Jan. 5, 1937. E. L. WALTERS 2,066,376

ANNEALING LEER

Filed May 29, 1933 2 Sheets-Sheet 1

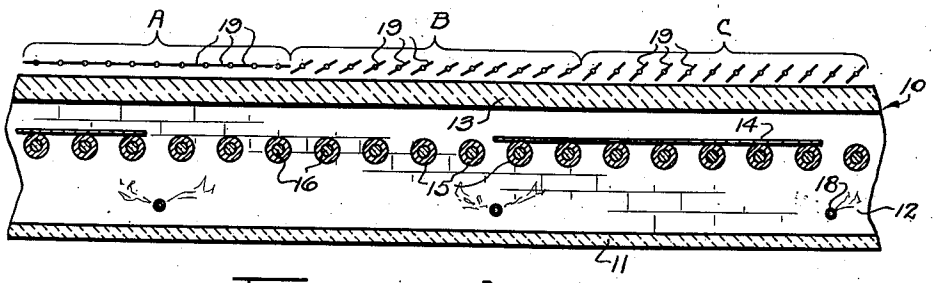


Fig. 1.

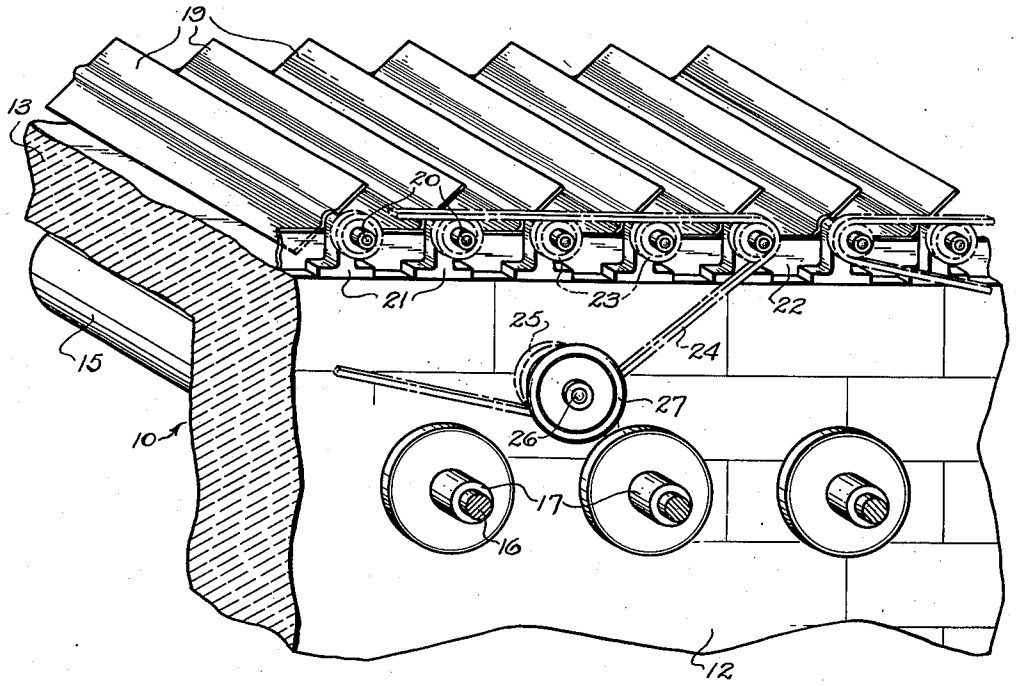


Fig. 2.

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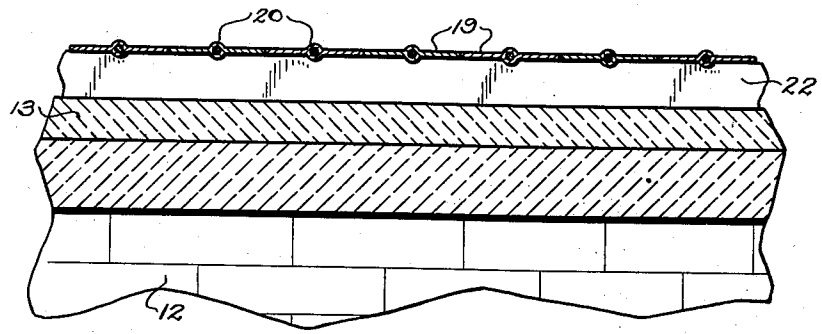


Fig. 3.

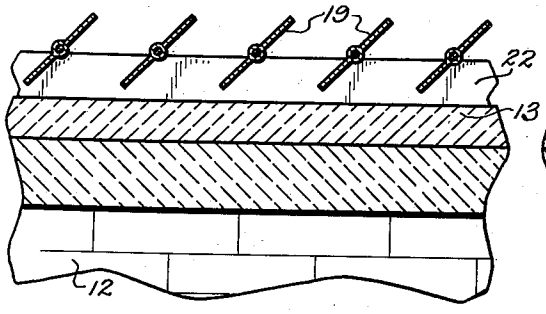


Fig. 4

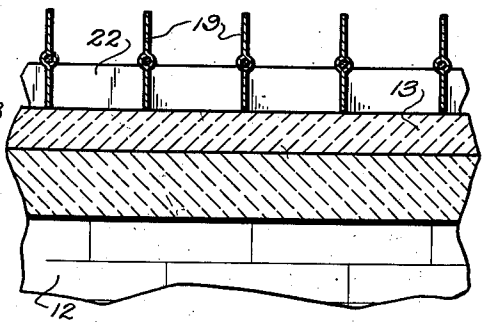


Fig. 5.

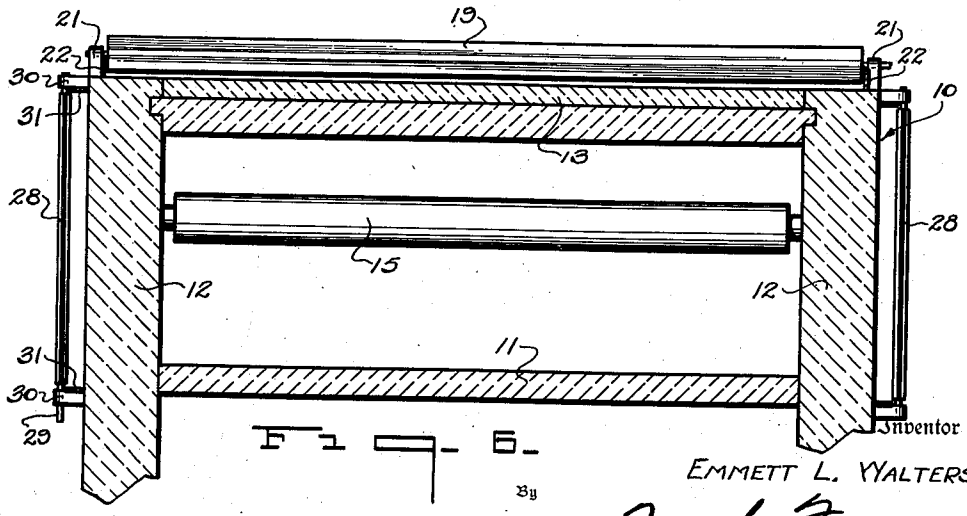


Fig. 6.

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UNITED STATES PATENT OFFICE

2,066,376

ANNEALING LEER

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Application May 29, 1933, Serial No. 673,329

9 Claims. (Cl. 49—47)

The present invention relates broadly to the art of annealing and more particularly to improvements in annealing leers or ovens primarily adapted for the annealing of sheet glass, although it is of course not restricted to such use.

In annealing sheet glass, however, according to one well known method, the sheet is passed in a generally horizontal direction through a leer which is in the form of a relatively long tunnel and wherein it may be supported and carried along upon a series of spaced revolving rolls. During the passage of the sheet through the leer, the internal stresses and strains set up in the sheet during the formation thereof are adapted to be relieved and, in addition, the said sheet is gradually reduced from a relatively high temperature to a temperature at which it can be readily handled. The leer is also usually heated in some suitable fashion, with the temperature therein being gradually reduced from the entrance end to the exit end thereof.

An important object of this invention resides in the provision of an annealing leer of the above general character embodying means for controlling the temperature therein, such means being particularly adapted for establishing and maintaining the proper temperature regulation throughout the length of the said leer.

Another object of the invention is the provision of an annealing leer having means associated therewith for reducing the temperature therein by increasing the radiation heat loss through the wall thereof and for likewise decreasing the radiation heat loss by varying the insulation of the said wall to thereby regulate the escape of heat therethrough.

Another object of the invention is to provide means for controlling and regulating the amount of heat radiating from the leer embodying a series of louvers or shutters associated with the top and/or side walls of the leer outwardly thereof and being movable from an extreme insulating position where they are out of contact with the leer to an extreme radiating position where they contact therewith.

A further object of the invention consists in the arranging of the louvers or shutters into a plurality of separate groups operable independently of one another to control and regulate the insulating or radiating effect thereof upon any desired portion of the leer throughout the length thereof.

Other objects and advantages of the invention will become more apparent during the course of the following description when taken in connection with the accompanying drawings.

In the drawings wherein like numerals are employed to designate like parts throughout the same,

Fig. 1 is a vertical longitudinal section through an annealing leer provided by the present invention,

Fig. 2 is a perspective elevation of a portion thereof,

Fig. 3 is a vertical longitudinal section through a portion of the leer showing the temperature control means in extreme insulating position,

Fig. 4 is a similar view showing the temperature control means in an intermediate position,

Fig. 5 is a similar view showing the temperature control means in extreme radiating position, and

Fig. 6 is a transverse sectional view through the leer showing an alternative arrangement of the invention.

Referring now to the drawings, the annealing leer illustrated therein is designated in its entirety by the numeral 10, said leer being preferably of tunnel-like formation and including a bottom 11, spaced vertical side walls 12, and a horizontal top 13.

Arranged within the leer for supporting and conveying the glass sheet 14 therethrough are a plurality of horizontally aligned rotatable rolls 15, the shafts or trunnions 16 of which project through bearing members 17 mounted in the opposite side walls 12 of the leer. These rolls are preferably positively driven in unison in any preferred or well known manner to advance the sheet through the leer.

Ordinarily, the sheet when entering the annealing leer is relatively hot and, in addition to the heat of the sheet, the leer may be further heated by a plurality of spaced burner pipes 18 extending transversely thereof so that the sheet is not passed into a chamber whose temperature is much cooler than the chambers in which the said sheet is formed. The temperature of the leer is gradually reduced from the entrance end to the exit end thereof so that when the sheet passes out of the leer it can be conveniently handled.

In accordance with the present invention, there is positioned above the top 13 of the leer 10 a series of horizontally disposed metallic louvers or shutters 19 which may be arranged throughout the entire length of the leer or over any desired portion thereof. These louvers are in the form of substantially flat double-winged baffle plates of relatively narrow width and which

extend transversely of the leer substantially the entire width thereof. The baffle plates each have a central longitudinally extending opening formed therethrough for receiving a horizontal pivot shaft 20, said shafts projecting at opposite ends beyond the said plates and being rotatably mounted within bearing brackets 21 carried by the leer at the opposite sides thereof.

The baffle plates 19 are of such a width that when they are moved into horizontal alignment with one another, as shown in Fig. 3, the adjacent edges of adjoining plates will be in substantial contact with one another so as to provide a substantially continuous unbroken cover for the top of the leer. On the other hand, the baffle plates may be moved to assume a substantially vertical position as in Fig. 5, and when in such position the said plates are disposed in parallel relation with respect to one another, with the lower edges thereof in contact with the upper surface of the top of the leer. Likewise, the baffles may be moved to assume any desired position intermediate their horizontal position and vertical position, one intermediate position being illustrated in Fig. 4 wherein the baffles are arranged in an inclined position with the bottom edges thereof spaced from the top of the leer.

Also carried upon the top of the leer and extending longitudinally at opposite sides thereof are the vertical side boards 22, said boards being arranged inwardly of the bearing brackets 21 and of such a height that they extend beneath the pivot shafts 20. These side boards are positioned outwardly of the opposite ends of the baffle plates 19 so as not to interfere with the pivoting of the said plates upon shafts 20.

In carrying the invention into practice, when the baffle plates 19 are moved into substantial horizontal alignment with one another as in Fig. 3, they cooperate with the top 13 of the leer and also with the vertical side boards 22 to form a substantially dead air space or inert air strata above the leer. This position may therefore be called the extreme insulating position in that the creation of the dead air space between the top of the leer and the baffle plates serves in the nature of insulation to reduce to a minimum radiation heat loss through the top wall of said leer. When the baffle plates are moved to an inclined position as in Fig. 4, the insulation of the leer wall is lessened in that air currents are now permitted to pass between the plates and come into contact with the leer in an amount determined by the angular position of the said plates. On the other hand, when the baffles are moved to a vertical position, as in Fig. 5, the lower edges thereof contact with the top of the leer so that the plates will serve to carry away heat which is radiated by this additional surface to the atmosphere. In addition, air currents are allowed to pass between the plates and come in contact with the leer wall. Consequently, this position is termed the extreme radiating position.

From the above, it will be seen that the baffle plates 19 are movable either to an extreme insulating position or to an extreme radiating position, with a series of intermediate positions being possible between these two extremes. As a result, it is possible, by proper adjustment of the baffles, to effectively and efficiently control the temperature within the leer by establishing and maintaining the proper temperature regulation throughout the entire length of said leer or any desired portion thereof. For instance, the temperature in the leer may be reduced by moving the baffle plates to extreme radiating position so as to increase radiation heat loss through the wall thereof or, if desired, the radiation heat loss may be reduced to a minimum by moving the baffles to extreme insulating position. In other words, it is possible to regulate the escape of heat through the leer wall by varying the insulation of the wall upon proper adjustment of the baffle plates.

In actual operation, it may be found desirable, in order to effect the proper temperature regulation throughout the length of the leer, to move the baffle plates above one portion or section of the leer to extreme radiating position to reduce the temperature therein; the baffle plates above another portion of the leer to extreme insulating position to reduce to a minimum radiation heat loss; and over still another portion of the leer to move the baffle plates to an intermediate position. In order that this may be readily and conveniently accomplished, the baffles are preferably divided into a plurality of groups actuated independently of one another, with the baffles in each group moving as a unit. Thus, as shown in Fig. 2, the pivot shafts 20 project at one side of the leer beyond the bearing brackets 21 and have keyed thereto sprockets 23. Trained around the sprockets of any desired number of baffles 19 is a sprocket chain 24, said chain also meshing with a sprocket 25 fixed to shaft 26 which also carries an operating hand wheel 27. Upon turning of this hand wheel, the baffles of the respective group may be simultaneously actuated to assume any desired position. By dividing the baffles into a plurality of independently operable groups, it is possible to more effectively and efficiently regulate and control the temperature at different portions of the leer throughout the length thereof. For instance, upon reference to Fig. 1, it will be noted that one set of baffles, indicated at A, may be moved to extreme insulating position, while other sets B and C may be moved to assume different intermediate positions or to extreme radiating position if preferred.

This invention also contemplates the provision of means for controlling radiation heat loss through the side walls of the leer if desired. Thus, as illustrated in Fig. 6, a series of louvers or shutters 28, corresponding to the louvers 19 above described, may be arranged at either one or both sides of the leer. These louvers are of the same construction and operate in the same manner as louvers 19, the only difference being that they are disposed in a substantially vertical position rather than in a horizontal position. The louvers 28 are carried by vertical pivot shafts 29 rotatably supported at opposite ends in bearing brackets 30 carried by the respective side wall of the leer. Arranged inwardly of the bearing brackets and extending longitudinally of the leer are the horizontal side boards 31 which cooperate with the louvers 28, when the latter are moved to extreme insulating position, to provide a substantially dead air space between the said louvers and the respective side wall of the leer. The louvers 28 may also be moved to an extreme radiating position where they contact with the respective side wall of the leer or to an intermediate position.

While the present invention has been illustrated and described in connection with an annealing leer of tunnel-like formation, yet it will be readily appreciated that the principle of the invention

may also be applied to other types of leers as well as to different types of furnaces.

It is to be understood that the form of the invention herewith shown and described is to be taken as the preferred embodiment of the same, and that various changes in the shape, size and arrangement of parts may be resorted to without departing from the spirit of the invention or the scope of the subjoined claims.

I claim:

1. The combination with a heated chamber of substantially tunnel-like formation including a bottom, side walls, and a top, of a plurality of movable members arranged outwardly of said chamber in opposed relation to one wall thereof for varying the insulation of the said wall, and means for moving said members into and out of contact with the wall.

2. The combination with a heated chamber of substantially tunnel-like formation including a bottom, side walls, and a top, of a plurality of movable members arranged outwardly of said chamber in opposed relation to one wall thereof for varying the insulation of said wall, and means for moving said members to assume either a substantially horizontal position where they are out of contact with the wall or a substantially vertical position where they contact with said wall.

3. The combination with a heated chamber of substantially tunnel-like formation including a bottom, side walls, and a top, of a plurality of members arranged outwardly of said chamber in opposed relation to one wall thereof and movable to assume different positions, said members, when in one position, being out of contact with the wall and when in another position in contact therewith.

4. The combination with a heated chamber of substantially tunnel-like formation including a bottom, side walls, and a top, of a plurality of pivotally mounted members arranged outwardly of said chamber in opposed relation to one wall thereof and movable to assume a position either in substantial alignment with one another or substantially parallel with one another, said members, when in substantial alignment, being spaced from the wall and when in substantially parallel position in contact therewith.

5. The combination with a heated chamber of substantially tunnel-like formation including a bottom, side walls, and a top, of means for controlling and regulating the amount of radiation heat loss through one wall thereof including a series of movable plates extending transversely of the chamber outwardly thereof and in opposed relation to said wall, means for pivotally mounting said plates, and means for moving the plates from an extreme insulating position where they are out of contact with the wall to an extreme radiating position where they contact therewith.

6. The combination with a heated chamber of substantially tunnel-like formation including a bottom, side walls, and a top, of means for varying the insulation of one wall thereof including a plurality of double-winged baffle plates extending transversely of the chamber in opposed relation to said wall, means for pivotally mounting said plates, and means for moving the plates into substantial alignment with one another in spaced relation to the wall or into a position at substantially right angles with respect thereto to bring one edge of each plate into contact with the said wall.

7. The combination with a heated chamber of substantially tunnel-like formation including a bottom, side walls, and a top, of a plurality of substantially rectangular parallel plates extending transversely substantially the entire width of the chamber outwardly of said chamber in opposed relation to one wall thereof, means for pivotally mounting said plates to turn about axes extending transversely of the chamber, said plates being movable to a substantially horizontal position where they will be in substantial alignment with one another, and side boards extending longitudinally of the chamber at opposite ends of said plates and cooperating therewith to form a substantially dead air space between the said plates and wall when the plates are moved to horizontal position.

8. The combination with a heated chamber of substantially tunnel-like formation including a bottom, side walls, and a top, of means for controlling and regulating the amount of radiation heat loss through one wall thereof including a plurality of substantially rectangular parallel plates extending transversely substantially the entire width of the chamber outwardly thereof and in opposed relation to said wall, means for pivotally mounting said plates to turn about axes extending transversely of the chamber, and means for moving the plates to assume either a substantially horizontal position where they will be in substantial alignment with one another and out of contact with the wall or a substantially vertical position where they will be substantially parallel with one another and in contact with said wall.

9. The combination with a heated chamber of substantially tunnel-like formation including a bottom, side walls, and a top, of means for controlling and regulating the amount of radiation heat loss through one wall thereof including a plurality of substantially rectangular parallel plates extending transversely substantially the entire width of the chamber outwardly thereof and in opposed relation to said wall, means for pivotally mounting said plates to turn about axes extending transversely of the chamber, means for moving the plates to assume either a substantially horizontal position where they will be in substantial alignment with one another and out of contact with the wall or a substantially vertical position where they will be substantially parallel with one another and in contact with said wall, and side boards extending longitudinally of the chamber at opposite ends of said plates and cooperating therewith to form a substantially dead air space between the said plates and wall when the plates are moved to horizontal position.

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