RE 24837

June 10, 1958 A. E BRYMER, JR 2,837,872

HYDRAULIC CONTROL FOR GLASS PRESSING MACHINES

Filed Aug. 24, 1955 4 Sheets-Sheet 1

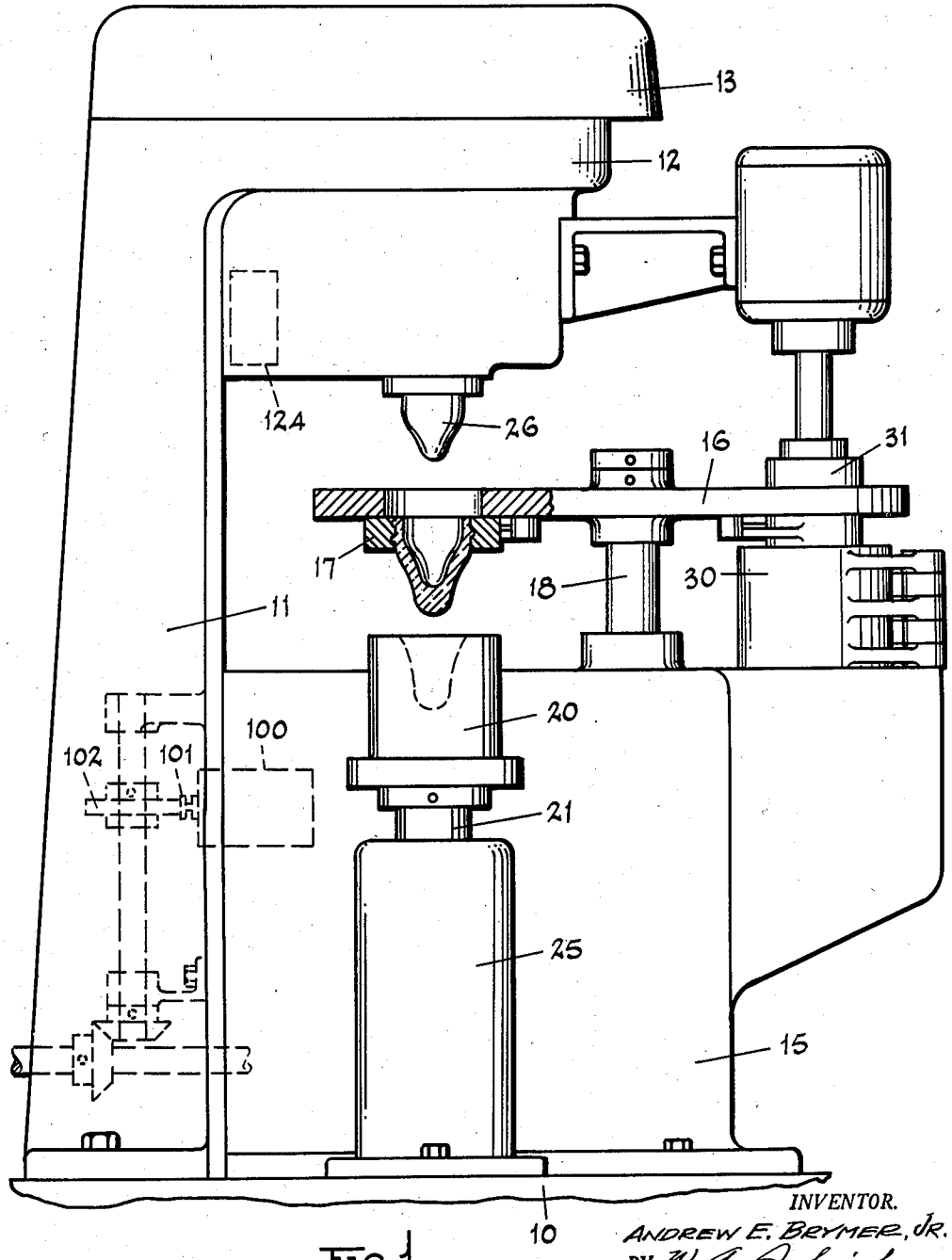


Fig 1

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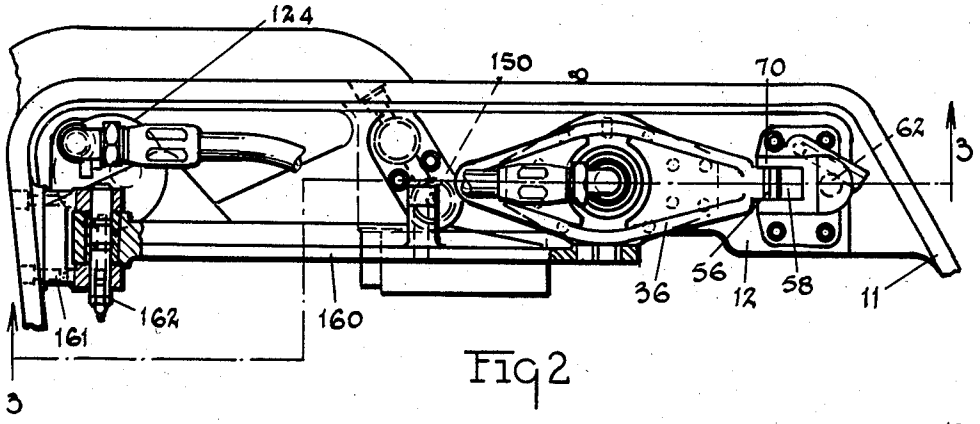


Fig 2

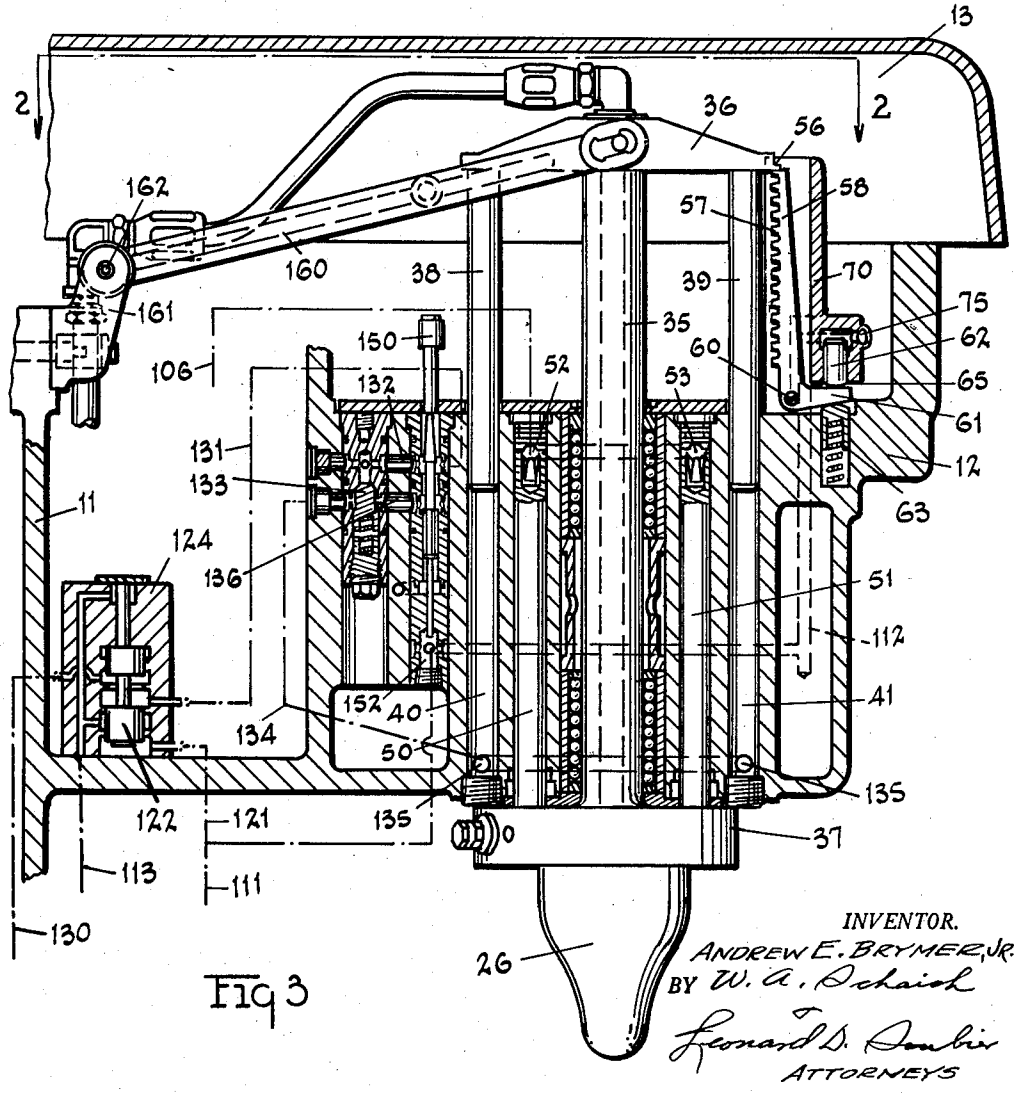


Fig 3

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Filed Aug. 24, 1955 4 Sheets-Sheet 3

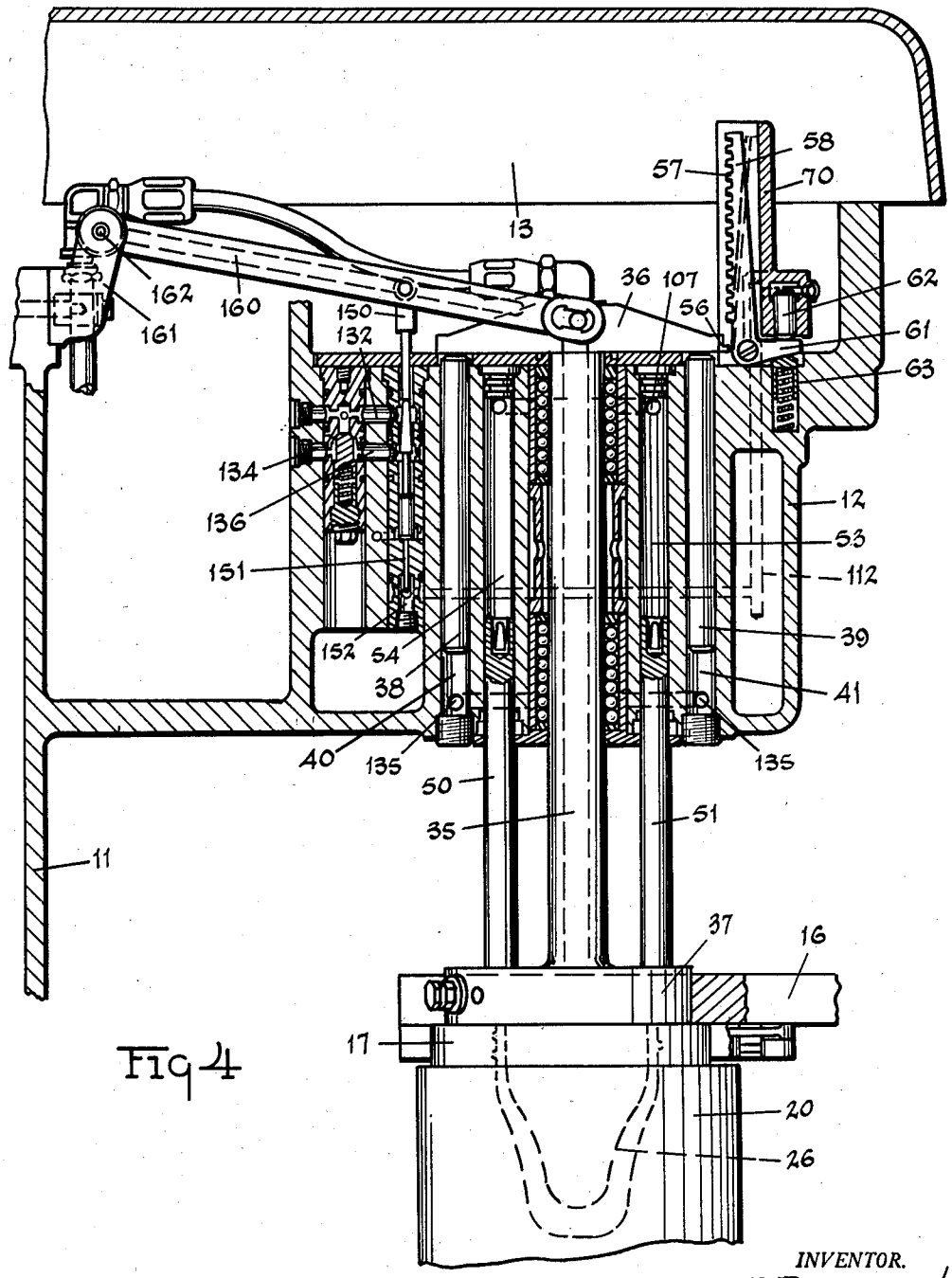


Fig 4

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Filed Aug. 24, 1955 4 Sheets-Sheet 4

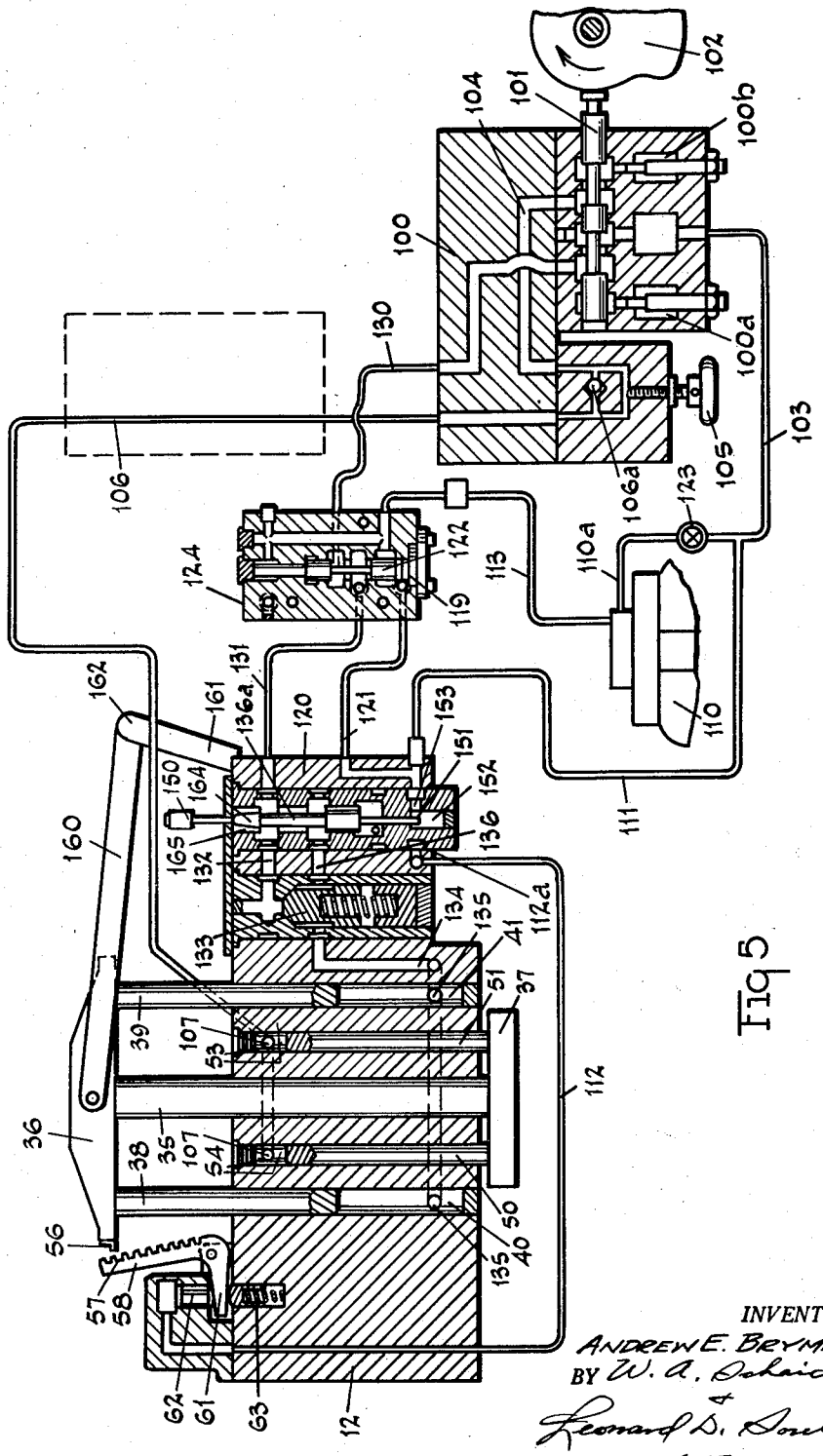


Fig 5

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United States Patent Office 2,837,872 Patented June 10, 1958

2,837,872

HYDRAULIC CONTROL FOR GLASS PRESSING MACHINES

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Application August 24, 1955, Serial No. 530,309

4 Claims. (Cl. 49—38)

My invention pertains to machines for pressing and blowing glass articles, and in particular to mechanisms for controlling the movements of the pressing plunger to and from press forming positions. Among the objects of this invention is the provision of a device permitting the operator to withdraw the plunger from press position in the event of mechanical interference in other portions of the machine.

A further object is the provision of a device for automatically preventing the movement of the pressing plunger into pressing position with the failure of the power.

In the drawings:

Fig. 1 is a partial elevational view of a glass forming unit illustrating the pressing position of such forming unit;

Fig. 2 is a plan view taken approximately at the line II—II on Fig. 3;

Fig. 3 is a part sectional elevation through the hydraulic operating mechanism for the plunger taken at line III—III on Fig. 2 with the plunger in the retracted position;

Fig. 4 is a part sectional elevation taken at line III—III on Fig. 2 showing the hydraulic plunger operating parts in the pressing position; and

Fig. 5 is a diagram of the hydraulic circuit for this mechanism.

In the drawings, **10** is a base upon which is mounted a column **11** supporting the hydraulic operating mechanisms for the pressing plunger. These mechanisms are mounted in an enclosing head **12** at the top of the column **11** and a removable hood **13** is provided permitting access to these mechanisms. A table **15** supports a rotatable carrier **16** upon which is mounted a series of neck molds **17** arranged to be moved to and from pressing and blowing positions. The carrier **16** is mounted on a vertical shaft **18** which is driven step-by-step from a motor drive, not shown.

At one station the neck molds **17** are maintained in operative position and arranged to cooperate with a press mold **20** mounted on the top end of a vertical piston **21**. The press mold **20** is moved to and from its operative position with the neck molds **17** by an air motor **25**. Directly above the press mold **20** is a pressing plunger **26** adapted for vertical movement to and from the operative position in cooperative alignment with the neck molds **17**. When the glass parisons have been pressed to shape, the carrier **16** is adapted to transfer them to the blow mold **30** where they are enclosed by said mold, and the blowing head **31** is adapted to be seated on the carrier **16** and to provide blowing air to expand the parison to hollow shape in the blow mold **30**.

All of these operations may be controlled by any well known timing device.

In the operation of such mechanisms and in particular the pressing mechanisms, any power failure or mechanical interference is apt to be highly detrimental to the forming mechanisms, particularly if such failure happens during the pressing operation. In any such instance, if the plunger **26** and the molds **17** and **20** are permitted to remain in pressing position, the glass will freeze to the plunger and the molds, and the subsequent separation of these parts will result in damage to all three members.

Therefore, the essence of this invention is to provide a safety means particularly for preventing the pressing plunger ever remaining in such pressing or any other obstructing position, and second, to prevent the plunger from moving down to pressing position in the event of any power failure or mechanical interference.

Mounted in the head **12** is a vertical shaft **35** carrying at its lower end the pressing plunger **26**, said shaft having attached to its top end a cross arm **36** with a second cross arm **37** attached to its lower end and forming in effect an I-shaped member or combined crosshead. A pair of floating pistons **38**, **39** mounted in cavities **40**, **41** in head **12** are adapted for free contact with the upper cross arm **36** for raising the plunger **26** out of pressing position. A second pair of floating pistons **50**, **51** mounted in cavities **52**, **53** in the head **12** are also adapted for free contact with the lower cross arm **37** to lower the pressing plunger to pressing position. The upper cross arm **36** has a locking finger **56** formed at one end which is adapted for engagement with locking teeth **57** formed on the inner face of a lock bar **58**. The said lock bar being fulcrumed at **60** on the head **12** and having an extension **61** arranged for contact with a piston valve **62**. The lock bar **58** is held in normal vertical position by a spring **63** adapted for contact with the extension **61**, and said lock bar is prevented from going beyond vertical position by contact with the surface **65** of the bracket **70**.

The normal operation of this locking mechanism is such that when hydraulic or fluid pressure is provided from a constant pressure source, it flows to the opening **75** in the bracket **70** and provides pressure upon the top end of the piston valve **62** which is in contact with the extension **61** of the lock bar **58**. Pressure applied to this valve **62** moves the extension **61** against the pressure of spring **63**, and will hold the lock bar **58** in retracted position such as shown by the dotted lines in Fig. 4.

With any cutting off of the fluid pressure or hydraulic power from the main supply source, pressure will be instantly released upon the valve **62** and spring **63** will automatically move the lock bar **58** into its locking position as shown in Fig. 3. If the pressing plunger **26** is in up position at that time, it will be automatically locked in up position as shown in Fig. 3. If it has started on its downward stroke, it will automatically come into contact with one of the many teeth **57** provided on lock bar **58** and be automatically stopped at whatever point it has reached in its downward motion.

With the parts in the position shown in Fig. 3, the cycle of operation will be as follows:

In accordance with the fluid or hydraulic diagram shown in Fig. 5, the various fluid valves are shown positioned to maintain the cross arm **36** in its top position. A master valve block **100** mounted within the table support **15** is so arranged that the valve **101** is in contact with a rotating cam **102** and is riding the short radius surface of said cam preparatory to being moved to its next succeeding position. As the valve **101** is shifted by continued rotation of cam **102**, fluid under constant pressure enters through line **103** passing to conduit **104** through a pressure regulating valve **105**, thence through line **106** to ports **107** and to the top of the pistons **50** and **51** in the cavities **52**, **53** in the head **12**. This pressure on pistons **50** and **51** simultaneously moves the joined cross arms **36** and **37** downwardly bringing the plunger **26** and its cooperating parts into the pressing or forming position, as shown in Fig. 4.

The pressure regulating valve **105** permits obtaining

desirable pressing pressures upon the pistons **50** and **51** and in turn upon the press plunger **26** in order that the pressure applied to each individual charge of glass may be regulated and controlled. As the plunger **26** approaches its lower pressing position, the valve **150** is lowered to restrict the flow of fluid from cavities **40** and **41**. The check valve **133** prevents any flow of fluid through line **132**, thus causing all the back flow to be through lines **136** and **136a** to the control portion **164** of valve **150**. The fluid then passes through line **131** to and through valve block **124**, line **130**, and past the valve **101** which is then in a position to open line **130** to the exhaust line **100a**. This shifting of valve **101** is previously mentioned above. This permits accurate control of the speed of the stroke of the plunger **26** at the end of its pressing stroke and prevents hard impact with the glass.

During all the preceding mechanical operation, constant fluid pressure has been maintained from a constant fluid source **110** through lines **103**, **111**, **112** and **113**. It will be noted that lines **103**, **111** and **113** are constant source lines and have no direct interconnection. The constant fluid pressure through line **111** enters into a valve block **120**, thence through line **121** to a chamber **119** beneath a piston valve **122** in valve block **124**. This constant pressure maintains this valve piston **122** in its up position at all times with the sole exception of such time as this pressure is released by the machine operator through the actuation of a two-way valve **123** mounted in pressure line **110a**. With the completion of the pressing operation, the continued rotation of cam **102** permits the valve **101** to move back into the position shown in Fig. 5, thus permitting fluid under pressure to enter through line **130**, through the valve **122**, line **131** into valve block **120**. The pressure fluid then flows through line **132** to open the check valve **133** and permit fluid to flow through line **134** to the ports **135** in the piston chambers **40** and **41**, thus moving pistons **38** and **39** upwardly and through their free contact with cross arm **36** causing the shaft **35** and its integral cross arms **36**, **37** to move as a crosshead upwardly into the position shown in Figs. 3 and 5. The upward movement of pistons **38** and **39** causes a like movement of pistons **50** and **51** due to their free contact with cross arm **37** and such movement forces the fluid out of cavities **52** and **53** through ports **107**. This fluid flows back through line **106** through check valve **105a** to line **104** and out through exhaust port **100b** in the valve block **100**.

If at this point in the operating cycle or at any other point in said cycle, some physical interference occurs with the machine mechanisms which necessitates that the pressing plunger **26** be restricted from moving into pressing position, the operator may, by moving the two-way valve **123**, discontinue the pressure from pressure source **110** to the line **111**. This actuation of valve **123** permits the fluid in lines **103**, **111**, **112**, and **121** to drain back to a sump tank through line **123a** and releases the pressure on valves **122** and **150** and on pin **62** of the plunger locking mechanism **58**. This action permits the piston valve **122** to move downwardly, closing off the lead line **130** and permits the constant pressure fluid to pass through line **113** past the valve **122** through line **131** around valve **150** to line **132**. The fluid depresses check valve **133** and flows to line **134** into the cavities **40** and **41** to retain the crosshead and the press plunger **26** in the up position as shown in Fig. 5. With this release of the constant pressure on line **111**, through actuation of the two-way valve **123**, the pressure is also simultaneously released on line **112** and above the piston **62**, thus permitting the spring **63** to move the lock rack **58** into operative position as shown in Figs. 3 and 4, locking the crosshead **36** in its top position. This release of pressure on line **112** permits the fluid to flow back through line **112** to valve block **120**, through channel **112a**, line **111** to exhaust through line valve **123**.

It should be apparent that if the valve **123** is actuated when the plunger **26** is in its pressing position, the constant pressure through line **113** will act to raise the combined crosshead of cross arms **36**, **37** and the plunger **26** into the up position as in Fig. 3 because the constant pressure to line **103** will be simultaneously stopped and vented to the atmosphere through valve **123**. Through this mechanism it is therefore, almost impossible for the pressing plunger to move to or remain in a position where it might interfere with any other moving parts of the machine.

If, for any reason, all of the pressure in all of the constant pressure lines is released, the lock bar **58** will be automatically moved into locking position by the spring **63**, thus retaining the cross arm **36** in its top position or at any intermediate position along the several teeth **57** on the inner face of the lock bar **58**. Under such circumstances, if the cross arms **36** and **37** are in the down position, they may be raised by hand and the lock bar **58** will retain them in any desired up position.

The operation of the mechanism in sequence is as follows:

The cam **102** will during rotation, shift the valve **101** and fluid will be provided to the tops of cavities **52** and **53** moving the floating pistons **50** and **51** downwardly in free contact with the cross arm **37**. This free contact as between these two pistons and the cross arm **37** brings the pressing plunger **26** downward into pressing cooperation with the mold **30** for pressing a parison or a completely pressed article as the case may be.

In order that the downward motion of the press plunger **26** may be rapid, and yet the contact thereof with the glass may not be of high impact force, a means is provided to cushion the last increment of the down stroke. Provided in the block **120** is a piston valve **150** having a rod extension **151** positioned in a small cylinder **152**.

Constant fluid pressure from line **111** enters cylinder **152** through port **153** and applies pressure to the flat end of rod **151** and thereby maintains the valve **150** in its up position. The area of the flat end of rod **151** is just sufficient to raise the weight of the valve **150**. So long as the valve **150** is in its up position the full exhaust and fluid from beneath the pistons **38** and **39** through lines **132** and **131** remains constant. However, as the pistons **38** and **39** approach the end of their down stroke, a lever **160**, attached to the cross arm **36** and fulcrumed on bracket **161** at **162**, contacts the top end of valve **150** moving it downward to restrict the flow of fluid through lines **131** and **132**.

A flat surface **163** on the outer cylindrical surface portion **165** of the valve **150** permits a continued but restricted exhaust of fluid and prevents any high impact force of the press plunger **26** upon the glass and between the other mechanical parts.

With the completion of the pressing of the glass, the valve **101** is shifted to the position shown in Fig. 5 permitting fluid to enter into the cavities **40** and **41** under the pistons **38** and **39** and through their free or floating contact with cross arm **36** they will withdraw the pressing plunger **26** from its cooperation with the mold **20** and move it into the position shown in Fig. 1. With the shifting of valve **101**, as disclosed immediately above, the fluid in cavities **52** and **53** will exhaust through ports **107**, lines **106** and **104** to the exhaust port **100b** of valve block **100**. This relieves the pressure on pistons **50** and **51** and permits the constant fluid pressure from line **113** to raise the plunger **26** from pressing position and the lock **58** to move the locking position as in Fig. 3.

In order to eccentuate the essence of this invention, it will be assumed that the table **16** has failed to index, its parts have remained in the position shown in Fig. 1 and with the previously pressed parison still in the mold **20**. The machine timing is such that the pressing plunger **26** is about to again move down into cooperative

position with press mold 20 due to pressure on pistons 50 and 51. Under such circumstance the operator will actuate the two-way valve 123 releasing the fluid pressure in lines 103, 111 and 112 as well as under the piston valves 122 and 150, thus bringing into operation the second constant pressure source, viz., line 113, which will act to retain the cross arm 37 and the pressing plunger 26 in the up position. At the same time the release of pressure on line 112 and valve 62, permits the lock bar 58 to move in and lock the cross arm 36 in its up position. The parts will remain in this locked position until such time as the operator again actuates valve 123 to provide constant pressure to lines 103, 111, and 112 and to the valve block 120.

This application is a continuation-in-part of my former application, S. N. 454,130, filed September 3, 1954, now abandoned.

Modifications may be resorted to within the spirit and scope of the appended claims.

I claim:

1. In an apparatus for pressing molten glass, the combination which includes a pressing head, a crosshead shaft extending through said head, opposing cross arms formed on each end thereof one of said cross arms disposed above and one below said head, said crosshead shaft and arms mounted for vertical movement relative to said head, pairs of vertically movable pistons arranged in said head between said opposing cross arms, each pair of said pistons having actuating contact with only one of said cross arms, each pair of said pistons being adapted for alternate communication with a controlled source of fluid pressure, means to alternately aply fluid pressure to each pair of pistons, and means adapted to supply a separate constant pressure on one pair of pistons upon the cessation of the normal supply of pressure thereto.

2. In an apparatus for pressing molten glass, the combination which includes a pressing head, a vertical crosshead shaft extending through said head, opposing cross arms formed on each end thereof, one of said cross arms disposed above and one below said head, said crosshead shaft and arms mounted for vertical movement relative to said head, pairs of vertically movable pistons arranged in said head between said opposing cross arms, each pair of said pistons having actuating contact with only one of said cross arms, means to alternately apply fluid pressure to one end of each pair of pistons, and means adapted to supply a separate constant pressure on one pair of said pistons upon the cessation of the normal supply of pressure thereto.

3. In an apparatus for pressing molten glass, the combination which includes a pressing head, a vertical crosshead shaft extending through said head, opposing cross arms formed on each end thereof, one of said cross arms disposed above and one below said head, said crosshead shaft and arms mounted for vertical movement relative to said head, a first pair of vertically movable pistons arranged in said head and adapted to contact the top cross arm, a second pair of pistons having actuating contact with the lower cross arm, each pair of said pistons being adapted for alternate communication with a controlled source of fluid pressure, means to alternately supply fluid pressure to said first and second pairs of pistons, and means adapted to supply a separate constant pressure on said first pair of pistons upon cessation of the normal supply of pressure thereto.

4. In an apparatus for pressing molten glass, the combination which includes a pressing head, a crosshead shaft extending through said head, opposing cross arms formed on each end thereof one of said cross arms disposed above and one below said head, said crosshead shaft and arms mounted for vertical movement relative to said head, pairs of vertically movable pistons arranged in said head between said opposing cross arms, each pair of said pistons having actuating contact with only one of said cross arms, each pair of said pistons being adapted for alternate communication with a controlled source of fluid pressure, means to alternately apply fluid pressure to each pair of pistons, means adapted to supply a separate constant pressure on one pair of pistons upon the cessation of the normal supply of pressure thereto, and means to prevent vertical movement of said cross arms upon cessation of said normal pressure.

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