Dec. 1, 1925. 1,564,171

R. W. BROWN

MILL ROLL COOLING DEVICE

Filed July 16, 1923

Fig. 1.

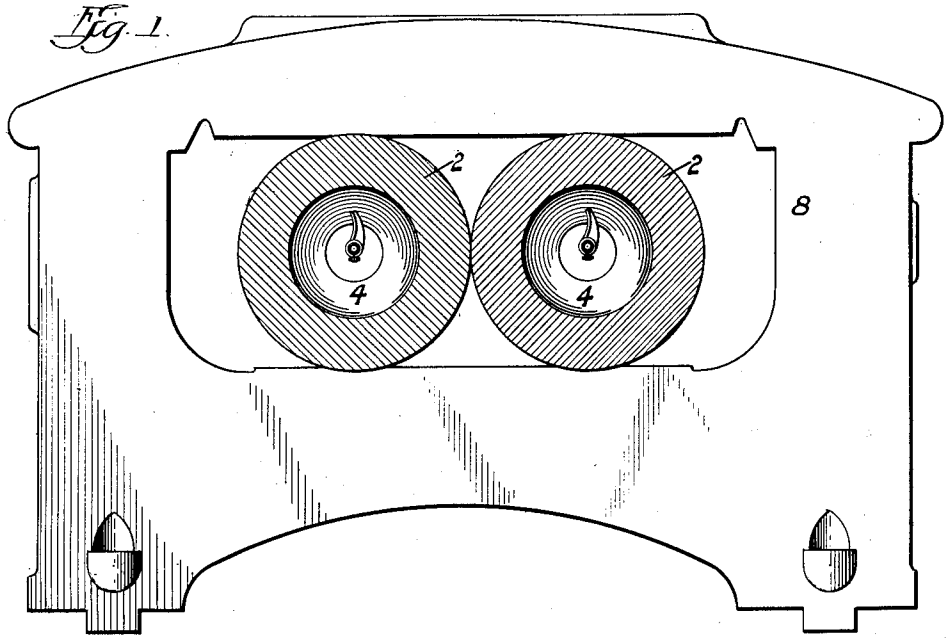


Fig. 2.

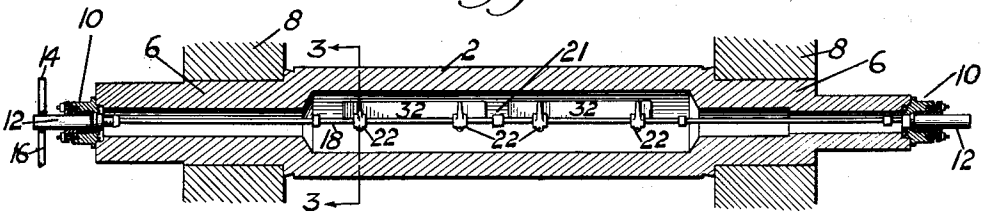
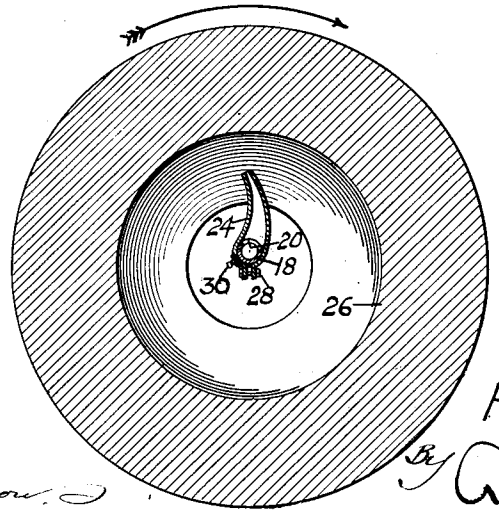


Fig. 3.



Witness:

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UNITED STATES PATENT OFFICE.

ROY W. BROWN, OF AKRON, OHIO, ASSIGNOR TO THE FIRESTONE TIRE AND RUBBER COMPANY, OF AKRON, OHIO, A CORPORATION OF OHIO.

MILL-ROLL-COOLING DEVICE.

Application filed July 16, 1923. Serial No. 651,699.

To all whom it may concern:

Be it known that I, ROY W. BROWN, a citizen of the United States, and a resident of Akron, county of Summit, State of Ohio, have invented certain new and useful Improvements in Mill-Roll-Cooling Devices, of which the following is a specification.

This invention relates to a device for cooling mill rolls. The invention is herein shown as embodied in a standard roll such as used on calendars and mixing mills, but is likewise applicable to rolls of other types of machines, and the term "roll," as hereinafter used for convenience, is to be understood as referring in general to any standard mill roll used in a machine where there is a tendency on the part of the roll to become heated and in which a cooling system is required to lower the temperature thereof.

It has been proposed heretofore, to provide a cooling system on mill rolls which consists in directing a stream of water through the center of the roll. This system has many marked disadvantages which are readily apparent. It will be understood that the flow of the heat is from the outer surface of the roll inward through the roll toward the center. In the ordinary method of cooling, the layer of water next to the inner surface of the roll becomes hot and in accordance with a well known law of physics remains practically stationary, while the fresh cool water will flow straight through the roll without mixing with or disturbing the heated layer, and consequently providing little, if any, cooling effect on the roll. Furthermore, the placid condition of the roll contacting layer of water will result in a deposition of sediment upon the surface of the roll which will eventually clog the water passage completely.

An important object, among others, of this invention is to provide a novel cooling device for mill rolls so organized as to create a counter circulation of the fresh water with relation to the hot water in the rolls, resulting in a violent agitation of the water.

As contributing to the improved results in the operation of mill rolls, this invention provides a cooling device in which the heated layer of water is removed from the inner surface of the roll and fresh cool water substituted in place thereof. In accordance with a further feature of this invention, the fresh water is impinged with a high velocity against the inner periphery of the roll in such a manner as to automatically clean all sedimentary deposits and scale therefrom,

A further feature of the invention consists in a novel organization of a cooling device which will greatly reduce the amount of water ordinarily consumed and will allow the use of cooling water of a higher temperature.

These and other features of the invention will appear more fully from the following detailed description when read in connection with the accompanying drawings and will be pointed out in the appended claims.

In the drawings:

Figure 1 is a side elevation of a mill with the rolls in cross-section, showing the cooling device in position.

Figure 2 is a cross-section of one of the rolls illustrating the cooling device therein; and

Figure 3 is a cross-section on the line 3—3 of Figure 2.

In its general aspects, the machine selected to illustrate my invention consists of a plurality of cast iron rolls 2 having an annular opening 4 therein and being provided with reduced bearing ends 6 suitably mounted in standards 8 of the machine. Each end of the roll 2 is closed by a conventional stuffing box 10 held in place by suitable cap screws.

Extending through the stuffing boxes at each end of the roll is a two-bore pipe 12, a water inlet pipe 14 and an outlet pipe 16. Screwed into the inlet bore of the pipes 12 is a conveying pipe 18 arranged centrally of the roll 2, being provided at spaced points with apertures 20 and closed midway of its length by a stop 21, if desired.

Mounted upon the pipe 18 and arranged to enclose the apertures 20 therein are a plurality of vanes 22, each of which comprises a converging nozzle 24 which is substantially tangential to the inner surface 26 of the roll. The bearing 28 of the nozzle surrounds the pipe 18 and is split to allow the vane to be adjusted circumferentially of the pipe, a set screw 30 serving to hold the vane in adjusted position.

From the above description, it will be

clear that with the roll 2 rotating in the direction of the arrow (Figure 3), the fresh water will be directed by the nozzles in the opposite direction, thus causing the layer of hot water, which has a tendency to hug the inner surface of the roll, to be broken and allowing the fresh water to come into contact with the roll surface to produce the desired cooling effect thereon.

Connecting the vanes and formed integral with one wall thereof are blades 32 having the same curvature as the vanes, the outer edge of the blades extending close to the surface of the roll and serving to direct the hot water away from the surface thereof. The hot water will thus be turned toward the center of the roll due to the contour of the blades and will pass out of the outlet bore of the pipe 12 and be carried away by the pipe 16.

By the arrangement of parts described, circulation of the water contra to the direction of the roll will be effected, the combined action of the nozzles 24 and blades 32 resulting in a violent agitation and a thorough mixing of the hot and cold water.

Moreover, the convergence of the nozzles toward the outlet end will cause the water to be directed against the inner surface of the roll with considerable force sufficient to thoroughly clean the surface of the roll and effectively prevent the accumulation of any sedimentary deposits thereon.

Since the manner in which the different parts of the cooling device operate to perform their function has been set forth in connection with the detailed description of the device, no further description of the operation is necessary for an understanding of the invention.

Having described the invention, what I claim as new and desire to secure by Letters Patent of the United States is:

1. A device for cooling a roll having an annular opening therein comprising means for conducting a cooling fluid into the opening, and means for directing the fluid against the inner surface of the roll and contra to the direction of rotation of the roll.

2. A device for cooling a mill roll having an annular central opening therein, comprising means for conducting a fluid into the opening, and means for forcibly impinging the fluid against the inner surface of the roll and contra to the direction of rotation of the roll.

3. A device for cooling a mill roll having an annular central opening therein comprising means for conducting a fluid into the opening, means for directing the fluid against the inner surface of the roll, and means for removing the fluid from said surface.

4. A device for cooling a roll having an annular central opening comprising means for conducting a cooling fluid into said opening, means for directing the fluid against the inner surface of the roll, and means for turning the fluid toward the center of the opening.

5. A device for cooling a roll having an annular central opening therein comprising means for conducting a cooling fluid into said opening, and a vane having a converging nozzle for impinging the fluid against the inner surface of the roll.

6. A device for cooling a roll having an annular central opening therein comprising means for conducting a cooling fluid into said opening, and a plurality of vanes connected to said conducting means for directing the fluid against the inner surface of the roll.

7. A device for cooling a roll having an annular central opening therein comprising means for conducting a cooling fluid into said opening, and a vane having a nozzle substantially tangential to the inner surface of the roll for directing the fluid against the surface of the roll.

8. A device for cooling a roll having an annular central opening therein comprising means for conducting a cooling fluid into said opening, and a vane having a converging nozzle for directing the fluid against the inner surface of the roll, said nozzle being substantially tangential to the surface of the roll.

9. A device for cooling a roll having an annular central opening therein comprising means for conducting a cooling fluid into said opening, said conducting means being apertured at spaced points, and a plurality of vanes surrounding said apertures and constructed and arranged to direct the fluid against the inner surface of the roll.

10. A device for cooling a roll having an annular central opening therein comprising a pipe for conducting a fluid into the opening, said pipe being apertured at spaced points, vanes connected to said pipe and surrounding said apertures, and means for adjusting the vanes circumferentially of the pipe.

11. A device for cooling a roll having an annular central opening therein comprising means for conducting a cooling fluid into said opening, means for directing the fluid against the inner surface of the roll, and means for removing the fluid from said surface, said removing means including a wiping plate supported by the conducting means and extending close to the inner surface of the wall.

12. A device for cooling a mill roll having an annular central opening therein comprising means for conducting a cooling fluid into said opening, means to direct the fluid against the inner surface of the roll, and means for removing the fluid from said surface, said means including a curved wiping

plate arranged substantially tangential to the inner surface of the roll.

13. A device for cooling a roll having an annular central opening therein, comprising means for conducting a cooling fluid into said opening, said means being apertured at spaced points, a plurality of vanes enclosing said apertures and having converging nozzles arranged substantially tangential to the inner surface of the roll for directing the fluid gainst the inner surface of the roll and contra to the direction of rotation thereof, and means attached to said vanes for removing the fluid from the surface of the roll and directing it toward the center of the opening.

ROY W. BROWN.