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MEANS FOR UNBLOCKING LENSES

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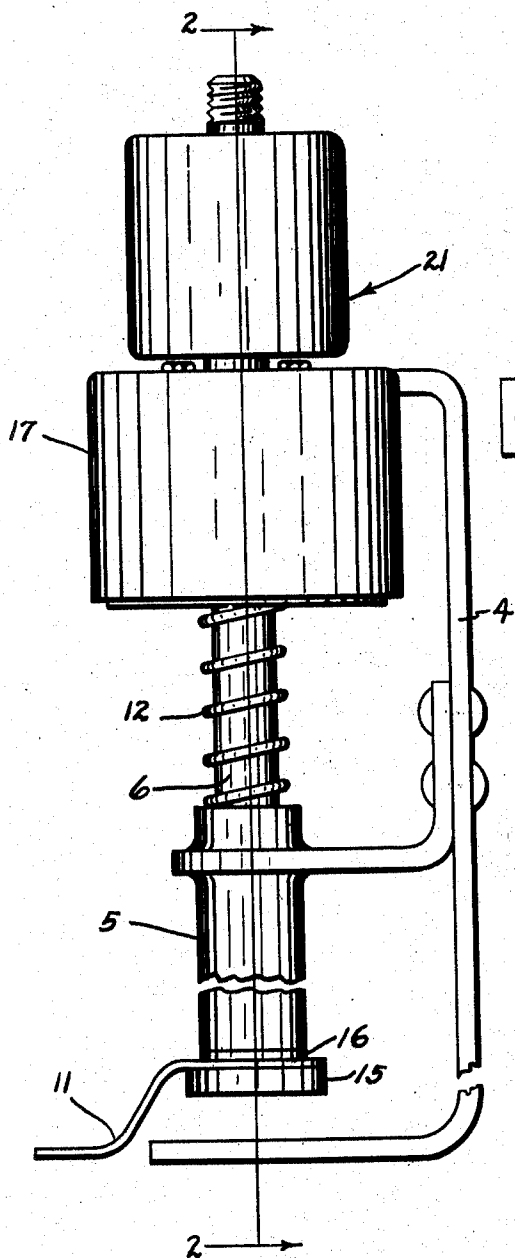


Fig. 1

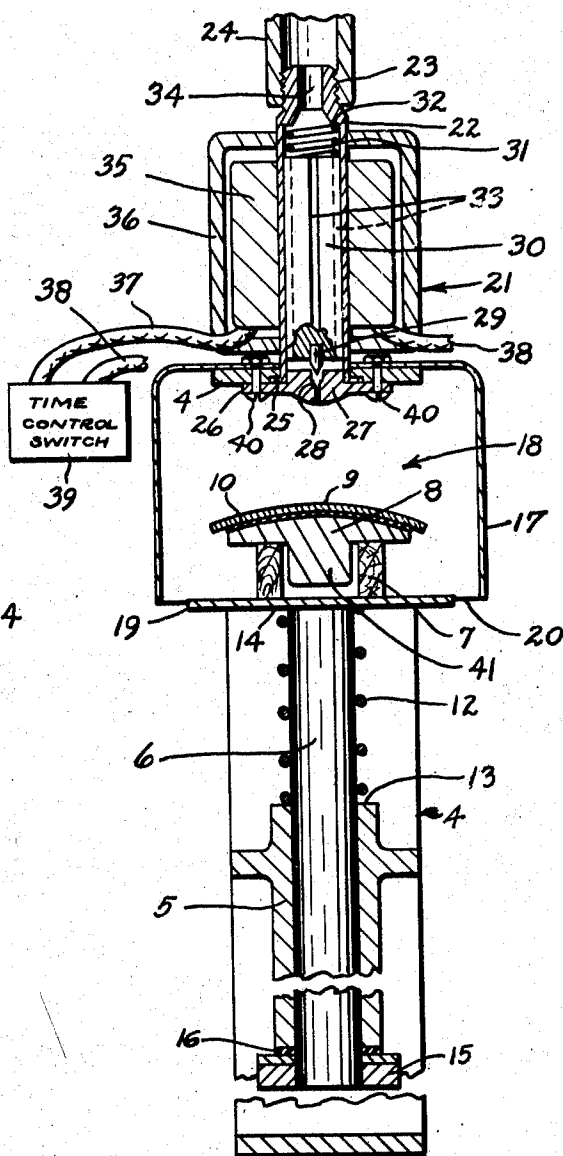


Fig. 2

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MEANS FOR UNBLOCKING LENSES

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This invention relates to devices for removing articles from supporting means and more particularly relates to novel means for removing a lens from a support to which the lens has been initially adhesively secured.

One of the principal objects of the invention is to provide improved means for removing a lens from a holder to which it has been adhesively secured by introducing a relatively marked difference in coefficient of expansion between the lens and the adhesive through rapid chilling of the lens whereby the lens will become dislodged from the holder.

Another object is to rapidly chill pitch blocked lenses for an automatically controlled time interval while on the block whereby the lens is caused to contract more rapidly than the pitch and will thereby become dislodged from the block.

Another object is to provide simple, efficient and economical means for accomplishing the above result.

Another object is to provide means embodying the use of carbon dioxide for chilling the lens whereby the extent of exposure of the blocked lens to the carbon dioxide may be positively controlled.

Other objects and advantages of the invention will become apparent from the following description taken in connection with the accompanying drawing and it will be apparent that many changes may be made in the details of construction, arrangement of parts shown and described without departing from the spirit of the invention as expressed in the accompanying claims. I, therefore, do not wish to be limited to the exact details of construction, arrangement of parts shown and described as the preferred form only has been given by way of illustration.

Referring to the drawing:

Fig. 1 is a side elevational view of the device embodying the invention; and

Fig. 2 is a longitudinal sectional view taken as on line 2—2 of Fig. 1 and looking in the direction indicated by the arrows.

The broad idea of removing a lens which has been secured to a block or holder by means of an adhesive, such as pitch, by chilling the lens more rapidly than the pitch to cause the lens to snap loose from the block or holder is not new in the art. Several different arrangements have been devised in the past to utilize liquid CO₂ as the chilling means. One of the main difficulties with most known prior art devices utilizing liquid CO₂ has been in controlling the amount of said CO₂ used in the actual chilling operation. In

most instances liquid CO₂ is obtained from a tank supply and, as used in the past, great difficulty was encountered in obtaining the most economical use of the supply.

The present invention, therefore is directed more particularly to the provision of means whereby the greatest possible number of removals can be obtained from a single source of supply and thereby greatly reducing the cost of unblocking lenses through the use of such chilling material.

Referring more particularly to the drawing wherein like characters of reference designate like parts throughout the several views the device embodying the invention comprises a main support 4 carrying an upright bearing member 5 in which a bar member 6 is slidably supported. The bar member 6 is provided adjacent the upper end thereof with a holder 7 for supporting the lens block 8 to which a lens 9 has been adhesively secured as by a layer of pitch or other suitable adhesive 10. The said bar 6 is provided adjacent the lower end thereof with hand or foot engagement means 11 by which the bar member, together with the holder 7 and lens block 8, may be moved in a downward direction. A coil spring 12 surrounding the bar member 6 is adapted to engage the upper surface 13 of the bearing adjacent one end thereof and the under surface 14 of the support 7 to constantly urge said bar member 6 in an upward direction. The extent of said movement is controlled by stop means 15 engaging the lower end of the bearing 5 or other suitable stop means. The engaging surfaces of the member 5 and the stop means 15 are provided with a facing 16 of resilient material functioning as cushioning means. The support 4 also carries a housing or hood 17 which is adapted to form a hollow chamber 18 in which the lens block 8 having the lens 9 adhesively secured thereto is adapted to be positioned for the chilling treatment. Adjacent the holder 7 there is supported a flange member 19 functioning as baffle means disposed adjacent the lower end of the hood 17 with the diameter of said baffle means being smaller than the diameter of the hood to provide an exhaust space 20 circumferentially of the baffle 19. There is also carried by the support 4 a valve member 21 having a central tubular portion 22 provided with threaded coupling means 23 to which a pipe or hose line 24 leading to a source of supply of liquid CO₂ may be connected. The tubular member 22 has a flanged end 25 clamped between the upper portion of the support 4 and a peripheral flange 26, formed inte-

grally with a nozzle member 27, by means of suitable bolts or the like 40. The nozzle member 27 has a restricted opening 28 therein, the upper portion of which forms a valve seat for a valve needle or contact member 29 carried by a plunger 30 slidably supported internally of the tubular member 22. The plunger member 30 is normally urged in a downward direction by means of a coil spring or the like 31 which engages the upper portion of the plunger adjacent one end thereof and which engages a shouldered edge 32 internally of the tubular member 22. The said plunger has a plurality of longitudinal grooves 33 therein through which liquid, passing through the restricted opening 34 in the coupling means adjacent the upper end of the tubular member 22, may pass to gain access to the needle valve 29 and restricted opening 28. The tubular member 22 is preferably formed of brass or other non-magnetic material. The plunger 30, while functioning as means for supporting the needle valve 29, actually is the core of an iron clad solenoid having a plurality of windings 35 encased in an iron casing 36. The windings 35 are connected through suitable lead wires 37 and 38 to a time control switch 39. The time control switch may be of any known commercial type which when operated will energize the solenoid for a predetermined controlled time interval and which may be varied for any desirable duration of energizing of the coil 35 of the solenoid.

The function of the device is substantially as follows:

The plunger 30 is normally urged in a downward direction by the coil spring 31 causing the needle valve 29 to be relatively firmly seated on the valve seat of the restricted opening 28. This shuts off the flow of liquid CO₂ through said restricted opening. The engagement means 11 is then engaged to force the bar-like member 6 in a downward direction to move the holder 7 outwardly of the chamber 18 an amount sufficient to permit the lens holder or block 8 having a lens secured thereto by a layer of pitch or other suitable adhesive 10 to be placed on said holder. Holders of this nature have a shank portion 41 thereon which is adapted to extend inwardly of the holder 7, which holder in this particular instance, is in the form of a cylinder having an upper supporting edge and a hollow center to receive the shank 41 thereby permitting the main holding portion of the block 8 to rest on the upper edge of the cylinder. Pressure is then released on the member 11 to allow the holder and block 8 to move upwardly into the chamber 18. The time control switch 39 is then operated to cause a current flow for a predetermined duration to be directed to the solenoid coil 35. This causes the magnetic field of the coil 35 to raise the core or plunger 30 against the action of the coil spring 31. This causes the needle valve 29 to be raised relative to the valve seat of the restricted opening 28 thereby permitting the liquid CO₂ to be discharged through said restricted opening. The discharge is in the form of a spray which engages the upper surface of the lens substantially throughout the entire area of said upper surface and thereby suddenly chills the lens causing it to contract more rapidly than the contraction of the pitch or other adhesive 10 whereupon the lens will snap loose from said adhesive. The member 11 is then engaged to move the bar-like member 6 in a downward direction whereupon the block and loosened lens may be removed from

the holder and a new lens and block assembly placed thereon.

The solenoid operating through the time control switch causes the needle valve 29 to be raised relative to the valve seat of the restricted opening 28 for a controlled time interval and the said time control switch will function automatically to shut off the current flow to the solenoid coil whereupon the plunger or core 30 will be automatically forced downwardly by the spring 31 to close the restricted opening 28. This provides a positive control for the amount of flow of the liquid CO₂ through the restricted opening 28 and prevents excessive and unrequired usage of said liquid CO₂.

The construction set forth above is relatively simple and inexpensive in nature and obviates the use of seals, packings and the like which were required with most known prior art constructions. This is particularly of advantage when working at the extremely high pressures of the magnitude of 800 to 1000 lbs. required with the use of liquid CO₂.

From the foregoing description it will be seen that simple, efficient and economical means and methods have been provided for accomplishing all of the objects and advantages of the invention.

Having described my invention, I claim:

1. In a device of the character described the combination of a support, a housing carried by said support, a holder member on said support having a portion movable into and out of the housing, a member having a passageway with a restricted opening therein leading into the housing, a plunger in said passageway, said plunger having a contact portion carried by the end thereof for engaging the walls of the restricted opening, said plunger constituting the core of a solenoid, a solenoid coil surrounding said member having the passageway therein and said plunger in the last mentioned passageway, means for normally urging said plunger and the contact portion carried thereby toward the restricted opening to close said opening, a source of liquid refrigerant connected with said passageway and means for energizing the solenoid for a controlled period of time for causing said plunger to move in a direction opposite the direction of the force exerted by the means for urging said contact portion into engagement with the walls of the restricted opening whereby a controlled amount of liquid refrigerant will be permitted to flow through said restricted opening into the housing.

2. In a device of the character described the combination of a support, a housing carried by said support, a holder member on said support having a portion movable into and out of the housing, a member having a passageway with a restricted opening therein leading into the housing, a plunger in said passageway, said plunger having a contact portion carried by the end thereof for engaging the walls of the restricted opening, said plunger constituting the core of a solenoid, a solenoid coil surrounding said member having a passageway therein and said plunger in the last mentioned passageway, means for normally urging said plunger and the contact portion carried thereby toward the restricted opening to close said opening, a source of liquid refrigerant connected with said passageway, means for energizing the solenoid and time control switch means for controlling the period of time of said energizing for causing said plunger to move in a direction opposite the direction of the force exerted by the means for urging said contact por-

tion into engagement with the walls of the restricted opening whereby a controlled amount of liquid refrigerant will be permitted to flow through said restricted opening into the housing.

3. In a device of the character described the combination of a support, a housing on said support, a bearing member carried by said support, a bar-like member slidably supported in said bearing member having a holder member at an end thereof presented toward the housing, resilient means associated with said bar-like member for normally urging said holder member toward the housing and for permitting said holder member to be moved out of the housing, a member having a passageway with a restricted opening leading into the housing in substantial alignment with the holder, a plunger in said passageway having grooves longitudinally thereof, said plunger having a contact portion carried by the end thereof for engaging the walls of the restricted opening, resilient means in said passageway for normally urging the plunger toward the restricted opening and the contact portion into seated relation with the walls of the said opening, a solenoid coil surrounding said member having the passageway therein, a source of liquid refrigerant connected with said passageway and means for energizing the solenoid to cause the plunger to be moved in a direction opposite the direction of the force exerted by the resilient means to disengage the contact portion from the walls of the restricted opening to permit the liquid refrigerant to flow through the longitudinal grooves in the plunger and through the restricted opening into the housing.

4. In a device of the character described the combination of a support, a housing on said support, a bearing member carried by said support, a bar-like member slidably supported in said bearing member having a holder member at an end thereof presented toward the housing, resilient means associated with said bar-like member for normally urging said holder member toward the housing and for permitting said holder member to be moved outwardly of the housing, a member having a passageway with a restricted opening leading into the housing in substantial alignment with the holder, a plunger in said passageway having grooves longitudinally thereof, said plunger having a contact portion carried by the end thereof for engaging the walls of the restricted opening, resilient means in said passageway for normally urging the plunger toward the restricted opening and the contact portion into seated relation with the walls of the said opening, a solenoid coil surrounding said member having the passageway therein, a source of liquid refrigerant connected with said passageway, means for energizing the solenoid, and time controlled switch means for controlling the period of energizing of the solenoid to cause the plunger to be moved in a direction opposite the direction of the force exerted by the resilient means to disengage the contact portion from the walls of the restricted opening to permit the liquid refrigerant to flow through the longitudinal grooves in the plunger and through the restricted opening into the housing.

5. In a device of the character described the combination of a support, a housing on said support, a bearing member carried by said support, a bar-like member slidably supported in said bearing member having a holder member at an end thereof presented toward the housing, resilient means associated with said bar-like mem-

ber for normally urging said holder member toward the housing and for permitting said holder to be moved outwardly of the housing, a member having a passageway with a restricted opening leading into the housing in substantial alignment with the holder, a plunger in said passageway having grooves longitudinally thereof, said plunger having a contact portion carried by the end thereof for engaging the walls of the restricted opening, resilient means in said passageway for normally urging the plunger toward the restricted opening and the contact portion into seated relation with the walls of the said opening, a solenoid coil surrounding said member having the passageway therein, a source of liquid refrigerant connected with said passageway, means for energizing the solenoid to cause the plunger to be moved in a direction opposite the direction of the force exerted by the resilient means to disengage the contact portion from the walls of the restricted opening to permit the liquid refrigerant to flow through the longitudinal grooves in the plunger and through the restricted opening into the housing and an engagement member carried by the bar-like member for moving said bar-like member against the action of the resilient means which normally urges the holder member carried by said bar member towards the housing.

6. In a device of the character described the combination of a support, a housing on said support, a bearing member carried by said support, a bar-like member slidably supported in said bearing member having a holder member at an end thereof presented toward the housing, resilient means associated with said bar-like member for normally urging said holder member toward the housing and for permitting said holder member to be moved outwardly of the housing, a member having a passageway with a restricted opening leading into the housing in substantial alignment with the holder, a plunger in said passageway having grooves longitudinally thereof, said plunger having a contact portion carried by the end thereof for engaging the walls of the restricted opening, resilient means in said passageway for normally urging the plunger toward the restricted opening and the contact portion into seated relation with the walls of the said opening, a solenoid coil surrounding said member having the passageway therein, a source of liquid refrigerant connected with said passageway, means for energizing the solenoid, time control switch means for controlling the period of energizing of the solenoid to cause the plunger to be moved in a direction opposite the direction of the force exerted by the resilient means to disengage the contact portion from the walls of the restricted opening to permit the liquid refrigerant to flow through the longitudinal grooves in the plunger and through the restricted opening into the housing and an engagement member carried by the bar-like member for moving said bar-like member against the action of the resilient means which normally urges the holder member carried by said bar member towards the housing.

7. In a device of the character described the combination of a support, a housing on said support, a bearing member carried by said support, a bar-like member slidably supported in said bearing member having a holder member at an end thereof presented toward the housing, resilient means associated with said bar-like member for normally urging said holder member to-

ward the housing and for permitting said holder member to be moved out of the housing, a member having a passageway with a restricted opening leading into the housing in substantial alignment with the holder, a plunger in said passageway having grooves longitudinally thereof, said plunger having a contact portion carried by the end thereof for engaging the walls of the restricted opening, resilient means in said passageway for normally urging the plunger toward the restricted opening and the contact portion into seated relation with the walls of the said opening, a solenoid coil surrounding said member having the passageway therein, a source of liquid refrigerant connected with said passageway, means for energizing the solenoid and variable time control switch means connected with said solenoid for controlling the time interval of energizing of said solenoid.

8. In a device of the character described the combination of a housing having means associated therewith movable to a position internally thereof for supporting a holder having a lens adhesively secured thereto, a passageway leading into said housing, a member having a restricted opening therein aligned with said passageway adjacent the end thereof connecting with the housing, a source of liquid CO₂, means for connecting said source of liquid CO₂ to the passageway, a plunger in said passageway having an end portion adapted to engage the member having the restricted opening therein and to overlie said opening and means having automatic time control means associated therewith and cooperatively related with the plunger for moving said plunger away from said member having the restricted opening therein for a controlled period of time for regulating the extent of flow of liquid CO₂ through said restricted opening into said housing.

9. In a device of the character described the combination of a support, a housing carried by said support, bearing means carried by said support, a bar member slidably supported in said bearing means and having a holder at an end thereof presented toward the housing, resilient means normally urging said bar member and holder in a direction towards the housing to support said holder inwardly of said housing, a passageway leading into said housing having a portion with a restricted opening therein, a plunger member in the passageway having a portion of a diameter smaller than the diameter of the passageway and having an end portion for engaging the portion having the restricted opening therein in overlying relation with the opening, means for normally urging said plunger member towards the portion having the restricted opening therein, a refrigerant conduit connected with said passageway, the flow of refrigerant between the portion of the plunger of smaller diameter and the wall of the passageway and through said restricted opening being limited by the overlying relation of the end of the plunger with the restricted opening, and electro-magnetic means cooperatively functioning with said plunger mem-

ber for urging said plunger member in a direction away from the portion having the restricted opening therein to permit the flow of the refrigerant through said restricted opening.

10. In a device of the character described the combination of a support, a housing carried by said support, bearing means carried by said support, a bar member slidably supported in said bearing means and having a holder at an end thereof presented toward the housing, resilient means normally urging said bar member and holder in a direction towards the housing to support said holder inwardly of said housing, a passageway leading into said housing having a portion with a restricted opening therein, a plunger member in the passageway having a portion of a diameter smaller than the diameter of the passageway and having an end portion for engaging the portion having the restricted opening therein in overlying relation with the opening, means for normally urging said plunger member towards the portion having the restricted opening therein, a refrigerant conduit connected with said passageway, the flow of refrigerant between the portion of the plunger of smaller diameter and the wall of the passageway and through said restricted opening being limited by the overlying relation of the end of the plunger with the restricted opening, electro-magnetic means cooperatively functioning with said plunger member for urging said plunger member in a direction away from the portion having the restricted opening therein to permit the flow of the refrigerant through said restricted opening, and a time control switch connected with said electro-magnetic means for controlling the time interval of energizing the said electro-magnetic means.

11. In a device of the character described, the combination of a housing, means for supporting a holder having work adhesively secured thereto in said housing, a member having a passageway therein connected with the housing, with said passageway leading into said housing, a liquid refrigerant conduit connected with said member having the passageway therein, valve means in said passageway for closing said passageway and electrically operated means for retaining said valve means open for a controlled predetermined time interval.

12. In a device of the character described, the combination of a housing, means for supporting a holder having work adhesively secured thereto in said housing, said housing having an opening therein, a member secured to said housing having a passageway aligned with said opening, means in said passageway having a portion for engaging said opening to close the same, a liquid refrigerant conduit connected with said member having the passageway therein and electrically operated means for inducing a force on said means having the portion for closing said opening in a direction away from said opening for a predetermined time interval for permitting a predetermined amount of the liquid refrigerant to flow through said opening.

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