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MEANS FOR GLASS HARDENING

Filed May 10, 1943

2 Sheets-Sheet 1

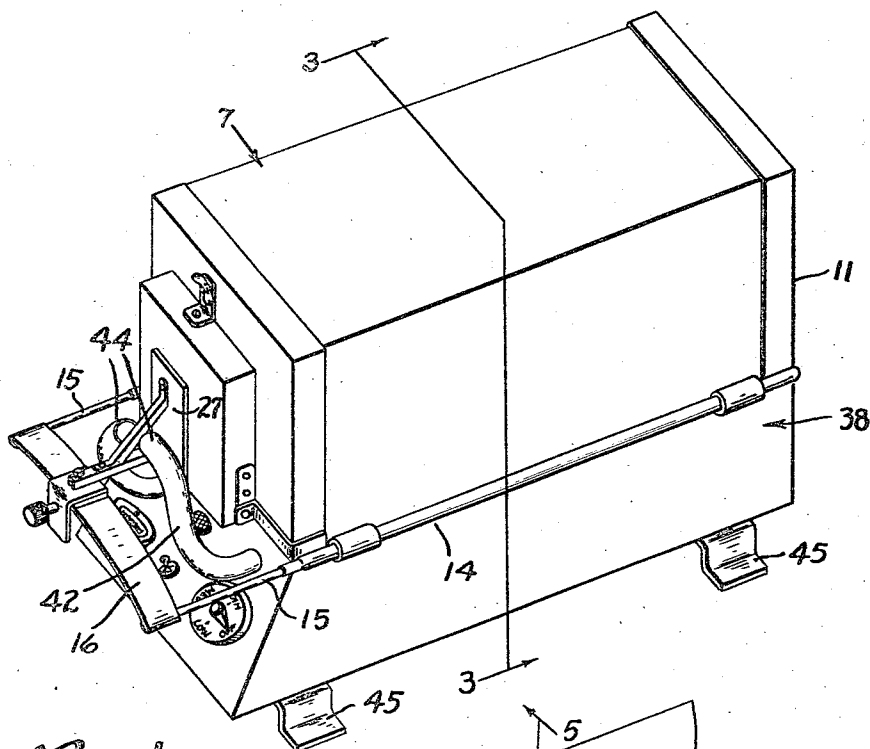


Fig. 1

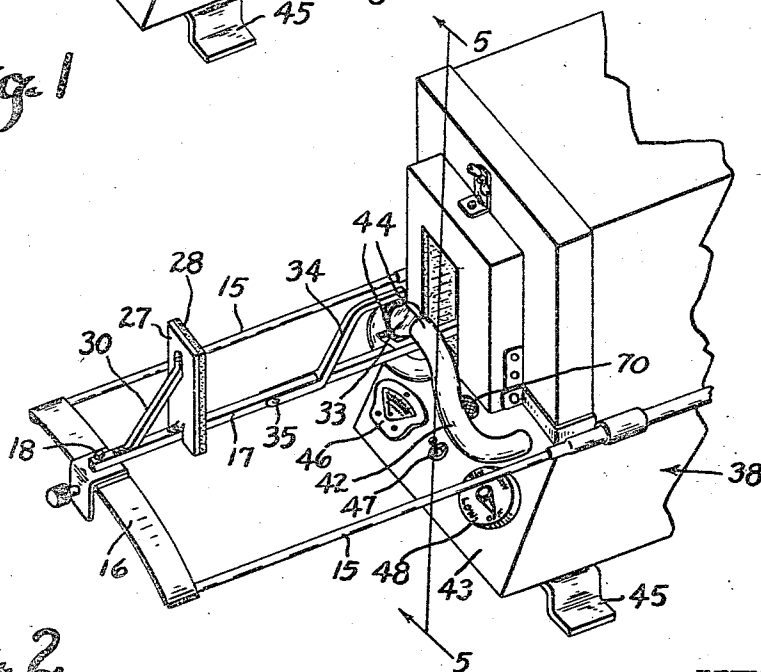


Fig. 2

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2 Sheets-Sheet 2

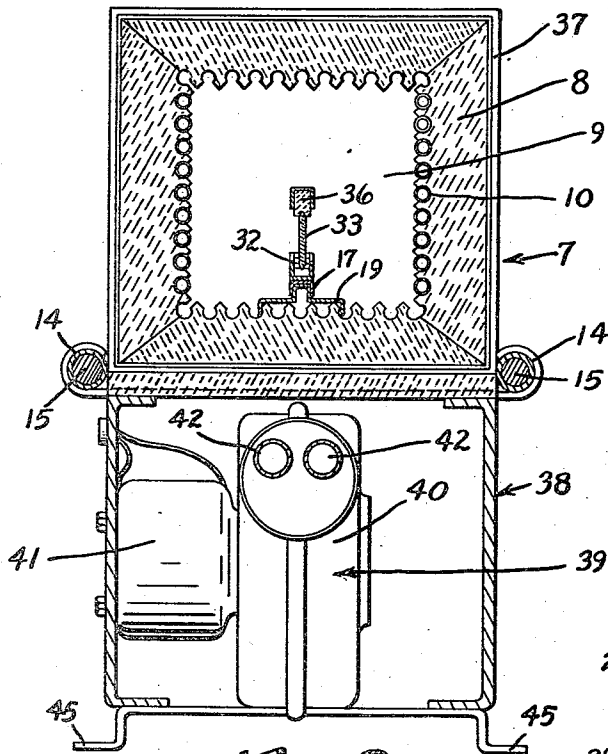


Fig. 3

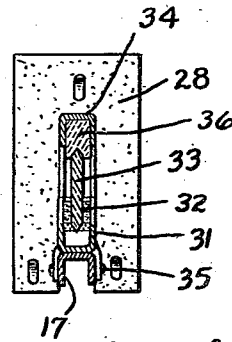


Fig. 4

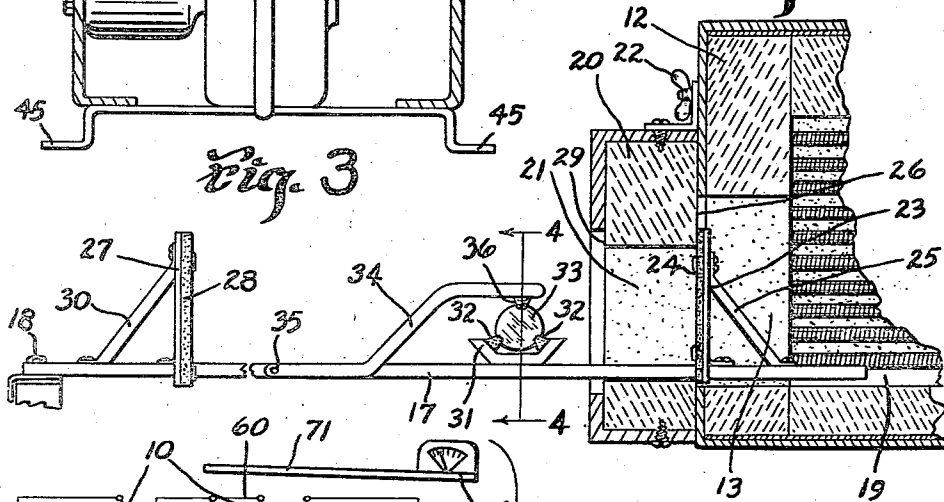


Fig. 5

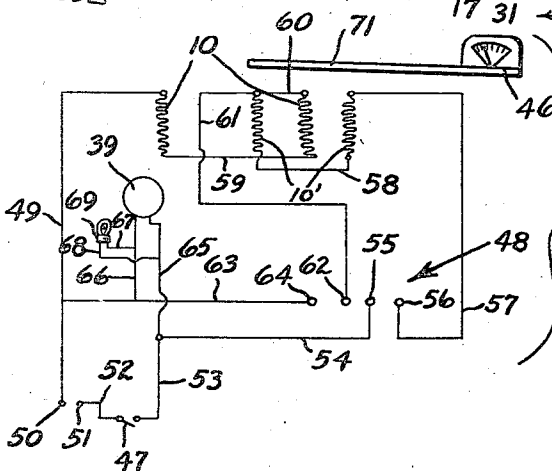


Fig. 6

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MEANS FOR GLASS HARDENING

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8 Claims. (Cl. 49—45)

1

This invention relates to means for hardening glass articles and relates particularly to the provision of a portable unitary device for hardening lenses and method of making the same.

One of the principal objects of the invention is to provide simple, efficient and economical means for hardening glass articles, such as lenses, whereby the heating furnace and means for hardening the lenses are embodied in a unitary structure with the correlated parts being arranged to perform their desired functions in a simple and efficient manner.

Another object is to provide a combined heating furnace and air hardening unit correlated with each other in such a manner as to permit the article or lens to be hardened to be placed within the chamber of the heating unit and to be removed therefrom and simultaneously aligned with the air hardening device.

Another object is to provide an inexpensive device of the above character for efficiently performing the successive steps of heating the lens and directing a blast of cooling liquid on the opposed sides thereof substantially immediately upon removal from the furnace.

Another object is to provide a support for the article or lens to be hardened whereby the said article may be positioned internally of the furnace and removed therefrom and be simultaneously positioned in alignment with the lens hardening means, with the said support having means thereon for automatically closing the entrance way to the furnace when the article is positioned internally of the furnace and when the article is removed therefrom.

Another object is to provide a relatively compact hardening unit comprising a heating furnace whose heating temperature may be varied as desired and having an electrically operated blower member associated therewith in such a manner as to direct a blast of air on the opposed side of the article upon removal from the furnace.

Another object is to provide novel means for supporting the article to be hardened whereby it may be simply and easily moved to operating position and may be easily removed after the hardening treatment for substitution of another article to be treated.

Other objects and advantages of the invention will become apparent from the following description taken in connection with the accompanying drawings and it will be apparent that many changes may be made in the details of construction and arrangement of parts without departing from the spirit of the invention as expressed in

2

the accompanying claims. I, therefore, do not wish to be limited to the exact details of construction and arrangement of parts as the preferred forms have been given only by way of illustration.

Referring to the drawings:

Fig. 1 is a perspective view of the device embodying the invention showing the work supporting means positioned for retaining the work internally of the furnace;

Fig. 2 is a fragmentary perspective view of the device illustrated in Fig. 1 showing the work or lens supporting means with the work removed from the interior of the furnace and aligned with the chilling and hardening means;

Fig. 3 is a sectional view taken as on line 3—3 of Fig. 1 and looking in the direction indicated by the arrows;

Fig. 4 is an enlarged sectional view taken as on line 4—4 of Fig. 5 looking in the direction indicated by the arrows;

Fig. 5 is a fragmentary sectional view taken as on line 5—5 of Fig. 2 and looking in the direction indicated by the arrows; and

Fig. 6 is a schematic view of the wiring circuit of the device.

The provision of means for hardening glass articles, such as lenses, is not new in the art. Most known prior art devices, however, were of a large cumbersome and expensive factory type, particularly adaptable for large production output and were in no way adaptable for commercial distribution and use in small shops where only a limited amount of such articles are to be hardened.

The present invention, therefore, is directed more particularly to the provision of a relatively small compact and inexpensive hardening unit having its various operating parts required for performing the various steps of the operation self-contained so as to render such devices commercially practical and feasible for use in small shops with ease and accuracy.

Referring more particularly to the drawings wherein like characters of reference designate like parts throughout the several views the device embodying the invention comprises a box-like furnace 7 having relatively thick side walls of insulation material 8 forming an internal chamber 9. The side walls 8 are preferably formed of a refractory material having their inner faces constructed to support electrical heating elements 10. Said heating elements may be provided throughout the side and upper and lower walls if desired or two or more of said walls may only

be provided with such heating units. The chamber 9 has an end 11 simulating the side walls 8 and has a front wall 12 of refractory material having an entrance opening 13 therein. On the opposed sides of the main furnace 7 there is provided a pair of slideways 14 in which bar-like members 15 are slidably supported. The slideways extend in a direction longitudinally of the furnace adjacent the base thereof. The slide bars 15 are joined by a cross brace 16 to which a channelled work supporting rod 17 is attached by means of bolts or the like 18. The channelled work supporting rod 17 is adapted to slidably engage a track-like member 19 internally of the heating chamber 9 for guiding said channelled work supporting rod 17 during its sliding movement inwardly and outwardly of the chamber 9.

Secured to the front wall 12 of the furnace there is a demountable door member 20 having an entrance opening 21 therein in substantial alignment with the entrance opening 13. The said door member 21 is also formed of refractory material and is secured to said front wall 12 by suitable bolt connections 22.

The channelled work supporting rod 17 is provided, internally of the heating chamber 9, with a baffle plate 23 having a facing 24 of insulation material simulating the refractory insulation material internally of the furnace. The baffle plate is supported by a bracket 25 and is adapted to engage the internal wall 26 of the door member to close the entrance opening 21 when the channelled work supporting rod 17 is in its outermost position of adjustment. The said channelled work supporting rod 17, adjacent its end closest to the cross brace 16, is provided with a baffle plate 27 having a facing 28 of refractory material thereon, simulating the baffle plate 23, adapted to engage the outer surface 29 of the refractory liner of the door to provide closure means for the entrance opening 21 when the rod 17 is in its innermost position of adjustment. The said baffle plate 27 is supported by a suitable bracket or the like 30. Intermediate the baffle plates 23 and 27 there is provided a channelled work support 31 having grooved blocks of refractory material 32 thereon adapted to receive the contour edge of the work or lens 33 to be supported thereby. A clamp lever 34 pivotally attached at 35 to the rod 17 and provided with a grooved block 36, simulating the blocks 32, is adapted to engage the upper contour edge of the work or lens 33 under the action of gravity and to support said lens 33 in an upright position with its surfaces disposed substantially parallel with the longitudinal axis of the bar 17, this is best seen in Fig. 4.

The outer surfaces of the refractory walls forming the chamber 9 are provided with a sheet metal covering or the like 37. Secured to the bottom of the furnace 7 there is a hollow chamber-like member 38 forming a base support for the furnace 7 and simultaneously forming a housing in which a motor driven blower unit 39 is mounted. Said unit 39 comprises a centrifugal type blower member 40, of any standard commercial make, rotatably operated by a suitable electrical motor 41 and having a pair of pipe lines 42 emanating therefrom. Said pipe lines 42 are directed outwardly of the front wall 43 of the base and thence turn upwardly, as shown best in Figs. 1 and 2, with the ends 44 thereof terminating in adjacent spaced relation with each other and located adjacent the station point of the work or lens when moved to its outermost position of adjustment with respect to the furnace

7, this is clearly shown in Fig. 2. The ends 44 are so positioned as to be in substantial alignment with the opposed sides of the work or lens 33 when in said outermost position whereby a blast of air coming from the blower 40 will be directed onto the opposed sides of said lens.

The lower wall of the housing 38 is provided with suitable supporting foot members 45. The front wall 43 also supports a suitable pyrometer or temperature indicating device 46, main shut off switch 47 and temperature control switch 48.

The electrical circuit of the device is schematically illustrated in Fig. 5 and comprises a plurality of heating elements 10 and 10'. One end of the heating elements 10 is connected by an electrical circuit line 49 to a main input terminal post 50 connected with the main source of electrical energy. The opposed post 51 of said main source of electrical energy is shown adjacent the post 50. This is connected through a lead wire 52 to the main cut-off switch 47. A lead wire 53 extends from said main cut-off switch to a circuit line 54 connected with one pole 55 of the heat control switch 48. Another pole 56 of said heat control switch 48 is connected through the lead wire 57 to one end of the heating units 10'. It is to be understood that said heating units 10' may be a plurality in number connected in series with other heating units 10' by a circuit line 58. This is also true of the units 10 which may comprise a plurality of units connected in series with an additional plurality of units 10 by the circuit line 59. One end of the serially connected heating units 10 and 10' are connected together by the circuit line 60 and are, in turn, connected with a circuit line 61 leading to the pole 62 of the heat control switch 48. A circuit line 63 connected with an additional pole 64 of said heat control switch is connected with the main circuit lines 49. Suitable circuit lines 65 and 66, secured to the respective circuit lines 54 and 63, connect the motor operated blower unit 39. Tapped off of said circuit lines 65 and 66 there are suitable lead wires 67 and 68 connected with a source of illumination 69. This source of illumination is visible through a suitable window 70 formed in the front wall 43 of the chamber 38. The pyrometer 46 has a thermocouple 71 extending inwardly of the chamber 9 and supported preferably above the article or lens 33 being heated.

The temperature internally of the chamber 9 is controlled through the setting of the heat control switch 48. This may be low, medium or high. If it is desired to have a low temperature the switch 48 is operated so as to close a circuit across the poles 55 and 56. This causes the current to flow through the heating units 10 and 10' with said heating units being effectively in series with each other.

If a medium temperature is required the switch 48 is operated so as to close a circuit across the poles 62 and 55 causing only the group of heating units 10 to be energized.

If a high temperature is required the switch 48 is operated so as to close a circuit across the poles 56 and 64 and across the poles 55 and 62 simultaneously whereby the current will flow through the heating units 10 and 10' with said heating units being effectively in parallel. The actual temperature of the heating can be determined by the pyrometer. It is, of course, assumed that the switch 47 has initially been closed. When the switch 47 is closed current is directed to the motor of the blower 39 and simultaneously

5

to the source of illumination 69 with said source of illumination 69 being a tell-tale light to indicate that the blower is running and that there is power to the heat control switch.

When the chamber 9 is heated to the proper temperature an article or lens 33 to be hardened is clamped in the holding blocks 32 and 36. The bars 15 are then slid longitudinally of the slideways 14 to move the channelled work supporting bar 17 and work carried thereby inwardly of the entrance openings 21 and 13 respectively an amount sufficient to position the work or lens 33 internally of the heating chamber 9 and to cause the plate 27 to engage the wall 29 and close the entrance opening 21. The work is allowed to remain internally of the furnace until properly heated, depending upon the temperature and the time required for heating the particular article. The bars 15 are then slid outwardly of the slideways 14 an amount sufficient to cause the baffle 23 to engage the inner wall 26 of the door 20 to close the entrance opening 21 and to simultaneously move the work or lens 33 outwardly between and in substantial alignment with the ends 44 of the pipe lines 42. When in this position the work or lens 33 receives a blast of cool air on the opposed sides thereof causing the said lens to be chilled with the result that the outer surfaces of said lens are placed in compression with the interior of the lens in tension. This causes the said article or lens to be more resistant to impact. The article or lens 33 is then removed by lifting the clamp lever 34 and a new lens to be hardened is placed in the holder.

It is to be noted that the heating unit, blower operating motor and electrical circuits are all embodied in a unitary structure in a simple and efficient manner and that the device is particularly adaptable for portable use.

Having described my invention, I claim:

1. In a device of the character described, the combination of a heating chamber having an entrance opening leading into said chamber, slideways on the opposed sides of said heating chamber, slide members slidably supported in said slideways, a supporting member carried by said slide members for supporting an article to be treated for movement into and out of said heating chamber through said entrance opening and means having a mouth portion disposed adjacent the entrance opening for directing a blast of air onto the article when moved to a given position outwardly of the heating chamber.

2. In a device of the character described, the combination of a heating chamber having an entrance opening leading into said chamber, slideways on the opposed sides of said heating chamber, slide members slidably supported in said slideways, a supporting member carried by said slide members for supporting an article to be treated for movement into and out of said heating chamber through said entrance opening and means having spaced mouth portions located adjacent the entrance opening between which the article is to be moved when located outwardly of the furnace for directing blasts of air onto the opposed sides of said article.

3. In a device of the character described, a heating chamber having an entrance opening leading into said chamber, slideways on the opposed sides of the chamber, slide members slidably mounted in the slideways, a cross member adjacent one end of the slide members, a bar-like member carried by the cross member in alignment with the entrance opening of the

6

chamber and extending longitudinally of the slideways, and a releasable holding member carried by the bar-like member for supporting an article to be treated for movement with said bar-like member in a direction inwardly and outwardly of the heating chamber.

4. In a device of the character described, a heating chamber having an entrance opening leading into said chamber, slideways on the opposed sides of the chamber, slide members slidably mounted in the slideways, a cross member connecting the adjacent outer ends of the slide members, a bar-like member carried by the cross member in alignment with the entrance opening of the chamber and extending longitudinally of the slideways, a releasable holding member carried by the bar-like member for supporting an article to be treated for movement with said bar-like member in a direction inwardly and outwardly of the heating chamber and means adjacent the entrance opening for spraying gases onto the article when moved to a given position outwardly of the heating chamber.

5. A device of the character described comprising a housing having two adjacent compartments, one of said compartments embodying a furnace having a heating chamber with an entrance opening therein, and the other compartment containing gas current producing means for directing gases to mouth portions disposed at a given position adjacent the entrance opening to the heating chamber, slideways on the opposed sides of the housing, slide members slidably mounted in the slideways, a connecting member joining the slide members adjacent the outer ends thereof, a supporting member carried by the connecting member extending in a direction longitudinally of the housing and in substantial alignment with the entrance opening to the heating chamber, and holding means on the supporting member for supporting the article to be treated for movement a controlled amount inwardly of the entrance opening and outwardly thereof to a point in substantial alignment with and between said mouth portions to direct gases forced outwardly of said mouth portions on the opposed sides of the article.

6. A device of the character described comprising a housing having two adjacent compartments, one of said compartments embodying a furnace having a heating chamber with an entrance opening therein, a plurality of heating elements within the heating chamber, members having mouth portions positioned adjacent said entrance opening, gas current producing means in the other of said compartments connected with said members having mouth portions for directing gases through said portions, said heating chamber having slideways on the opposed sides thereof, slide members slidably mounted in the slideways, a connecting member joining the slide members adjacent the outer ends thereof, a supporting member carried by the connecting member and extending in the direction of the slideways in substantial alignment with the entrance opening to the heating chamber, holding means on the supporting member for supporting the article to be treated for movement a controlled amount inwardly of the entrance opening of the heating chamber and outwardly thereof to a point in substantial alignment with and between said mouth portions to receive gases directed outwardly of said mouth portions upon the opposed sides of the article, said housing

7

having means connected with the heating elements in the heating chamber for regulating the amount of heat generated in said heating chamber and having indicating means cooperatively associated with the gas current producing means and the heat regulating means for indicating when they are in operation.

7. In a device of the character described a heating chamber having an entrance opening leading into said chamber, slideways on the opposed sides of the chamber, slide members slidable on the slideways, a connecting member secured adjacent one end of the slide members, a channelled rod member secured to the connecting member and having means thereon for supporting the work to be treated, said channelled rod extending in the direction of the slide members in substantial alignment with the entrance opening in the heating chamber, a track-like member within the heating chamber slidably supporting the channelled rod, said rod having clo-

8

sure portions on the opposed sides of the work holding means for closing the opening to the heating chamber when the article is carried by the channelled rod to its respective positions of adjustment inwardly or outwardly of the heating chamber, and means outwardly of and adjacent the entrance opening for directing gases upon the work when the work is moved to a given position between said means.

10 8. In a device of the character described, a furnace having a heating chamber with an entrance opening therein, bar members adjustably mounted on the outer sidewalls of said furnace and a work supporting member carried by the bar members having means thereon for supporting work
15 to be treated for movement into and out of the heating chamber through the entrance opening and means adjacent the entrance opening for spraying gases upon the work when moved to a
20 given position outwardly of the heating chamber.

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