April 4, 1933. S. B. BOWMAN 1,903,281

LEER

Filed June 18, 1928 4 Sheets-Sheet 1

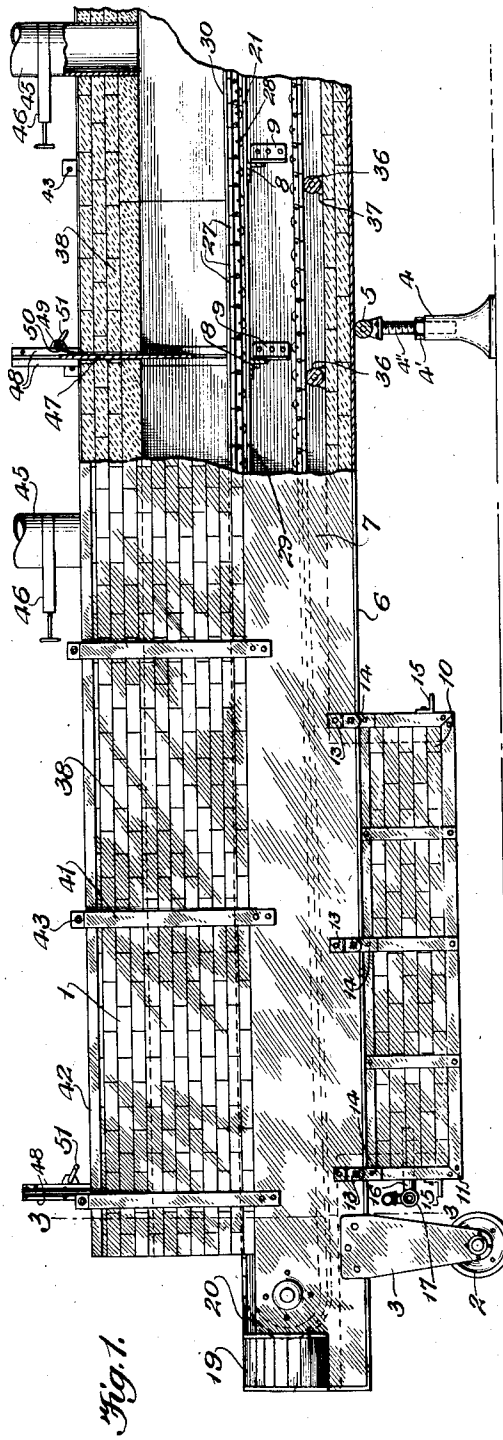


Fig. 1.

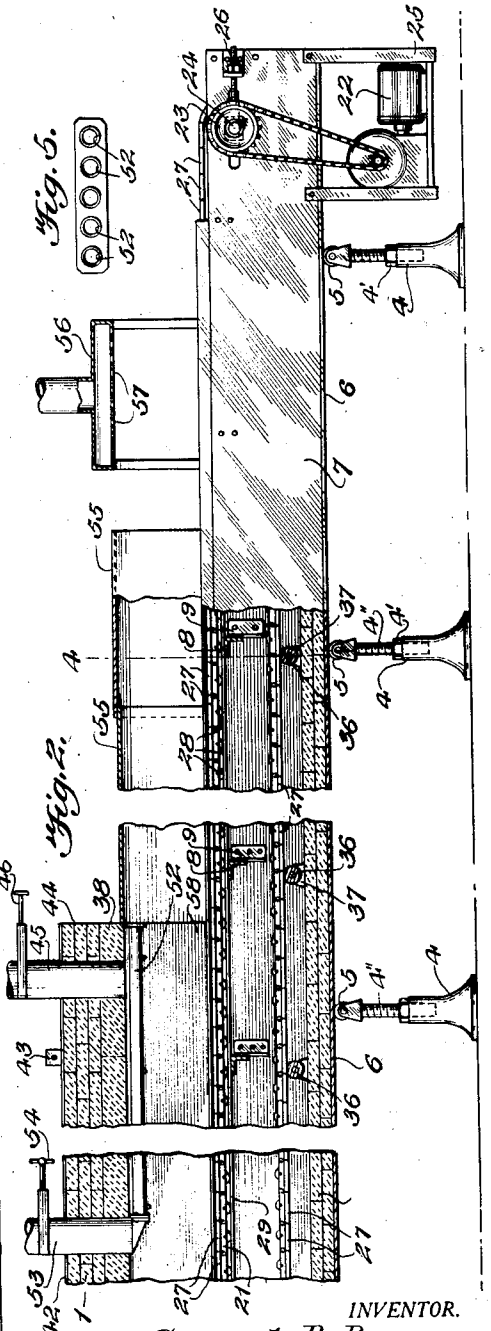


Fig. 5.

Fig. 2.

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LEER

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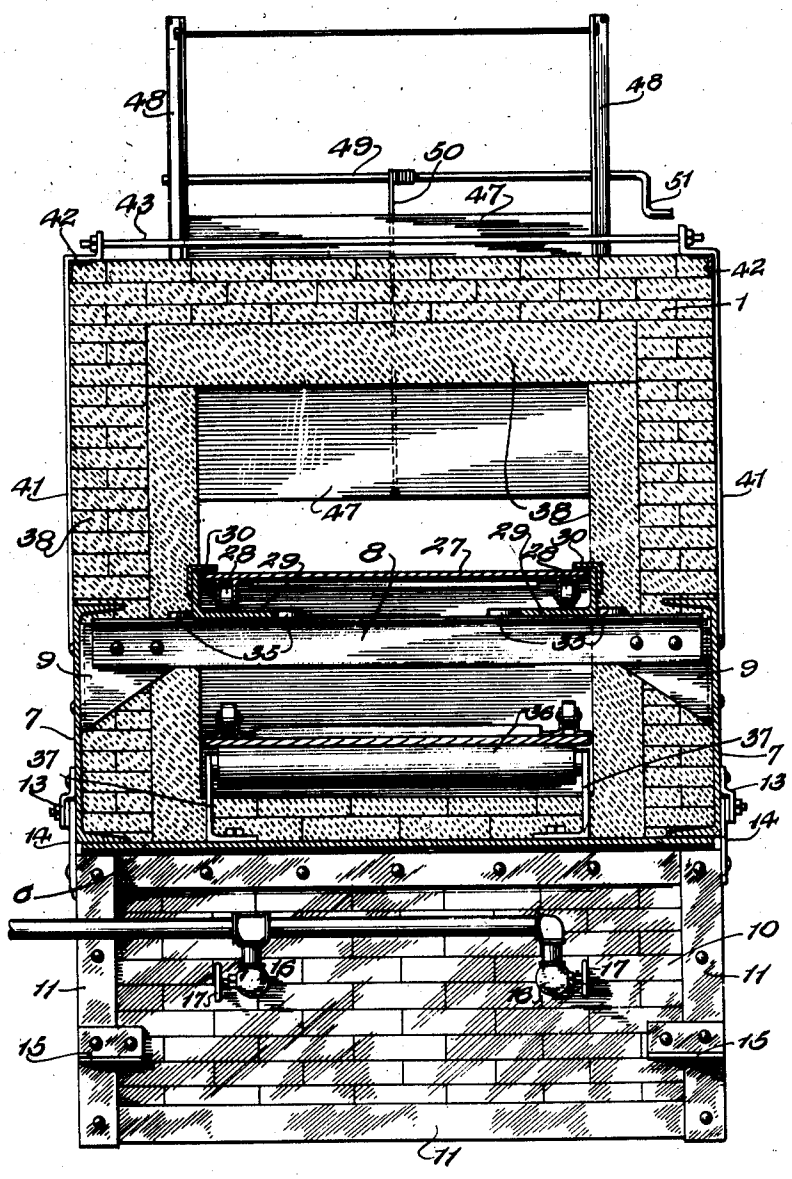


Fig. 3.

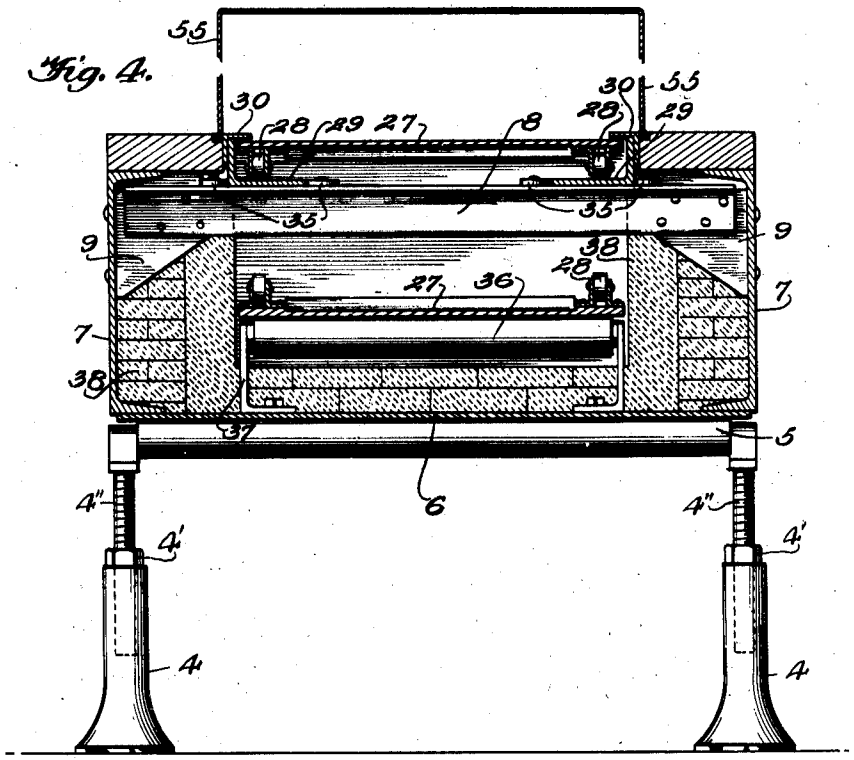
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LEER

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Fig. 4.



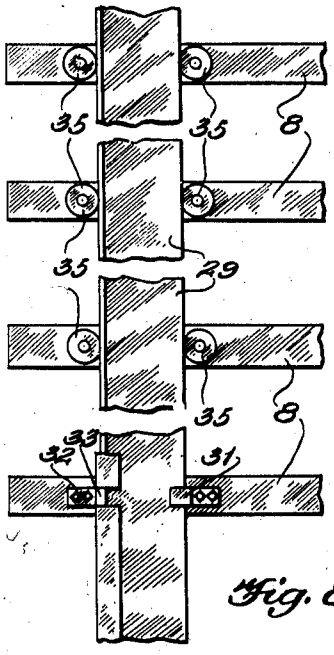
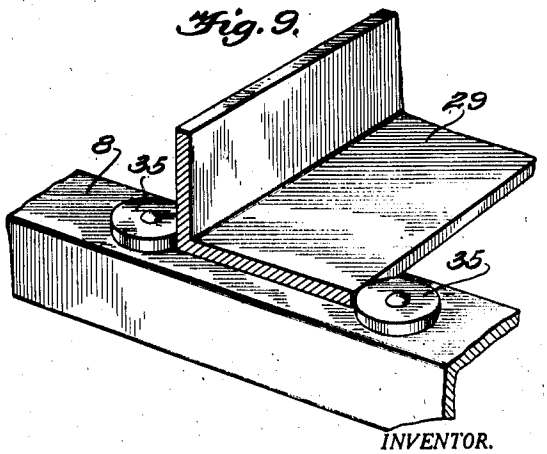


Fig. 8.

Fig. 9.



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LEER

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Fig. 6.

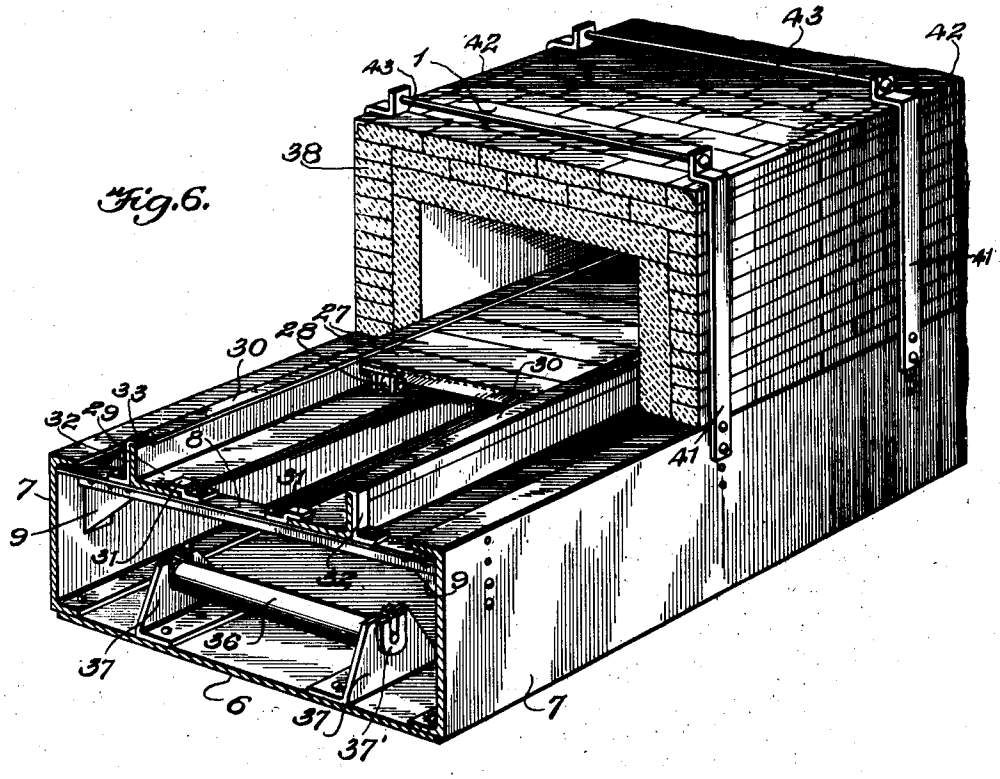
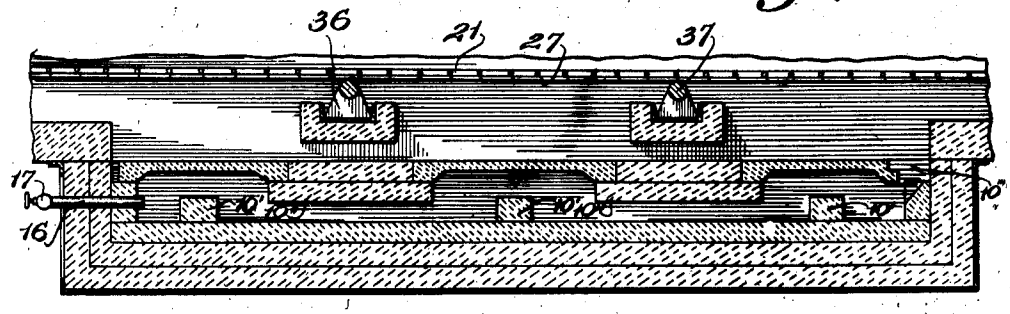


Fig. 7.



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UNITED STATES PATENT OFFICE

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LEER

Application filed June 18, 1928. Serial No. 286,125.

In the annealing of glassware, it has been common practice for many years to employ continuous leers, the ware to be annealed being placed in the forward end of the leer, and being annealed while the ware is being continuously carried toward the rear end of the leer. These leers may be sufficiently large to anneal the ware from several forming machines, or they may be of a smaller type, sometimes termed individual leers, which are adapted to anneal the ware from a single forming machine, or sometimes the ware from two forming machines. The individual leer is sometimes more desirable for use than the larger leers, because of the nature and location in the glass plant of the other units necessary for the production of glassware, such as the tanks, forming machines, packing room, etc. In addition, the smaller leer may possess certain advantages, such as annealing more quickly, economizing fuel, etc. The larger leer usually requires the same amount of fuel, whether or not it is being used to capacity, while with the smaller leers the number in use will vary with the production, thus avoiding the waste of fuel which results from operating large leers at less than capacity. In some instances, individual leers are better adapted than large leers, in efficient and economical production. The present invention relates to the mechanical construction of, and detail improvements in a continuous individual leer, arranged in close relation to a forming machine, so that the ware is fed directly from the forming machine to the leer, such as illustrated in the Brookfield Patent No. 836,297, granted November 20, 1906.

Referring to the drawings:

Figure 1 is a side elevational view of the forward portion of the leer; parts being broken away to show the interior construction.

Figure 2 is a side elevational view of the rear portion of the leer; being a continuation of Figure 1; and parts being broken away to show the interior construction.

Figure 3 is a vertical transverse sectional view taken on line 3—3 of Figure 1.

Figure 4 is a vertical transverse sectional view taken on line 4—4 of Figure 2.

Figure 5 is a detail end view of the battery of cooling pipes illustrated in side elevation in Figure 2.

Figure 6 is a perspective view of a portion of the leer; the heat insulation material within and above the frame being omitted, and a portion of the conveyer being also omitted, to more clearly show the construction of the frame.

Figure 7 is a vertical longitudinal sectional view of the fire box; and

Figures 8 and 9 are detail views illustrating the means for guiding the movements of expansion and contraction of the rails.

Numeral 1 refers generally to the leer, which is of the individual type, and is adapted to be arranged in close relation to the forming machine. The leer is preferably portable in order that it may be easily arranged in the desired relation to a forming machine, or may be moved to various desired positions in the factory. It is the usual practice in glass factories to mount various machines on rollers, to facilitate their movement, and if desired the present leer may be provided with ordinary rollers such as shown in the patent to Denning No. 1,132,459, granted March 16, 1915; but I prefer to employ such rollers only at the front of the leer; the rollers being indicated by numeral 2, and carried by brackets 3 attached to the leer frame. At suitable intervals rearward of these rollers, I provide horses 4, which carry at their upper ends rollers 5, extending substantially the entire width of the leer. This results in a more substantial structure than the ordinary rollers, and yet provides means by which the leer may be easily adjusted into position with relation to a forming machine, or be moved to different positions in the factory. In order that the leer may be vertically adjusted, the horses are preferably of the jack type; the vertical movement being effected by adjustment of the nuts 4′ threaded on the rods 4″.

The frame of the leer is extremely simple in construction, is relatively inexpensive in that it is made of standard stock material, such as plates, angle irons, channel irons,

straps, etc.; and the construction is so standardized, that leers of different width are made by merely employing plates of different width.

The bottom of the frame is formed of an ordinary metal plate 6 which extends substantially the full width and length of the leer; and may of course, comprise a plurality of plates riveted together. The side frames consist of channel irons 7, one arranged along each side edge of the bottom plate, extending the full length thereof and riveted thereto. At intervals throughout their lengths, the upper portions of the channel irons, or side frames, are rigidly connected together by means of angle irons 8, the ends of which are riveted to brackets 9, which brackets are riveted to the channel irons or side frame. Thus by the use of standard stock material, a strong and durable leer frame is inexpensively fabricated, and the construction is standardized to such as extent that in the manufacture of leers of different width, for handling ware of materially different sizes, it is only necessary to employ bottom plates of different width.

Any desired means may be employed for supplying the necessary heat to the leer, but in the present form I employ an ordinary fire-box 10, provided with baffles 10′ and 10″, which cause the flame and products of combustion to follow a circuitous path before the gases pass through the opening 10‴ into the leer. This fire-box is mounted in a frame formed of angle irons 11 and reinforced by straps 12; the unit being preferably removably attached to the side frames 7 by means of brackets 13 which are riveted to the leer side frames, and by bolts which pass through these brackets and through plates 14; the lower ends of the plates 14 being riveted to the angle iron frame of the fire-box. Short pieces of angle iron, indicated by numeral 15, are riveted to the front and rear of the fire-box frame, and constitute abutments for jacking up the fire-box when it is to be removed from the leer. If desired, the fire-box may be protected by a sheet metal covering.

Numeral 16 indicates burners which lead into the fire-box 10, and which are provided with the usual valves 17. These burners are used for heating up the leer when it is put into operation, but after the leer has reached the proper temperature the burners are turned very low, or shut off entirely, depending on the character of ware being annealed.

In the form illustrated herein, I have shown, more or less diagrammatically, a cross-conveyer 19 mounted on the leer frame at the front end thereof, and a shadow pan 20 spanning the space between the cross-conveyer and the leer conveyer. This cross-conveyer extends beyond one side of the leer into cooperative position with a forming machine; but in other constructions of this same leer, the ware is delivered from the forming machine directly to the leer conveyer; and it will therefore be understood that in such installations the cross-conveyer 19 and shadow pan 20 may be omitted.

There are many forms of conveyers for glass leers disclosed in the prior art, such as endless cables as illustrated in the patent to Stender No. 818,573, granted April 24, 1906; or endless chains, as illustrated in the patent to Zellers et al. No. 573,318, granted December 15, 1896; or mesh conveyers, as illustrated in the patents to Meyer No. 564,568, granted July 21, 1896, or Calhoon et al. No. 574,389, granted January 5, 1897; or roller conveyers, which are disclosed in various patents, such as Heisey et al. No. 365,813, granted July 5, 1887, or Butler No. 679,292, granted July 30, 1901; or a conveyer comprising endless chains carrying transversely extending perforated conveyer plates or leer pans, such as shown in the patent to Rau No. 1,195,087, granted August 15, 1916; or the type which has been in general use for many years, which is illustrated in many patents, and which consists of endless chains carrying transversely extending solid or imperforate plates or leer pans. Although any of the well known forms of conveyers for glass leers may be employed in the present leer, I prefer the same type of conveyer that has been commonly used for many years in the large leers and which is the type last described above.

Such conveyer comprises the endless chains 21 which extend over sprocket wheels at the front and rear of the leer; the chains being driven by a motor 22 which is operatively connected with a sprocket wheel 23 on the end of the shaft 24 which carries the sprockets engaging and driving the conveyer chains. The motor and associated parts are carried by a frame 25 suspended from the leer frame. The ordinary belt tightener 26 is provided for maintaining the conveyer chains under proper tension. The leer pans, indicated by numeral 27, are made of thin sheet metal and are preferably provided with downturned flanges; the pans extending transversely of the leer and being attached to the endless chains. These plates carry rollers 28 on their under sides, and throughout the upper run of the conveyer these rollers travel on rails 29, which are ordinary angle irons. I also preferably provide a smaller angle iron 30, which functions as a guard, and which is welded to the upstanding flange of the rail 29, so that the horizontal flange of the angle iron 30 will project slightly over the ends of the leer pans, and thus act as a guard to avoid the jamming of glass or other material between the ends of the leer pans and the side walls of the leer. This guard rail extends inwardly the desired distance from the hot end of the leer.

The rails 29 extend substantially the full

length of the leer and are mounted on the transversely extending angle irons 8, and it will be understood of course, that each of these rails may be formed of a single piece, or a plurality of pieces laid end to end, but suitably spaced to provide for expansion and contraction. The rails may be anchored at one end or at any point intermediate their ends, to one of the ties 8, by means of countersunk bolts. For the purpose of preventing the rails from being displaced or overturned, I provide clips 31 which are bolted to the angle irons 8 and which clamp over the horizontal flange of the angle iron 29 constituting the rail. Brackets 32 are also bolted to the angle irons 8, and the upper ends of the brackets are provided with flanges 33 which clamp over the top of the vertical flange of the rail angle iron. For the purposes of maintaining the rails in proper alignment and permitting the necessary expansion and contraction, guide rollers 35 are mounted on the angle irons 8 on opposite sides of the rails and in rolling contact therewith, as clearly illustrated in Figs. 3, 8 and 9.

The lower or return run of the leer conveyer is supported by rollers 36 which are mounted in brackets 37 riveted to the bottom plate 6 of the leer. By reference to Fig. 6, it will be noted that I preferably provide bearings 37′ which are removably mounted on the brackets 37, and that the rollers 36 are removably mounted in these bearings.

The walls of the leer are made of suitable heat insulating material 38; the walls being built up on the leer frame hereinbefore described, and being of the required thickness to insure proper heat insulation. In the form illustrated, the refractory construction is almost entirely exposed, and is reinforced by means of straps 41 of flat stock, the lower ends of which are secured to the side frames of the leer, and the upper ends project over the angle iron 42 extending along the upper edges of the construction; the oppositely arranged straps being connected at their upper ends by the rods 43, by means of which the straps are caused to tightly bind the refractory construction. In some instances I prefer to protect the refractory construction by a sheet metal covering.

The roof and side walls of insulating material which inclose the upper run of the conveyer do not extend the full length of the conveyer, it being customary to leave a considerable length of the rear portion of the conveyer exposed, so that the ware may be properly cooled and ready for packing by the time it reaches the end of the conveyer. It will be noted by reference to Figure 2 that the insulating walls and roof above the upper run of the conveyer terminate at the point indicated by numeral 44; but it will also be noted that the insulating side walls and floor within the leer frame and surrounding the conveyer, extend to the rear end of the frame and conveyer. Obviously, the extending of this insulation material to the end of the conveyer avoids considerable heat loss, which would occur if the rear portion of the conveyer were entirely exposed.

For the purpose of aiding in the control of the leer temperature, the roof of the leer is provided with a plurality of properly spaced flues 45; each flue having a damper 46. By the operation of these dampers, the amount of heat carried off at any point in the leer may be regulated, thereby insuring a proper temperature throughout the leer. This arrangement of flues has been in use for many years, and if desired they may lead to a common flue, which is also a conventional arrangement.

It has also been customary to arrange vertically adjustable curtains or baffles within the leer, and such curtains or baffles are indicated in the present leer by numeral 47. These baffles are made of asbestos or metal, and may be vertically adjusted by any desired means. In the present form, the baffles are slidably mounted between slightly spaced angle irons 48 which act as guides therefor; and a shaft 49 is rotatably mounted on the angle irons and is operatively connected with the upper end of the baffle by means of a chain or other flexible member 50. The shaft is provided with a crank 51, by the rotation of which the baffle is raised or lowered to the desired position. These baffles are adjusted for different heights of ware and they are usually positioned so that the ware will just clear them. This arrangement of baffles not only reduces air currents through the leer, but also tends to keep the heated gases down in contact with the ware being annealed.

When the annealed ware is carried out on the open conveyer from the interior of the leer, it is ordinarily subjected to considerable shock due to the sudden change in temperature; and this results in loss of ware due to strains or fractures. This objectionable feature is eliminated in the present leer by means of a battery of cooling pipes 52, the rear ends of which open to the atmosphere, and the front ends of which are connected with a flue 53, having a damper 54. In operation, air from outside the leer will be drawn into these pipes and pass out through the flue; and the air thus continuously passing through these pipes will absorb the heat therefrom and produce the desired cooling effect in the leer, without the cold air coming into direct contact with the ware. Forced draft may be employed with these cooling pipes, if desired.

I find it desirable to vary the point at which the annealed ware comes in contact with the atmospheric air; for even though ware may be perfectly annealed, yet it may be strained or fractured if it is brought out into the atmospheric air too early. In order

that this point may be varied, I have provided a number of hoods 55 which are arranged end to end over the open conveyer. In the annealing of some ware these hoods are not used at all; and in other cases several of them are employed; it being desirable to use as few as possible, so that the ware will come into contact with the cooling atmospheric air as early as practicable without injuriously affecting the annealed ware. In the form disclosed herein, the hoods are telescopically arranged, so that the sections may be pushed in or pulled out sufficiently to give a hood of the desired length.

When the ware leaves the hoods it is exposed to the atmosphere for a few feet of travel, and then passes beneath a wind box 56, through which air is forced downward at a moderate pressure against the ware and cools it, without danger of breakage. By reference to Fig. 2, it will be noted that the orifices 57 of the air jets are graduated in size, so as to gradually increase the amount of cooling air supplied to the ware.

From the foregoing description, it will be apparent that I have devised a leer of the individual type or smaller type, which is of extremely simple construction, is made largely of standard stock material, so that it is relatively inexpensive in manufacture, and yet which is highly efficient in operation.

Having fully described the invention, what I claim as new is:

1. A leer including a frame, said frame formed of channel irons extending substantially the full length of the leer and constituting the leer side frames, a bottom plate attached to the channel irons, transversely extending angle irons rigidly connecting the channel irons, and longitudinally extending angle irons mounted on the transverse angle irons and constituting rails for a leer conveyer.

2. A leer including a frame, said frame formed of channel irons extending substantially the full length of the leer and constituting the leer side frames, a bottom plate attached to the channel irons, transversely extending angle irons rigidly connecting the channel irons, longitudinally extending angle irons mounted on the transverse angle irons and constituting rails for a leer conveyer, and rollers for guiding the rails during expansion and contraction.

3. A leer including a frame, said frame formed of channel irons extending substantially the full length of the leer and constituting the leer side frames, transversely extending angle irons rigidly connecting the channel irons, longitudinally extending angle irons mounted on the transverse angle irons and constituting rails for a leer conveyer, and longitudinally extending angle irons mounted on the vertical flange of the angle iron rails and constituting guards for the leer conveyer.

4. In a leer, a metallic frame extending the full length of the leer, an endles conveyer housed within said frame and extending substantially the full length thereof, a tunnel of heat insulation material extending over only a portion of the length of said conveyer, and telescopically arranged hoods positioned over said conveyer beyond the tunnel.

5. In a leer, a metallic frame extending the full length of the leer, a conveyer housed within said frame and extending substantially the full length thereof, a tunnel of heat insulating material extending over only a portion of the length of said conevyer, means over the conveyer and spaced rearwardly of the tunnel for applying cooling air to the ware, a hood construction arranged over the conveyer and between the tunnel and said means, said hood construction being adjustable as to length, to vary the distance the top and sides of the ware are fully exposed to the atmosphere before being subjected to the cooling air.

6. A leer including a tunnel, a conveyer extending through and beyond said tunnel, means spaced rearwardly from the tunnel for applying cooling air to the ware on the conveyer, and means for varying the distance through which the top and sides of the ware are fully exposed to the atmosphere before reaching the first-mentioned means.

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