proximity to the end wall of the drum and at the opposite end is entirely open to the interior of the drum. An exit-mouth b' , provided with an exhaust-fan, (not shown,) leads outward from the interior of the drum. The hollow shaft D is provided with radial arms e , the outer ends of which, arranged in close proximity to the shell a^2 , are spiral blades E, all having the same spiral inclination in substantial parallelism. The drum is provided at the top at one end with a receiving-mouth b^3 , through which the semiliquid matter is fed to the drum, falling first upon the shield D' and thence around the same to the inner bottom of the drum. A discharge-mouth b^4 is provided at the opposite end at the bottom, through which the dried material is discharged. Suitably-controlled openings a^5 a^6 open into the channel a^4 to admit cool air, as may be necessary. The hollow shaft D at its receiving end may be provided with a suitably-turned annulus and carried thereby upon friction-rollers properly disposed, as at y .

The mode of operation is as follows: The pipe b^2 being connected to a suitable supply of hot air, the exhaust-fan in exit-pipe b' is set in motion. The first effect of the exhausting process is upon the interior of the drum A, and (supposing the openings b^2 and b^3 to be closed) the condition of vacuum thus produced is supplied through the apertures x of hollow shaft D, and the hollow shaft in turn is supplied through connecting-pipe c and the spiral channel a^4 from the pipe b^2 , leading to the source of air-supply. Thus the inner shell a^2 is completely surrounded by hot air, and the hollow shaft D is likewise filled with the same and the shield D' heated by the same, and the current of air thus utilized to heat the apparatus is then drawn outward through the interior of the drum to absorb and carry off vapors engendered by the heat thus applied. The semiliquid material is

fed in through the receiving-aperture b^3 , falling first on and over the shield D' , by which it is spread into a thin sheet and heated. It falls thence to the bottom, where it is caught, 5 agitated, and partially carried upward by the blades E , and the drippings fall upon and over the hollow shaft D , while the material generally is slowly moved toward the discharge-mouth b^4 . The parts are so proportioned and the heat so tempered that the material is thoroughly dried and its vapors carried off before reaching the discharge-mouth, through which it falls a dried "meal." The incoming material forms a seal for the inlet-mouth b^3 , and the accumulation of meal at 10 the discharge-mouth b^4 forms the desired seal at that point, and the operation is continuous under suitable regulation of the necessary conditions.

20 I claim as my invention and desire to secure by Letters Patent of the United States—

1. In a drying apparatus, the combination of a jacketed drum; an axial hollow rotatable shaft; means connecting with one end portion of the drum and admitting hot air thereto; a pipe or passage connecting with the opposite end portion of the drum said pipe or passage having its opposite end connecting with one end of the shaft; a spiral conveyer 30 carried by the shaft; and a pipe or passage at the end of the drum opposite to the first-named pipe or passage and through which vapors may be exhausted from the interior of the drum.

35 2. In a drying apparatus, the combination of a stationary jacketed drum having a hot-air entrance connecting with the jacket-space near one end of the drum, and a discharge-passage from the interior of the drum, near the opposite end thereof; a hollow rotatable shaft, having means for conveying the material through the interior of the drum; a pipe or passage connecting the jacket-space of the drum directly with the shaft; and a pipe or 45 passage leading from the interior of the drum and through which the air is exhausted from the shaft and the vapors from the drum.

3. In a drying apparatus, the combination of a drum; means for heating the same; a hollow rotatable shaft; means carried by the shaft for conveying material through the drum, said shaft having air-outlets near one end; an inclosure for said outlets; and means whereby the vapors may be exhausted from 55 the drum.

4. In a drying apparatus the combination of a drum and an axial hollow rotatable shaft; means whereby the drum may be heated and the heat medium conveyed to the interior of the shaft said shaft having outlets near one 60 end; a shield or casing surrounding said out-

lets and separated from the shaft to form an intervening passage which connects with the interior of the drum; means whereby the vapors may be exhausted from the drum; and 65 means for conveying material through the drum.

5. In a drying apparatus the combination of a drum and a hollow shaft therefor having air-outlets near one end; means for supplying hot air to said shaft; a shield or casing surrounding one end of the shaft and covering and protecting said outlets said shield receiving the material upon its exterior and dividing and heating it; and means for conveying the material through the drum, substantially as described. 75

6. In a drying apparatus the combination of a drum and means whereby the same may be heated; a hollow rotatable shaft adapted to receive heat products said shaft having openings in one end portion; and a shield surrounding the last-named portion of the shaft and upon which the material first falls and by which it is spread into a sheet and heated; 85 and means for conveying the material through the interior of the drum.

7. In a drying apparatus a jacketed drum having a spiral passage through it said passage connecting at one end with a source of heat, and having a discharge at the opposite end; a hollow shaft and means for rotating the same; means connecting the discharge end of the spiral passage with one end of the shaft said shaft having heat-outlets near the opposite end; a shield surrounding the last-named end of the shaft so as to inclose the outlets and connect the interior of the shaft with the interior of the drum; means whereby the vapors may be exhausted from the interior of the drum; and means for conveying the material through the drum. 95 100

8. The apparatus for drying still-slop and similar semiliquid material, embodying a jacketed drum, adapted to be heated, an axial hollow shaft opening into the interior of the drum and rotating therein, radial arms fixed to the shaft and blades carried upon the arms in proximity to the curved wall of the drum, a pipe connecting the jacket-space of the drum directly with one end of the shaft said shaft having air-outlets in its opposite end portion, an inclosure for these outlets, and means whereby the air and vapors are exhausted from the drum. 110 115

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

CARL WHITE.

Witnesses:

L. M. HOSEA,
CHAS. HERBERT JONES.