This invention relates to a revolving ironer or drier of the drum or cylinder and roll type and more particularly to means for uniformly heating the cylinder.

The controlled and uniform heating of the surface of the cylinder of a cylinder and roll ironer presents a serious problem. Formerly very complicated and expensive devices and arrangements have been proposed to accomplish this highly important result.

One of the simplest means for heating the cylinder of a cylinder and roll ironer is a gas flame inside the hollow cylinder, but this results in extremely non-uniform heating. Many of the proposals have been designed to overcome the defects of this simple means.

It will be appreciated that both hot spots, that is, areas which may scorch or burn the fabric being ironed, and cold spots which will not sufficiently heat the fabric are to be avoided. For best results it is not sufficient merely to avoid hot spots which will burn and cold spots which will not iron or dry the fabric but even relatively hot and cold spots should be avoided. The heat should be supplied in such a way that the temperature of an area of the cylinder from which heat is abstracted relatively rapidly due to uneven distribution of the damp cloth on the surface of the cylinder will be quickly brought back to or maintained at substantially the same temperature as other areas from which much less heat is abstracted in the ironing operation. One way to accomplish this result is by contacting the inner surface of the cylinder wall with a relatively large volume of heating fluid at a uniform temperature which is not materially above the desired temperature of the ironing surface of the cylinder. In this way a large amount of heat may be supplied to areas that need it while avoiding the possibility of overheating other areas.

The proposals for effecting a uniform heating of the cylinder include injecting not a flame but merely hot gas such as hot combustion gas from a flame situated outside the cylinder into the cylinder, the use of a central heating tube rotating with the cylinder and provided with evenly distributed openings through which flame or hot combustion gas passes to one end of the cylinder and then back along the cylinder wall, and the provision of a water or steam jacket in contact with the inner wall of the cylinder, and means for heating the fluid in the jacket or for supplying hot fluid to the jacket.

The present invention represents a considerable simplification as compared with the prior proposals and at the same time provides a highly uniform heating of the cylinder which is controllable to a high degree to maintain or vary at will the operating temperature of the cylinder.

The invention, in its simplest embodiment, comprises a hollow cylinder provided with a central imperforate tube having a gas burner at one end and open at the other end within the cylinder to permit the hot gas to flow from the burner through the inner tube to the open end thereof and then back between the cylinder and tube to an outlet. The invention is characterized by its extreme simplicity compared to its efficient operation and its freedom from parts which may wear out and require replacement or fail to function efficiently.

The invention is embodied in a single cylinder ironer illustrated in Figs. 1 and 2 and in a double cylinder ironer illustrated in Figs. 3 and 4, in the latter of which one cylinder is like the single cylinder of the ironer illustrated in Figs. 1 and 2 and the other cylinder is a simple hollow cylinder, without any central tube, through which the hot gas from the first cylinder passes.

In the drawing:

Fig. 1 is a vertical section through the axis of the cylinder of a single cylinder ironer.

Fig. 2 is a right end elevation of the ironer of Fig. 1.

Fig. 3 is a section on a plane through the axes of the cylinders of a two cylinder ironer, and Fig. 4 is a left end elevation of the ironer of Fig. 3.

Referring to Figs. 1 and 2, 1 is the main ironing cylinder mounted on trunnions 2 and 3 carried by bearing blocks 4 and 5 supported by the legs 6 and 7. Illustration of conventional means for rotating the cylinder is omitted in order to simplify the showing of the invention. Small rolls 8 are mounted on a supporting structure (not shown) to cooperate with cylinder 1. Within the cylinder 1 is the cylindrical tube 9 axially supported therein by the arms 10. The tube 9 extends to the right end of the cylinder as it appears in Fig. 1 and communicates with the hollow trunnion 3. The other end of the tube 9 stops short of the other end of the cylinder 1, leaving the space 11 between the closed end of cylinder 1 and the end of the tube 9. A stationary housing 12 is fitted around the trunnion.
3 and against the end of cylinder 1, with a sliding contact, to receive the used heating gas (products of combustion) and convey it to the flue 13. The gas burner 14 is carried on the end of the pipe 15 which extends through the hollow trunnion 3 and positions the burner in the end of the tube 9. Pipe 15 connects with transverse pipe 16 supported by brackets 17 which in turn are supported by the bearing 5. Pipe 16 connects to the mixer 18 which comprises two valves 19 and 20 for controlling the supplies of air and gas (not shown) and these valves may be electrically controlled to increase or decrease the amount thereof and consequently the size of the flame delivered by the burner 15 in response to the action of the thermostat 21 which is in heat transfer relationship to the gas passing through the flue 13.

In operation, the cylinder 1 is rotated, burner 14 started and the thermostat 21 set for the desired temperature. The tube 9 protects the wall of cylinder 1 against contact with the extremely hot gas of the flame issuing from the burner 14 and prevents any immediate heating of the surface of the cylinder by the flame. By the time the products of combustion produced by the burner 14, mixed, if desired, with air admitted through the trunnion 3, reach the opposite end of the tube 9 they have become thoroughly mixed and pass through the chamber 11 and back between the tube 9 and cylinder 1 to the casing 12 and flue 13. The temperature of the products of combustion or their mixture with air admitted through trunnion 3 may be regulated by regulating the size of the flame or the admission of air or both so that the temperature of the gas mixture in the chamber 11 is not sufficiently higher than the desired temperature of the cylinder to give rise to uneven heating of the cylinder. The hot gas passes fairly uniformly around the tube 9 and there is ordinarily, in conventional apparatus in which the space between tube 9 and cylinder 1 is not too great, sufficient turbulence to keep it uniformly mixed and prevent any unequal heating of the cylinder circumferentially. The rotation of the cylinder, of course, favors uniform heating. There is very little temperature difference between the ends of the cylinder which might be expected as a result of the fact that the heating gas is being cooled as it passes from the chamber 11 to the housing 12. This may be explained by the fact that the gas passes fairly rapidly and carries a large surplus of heat so that its temperature does not drop materially and further by the fact that the tube 9 is definitely hotter at the end adjacent the burner than at the other end, and by transferring more heat to the gas in the region adjacent the burner than at the opposite end of the cylinder tends to maintain it at a uniform temperature. Regardless of the cause, it is a fact that the cylinder 1 is heated quite uniformly around its circumference from end to end.

Referring to Figs. 3 and 4, it will be seen that the lower cylinder of Fig. 1 but the housing 22 instead of leading to a flare delivers the gas to the second cylinder 23. Cylinder 23, like cylinder 1, is carried by trunnions 24 and 25 supported by the legs or frame 26 and is rotated by conventional means (not shown). Cylinder 23, however, has no central tube like tube 9 of cylinder 1 and the hot gas simply passes through it and to the housing 21 and flue 28. The thermostat 21 is in the housing 22. In this modification, illustrated in Figs. 3 and 4, the rollers 29 cooperating with cylinder 1 are located around the lower side of it and rollers 30 cooperating with cylinder 23 are located around its upper side. Cylinder 23 is connected to its trunnions 24 and 25 through the arms 31 and 32.

In the operation of the double ironer of Figs. 3 and 4, the hot combustion gas from the burner 14 which operates under the control of the adjustable thermostat 21 located in heat transfer relationship and which does not impinge against the wall of tube 9, the heating of the cylinder 1 is uniformly high and there is no need of other measures or means, other than the admission of air through the trunnion 3, for regulating the temperature of the gas to secure uniform heating. In the two cylinder ironer of Figs. 3 and 4, the second cylinder 23 is uniformly heated because the gas which heats it is at a uniform temperature only slightly above the desired temperature of the cylinder as a result of its passage through tube 9 and the space between tube 9 and cylinder 1.

There may be a slight temperature difference between the two ends of cylinder 23 due to the cooling of the gas as it passes through it, but this difference is not sufficient to produce a noticeable difference in the ironing results in normal operation of the ironer.

The essence of the invention, as previously indicated, is its extreme simplicity and freedom from operating parts which may give rise to difficulties or shorten the life of the ironer. Features of the ironer which contribute to its success are the size and shape and direction of the burner flame with respect to the size of the tube 8, the provision for a free flow of the combustion gas with air drawn in through the trunnion, through the tube 9, the ample openings between the arms 10, the ample chamber 11 and the space between tube 9 and cylinder 1. It will be appreciated that considerable variation in the size of the ironer and in the relative sizes of the parts is permissible so long as the general plan, as illustrated, of avoiding any impingement of flame from the burner against the cylinder or the tube 9 and providing for a free flow of hot combustion gas with free admission of air for mixing with and tempering the combustion gas is adhered to.

1 claim:

1. A revolving ironer and drier comprising a cylinder the outer surface of which provides an ironing surface, a tube concentrically supported within the cylinder by a plurality of spaced arms rigidly attached to the tube and cylinder whereby the tube and cylinder revolve together, said cyl-
inder being closed at one end and one end of said tube being open and terminating short of said closed end of the cylinder to provide a chamber through which said tube communicates with the space between the tube and the cylinder, a flame producing burner positioned axially adjacent the other end of the tube, said burner being adapted to produce a flame which is small in diameter relative to the diameter of the tube and extends axially of said tube, a hollow trunnion supporting the end of the cylinder opposite said closed end and communicating with said tube, and means for discharging gas from the space between the tube and cylinder at the end opposite said closed end.

2. A revolving ironer and drier comprising a first cylinder the outer surface of which provides an ironing surface, means for rotatably supporting said first cylinder comprising a hollow trunnion at one end thereof the diameter of which is smaller than that of said cylinder, a tube the diameter of which is smaller than that of said cylinder axially supported therein by spaced radial arms and having one end in communication with the outer atmosphere through said hollow trunnion, the other end of said first cylinder being closed, and the other end of said tube terminating short of the closed end of the cylinder, a fuel burner positioned in the end of the tube adjacent said hollow trunnion and adapted to project a flame which is small in diameter relative to the diameter of the tube axially of said tube and toward the opposite end thereof, a housing surrounding said hollow trunnion and enclosing the remainder of the adjacent end of said first cylinder, a second rotatably mounted cylinder the outer surface of which provides an ironing surface, said second cylinder being open at both ends, and a housing enclosing one end of said second cylinder and communicating with said housing enclosing an end of the first cylinder.

TIMOTHY J. SULLIVAN.