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SUPPORT FOR ROTARY KILNS

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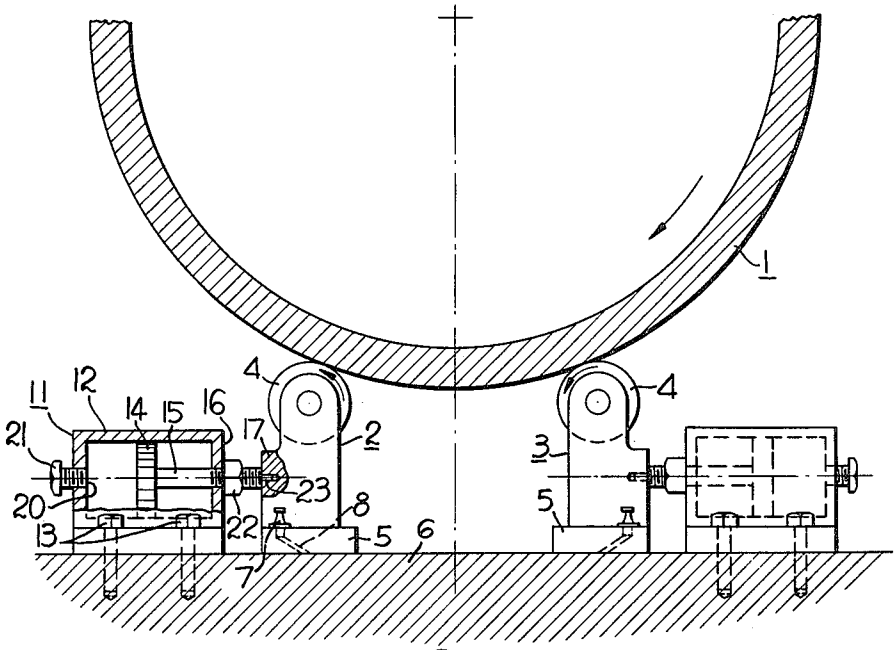


Fig. 1

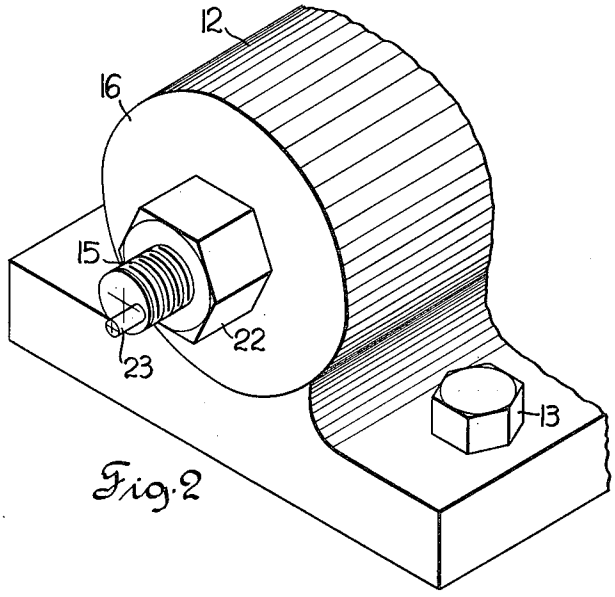


Fig. 2

Inventor
Alexander J. Roubal
By Arthur M. Streich
Attorney

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SUPPORT FOR ROTARY KILNS

Alexander J. Roubal, Milwaukee, Wis., assignor to Allis-Chalmers Manufacturing Company, Milwaukee, Wis.

Continuation of abandoned application Ser. No. 200,989, June 8, 1962. This application June 17, 1964, Ser. No. 375,786

5 Claims. (Cl. 308—15)

This invention relates to providing support for large tubular bodies such as rotary kilns and in particular to an arrangement capable of raising the kiln, aligning kiln supporting rollers and adjusting the distribution of load on kiln carrying supports. This application is a continuation of my pending application Serial Number 200,989, filed June 8, 1962, now abandoned.

According to a past practice in this art, the position of a kiln bearing assembly is adjusted by turning set screws to move the assembly relative to foundation structure. Because of the huge size of rotary kilns, it was necessary to turn such screws by applying a wrench and sledging them with a sledge hammer. As kilns are built over 600 feet long and more than 18 feet in diameter, it is difficult to achieve the desired adjustment by sledging.

It has been recognized for some time that fluid pressure could perhaps make easier the task of adjusting kiln bearing assemblies. Although many arrangements utilizing fluid pressure have been proposed, none has achieved wide acceptance or use because of dangerous consequences from accidental loss of fluid pressure.

According to the present invention, the aforsaid dangers have been avoided. In a preferred embodiment, a fluid motor is provided having a cylinder anchored rigidly to foundation structure. A piston is arranged within the cylinder and a ram connected to the piston projects from the cylinder to engage the bearing assembly. The motor is arranged so that fluid pressure acting upon the side of the piston opposite the ram moves the piston, ram and assembly toward a vertical plane through the center line of the kiln. Thus the fluid motor need provide force in but one direction as the weight of the kiln itself will provide force to move the bearing assemblies in the opposite direction. The ram is threaded and a nut is turned thereon external of a cylinder end wall through which the ram projects. When fluid pressure causes the motor to act to move a bearing assembly to a desired position, the nut is turned to engage the cylinder end wall. Thus although fluid pressure moved the bearing assembly to a new position, a mechanical stop (i.e., the nut engaging the cylinder end wall) holds the assembly in its new position. Among the advantages thereby achieved of course is that of eliminating concern over a possible failure of fluid pressure. In fact once the nut engages the cylinder end wall, fluid pressure may be bled from the motor. A further advantage is that a single transportable source of fluid pressure is all that is required to serve the needs of even very large kilns.

Other features and advantages of the invention will appear from the following more detailed description of the invention with reference to the accompanying drawing in which:

FIG. 1 illustrates schematically, and by way of example, one preferred embodiment of the invention; and

FIG. 2 is a fragmentary perspective view of a fluid pressure operated motor as shown in FIG. 1.

In the embodiment of the invention shown in the drawing, a tubular body such as a rotary kiln 1 is supported by a pair of what may be identical bearing assemblies 2 and 3. Each bearing assembly is provided with a roller bearing 4 journaled in a bearing support 5. The bearing support 5 is slidably mounted on a surface 6 of foundation structure. A high pressure grease fitting 7 and passage 8

provide for a film of grease beneath support 5 so support 5 may move with relative ease despite what may be enormous weight of the kiln 1.

A fluid motor 11 has a cylinder 12 anchored rigidly to surface 6 by bolts 13. A piston 14 is arranged within the cylinder 12 and a ram 15 is connected to piston 14 and projects through a cylinder end wall 16 to engage a portion 17 of the bearing support 5. A port 20 (which may be closed by a cap 21) provides access for fluid pressure to act upon piston 14. Ram 15 is threaded and a stop nut 22 is turned thereon external to end wall 16. A smooth surface pin 23 is provided on the end of ram 15 opposite of piston 14 and a hole is provided in portion 17 of support 5 to receive the pin 23.

Referring to FIG. 2, pin 23 is shown eccentrically spaced from the central axis of ram 15. This off center pin 23, when seated in the portion 17 of support 5 as shown in FIG. 1, will prevent ram 15 rotating about its own central axis when nut 22 is turned relative to end wall 16. Since pin 23 prevents ram 15 turning relative to end wall 16, it is insured that turning nut 22 relative to wall 16 will also move this nut along the axis of the ram so that it may perform the desired function of acting as a stop device to prevent the weight of kiln 1 acting upon bearing assembly 2 from pushing ram 15 outwardly of a desired position.

In operation, bearing assemblies 2 and 3 will tend to be moved apart from each other when a kiln is placed thereon. The bearing assemblies 2, 3 will continue to move apart until they each engage a ram 15. Continued movement of the bearing assembly after portion 17 engages ram 15 will move ram 15 and piston 14 toward port 20 until stop nut 22 engages cylinder end wall 16. The position of all of the parts thus achieved can be expected to be initially at variance from that desired so at least some adjustment will be required. Adjustment may be achieved by removing cap 21 and connecting to port 20 any suitable transportable (or permanent) source of fluid pressure (not shown). Fluid pressure is applied to piston 14 to move ram 15 and the entire bearing assembly 2 toward bearing assembly 3, which is the direction opposite to that in which assembly 2 will move as a result of the downwardly bearing weight of kiln 1. The movement of piston 14 and ram 15 caused by fluid pressure will carry stop nut 22 away from cylinder end wall 16. When the desired adjustment has been achieved, stop nut 22 is turned about ram 15 until nut 22 engages end wall 16 at which time fluid pressure may be bled from the motor and the fluid pressure source may be moved to another bearing assembly to achieve similar adjustment of other kiln supports.

From the foregoing it will be understood that the present invention is possessed of unique advantages. However, such modifications and equivalents of the disclosed concepts such as readily occur to those skilled in the art are intended to be included within the scope of this invention and thus the scope of this invention is intended to be limited only by the scope of the claims such as are, or may hereafter be, appended hereto.

Having now particularly described and ascertained the nature of my said invention and the manner in which it is to be performed, I declare that what I claim is:

1. In a bearing assembly for supporting a tubular body for rotation about its central axis and upon foundation structure by means including a pair of roller bearings arranged with one on each side of a vertical plane through the body axis and with each roller axis aligned parallel to the body axis, a bearing support slidably mounted upon a generally horizontal surface of a foundation structure, and a fluid pressure operated motor rigidly anchored to the foundation structure outward of said bearing support with respect to said vertical plane, the motor containing a fluid pressure operated ram mov-

able along an axis parallel to said surface and projecting through a motor end wall facing the bearing support and toward engagement with the bearing support, the ram being operative upon introduction of fluid pressure to the motor to engage the bearing support to push the bearing support along said surface and toward said vertical plane, a pin projecting from the end of the ram facing the bearing support and eccentric to the central axis of said ram, and a seat in the bearing support to receive the pin with the pin parallel to said surface of the foundation structure, the pin having a diameter substantially less than the diameter of the ram.

2. In the assembly of claim 1, the ram being threaded and a stop nut being turned on the portion of the ram projecting outwardly of the motor end wall to provide an adjustable mechanical stop when the stop nut engages the end wall and thereby prevent movement of the ram and bearing support away from said vertical plane when fluid pressure is released from said motor.

3. In a bearing assembly for supporting a tubular body for rotation about its central axis and upon foundation structure by means including a pair of roller bearings arranged with one on each side of a vertical plane through the body axis and with each roller axis aligned parallel to the body axis, a bearing support slidably mounted upon a generally horizontal surface of a foundation structure, a fluid pressure operated motor rigidly anchored to the foundation structure outward of the bearing support with respect to the vertical plane, the motor containing a piston and a threaded ram connected thereto and projecting through a motor end wall facing the bearing support and toward engagement with said bearing support, a stop nut turned on the portion of the ram projecting outwardly of the motor end wall, a pin projecting from the end of the ram facing the bearing support and eccentric to the central axis of said ram, and a seat in the bearing support for receiving the pin with the pin parallel to the surface of the foundation structure, and said pin and said seat each having a diameter of less than one-half the diameter of the ram.

4. In a bearing assembly for supporting a tubular body for rotation about its central axis and upon foundation structure by means including a pair of roller bearings arranged with one on each side of a vertical plane through the body axis and with each roller axis aligned parallel to the body axis, a bearing support slidably mounted upon a generally horizontal surface of a foundation structure, a fluid pressure operated motor rigidly anchored to the foundation structure outward of the bearing support with respect to the vertical plane, the motor containing a piston and a threaded ram connected thereto and projecting through a motor end wall facing the bearing support and toward engagement with said bearing support, said piston having an end surface area for exposure to fluid pressure that is at least twice the surface area of the end of the ram that engages the bearing support, a stop nut turned on the portion of the ram projecting outwardly of the motor end wall, a pin projecting from the end of the ram facing the bearing support and eccentric to the central axis of said ram, and a seat in the bearing support for receiving the pin with the pin parallel to the surface of the foundation structure, and said pin and said seat each having a diameter of less than one-half the diameter of the ram.

5. In a bearing assembly for supporting a tubular body for rotation about its central axis and upon foundation structure by means including a pair of roller bearings arranged with one on each side of a vertical plane through the body axis and with each roller axis aligned parallel to the body axis, a bearing support slidably mounted upon a generally horizontal surface of a foundation structure, a fluid pressure operated motor rigidly anchored to the foundation structure outward of the bearing support with respect to the vertical plane, the motor containing a piston and a threaded ram connected thereto and projecting through a motor end wall facing the bearing support and toward engagement with said bearing support, said piston having an end surface area for exposure to fluid pressure that is at least twice the surface area of the end of the ram that engages the bearing support, a stop nut turned on the portion of the ram projecting outwardly of the motor end wall, a smooth surface antirotation pin projecting from the end of the ram facing the bearing support and eccentric to the central axis of said ram, and a smooth bore seat in the bearing support for receiving the pin with the pin parallel to the surface of the foundation structure, and said pin and said seat each having a diameter of less than one-half the diameter of the ram.

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FRANK SUSKO, *Primary Examiner.*