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DRUM STRUCTURE WITH COOLING MEANS

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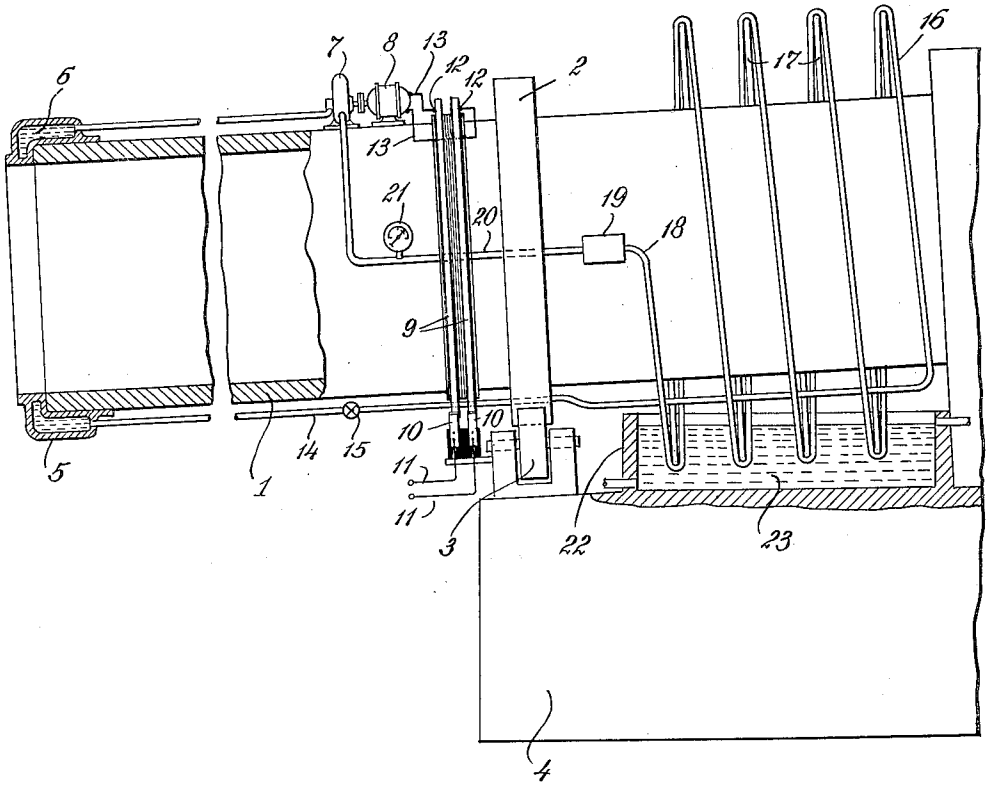

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DRUM STRUCTURE WITH COOLING MEANS

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6 Claims. (Cl. 257—87)

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This invention relates to drums mounted for rotary or rocking movement and having sections which require cooling during operation. More particularly, the invention is concerned with a drum structure provided with novel means for cooling a section of the drum shell, the cooling being effected by means of a cooling fluid circulated through a hollow part of the section and then indirectly cooled at a place remote from the section. A drum provided with the cooling means of the invention may be used for various purposes and an example of such a drum is a rotary kiln of the type used in the cement industry. A form of the new drum structure suitable for use as a rotary kiln will, accordingly, be illustrated and described for purposes of explanation.

At the present time, it is common practice to cool portions of rotary kilns by spraying them with water supplied by a pump mounted near the kiln. This method of cooling is objectionable, because it is inefficient and means must be provided for collecting the water sprayed on the kiln and for carrying off the vapor. Also, the surfaces on which the water is sprayed are subject to corrosion.

The present invention is directed to the provision of a drum structure which includes a section requiring cooling, and means for cooling the section efficiently and without loss of the cooling fluid. According to the invention, the section of the drum to be cooled is jacketed and cooling fluid is circulated through the jacket by means of a motor driven pump mounted on the outside of the drum. The fluid, which has passed through the jacket of the section is then circulated through a cooler, which may take the form of a coil and may dip into a cooling bath as the drum rotates. With such a construction, all parts of the system through which the fluid circulates are mounted on the drum to move therewith, so that it is not necessary to provide couplings between stationary and moving parts. The cooling system preferably includes a pressure gauge and a safety valve, so that damage resulting from the development of abnormal pressure may be avoided. Also, the system includes means for permitting expansion of the cooling fluid as it becomes heated.

For a better understanding of the invention reference may be made to the accompanying drawing, in which the single figure discloses an embodiment of the invention in the form of a rotary kiln, having a cooled section at the discharge end.

The kiln installation disclosed in the drawing

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includes a metal shell 1 of conventional construction and having the usual ceramic lining. The shell is provided with a plurality of tires 2, which run on rollers or slide shoes 3 mounted on a base 4, and the shell is driven by any suitable means, such as a girth gear meshing with a driving pinion.

The ring section 5 of the kiln at the discharge end becomes highly heated in operation and, in order to protect this section, it is jacketed and a cooling fluid, indicated at 6, is passed through the interior thereof. The cooling fluid is supplied to the interior of the jacket by a pump 7 driven by a motor 8, the pump and motor being mounted on the outer surface of the shell. Current is supplied to the motor through slip rings 9 encircling the shell and carried by an insulating mounting. Brushes 10 mounted at any suitable point adjacent the kiln bear upon the rings and are connected through lines 11 to a source of power. The terminals of the motor are connected to the rings at 12 by lines 13.

The cooling fluid leaves the jacket of ring 5 through a pipe 14 containing a safety valve 15, and is cooled by passage through a coil 16, which encircles the drum and is held spaced therefrom on supports 17. The coil is connected by a pipe 18 to an expansion tank 19, from which the pipe 20 leads to the intake of the pump. A pressure gauge 21 is mounted in pipe 20 to indicate the pressure of the fluid in the system.

The travel of the cooling fluid through the coil 16 lowers the temperature thereof but, if desired, the fluid may be further cooled by causing the coil to pass through a cooling bath as the kiln rotates. For this purpose, a tank 22 is mounted on base 4 beneath the kiln, in such position that the coil 16 enters the tank. Cooling fluid 23 is then circulated through the tank during the operation of the kiln.

With the drum structure described, the outlet ring 5 may be readily maintained within desired temperature limits by continuous circulation of the cooling fluid therethrough and through the cooler. The cooler may be mounted at any convenient place along the kiln and is preferably disposed at a distance from the hot zone thereof. During the rotation of the kiln, the pump operates continuously and heat is abstracted from the cooling fluid either by radiation from the coils of the cooler or by causing the coils to dip within the cooling bath in tank 22. The safety valve prevents the development of excess pressure in the cooling system, resulting, for example, from failure of the pump motor, and the pressure

gauge may, if desired, be of the type, which includes alarm means to warn the attendant of the development of undesirable pressure.

I claim:

1. A drum structure, which comprises a hollow shell mounted for movement and having a jacketed section, and fluid-tight means for circulating a cooling fluid through the jacket, including a motor driven pump mounted on the outside of the shell and having its outlet connected to the jacket, a cooler for the fluid mounted on the outside of the shell and spaced therefrom and connected to the jacket and to the pump intake, and a cooling bath into which the cooler dips as the shell moves.

2. A drum structure which comprises a hollow shell mounted for rotary movement and having a jacketed section, and fluid-tight means for circulating a cooling fluid through the jacket, including a motor driven pump mounted on the outside of the shell and having its outlet connected to the jacket, and a cooling coil mounted on and spaced from the outside of the shell to encircle the shell and connected to the jacket and to the pump intake.

3. A drum structure which comprises a hollow shell mounted for rotary movement and having a jacketed section, and fluid-tight means for circulating a cooling fluid through the jacket, including a motor driven pump mounted on the outside of the shell and having its outlet connected to the jacket, a cooling coil mounted on and spaced from the outside of the shell to encircle the shell and connected to the jacket and to the pump intake, and a cooling bath into which the coil dips as the shell rotates.

4. A drum structure, which comprises a hollow shell mounted for rotary movement and having a jacketed section, and fluid-tight means for circulating a cooling fluid through the jacket, including a motor-driven pump mounted on the outside of the shell and having its outlet connected to the jacket, a cooling coil mounted on and spaced from the outside of the shell to encircle the shell and connected to the jacket, means including an expansion tank for connecting said cooling coil to the pump intake, and a cooling bath into which the coil dips as the shell rotates.

5. A drum structure, which comprises a hollow shell mounted for rotary movement and having a jacketed section, and fluid-tight means for circulating a cooling fluid through the jacket, including a motor-driven pump mounted on the outside of the shell and having its outlet connected to the jacket, a cooling coil mounted on and spaced from the outside of the shell at a point thereon remote from the jacket to encircle the shell, said cooling coil being connected to the jacket, means including an expansion tank for connecting the cooling coil to the pump intake, and a cooling bath into which the coil dips as the shell rotates.

6. A drum structure, which comprises a hollow shell mounted for rotary movement and having a jacketed section, and fluid-tight means for circulating a cooling fluid through the jacket, including a motor-driven pump mounted on the outside of the shell and having its outlet connected to the jacket, a cooling coil spaced from and mounted on the outside of the shell to encircle the shell, a connection including a safety valve between the coil and the jacket, means including an expansion tank and a fluid-pressure indicator for connecting the cooling coil to the pump intake, and a cooling bath into which the coil dips as the shell rotates.

NIELS SOFUS BORCH.

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