C. B. ALBREE.

AUTOMATIC ADJUSTABLE PRESS.

APPLICATION FILED MAR. 4, 1911. RENEWED JAN. 15, 1912.

1,035,828. Patented Aug. 20, 1912.

3 SHEETS—SHEET 1.

Fig.1

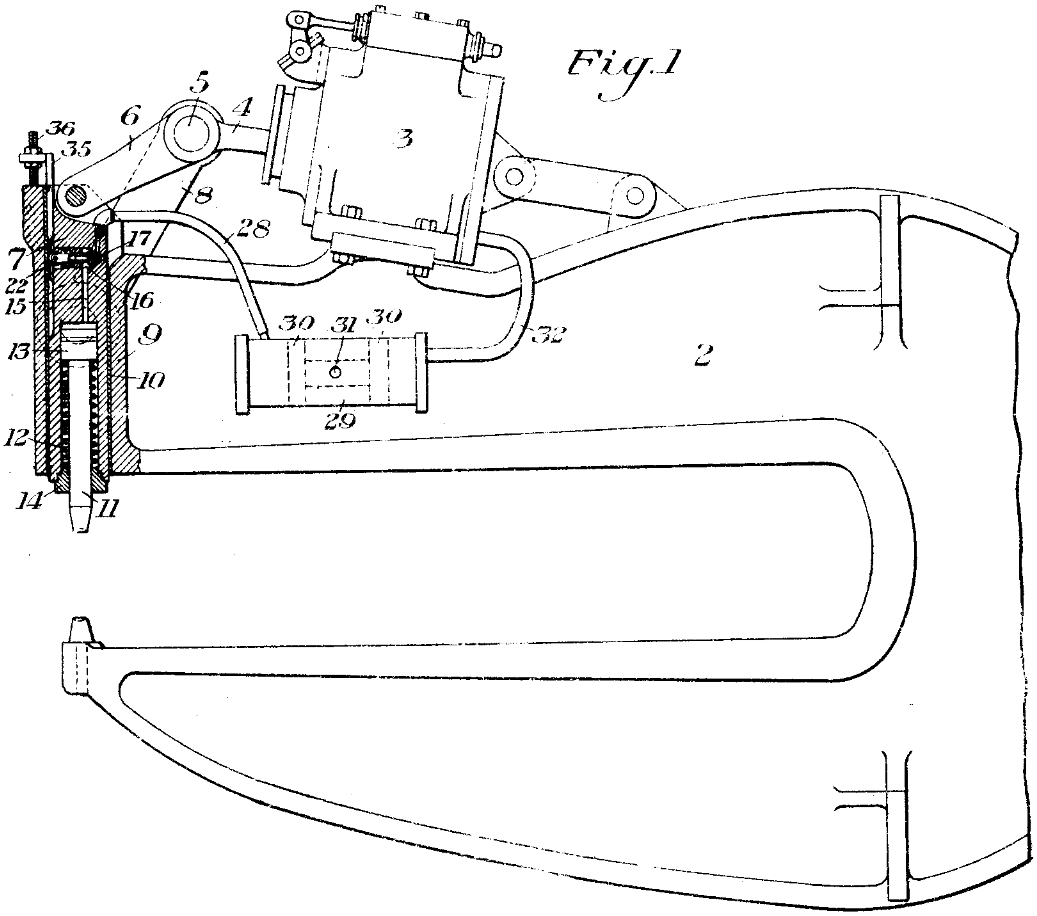
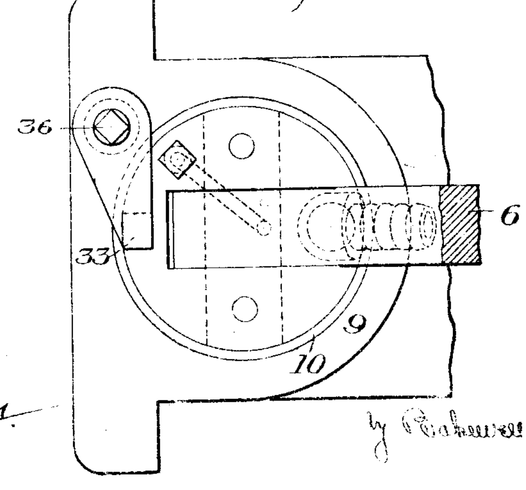


Fig.2.



WITNESSES

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3 SHEETS—SHEET 2.

Fig. 3.

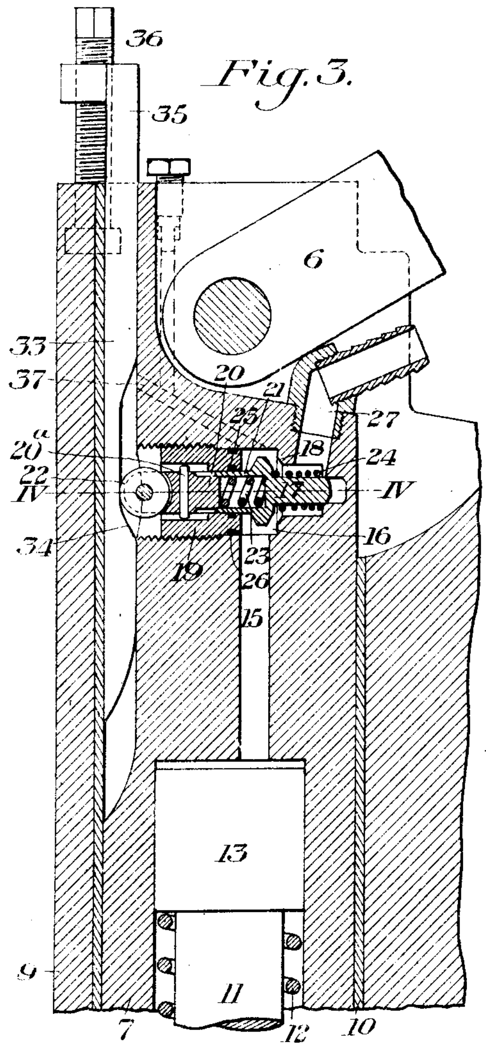


Fig. 5.

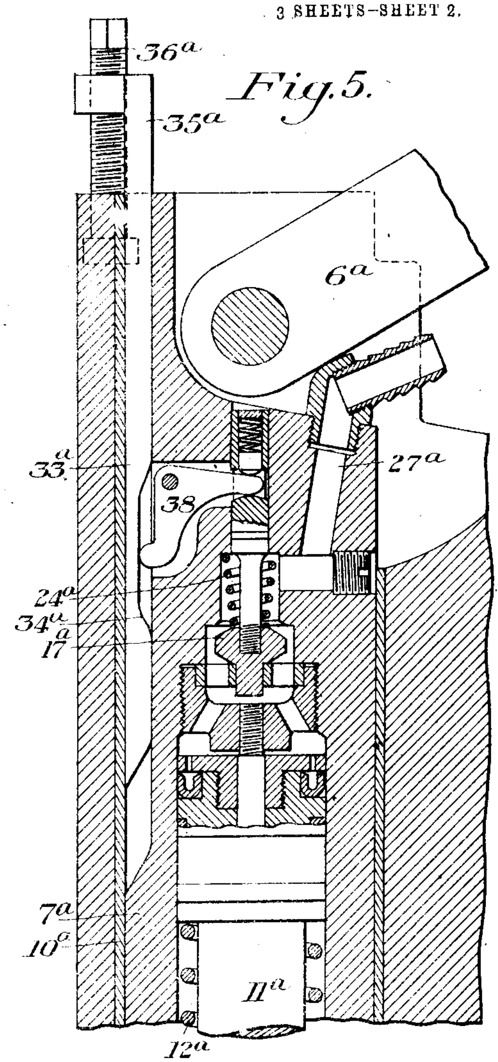
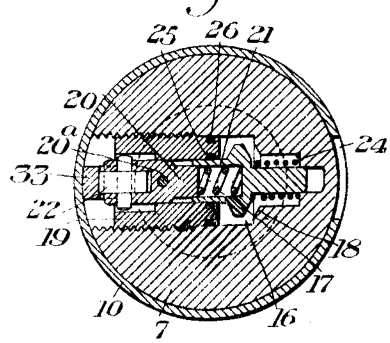


Fig. 4.



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3 SHEETS-SHEET 3.

Fig. 6.

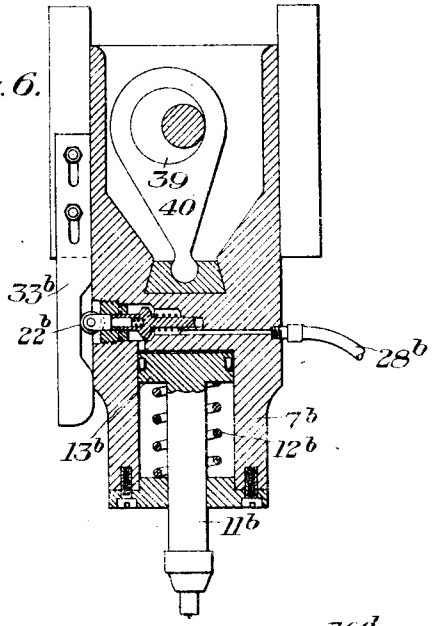


Fig. 7.

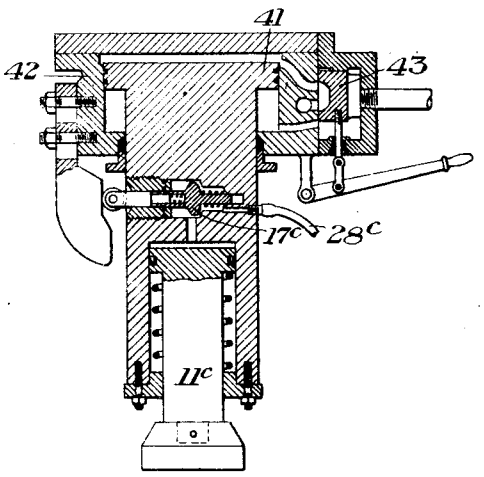
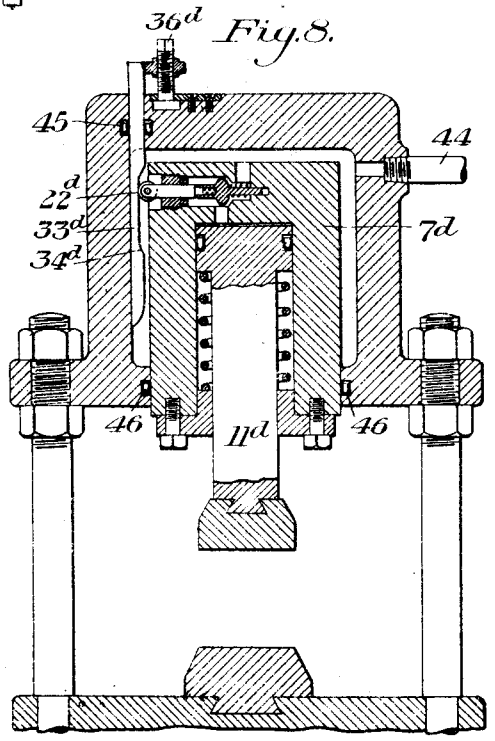


Fig. 8.



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UNITED STATES PATENT OFFICE.

CHESTER B. ALBREE, OF PITTSBURGH, PENNSYLVANIA, ASSIGNOR TO CHESTER B. ALBREE IRON WORKS COMPANY, OF PITTSBURGH, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

AUTOMATIC ADJUSTABLE PRESS.

1,035,828. Specification of Letters Patent. Patented Aug. 20, 1912.

Application filed March 4, 1911, Serial No. 612,322. Renewed January 15, 1912. Serial No. 671,291.

To all whom it may concern:

Be it known that I, CHESTER B. ALBREE, of Pittsburgh, Allegheny county, Pennsylvania, have invented a new and useful Automatic Adjustable Press, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a side elevation partly in section, showing one form of my invention as applied to a toggle riveting machine; Fig. 2 is a top plan view of the head portion thereof; Fig. 3 is an enlarged vertical section showing the valve arrangement; Fig. 4 is a cross-section on the line IV—IV of Fig. 3; Fig. 5 is a view similar to Fig. 3, showing a modified form; and Figs. 6, 7 and 8 are sectional side elevations showing the invention applied to other forms of press.

My invention relates to presses, and is designed to provide for automatically adjusting the tool to the work previous to the power stroke. For example, as applied to riveters, the invention provides for automatically adjusting the riveting tool into contact with the rivet, and then imparting the power stroke for riveting, either by toggle mechanism or other power means.

The invention is especially applicable to toggle riveters in which the stroke is fixed, for in such case the ordinary riveter gives a maximum pressure at the same point in the stroke and it is, therefore, necessary to adjust the distance between the die and the point of maximum pressure by a hand actuated screw. My invention overcomes this hand adjustment, and when applied to the riveter provides for automatic adjustment to different thicknesses of work, giving the maximum pressure at the proper point in the stroke irrespective of the thickness of the work.

In the drawing, referring to the form of Figs. 1 to 4, inclusive, 2 represents the yoke of an ordinary riveter of any desirable type, and which I have shown as provided with a double-acting cylinder 3 containing a piston or plunger having connecting rod 4 pivoted to the toggle lever joint at 5. The short toggle link 6 is pivotally connected to the ram 7, while the links 8 are pivoted to the sides of the ram cylinder 9. The ram 7 fits within a bushing 10 in the head, and is bored out from its lower end to form a cylinder within it to contain the plunger 11. The upper end of this plunger is enlarged to fit the bore within the ram, and around the remaining portion fits a return spring 12, bearing at its upper end against the head 13 of the plunger and its lower end against a collar 14 screwed into the lower end of the ram.

From the ram bore containing the head 13, a port 15 leads upwardly to a valve chamber 16 containing a valve 17 which fits against a seat 18 in the upper part of the ram. The valve stem fits within an inserted plug 19, which is screwed into a suitable screw-threaded hole in the ram, and the stem is preferably made in two telescopic parts 20 and 21. The part 20 carries a roller 22, and slides within the part 21, the parts being normally forced apart by a spiral spring 23 fitting against the end of the part 20. The spring 23 is stronger than the valve opening spring, and serves to prevent jamming of the valve owing to dirt accumulating on the face of the cam or to a slight irregularity in machining. The top and bottom of the bore in the plug are recessed to receive the ends of the pin 20ª driven into the part 20, thus preventing rotation and holding the roller 22 in proper position. The valve is normally forced back from its seat by spring 24, and the portion 21 of the stem is surrounded by packing 25 seated in an annular recess in the plug. The outer cylindrical part of the plug is also preferably provided with packing 26, to prevent possible leakage of liquid through the screw-thread connection. From the valve chamber port 27 leads upwardly to the upper part of the ram, and receives a suitable fitting for connecting thereto the end portion of a flexible pipe 28 leading from one end of a single-acting cylinder 29 containing a loose plunger 30. This plunger is preferably reduced in its intermediate portion to provide an intermediate air chamber open to the atmosphere through hole 31 in the cylinder to prevent the air under pressure from leaking past. Pipe 32 lead air from one end of cylinder 3 into the end of the cylinder 30 from that to which pipe 28 is connected. The roller 22 on the

stem of valve 17 moves along a cam bar 33, during the movement of the ram. This cam bar is held within a suitable vertical recess at one side of the ram, and is provided with a cam surface 34 which acts to close the valve after the ram has made a certain amount of downward movement. The cam may be adjusted by any suitable means attached to the projecting portion 35 of the cam bar, such as the screw 36.

In preparing the apparatus for use, oil, or some non-compressible liquid, is filled into the spaces between the end of plunger 30 and the head of the plunger 13. This oil fills the pipe 28, the valve chamber, the ports 15 and 27, and causes a downward movement of the plunger head 13 within the ram when the piston 30 is moved toward the left of Fig. 1. In order to provide for release of air and complete filling of these connecting cavities and channels, I provide a vent hole 37 which leads from the valve chamber angularly upward to an accessible exposed point. In the form shown, a hole is bored diagonally inward and downward from the cam bar side of the ram, and the end of this hole is plugged, and then a hole is bored in from the top of the ram downward into the first named hole, and the end of this hole is closed by a removable plug. The oil is filled in through this hole, and the air allowed to pass out, the hole then being closed by the removable plug.

In the use of the apparatus, the work being in proper position within the yoke, air is admitted to the rear end of the cylinder 3, a portion of this air passing through the pipe 32 into the rear end of cylinder 29. The air within the cylinder 3 begins to move the toggle connection and thus start the downward movement of the ram as a whole. At the same time, the forward movement of the piston 30 within cylinder 29 causes the plunger 11 to move down relative to the ram, this being a relatively rapid movement. This movement of the plunger 11 continues until the die meets the end of the rivet. The area of the piston 30 is such that the power exerted thereby is insufficient to upset the rivet, and consequently after the plunger has met the head of the rivet, the ram will move down over the plunger until the roller 22 is acted upon by the cam face 34 to close the valve 17. Farther back flow of the oil or liquid from above the head 13 of the plunger is thus stopped, and the ram and its contained plunger are locked together by the non-compressible liquid. From this point on through the remainder of the stroke of the ram, the plunger 11 moves with the ram to head the rivet through this working stroke of the ram. During this working stroke the pressure exerted will, of course, be the complete pressure exerted by the ram the same as though it were one solid piece of metal. After the working stroke is finished, the air is exhausted from the rear end of the cylinder 3 and admitted to the forward end, and the ram is returned through the toggle links. As soon as the roller 22 passes back over the cam face 34, the valve 17 is opened by means of the spring 24, and the plunger 11 will then return to its normal upper position within the ram under the pressure of the return spring 12. This spring is of sufficient power to force back the oil into the cylinder 29, the air exhausting from the back end of this cylinder through the cylinder 3.

In Fig. 5 I show a form similar to that of Figs. 1 to 4, inclusive, except that the valve is placed in a vertical position, and is actuated through a bell crank lever. In this case, parts similar to those of Figs. 1 to 4 are marked with the same numeral with the letter *a* applied, the bell crank lever 38 taking the place of the roller of the first form and actuating the valve in a way similar to that of the first form.

In Fig. 6 I show the invention as applied to an eccentrically actuated press. In this case the ram 7^b is actuated by an eccentric 39, an eccentric rod 40, and the same kind of adjustable cam bar 33^b and cam actuated valve is used as in Figs. 1 to 4. The pipe 28^b in this case leads from an independent source of fluid under pressure, and the valve controlling this fluid is actuated at the proper moment to move down the plunger 11^b within the ram to adjust the tool to the work before the valve roller meets its actuating cam face in the ram movement imparted from the eccentric.

In Fig. 7 I show the same valve arrangement applied to a fluid actuated ram. In this case the ram body is of two diameters, the head 41 moving within a cylinder 42 having valve mechanism 43 for controlling the supply and exhaust of the steam or air or main motive fluid. In this case again the pipe 28^c leads to a source of independent fluid under pressure to give the preliminary adjustment movement to the plunger 11^c.

In Fig. 8 I show a form wherein the same motive fluid actuates the ram 7^d and its contained plunger 11^d. In this case the motive fluid entering through pipe 44 acts simultaneously upon the ram and upon the head of the plunger to give the preliminary downward adjustment of the plunger until the valve roller reaches its actuating cam face. In this form the cam bar is packed as shown at 45, as this cam bar extends into the motive fluid space. In this form the main ram is of much larger diameter than its contained plunger, the packing 46 is preferably arranged to give much greater friction on the main ram than is present on its contained plunger. Owing to its much

greater friction, the contained plunger will move down through its stroke to contact with the work before any material movement of the main ram.

The advantages of my invention will be obvious to those skilled in the art, since automatic adjustment of the tool to its work is afforded before the power stroke begins. This is accomplished in a very simple and effective manner, and by mechanism which in practice has been found to be not only efficient but long-lived. It will be noted that the packings for the valve and the ram plunger are stationary as regards the parts which contact with them throughout the power stroke after the valve has closed thus reducing liability to wear and leakage. In these high pressure devices, if the packings contact with moving parts during the working stroke of the device, the wear is necessarily rapid and the packings must be frequently renewed. This trouble is practically overcome in my device, since the packings do not contact with moving parts during the pressure working stroke.

Many changes may be made in the form and arrangement of the press, and the work for which it is designed, without departing from my invention.

I claim:—

1. In a press, a ram, a plunger within the ram, means for leading liquid under pressure to the plunger, means for actuating the arm, and a valve device arranged to lock the plunger-actuated fluid within the ram at a predetermined stroke of the ram; substantially as described.

2. In a press, a ram, means for actuating said ram, a plunger within the ram, a source of fluid under pressure to the plunger, a valve in the ram controlling the supply of fluid to the plunger, and a relatively fixed actuating device arranged to close the valve at a predetermined point in the stroke of the ram; substantially as described.

3. In a press, a ram, means for actuating said ram, a plunger in the ram, means for leading fluid under pressure to a passage in the ram leading to the plunger, a valve within the ram controlling said passage, and a fixed cam arranged to close the valve at a predetermined point in the stroke of the ram; substantially as described.

4. In a press, a ram, means for actuating said ram, a plunger in the ram, means for leading fluid under pressure to a passage in the ram leading to the plunger, a valve within the ram controlling said passage, and a fixed cam arranged to close the valve at a predetermined point in the stroke of the ram, said cam being adjustable; substantially as described.

5. In a press, a ram, means for actuating said ram, a plunger within the ram, means for leading fluid under pressure to the plunger, a valve in the ram controlling the fluid supply, and means for closing the valve at a predetermined point in the stroke of the ram, said valve stem having a yielding connection with the closing means to prevent jamming; substantially as described.

6. In a press, a ram, means for actuating said ram, a plunger within the ram connected to a source of fluid under pressure, a valve arranged to lock the fluid within the ram, means for actuating the valve at a predetermined point in the stroke of the ram, and a vent through which the plunger actuating liquid may be filled, said vent having a closure; substantially as described.

7. In a press, a ram, a plunger in the ram, means for leading fluid pressure to the plunger, and a valve controlling the fluid supply to the plunger, the plunger and ram being held stationary relative to each other during the power stroke of the ram; substantially as described.

8. In a press, a ram, mechanical connections for giving the same a fixed stroke, a plunger within the ram, means for leading fluid pressure through said ram to the plunger, a valve within the ram controlling said fluid pressure, and an operating device for the valve arranged to close the same at a fixed point in the stroke of the ram; substantially as described.

9. In a press, a ram, a power cylinder arranged to actuate the ram, a plunger within the ram, a cylinder connected to the power cylinder for the ram, and having fluid supply connection leading to the ram plunger, a valve within the ram controlling the fluid supply to the plunger, and means for actuating said valve at a predetermined point; substantially as described.

10. In a press, a ram, a fluid cylinder arranged to actuate the ram, another fluid cylinder containing a piston and connected to the plunger bore of the ram, a valve in the ram controlling the fluid supply to the plunger, means for actuating the valve at a predetermined point in the stroke of the ram, and a fluid supply under pressure leading to the second cylinder; substantially as described.

11. In a press, a ram, a plunger within the ram, means for leading fluid under pressure to the plunger, a valve controlling said fluid supply, means for actuating the valve at a predetermined point in the stroke of the ram, and a return spring for the plunger arranged to move the plunger back to its normal position in the ram when the valve is opened; substantially as described.

12. In a press, a ram, a plunger within the ram, means for leading fluid under pressure through the ram to the plunger, a valve in the ram controlling said fluid, and a cam bar lying in a recess in the ram and ar-

ranged to actuate said valve at a predetermined point in the stroke of the ram; substantially as described.

13. In a press, a ram, a plunger within the ram, means for leading fluid under pressure through the ram to the plunger, a valve in the ram controlling said fluid, and a cam bar lying in a recess in the ram and arranged to actuate said valve at a predetermined point in the stroke of the ram, said cam bar projecting externally and having adjusting means; substantially as described.

14. In a press, a ram, a plunger within the ram, means for leading fluid under pressure through the upper part of the ram to the plunger, a valve in the ram controlling said fluid supply and having a roller, means for preventing rotation of the valve stem, and a relatively fixed cam arranged to contact with the roller and close the valve at a predetermined point in the stroke of the ram; substantially as described.

15. In a press, a ram, a plunger within the ram, means for leading fluid under pressure through the upper part of the ram to the plunger, a valve in the ram controlling said fluid supply and having a roller, means for preventing rotation of the valve stem, and a relatively fixed cam arranged to contact with the roller and close the valve at a predetermined point in the stroke of the ram, the valve stem being yielding to prevent jamming; substantially as described.

In testimony whereof, I have hereunto set my hand.

CHESTER B. ALBREE.

Witnesses:
G. M. VIERS,
H. M. CORWIN.