No. 750,051. PATENTED JAN. 19, 1904.

C. E. GEIGER.

DRIER.

APPLICATION FILED OCT. 5, 1903.

NO MODEL. 3 SHEETS—SHEET 1.

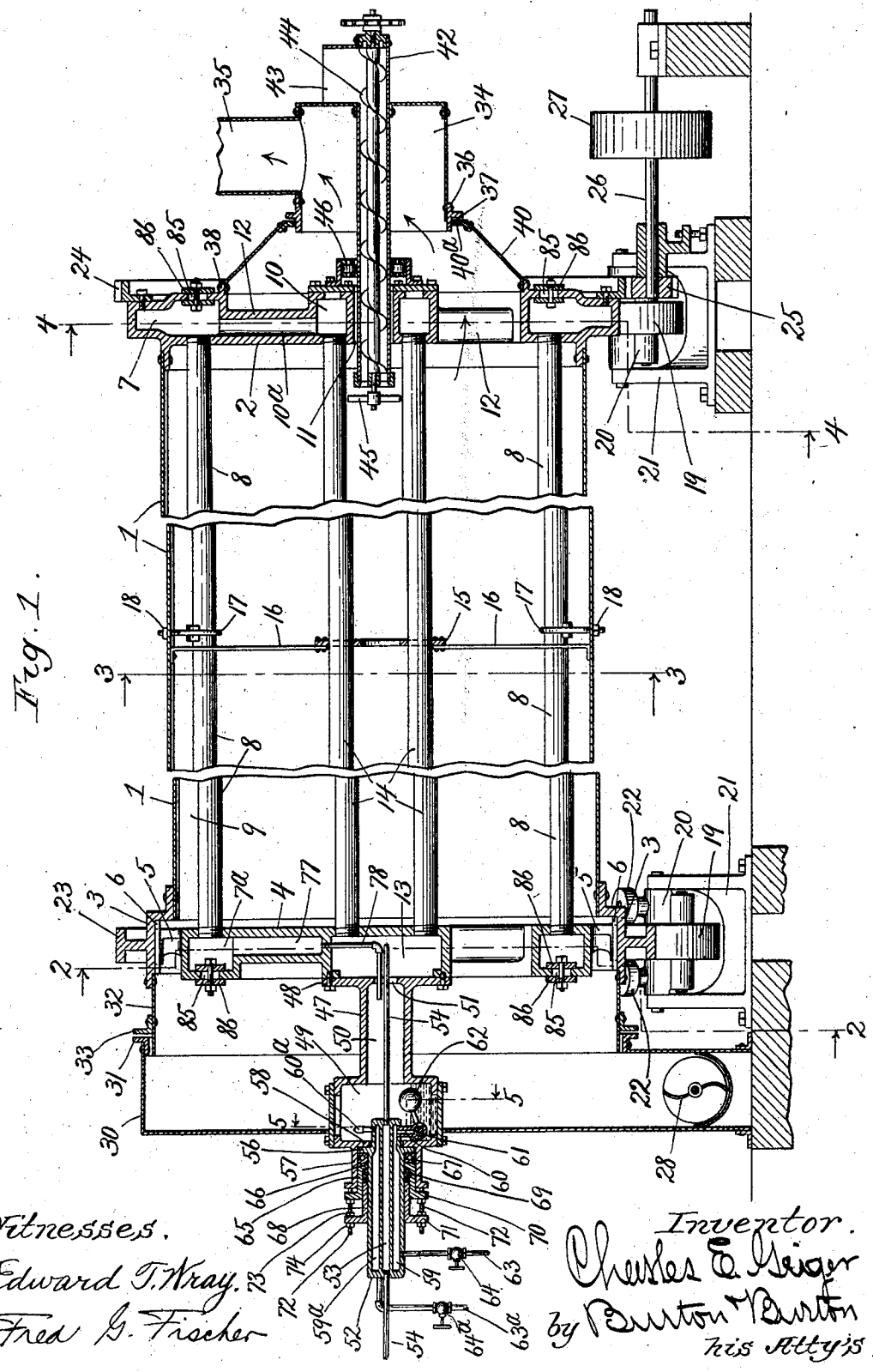


Fig. 1.

Witnesses.
Edward T. Wray.
Fred G. Fischer

Inventor.
Charles E. Geiger
by Burton & Burton
his Atty's.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

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NO MODEL. 3 SHEETS—SHEET 2.

Fig. 4.

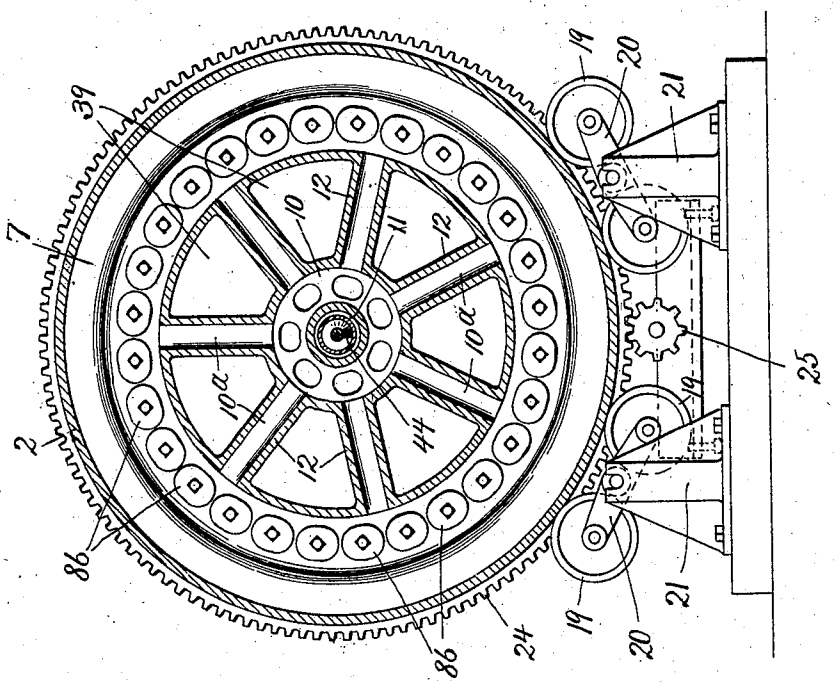
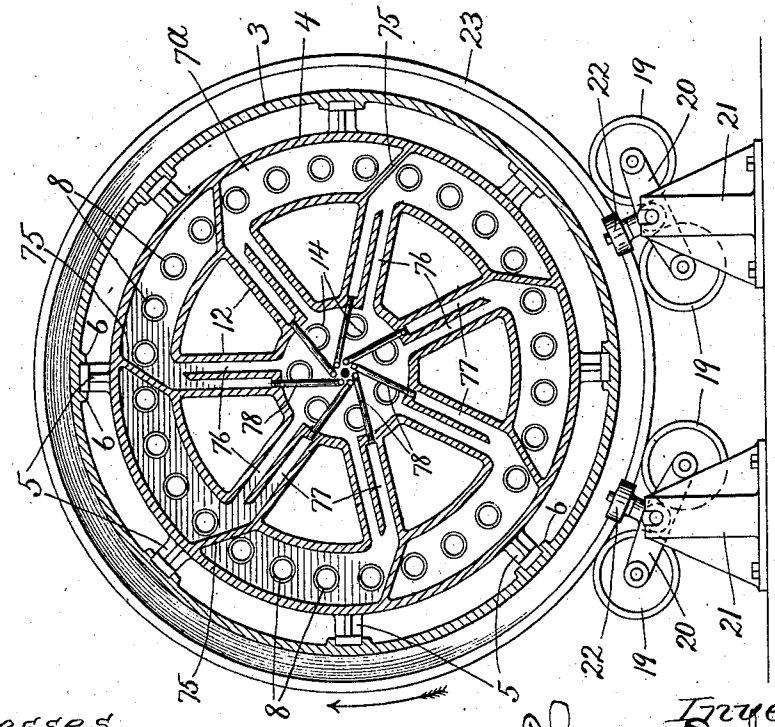


Fig. 2.



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NO MODEL. 3 SHEETS—SHEET 3.

Fig. 6.

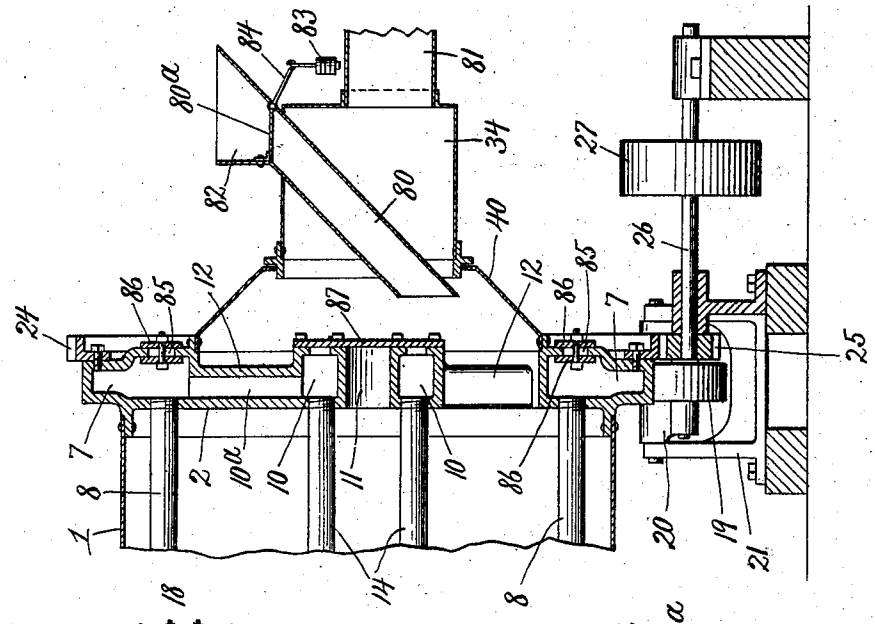


Fig. 3.

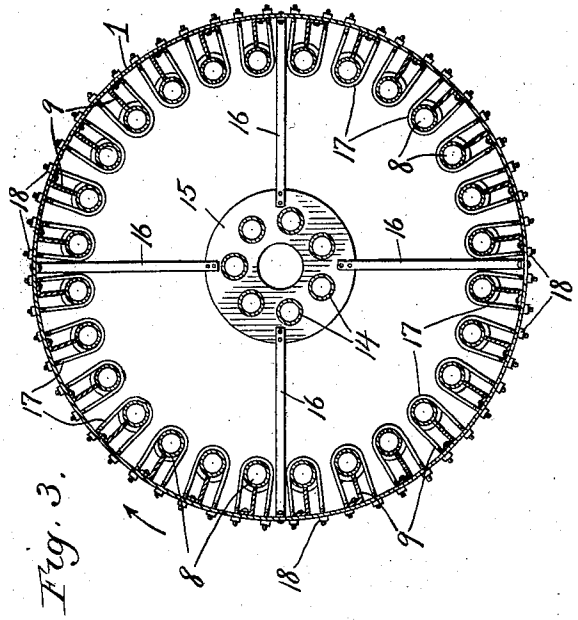
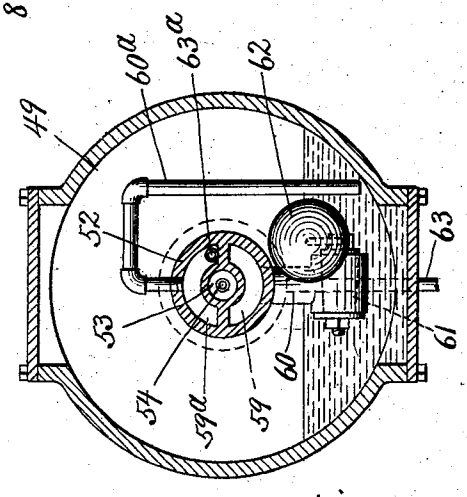


Fig. 5.



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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 750,051. Patented January 19, 1904.

UNITED STATES PATENT OFFICE.

CHARLES E. GEIGER, OF LOUISVILLE, KENTUCKY.

DRIER.

SPECIFICATION forming part of Letters Patent No. 750,051, dated January 19, 1904.

Application filed October 5, 1903. Serial No. 175,757. (No model.)

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.

The purpose of this invention is to provide an improved construction in a rotary drier of the class employing steam-heated pipes as the heating element, the specific purposes being to provide for carrying away the water-condensation derived from the steam and to provide improved means for supplying the material to be dried.

It consists in the features of construction set out in the claims.

In the drawings, Figure 1 is a longitudinal axial section of my improved drier. Fig. 2 is a section through the discharge-head of the drying-cylinder at the line 2 2 on Fig. 1, showing the cylinder-supporting parts in elevation. Fig. 3 is a section at the line 3 3 on Fig. 1. Fig. 4 is a section through the receiving-head of the cylinder at the line 4 4 on Fig. 1, showing the cylinder supporting and rotating parts in elevation. Fig. 5 is a detail section at the line 5 5 on Fig. 1, showing the parts on an enlarged scale. Fig. 6 is a detail section axial with respect to the cylinder of the receiving-head and associated parts, showing a modification.

The drying-cylinder 1 has at the opposite ends hollow or chambered heads, termed "manifolds." The chambered head or manifold 2 at the end of the cylinder at which the material to be dried enters, hereinafter referred to as the "receiving" end, is a unitary structure rigid with the cylinder 1, having its periphery adapted to serve as the tread of the cylinder at that end upon the supporting-rollers, hereinafter described. At the opposite end of the cylinder, hereinafter referred to as the "discharge" end, there are two elements together constituting a complete head corresponding to the head at the receiving end. The outer of these elements 3 is rigid with the cylinder and constitutes a rim whose periphery is adapted to operate as the tread of the cylinder upon the supporting-rollers at that end. The other element 4 constitutes the chambered head or manifold proper. It is centered within the rim 3 and adapted for movement in the direction of the axis of the cylinder with respect to said rim and at the same time connected therewith for rotation by means of lugs 5 5 5, &c., projecting from the periphery of the manifold 4 and engaged between the lugs 6 6 6 6, projecting inward from the rim. The two manifolds have each a peripheral annular chamber 7, and these chambers are connected by steam-pipes 8 8 8, constituting a circular group at a short distance from the inner wall of the cylinder, as seen clearly in the transverse sectional views. Between each of these pipes 8 and the cylinder 1 a ledge 9, of angle-iron, is located and secured to the cylinder and, together with the pipe, constitutes a shelf or lift for carrying up the material to be dried and causing it to be showered down through the cylinder as it revolves. About the center of the manifold 2, at the receiving end, there is an annular chamber 10, encompassing a central aperture 11. The annular chamber 10 is connected by ducts 11 11 in the radial arms 12 12 with the annular chamber 7. The manifold 4 at the discharge end has a central chamber 13, corresponding to the annular chamber 10 of the other manifold, and these two chambers are connected by additional pipes 14, forming a group about the axis of the cylinder. The pipes 14 of this group are stayed intermediate the ends of the cylinder by a plate 15, which the pipes penetrate, said plate being itself stayed by radial braces 16 16, extending to the cylinder-wall. The outer annular group of pipes is stayed and supported intermediate their ends by loops or stirrups 17 17, which may be in the form of staple-bolts protruding through the cylinder and secured by nuts 18 on the outside. The expansion and contraction of the steam-pipes is accommodated by the movability of the manifold 4 with respect to the rim 3 at the discharge end.

The entire structure thus far described, comprising the cylinder with its two heads and certain appurtenances thereof not yet described, is supported on rollers 19 19 19 19,

journaled in carriers 20 20, mounted upon standards 21 21, the peripheries of the two heads "treading" upon these rollers, respectively, as above indicated, said rollers being located lower at the discharge than at the receiving end, so that the cylinder is inclined downward from receiving to discharge end. Longitudinal displacement of the cylinder on its supporting-rollers is prevented by guard-rollers 22, mounted in a familiar manner on the carriers 20 20 at the discharge end and arranged to engage at opposite sides of the tread-flange 23 of the rim 3. Means for rotating the cylinder on the supports described consist of a gear-rim 24, which is secured to the outer face of the chambered head 2 at the receiving end and is engaged by a pinion 25 on a shaft 26, journaled in the outer standard supporting the carriers at that end and provided with a power-communicating wheel 27.

The steam is introduced into the two systems of pipes which connect the two heads by means hereinafter described connected with the head at the discharge end, and the material to be dried is introduced through the head at the receiving end and makes its way by spiral movement toward the discharge end, being carried up by the lifts or flights comprising the pipes of the outer group and the angle-iron shelves behind them and showered down through the space of the cylinder with a slight advance at each rotation resulting from the inclination of the cylinder, until it finally emerges at the discharge end at the lower side between the outer periphery of the manifold 4 and the inner surface of the tread-rim 3 in the intervals between the guiding-lugs 5 and 6, which connect said two elements. Having emerged past the head at the discharge end, the material is received in any suitable form of conveyer—as, for example, the spiral conveyer 28. (Represented conventionally in Fig. 1.) The moisture which is driven off by the steam furnished through the steam-pipes while the material is passing through the cylinder is to be carried off from the end of the cylinder at which the material enters, so as not to be exposed to the more dried material, which would reabsorb the moisture, and for this purpose a current is necessarily produced through the cylinder from end to end, the heads, as will be seen, being opened freely between the radial arms 12, so as to permit the free movement of a current through the cylinder from end to end. It will be seen, therefore, that there is necessarily at the discharge end a fixed structure into which the material is delivered from the rotating cylinder and at the opposite end a fixed structure into which the moisture-laden current shall be gathered and drawn from the cylinder. At the discharge end the fixed structure comprises merely a shell 30, at the bottom of which is located the conveyer 28, above mentioned, and which has an angle-iron rim 31 at the side facing the discharge end of the cylinder, into which protrudes and approximately fits the thin metal lip of the cylindrical terminal 32 of the rotating cylinder, said cylindrical terminal 32 being riveted to the outer side edge of the rim 3 and being stiffened to hold it in cylindrical form by the flanged hoop or angle-iron rim 33, which corresponds to and faces the angle-iron rim 31. This cylindrical terminal 32 constitutes a part of the conduit for the dried material in its passage from the cylinder at the lower side into the conveyer 28, as illustrated in Fig. 1. At the opposite end, for the purpose of gathering and receiving the moisture-laden current from the cylinder, there is fixedly supported in any convenient manner a chamber 34, hereinafter referred to as a vapor-chamber, from which a pipe 35 leads to any means for inducing current through the cylinder toward the vapor-chamber. A sufficiently-high stack or a fan or other means of inducing a current (none of which are shown) may be employed at any point beyond the portion of said pipe 35, which is shown. At the side toward the cylinder the vapor-chamber 34 is freely open and being circular in the vertical section at this point has a peripheral annular rim 36, provided with a flange 37 in a plane at right angles to the axis of the cylinder. To the outer side of the chambered head 2, at a flange 38, which encompasses all the apertures 39 between the spokes 12, there is secured a conical or tapering hood 39, which at its outer edge has a flanged rim 40, the aperture of which fits not too tightly for rotation about the rim 36 of the vapor-chamber and which faces the flange 37 of said rim, so that there is produced a fairly close joint between the fixed element of the structure—namely, the vapor-chamber and the rotating cylinder—and a practically closed continuation of the cavity of the cylinder through which the vapors are drawn and the vapor-chamber is effected and maintained.

The purpose of the specific structure just described as compared with former features of construction of driers of this type is to prevent the leakage which would occur if in accordance with the more common construction the joint between the fixed and rotating elements of the structure were made at a point to which the moisture could drain from the material delivered wet into the cylinder—as, for example, if the hood 39 were secured to the vapor-chamber and made junction with the rotating element at the other edge or end where in the construction illustrated it is instead made fast to the head 2. In order to further and more completely carry out this improvement for preventing leakage and for other advantages which may be afforded, the means for delivering the material to be dried into the cylinder is made to comprise in the form shown in Fig. 1 a conveyer whose cylindrical case 42 extends through the vapor-

chamber and through the aperture 11 at the center of the chambered head 2, so that at its inner end it protrudes a little distance into the cylinder 1 within the group of pipes 14. At the outer end—that is, outside the vapor-chamber—this case has an upwardly-open entrance at 43, into which by any convenient means the material may be delivered, and a spiral conveyer 44, rotating in it, has its shaft extending out through a bearing at the outer end and provided with means for rotating it. At the inner end the shaft is journaled in a suitable spider, which does not materially obstruct the delivery of the material into the cylinder, and outside of said bearing the shaft carries a rotating arm or finger 45, which may be termed a "stirrer," the purpose of which is to prevent the material after delivery from the conveyer from remaining lodged on the pipes 14 and to cause it, on the contrary, to be delivered between them and fall to the lower side of the cylinder to be picked up and carried by the outer group of pipes and angle-irons constituting the flights. In order to steady and stay the inner end of the conveyer-case 42, roller-bearings may be provided for it at the outer side of the head 2, and such roller-bearings, with their case, may be seen at 46 in Fig. 1. The details of the structure will be obvious without specific description.

In order to admit the steam to the chambers of the head at the discharge end, and thereby supply it to the pipes for heating them, and also to provide for the drainage of the water of condensation, there is secured to the head at said discharge end a case 47, which has a flange 48, by which it is secured to the outer sides of and closes the central cavity 13 of the manifold 4. The case is axially apertured throughout, so that it communicates with said cavity 13, and at a little distance from the flange 48 the axial cavity is enlarged, forming a water-chamber 49, which is connected by the throat 50 with the aperture 51 at the center of the said case for communication with the chamber 13. At the outer end—that is, at the opposite side of the chamber 49 from the flange 48—the case comprises a cylindrical portion 57, which constitutes the outer element of a stuffing-box through which the steam-supply fitting 52 protrudes for delivering the steam into the manifold 4. This fitting 52 is cylindrical and comprises an axial passage 53 for the steam, into one end of which the supply-pipe 54 is screwed and protrudes thence through the throat 50 into the cavity 13 of the manifold 4. The fitting has a flange 56, whose outer circumference corresponds to the inner circumference of the cylindrical portion 57 of the case and is stopped against the inwardly-projecting flange 58, which bounds the aperture in the outer side wall of the water-chamber 49, through which the fitting 52, which is reduced at that end, protrudes into said water-chamber. Said fitting 50 has outside the axial steam-passage 53 partitioned chambers 59 and 59ª, and at the end of the fitting, protruding into the water-chamber 49, there is connected with the chamber 59 a drain-cock 60, whose valve 61, which closes it, carries on a suitable lever-arm within the water-chamber a float 62, by the lifting of which to a height to which it may be lifted by water accumulated in the lower side of said chamber the cock will be opened, said cock being closed by the dropping of the float. The chamber 59ª is connected by a gooseneck-pipe 60ª with the lower part of the water-chamber 49 and has outside the stuffing-box a discharge-pipe 63ª, provided with a valve 64ª. At the end of the fitting 52, which protrudes beyond the stuffing-box, it is provided at the lower side with a discharge-pipe 63, having a valve 64, which in the ordinary action is left open. The stuffing-box, by which the fitting 52 is afforded a steam and water tight entrance into the case 49, and thereby a proper connection for conducting the steam to the manifold 4, comprises a sleeve 65, which fits within the cylindrical portion 57 of the case, having at the inner end an inwardly-projecting flange 66, between which and the flange 56 of the fitting ball-bearings are provided, as seen at 67. Between said flange 66 at the opposite side from the ball-bearings and the inner end of the sleeve 68, which fits within the sleeve 65 and outside of the fitting 52, suitable packing 69 is interposed, and for the purpose of compressing such packing an outwardly-projecting flange 70 of the sleeve 66 and a similarly outwardly-projecting flange 71 of the sleeve 68 are connected by bolts 72 72, made fast at their inner ends in the flange 70 and provided with stop-nuts 73 and 74 at opposite sides of the flange 71, so that the two flanges may be forced together, and thereby the inner end of the sleeve 68 forced toward the flange 67 of the other sleeve.

The annular chamber 7ª of the manifold 4 is partitioned by diaphragms 75 75 into compartments which communicate each through one of the radial arms 12 of said manifold with the central chamber 13, and in each of said arms there are two passages for such communication—one passage, 76, being designed for the steam and opening freely at the ends into the annular chamber and the central chamber, respectively, while the other passage, 77, opening freely into the proper compartment of the annular chamber, has connected into it at its inner end within the chamber 13 a pipe 78, constituting a discharge-terminal projecting nearly to the center of the chamber and thence longitudinally through the aperture 51 for delivery of the water of condensation into the throat 50, through which it flows into the water-chamber 49.

In the form shown in Fig. 6 the means for introducing the material to be dried is an inclined chute 80, which penetrates the vapor-

chamber, entering through the upper wall and discharging through the forward mouth within the conical hood, the vapor-chamber having its vapor-discharge connection at 81 at the outer end instead of at the top. When employing this inclined chute for the purpose stated, in order that it may not act as a free opening for the escape of vapor, which would prevent the latter from being drawn by the means provided for that purpose through the upper vapor-discharge pipe, a trap-gate 81 is provided at the upper end of the inclined chute 80 and at the bottom of the hopper 82, through which the chute is fed, such gate being counterbalanced by weights 83 on a lever-arm 84, the counterbalance being such as to require a moderate charge of the material to be lodged upon the gate before it will trip and closing the gate immediately as soon as the discharge so lodged has been discharged down the chute.

At the outer sides of both the manifolds hand-holes 85 85 are provided in line with the steam-pipes, respectively, and are closed by means of plates 86 in a manner well understood. When the form of feeding device on Fig. 6 is employed at the receiving end, all the hand-holes for the central group of pipes, together with the central aperture, which in that construction is not used, may be covered by one plate 87, as illustrated in said figure.

The operation of the structure above described, at the material to be dried being fed in at the receiving end by either of the two feed devices shown in Figs. 1 and 6, respectively, traverses the cylinder, as already stated, in a spiral course and is delivered into the discharge-conveyer 28, while the steam admitted through the steam-supply fitting 52 keeps the pipes heated, the condensation being received in the several compartments of the annular chamber of the manifold 4 and delivered from said compartments through the ducts 77 as said ducts respectively and in turn pass above the horizontal line in the rotation of the manifold, and conducted by means of the discharge-pipes 78 and throat 50 of the casing into the water-chamber 49, rising in said chamber until the float 62 opens the valve 61, whereupon the steam-pressure operating upon the water in the chamber forces the latter up through the duct 60 into the lower water-chamber 59 of the steam-supply fitting 52 and thence out through the discharge-pipe 63. The discharge in this manner will be intermittent, occurring as frequently as the chamber 49 becomes sufficiently filled with water to operate the float. If in any case the float fails to operate, either by reason of the valve sticking or the float becoming water-logged or punctured, whether the valve is thereby held open or held closed, the defect will be apparent, because in the first instance the discharge of water through the pipe 53 will be followed by steam, and in the second instance the water discharges will cease, and such cessation having continued through a period longer than the customary interval the attendant will be thereby advised of the difficulty. In the first case the valve 64 in the discharge-pipe 63 will be closed and prevent the discharge of steam and the valve 64^a in the pipe 63^a will be opened for the discharge of the water of condensation at the proper intervals, so as to free the chamber 49 as frequently as it would be freed in the automatic action of the float-controlled valve. In the case of the difficulty caused by the sticking of the float-controlled valve on the seat the periodic action will be effected in the same manner—that is, by opening the valve 64^a in the discharge-pipe 63^a at the proper intervals.

I claim—

1. In a drier of the type indicated in combination with the cylinder, the manifold at the receiving end provided with steam-cavities and having apertures extending entirely through it without communication with said cavities; a frusto-conical hood secured at its larger base to said manifold at a line encompassing all said apertures; a fixed vapor-chamber having its mouth toward the manifold circular and registering with the smaller base of the frusto-conical hood, and a conduit for the material to be dried, penetrating the vapor-chamber.

2. In a drier of the type indicated in combination with the cylinder, the manifold at the receiving end provided with a central aperture and vapor-escape apertures aside from the center; a conveyer for the material to be dried protruding through the central aperture; a hood secured to said manifold by a tight joint therewith at the outer side thereof at a line encompassing the vapor-escape apertures of the manifold, and having a circular mouth conaxial with the manifold; and a fixed vapor-chamber penetrated by the conveyer having its mouth toward the manifold circular and registering with said circular mouth of the hood.

3. In a drier of the type indicated, in combination with the cylinder, a manifold at the receiving end provided with a central aperture and with non-central vapor-escape apertures, a conveyer for the material to be dried protruding through said central aperture; a conical hood secured at its base to the manifold at the outer side thereof at a line which encompasses the vapor-escape apertures of the manifold, and a fixed vapor-chamber penetrated by the conveyer and having a circular mouth open toward the manifold and registering with the outer end of the conical hood.

4. In a drier of the type indicated, in combination with a cylinder having its receiving end closed by a manifold provided with a central aperture, an annular cavity encompassing said central aperture and vapor-escape apertures outside the annular cavity; steam-pipes connected with said annular cavity; a vapor-chamber and means for leading into it the va-

por from the vapor-escape apertures; a conveyer for the material to be dried penetrating the vapor-chamber and protruding into the cylinder through the central aperture and within the group of steam-pipes connected to the annular cavity, the rotating element in said conveyer having its shaft protruding beyond the case within said group of pipes and provided with a transversely-projecting arm or finger for clearing the material from the pipes as it is delivered from the conveyer.

5. In a drier of the type indicated, in combination with the cylinder, a manifold at the receiving end provided with a central aperture, a conveyer for the material to be dried, exteriorly supported and protruding through said aperture, and roller-bearings for the case of said conveyer mounted on the outer side of the manifold about the central aperture thereof.

6. In a drier of the type indicated, in combination with the cylinder, a manifold at the discharge end provided with an axial aperture leading into its cavity from the outer side and means by which it discharges the water of condensation through said aperture; a case secured to the manifold at the outer side and having its cavity communicating with said axial aperture and comprising a chamber for water of condensation of greater diameter than the aperture; a steam-supply fitting protruding into said case having a steam-passage communicating with the central chamber of the manifold through said aperture, and a water-passage separated from the steam-passage and provided with an exterior discharge-pipe; an inlet-tube or branch connected with the water-passage and leading down within said condensation-chamber to a point lower than the lower margin of said axial aperture; a valve which controls communication from the condensation-chamber of the case to the discharge of said discharge-pipe, and a float operated by the water of condensation operatively connected with said valve for opening it when the float is lifted by the accumulation of such water.

7. In a drier of the type indicated, in combination with the cylinder, a manifold at the discharge end provided with an axial aperture leading into its cavity and means by which it discharges the water of condensation through said aperture; a case secured to the manifold at the outer side and having its cavity communicating with said aperture and comprising a chamber for water of condensation of greater diameter than said aperture; a steam-supply fitting protruding into said condensation-chamber, said fitting comprising a steam-passage communicating with the cavity of the manifold through the axial aperture thereof, and a water-passage separated from the steam-passage and provided with an exterior discharge; an inlet-cock connected with said water-passage having its inlet-mouth within the condensation-chamber at a point lower than the lower margin of said axial aperture, and a float in said chamber connected with said cock for opening the same when the float is lifted.

8. In a drier of the type indicated, in combination with the cylinder, a manifold at the discharge end provided with steam-cavities and an axial aperture through the outer wall for communication therewith, means by which said manifold discharges the water of condensation through said aperture; a case secured to the manifold at the outer side having its cavity communicating with said aperture and comprising a chamber for the water of condensation of greater diameter than said aperture; a steam-supply fitting protruding into the case having a steam-passage communicating through the axial aperture with the steam-cavities of the manifold, and two water-passages partitioned from each other and from said steam-passage, each water-passage having an exterior discharge; two ducts opening in the lower portion of the condensation-chamber and leading therefrom to the two water-passages respectively, the exterior discharge from one of said passages having a valve for operation at will, and the duct leading into the other of said passages having a valve and a float in the condensation-chamber operatively connected therewith.

9. In a drier of the type indicated, in combination with the cylinder, the manifold at the discharge end having an annular chamber and a central chamber, the former being partitioned into compartments; two ducts connecting each compartment with the central chamber; steam-pipes connected with the annular chamber; a case connected with said manifold at the outer side having its cavity communicating axially with the central chamber of the manifold, and provided with a stuffing-box; a steam-supply fitting extending through said stuffing-box having a steam-passage and a water-chamber partitioned therefrom; a chamber in the case encompassing the end of the steam-supply fitting for receiving the water of condensation, the communicating aperture from the case to the manifold being of less diameter than said water-chamber of the case; a branch leading from the water-chamber of the steam-supply fitting downward within said water-chamber of the case to a point lower than the lower margin of said aperture; a discharge-pipe from said water-chamber of the steam-supply fitting outside the stuffing-box; a valve which controls communication from the water-chamber of the case to the discharge of said discharge-pipe; pipes leading from the inner ends of one of the two ducts from each compartment of the annular chamber through said central aperture for discharging the water of condensation into the case, and a float operated by said water of condensation, operatively connected with said valve for opening

it when the float is lifted by the accumulation of such water.

10. In a drier of the type indicated, in combination with the cylinder, a manifold at the discharge end provided with an annular chamber and partitioned into compartments, and steam-pipes connected therewith, the central chamber and steam and water ducts leading from said compartments respectively to said central chamber; a case secured to the manifold at the outer side and having its cavity communicating by an axial aperture with said central chamber, said case comprising a chamber for water of condensation, of greater diameter than said axial aperture; a stuffing-box at the outer end of the case; a cylindrical steam-supply fitting protruding through said stuffing-box into said condensation-chamber, said steam-fitting comprising a steam-passage communicating with the central chamber of the manifold, and a water-passage separated from said steam-passage, and provided with a discharge outside the stuffing-box; a cock connected with said water-passage and extending downward therefrom within the chamber of said case to a point lower than the lower margin of said axial aperture; a float in said chamber connected with said cock for opening the same when the float is lifted in said chamber, and pipes connecting the several water-passages.

11. In a drier of the type indicated, in combination with the cylinder, a manifold provided with an annular chamber partitioned into compartments and steam-pipes connected therewith, a central chamber and steam and water ducts connecting the said compartments respectively with the central chamber; a case secured to the outer side of the manifold having its cavity communicating with the central chamber through an axial aperture; pipes leading from the inner end of the water-ducts respectively through said central aperture, said case comprising an enlarged cavity for receiving the water of condensation; a stuffing-box at the outer end of the case; a steam-supply fitting extending through said stuffing-box having a steam-passage communicating with the central chamber of the manifold, and two water-passages separated from each other and from the steam-passage, each having a discharge exterior to the stuffing-box; two pipes leading from the lower portion of the condensation-chamber and effecting communication therefrom with the two water-passages respectively, the discharge-pipe from one of said passages having a valve operated at will, and the pipe leading into the other of said passages having a valve and a float in the condensation-chamber operatively connected with such valve.

12. In a drier of the type indicated, in combination with the cylinder, a manifold at the discharge end provided with an aperture about its axis; a chamber into which the aperture leads; a steam-pipe discharging through said chamber and said aperture into the manifold, said chamber comprising a cavity for accumulating water of condensation which extends lower than the lower margin of the aperture; a valve which controls discharge of the water of condensation from such cavity, and a float operatively connected with such valve.

13. In a drier of the type indicated, in combination with the cylinder, a manifold at the discharge end provided with an axial aperture for the entrance of steam and the escape of water of condensation, and means by which it discharges the water of condensation through said aperture; a chamber encompassing said aperture and communicating therethough with the manifold-cavity, said chamber having a steam connection leading into it and additional space for the passage of water of condensation, and comprising a cavity for the accumulation of water of condensation extending lower than said axial aperture; a valve which controls discharge from said cavity, and a float in said cavity operatively connected with the valve.

In testimony whereof I have hereunto set my hand, in the presence of two witnesses, at Louisville, Kentucky, this 10th day of September, A. D. 1903.

CHARLES E. GEIGER.

In presence of—
B. FRESE,
LOUIS METZ.