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VALVE OPERATING MECHANISM

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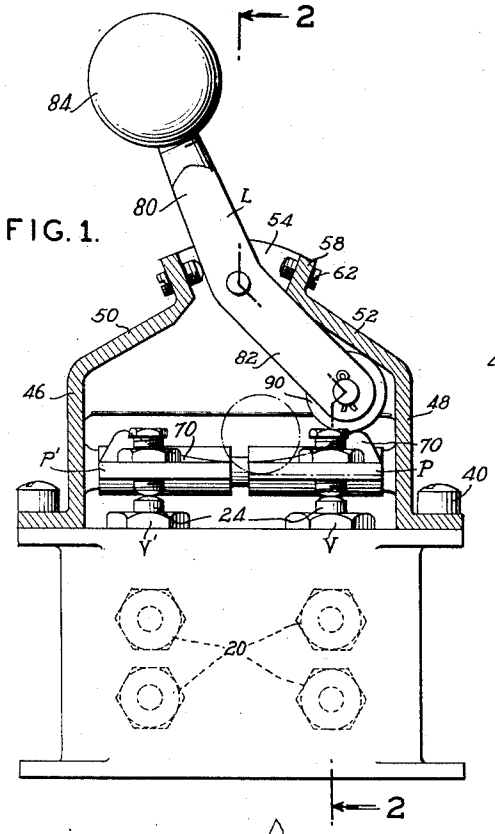


FIG. 1.

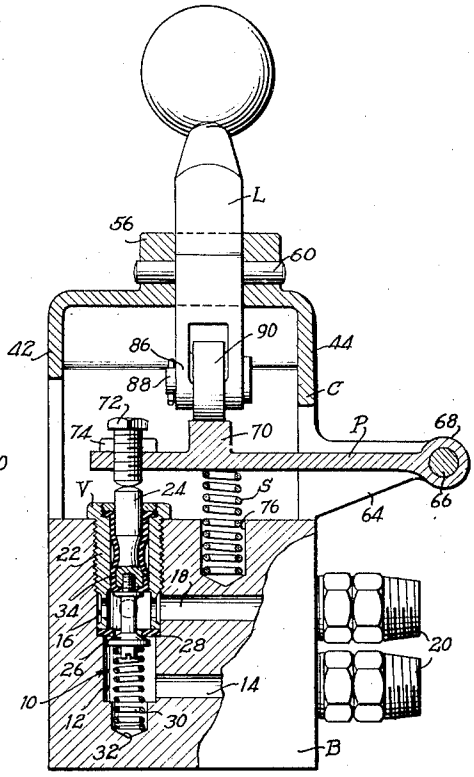


FIG. 2.

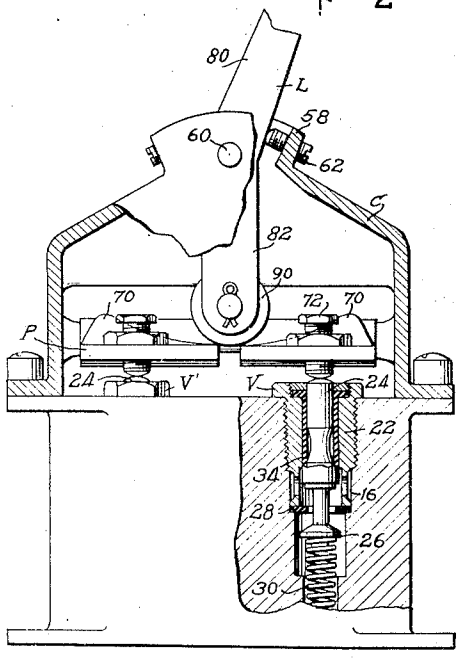


FIG. 3.

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VALVE OPERATING MECHANISM

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14 Claims. (Cl. 277—20)

This invention relates to a valve operating mechanism for positively opening and closing a plurality of valves in a preselected sequence.

When the oxyacetylene blowpipe is used for heat treating, surface hardening, machine welding, heavy duty cutting, deseaming, and other metal working processes, large flows of gases are needed and the various gases comprising the heating mixture must be turned on and off in a preselected sequence.

For instance, when the oxyacetylene blowpipe is used for surface hardening, if the blowpipe is in close proximity to the work, it is desirable that the acetylene be turned on and lighted before the oxygen is turned on. When the surface being treated has reached a predetermined temperature, it is important to interrupt the flow of oxygen before interrupting the flow of acetylene in order to prevent oxygen attacking the heated surface.

Occasionally, a manufacturer will object to the smoke and soot caused by free burning acetylene. If the blowpipe is being used for heat treating or surface hardening, it may be removed from the work, both gases turned on simultaneously and the mixture ignited. This will eliminate the smoke and soot caused by supplying and lighting the acetylene before turning on the oxygen. When the heating operation is finished, the flow of oxygen and acetylene may be interrupted in the proper sequence to prevent the oxygen attacking the heated surface.

In another instance, when the oxyacetylene blowpipe is used for cutting or deseaming, the acetylene may be supplied and lighted first or both gases may be supplied simultaneously and the mixture ignited. When the cutting or deseaming is completed, the acetylene may be turned off before the oxygen in order to avoid the formation of smoke and soot from free burning acetylene.

From the above illustrations, it will be apparent that a properly designed sequence valve operating mechanism for controlling large flows of gases, and adjustable to suit various operating requirements, is essential to good, blowpipe operating technique. Such a mechanism is also very valuable in processes using gases other than oxygen and acetylene, and in which it is necessary or desirable to supply various gases in a preselected sequence.

It is, therefore, among the objects of this invention to provide a simple valve-operating mechanism for operating a plurality of valves in a preselected sequence, which is reliable and positive in its operation, may be used to operate valves of different form, and is easily adjustable to permit the sequence of operation being varied to suit various operating requirements.

These and other objects of the invention will in part be obvious and in part become apparent from the following description and the accompanying drawing, in which:

Fig. 1 is a front elevational view, partially in section, illustrating a valve-operating mechanism embodying the invention;

Fig. 2 is a sectional view taken along the line 2—2 of Fig. 1 and looking in the direction of the arrows; and

Fig. 3 is a front elevational view, partially in section, and similar to Fig. 1, but showing the valve-operating mechanism in a different position.

As shown in the drawing, the improved valve-operating mechanism embodying the invention comprises a body B, a pair of valves V, V' mounted therein, a cap C secured to the body B, and an operating member, such as a lever L, pivotally mounted in the cap C and adapted to engage either one or both of a pair of valve operating plates P, P', each of which plates is pivotally associated with the valve-operating mechanism and operatively associated with one of the valves V, V', respectively. Springs S mounted in the body B are each associated with one of the valve operating plates P, P'.

A pair of vertically extending bores 10 are formed in the body B, and each receives one of the valves V, V', which valves are identical in construction. The bore 10 comprises a lower reduced portion 12, communicating with a horizontally extending inlet passage 14 and an upper portion 16 communicating with a horizontally extending outlet passage 18. Suitable hose connections or nipples 20 are secured in each inlet and outlet passage.

Seated in the upper portion 16 of each bore 10 is one of the valves V or V'. As the valves are identical, and form no part of the present invention, only one will be briefly described to show how it cooperates with other elements of the valve operating mechanism. Each valve includes a casing 22 and a plunger 24, the upper end of which extends above the body B. To the lower end of the plunger 24 is secured a valve head 26 which cooperates with a valve seat 28 to control communication between portions 12 and 16 of bore 10, and thus between the inlet and outlet passages 14 and 18, respectively. A spring 30, seated in a recess 32 aligned with bore 10 normally urges the valve to a closed position, and a flexible pack-

ing 34 surrounds plunger 24 to prevent any leakage of gas.

The cap C, which is secured to the body B by bolts 40, comprises an open front wall 42, an open rear wall 44, side walls 46 and 48 joining the front and rear walls, and upwardly converging top walls 50 and 52. A longitudinally extending aperture 54, surrounded by side walls 56 and end walls 58, is formed at the apex of the top walls 50 and 52. Side walls 56 support a pivot 60 for the operating lever L. Threaded into each end wall 58 of the aperture 54 is an adjusting stud 62 for limiting the movement of the operating lever L. Side walls 46 and 48 are each formed with a rearwardly extending arm 64, which arms support a shaft 66 on which are pivoted the valve-operating plates P, P'.

Each valve-operating plate P, P' is provided at its rearward end with a hinge portion 68 and intermediate its ends with an upwardly extending curvilinear cam 70. Extending through the forward end of each plate is an adjusting screw 72 provided with a lock nut 74. Springs S, seated in a recess 76 in the body B, urge each valve plate P, P' to an upper position in firm engagement with a roller 90 on lever L, described below.

The operating lever L is bent at its pivot to form outer and inner arms 80 and 82 above and below the pivot, respectively. On the end of arm 80 is an operating knob 84 which may be spherical as shown to afford a convenient hand grip. The inner arm 82 is forked at its lower end, and between the arms 86 of the forked end extends a pin 88, on which is mounted valve operating means, such as a roller 90, adapted to engage and roll along either or both of the cams 70 on the operating plates P, P'.

The operation of the particular embodiment of the invention as shown in the drawing may be best understood by reference to Figs. 1 and 3. The source of the gas to be initially supplied, which, for the purpose of description will be assumed to be acetylene, is connected by a suitable hose, or other conduit, and nipples 20, to the inlet passage 14 leading to the valve V (shown at the right in Fig. 1). The other gas, which may be oxygen, is conducted through nipples 20 to the inlet passage 14 leading to valve V' (at the left in Fig. 1). Screws 72 are adjusted to move each valve plunger 24 the necessary amount to fully open the valves V, V' when the plates P, P', respectively, are depressed by movement of lever L. Also, the studs 62 are adjusted to predetermine the movement of lever L in slot 54. The gas conduits leading to the blowpipe, or other gas consuming appliance, are connected to outlet passages 18 by nipples 20.

When the above connections and adjustments have been made, the valve-operating mechanism is ready for use. To start the flow of gas, lever L is rotated clockwise from the position shown in Fig. 1 to that shown in Fig. 3. In this movement, the roller 90 initially engages the cam 70 on plate P and rolls along this cam to the left, as viewed in Fig. 1. Cam 70 is so designed that when the roller 90 reaches the left end thereof the plate P will be fully depressed. As plate P moves downwardly, the screw 72 engages the plunger 24 of valve V and depresses this plunger, thereby compressing spring 30 and moving valve head 26 away from valve seat 28 to establish communication between inlet passage 14 and outlet passage 18 associated with valve V. Acetylene may then flow to the blowpipe, or other gas consuming apparatus, and be ignited.

Further movement of lever L in a clockwis direction causes a portion of roller 90 to engag the lower edge of cam 70 on plate P'. As th cams 70 are identical in construction, the plat P' will be moved downwardly to depress th plunger 24 of valve V', opening this valve i the same manner as described for valve V, an permitting oxygen to flow to the blowpipe. I should be noted that, at the limit of clockwis movement of lever L, as determined by the righ hand stud 62, the roller 90 engages the lowes inner surface of each cam 70, thus retaining bot plates P and P' in a depressed position holdin both valves V and V' open.

To close the valves V, V', lever L is swung i a counter-clockwise direction from the positio shown in Fig. 3 to that shown in Fig. 1. In thi movement, roller 90 initially disengages cam 7 on plate P', which plate is forced upwardly b its associated spring S. The spring 30 of valv V' will move the valve head 26 into engagemen with valve seat 28 to interrupt the flow of oxyge

As the roller 90 approaches the upper end c cam 70 on plate P, this plate, likewise, is move upwardly by its associated spring S, permittin the valve V to close under the pressure of sprin 30 associated therewith. The acetylene suppl will thus be interrupted. The operating lever is maintained in the "on" position by the com bined upward thrust of the plates P and P against roller 90.

If a different sequence of operation is desire the connections of the respective fluid suppl lines to the inlet passages 14 in the body B ma be reversed, or, if desired, the pivot 60 may b removed and the operating lever L reversed i position in the cap C so that the valve-opera ing plate P' will be depressed prior to depressio of the valve-operating plate P.

While only two valves and valve-operatin plates therefor have been shown, it is obviou that, by suitable design of the cams 70 on th plates P, P', more than this number of valv and valve-operating plates may be mounted i the same body and operated by the single ope ating lever L in any desired sequence.

While a specific embodiment of the novel fe tures of the invention has been shown, the inve tion may be otherwise embodied and the rel tive dimensions and interrelation of par changed, provided the objects of the invention a attained.

What is claimed is:

1. In combination, a body having a plurality passages extending therethrough; a spring clos valve controlling the flow of fluid through ea of said passages; plates pivotally associated wi said body and each operatively associated wi one of said valves; an operating member pivo ally associated with said body and movable rel tively to said plates, said member, upon mov ment in one direction, engaging and depressi each of said plates in succession to open sa valves in a preselected sequence; and means pr venting further movement of said member said one direction when said member is in e gagement with and has depressed all of sa plates to retain all of said valves open.

2. In combination, a body having a plurali of passages extending therethrough; a spri closed valve mounted in each passage; an ope ating plunger connected to each valve and pr jecting above said body; a cap secured to sa body; plates pivoted to said cap, each operative associated with one of said valve plungers;

operating member pivoted to said cap and movable transversely of said plates, said member, upon movement in one direction, successively engaging and depressing each of said plates and the associated valve plungers to open and retain open all of said valves in a preselected sequence; and means preventing further movement of said member in said one direction when said member is in engagement with all of said plates and has depressed all of said plates and the associated valve plungers to retain open all of said valves.

3. In the combination claimed in claim 2, means normally urging each plate upwardly into engagement with said member, whereby, when said member is moved in the opposite direction, said means will successively urge said plates upwardly upon release of said plates by said operating member to permit all of said valves to close and remain closed in another preselected sequence.

4. In the combination claimed in claim 2, means adjustably mounted in the free end of each plate to engage the associated valve plunger.

5. The combination claimed in claim 2, in which said means limiting the movement of said member is adjustably mounted in said cap.

6. In the combination claimed in claim 2, means retaining said member in its actuated position.

7. In the combination claimed in claim 2, a cam formed on the upper side of each plate and a roller on said member adapted to engage each of said cams.

8. In combination, a body having passages therein; valves arranged in tandem alignment in said body and each normally obstructing one of said passages; a cap secured to said body; plates pivoted to said cap and each operatively associated with one of said valves; valve operating means pivotally mounted on said cap and movable transversely of said plates along said aligned valves, said means, upon movement in one direction, engaging and depressing each of said plates in succession to open said valves in a preselected sequence; means preventing further movement of said valve operating means in said one direction when the latter is in engagement with and has depressed all of said plates to retain all of said valves open; and springs normally urging each plate upwardly; said valve operating means, upon movement in the opposite direction successively disengaging said plates, and said springs thereupon moving said plates upwardly to permit said valves to close in another preselected sequence.

9. In combination, a body; passages in said body; valves in said body each normally obstructing one of said passages; an operating means for each valve extending above said body; a cap secured to said body; a pair of longitudinally spaced arms extending rearwardly from said cap; a shaft mounted in said arms; plates pivotally mounted on said shaft and each extending forwardly into said cap in operative association with a valve-operating means; means resiliently urging each plate in an upward direction; a cam on the upper surface of each plate; a pivot extending transversely of said body; and an operating lever mounted on said pivot and adapted to swing longitudinally of said body and successively engage said cams and depress said plates to open said valves in a preselected sequence.

10. The combination claimed in claim 9, in which a roller is mounted in the inner end of said lever in operative association with said cams.

11. The combination claimed in claim 9, in which a roller is mounted in the inner end of said lever in operative association with said cams, an operating knob is mounted on the outer end of said lever, and said lever is bent at said pivot in such a manner that said knob is disposed at a distance either side of a perpendicular line through said pivot when said lever is in either of its extreme positions, whereby the upward thrust of said plates against said roller will retain said lever in either of said positions.

12. In the combination claimed in claim 9, adjustable means in said cap limiting the movement of said lever in either direction.

13. In the combintation claimed in claim 9, means adjustably mounted in the forward end of each plate adapted to operatively engage each associated valve operating means.

14. The combination claimed in claim 9, in which said cams are so designed that said lever will retain one of said plates in depressed position while depressing another of said plates.

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