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MEANS FOR UNBLOCKING LENSES

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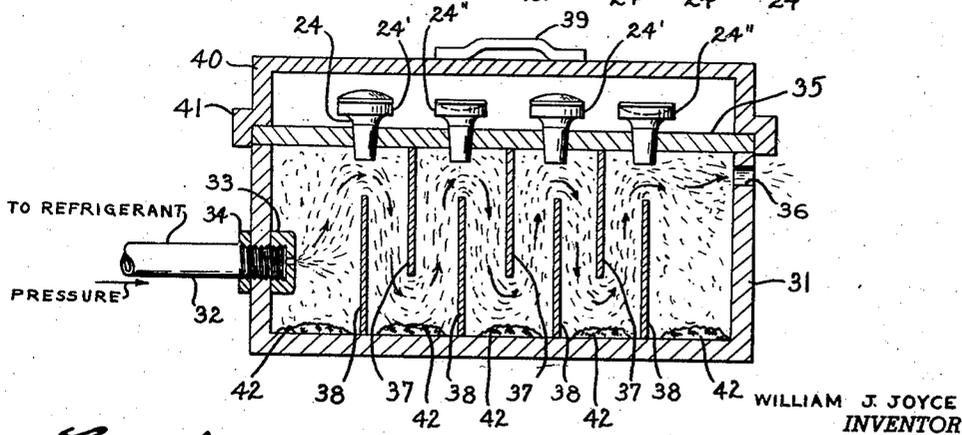
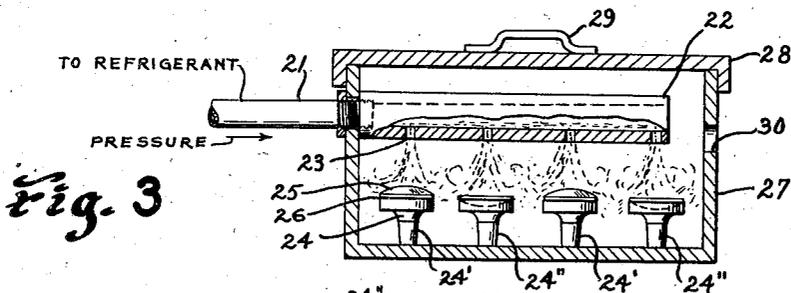
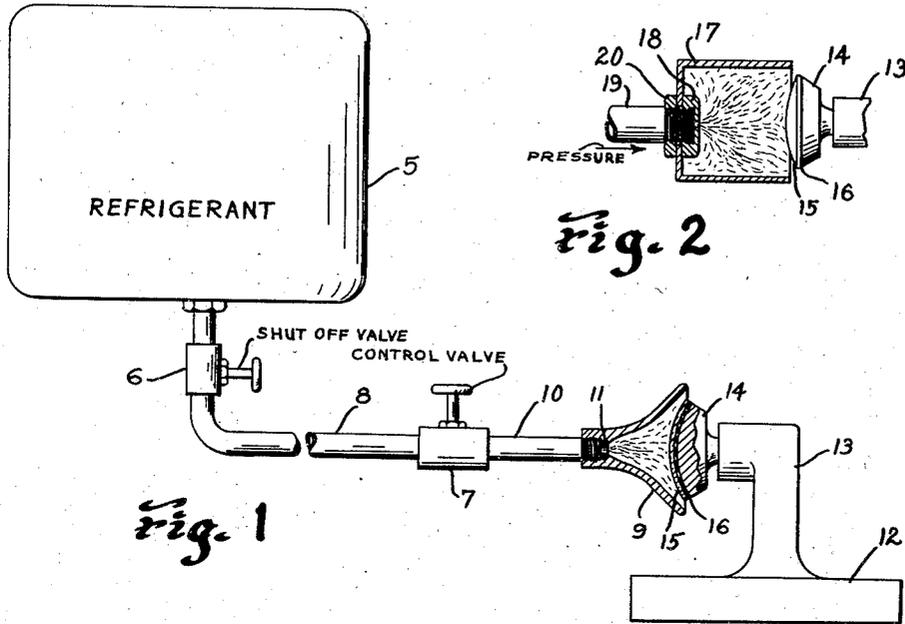


Fig. 4

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MEANS FOR UNBLOCKING LENSES

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2 Claims. (Cl. 62—104)

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This invention pertains to improved means for unblocking lenses or materials having the character of lenses.

In the manufacture of lenses for optical purposes, the finished optical surface or surfaces on the lens material is ordinarily obtained by what is commonly referred to as a polishing process. In order to properly polish a lens, it is customary practice to secure the lens blank to a lens block by employing a suitable adherent to secure the lens blank to said lens block. One of the conventional materials for securing the lens blank to the lens block is ordinarily referred to as "pitch." The pitch is softened and put on the lens block, and the lens blank is thereafter positioned in place with one surface against the pitch. When the lens blank is properly located on said lens block, the pitch is permitted to set sufficiently so that it adheres the lens blank to the lens block.

The lens blank may then be subjected to the grinding and polishing operation while said lens is in position on the lens block.

After the lens blank has been suitably treated by subjection to the grinding and polishing operation, the lens blank may then be removed from the lens block.

Heretofore, the lens blank was removed from the lens block either by chipping off the pitch, or using some cooling method, or a combination of both. One of the cooling methods employed was to put the lens blank and lens block in a bath of water at ordinary room temperatures, or somewhat lower, and thereafter the lens blank was forced from the lens block as by chipping, where this step was necessary.

In some instances, a refrigerating system was employed to cool the lens blank, or the lens block, or both. The system employed may have consisted of a cooled air chamber of the nature of a conventional ice box such as is used in a home. Under any of the conditions enumerated above, if a sufficient cooling was obtained the difference in expansion between the lens material and the pitch binding material would be such that the lens would become loosened from the pitch so that it may be readily removed from the lens block. Particles of the pitch frequently would stick to the lens which required a cleaning operation of the lens blank which involves time.

It is an object of the present invention to provide an improved means for unblocking a lens or lens blank whereby the lens, or the lens block or both, may be subjected to a sudden cooling

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so that the lens material may be more readily and efficiently removed from the lens block.

It is a further object of the invention to provide new and improved means for unblocking a lens whereby the lens or the lens block, or both, may be subjected to a gaseous or quasigaseous refrigerant.

It is a further object of the invention to provide improved means for unblocking a lens material whereby a plurality of blocked lenses may be subjected to a refrigerant where there is an intimate contact between the refrigerant and the material under treatment to decrease the time required for unblocking the lens material.

A further object of the invention is to provide improved means for supplying a gaseous or quasigaseous refrigerant to a cooling chamber which contains the lens which is to be unblocked.

A further object of the invention is to provide means for unblocking a lens whereby the lens material or the lens block or both may be subjected to a refrigerating action in an expansion chamber which may be such that either a constant velocity or varying a velocity of the refrigerant may be utilized.

A further object is to provide new and improved means for unblocking a lens or lenses whereby a blocked lens or lenses may be subjected to a stream of gaseous or quasigaseous refrigerant, whereby the rapid passage of the stream of refrigerant will accelerate the rate of cooling and thereby unblock the lens or lenses more rapidly and efficiently.

Another object of the invention is to provide new and improved means for subjecting blocked lenses to low temperatures without the use of liquid baths or mechanical accessories such as compressors, cooling coils, fans or the like.

A further object of the invention is to provide a chamber which has a stream of refrigerant directed so as to traverse the parts to be refrigerated whereby a single jet or orifice may emit a refrigerant to substantially simultaneously cool the lenses or lens blocks in a lens unblocking operation.

Further and other objects of the invention may be and may become apparent to one skilled in the art by a perusal of the disclosure in the present application, and it is to be understood that the present showings are by way of illustration only and are not to be considered as limitations.

In the drawings:

Fig. 1 is a side view, partially shown in section, showing a lens being subjected to the effect

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of the refrigerant of varying velocity in an expansion chamber.

Fig. 2 is a sectional view of an expansion chamber of the constant velocity type in approximate relation to a lens to be unblocked.

Fig. 3 is a sectional view of a refrigerating chamber wherein the refrigerant is directed toward the lenses to be unblocked.

Fig. 4 is a sectional view of a refrigerating chamber wherein the refrigerant is directed on the lens blocks, said refrigerating chamber having a series of baffles to control the flow of the refrigerant within the chamber.

Referring to the drawings and more particularly to Fig. 1, a tank 5 containing a refrigerant is connected to a shut-off valve 6 and a control valve 7 in the refrigerant feed line 8. An expansion chamber 9 is connected to the control valve 7 by a pipe connection 10. The expansion chamber 9 has a nozzle 11 communicating with the end of the pipe connection 10. A base 12 is connected to a lens block support 13 which has a lens block 14 carried thereby. A lens 15 is connected to the lens block 14 by a layer of pitch 16.

In Fig. 2, an expansion chamber 17 has a nozzle 18 which is threadedly connected to a pipe connection 19 and secured thereon by a lock nut 20. The lens block support 13 and the lens block 14 are similar to those referred to in Fig. 1, wherein the lens block has a lens 15 secured thereon by pitch 16. The pipe connection 19, in Fig. 2, may be interchangeable with the corresponding parts in Fig. 1, wherein one end of the pipe connection 19 which is connected to the expansion chamber 17 has the opposite end of the pipe connection connected to a control valve such as valve 7 in Fig. 1.

Referring to Fig. 3, a pipe connection 21 is connected to a supply of refrigerant through a control valve similar to 7 in Fig. 1. A multiple jet nozzle 22 is connected to one end of the pipe connection 21, with the multiple jet nozzle having a plurality of jets 23 in the multiple jet nozzle 22. The jets are directed downwardly toward a group of lens blocks 24 each of which has a lens 25 thereon connected by pitch 26. Lens blocks 24' are carrying lenses with the convex side up, lens blocks 24'' are carrying lenses with the concave side up. All of the lens blocks 24 consisting of groups 24' and 24'' are supported in a chamber 27 which has a cover 28 thereon, which cover may be removed by a handle 29. An outlet 30 in one end of the chamber 27 permits a pressure release of any possible pressure which might have a tendency to build up if the pressure release were not provided in the chamber when the device is in operation.

Referring to Fig. 4, a chamber 31 is connected to a pipe connection 32. A nozzle 33 on the end of the pipe connection 32 is held thereon by a lock nut 34. A lens block support 35 has a series of apertures therein which carry the lens blocks 24. Lens blocks 24' and 24'' carry lenses with the convex and concave sides respectively supported upwardly, as referred to in Fig. 3. A pressure release 36 is located below the lens block support 35 and is used for the same purpose as the pressure release 30 described in connection with Fig. 3. A series of baffles 37 are suspended from the lens block support 35 substantially crosswise of the chamber 31. A plurality of baffles 38 are connected to the chamber 31 on the bottom thereof and extended upwardly across the chamber 31. By means of the baffles 37 and 38, a flow

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of refrigerant is directed from the nozzle 33 substantially in the direction of the arrows shown within the chamber 31 and through the outlet 36. A handle 39 is connected to the cover 40, which cover has flanges 41 so that it fits securely about the upper portion of the chamber 31.

The tank 5, Fig. 1, contains a liquid refrigerant, which in the present case is carbon dioxide under pressure. The shut-off valve 6 is used to shut off the supply of the carbon dioxide close to the tank 5, while the control valve 7 is used to control the amount or rate of flow of the liquid carbon dioxide into the expansion chambers 9 and 17. After the lens block support 13 has been moved toward the mouth of the expansion chambers 9 or 17 respectively, as shown in Figs. 1 and 2, the shut-off valve 6 is opened and the control valve 7 if open will permit a flow of the liquid carbon dioxide through the nozzles 11 and 18 connected to the expansion chambers 9 and 17 respectively.

Concerning Fig. 1, the inclined sides of the expansion chamber 9 are such that the flow of refrigerant through the nozzle 11 will have a varying velocity in the expansion chamber.

The substantially cylindrical sides of the expansion chamber 17, shown in Fig. 2, will provide substantially a constant velocity within the expansion chamber. The various types of expansion chambers may be used where a single lens is or multiplicity of lenses are simultaneously subjected to the action of the refrigerant and where a constant velocity or variable velocity of refrigerant may be desirable depending upon the characteristics of the lens and other factors which may determine the nicety of operation when the present invention is in use.

The expansion chambers shown in Figs. 1 and 2 may be singly disposed where the lens unblocking operation features only one lens to be unblocked at a time. However, where two or more lenses are to be unblocked simultaneously, for the purpose of facilitating the unblocking operation, two or more of the nozzles shown in Figs. 1 and 2, may be used or a battery of expansion chambers may be employed. The disclosure in Fig. 3 shows the nozzle disposed directly over the lenses so that the blast or stream of refrigerant is directly applied to one surface of the lenses. In Fig. 4, the lens blocks are disposed in the chamber 31 so that the baffles create semi-chambers which will permit the refrigerant stream to flow upwardly and impinge against the lens block and thence downwardly below the upper baffles 37 and continue in this zig zag path to the pressure release 36. The purpose of the baffles is to assist in supplying a stream of cool refrigerant gas to the lens blocks while the solid carbon dioxide (Dry Ice) may collect in the lower part of the chambers as indicated at 42.

The portions of the lenses in the chambers throughout the various views are not presented as being drawn to scale as it should be obvious to one skilled in the art that it may be desirable to lower the lens blocks, shown in Fig. 4, so that a greater portion of each of the lens blocks will be subjected to the refrigerant in the lower portion of the chamber 31, and likewise it may be desirable to move the lens blocks, shown in Fig. 3, nearer to the jets within the chamber 27. Further, the individual jets 23 in the nozzle 22, shown in Fig. 3, may be so disposed that an individual jet may be located immediately above the center of each of the lens blocks. In operation, when the control valve is opened so that the refrigerant

ant is permitted to come into the chamber, the carbon dioxide gas and the solid carbon dioxide will impinge upon the exposed side of the lens or lenses.

The coefficient of expansion of the pitch is appreciably greater than the coefficient of expansion of glass, and consequently the coefficient of contraction would be effective in the same ratio. As the lens is cooled by the sudden blast of CO₂, the absorption of heat from the lens and pitch will cause the lens and pitch to contract rather rapidly so that the lens will be separated cleanly from the pitch. The speed of the cooling action is a great deal more rapid according to the teachings in the present disclosure than in any method heretofore known, and it also provides a much cleaner severance of the lens from the pitch.

It is pointed out that while heretofore the time required in using any conventional unblocking methods which used a cooling medium such as water or the like, would vary in accordance with different methods used, but invariably was a matter of minutes in obtaining the severance between the lens and pitch, in the present procedure the severance of the lens from the pitch is a matter of seconds. Further, the break is a great deal cleaner, thus leaving a practically clean surface on the lens on the side that was connected to the lens block by the pitch.

In Fig. 4, the operational result is quite similar to the result obtained in the other showings in the application except that the lens block is cooled first and the pitch is cooled through the medium of the lens block. Both of these methods of cooling have been used and found satisfactory. While the lens blocks usually are made of a metal, such as iron, the invention also works well by using a plastic lens block as set forth in the co-pending application of William P. Canning, Serial No. 431,133, filed February 16, 1942, the assignee in both the co-pending application and this application being the same.

While carbon dioxide has been referred to as the refrigerant, it has been so set forth because carbon dioxide (CO₂) is usually readily available throughout the United States and is low in cost and easy to handle. The theory of cooling in the present application is by producing a chilling action by the expansion of either a gas or a liquid at high pressure into a chamber of lower pressure, such as at ordinary atmospheric pressure. Upon the release of the liquid carbon dioxide, it immediately begins to expand. Part of it will start to expand into a gas and the temperature will drop sufficiently as it expands so that part of the residue will be frozen to form solid carbon dioxide or what is commonly referred to as Dry Ice at approximately -109° F. The direct stream of the Dry Ice mixture in Figs. 1, 2, and 3 produces a more direct or intimate contact, and thereby providing quicker cooling than in the view shown in Fig. 4.

The coefficient of expansion and contraction is much greater for the pitch than for the glass. The sudden cooling of the glass will rapidly cool the pitch which will have sufficient contraction to provide a nice clean severance of the lens from the pitch.

The closed chamber is used where a multiplicity of lenses are simultaneously unblocked so that the efficiency may be increased so that the cold air will be circulated through the chamber to conserve the supply of liquid carbon dioxide.

The lens block shown horizontally disposed in Figs. 1 and 2, may be vertically disposed so that a simple rack may be used, or the lens blocks may be set upright as shown in Fig. 3.

While carbon dioxide has been specifically set forth as a desirable refrigerant, it is to be understood that other sources may be used such as ethane C₂H₆, propylene C₃H₆, and propane C₃H₈.

While liquid refrigerants have been referred to, it is to be understood that the refrigerants referred to may be subjected to pressure so that the container for storing the refrigerant may contain a refrigerant gas or a refrigerant liquid depending upon various features such as the critical pressure to which the refrigerant gas is subjected in the tank, such as 5 in Fig. 1.

Having described my invention, I claim:

1. In a lens unblocking device the combination of a supply of refrigerant held under pressure, an expansion chamber, a feed line leading from said supply of refrigerant and connected to the chamber, discharge means within the chamber communicating with the feed line and including one or more nozzles, a lens block positioned in alignment with each nozzle and so arranged that the outer surface of a lens secured thereto will be exposed directly to the discharge of such nozzle and the refrigerant may expand adjacent the lens so as to introduce a chilling action upon said surface of the lens.

2. In a lens unblocking device, the combination of a supply of refrigerant held under pressure, an expansion chamber, a feed line leading from said supply of refrigerant to the chamber, nozzle means within the chamber communicating with the feed line, said nozzle means having a plurality of jets therein, lens blocks supported within the chamber and in substantial alignment with the jets of the nozzle means and arranged to hold the outer exposed surfaces of lenses secured thereto so positioned relative to said jets that the refrigerant upon being discharged from said jets will strike the lenses and expand adjacent the lenses so as to introduce a chilling action upon the surfaces thereof.

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