June 28, 1927. 1,633,723

J. M. ARNOT

STEAM HEATED CYLINDER AND THE LIKE AND MEANS FOR DRAINING THE SAME

Filed Jan. 6, 1925

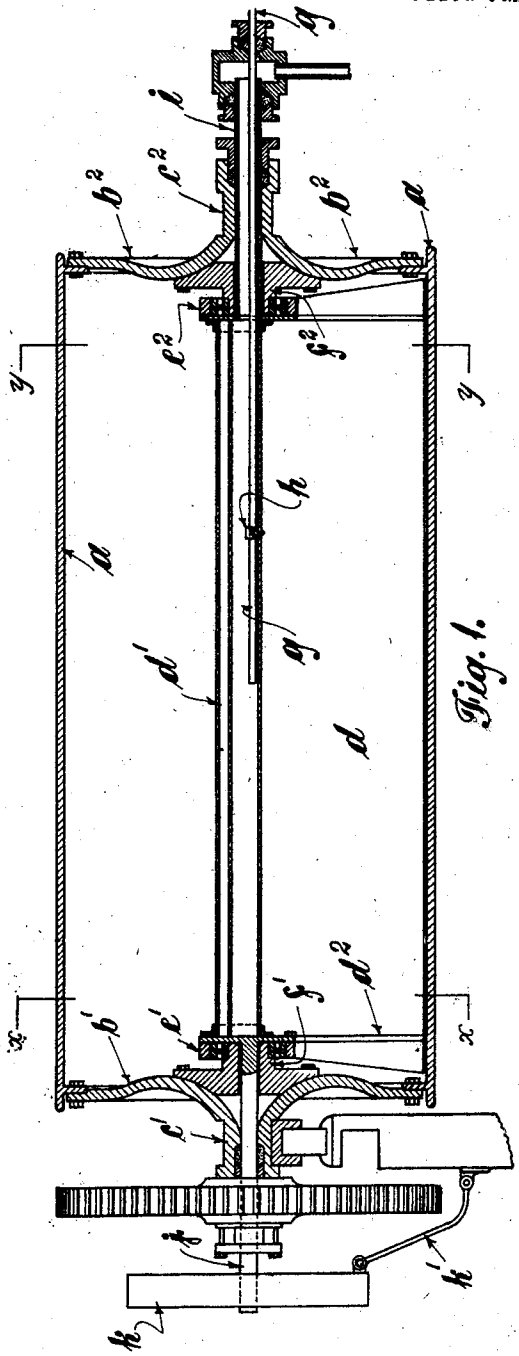


Fig. 1.

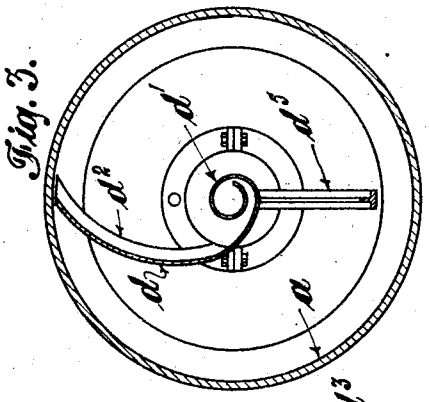


Fig. 3.

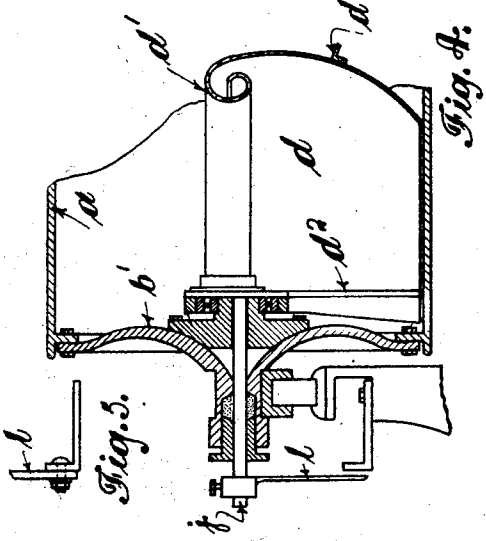


Fig. 4.

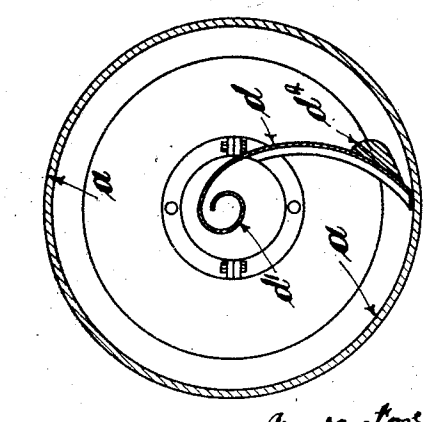


Fig. 2.

Fig. 5.

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Patented June 28, 1927. 1,633,723

UNITED STATES PATENT OFFICE.

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STEAM-HEATED CYLINDER AND THE LIKE AND MEANS FOR DRAINING THE SAME.

Application filed January 6, 1925, Serial No. 881, and in Great Britain December 1, 1924.

This invention refers to the draining of the water of condensation from steam-heated drying cylinders as used in drying paper, fabric and the like.

The main object of the invention is a construction and arrangement of draining apparatus suitable for draining fast or slow running cylinders, and a further object is to provide means exterior to the cylinder, whereby the draining apparatus may be held stationary or rotated at will while the cylinder rotates.

According to the invention, the improved apparatus is characterized in that when held stationary or rotated within the cylinder, and the cylinder revolves at a high speed, it utilizes the centrifugal momentum of the water to redirect and remove the water from the cylinder, said apparatus also being characterized in that when rotated, within a cylinder rotating at a low speed it will lift the water from the lower part of the cylinder to a height where it may be discharged by gravity or pressure through the usual outlet.

In carrying out the invention, the improved apparatus comprises a curved flap or blade extending the whole length of the cylinder, and having one edge bent to form a volute or scroll, its other and parallel edge being plain. Said blade and scroll collectively form a scoop. At each end of the scroll part, the scoop is mounted coaxial with the cylinder and said scroll part of the scoop communicates with an exhaust conduit, or conduits, extending to the exterior of the cylinder through the cylinder trunnion or trunnions. At its free edge the scoop lies close to or lightly touches the wall of the cylinder.

For cylinders running at a high speed, the scoop will usually remain stationary, but it may be rotated and preferably in a direction opposite to that of the cylinder. For slow running cylinders, the scoop will be rotated and preferably in an opposite direction.

Anti-friction bearings will be provided for the scoop when requiring to remain stationary, or to rotate on its own axis. In the case of high speed cylinders the scoop will operate to skim off the layer of water clinging to the cylinder and the centrifugal momentum of the water will be utilized to redirect and convey the water to the scroll part of the scoop, and from thence through the exhaust outlet pipe or pipes. In the case of slow running cylinders the scoop will pick up the water as it rotates and deliver it to the scroll part, from whence it will flow by gravity or differences of pressure through the exhaust outlet pipe or pipes.

Upon the accompanying drawings:—

Fig. 1 illustrates a longitudinal section of a drying cylinder with one example of the invention applied thereto.

Fig. 2 ilustrates a cross section of Fig. 1 on line x—x.

Fig. 3 illustrates a cross section of a drying cylinder with another example of the invention applied thereto.

Fig. 4 illustrates a longitudinal section of part of a drying cylinder with another example of the invention applied thereto.

Fig. 5 illustrates a modified detail.

Referring to the drawings, a is the cylinder wall, b^1, b^2 the end plates, and c^1, c^2 the trunnions of the cylinder. d is the scoop made of sheet metal and formed along one edge with a volute or scroll d^1, and at its other edge lying in close proximity to the inner face of the cylinder wall a. The scoop is supported at both ends by sheaves e^1, e^2 journaled on bosses f^1, f^2 secured to the cylinder ends. Between said bosses and sheaves are hardened steel balls or rollers and race rings to eliminate friction and thus ensure of the scoop remaining vertical in spite of the rotation of the cylinder, or to eliminate friction when the scoop requires to rotate about the bosses. The scoop widens out towards its free edge in order to act on the full length of the cylinder, and each end is provided with a flange d^2 to prevent the water escaping over such end.

Steam enters the cylinder via pipe g which may be supported by a small eye bracket h bolted to the scroll but loosely fitting the pipe. The water of condensation leaves the scroll via pipe i.

The weight of the scoop may itself be sufficient to cause the scoop to remain stationary while the cylinder rotates, or an additional weight, such as a length of angle iron d^3, Fig. 4, or a weight bar d^4, Fig. 2, may be provided. Instead of relying on the weight of the scoop or added weight for holding it stationary, the scoop may be held stationary in any desired position by means exterior to the cylinder. For such purpose

one of its sheaves may be provided with a shaft j, extending through the cylinder trunnion, and outside the cylinder fitted with a power wheel or pulley k, by which and a link k^1 secured to the frame of the machine, the pulley, shaft and scoop are held locked against rotary motion. This same arrangement of pulley and shaft is used when requiring to rotate the scoop.

With the cylinder rotated at a speed which causes the water of condensation to cling to the inner face of the cylinder by centrifugal action, the water is interrupted by the scoop, and, urged by its centrifugal momentum, is caused to flow over the curved face of the scoop until it reaches the scroll part d^1 from whence, under gravity, or under differences of pressure, it flows through the pipe i to the usual exhaust conduit outside the cylinder.

With the cylinder rotated at a speed at which the water of condensation collects in the lower part of the cylinder, the pulley k is released and a belt applied to same to rotate the scoop in a direction opposite to the direction of rotation of the cylinder, when at each rotation of the scoop the water of condensation (if any present) is lifted by the scoop and conveyed by gravity to the scroll d^1, and from thence by gravity, or differences in pressure, is discharged from the scroll and cylinder via the pipe i. The scoop may also be rotated for removing water of condensation with high speed cylinders. To give an even turning movement, the scoop may be balanced and either inside the cylinder (see Fig. 3) by means say of an angle-iron frame d^5 or outside the cylinder.

When operating to drain cylinders running at a high speed, the scoop may be held stationary at a point other than the lowest in the cylinder, see Fig. 3.

In the case of a scoop requiring always to remain stationary, a pointer l may be applied to the shaft j outside the cylinder, see Fig. 4, which moving over a stationary scale, will indicate the angular position of the scoop. Said pointer, after indicating the position of the scoop, may be rigidly connected to the scale, see Fig. 5.

What I claim is:—

1. In steam-heated cylinders and the like, an axially mounted scoop extending the full length of the cylinder, and means exterior to the cylinder for either holding same stationary or rotating same, the scoop embodying a scroll by which the water of condensation may be caught as it is caused to pass to same by the rotations of the scoop, or by the centrifugal momentum of the cylinder when the cylinder is rotated at a high speed, and means for conveying the water from the scroll to the exterior of the cylinder, as set forth.

2. In combination, a steam-heated drying cylinder with hollow trunnions, a sheet-metal plate extending from end to end of the interior of the cylinder, said plate being curved transversely and along one longitudinal edge having a scroll, the plate and scroll collectively forming a scoop, means for axially supporting and controlling the position of said plate or scoop with its plain longitudinal edge lying close to the inner face of the cylinder, and its scroll coaxial with the cylinder, a pipe passing through one of the cylinder trunnions for conveying steam into the cylinder and a further pipe also passing through one of the cylinder trunnions for conveying water of condensation from the interior of the scoop scroll to the exterior of the cylinder, as set forth.

3. In combination, a steam-heated drying cylinder with hollow trunnions, a sheet-metal plate extending from end to end of the interior of the cylinder, said plate being curved transversely and along one longitudinal edge having a scroll, the plate and scroll collectively forming a scoop, anti-friction bearings for axially supporting the scoop coaxial with the cylinder and with its plain longitudinal edge lying close to the inner face of the cylinder, pipes at one end of the cylinder for conveying steam into the cylinder and the water of condensation out of the cylinder, and a shaft at the other end of the cylinder connected to the scoop and passing through the cylinder trunnion at such end, and a pulley on said shaft outside the cylinder for rotating the scoop, as set forth.

4. In combination, a steam-heated drying cylinder with hollow trunnions, a sheet-metal plate extending from end to end of the interior of the cylinder, said plate being curved transversely and along one longitudinal edge having a scroll, the plate and scroll collectively forming a scoop, anti-friction bearings for axially supporting the scoop coaxial with the cylinder and with its plain longitudinal edge lying close to the inner face of the cylinder, means for balancing the scoop so as to allow it to remain in any angular position to which it may be moved, pipes at one end of the cylinder for conveying steam into the cylinder and the water of condensation out of the cylinder, and a shaft at the other end of the cylinder connected to the scoop and passing through the cylinder trunnion at such end, and a pulley on said shaft outside the cylinder for rotating the scoop, as set forth.

In testimony whereof I have signed my name to this specification.

J. MELROSE ARNOT.