April 27, 1926. 1,582,511

C. J. COBERLY

VALVE STRUCTURE FOR ACETYLENE TORCHES

Filed June 5, 1923

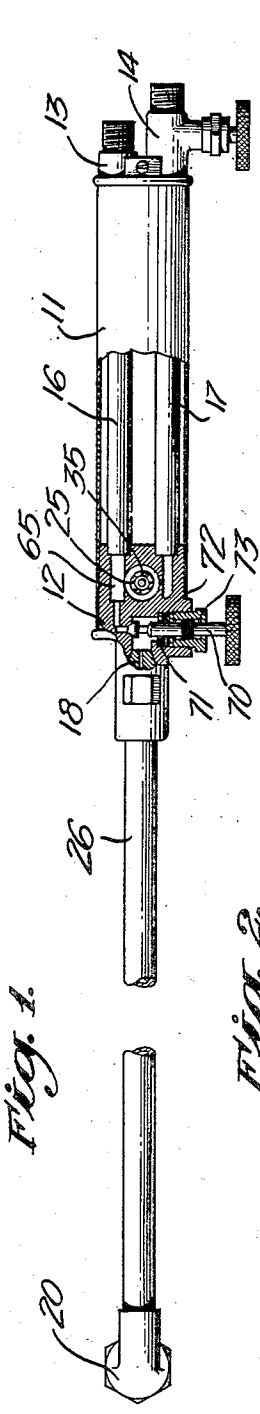


Fig. 1.

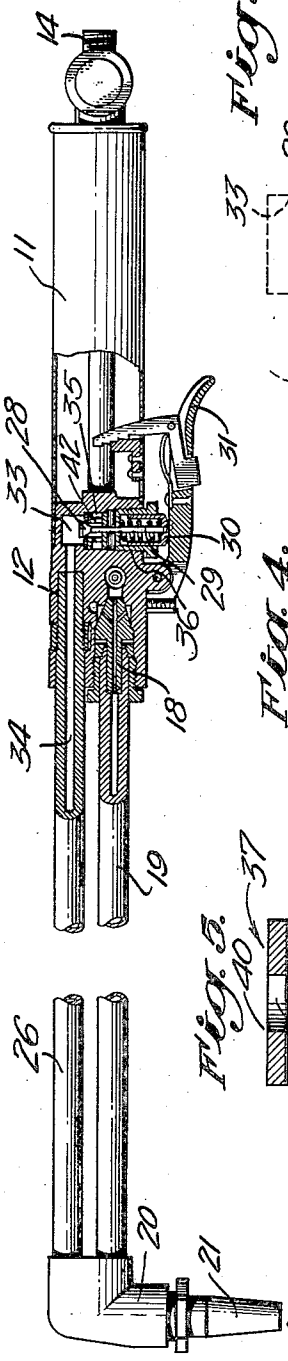


Fig. 2.

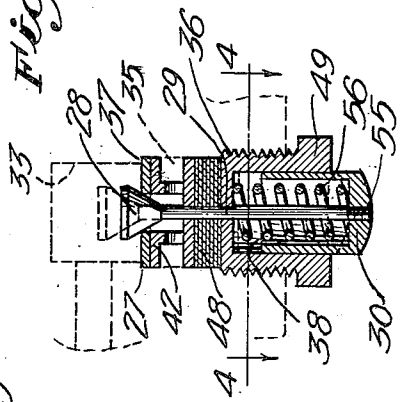


Fig. 3.

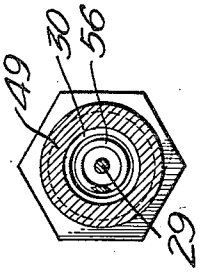


Fig. 4.

Fig. 5.

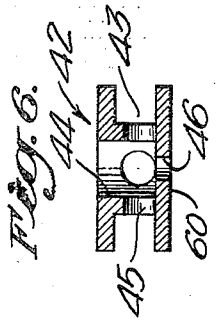


Fig. 6.

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Patented Apr. 27, 1926. 1,582,511

UNITED STATES PATENT OFFICE.

CLARENCE J. COBERLY, OF LOS ANGELES, CALIFORNIA, ASSIGNOR, BY MESNE ASSIGNMENTS, TO PUROX COMPANY, OF DENVER, COLORADO, A CORPORATION OF COLORADO.

VALVE STRUCTURE FOR ACETYLENE TORCHES.

Application filed June 5, 1923. Serial No. 643,559.

To all whom it may concern:

Be it known that I, CLARENCE J. COBERLY, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles, State of California, have invented a new and useful Valve Structure for Acetylene Torches, of which the following is a specification.

This invention relates to the construction of cutting torches which are employed for cutting metals by the use of a stream of oxygen directed against a heated body of metal, and relates particularly to the construction of a valve for controlling the flow of oxygen to the cutting orifice of a torch of this type.

It is an object of the invention to provide a valve structure of this character which may be economically manufactured, which may be readily assembled and installed in a torch and which is extremely efficient in operation.

One of the particular advantages of the invention is that therewith a replaceable valve seat is provided which, furthermore, is reversible and is consequently endowed with double wearing life. The feature of removability of this valve seat eliminates all necessity for re-grinding valve seats within the structure of the torch. The valve seat and the valve closure member are so designed that a perfect seat is formed when the valve seat is installed, and is formed without the necessity of grinding the valve and the seat together to form a tight closure.

A further advantage of the invention is in the provision of a means which insures a non-leaking valve but which also permits of considerable freedom in action of the valve. This means consists of a valve stem having an intermediate portion of considerably reduced diameter, permitting a very marked reduction in the area of contact between the valve stem and the packing material which is placed around the constricted portion of the stem. The reduced periphery of the valve stem practically negates the possibility of leakage.

A further advantage of the invention is in the provision of an enlargement formed at the outer end of the valve stem which operates in a cylindrical bore in such a manner that all flexure strains placed upon the valve stem are received by the bore, and any force other than direct thrust is prevented from being applied to the reduced portion of the valve stem.

Other advantages and objects of the invention will be made evident hereinafter.

Referring to the drawing which is for illustrative purposes only:

Fig. 1 is a partially sectioned plan view of a cutting torch incorporating an embodiment of my invention.

Fig. 2 is a partially sectioned elevation corresponding to Fig. 1.

Fig. 3 is an enlarged view of the valve structure shown in Fig. 2.

Fig. 4 is a section taken on a plane indicated by the line 4—4 of Fig. 3.

Fig. 5 is an enlarged section of the valve seat I employ in the valve structure of my invention.

Fig. 6 is an enlarged section through the spacing member used with my invention.

The torch shown in the drawing is comprised of a grip 11, in the forward end of which a mixing and control head 12 is situated. From fixtures 13 and 14 situated at the rear end of the grip 11, the combustible gases are conducted through tubes 16 and 17 to the mixing head 12. A combustible mixture of gases for providing heating flames is formed in a mixer 18 and is delivered therefrom through a delivery tube 19 to a burner head 20 in which a cutting tip 21 is situated. The cutting flow of oxygen is controlled by a valve 25, from which it is directed through a delivery tube 26 to the burner head 20.

The valve 25, as shown in the enlarged Fig. 3, provides a valve seat 27 which is closed by a valve member 28 situated upon the inner end of a stem 29 having an inverted cap 30 situated at the outer end thereof which is engaged by a control lever 31, Fig. 2, in such a manner that the valve member is raised from the valve seat and a flow of oxygen thereupon permitted. The mixing head 12 is provided with an inner bore 33 which communicates with a passage 34 of the delivery tube 26, an intermediate bore 35 which is of slightly larger diameter than the inner bore 33, and an outer threaded bore 36, a very narrow ledge 37 being formed by the shoulder between the inner bore and the intermediate bore 35. The valve seat consists of a disc of fairly soft metal, such as brass, having a central

opening 39 therethrough which is carefully bored, so as to retain sharp corners 40 and 41. This disc constitutes a replacement member and is situated at the inner end of the intermediate bore 35 and rests against the ledge 37. Adjacent to the disc 27, a spacer 42 is placed. This spacer as shown in Fig. 6, is in the form of a spool, having an annular recess 43, a stepped bore 44 and radial openings 45 communicating between the enlarged portion of the bore 44 and the annular groove 43. A reduced portion 46 of the bore 44 is of a size to receive the stem 29.

Adjacent to the outer face of the spacer member 42, packing material 48 is placed, this material being compressed by a plug 49 through which the stem 29 passes and which has a relatively large, counterbore formed therein in such a manner as to render the plug cup-shaped. The valve member 28 is of conical shape and is preferably formed integrally with the stem 29, and is hardened so that pressurable contact with the corner 40 of the valve seat will have substantially no effect thereupon.

It is a feature of the invention to place the valve seat 27 in working position with the corners 40 and 41 thereof sharply formed, so that substantially a line contact is made therewith by the valve member 28. The continued application of the valve member against the corner will, of course, cause the wearing down of the corner to a perfectly fitting valve seat. In case of injury to the valve seat, thus formed, the disc comprising the member 27 may be turned over so that the corner 41 will be brought into engagement with the valve member.

It will be noted that the valve stem 29 is of very small relative diameter, and that the area of contact between the packing material and the surface of the valve stem is very small. By this construction I am enabled to reduce the friction between the stem 29 and the packing material to an extent, allowing considerable freedom of movement without liability of leakage around the stem.

It will be recognized that the inverted cup member 30, being screwed upon the end of the stem 29 proper at 55, is thus made a part of the valve stem and constitutes an enlargement having an outer cylindrical face which co-operates with the bore of the plug 49 and is guided thereby. A compression spring 56 is placed within the cup and exerts a pressure in the bottom of the bore and the cup 30 in such a manner that the valve member 28 is normally held against the valve seat 27. Owing to the fact that the member 30 fits closely within the bore 38, any application of force in a direction to cause flexure is received and absorbed by the member 49, thus positively preventing any application of force to the stem 29 other than in the direction of the axis thereof. Considering the valve member 28, the stem 29 and the cup 30 as a single structural element, it will be recognized that a closure member is provided, having a valve stem with a reduced intermediate portion around which the packing may be situated, and an enlargement at the outer end thereof adapted to be guided in a concentric bore.

The compression of the packing material 48 is accomplished by screwing in the plug 49 thereagainst. The area of the ledge 37 is exceedingly small in comparison to the area of the outer face 60, Fig. 6, of the spacer member 45; therefore, a pressure exerted on the packing 48 is greatly multiplied when received by the ledge 37, owing to the great difference in the two areas against which the pressure exerted by the member 49 is received. By this feature of construction, it is possible to exert a very heavy pressure for forcing the valve seat 27 against the ledge 37 by merely compressing the packing material 48 to a normal extent. The compression of the packing 48, however, is considerably less than ordinarily required, owing to the reduced area of contact thereof with the reduced portion of the stem 29.

As shown in Fig. 1, an oxygen passage 65 communicates with the intermediate portion 35 of the bore in which the valve 25 is situated, thus creating a presence of oxygen in the annular recess 43 and the bore 44 of the spacing member 42 at all times during the use of the torch. By depressing the lever 31, Fig. 2, the member 30 is forced upwardly, the movement thereof, being transmitted through the stem 29 and having the effect of raising the valve member 28 and allowing the passage of oxygen into the inner bore 33 from which this oxygen is directed through the passage 34 to the burner head 20.

A novel feature resides in hardening the cup 30 and screwing it upon the soft end of the stem 29, the end of the stem being then slightly riveted over, so that the unscrewing of the cup 30 under ordinary conditions is prevented. However, when it is desired to replace the valve seat 27, the cup member 30 may be forcibly unscrewed from the threaded end of the stem 29, the hardened threads of the cap cutting down the riveted end of the stem which may be again riveted over after replacement or reversing of the valve seat 27.

The structure of an oxygen control valve 70 embodies certain of the features described in connection with the valve 35, a disc member 71 being provided which is forced against a narrow ledge by packing material 72 which is compressed by a member 73. The struc-

ture of the valve 25 constitutes a very decided departure in the art, and it may be removed and replaced as an entire unit, the cost of such entire replacement being comparatively small, owing to the simplicity of the structure.

Although, I have described the valve in use with acetylene torches, it will be recognized that the valve may be employed in various devices of like and unlike character, without departing from the spirit of the invention as defined in the hereto appended claims.

I claim as my invention:

1. In a valve structure, the combination of: a cap; and a valve stem threadedly engaging said cap, an end of said stem being soft and riveted over said cap, said cap being hardened to cut the riveted portion of said stem when said stem and cap are being unscrewed.

2. In valve structure of the class described, the combination of: a member providing a bore, said bore having an annular ledge therein; a valve seat member comprising a perforated disc placed with the edge thereof against said ledge; a spacer disposed against said valve seat member; a closure member having a conical face cooperative with said valve seat member and extending outwardly through said valve seat member when seated; a stem supporting said closure member, said stem having an intermediate relatively small portion; packing disposed adjacent to the outer face of said spacer and surrounding said small portion of said stem; a plug member having an outwardly disposed bore, said member being disposed adjacent to the outer face of said packing; means for forcing said plug member inwardly so as to compress said packing and force said valve seat against said ledge; an inverted cup member supported on the outer end of said stem and operatively supported in said bore, said member being hardened and the end of said stem being retained in soft condition and riveted over; and a spring member situated in said cup member, for forcing said cup outwardly so as to normally hold said valve closure member against said valve seat.

In testimony whereof, I have hereunto set my hand at Los Angeles, California, this 31st day of May, 1923.

CLARENCE J. COBERLY.