No. 848,362. PATENTED MAR. 26, 1907.

C. E. GEIGER.

DRIER.

APPLICATION FILED NOV. 8, 1906.

Fig. 2.

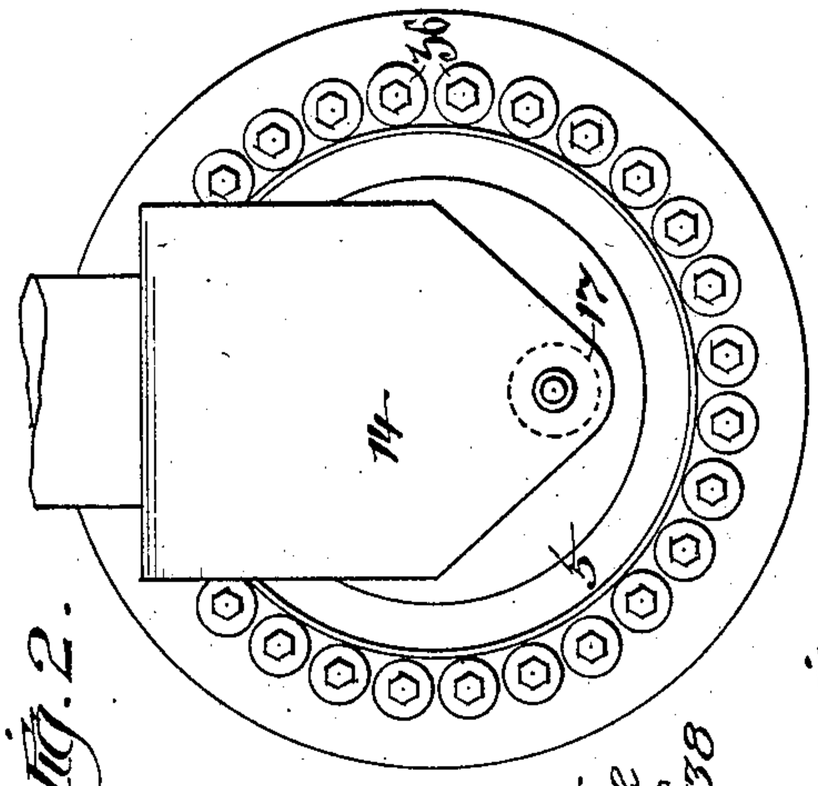


Fig. 3.

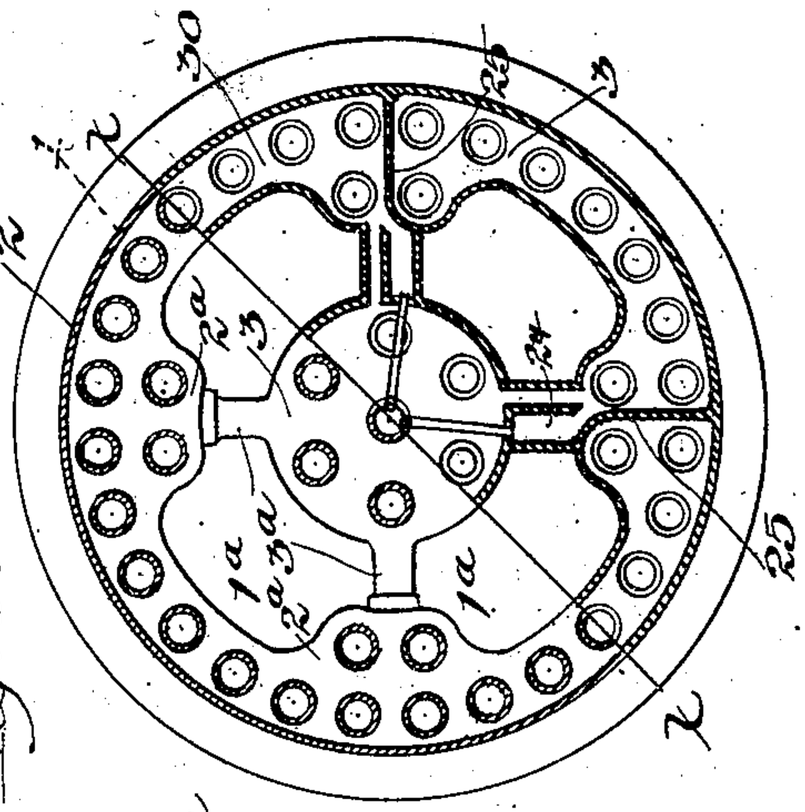
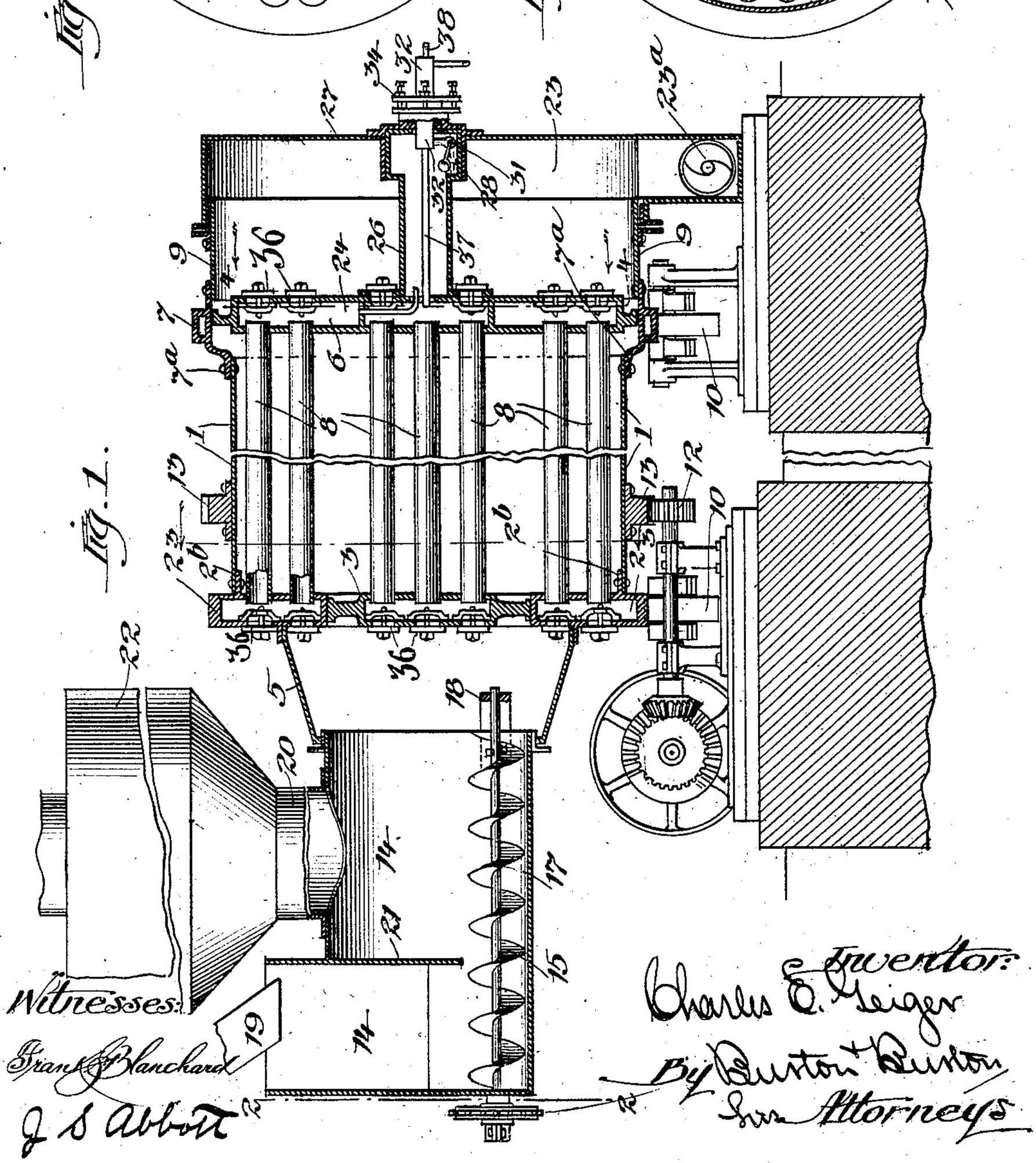


Fig. 1.



Witnesses:

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UNITED STATES PATENT OFFICE.

CHARLES E. GEIGER, OF LOUISVILLE, KENTUCKY, ASSIGNOR OF ONE-THIRD TO HIMSELF, ONE-THIRD TO WILLIAM E. KOOP, AND ONE-THIRD TO G. WALTER FISKE, OF LOUISVILLE, KENTUCKY.

DRIER.

No. 848,362. Specification of Letters Patent. Patented March 26, 1907.

Application filed November 8, 1906. Serial No. 342,447.

To all whom it may concern:

Be it known that I, CHARLES E. GEIGER, a citizen of the United States, residing at Louisville, in the county of Jefferson and State of Kentucky, have invented new and useful Improvements in Driers, of which the following is a specification, reference being had to the accompanying drawings, forming a part thereof.

This invention relates to driers of the class employing as a drying-chamber an approximately horizontal cylinder rotating about its axis and receiving at one end the material to be dried and discharging the dried material from the other end, and it is shown applied to such a drier in which the heating element is steam introduced into the pipes with which the rotary cylinder is furnished.

The particular improvements constituting this invention consist in locating the means for feeding in the material to be dried in position where it is adapted also to convey back into the drier the fine solid material which is sometimes carried up with the escaping vapors and in means for providing for the difference in expansion of the inner and outer sets of steam-tubes.

It consists also in the specific features of construction for the purpose indicated, which may be understood from the description, and are set out in the claims.

In the drawings, Figure 1 is an axial section of a drier embodying the improvements constituting this invention. Fig. 2 is a section at the line 2 2 on Fig. 1 Fig. 3 is a section at the line 3 3 on Fig. 1 from one side to the diametric line x x on said Fig. 3 and at the line 4 4 on said Fig. 1 from said diametric line to the other side.

The cylinder 1 has at the receiving end a head consisting of a manifold or chambered plate 2 3, said head consisting of two parts, an outer annular part 2 and a central part 3, the central part being centered within the annular part by four radial spokes or arms 3^a, which seat, respectively, upon the four inwardly-projecting convolutions 2^a of said annular element, as seen in Fig. 2. The two elements when assembled together in operative position constitute an apertured head for said cylinder, the four apertures 1^a constituting the means of access into the cylinder of the material to be treated. The cone-frustum 5, attached to the outer side of the annular element 2 of the head completely encompassing all the apertures 1^a, so that they open from the cylinder only into said cone-frustum, constitutes a vestibule or gathering mouth for the receiving end of the cylinder. At the opposite end the cylinder-head consists of a manifold 6, somewhat similar in form to the manifold 2 3, but made unitary instead of in two sections. The shell or cylinder 1 is secured directly to a flange 2^b of the manifold at the receiving end. At the opposite end said shell is secured to a flange 7^a of a ring 7, which encompasses the manifold 6, the latter fitting within said ring so as to be free to move longitudinally therein for a short distance to accommodate the difference in expansion and contraction between the shell 1 and the steam-pipes 8, which connect said manifold 6 with the outer element 2 of the opposite manifold. To the ring 7 there is secured a cylindrical extension 9, which constitutes the discharge-mouth of the entire rotating element of the drier. The annular element 2 of the receiving manifold and the ring 7 at the opposite end afford means by which the entire rotating element of the drier is lodged upon its supporting-rollers 10 10, and said element is rotated by a pinion 12, meshing with a gear-ring 13, bolted onto the cylinder at any convenient point in its length, any convenient means being employed to rotate said pinion.

At the receiving end there is a feed-chamber 14, mounted in fixed position and terminating in a cylindrical flange 17, which is concentric with the mouth of the cone-frustum 5, into which said flange protrudes, so that material may be delivered from said chamber 14 into the cone-frustum, and thereby into the rotating cylinder 1. For feeding the material through the feed-chamber 14 and into the cone-frustum a spiral conveyer 15 is located at the bottom of said chamber 14, having its shaft protruding through and suitably journaled in the outer end of the chamber and having a further bearing in a bracket 18 offset into the cone-frustum from the opposite end of the chamber, said entire end of the chamber which protrudes into the cone-frustum being open. 19 is a chute through which the material is delivered into the top of the feed-chamber.

20 is a vapor-pipe leading off from the upper side of the feed-chamber between the chute 19 and the cone-frustum 5.

21 is a partition which depends from the top of the feed-chamber between the chute 19 and the vapor-pipe 20, extending down substantially to the top of the spiral conveyer, and thereby partitioning the portion of the space into which the material is delivered from the chute 19 from the portion by which the vapor passes out of the cylinder and is discharged. In the vapor-pipe 20, between its connection with the chamber 14 and its upper discharge end, there is located an expanded chamber 22 in which light particles of solid matter carried up by the vapors, losing somewhat of their momentum as the vapors expand in said chamber, are precipitated back into the chamber 14. The location of the conveyer 15 at the bottom of said feed-chamber 14 and the connection of the vapor-discharge pipe 20, as shown, from said feed-chamber 14 facilitates the recovery of the solid matter thus precipitated and avoids clogging of the passages therewith, because it falls, as indicated, directly upon the screw conveyer and is carried back into the cylinder with the incoming new material.

In order to afford sufficient heating surface and to distribute it to the best advantage for the purposes of the drier, it will be observed that the steam-pipes consist of two distinct systems, one an annular system, which connects the annular element 2 of the left-hand manifold with the opposite manifold, and the other a central system, which connects the inner element 3 of said left-hand manifold with the opposite manifold. It is observed in practice that the expansion and contraction of these two systems of pipes is liable to be different, and this difference of expansion is accommodated by making the left-hand manifold, as described, in two parts connected with said two systems of pipes, respectively. No mechanical connection or attachment of the two parts to each other is necessary for any purpose, the inner part being merely stepped or seated by its radial arms or spokes 3^a upon the inwardly-protruding convolutions 2^a of the outer element, the pipes which connect the two manifolds obviating the necessity of any other means of supporting or attaching said parts.

At the discharge end of the drier the mouthpiece 9 intrudes into the fixed chamber 23, at the lower side of which there is a screw conveyer 23^a for carrying off the dried material. The water of condensation is drained from this manifold in the customary manner, being poured toward the center through the ducts 24 from each of the several sectoral chambers 30, into which the manifold is divided by the radial partitions 25 as such sectoral chambers respectively approach the upper side in the rotation of the cylinder, the water being received at the center by the sleeve 26′, which protrudes from the manifold out past the fixed head 27, said sleeve being provided with a trap-chamber 28, from which the water escapes by way of the float-controlled valve 31 into the fixed tube 32 and thence is delivered by the drain-cock 33. The tube 32 protrudes from any suitable support through a stuffing-box 34 into the trap-chamber 28, and the steam-supply passage extends axially through said fixed tube 32, the pipe 38 being screwed into it at the outer end and a terminal pipe 37 being screwed into it at the inner end for delivering steam into the center of the manifold. This construction of the manifold is fully shown in my Patent No. 750,051, dated January 19. 1904.

36 36 are caps for closing apertures in the outer walls of the manifolds through which the steam-pipes 8 are accessible for cleaning.

I claim—

1. A steam-drier comprising an approximately horizontal cylinder mounted for rotation about its axis, having its head consisting of chambered manifolds; steam-pipes connecting said manifolds, the latter being apertured between the groups of steam-pipes for entrance and discharge of the material to be treated; a cone-frustum at the receiving end secured at the outer side of the manifold encompassing all said apertures for gathering and directing material to the latter; a fixed feed-chamber having a terminal conaxial with the cylinder and protruding into the cone-frustum; a conveyer at the bottom of said chamber, and a vapor-discharge pipe leading from the top of the chamber.

2. A steam-drier comprising a horizontal rotary cylinder having apertured heads for receiving and delivering the material to be treated; a circular vestibule-piece at the outer side of the receiving-head encompassing all the apertures therethrough; a fixed chamber having a terminal mouth conaxial with the cylinder and protruding into the vestibule-piece, said chamber having a partition extending from the upper side downward toward the bottom; a conveyer in the bottom of said chamber extending past the lower edge of said partition; a vapor-escape pipe leading from the top of said chamber between the partition and the cylinder, and a connection for supplying material to be treated above the conveyer at the outer side of said partition.

3. A steam-drier comprising a cylinder having its heads hollow for steam-chambers; longitudinally-extending pipes within the cylinder connecting the corresponding chambers of the opposite heads, such pipes being distributed in an inner group and an outer group, one of the heads being formed in two sections seating one within the other with freedom of relative movement axially with

respect to the cylinder, the two groups of pipe being connected to said two sections respectively.

4. A steam-drier consisting of a cylinder having chambered heads; steam-pipes connecting the two heads distributed in two groups, one within the other, the shell inclosing all the steam-pipes having an extension at one end within which the head at that end seats with freedom of movement longitudinally with respect to the cylinder, the head at the other end consisting of an annular and a central section, the two groups of pipes being connected with said two sections respectively, the outer or annular section being joined rigidly to the shell, and the inner section being free to move relatively to the outer longitudinally of the cylinder.

In testimony whereof I have hereunto set my hand, at Louisville, Kentucky, this 30th day of October, 1906.

CHARLES E. GEIGER.

Witnesses:
C. A. FISKE, Jr.,
M. VAN DYKE.