Nov. 5, 1935. G. W. BATCHELL 2,019,839

LEER

Filed Dec. 14, 1934 3 Sheets-Sheet 1

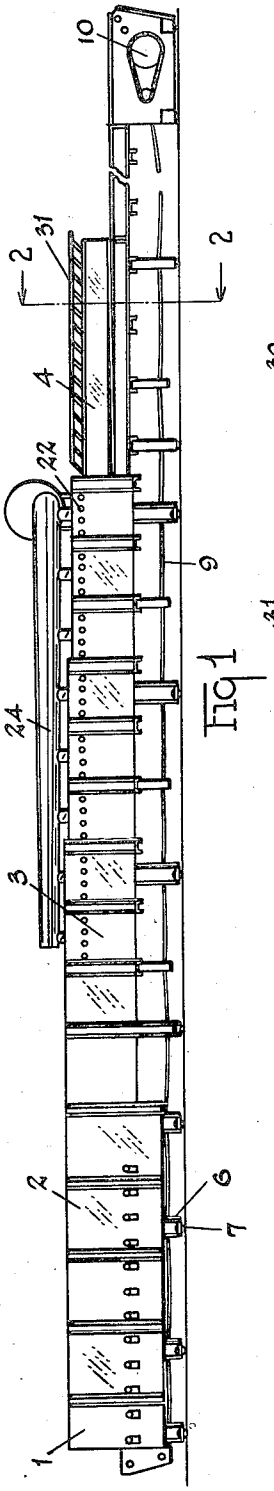


Fig 1

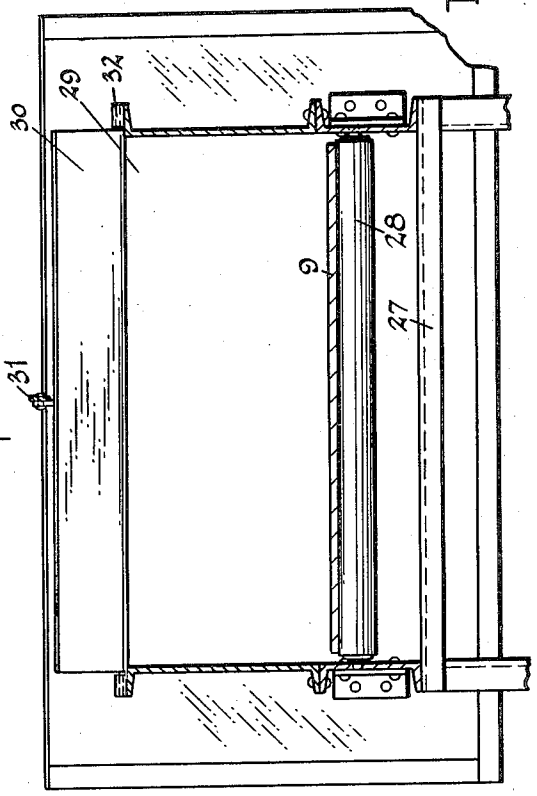


Fig 2

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LEER

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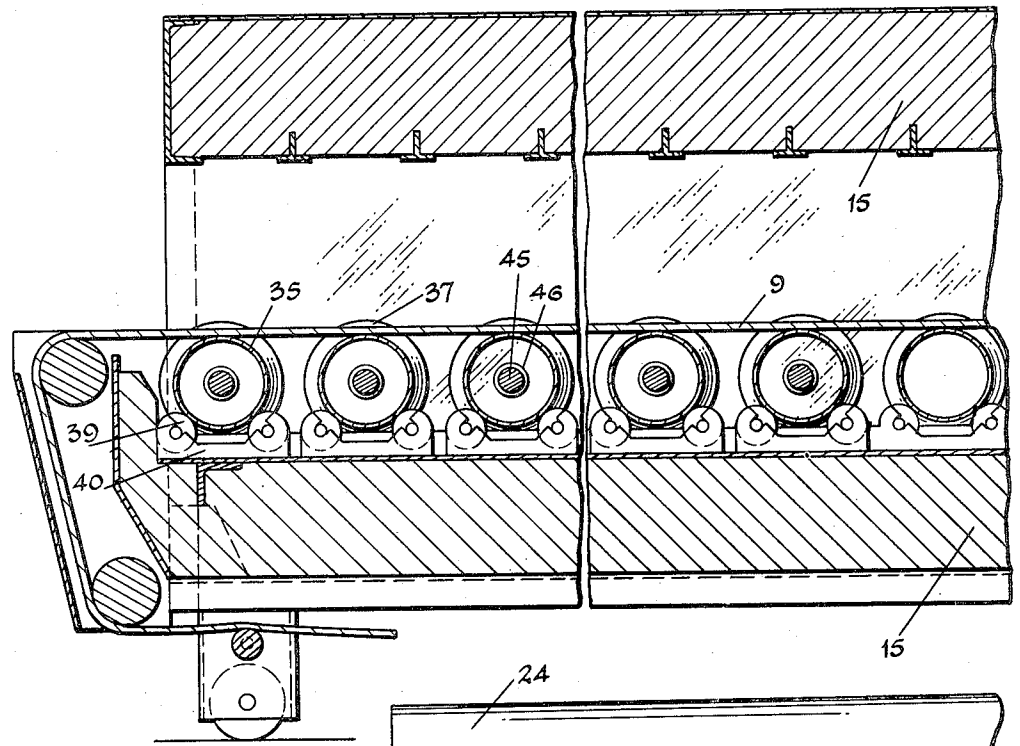


Fig 3

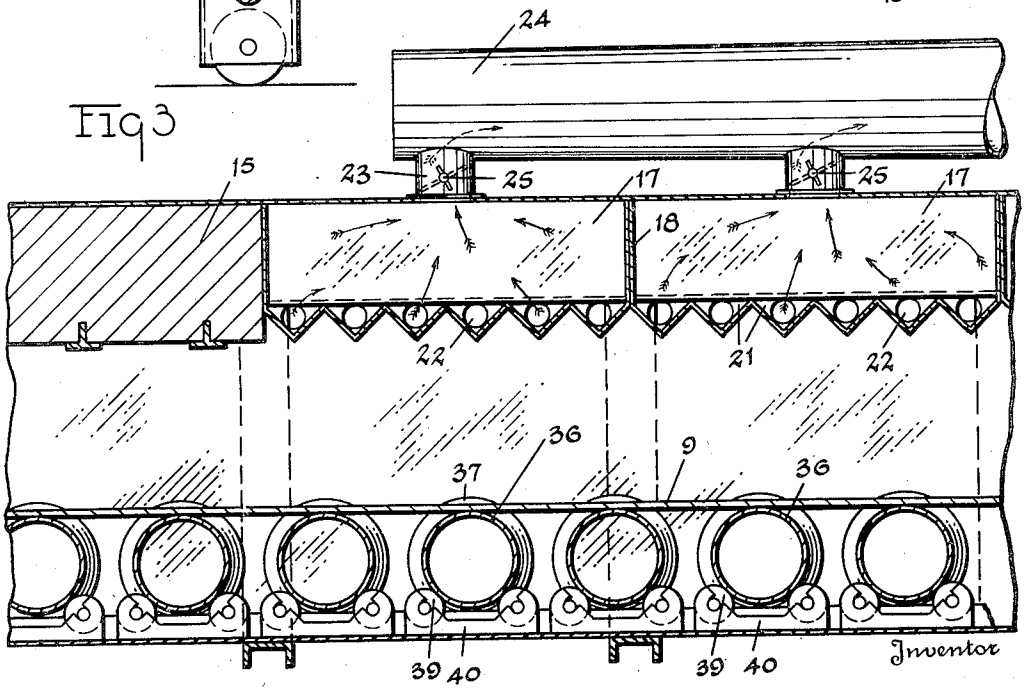


Fig 4

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LEER

Filed Dec. 14, 1934 3 Sheets-Sheet 3

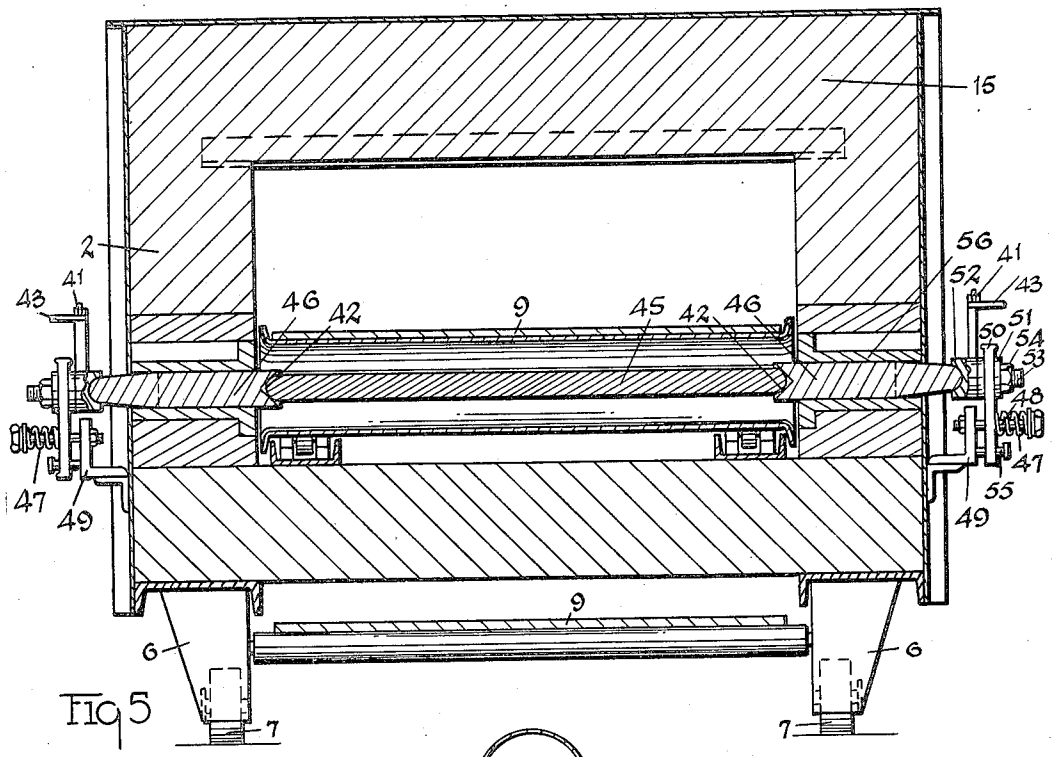


Fig 5

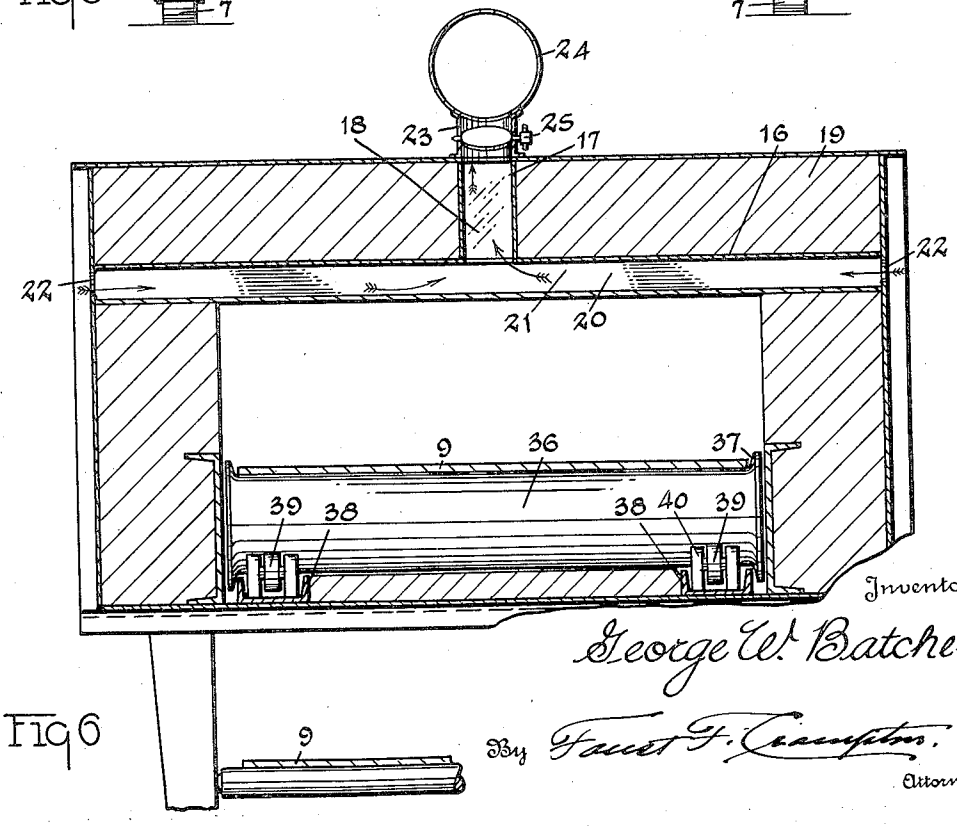


Fig 6

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UNITED STATES PATENT OFFICE

2,019,839

LEER

George W. Batchell, Toledo, Ohio

Application December 14, 1934, Serial No. 757,500

3 Claims. (Cl. 49—47)

My invention has for its object to provide a leer that may be electrically or gas heated at a point below the ware-conveying belt and wherein the ware will be subject to a uniform change in temperature in the heating and tempering zones of the leer.

The invention provides means for eliminating from the leer all air currents from the external atmosphere, which enables all parts of the ware to rise at a constant rate in its movement through the heating zone and gradual cooling of the ware at a uniform rate as it is brought well below the annealing temperature.

By reason of the uniform rate of cooling and elimination of air currents from the external atmosphere, the leer, particularly the tempering zone of the leer, may be made shorter than the leers heretofore commonly used.

The invention further provides division of the leer into sections that are separately supported by legs having casters whereby the leer may be positioned in different positions and thus may be readily located in the vicinity of a ware-forming machine or may be transposed to receive ware from machines located in different positions.

The invention also has for its object to provide means for protecting the heating means from broken portions of the ware that may work through the belt of the leer. To this end the heaters are covered for the protection of the heaters from objects falling from the belt.

The invention also has for its object to provide a plurality of interiorly heated cylinders for heating the ware in the heating zone of the leer and a plurality of non-heated hollow cylinders for absorbing and distributing the heat of the ware in the tempering zone of the leer, which enables uniform change in temperature either to raise the temperature of the ware or to lower the temperature of the ware.

The invention also provides means for removing the heat from the tempering zone of the leer gradually and at a regulated rate without movement of air into the zone. When the leer is electrically heated, the invention eliminates all dust that might otherwise be drawn into the tempering and heating zones of the leer, and which ordinarily deposits upon the ware.

The invention consists in other features and advantages which will appear from the following description and upon the examination of the drawings. The invention may be contained in structures of different forms and to illustrate a practical application of the invention, I have selected a leer embodying the invention as an example of such a structure and shall describe the leer selected hereinafter. The particular leer selected is shown in the accompanying drawings.

Fig. 1 of the drawings illustrates a side view of the leer. Fig. 2 is a view of a section of a cooling zone of the leer taken on the plane of the line 2—2 indicated in Fig. 1. Fig. 3 is a longitudinal section of a part of the heating zone of the leer. Fig. 4 is a longitudinal section of a part of the tempering zone of the leer. Fig. 5 is a view of a transverse sectional view of the heating zone of the leer. Fig. 6 is a view of a transverse section of the tempering zone of the leer.

As shown in Fig. 1 the leer 1 is formed of three sections 2, 3, and 4 that may be placed end to end and located in abutting relation and may be, if desired, suitably secured together to produce a substantially rigid structure. For convenience of movement of the sections relative to each other when they are disconnected and for location of the leer in a desired ware-receiving position from a ware-forming machine, the sections are supported on legs 6 that are provided with casters 7. Thus, the parts of the leer may be separated and the leer located in a desired position with reference to a glass-shaping machine.

A suitable reticulated belt 9 usually formed of netted, or meshed, helically formed wire, extends through the interior and along the lower side of the leer. The belt passes over cylinders located in the heating and tempering zones and rollers located in the chilling section or zone. The belt may be drawn by a suitable driving drum connected to an electric motor, through a speed reducing gear or pulley belt and wheels 10.

The sections 2 and 3 of the leer that contain the heating and tempering zones are provided with refractory, heat-insulating walls 15. A part of the upper wall of the tempering zone is provided with a plurality of passageways 17 formed by the sheet metal partitioning plates 18 and a plurality of pairs of refractory blocks 19 that are spaced from each other in a transverse direction. The plates 18 are located between contiguous blocks The blocks 19 may be located on plates 16 of sheet metal. Corrugated plates 20 are located below the blocks 19. The corrugations are preferably in zig-zag form, and provide passageways 21 that communicate with the passageways 17. The passageways 21 communicate with the exterior of the leer and through the openings 22 formed in the side walls 15 of the tempering zone. The passageways 17 are connected to pipes 23 which in turn are connected with a pipe 24 that may be connected

to the stack for drawing atmospheric air through the openings 22 over the surfaces of the corrugated plates 20. A damper 25 may be located in each pipe 23 that communicates with each passageway 17 to regulate the amount of cooling atmospheric air that flows through each part of the tempering zone of the leer.

The ware of the leer is rapidly cooled when it reaches a temperature well below the critical temperature. It is conveyed by the belt 9 into the cooling zone contained in section 4 of the leer. The section has sheet metal side walls and is open at the bottom except for the crossbars 27 of the supporting frame and the solid rollers 28 that support the part of the belt located in the cooling section of the leer. A plurality of openings 29 are formed in the top of the section and their effective areas are controlled by the dampers 30 to regulate the movement of the atmospheric air through the bottom of the section and through the dampered openings 29 in the top of the section. The dampers 30 are pivotally mounted by means of rods and lugs 32 on the upper edge of the sheet metal wall of the section and for convenience of manipulation may be connected together by means of the rod 31.

A plurality of belt-supporting, hollow, thin-walled, relatively large cylinders 35 and 36 are located in the heating and the tempering zones of the leer and are rotated by the belt 9. The cylinders in the heating zone are interiorly heated by gas burners or electric heating elements. The relatively thin walls of the cylinders and their rotation uniformly distribute or absorb the heat. The cylinders are preferably formed of sheet metal and are disposed in comparatively close parallel relation. Preferably distances between the cylinders are less than the circumferences of the cylinders to present a large moving, heat-transmitting or heat-absorbing area in a given length of the belt and to the corresponding amount of ware supported on the belt, which enables use of a short leer and movement of the belt as fast as loading will permit.

The cylinders 35 and 36 are provided with flanges 37. They are located above the channel irons 38 of the supporting frames of the sections having the heating and the tempering zones. The flanges 37 and the flanges of the channel irons 38 overlap so as to prevent material endwise movement of the cylinders relative to the channel. Each cylinder is supported on two pairs of rollers 39 located at the ends of the cylinder. The rollers are rotatably supported by bearing members 40 that may be welded to the web of the channel irons 38.

In the form of construction shown, the electric heating elements or resistance rods 45 are located within the cylinders 35. They extend substantially the length of the cylinders and are each secured between a pair of terminals 46 which are spring-pressed against the ends of the resistance rods 45 by means of the springs 47. The terminals have sockets 42 adapted to receive the ends of the resistance rods 45. The springs 47 are located on rods 48 connected to brackets 49 that are secured to the side wall of the leer. The springs 47 press against the bars 50 in which are located insulating bushings 51. The terminals 46 are socketed into contact members 52 having studs 53 that extend through the bushings 51. The contact members are secured in position on the bars 50 by the nuts 54 and are connected to electric cables or bus-bars 43 by means of a nut 41. The cables 43 are connected to a source of supply of electric current.

Suitable guiding pins 55 are secured in the brackets 49 whereby the bars 50 are held in their upright position and operate to hold the contact members 52 and the terminals 46 in position with reference to the resistance bars 45. The terminal members 46 extend through the bushings 56 of insulating and refractory material. Thus, by the pressure of the springs 47 the electric heating elements or rods 45 are held in position, preferably along the axes of the cylinders.

The cylinders of the tempering zone are formed and are supported in the same manner as the cylinders of the heating zone. The cylinders of the cooling zone contained in the section 4 of the leer may be formed solid and may be of the type of rollers commonly used in connection with leers for supporting the ware-conveying belt.

The ware that is conveyed through the leer by the belt 9 is heated from below by the resistance rods 45, and the rods 45 are protected against portions of the ware that may accidentally break or other material which may work or fall through the belt. If the pieces were to drop on the rods, they would be melted by the heat of the rods and adhere thereto and eventually destroy the heat radiancy of the rods by reason of the fluxing action of the material of which the glass or porcelain ware is formed. Sheathing the rods 45 in cylinders efficiently protects the rods and moreover increases thermo effectiveness of the rods. The cylinders operate to receive by radiation, as well as by convection, the heat of the rods over their entire surfaces and being formed of thin sheet metal, are continuously conveying substantially all their heat by rotation to a point in close proximity to the ware and thence by radiation to the ware.

As the belt moves through the heating zone, the ware is raised to a point above the critical temperature to eliminate all stresses and strains produced by the rapid cooling in the formation of the ware, and as the ware is moved into the tempering zone, the cylinders receive, by their close proximity to the ware, the heat of the ware, and the surfaces distribute it to the air and operate to progressively cool the ware at a uniform rate. The corrugated surfaces in the tempering zone over which atmospheric air moves, operates to cool the air, which rises by convection from the cylinders as well as from the ware. This eliminates drawing air into the leer and over the ware, and enables a more uniform rate of absorption of the heat of the ware. It prevents sudden chilling of parts of the ware.

Thus, the invention provides an exceedingly efficient means for maintaining a progressive, uniform, and relatively rapid rate of rise of temperature of the ware to a point above the critical temperature and then a progressive and gradual reduction of the heat of the ware at a relatively rapid rate. The invention thus enables shortening of the heating and tempering zones of the leer and forming the leer in readily movable sections to locate the leer in the loading relation with respect to any one of a number of ware forming machines.

I claim:

1. In a leer having heating, tempering, and cooling zones, a plurality of hollow, horizontally positioned, transversely extending, parallel cylinders distributed substantially throughout the length of the heating and tempering zones of the leer and having their upper surfaces located

in substantially a horizontal plane, a reticulated belt for conveying ware through the leer and supported by the cylinders and operating to rotate the cylinders, means located at one end of the leer for driving the belt, means for heating the interior of the plurality of the said cylinders located in the heating zone of the leer for heating the ware, the hollow cylinders located in the tempering zone operating to dissipate the heat of the ware.

2. In a leer having heating, tempering, and cooling zones, a plurality of hollow, horizontally positioned, transversely extending parallel cylinders distributed substantially throughout the length of the heating and tempering zones of the leer and having relatively thin walls, a pair of rollers for supporting each end of each of the cylinders, a reticulated belt for conveying ware through the leer and supported on the cylinders, means located at one end of the leer for driving the belt and rotating the cylinders, a heating unit extending axially within each of the plurality of cylinders located in the heating zone of the leer and supported on the side walls of the leer for heating the ware, the plurality of cylinders located in the tempering zone operating to dissipate the heat of the ware.

3. In a leer having heating, tempering, and cooling zones, a plurality of horizontally positioned, transversely extending, parallel cylinders distributed substantially throughout the length of the heating and tempering zones of the leer and spaced from each other substantially the circumferential length of the cylinders, a pair of rollers for supporting each end of each of the cylinders, a reticulated belt for conveying ware through the leer and supported on the cylinders, means located at one end of the leer for driving the belt and rotating the cylinders, a heating unit extending axially within each of the plurality of cylinders located in the heating zone of the leer for heating the ware, the plurality of cylinders located in the tempering zone operating to dissipate the heat of the ware.

GEORGE W. BATCHELL.