

Feb. 20, 1934.

W. R. REDD

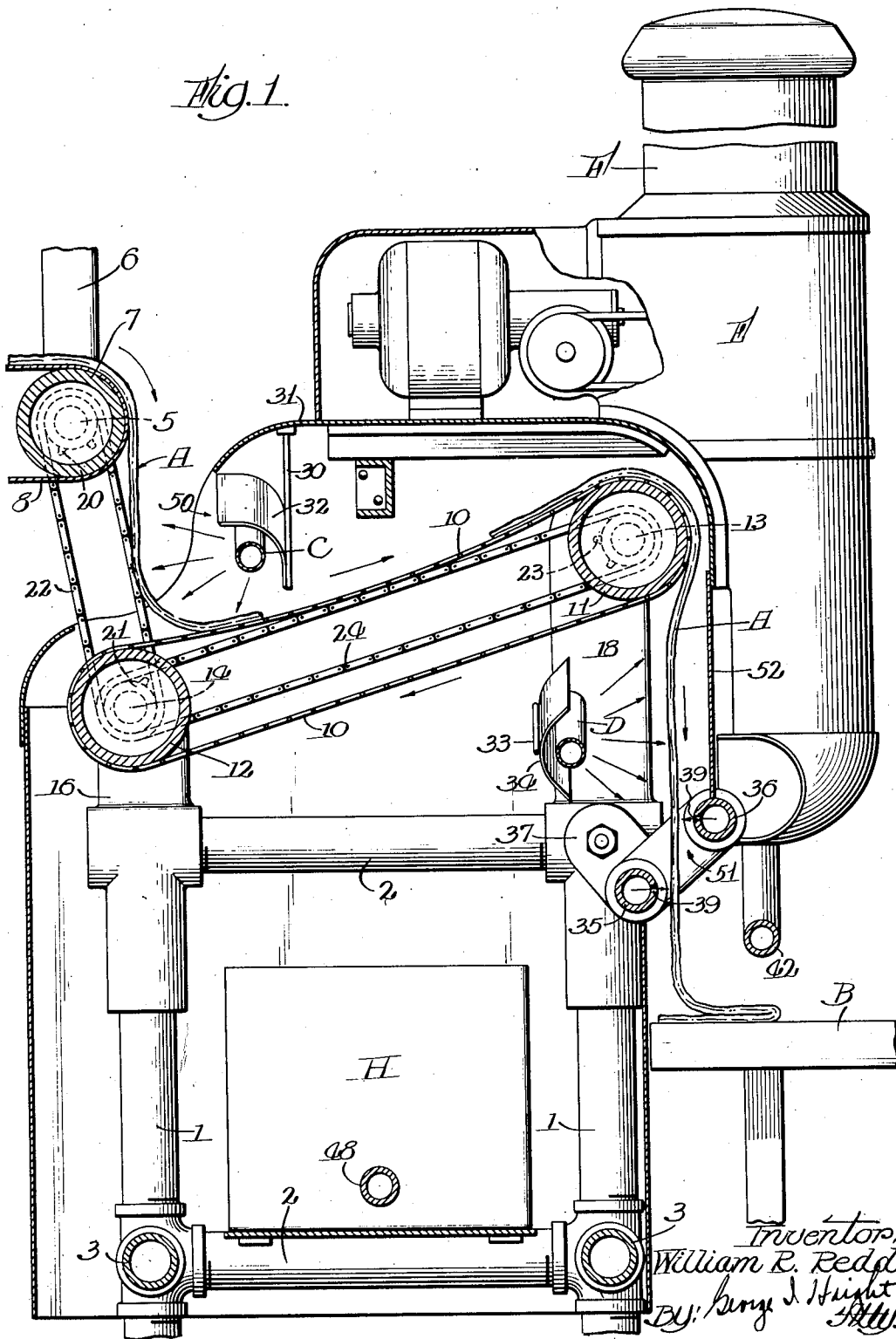
1,948,239

APPARATUS FOR SUBJECTING CLOTHES TO ULTRA-VIOLET
RADIATION AND OZONE IN LAUNDRY OPERATIONS

Filed May 12, 1932

2 Sheets-Sheet 1

Fig. 1.



Inventor:
William R. Redd
By: Roy J. Hight
Att.

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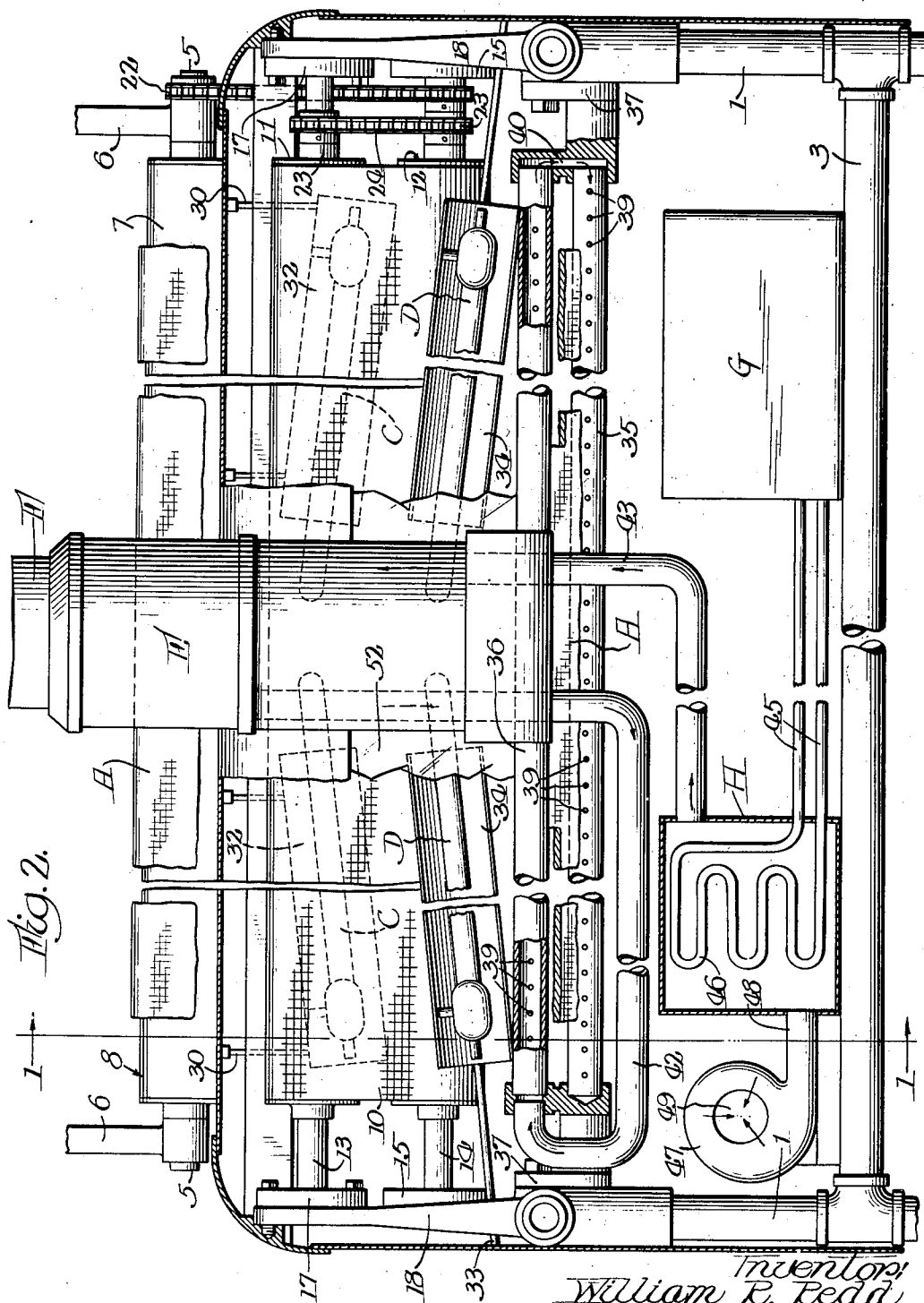


Fig. 2.

Inventor:
 William R. Redd
 BY: George J. Haight Atty.

UNITED STATES PATENT OFFICE

1,948,239

APPARATUS FOR SUBJECTING CLOTHES TO
ULTRA-VIOLET RADIATION AND OZONE
IN LAUNDRY OPERATIONSWilliam R. Redd, Western Springs, Ill., assignor
to Milprint Products Corporation, Milwaukee,
Wis., a corporation of Wisconsin

Application May 12, 1932. Serial No. 610,971

7 Claims. (Cl. 68—11)

My invention relates to an apparatus or machine which is used in power laundries for the treatment of clothes and fabrics by exposure to artificially produced ultra-violet radiation and ozone.

My object primarily is to provide a machine or apparatus which is positioned to receive the clothes from any of the operations of the laundry, preferably the mangling operation and to subject the clothes to ultra-violet radiation while the clothes are moving and in a continuous operation, without interfering with or slowing down the movement of the clothes as they are handled in the laundry.

A further object of my invention is to provide, in the above apparatus, means for subjecting both sides of the clothes passing therethrough to treatment of ultra-violet radiation and ozone.

A further object is to provide, in association with an ozone generator, means for subjecting the air entering the ozone generator to de-humidification so that the production of ozone for the purpose will not be affected by seasonal conditions of the atmosphere or temperature and humidity conditions of the air in the laundry rooms.

A further object is to provide a unitary portable structure in which the various parts are associated in compact operative relation, easily accessible for inspection and repair or renewal.

Other objects of the invention will appear hereinafter.

My invention is illustrated as embodied in the structure shown in the accompanying drawings, in which

Fig. 1 is a vertical, sectional view of an apparatus embodying my invention, taken substantially on the line 1—1 of Fig. 2, and

Fig. 2 is a front view of the structure partly in section and partly broken away to better disclose the relation of the essential operating parts.

In the structure shown in the drawings, I have associated together in co-operative relationship means constituting a source of ultra-violet radiation for the purpose of treating the clothes, means for generating ozone and subjecting the clothes to the treatment of ozone; a means for treating the air supplied to said generator to a process of de-humidification so that the seasonal or humidity conditions within the room do not affect the production of ozone, and means for continuously receiving the clothes to be treated and passing them in proper relation to radiation from said source of ultra-violet radiation and to the ozone treating means, and discharging the

treated clothes in a manner convenient for the operator to handle them.

These parts are all associated in a suitable compact relation and mounted upon a frame which renders the structure portable so that it may be conveniently positioned for operation in conjunction with other laundry machinery. The frame in the construction shown includes two end sections of rectangular formation, composed of vertical posts or uprights 1 connected by upper and lower horizontal members 2. The two end sections are held in rigid relation by upper and lower horizontal members 3 extending from one end section to the other. The various parts of the frame are preferably made up of pipe connected by suitable fittings but, of course, this frame may be constructed in any desired manner.

The rear of the structure is positioned beneath a horizontal shaft 5 which is mounted in suitable bearings in the frame members 6. The shaft 5 carries a large roll 7 around which an endless receiving belt 8 is intended to travel. These parts represent the delivery end of some machine in the laundry which performs a preceding operation, such as the flat-work mangle.

In the structure shown, the clothes A are discharged from the mangle belt 8 downwardly by gravity as the belt travels around the roll 7, and they are fed to the upper rear side of the continuously moving belt 10 of a conveyor mounted in the frame. This belt 10 travels around the forward and rear rolls 11 and 12 respectively, which are carried by the shafts 13 and 14 respectively. The rear conveyor shaft 14 is mounted in suitable bearings 15 at each end, which bearings are supported in upright members 16 of the frame. In like manner the forward shaft 13 is mounted in suitable bearings 17 in forward uprights 18 of the frame, this shaft being positioned higher in the frame so that the belt is inclined generally upward toward the front of the machine.

The belt may be driven in any suitable manner for the purpose but I find it advantageous to connect it with the mangle from which the clothes are received so that its speed of operation will be maintained in unison with that of the mangle. The mangle shaft 5 and the rear shaft 14 are provided with sprockets 20 and 21 around which the chain 22 travels to drive the conveyor roll 12. Both of the shafts 13 and 14 are likewise provided with sprockets 23 around which a drive chain 24 travels so that the forward roll of the conveyor will be driven accordingly and motion imparted to the conveyor belt

10 in the direction of the arrow shown in Fig. 1. The belt 10 is preferably formed of metal such as woven or interlinked wire so that in the course of continuous operations it will not become dampened or wet by clothes coming from the mangle in a partially dry condition.

The rear end of the conveyor belt 10 is positioned below the mangle belt 8 so that the clothes A will be fed onto the upper reach of this belt. The clothes are then carried forward by the belt 10 and discharged downwardly from the forward end of the conveyor, as shown more clearly in Fig. 1. In leaving the forward end of the conveyor, the clothes discharge substantially vertically downward onto a suitable receiving table from which they are taken by the operator to be wrapped in bundles.

In the present apparatus, the clothes are treated on both sides with both ultra-violet radiation and ozone. A group of lamps C extending substantially the width of the conveyor are positioned above the rear end of the conveyor so as to direct their radiation upon quite an expanse or area of one side of the clothes as the clothes feed downwardly from the mangle onto the conveyor belt 10. These lamps, which constitute a source of ultra-violet radiation may be of any suitable type for the purpose, but I prefer to use the type of lamp known as the Cooper-Hewitt mercury vapor lamps which are generally recognized as lamps suitable as a source of ultra-violet radiation. These lamps are in the form of straight vacuum tubes and two of them are arranged end to end to provide radiation throughout the width of the conveyor belt. These lamps may be mounted in any suitable way in the machine. I have shown them as suspended by the bracket members 30 from the housing 31 which encloses the entire structure. The bracket members 30 also support suitable reflectors 32, positioned in proper relation to the lamps to deflect their radiation onto the clothes as they pass the lamps.

The rear lamps thus described are positioned as before mentioned to project radiation upon and treat the upper surface of the clothes A as they travel from the mangle onto the conveyor belt 10. In order now to treat the other side of the clothes in like manner to ultra-violet radiation, I position a similar group of lamps D in the forward portion of the machine immediately adjacent the rear side of the clothes A as they feed vertically downwardly from the conveyor 10. These lamps are similar to the lamps C and their radiation is distributed throughout the width of the structure by the use of two lamps. They are positioned beneath the forward end of the conveyor adjacent the path of the moving clothes but on the opposite side thereof and are supported by the bars 33. Curved reflectors 34 are likewise provided to deflect radiation from the lamps to the face of the clothes A while these clothes are in vertical position in discharging from the forward end of the conveyor. Thus both sides of the clothes are equally treated by subjection to exposure from the ultra-violet lamps C and D.

Immediately below the forward lamps D, I provide two long, horizontally disposed tubes or pipes 35 and 36 which are supported by brackets 37 mounted in the frame. These tubes are spaced apart sufficiently so that the clothes feeding downwardly from the forward end of the conveyor will pass between the two pipes. Each pipe is provided with a longitudinal series of

small, closely spaced holes or openings 39 which form nozzles and which are directed toward opposite sides or surfaces of the clothes A and spray numerous jets of ozone against the moving clothes. At one side of the machine, the bracket 37 is formed as a manifold 40, connecting the corresponding ends of the two pipes 35 and 36. At the opposite end the pipe 35 is closed while the end of the pipe 36 is connected by a pipe 42 with a source of ozone supply.

The ozone for this purpose may be supplied by any suitable type of generator. I prefer, however, to utilize the type of ozone generator which constitutes the subject matter of my co-pending application Ser. No. 626,371 filed July 30, 1932. In the present machine, this ozone generator is mounted upon the forward or front side of the frame, preferably in the center thereof. The generator is represented by the housing E which is vertically positioned and carries at its upper end a dome F through which air is circulated for treatment to an electric discharge for the purpose of generating ozone. The pipe 42, as shown more clearly in Fig. 2, extends upwardly and connects with the discharge outlet of the ozone generator so as to supply ozone to the spray nozzle pipes 35 and 36. The intake of the ozone generator is connected by means of the pipe 43 to a supply of air which is subjected to a de-humidifying process for the purpose of removing the moisture from the air prior to its admission to the ozone generator.

In the generation of ozone, as is well known, the presence of moisture in air which is subjected to an electrical discharge detrimentally affects the process. For this reason, I treat the air to de-humidification by refrigerating it, prior to its being supplied to the ozone generator. Any suitable means for chilling or reducing the temperature of the air to the desired degree may be used for this purpose. I prefer, however, to associate a refrigerating mechanism with this structure by mounting in the base portion thereof a complete refrigeration unit. This refrigerating mechanism is represented by the structures G and H, G being the operating unit and H being the cooling chamber through which the air is passed. The cooling chamber H is connected by the pipes 45 with the operating unit and these connecting pipes carry the refrigerant to coils 46 within the chamber H. The outlet of the cooling chamber H is connected to the pipe 43 for supplying air to the ozone generator. The inlet for the cooling chamber is through a suitable blower 47 mounted in the lower portion of the frame. The outlet 48 of the blower is connected to the chamber H and the blower inlet through which the atmospheric air enters is through the opening 49 of the blower. The blower supplies the proper pressure for circulating the air and ozone through the system.

The housing 31 hereinbefore referred to may be arranged to enclose substantially the entire operating parts so as to protect said parts and present a finished appearance for the structure. The rear wall of the housing has an opening 50 through which the clothes are fed from the mangle to the rear end of the conveyor belt. The discharge opening 51 at the front of the machine is effectively formed by the space between the ozone spray nozzle pipes 35 and 36, the upper and lower portions of the front wall of the housing being offset accordingly. If desired, a window opening, covered by glass 52, can

be provided in the upper front wall of the housing to permit observation of the clothes by the operator as they feed downwardly from the conveyor. This window also permits a certain amount of radiation to permeate the room outside of the machine and makes the operating conditions pleasant for the operator.

It is obvious that changes may be made in the construction and operation of parts without departing from the spirit of the invention and it is understood that I contemplate such changes as fairly fall within the scope of the applied claims.

I claim:—

1. An apparatus of the class described, including, in association, a continuously traveling belt conveyor adapted to receive the clothes to be treated at its rear end and discharge them at its forward end; lamps constituting sources of ultra-violet radiation arranged adjacent said belt conveyor, and positioned to direct their rays upon opposite sides of said clothes, and an ozone-generating device having means disposed on opposite sides of the clothes as they leave the belt conveyor for directing ozone upon both sides of the clothes.

2. An apparatus of the character described, including, in association, an endless, substantially horizontally disposed belt carrier adapted to receive clothes at its rear end upon its upper side and discharge the clothes from its forward end so that the clothes leave the conveyor in a substantially vertical direction, lamps constituting a source of ultra-violet radiation positioned at the rear of said belt carrier adjacent its upper side to direct radiation upon the upper side of the clothes as they are received upon the conveyor, additional lamps producing ultra-violet radiation positioned beneath the forward end of the belt carrier to direct their radiation upon the opposite side of the clothes as they leave the conveyor, ozone spraying means disposed adjacent the path of the clothes as they leave the conveyor, spaced apart to permit the clothes to pass therebetween, for directing ozone upon both sides of the clothes, and means for supplying ozone to said spraying means.

3. An apparatus of the character described, including, in association, a frame having horizontally disposed rotating rolls at its front and rear portions, an endless belt traveling around said rolls and forming a continuously moving conveyor, means for delivering the clothes at the rear of said conveyor on the upper side thereof; lamps constituting a source of ultra-violet radiation positioned above the rear of said conveyor to direct their radiation upon the clothes as they are received upon the conveyor; additional ultra-violet radiation lamps positioned beneath the forward end of the conveyor to direct their radiation upon the opposite side of the clothes as the clothes leave the forward end of the conveyor in a substantially vertical direction, horizontally disposed pipes arranged in parallel relation and spaced apart to let the clothes pass therebetween as they leave the conveyor, and having nozzle openings distributed along their length to direct jets of ozone against the opposite surfaces of the clothes, and means for supplying ozone to said pipes.

4. An apparatus of the character described, including, in association, a frame having horizontally disposed rotating rolls at its front and rear portions, an endless belt traveling around said rolls and forming a continuously moving convey-

or, means for delivering the clothes at the rear of said conveyor on the upper side thereof; lamps constituting a source of ultra-violet radiation positioned above the rear of said conveyor to direct their radiation upon the clothes as they are received upon the conveyor; additional ultra-violet radiation lamps positioned beneath the forward end of the conveyor to direct their radiation upon the opposite side of the clothes as the clothes leave the forward end of the conveyor in a substantially vertical direction, horizontally disposed pipes arranged in parallel relation and spaced apart to let the clothes pass therebetween as they leave the conveyor, and having nozzle openings distributed along their length to direct jets of ozone against the opposite surfaces of the clothes, an ozone generator mounted upon said frame and connected with said pipes for supplying ozone to said nozzle openings, and means for refrigerating the air to said ozone generator to de-humidify said air.

5. An apparatus of the character described, including, in association, a supporting frame, a substantially horizontally disposed belt conveyor mounted in the upper portion of the frame and inclined upwardly toward the front of said frame and arranged to receive clothes to be treated on its upper side at the rear end portion thereof and to discharge the clothes in a downward direction from the forward end thereof, lamps constituting sources of ultra-violet radiation positioned adjacent the path of the moving clothes on opposite sides thereof to direct radiation against both sides of the moving clothes; an ozone generator mounted on said frame, parallelly disposed pipes spaced apart to permit the moving clothes to pass therebetween, connected with and supplied by ozone from said generator, said pipes having nozzle openings distributed along their length and directed toward both surfaces of the moving clothes passing between said pipes, and a refrigerating device mounted in the lower portion of the frame and connected with said ozone generator for supplying de-humidified air to said generator.

6. An apparatus of the character described comprising a supporting frame, horizontally disposed parallel rolls mounted in the rear and forward portions of said frame; an endless belt traveling around and driven by said rolls to form a continuously moving conveyor; means for delivering the clothes to the rear end of the conveyor on the upper side thereof, said conveyor being arranged to discharge the clothes downwardly in a substantially vertical direction from the forward end thereof; a series of mercury vapor lamps constituting a source of ultra-violet radiation and disposed end to end adjacent the upper rear side of the conveyor in position to direct radiation against one face of the clothes as the clothes are received upon the conveyor; a second series of mercury vapor lamps disposed end to end and positioned beneath the forward end of the conveyor adjacent the path of the clothes as they leave the conveyor for directing radiation upon the opposite surface of the clothes; a pair of pipe members mounted in said frame and positioned adjacent opposite sides of the clothes as they leave the conveyor, said pipes having each a series of nozzle openings distributed along their length to direct jets of ozone against the passing clothes and ozone generating mechanism, mounted upon the frame and connected with said pipes for supplying ozone thereto, a refrigerating device mounted in the lower portion

of the frame and connected with said ozone generator for de-humidifying the air supplied to said generator and a blower for circulating air through said refrigerating device, ozone generator and said nozzle pipes.

7. In an apparatus of the class described, the combination of a supporting frame having horizontally disposed shafts mounted in bearings in said frame, one of said shafts being disposed adjacent the rear side of the frame and the other adjacent the forward side of the frame; means connected between said shaft for driving said shafts in unison; rolls mounted upon the shafts and an endless belt traveling around said rolls and constituting a conveyor, means for delivering clothes to the upper side of said conveyor at the rear end thereof; a driving connection be-

tween said means and said rear shaft for driving the conveyor in unison with said delivery means; ultra-violet radiation producing lamps, positioned adjacent the receiving end of the conveyor for directing radiation upon one side of the clothes; other radiation producing lamps beneath the forward end of the conveyor for directing radiation upon the opposite side of the clothes as they leave the forward end of the conveyor; means mounted adjacent the path of movement of the clothes for directing a spray of ozone against opposite sides of the clothes after they leave the conveyor; and means supported by the frame for generating a supply of ozone for said spray-directing means.

WILLIAM R. REDD.

20	95
25	100
30	105
35	110
40	115
45	120
50	125
55	130
60	135
65	140
70	145
75	150