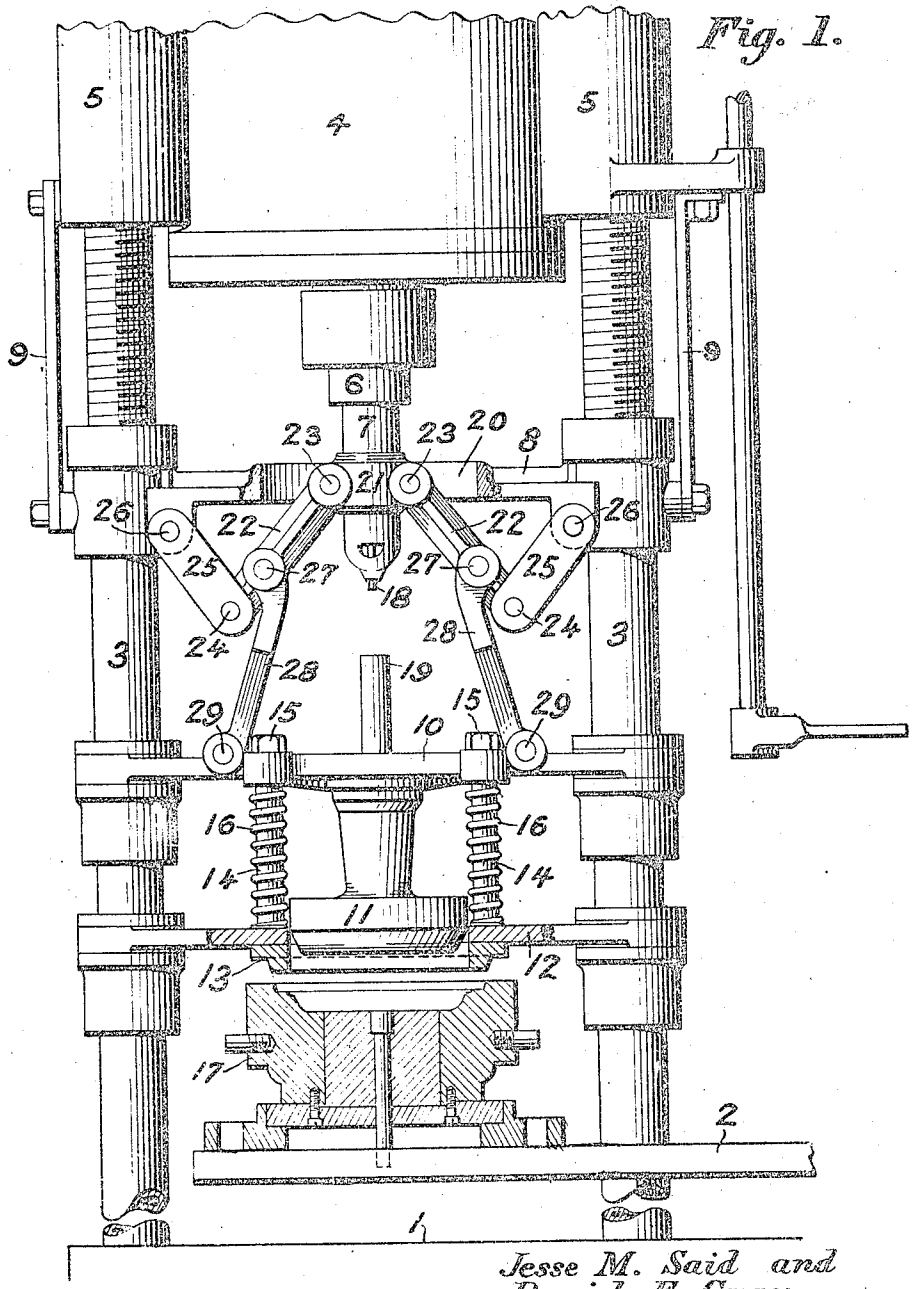
July 15, 1924. 1,501,868

J. M. SAID ET AL.

GLASSWORKING APPARATUS

Filed April 10, 1922 6 Sheets-Sheet 1

Fig. 1.



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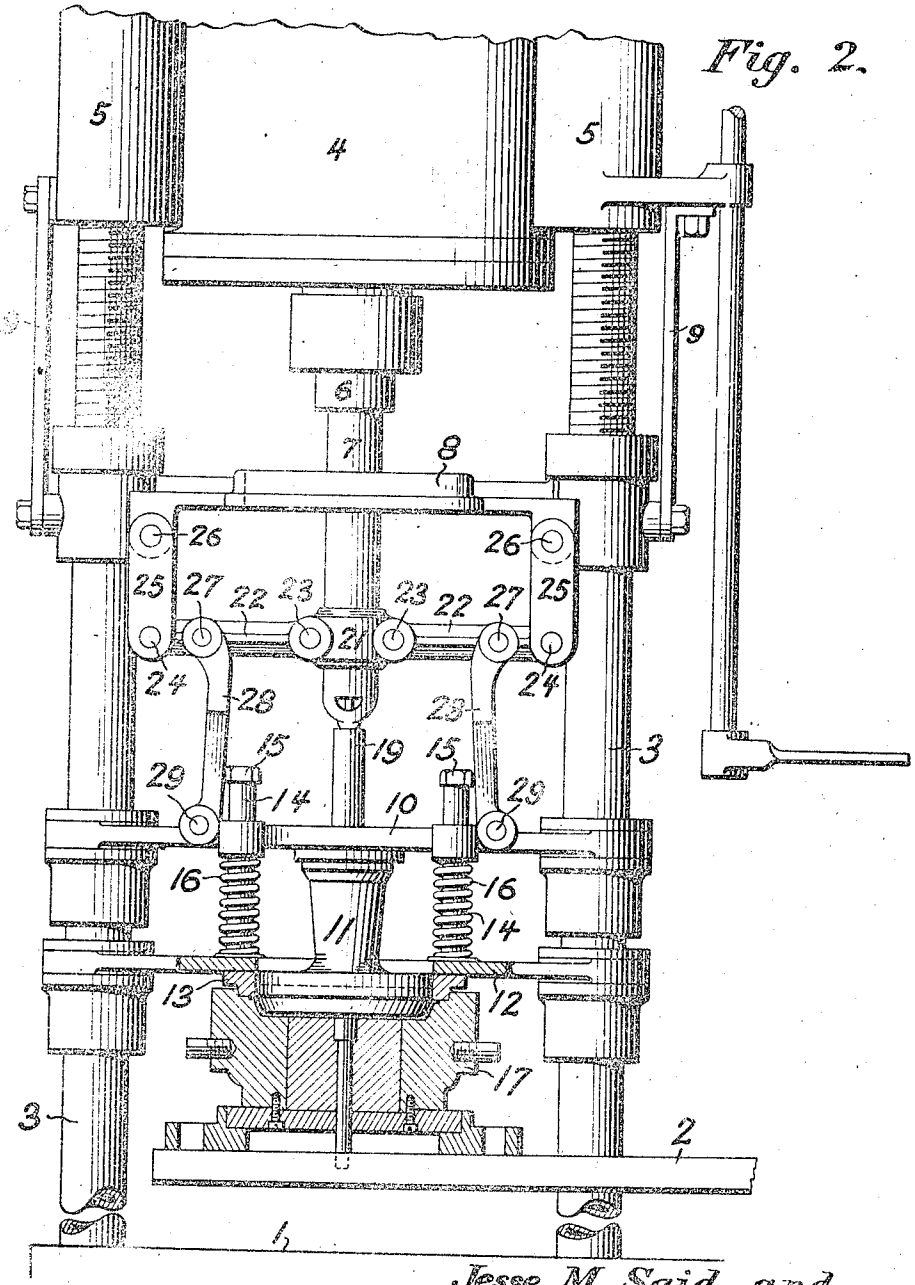
July 15, 1924. 1,501,868

J. M. SAID ET AL

GLASSWORKING APPARATUS

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Fig. 2.



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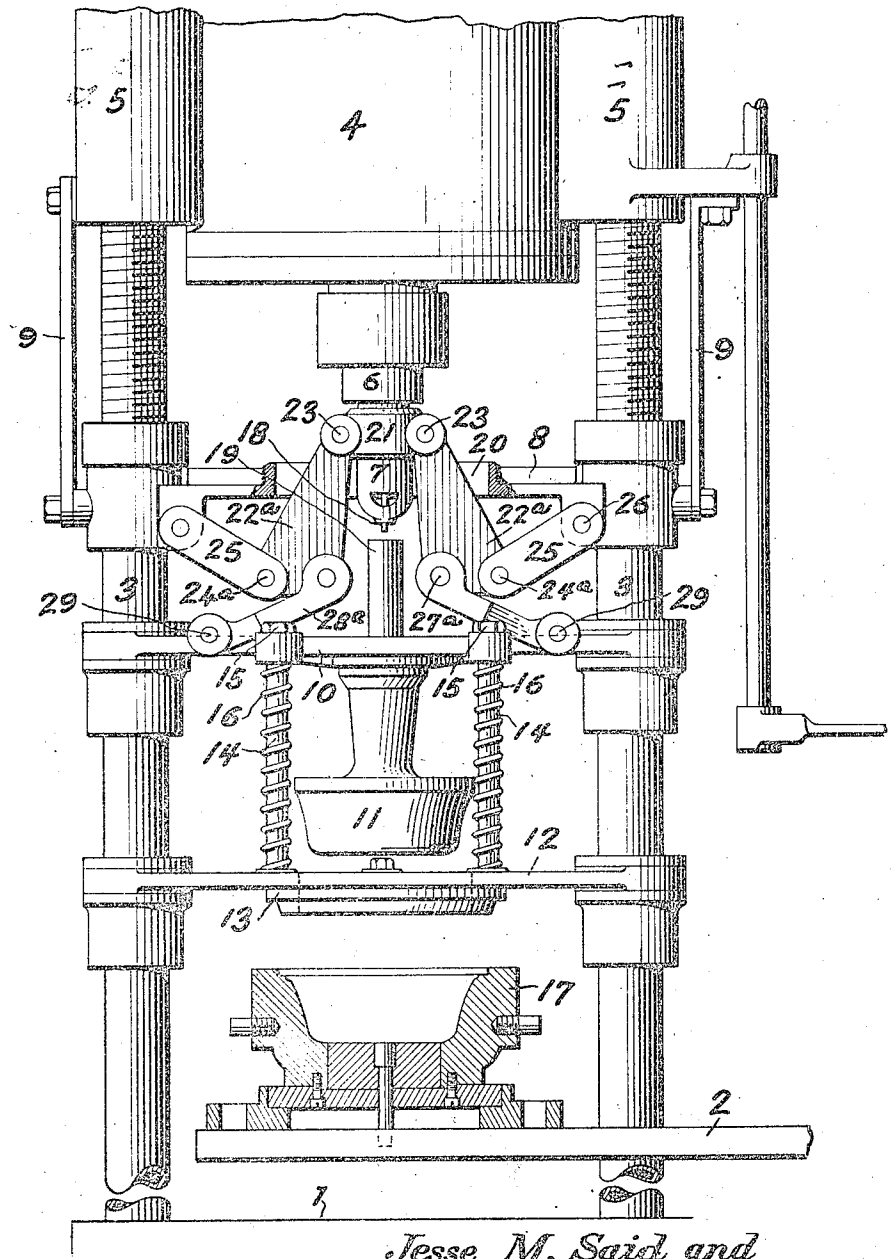
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GLASSWORKING APPARATUS

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Fig. 3.



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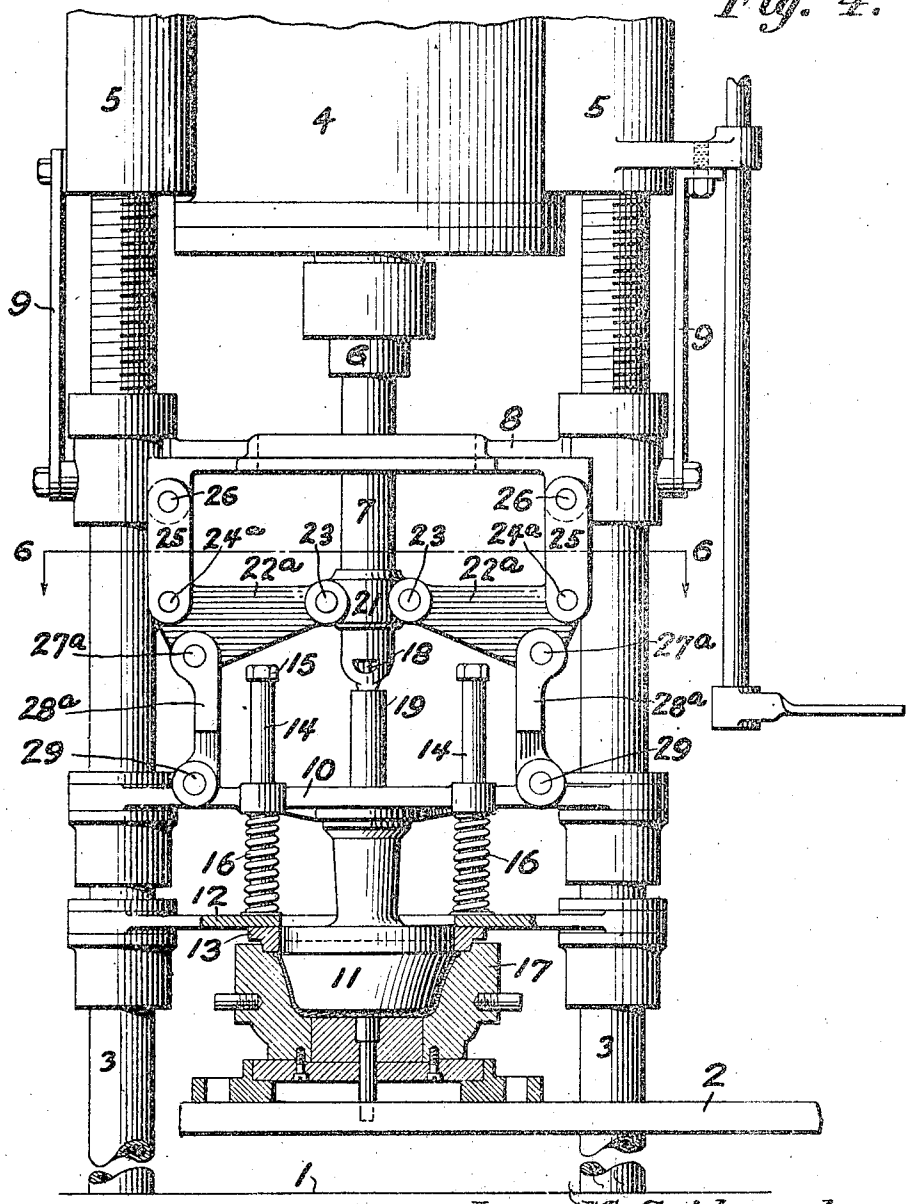
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GLASSWORKING APPARATUS

Filed April 10, 1922 6 Sheets-Sheet 4

Fig. 4.



Jesse M. Said and
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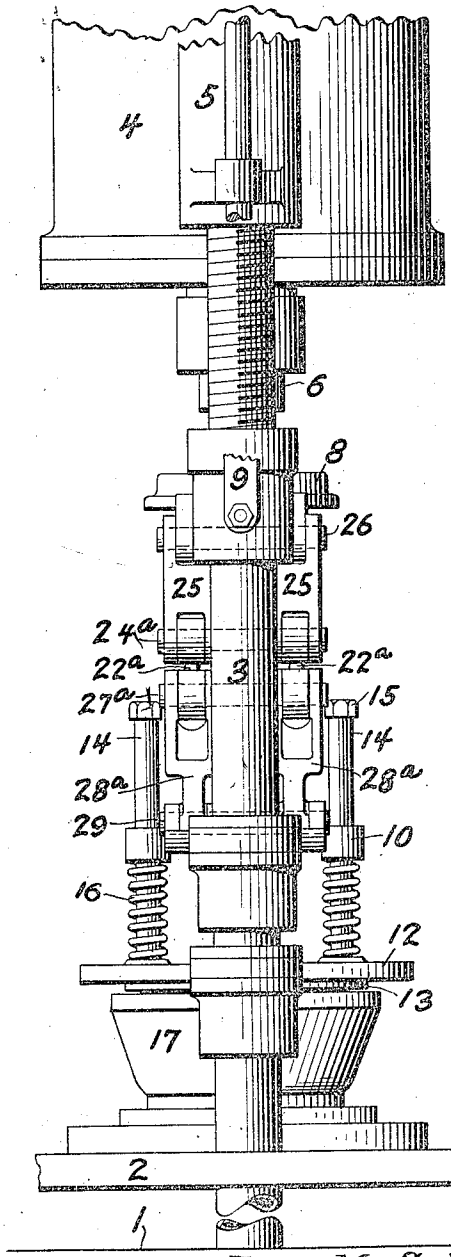
July 15, 1924. 1,501,868

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GLASSWORKING APPARATUS

Filed April 10, 1922 6 Sheets-Sheet 5

Fig. 5.



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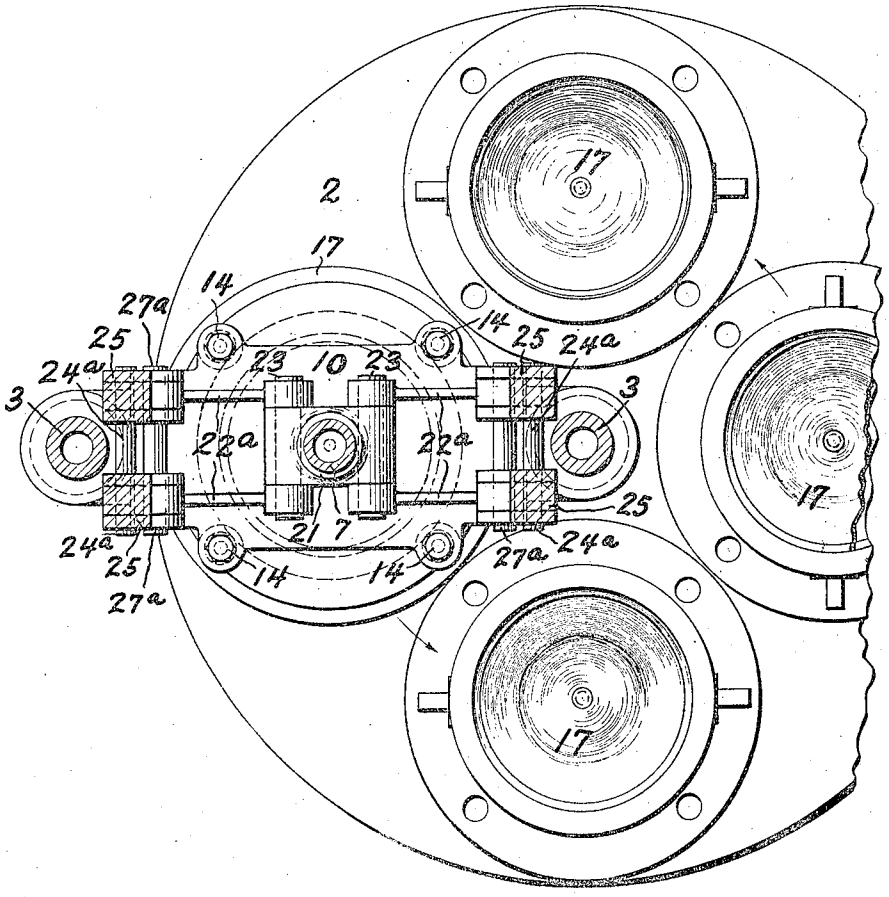
July 15, 1924. 1,501,868

J. M. SAID ET AL

GLASSWORKING APPARATUS

Filed April 10, 1922 6 Sheets-Sheet 6

Fig. 6.



Jesse M. Said and
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INVENTORS

BY

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Patented July 15, 1924. 1,501,868

UNITED STATES PATENT OFFICE.

JESSE M. SAID AND DAVID E. GRAY, OF CORNING, NEW YORK, ASSIGNORS TO CORNING GLASS WORKS, OF CORNING, NEW YORK, A CORPORATION OF NEW YORK.

GLASSWORKING APPARATUS.

Application filed April 10, 1922. Serial No. 551,196.

To all whom it may concern:

Be it known that we, JESSE M. SAID and DAVID E. GRAY, both citizens of the United States of America, residing at Corning, in the county of Steuben and State of New York, have invented new and useful Improvements in Glassworking Apparatus, of which the following is a specification.

This invention relates to certain improvements in machines for forming articles of glassware. We have illustrated our invention in the accompanying drawings as applied to the glass press shown in United States Letters Patent No. 1,171,928, issued February 15, 1916, to George E. Cleveland, but it will be understood that the same may be likewise applied to other glass working apparatus.

The prime object of our invention is to provide new and useful improvements in the plunger actuating mechanism of glass pressing machines. In the specific embodiments of our invention which we have chosen for illustration purposes, our invention comprises the use of floating levers and links which are interposed between the bottom of the fluid pressure cylinder of a glass working apparatus and the plunger cross head, said levers connecting the piston rod depending from the cylinder to the plunger cross head, so that increased pressure will be imparted to the plunger, as the piston rod descends. In this manner novel means are provided for utilizing low fluid pressure to obtain sufficient plunger pressure so that better results are obtained in the finished articles.

Our invention also comprises certain new and useful improvements in the construction, arrangement and combination of the several parts of which it is composed as will be hereinafter more fully described and claimed.

Referring to the accompanying drawings:—

Figure 1, is a side elevation of a fluid pressure actuated glass working apparatus showing one form of our invention applied thereto, the parts being in the position they assume when the plunger is raised;

Fig. 2, is a view showing the parts in the position they assume when the plunger is in the mold;

Fig. 3, is a view similar to Fig. 1, showing another form of the invention;

Fig. 4, is a view similar to Fig. 2, showing the form of the invention illustrated by Fig. 3;

Fig. 5, is an end elevation of the parts shown by Fig. 4, and

Fig. 6, is a horizontal section taken on the line 6—6 of Fig. 4.

The improved mechanism herein shown and described is particularly adapted to be used for the purpose of producing articles from the well known pyrex glass. Due to certain characteristics of this glass, the usual form of pressing apparatus has proved deficient for the purpose of forming high grade articles. It has been found necessary to increase the amount of plunger pressure in order to distribute the glass evenly throughout the mold cavity. This could have been done by increasing the amount of pressure exerted against the piston rod of glass working apparatus, either by increasing the size of the fluid pressure cylinder, or by increasing the quantity of fluid pressure, and the piston pressure so increased would have correspondingly increased the plunger pressure. But under conditions existing in most glass working establishments, the amount of fluid pressure available for use in operating glass working apparatus is limited and therefore, it was found desirable to provide means for increasing the plunger pressure without the necessity of increasing the amount of fluid pressure.

However, besides plunger pressure, another factor is desirable in glass working apparatus, and this is, plunger speed. As is well known the construction of manually operated glass working apparatus is such that the pressing plunger is first brought quickly down into the molten glass in the mold, and then the downward movement of the plunger is retarded, while the plunger force is increased, whereby the glass will be properly distributed throughout the mold cavity. Therefore, in order to produce a like movement of the pressing plunger of fluid pressure glass working apparatus, we have provided mechanical elements that are actuated by the piston rod of the apparatus in such manner that the pressing plunger is first moved downward-

ly at rapid speed with comparatively little force, and later the speed of the plunger is retarded while the force exerted by the plunger is considerably increased. It is also essential to good results that the final pressure, although great, must not exceed certain definite amounts, which are goverened by various conditions such as temperature of the molten glass, size and shape of the finished articles.

We have chosen, for illustration purpose, to show our improvement used in connection with a glass working apparatus that is used for the purpose of forming relatively shallow articles, such as glass oven-doors, pie plates, lenses, and the like; and also in connection with a glass working apparatus that is used for the purpose of forming comparatively deep articles. The first form of our invention is shown by Figures 1 and 2, and will be first described, while the second form of our invention is shown by Figures 3 to 6 inclusive. It is to be understood that the salient features of our invention remain the same in both forms illustrated and described.

Referring now to Figures 1 and 2 of the drawings, the various parts are carried on a base 1, above the upper surface of which is a revolubly mounted mold table 2. Arising from the base 1, is a pair of vertical standards 3, one of said standards being located outside of the periphery of the table 2, while the other standard is passed upwardly through a central opening in the table 2, as shown by Fig. 6 of the drawings.

The upper ends of the standards 3 are threaded and on them is mounted for vertical movement the press head. This comprises a casting 4, in the form of a cylinder having side ears 5, which are vertically bored to receive the standards 3.

Mounted within the cylinder and projecting through a stuffing box 6 on the lower end thereof is a piston rod 7. A cross head 8, which is provided with collars that engage with the standards 3, is suspended from the side ears 5 of the press head by means of straps 9. In this manner, the relative position of the cross head 8 to the press head is constant.

Carried on the standards 3, by slidingly mounted collars is another cross head 10. The cross head 10 is located below the cross head 8, and a press plunger 11 adapted, as will be hereinafter described, to enter the mold, is carried by and depends downwardly from the cross head 10 between the standards 3.

Guided on the standards 3 below the plunger cross head 10, is a lower cross head 12, which is centrally apertured to permit the passage of the plunger 11 therethrough in the pressing, the cross head 12 carrying a mold ring 13, and having attached thereto the lower ends of rods 14, which project upwardly therefrom and passing through the cross head 10, have their upper ends provided with heads 15. In this manner the rods 14 are capable of vertical movement.

A spiral spring 16 encircles each rod 14 between the cross heads 10 and 12 for the purpose of maintaining normal distance between these two members and affording a connection of the desired elasticity. When the cross head 10 is raised by the piston rod 7, as will be hereinafter more fully described, the cross head 12 will also be raised to a point sufficiently elevated to permit the positioning of a mold 17 under the plunger 11 by the rotation of the table 2. When the piston rod 7 is depressed, the cross heads 10 and 12 will also be depressed and the lower cross head 12 carrying the ring 13 will be seated on the mold, as shown by Fig. 2.

The piston rod 7 is hollow and has at the lower end thereof a tappet valve 18. Projecting upwardly from the center of the cross-head 10 and in alignment with the piston rod 7, is a vertical stem 19. Should undue pressure in the cylinder cause the piston rod to descend until the valve 18 engages with the top of the stem 19, the pressure in the head of the cylinder will be released in the manner fully described in United States Letters Patent No. 987,671 issued March 21, 1911 to George E. Cleveland for improvements in machines for making articles of glass. It will also be understood that the stem 19 acts as positive means for preventing the piston rod from descending beyond a predetermined point.

The piston rod 7 projects downwardly through an opening 20 in the fixed cross head 8. Pivotally mounted by means of pins 23, in a collar 21, which is fixed to the lower end of the piston rod 7, are pairs of oppositely arranged arms 22. The arms 22 are in the nature of levers, and their outer ends are pivotally connected by means of pins 24 to links 25, which latter are pivoted by means of pins 26 to bosses formed on the cross-head 8. By means of pins 27, the upper ends of the links 28 are pivotally connected to the arms 22, between the pivots 23 and 24 thereof, the opposite ends of the links 28 being pivoted, by means of pins 29, to the plunger cross head 10. The linking of the arms 22 to the apparatus as hereinabove described provides floating levers, the operation of which will now be described.

As shown, when the piston rod 7 is in raised position, the arms 22 will lie at an angle to the horizontal, and the links 25 which connect the outer ends of the arms to the cross-head 8, will be in an inward position. The position of these members is such, that the pivot 27 is raised and thus the cross heads 10 and 12 are raised by the link 28.

When the piston rod 7 descends, the pivots

24 will swing downwardly and outwardly in an arc about the pivots 26. The pivots 23 being fixed to the collar 21 of the piston rod, will move downwardly in a vertical line. During downward movement of the piston rod 7, the arms 22 will therefore be swung downwardly, the pivot 24 thereof moving in an arc having the pivot 26 as a center, and the pivot 23 thereof will be moved downwardly in a vertical line, limited only to the downward movement of the piston rod. Therefore, pivot 27 will have a resultant downward and outward movement which in turn, through the links 28, will impart a downward movement to the cross head 10.

As the piston rod 7 approaches the limit of its downward stroke, (see Fig. 2), the arms 22 will be substantially horizontal, while the links 25 and 28 will be substantially vertical, or parallel to the direction of motion of the piston rod. In this position, the arms 22 become simple levers in which the pivots 24 become relatively fixed, and the motion of the piston rod 7 will be imparted to the cross head 10 in the direct ratio of the leverage supplied by arms 22, the component forces being reduced to direct forces parallel to the direction of motion of the piston rod 7.

At the beginning of the downward stroke of the piston rod 7, the relative downward motion of the pivots 27 will be greatest, due to the combined downward motions of pivots 23 and 24, and this motion will bring the ring 13 of the cross head 12 into engagement with the top of the mold 17, but as the links 25 approach the vertical, the downward movement of pivots 24 ceases, and, therefore, the relative downward movement of the links 28 is retarded. Therefore, it will be apparent that the downward movement of the plunger 11 is greatest at the beginning of its stroke, and is least as the plunger approaches final pressing position. Thus, while the ring 13 is being seated on top of the mold 17, the plunger 11 will be brought quickly into contact with the charge of molten glass in the mold 17, and as the glass is being distributed, the downward motion of the plunger will be retarded, while the pressure exerted by the plunger will be increased.

It is to be noted that when the piston rod 7 is in its lowermost position, the links 25 and 28 will be in such position that the forces exerted through the arms 22 tend to bend the same. Furthermore, the forces of the piston rod 7 will be exerted longitudinally in the links 25 and 28, and laterally in the arms 22.

When the piston rod 7 ascends, the plunger will be withdrawn slowly from the mold at the beginning of the upward movement. This is beneficial, for a quick upward movement of the plunger, while it is still in the mold, has a tendency to suck up the glass that has just been pressed into form. After the plunger has been withdrawn from the mold its upward movement will be accelerated until it reaches its uppermost position.

Referring now to Fig. 4, it will be noticed that the links 28^a are shorter than the links 28 of the preferred form of the invention, and that the pivots 27^a have been brought downwardly in a vertical line, so that the arms 22^a become bell-crank levers instead of the simple levers shown in Fig. 2. The application of the resultant forces, however, in the down position, is the same as in the form of the invention previously described. For the same ultimate leverage, the distance between pivots 24^a and 27^a is greater than between pivots 24 and 27, and, therefore, the upward motion of the pivots 27^a will be greater for a given stroke of the piston rod 7, than is the case of the pivots 27. Thus, with the same piston stroke, a greater plunger stroke is provided.

Having thus described our invention, what we claim is:—

1. In a machine for pressing articles of glass, the combination of vertical standards having slidably mounted thereon a plunger cross head, and levers for actuating said plunger cross head the levers both having a floating fulcrum and a floating point of resistance separated from each other.

2. In a machine for pressing articles of glass, the combination of vertical standards having slidably mounted thereon a plunger cross head, and a lever for actuating said plunger cross head, said lever being connected by links to the standards and to the cross head respectively, the points of attachment of the lever to the several links being remote from each other.

3. In a machine for pressing articles of glass, the combination of vertical standards having slidably mounted thereon a plunger cross head, and floating levers for actuating said plunger cross head, said levers being connected by links to the standards and to the cross head, whereby force is exerted longitudinally in said links and laterally in said levers when the cross head is in its lowermost position.

4. In a machine for pressing articles of glass, the combination of vertical standards, a fluid pressure cylinder mounted on the upper ends of said standards, a piston rod depending through the lower end of said cylinder, a cross head slidably mounted on said standards, a pressing plunger depending from said cross head and adapted to be forced into a mold, arms having one of their ends pivoted to said piston rod and their opposite ends linked to the said standards, to afford points of fulcrum, and links connecting the arms to the plunger cross head, the points of attachment of the links and arms being remote from the points of fulcrum.

5. In a machine for pressing articles of glass, the combination of vertical standards, a fluid pressure cylinder mounted on the upper ends of said standards, a piston rod depending through the lower end of said cylinder, a cross head slidably mounted on said standards, a pressing plunger depending from said cross head and adapted to be forced into a mold, arms having one of their ends pivoted to said piston rod and their opposite ends linked to the said standards, and links connecting the arms to the plunger cross head, said last named links being pivoted to said arms intermediate the length thereof.

6. In a machine for pressing articles of glass, the combination of vertical standards, a fluid pressure cylinder mounted on the upper ends of said standards, a piston rod depending through the lower end of said cylinder, a cross head slidably mounted on said standards, a pressing plunger depending from said cross head and adapted to be forced into a mold, arms having one of their ends pivoted to said piston rod and their opposite ends linked to the said standards, and links connecting the arms to the plunger cross head, said last named links being pivoted to said arms intermediate the length thereof, whereby when said piston rod is in its lowermost position the links connected to the arms will be substantially parallel to the direction of motion of the piston rod.

7. In a machine for pressing articles of glass, the combination of vertical standards, a fluid pressure cylinder mounted on the upper ends of said standards, a piston rod depending through the lower end of said cylinder, a cross head slidably mounted on said standards, a pressing plunger depending from said cross head and adapted to be forced into a mold, arms having one of their ends pivoted to said piston rod and their opposite ends linked to the said standards, and links connecting the arms to the plunger cross head, said last named links being pivoted to said arms intermediate the length thereof, whereby when said piston rod is in its lowermost position the links connected to the arms will be in such position that the forces exerted through them will be substantially parallel to the direction of motion of the piston rod.

8. In a machine for pressing articles of glass, the combination of vertical standards, a fluid pressure cylinder mounted on the upper ends of said standards, a piston rod depending through the lower end of said cylinder, a cross head slidably mounted on said standards, a pressing plunger depending from said cross head and adapted to be forced into a mold, arms having one of their ends pivoted to said piston rod and their opposite ends linked to the said standards, and links connecting the arms to the plunger cross head, said last named links being pivoted to said arms intermediate the length thereof, whereby force is exerted longitudinally in said links and laterally in said arms.

9. In a machine for pressing articles of glass, the combination of vertical standards, a fluid pressure cylinder mounted on the upper ends of said standards, a piston rod depending through the lower end of said cylinder, a cross head slidably mounted on said standards, a pressing plunger depending from said cross head and adapted to be forced into a mold, arms having one of their ends pivoted to said piston rod and their opposite ends linked to the said standards, and links connecting the arms to the plunger cross head, said last named links being pivoted to said arms intermediate the length thereof, whereby when said piston rod is moved downwardly the plunger movement will be decelerated in relation to the movement of the piston rod.

10. In a machine for pressing articles of glass, the combination of vertical standards, a fluid pressure cylinder mounted on the upper ends of said standards, a piston rod depending through the lower end of said cylinder, a cross head slidably mounted on said standards, a pressing plunger depending from said cross head and adapted to be forced into a mold, arms having one of their ends pivoted to said piston rod and their opposite ends linked to the said standards, and links connecting the arms to the plunger cross head, said last named links being pivoted to said arms intermediate the length thereof, whereby when said piston rod is moved upwardly the movement of the plunger will be slower at the beginning of the piston stroke than the movement of the piston rod.

11. In a machine for pressing articles of glass, the combination of vertical standards, a fluid pressure cylinder mounted on the upper ends of said standards, a piston rod depending through the lower end of said cylinder, a cross head slidably mounted on said standards, a pressing plunger depending from said cross head and adapted to be forced into a mold, arms having one of their ends pivoted to said piston rod and their opposite ends linked to the said standards, and links connecting the arms to the plunger cross head, said last named links being pivoted to said arms intermediate the length thereof, whereby when said piston rod is moved upwardly the movement of the plunger will be accelerated in relation to the movement of the piston rod.

12. In a machine for pressing articles of glass, the combination of vertical standards, a fluid-pressure cylinder mounted on the upper ends of said standards, a piston rod depending through the lower end of said

cylinder, a plunger cross-head slidably mounted on said standards, a floating lever for actuating said plunger cross-head, said lever being pivotally carried from said piston, and links pivoted to the lever and to the standards, and the plunger cross-head respectively, the points of attachment of the two links to the lever being remote from each other.

In testimony whereof, we have hereunto signed our names this 8th day of April 1922.

JESSE M. SAID.
DAVID E. GRAY.