June 17, 1947. F. W. GRANTHAM 2,422,481

MEANS FOR AND METHOD OF APPLYING HEAT TO IRONING MACHINES

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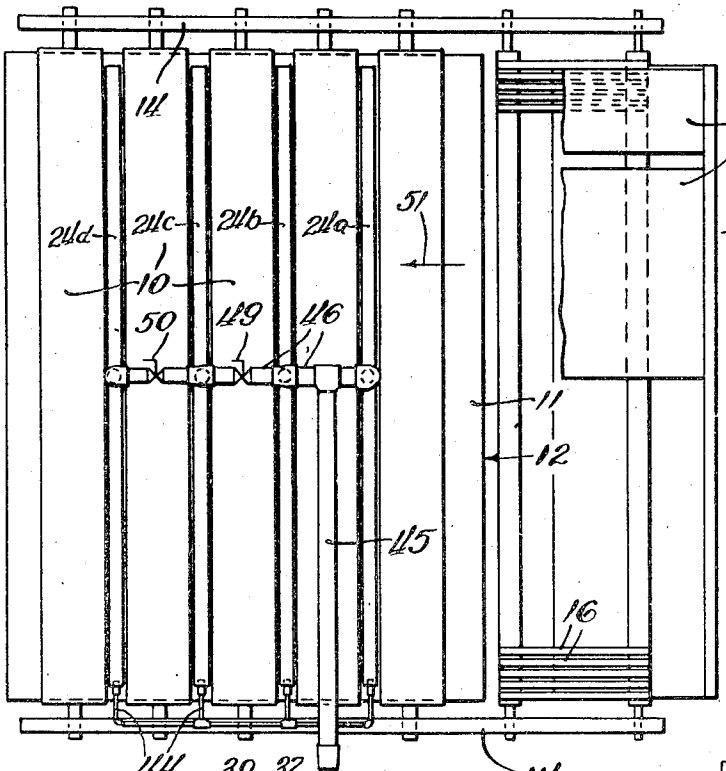


Fig. 1.

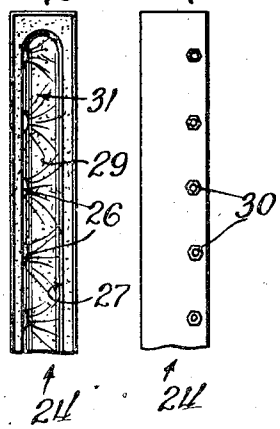


Fig. 4.

Fig. 5.

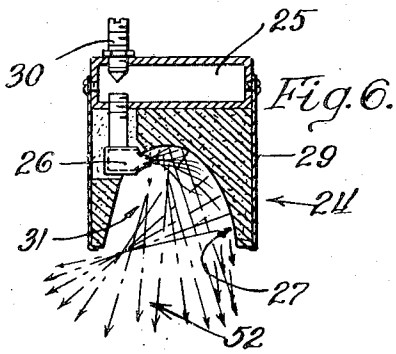


Fig. 6.

Fig. 2.

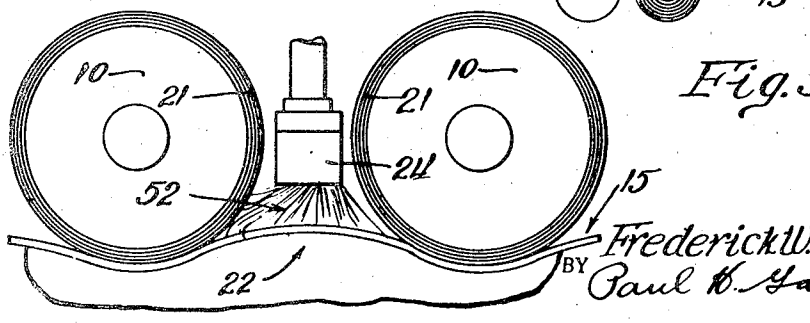


Fig. 3

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MEANS FOR AND METHOD OF APPLYING HEAT TO IRONING MACHINES

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3 Claims. (Cl. 38—56)

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This invention relates to means for and method of applying heat to ironing machines.

The present method of ironing in commercial or industrial laundries consists of bringing the work to be ironed into sliding contact with a steam heated ironing surface by a series of rolls. The work must be wet when ironed for proper ironing effect, and the ironer must therefore dry the work as well as iron it. The temperature of the steam heated ironing surface can be raised only to a limited extent, and the rate of drying of the work is correspondingly limited.

The method of the present invention involves the application of combined radiant and convection heat to the work as it is being ironed with tremendous increases in speed of ironing. By employing the method of the present invention the increase in speed of present ironing machines is limited only by the mechanical limit of the machines themselves. The radiant and convection heat are produced by a novel gas burner which can be installed in any existing ironing machine, and the machine need not be specially designed.

The method consists in subjecting the work to be ironed to intense heat for a short period of time. The intense heat sterilizes the work, killing all disease germs, and the time that the work is subjected to the heat is short enough that is is not scorched or otherwise impaired. By using this method of sterilizing instead of other methods a material increase in the life of the fabrics is effected. Chlorine and other sterilizing solutions have a detrimental effect, by impairing the strength of the fibers of fabrics and thereby shortening their life.

The burners employed with this method are of the refractory type wherein premixed gas and air are directed onto the surface of the refractory where it burns and brings the surface of the refractory up to incandescent temperature. Infra-red rays are emitted from this surface.

The separate burners are individually controllable so that various intensities of heat can be produced at different points along the ironing path; more heat is required at the start where the work is wettest, and less toward the end where it is dry.

The burners are placed between the rolls of the ironer so that the infra-red rays, which are radiant heat, are directed onto the work being ironed. The distribution of heat along the travel of the work being ironed can be adjusted to suit various requirements.

The heat generated by this method is sufficient to evaporate all moisture in the form of dry steam, or vapor. This eliminates the undesirable effects of wet steam on the operators, and aids materially in speeding the drying.

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Summarizing, the objects of the invention are: to sterilize the work being ironed; to increase the life of the fabrics; to increase the speed of present ironing machines with attendant savings in labor, floor space and investment.

Now, in order to acquaint those skilled in the art with the manner of constructing and employing my invention, reference may be had to the following detail description, taken in conjunction with the accompaning drawings, in which:

Figure 1 is a plan view of the essential parts of an ironing machine showing the burners of the present invention in position;

Figure 2 is an end view of the same;

Figure 3 is an enlarged end view of a portion of the ironing machine and burners with the work being ironed shown exaggerated;

Figures 4 and 5 are top and bottom views, respectively, of a portion of a burner; and

Figure 6 is an enlarged cross sectional view of the burner.

Referring now in detail to the drawings, the essential features of the ironing machine consist of a series of rolls 10 and an ironing surface 11 which forms the upper surface of a steam heated chest 12. The rolls 10 are mounted in a suitable frame 14 and are rotated by suitable power means not shown here. The steam chest 12 is an enclosed metal container into which steam is driven for heating the upper surface 11.

Towels 15 or other flat work, to be ironed are fed into the ironing machine over feeder belts 16 from which they enter the machine at 17 over the ironing surface 11 and under the rolls 10 and emerge at 19, the rolls being rotated and the towels traveling in the direction indicated by the arrows. Tapes 20 are threaded under the rolls and over the ironing surface and towels and travel with the rolls to assure that the towels are carried through the ironing machine and to prevent them from wrapping around the rolls.

The rolls are provided with padding 21 and are brought to bear against the towels and ironing surface by spring pressure or other suitable means. The pressure of the rolls forces the towels to conform to the corrugations 22 throughout their travel through the machine by which action the towels are in firm and sliding contact with the ironing surface over all its area.

Reference is made to towels, but it will be understood that any kind of flat work can be ironed, whether towels, sheets, etc., and the fabrics being ironed are referred to herein as "work."

The foregoing describes the conventional ironing machine as it is being used in commercial and industrial laundries today. Many shortcomings are present and have been recognized for a long time to be serious.

With steam heat the temperature to which the ironing surface can be brought is limited. The towels must of course be wet for proper ironing and the ironer must dry them. To increase the drying of the towels I put novel radiant burners 24 in between the rolls 10. These burners generate both infra-red rays (radiant heat) and convection heat. The burners operate on a premix principle, i. e., air and gas are mixed to proper combustion proportions and delivered under pressure to the manifold 25 from which the mixture is forced through jets 26 and onto the surface 27 of refractory 29. The burning of the gas on the surface of the refractory brings the surface up to incandescent temperature (about 2500°) from which infra-red rays or radiant heat is emitted. There is in addition convection heat generated as in an ordinary gas burner. Individual shut-offs 30 extend through the manifold for shutting off separate jets so that the total capacity of the burners can be cut down. Figures 4 and 5 show how a burner appears, showing a series of jets and shut-offs. With all the jets open the entire length of the channel 31 becomes radiant. A great advantage of this feature is that there is even distribution of heat along the burner, and entire elimination of "spotted" or "bunched" heat.

However, with individual shut-offs provided for the separate jets, the radiant portions can be spaced along the length of the burner, if desired, for directing heat in only a portion of the width of the ironer when narrow work is being ironed.

The novel construction and design of the burner render it exceedingly effective in drying in an ironer—a very compact device capable of generating a great amount of heat in a small space.

The gas and air mixture is developed by a blower 35 operated by a motor 36 which delivers the mixture under pressure to the manifolds 25. An air shutter 37 and a gas adjusting valve 39 are employed so that relative adjustment with respect to each other brings about the proper proportions of gas and air for ultimate complete combustion in the burners. A pressure diaphragm valve 40 and an atmospheric gas pressure regulator 41 are employed in the gas line 42 for controlling the flow of gas. Preferably, the motor 36 is hooked in with the power unit of the ironing machine so that the burners will turn on and off with the ironing machine. Pilots 44 automatically light the burners when the ironing machine starts up.

The mixture of gas and air on leaving the blower 35 passes through the line 45 to the header 46 and the separate burners 24. Turn-down valves 49 and 50 are placed in the header 46 to control the amount of flow to the burners 24c and 24d. The towels pass through the machine in the direction indicated by the arrow 51. At the entrance of the machine the burners 24a and 24b can be turned on full force without damage to the towels or rolls, for at this point the towels are the wettest and will take more heat. As the towels travel along they become drier

and consequently the amount of heat applied to them must be less. Turn-down valves 49 and 50 can be individually regulated for cutting down the capacity of the burners 24c and 24d. An advantageous feature of this novel burner is that they are adapted to a wide range in turn-down, and accurate control. This arrangement therefore allows progressively decreasing the heat as the work being ironed becomes drier. In addition to this control, shut-offs 30 can be operated to regulate the total capacity of my burner. This regulation controls both the amount of infra-red rays and convection heat.

As shown in Figure 3 the burner 24 is inverted and placed in between adjacent rolls 10 so that the infra-red rays are directed onto the towels 15. The paths of the infra-red rays are indicated by the lines 52 (see also Fig. 6). The height of the burners above the towels determines the intensity of the infra-red rays applied to the towels. The surface of the refractory 24 reaches a temperature of 2500° F., and at a short distance of several inches from this surface the towels are exposed to a temperature of about 1000° F. This intense heat has a quick drying effect, and the towels are subjected to it for only a short time—too short to cause damage to them by scorching.

The width of the burners is such as to almost fill the space between the rolls. The burners then act to confine the convection heat at the surface of the towels. Convection heat, which is also generated by the burner, is also effective in drying the work.

With this method of drying, speeds of production never before heard of have been attained. Ironers are operated at their maximum mechanical limits with the burners operating at far below their limit. The advantages and savings are too apparent to need elaboration, such as saving in floor space, more production for investment, and tremendous savings in labor.

Another and just as important advantage lies in the sterilizing effect produced by this method of drying. Intense heat will kill disease germs long before it will injure the fabric of the work being ironed. The length of time that the work is subjected to the heat is sufficient that all disease germs will be killed. The prevailing methods of sterilizing employ chlorine and other solutions. Chlorine damages the fibers of the fabrics and shortens their life, and the loss by such procedure reaches great proportions in large establishments. The method of the present invention overcomes this great loss.

While I have set forth above a particular means and method of carrying my invention into effect, it is to be understood that they are illustrative and not limiting, and that various changes in detail and substitution of equivalents can be made without departing from the spirit and scope of the invention.

I claim:

1. The method of applying heat to work being ironed in an ironer in which the work enters wet, passes through the ironer, and emerges dry, which comprises directing infra-red rays onto the work being ironed to a relatively great extent at the entrance of the ironer where the work enters wet and the moisture content is greatest, and to a progressively lesser extent at successive points along the ironer so that the work is subjected to progressively less heat as it passes through the ironer and the moisture content of the work decreases.

2. Means for applying heat to work being ironed in an ironer which includes a series of rolls and an ironing surface and in which the work being ironed passess successively between the rolls and ironing surface, the work being dried as it passes through the ironer, comprising burners positioned between adjacent rolls, the burners generating heat and being arranged so as to direct the heat onto the work being ironed as it passes from one roll to another and means controlling individual burners in such manner as to regulate the amount of heat applied to the work in proportion to the amount of moisture retained in the work along its path through the ironer.

3. The method of applying heat to work being ironed in an ironer in which the work enters wet, passes through the ironer, and emerges dry, which comprises directing heat downwardly onto and confining it above the surface of the work being ironed to a relatively great extent at the entrance of the ironer where the work enters wet and the moisture content thereof is greatest, and to a progressively lesser extent at successive points along the ironer so that the work is subjected to progressively less heat as it passes through the ironer and the moisture content of the work decreases.

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