The present invention relates generally to metal cutting torches and more specifically to an improved form of torch which upon attachment to suitable sources of oxygen and fuel gas automatically controls feed of such oxygen and fuel gas upon actuation of a control handle through ignition, preheating and cutting operations of the torch.

Oxygen burning cutting torches are known in the art, these prior devices required considerable skill in the manual control of the flow of oxygen and fuel gas to the torch tip and require frequent repairs and replacements of such control valves.

My prior invention No. 2,371,970 dated March 20, 1945, discloses a cutting torch of the general type herein described and the present invention comprises an improvement thereon providing greater efficiency through the improved valve controls whereby the torch as shipped from the factory is ready for maximum efficient use without any required valve adjustments by the user.

One object of the invention is to provide a new and improved form of oxygen feed valve and an improved form of valve control and gas feed valve body portion for accurately controlling feed of oxygen and fuel gas through a simple hand actuated control lever formed on the handle of the torch.

Other objects will be made apparent from the following description and the drawing forming a part thereof, wherein:

FIG. 1 shows in side elevation the torch of the invention;

FIG. 2 shows in plan view the valve chest of the torch body;

FIG. 3 shows in cross section one of the valves normally providing oxygen and fuel gas for ignition and preheating flames;

FIG. 4 shows in cross section the valve providing cutting oxygen; and

FIG. 5 shows control valve for admission of oxygen and fuel gas to the valve chest.

Referred to now to FIG. 1 of the drawing, the torch comprises a valve chest 1, a handle portion 2, pipes 3, 4 and 5, and head portion 6 for attachment of a suitable removable and replaceable tip 7. Pivotaly mounted upon valve chest 1 and overlying handle 2 is a valve actuating lever 8. Adjacent one end of valve chest 1 and at opposite sides thereof are screw valves 9 and 10 for admission of oxygen and fuel gases respectively, to the valve chest 1. Extending rearwardly of valve chest 1 are suitable coupling members 11 and 12 respectively, for attachment of suitable flexible hoses extending to suitable tanks for pressure storage of oxygen and a fuel gas, such as acetylene.

Referred now to FIG. 2 of the drawing showing an enlarged detail plan view of the valve chest 1 and valve cavities and channel therein for conveying oxygen and fuel gas, at the extreme right hand end of the valve chest are openings 13 and 14 for reception of the coupling members 11 and 12 for admission of oxygen and fuel gases to the respective valves as hereinbefore discussed.

Adjacent said openings 13 and 14, at the opposite sides of the valve chest 1, are the valve body openings 15 and 16 having an opening 17 provided in the inner face thereof, inwardly extending bores 18 for receipt of valve bodies, control-
spring 58. The top wall 55 has an opening 59 there-through and an O-ring 60 underlying said opening. Seated upon the compression spring 58 is a metal ball 61 which seals against the O-ring 60. The bottom wall 62 has an aperture 63 therein communicating with the valve chest opening 31 in coming through with channels 23 and 24, respectively. The chest openings 15 and 16, adjacent the upper end thereof, are closed by valve head portions 66 which receive the screw threaded valve stems 67 which terminate in head portions 67a. The valve stems are sealed by O-rings 68 and retaining washer 69.

The inserts 56 of valves 9 and 10 serve an important function in the operation of the cutting torch. The insert 56 in the valve providing fuel gas to the torch has its aperture 63 therein of a size to admit a maximum volume, per unit of time, of the fuel gas to maintain an efficient and economical torch preheating flame when the valve 10 is opened by turning valve stem 67 to downwardly displace valve ball 61 out of sealing engagement with O-ring 60, which fuel gas flows from the valve opening 15 through channel 31a of the valve chest. In such cases where valve 28, feeding fuel gas to torch pipe 3, is closed, as shown in FIG. 3 of the drawing, the fuel gas entering opening 31 of the valve 28 is metered through aperture 37 of valve 28 and thence through valve chest channel 41 into pipe 3 in sufficient amounts to maintain an ignition flame on the torch tip.

This construction and arrangement constitutes an improvement over the cutting torch of my Patent 2,571,970 wherein the valve 30 (FIG. VII) must be constantly adjusted to admit fuel gas in proper volumes and, due to wear from constant opening, closing and adjustment, requires constant attention from the operator and a varying setting to maintain sufficient volume of gas for preheating purposes. Such adjustments are further complicated by the necessity for adjustment of stem 17 (FIG. 11) to maintain sufficient biasing pressure on handle 15 to initially maintain valve stem 20 (FIG. VI) sufficiently depressed to admit fuel gas to valve 12 to maintain a proper ignition flame, by means of gas flowing through valve 21 perforation 22 of the patent.

Referring now to valve 9 which admits oxygen to the valve chest 1, through aperture 63a (FIG. V) in insert 56, the size of aperture 63a is predetermined in the factory to admit the maximum volume of oxygen through valve chest channel 21 to valve 29 during the cutting operation. At the same time valve chest channel 31 meters the required amount of oxygen to valve 28 during the preheating operation.

Referring now to the operation of the torch of the present invention, after the torch inlet openings 11 and 12 are connected by their hoses to the oxygen and fuel gas storage tanks (not shown) the valves 9 and 10 are opened to admit the respective gases to the torch chest 1 through which they flow to closed valves 28 and thence to the pipes 3 and 4 and into the torch tip 7. The workman can then ignite the torch by any usual or suitable means.

Thereafter the workman holding the torch handle in the palm of his hand, with the fingers overlapping the lever 8, may advance the latter towards the handle to initially actuate valves 28 by depressing stems 39 thereof to depress the balls out of engagement with O-rings 34 admitting oxygen and fuel gas from valve chest channels 31, 31a into valve openings 25 and therefrom through valve chest channels 41, 42 to pipes 3 and 4 and torch tip 7 to effect a preheating flame. After the metal is suitably preheated by said flame, the workman again advances the lever 8 towards handle 2 until the gaskets 40 on valve stems 39 of valves 28 abut the valve body portions 32 cutting off flow of oxygen and fuel gas therethrough in amounts to retain the preheating flame, yet supplying oxygen and fuel gas through apertures 37 of valves 28 to maintain an ignition flame. Concurrent with this latter actuation of valves 28, the advancing lever 8 abuts valve stem 52 moving same to depress ball 48 sufficiently to admit a cutting volume of oxygen from valve chest channel 21 through valve 29 and valve chest channel 53 to pipe 5 and into tip 7 to provide a suitable cutting flame. After cutting the outer cylinder 9 is actuated, the operator releases the lever 8 and the compression springs 36 and 49 in closing valves 28 and 29 will return the handle to initial position. Since the ignition flame is maintained without actuation of the handle, the operator can then repeat the cycle of preheating and cutting flames to effect another cutting or, as sometimes referred to, scaring operation. When the torch is not in use, the operator by closing valves 9 and 10 can extinguish the ignition flame by cutting off all supply of oxygen or fuel gas to the torch.

I claim:
1. In a cutting torch of the character described including a valve chest, a body portion attached to said chest, fuel and oxygen tubes connecting said chest with a torch head and a replaceable torch tip received in said torch head, the combination of
   (1) a plurality of recessed openings in a longitudinal face of said valve chest for reception of valves for transmission of oxygen in preheating and cutting volumes and fuel gas in torch ignition volumes, respectively, inlet openings in an end wall of said valve chest for admission of oxygen and fuel gases,
   (2) a recessed opening in each chest side wall adjacent said end wall inlet openings,
   (3) a control valve received in each said chest side wall openings and each provided with an inlet opening sized to admit to the valve a pre-selected constant volume of fuel or oxygen gas under all degrees of opening movements of the valve,
   (4) a first channel extending longitudinally within the valve chest and opening into the said recessed opening receiving the valve for passage of oxygen in metal cutting volumes,
   (5) a second channel extending longitudinally within the valve chest and opening at one end into the recessed opening receiving the valve for passage of fuel gas for ignition of the torch,
   (6) a channel within the valve chest connecting the valve chest end wall opening for admitting oxygen to said chest first channel opening,
   (7) a channel in the valve chest connecting the valve chest end wall opening for admitting fuel gas to said body with said chest second channel,
   (8) valve means in each of said valve chest side wall openings including a moveable valve stem and a spring loaded steel ball controlling passage of the respective gases through said valve means,
   (9) channels in said valve chest connecting said chest side wall valves means with the adjacent recessed openings in the valve chest end wall,
   (10) channels in said valve chest connecting said chest side wall openings with two of the adjacent said recessed openings in the longitudinal face of said chest,
   (11) a connection between the third of said recessed openings in the longitudinal face of the chest and the said first channel extending longitudinally of the chest,
   (12) valve means in each of said recessed openings in the longitudinal face of said chest for respectively continuously supplying fuel gas and oxygen from said chest side wall valves to said torch tip for ignition purposes and intermittently supplying oxygen to said torch tip for metal preheating and cutting purposes, and
   (13) moveable valve actuating means on said torch overlying said latter valve means for selectively actuating the valve means from normally closed to open position for performance of their functions.
2. The torch as defined in claim 1 in which said valve means supplying preheating fuel and oxygen gases to the torch tip have valve body portions provided with an aper-
5. The torch as defined in claim 1, wherein the valve means supplying oxygen in suitable volumes to maintain the cutting flame of the torch is normally closed and is moveable to open position only after the valve means providing a preheating flame for this torch have been sequentially opened and advanced to cut off supply of oxygen to the torch tip.

6. The torch as defined in claim 3, wherein the valve means supplying oxygen in suitable volumes to maintain the cutting flame, receives its oxygen through the first said channel and independently of the first said valve means providing the preheating flame.

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