June 24, 1930. W. S. RENDALL 1,766,545

LEER

Filed March 12, 1928

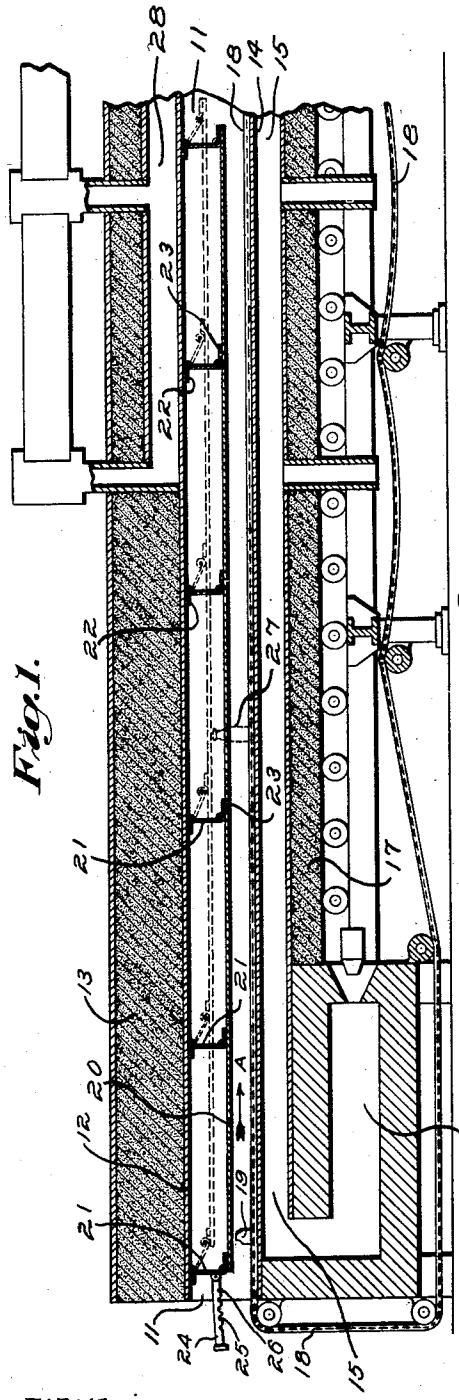


Fig. 1.

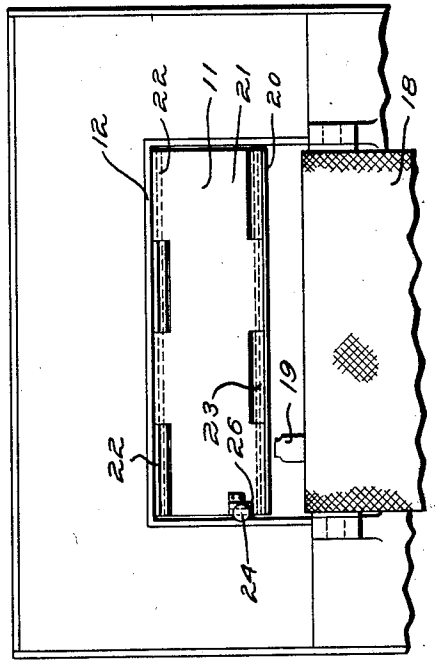


Fig. 2.

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UNITED STATES PATENT OFFICE

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LEER

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This invention relates to glass annealing leers of the tunnel type in which controlled heat conditions are maintained, first to bring the glassware to the proper annealing temperature, and then to reduce that temperature gradually at a suitable rate to prevent excessive strains from being set up in the glass articles.

It is usual in such leers to pass the glass to be annealed into the hot end of the leer and thence slowly at gradually decreasing temperatures through the leer tunnel to the cold end. Means may also be provided for heating that end of the tunnel at which the ware is received. Unusual temperature variations are to be avoided throughout the tunnel, but such variations are particularly harmful at the hot end of the leer which may be called the critical zone for at least two reasons. First, it is during the earliest stages of cooling that permanent strains are removed or are left in the ware; second, because this part of the leer is so much hotter than the rest, there is a greater tendency for air leakage and convection currents to be set up in that part of the leer. It is common practice therefore to provide thick insulation around the leer walls at this end and to so build the walls that air currents cannot pass through them laterally, although the tunnel is open from end to end.

These expedients do not take care of another type of heat variation which is due to the convection air currents within the tunnel. These are greater when the cross-sectional area of the leer tunnel is large and are unnecessarily great when only a part of the cross-sectional area is occupied by the ware being annealed. For example, when a leer tunnel capable of accommodating tall bottles or other tall ware is used for short bottles or ware, the space above the short ware is wasted, and also the convection currents are greatly increased.

It is the purpose of this invention to provide improved means for adjusting the cross-sectional area of the leer tunnel so that unnecessary space not required for the ware is eliminated, and the convection currents are thus minimized.

In order to more clearly explain the invention, one embodiment thereof is shown in the accompanying drawings, in which:

Figure 1 is a longitudinal elevation in section of the receiving end of a tunnel leer, and

Fig. 2 is an enlarged broken end elevation of the leer shown in Fig. 1.

The numeral 11 indicates a leer tunnel having a top wall 12 provided with insulation 13 to reduce the heat losses. The tunnel 11 has a metal floor 14 under which there may be heating ducts 15 supplied from a furnace 16. Heat insulation 17 may also be provided for the underside of the leer and heating ducts. An endless conveyor 18 moving in the direction indicated by the arrow A, transports the ware through the tunnel.

If small bottles, as indicated at 19, are being annealed, there would ordinarily be a considerable space between the top of the bottles and the top of the leer 12, which space not only is not required for the ware, but greatly increases the convection currents. In order to decrease this space, a partition 20 may be provided and constitutes an auxiliary or false top which extends the entire width of the leer tunnel. This partition or auxiliary top may be adjustable in a manner to be presently described, and is shown in Fig. 1 in its lowest position. It is supported in this position by a plurality of hinge members which, as shown, are in the form of transverse partitions 21 pivotally connected with the fixed top wall 12 of the leer tunnel at 22 and with the partition or auxiliary top 20 at 23 in any well known or suitable manner.

For convenience in adjusting the auxiliary top 20 vertically, an operating handle 24 is provided which, as shown, is pivotally connected with one of the vertical partitions 21 and is provided with notches 25, any one of which may be engaged with a fixed pin 26 to hold the parts in the position to which they have been adjusted. The pin 26 may be carried by a side wall of the tunnel.

In operation, the auxiliary top 20 is placed in the lowest position which will permit the ware being annealed to pass there-

under with a reasonable clearance. If the ware consists of small bottles, as shown at 19, then the adjustable partition 20 is placed in its lowest position, as shown in full lines in Fig. 1, which position the partition normally tends to assume by gravity. If a larger bottle, as indicated at 27, is to be annealed, then the auxiliary top 20 is swung into the dotted line position of Fig. 1, the transverse partitions 21 acting through their pivotal connections as hinge members.

It will be understood that both the horizontal partition or adjustable top and the transverse partitions or hinge members extend the full width of the leer tunnel, and thereby prevent circulation of air in the space between the auxiliary top and the top of the leer tunnel.

It is common to provide cooling flues 28 commencing a short distance from the entrance to the leer to assist in gradually lowering the temperature of the ware. The auxiliary top may extend below that part of the top provided with flues, and is so shown in the drawings. When so arranged, the auxiliary top has a tendency to render the temperature transition less abrupt between the hot insulated part of the tunnel and the part where the cooling flues begin to have an effect.

It will be seen that simple, inexpensive and effective means thus have been provided for minimizing convection air currents without the necessity of modifying the effectiveness of the leer structure either as to the fixed and stable nature of the insulated walls, or as to the sealing of the leer tunnel against the leakage or entrance of transverse air currents.

While the drawings show the auxiliary partition parallel to the top of the leer, the partition thus constituting an auxiliary or false top, it will be understood that the partition may also be adjustable toward and away from one of the other walls of the tunnel. For example, large pieces of glassware which occupy a little more than half the width of the leer may leave a wide space unoccupied by the ware. An adjustable partition disposed vertically adjacent to one of the side walls may be used for closing the unoccupied space and preventing convection currents. Such an adaptation is contemplated as within the scope of the invention.

It will be understood that these and various other modifications and changes may be made in the details of the construction hereinbefore described without departing from the spirit and scope of the invention, as defined in the appended claims.

I claim:

1. In a tunnel leer, means for adjusting the cross-sectional area of the leer tunnel, said means comprising an auxiliary top of light construction adjustable to different heights, and means for minimizing air circulation between the top of the leer tunnel and said auxiliary top.

2. For a tunnel leer having a fixed insulated wall, an auxiliary wall adjacent to said insulated wall, said auxiliary wall being of relatively light construction and readily adjustable to different positions relatively to the fixed wall.

3. For a tunnel leer having a fixed insulated top wall, an auxiliary top wall below said insulated wall, said auxiliary top being of relatively light construction and readily adjustable to different heights, and means for preventing air currents between said insulated top wall and said auxiliary top wall.

4. For a tunnel leer of the type having fixed insulated walls, a partition adjustable toward and away from one of the walls and of substantially the same width as the wall, and hinge members also of the same width between said wall and said partition.

5. For a tunnel leer of the type having a fixed insulated top wall, a horizontal partition parallel to the top wall and extending the full width of the tunnel, a plurality of hinge members extending between said wall and said partition, said members being adapted to permit the adjustment of said partition to different heights and to prevent circulation of air between said wall and said partition, and means for holding said partition in its adjusted position.

6. For a tunnel leer, an auxiliary adjustable top extending the full width of the leer, a plurality of partitions between the auxiliary top and the top of the leer tunnel also extending the full width of the leer, each partition being pivotally supported from the top of the leer tunnel and pivotally connected with the adjustable top.

7. For a tunnel leer having a top wall, a horizontal adjustable partition lying parallel to said top wall, a plurality of transverse partitions pivoted at their upper ends to said top wall and at their lower ends to said partition, whereby said horizontal partition may be swung toward and away from said top wall, and means for holding the partitions in various adjusted positions, both horizontal and transverse partitions extending the full width of the leer tunnel.

8. For a tunnel leer having a top wall, a vertically adjustable horizontal partition lying parallel to said top wall, a plurality of transverse hinge members pivoted at their upper ends to said top wall and at their lower ends to the horizontal partition, said transverse partitions being vertical when said horizontal partition is in its lowest position and being adapted to be swung from their vertical positions to swing the horizontal partition closer to said top wall, and means for holding the horizontal partition in any vertically adjusted position.

9. In a leer, a tunnel having a fixed top wall, a vertically adjustable false top wall, and a transverse closure for the space between the fixed top wall and the false top wall, said transverse closure being adjustable to compensate for the adjustments of the false top wall.

10. In a leer, a tunnel having a fixed top wall, a vertically adjustable false top wall, and a transverse member constituting both an adjustable closure for the space between the fixed top wall and the false top wall and a support for the false top wall.

11. In a muffle leer for annealing glassware, a tunnel having insulated top, side and bottom walls, a muffle flue formed in one of said walls, and an auxiliary wall within said tunnel, said last-named wall being separate from the first-named walls and said flue.

12. In a muffle leer for annealing glassware, a tunnel having heat resistant walls, a muffle flue associated therewith and arranged substantially parallel to one of said walls, and an auxiliary wall within the said leer substantially parallel to one of the first-named walls, said last-named wall being separate from said first-named walls and said flue.

13. In a muffle leer for annealing glassware having a tunnel with a fixed insulated top wall, a muffle flue formed in said wall and an auxiliary top wall adjacent an end of the leer tunnel and extending throughout at least a part of the length of the leer for decreasing the effective height of the tunnel, the said auxiliary wall being separate from said top wall and said flue.

Signed at Hartford, Connecticut, this 9th day of March, 1928.

WILLIAM STANLEY RENDALL.