H. W. SHEPARD.

DRIER.

APPLICATION FILED JULY 2, 1909.

939,175.

Patented Nov. 2, 1909.

Fig. 2.

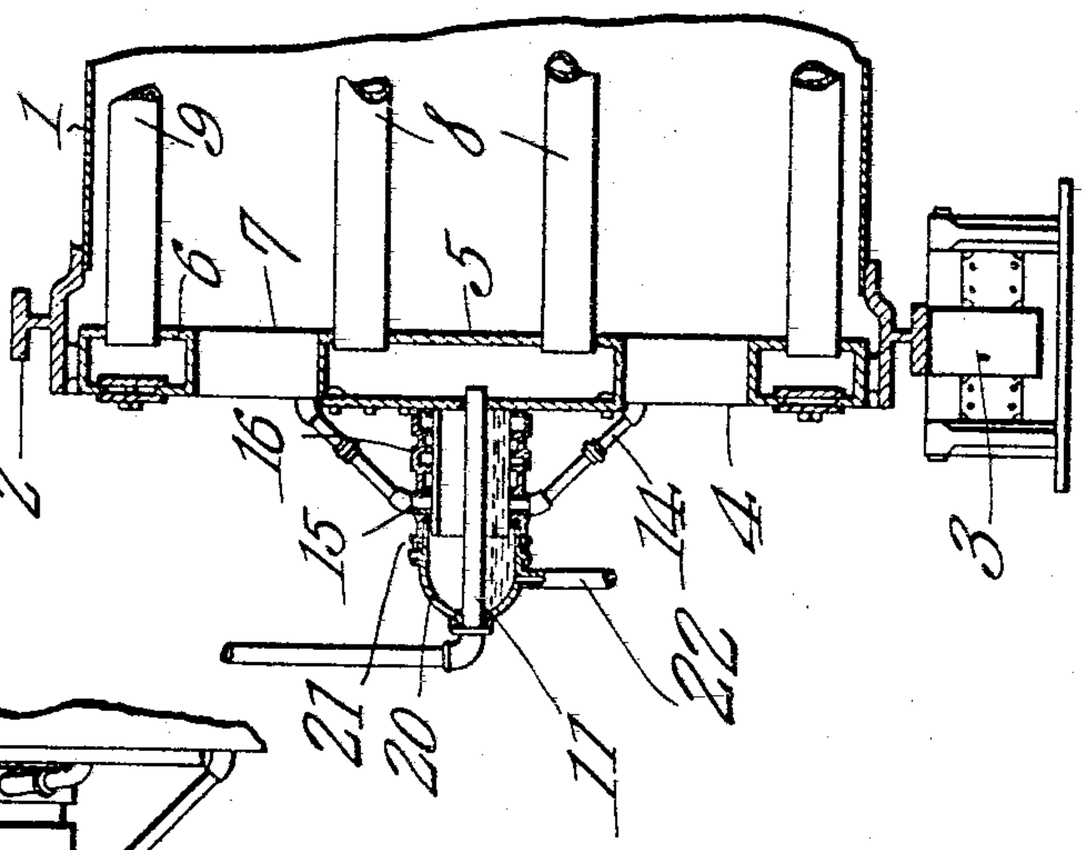


Fig. 3.

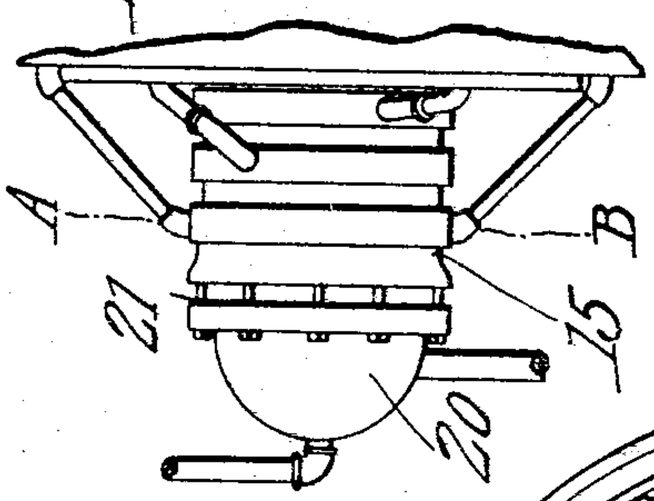


Fig. 1.

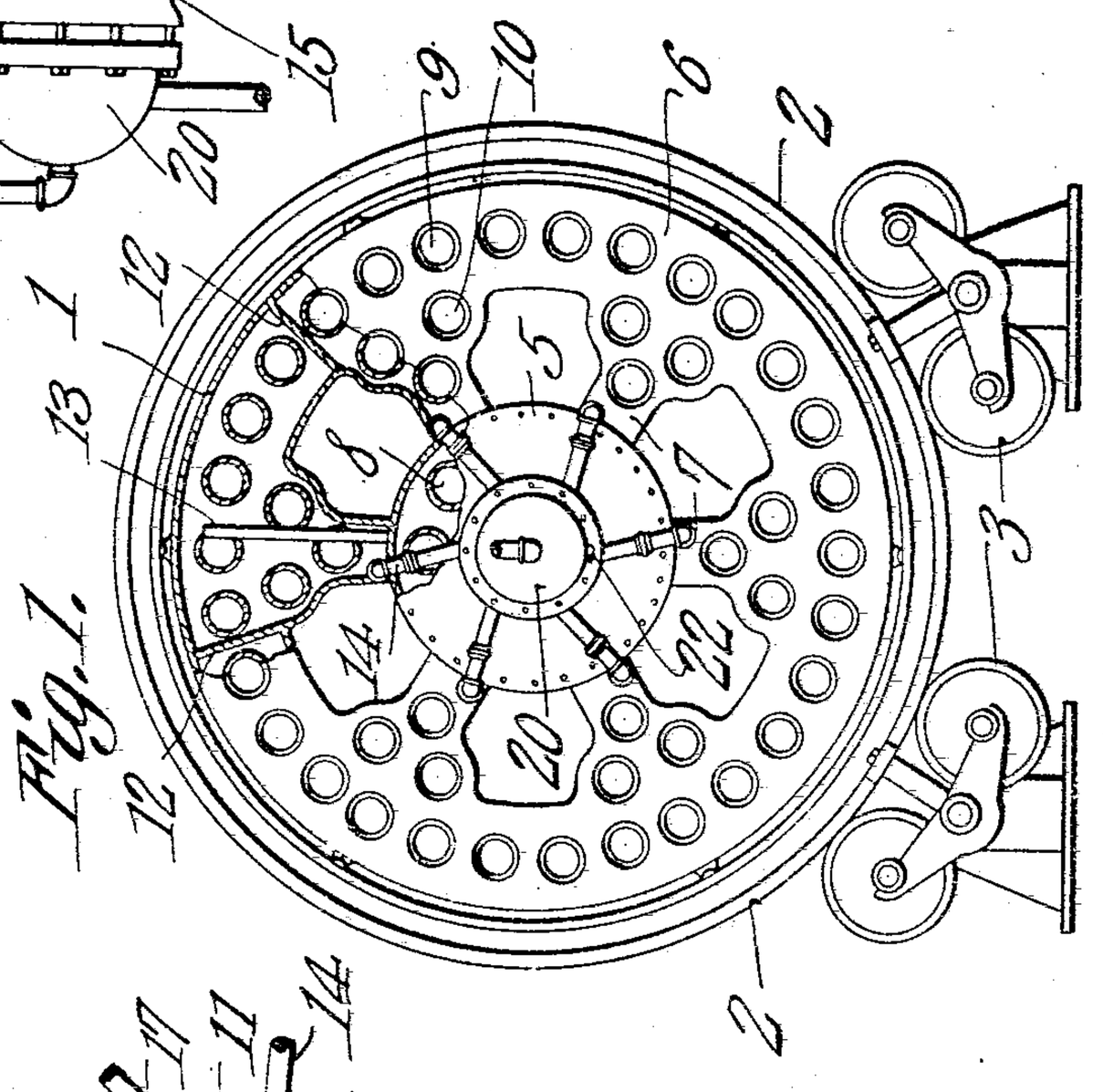
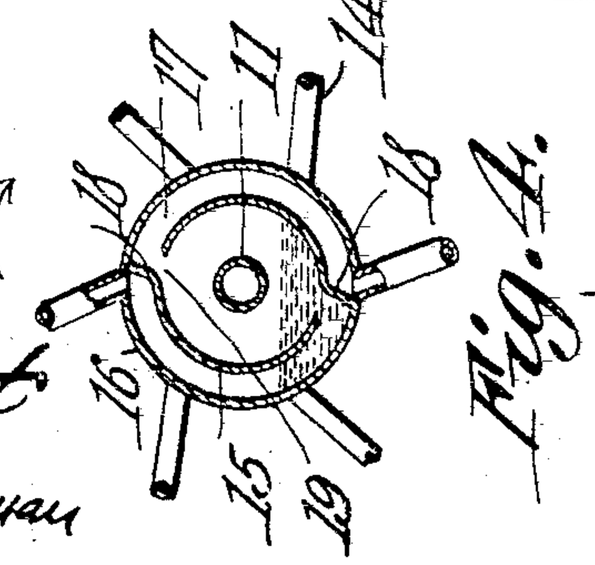


Fig. 4.



Witnesses

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UNITED STATES PATENT OFFICE.

HERBERT W. SHEPARD, OF NEW YORK, N. Y., ASSIGNOR TO ATLANTIC DRIER COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

DRIER.

939,175. Specification of Letters Patent. Patented Nov. 2, 1909.

Application filed July 2, 1909. Serial No. 505,685.

To all whom it may concern:

Be it known that I, HERBERT W. SHEPARD, a citizen of the United States, residing at New York city, in the county of New York and State of New York, have invented a new and useful Drier, of which the following is a specification.

This invention has reference to improvements in driers more especially of the rotary type employing steam heated pipes as the source of heat for drying any granular substance but especially is the drier designed for brewers' and distillers' use.

The particular class of driers to which the present invention relates is that in which there is provided a drying cylinder with hollow or chambered heads at the ends, which heads are usually termed "manifolds", and between these heads or manifolds there extend numerous steam pipes, there usually being a central or axial group of pipes at one end of which the live steam enters and is conducted to the other end where it discharges into the corresponding manifold, and there also being a peripheral series of steam pipes through which the steam after passing through the central series of pipes and into the more remote head or manifold returns to the first head or manifold and from this latter point the steam is discharged through a suitable exhaust.

The material to be dried is fed into the drying cylinder through the end remote from the steam inlet end of the cylinder, and because of the inclined axis of the cylinder the material is slowly fed toward the other or discharge end. The cylinder is so constructed that in the passage to the drier the material is thoroughly subjected to the drying action of the hot atmosphere therewithin.

So far as the general structure of the drier is concerned, the drier to which the present invention relates does not differ materially from that of driers already in commercial use, but such use has developed certain defects which it is the object of the present invention to overcome.

The present invention comprises means for causing the discharge of the water of condensation which accumulates within the manifolds, and more particularly the manifold at the discharge end of the drier, in such manner as to prevent this water of condensation from finding its way back again into the manifold under consideration.

The invention will be best understood from a consideration of the following detail description taken in connection with the accompanying drawings forming a part of this specification, in which drawings Figure 1 is an end view, partly broken away and in section, of a drier having the present invention applied thereto. Fig. 2 is a central longitudinal section of the discharge end of the drier shown in Fig. 1. Fig. 3 is an enlarged view in side elevation of the portion of the drier to which the present invention is more particularly directed. Fig. 4 is a section on the line A—B of Fig. 3, remoter parts being omitted.

Referring to the drawings, there is shown a drum 1 having at each end, though only one end is shown in the drawings, a peripheral track 2 running on suitably disposed supporting rollers 3 in a manner common to structures of this character and therefore needing no particular description. The end of the drum remote from that shown in the drawings is elevated to a greater extent than the illustrated end so that the axis of rotation of the drum is inclined to the horizontal and any material, including water of condensation, tends to flow or move toward the end of the drum illustrated. Rotative movement is imparted to the drum in any of the well known manners, but such driving means is not shown in the drawings.

At the discharge end of the drum there is a manifold 4 comprising a central circular portion 5 and a peripheral annulus 6, both hollow, and joined together though not in communication, by hollow spokes 7 expanding from the central portion 5 to the point of connection with the annulus 6.

The cylinder 1 contains a central series of longitudinal pipes 8 connecting the inner portion or chamber 5 of the manifold 4 with a like part of a manifold at the other end of the drum and there is also provided a peripheral series of pipes 9 connecting the annulus 6 with a similar annulus in the manifold at the other end of the drum. Other connecting pipes 10 are employed when desired.

The central portion or chamber 5 of the manifold 4 is entered at its axis by a pipe 11

whereby steam is introduced into the chamber 5 and from thence flows through the pipes 8 to the other manifold and from the latter through the pipes 9 back to the annulus 6.

The interior of the annulus 6 is divided into a circular series of chambers by radial diaphragms 12 each chamber including one of the spokes 7, the interior of which is in free communication with the annulus 6 at the point of connection therewith.

Extending through each spoke 7 and near to the outer wall of the annulus 6 is a pipe 13 opening at one end in the chamber 5 and at the other end near the outer portion of the annulus 6. This pipe permits the gravitating of any water of condensation which may form in the chamber 5 through each spoke 7 as it assumes the lowermost position, into the annulus 6.

The interior of each spoke 7 close to the point of junction with the chamber 5, at which point the spoke 7 is closed by the outer wall of the chamber 5, is in communication with a pipe 14.

Secured to the outer wall of the member 5 is a cylinder 15 having its longitudinal axis coincident with the longitudinal axis of the manifold 4 and this cylinder rotates with said manifold.

At spaced intervals along the cylinder, are annular hollow enlargements 16 each formed into two semi-annular compartments or channels 17 by means of interior webs 18 at diametrically opposite points and these channels 17 each communicate at one end through a passage 19 with the interior of the cylinder 15.

The pipes 14 communicate with the interior of the channels 17 adjacent to the diaphragms 18 at a point about coincident with a radius agreeable to the center line of the corresponding spoke 7 so that these pipes incline somewhat to a radial line agreeable to the center line of a spoke.

In the particular structure shown, each hollow annular rib or enlargement about the cylinder 15 accommodates two pipes 14 at diametrically opposite points and in the particular structure shown there are six spokes and consequently there are three pairs of pipes and three hollow ribs or enlargements 16. Of course with larger or smaller driers the number of pipes and the number of ribs or enlargements will be greater or smaller correspondingly.

The outer end of the cylinder 15 is closed by a cap 20 connected in steam tight relation to the end of the cylinder 15 by a suitable gland 21 so that the cylinder may rotate while the cap stands still in space. The steam pipe 11 passes through the cap 20 in the central axis thereof.

Leading from the cap 20 at the lower part thereof is a pipe 22 for the escape of any water which may accumulate in the said cap and in the cylinder 15. It will be understood of course that this pipe 22 may be provided with a suitable trap if such be found desirable.

As the steam passes through the drier, there is of course more or less condensation which condensation increases as the steam approaches the exhaust end for the steam, which corresponds to the manifold 4 by which time the steam is largely condensed and accumulates in the form of water in the annulus 16.

The rotation of the drum 1 will cause the chambers between the diaphragms 12 to move from a lower to an upper position and any water therein contained will gravitate toward the inner end of the corresponding spoke 7.

Let it be assumed that the drum 1 is rotating clockwise as viewed in Figs. 1 and 4. As a chamber of the annulus 6 approaches the uppermost position water of condensation will flow down into the corresponding spoke 7 and will find its way to the pipes 14 and from the latter into the corresponding chamber 17 of the rib or enlargement 16 and will gravitate through the latter until it flows out into the interior of the cylinder 15 through the corresponding opening or passage 19. The webs 18 are shaped to facilitate this flow of the water and as the passage 19 moves from the lowermost position to a higher position it will soon be above the level of any water which may accuinulate in the cylinder 15. This accumulation is never great because of the continual escape of the water through the pipes 22 and under no circumstance can this level of the water reach the point of entrance of the pipe 11 into the interior of the chamber 5, so that no water of condensation can ever find its way into the chamber 5 through the passage provided for the pipe 11. This pipe is of course stationary and passes loosely through an opening in the outer wall of the chamber 5 so as to prevent binding at this point should there be any wear or settling of the drum 1 with relation to the pipe 11.

By the present invention all water of condensation finds easy passage out of the manifold 4 and under no circumstances can it find its way back again into the manifold. The return of the water of condensation into the steam inlet port of the manifold 4 has been a source of trouble with structures of this character as heretofore constructed. With the present invention this trouble is entirely avoided and all water of condensation finds its way to the escape pipe 22 by a direct path.

The present invention may be embodied in practical form at little expense and with practically no machine work and is found

in practice to be more efficient than other structures designed for the same purpose but which are considerably more expensive to build because of the comparative accuracy of fit necessitated and the ease with which such structures get out of proper relation because of the wear or settling of the drier drum.

What is claimed is:

1. In a rotary steam drier, a manifold having an inner compartment for receiving live steam and outer pockets or compartments for receiving steam after passing through the drier, a steam supply pipe entering the inner compartment of the manifold, a closed cylinder surrounding the steam pipe outside the inner compartment of the manifold, conduits encircling the cylinder exterior thereto and opening at one end into the cylinder, and pipes connecting the other ends of these conduits to respective compartments in the outer portion of the manifold.

2. In a rotary steam drier, a manifold having an inner compartment for receiving live steam and outer pockets or compartments for receiving steam after passing through the drier, a steam supply pipe entering the inner compartment of the manifold, a cylinder encircling the steam pipe, circumferential channels or conduits about the cylinder opening at diametrically opposite points into the cylinder and provided with division members adjacent to the opening, and pipes leading from the outer compartments of the manifold to respective conduits about the cylinder at points adjacent to the division members but remote from the point of connection of the conduits with the cylinder.

3. In a rotary steam drier, a manifold having an inner drum or compartment for receiving live steam, and outer compartments for receiving steam after passing through the drier, the outer compartments being mechanically connected to the inner compartments by hollow spokes, which latter, do not communicate with the inner compartments, pipes connecting the inner compartment with the outer compartments and leading to near the outer portion of the outer compartments, a steam pipe entering the inner compartment, a cylinder surrounding the steam pipe and provided with circumferential channels or conduits each opening at one end into the cylinder, and pipes connecting the inner ends of the hollow spokes with the other ends of the said circumferential conduits.

4. In a rotary steam drier, a manifold having an inner compartment for receiving live steam, and outer pockets or compartments for receiving steam after passing through the drier, a steam pipe entering the inner compartment of the manifold, a cylinder surrounding the steam pipe and provided with an escape pipe, circumferential conduits about the cylinder each opening at one point thereinto, and pipes connecting the outer compartments with respective ones of the conduits at the ends remote from those opening into the cylinder, said pipes being arranged at an angle to a corresponding radius of the manifold.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

HERBERT W. SHEPARD.

Witnesses:
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F. T. CHAPMAN.