C. L. ST. CLAIR & J. H. HOFFMAN.

EVACUATOR FOR CYLINDRICAL DRIERS.

APPLICATION FILED AUG. 10, 1917.

1,258,055.

Patented Mar. 5, 1918.

3 SHEETS—SHEET 1.

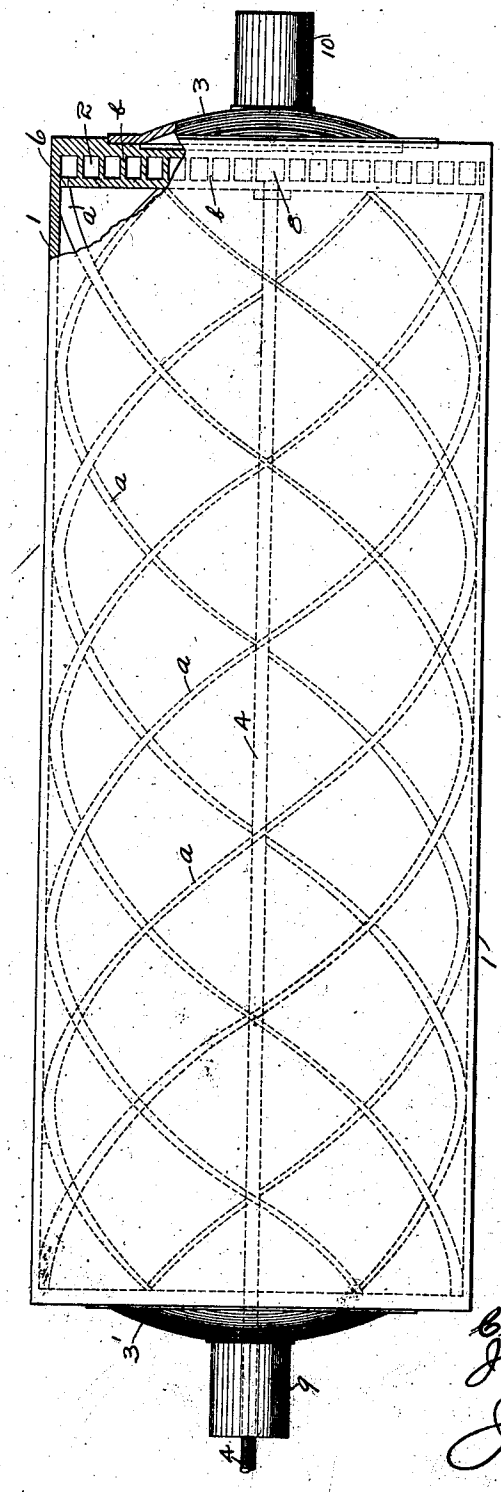


FIG 1

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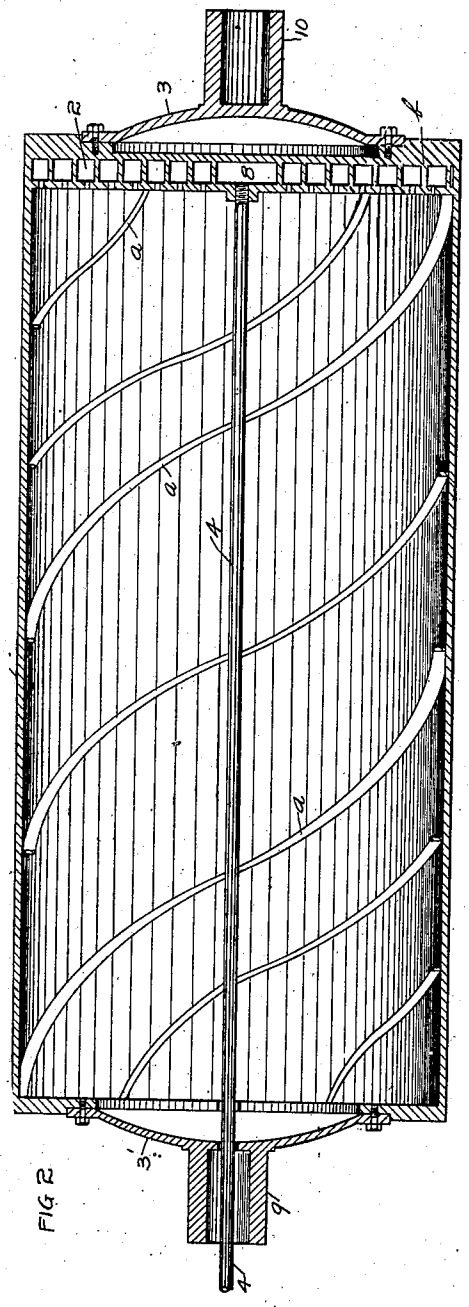


FIG 2

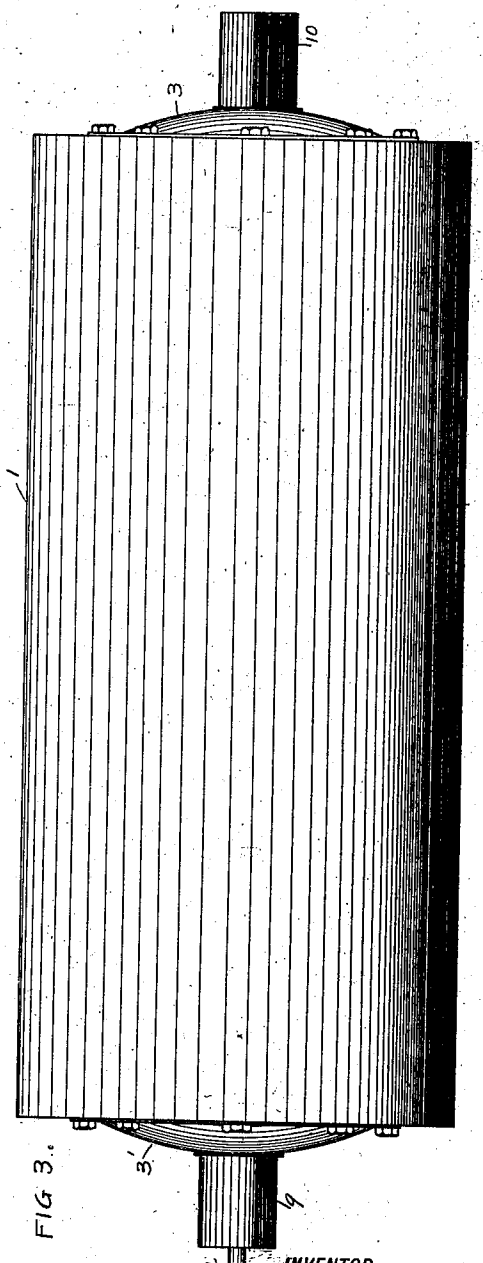


FIG 3.

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3 SHEETS—SHEET 3.

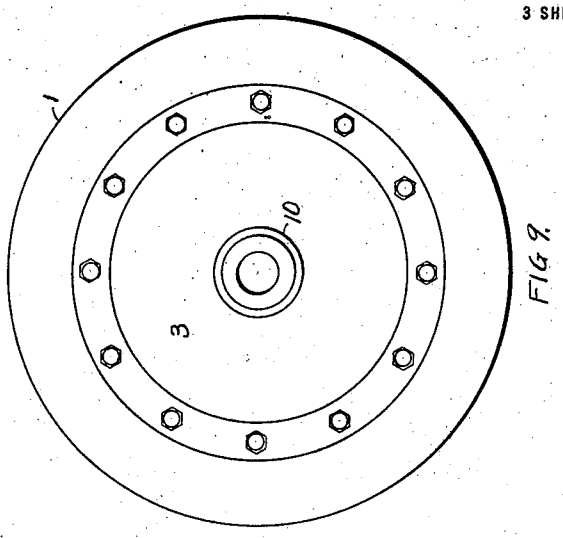


FIG 9.

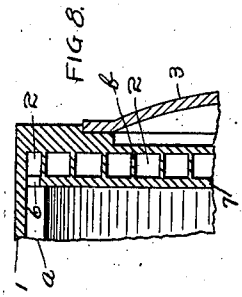


FIG 8.

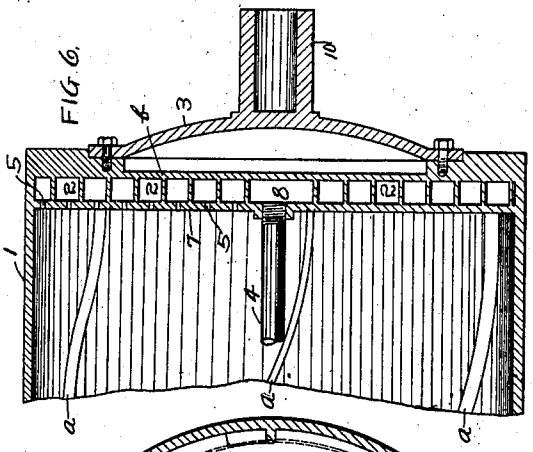


FIG 6.

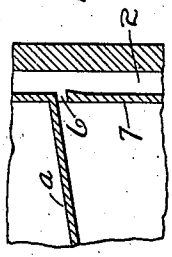


FIG 7.

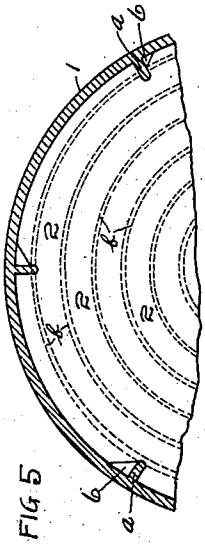


FIG 5.

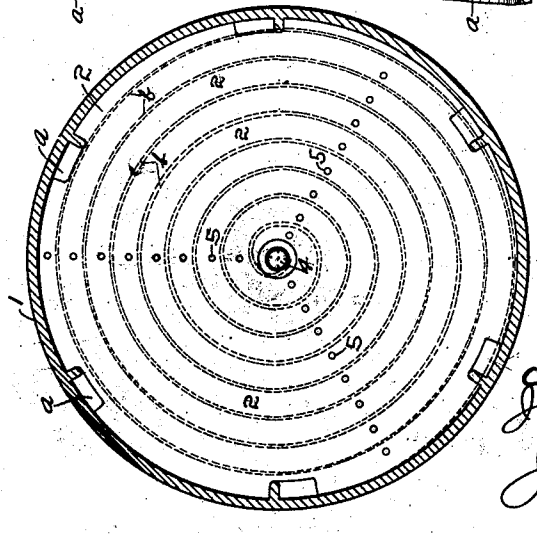


FIG 4.

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UNITED STATES PATENT OFFICE.

CLYDE L. ST. CLAIR, OF OREGON CITY, OREGON, AND JOHN H. HOFFMAN, OF DANSVILLE, NEW YORK.

EVACUATOR FOR CYLINDRICAL DRIERS.

1,258,055. Specification of Letters Patent. Patented Mar. 5, 1918.

Application filed August 10, 1917. Serial No. 185,608.

To all whom it may concern:

Be it known that we, CLYDE L. ST. CLAIR and JOHN H. HOFFMAN, citizens of the United States, residing, respectively, at Oregon City, in the county of Clackamas and State of Oregon, and at Dansville, in the county of Livingston and State of New York, have invented certain new and useful Improvements in Evacuators for Cylindrical Driers, of which the following is a specification.

The invention relates to that class of evacuators wherein the water of condensation from the heating agent steam is removed from the interior of the drier body by the operation of parts that are integral with the drier and turn with it. Its object is to remove this water of condensation from the drier at higher speeds of revolution of the drier than have hitherto been attainable with this type of evacuator, and it is related particularly to the cylindrical driers used in the paper making art. The means employed are simple, efficient and durable.

Referring to the drawings,—

Figure 1 is a longitudinal elevation showing in dotted outline the veins or channels "*a*" that are used to direct the water of condensation to one end of the drier, with a portion of the outer shell broken away to show the spiral chambered section of the front end. Fig. 2 is a longitudinal section. Fig. 3 is a longitudinal elevation showing the outside face of the drier, with its two journal heads and journals 9 and 10 and the drain or discharge pipe 4 leading from the left hand journal. Fig. 4 is an end view of the chambered end of the drier looking at it from the inside of the drier. Fig. 5 shows the ribs or veins "*a*" and the openings 6 into the outer groove of the spiral chamber. Fig. 7 is a top view of rib "*a*" and opening 6 into outer groove of end chamber; the outer shell 1 has been removed. Fig. 8 also shows in section the vein "*a*" and opening 6 into outer grove of spiral chamber. Fig. 9 is an end view of drier showing how the back head 3 is bolted to the drier shell.

There are several well known methods of taking the water of condensation out of the driers on a paper machine which work satisfactorily when the outer surfaces of the drying units are not traveling over 600 feet per minute. But the tendency is toward increasing the speed of paper machines and 700 feet per minute is now possible, with a prediction of 1000 feet per minute at no very distant time. At some point between 600 and 700 feet per minute, the water that has collected in the drier is held by centrifugal force against the inner wall and those evacuators which depend upon gravity alone are ineffectual under such conditions, as the force of gravity will not cause the water to flow to the outlet. And this presents one of the main difficulties when the speed of the machine is increased and the usual forty-eight inch and sixty inch diameter drying units are caused to revolve faster. The driers fill with water, thus interfering with the proper and economical heating of the drier surface and taking more steam to dry a given quantity of paper. Another consideration of importance in this connection is that by the necessary use of a larger amount of steam the pressure in the drier is increased and this increases the back pressure on the engine, as exhaust steam direct from the engine is principally employed in the drying system, although live steam is also introduced when too much water has accumulated in the driers and it becomes imperative to bring the driers up to the required temperature. This of course, entails an increased cost for fuel, aside from cutting down the power of the engine. Experience has also shown that the various forms of scoops, dippers and the like that it is customary to bolt on the inside of the drier to the back drier head frequently work loose, break and cause constant trouble and expensive repairs. In this respect it will be noted that in our device the flat spiral chamber forms part of the drier itself, Figs. 1 and 6, and cannot become loose or broken; also that the veins or channels "*a*" are simply ribs or projections on the inner wall of the drier and are integral with it, Figs. 4 and 5. This is the preferred construction, although when applying our device to driers of the old type, the ribs forming the channels are made of light angles which can be easily attached to the inside wall of the drier and the spiral chamber is also rigidly affixed to the front head so that it cannot work loose.

In the operation of our drier, steam enters through the hollow journal 9 of back journal head 3. The channels or veins "*a*"

which are simply ribs or projections arranged as advancing open spirals on the inside wall of the drier, Figs. 4 and 5, disposed as shown in Fig. 1, guide and carry the water of condensation, as the drier rotates, to the outer groove of the flat spiral chamber 2, which comprises the front end of the drier shell 1, Fig. 2. At the chamber end of each vein, just where it joins the outer groove of the spiral chamber 2, there is an opening 6, Figs. 1, 7 and 8, through which the water flows into the outer groove and starts on its journey to the central pocket 8, which feeds the axial discharge or drain pipe 4. The construction of the end chamber is shown in Figs. 4 and 6. The spiral groove 2 is formed, top and bottom, by the spiral walls, *b*, *b*, and the sides are inclosed as shown by the plate 7 and the drier shell. Vent holes 5, 5, are placed in the plate 7 so that there will be an equal distribution of air or steam pressure in the spiral groove 2, insuring an even flow of the water therein toward the center. These vent holes should be located at that part of the groove which is closer the center as appears in Fig. 4. This flat spiral, formed by the continuous curved walls *b*, *b*, is of very gradually changing radius, resulting in but slight pitch, so that while the centrifugal force of the rotating drier tends to hold the water in the outer groove of the spiral, the force of gravity and the effect of the spiral causes the water to flow to the center pocket 8 and thence it passes out the drain pipe 4. Such an evacuator will empty the drier of all its water of condensation up to a peripheral speed of nearly nine hundred feet per minute.

We claim:—

1. A cylindrical drier shell or body, a flat spiral chamber integral with the drier body and forming one end thereof, a plurality of openings into the outer groove of this spiral chamber, a plurality of open spiral ribs, corresponding to the number of said openings, on the inner wall of the drier body, extending lengthwise thereof, the chamber end of each rib connected with an opening into the outer groove of the spiral chamber, and an axial drain pipe from the spiral chamber.

2. A cylindrical drier shell, a flat spiral chamber at one end of the drier shell, a plurality of open spiral ribs on the inner wall of the drier shell, extending lengthwise thereof and each connected with the outer groove of said spiral chamber, and an axial drain pipe from the spiral chamber.

3. In a cylindical drier, a flat spiral chamber at one end thereof with openings therein at its outer groove, a plurality of open spiral ribs on the inner wall of the drier equal to the number of said openings, a plurality of vent holes from said spiral chamber and a central opening to receive an axial drain pipe.

4. In a cylindrical drier, a flat spiral chamber at one end thereof, a plurality of open spiral ribs on the inner wall of the drier, the chamber end of each rib connecting with the outer groove of the said spiral chamber.

5. In a cylindrical drier, a flat spiral chamber at one end thereof, with a plurality of openings into the outer groove of the said spiral chamber.

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