

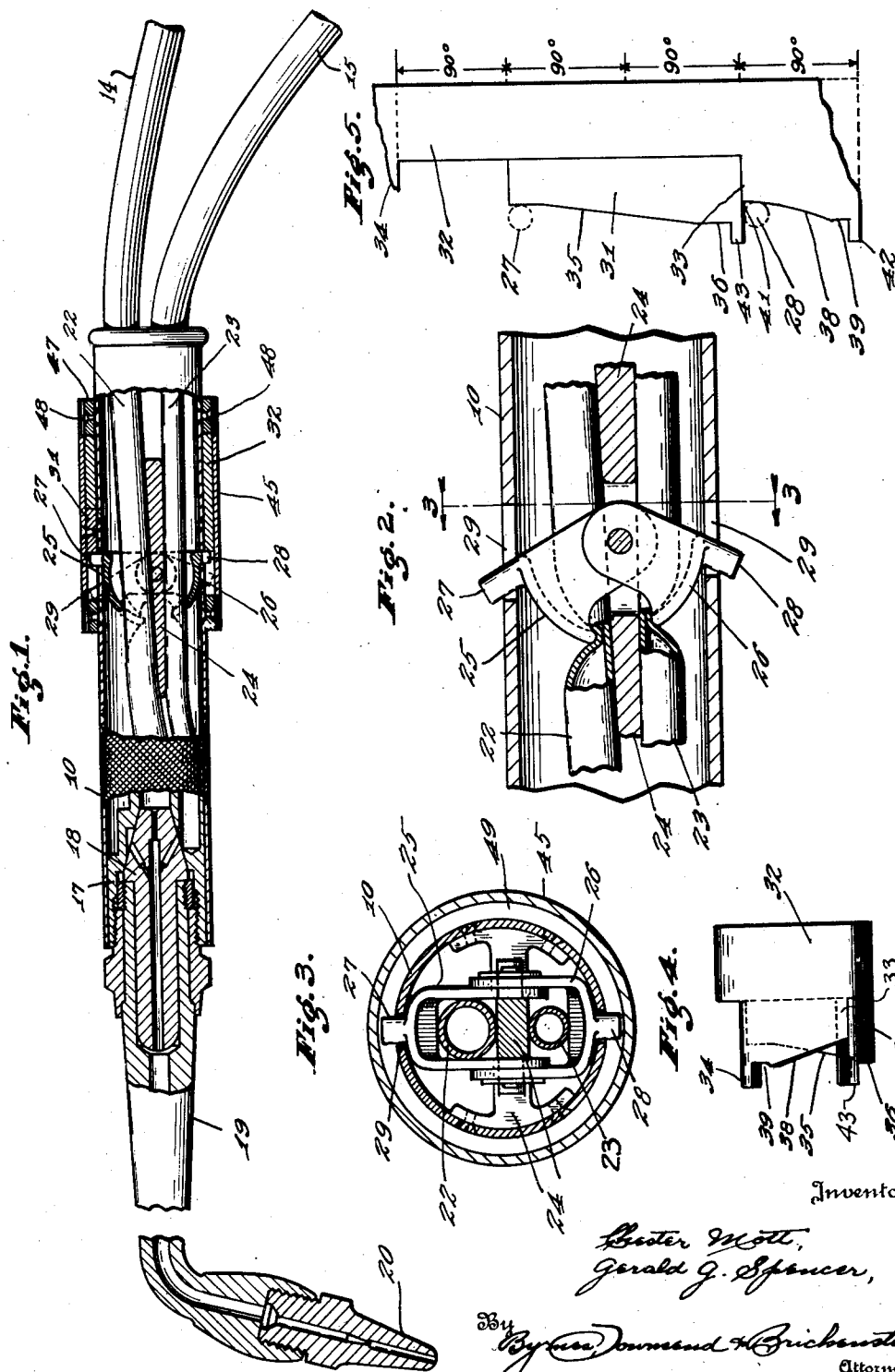
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TORCH

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UNITED STATES PATENT OFFICE

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TORCH

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Our invention relates to blow pipes or torches for welding and cutting purposes, and particularly to torches burning a mixture of gases, such as oxygen and acetylene, which are supplied independently to the torch.

An object of our invention is to provide a torch device in which the rate of flow of the gases may be controlled by valve means which automatically control the sequence in which the respective gases are turned on and off. Another object of our invention is to produce a torch having valve means which are not subject to leaking and do not cause any substantial drop in gas pressure. Still another object of our invention is to provide a torch in which fouling of the torch parts, and injury thereto from a strike-back or combustion inside the torch chambers are prevented. A still further object of our invention is to provide a simple valve device by which automatic sequence of valve operations is obtained and which also permits an independent adjustment of the gas flow.

In the past, it has been customary to provide such torches with needle valves by which the rate of flow of the constituent gases could be independently controlled; but difficulties have been encountered due to the fact that the needle valves do not always remain gas-tight in operation and to the fact that there is a loss of capacity which results from the drop in pressure occurring as the gas flows through the more or less tortuous path provided by the needle valve.

In the device of our invention, we supply the gases to the usual mixer through resilient tubing, and provide means for pinching this tubing to regulate the rate of gas flow there-through. We also provide a joint control for the pinching means in order to insure that the valving means will be operated in proper sequence. We further arrange the valve means so that after the valves have been operated in the required pre-determined sequence, the rate of flow can be adjusted to the proper magnitude by an appropriate other movement of the valve control means.

Other objects and structural details of our invention will be apparent from the following

description when read in connection with the accompanying drawing wherein:

Fig. 1 is a side elevation of a torch with parts thereof broken away to show the interior construction;

Fig. 2 is a fragmental axial section through the torch showing details of the valving means;

Fig. 3 is a transverse section on the line 3—3 of Fig. 2;

Fig. 4 is a side elevation of the two cams which we employ to control jointly the two valving means; and

Fig. 5 is a diagrammatic showing of a development of the two cams illustrated in Fig. 4.

The torch illustrated comprises a tubular handle 10 having two gas-inlet conduits which may be the flexible tubing 14 and 15 through which the combustible and combustion-supporting gases are supplied. In the opposite end of the handle, there is provided a head 17 in which is mounted a mixer 18 and tube 19, the latter terminating in the usual tip 20. Our invention is not concerned with the precise construction of any of these parts.

In our improved torch, we conduct the gases from the conduits 14 and 15 to the head 17 through tubes 22 and 23 of some suitable resilient material, such as a good quality of soft rubber. For a portion of their length, these tubes are separated by a bridge 24 which is secured to the walls of the handle 10 as is shown in Fig. 3. Pivotally mounted on opposite sides of the bridge 24 are two yokes 25 and 26, the tube 22 passing through the yoke 25 and the tube 23 through the yoke 26. Each of these yokes may be rocked about its axis or pivotal mounting from the full-line to the dotted line position indicated in Fig. 1 to pinch its associated tube against the bridge 24 and thus to prevent the flow of gas through such tube.

The two yokes 25 and 26 are provided respectively with fingers 27 and 28 which project outwardly through slots 29 in the wall of the handle 10 in a position to cooperate with valve control means.

The valve control means which we prefer

to employ comprises a pair of cams 31 and 32. One of these cams, here shown as the cam 32, is in the form of a complete ring provided with two spaced abutments 33 and 34 between which the other cam is received, as is shown in Fig. 5. The angular distance between the abutments 33 and 34 is greater than the angular extent of the cam 31 in order to provide between the two cams a certain amount of lost motion, the purpose of which will become evident hereinafter. The proportions of the cams 31 and 32 may be varied to suit the circumstances. As shown, the cam 31 is approximately 180° in extent, and has a helical surface 35 which extends substantially its entire length except for a short land 36 near its high end. The cam 32 has a helical camming surface 38 approximately 90° in extent, and at its high point is provided with a shallow locking depression 39. The cam surfaces 35 and 38 cooperate respectively with the fingers 27 and 28.

At the ends of the camming surface 38 of the cam 32, we preferably provide abutments 41 and 42 which, cooperating with the finger 28, limit the extent to which the cam 32 may be rotated. A similar abutment 43 at the high end of the cam 31 cooperates with the finger 27 for a similar purpose.

The two cams 31 and 32 are surrounded by a control sleeve 45 which is secured to the cam 31. To locate the cams 31 and 32 axially of the handle 10 and to take the axial thrust to which the cams are subjected when the tubes 22 and 23 are pinched against the bridge 24, we provide a thrust collar 47 which is secured to the handle 10 as by means of rivets 48.

To secure safe operation of the torch, it is desirable that the constituent gases be turned on and off in the proper sequence. When the torch is not in use, both gases are of course shut off. When the torch is to be lighted, the combustible gas, usually acetylene, is turned on and ignited; the oxygen valve is then opened to its limit; and subsequently, the fuel gas is regulated to provide a flame of the desired character. In shutting off, the fuel valve should be closed before the oxygen valve.

The sequence of valve operations just described is advantageous in lighting the torch, in maintaining the desired character of flame, in lessening the probability of "flash-backs", and in eliminating "pops" and fouling when the torch is turned off.

Our improved control means secure the desired sequence of operations. When the torch is not in use, the yokes 25 and 26 occupy the positions illustrated in Fig. 2 and cut off all flow through the tubes 22 and 23. In this condition, the fingers 27 and 28 are on the high points of the cams 31 and 32 respectively. The cam 31 is against the abutment 34 of the cam 32.

When it is desired to light the torch, the

control ring 45 is rotated to carry the cam 31 away from the abutment 34. The inherent resilience of the tube 22 causes the finger 27 to follow the cam surface 35, and thus forces the yoke 25 from the dotted line position indicated in Fig. 1 toward the full line position. This movement of the yoke releases the tube 22 and permits the fuel gas to flow therethrough to the tip 20 where it can be ignited. The fuel gas should be ignited before the cam 31 has engaged the abutment 33 to move the cam 32.

Further rotation of the control ring 45 causes the cam 31 to engage the abutment 33 and thus to move the cam 32. This movement of the cam 32 forces the finger 28 from the locking depression 39 onto the sloping cam surface 38, which is made steep enough so that the cam 32 "overhauls". In other words, the force with which the finger 28 bears against the cam surface 38 is sufficient to cause the cam 32 to move to the limit of its movement, or to the position illustrated in Fig. 5.

In the usual installation of the torches of the type with which our invention is concerned, the respective gases are supplied to the tubes 14 and 15 from pressure tanks through pressure regulators, and the pressure regulator controlling the fuel gas is so adjusted that it supplies fuel gas in quantities in excess of that required for all practical uses of the torch. Therefore, after the torch is ignited, it is possible by regulation of the fuel gas to produce any desired character of flame. In our torch, this is readily accomplished by rotation of the control ring 45, which causes the cam 31, by reason of its engagement with the finger 27, to move the fuel-gas control yoke 25 to any desired position. Such movement of the cam 31 may be accomplished without disturbing the cam 32, because of the fact that the overall length of the cam 31 is less than is the space between the abutments 33 and 34. The lost motion thus provided is some 90° in extent, which is sufficient to obtain the adjustment of fuel gas flow necessary to produce the desired character of flame.

In Fig. 5, the two cams 31 and 32 are shown in the positions which they occupy when the fuel gas and the oxygen are turned on to the limit. If it is desired to turn the torch flame off, the control ring 45 is rotated to cause movement of the cam 31. During the first stage of this movement, the fuel gas is partially cut off, the oxygen remaining completely turned on until the cam 31 engages the abutment 34. Continued movement of the control ring 45 thereafter forces both yokes 25 and 26 toward the bridge plate 24 and eventually shuts off the gas flow in both tubes 22 and 23. By reason of the presence of the land 36, the fuel flow is completely shut off before the oxygen is com-

pletely shut off. The final stage of this movement in the control ring 45 causes the finger 28 to drop into the locking recess 39 which restores the control means to the condition which is to obtain when the torch is not in use.

By our control means, we eliminate needle valves and substitute therefor a valving mechanism which will not readily develop leaks, which will not become clogged; and which does not decrease the torch efficiency. Further, both gases are under control exercised by a single control member, which adds to the convenience with which the torch is operated. Still further, the particular form of control means which we employ insures that the operator will follow the desirable and safe sequence of operations both in turning on the torch and also in turning it off. The fact that the cam surface 38 is made steep enough to insure that the cam 32 will "overhaul", results in a structure in which the oxygen will be either completely turned on or completely turned off; a feature which adds greatly to the safety with which the torch may be operated.

The construction of our invention likewise is particularly advantageous because of the fact that it prevents injury to the torch from flash-back or fouling. The fuel gas being turned off first, the flow of oxygen sweeps all of the fuel gas out of the torch as the flame is extinguished, leaving no combustible mixture within the torch chambers to ignite for the production of a strike-back or fouling as may occur if the oxygen is cut off first, likewise, since the fuel gas is turned on first, it is readily ignited at the tip before the oxygen is admixed with it, thereby securing a convenient and easy lighting and adjustment of the torch.

While we have shown but a single embodiment of the device of our invention, it is capable of other modifications therefrom without departure from the spirit thereof, and it is desired therefore that only such limitations shall be imposed upon the appended claims as are stated therein, or required by the prior art.

We claim as our invention:

1. In a welding or cutting torch adapted to burn a mixture of an oxygen containing gas and a fuel gas, means for regulating the supply of each gas, a single control member, and means interconnecting said control member and said regulating means, said interconnecting means including a lost-motion connection permitting independent adjustment of the regulating means for one gas.

2. In a welding or cutting torch adapted to burn a mixture of an oxygen containing gas and a fuel gas, means for regulating the supply of fuel gas to said torch, means for regulating the supply of oxygen to said torch, said oxygen-regulating means including a

member movable between two controlling positions in one of which it prevents the flow of oxygen to the torch and in the other of which it permits unrestricted flow, and means for automatically moving said member to the latter position when it is suitably moved from the former position and for preventing said member from assuming any intermediate position.

3. The invention set forth in claim 2 with the addition of a single control member for jointly controlling both of said regulating means.

4. In a welding or cutting torch adapted to burn a mixture of gases, two movable cams, a control member rigid with one of said cams and having a lost-motion connection with the other, and means associated with each cam for regulating the supply of one of the gases as the cam is moved.

5. In a welding or cutting torch adapted to burn a mixture of gases, two movable cams, a control member rigid with one of said cams and having a lost-motion connection with the other, means associated with each cam for regulating the supply of one of the gases as the cam is moved, and additional means associated with one of said cams for moving it.

6. In a welding or cutting torch adapted to burn a mixture of gases, two movable cams rotatably mounted on the torch, a control member rigid with one of said cams and having a lost-motion connection with the other, and means associated with each cam for regulating the supply of one of the gases as the cam is moved.

7. In a welding or cutting torch adapted to burn a mixture of gases, two movable members, a control member rigid with one of said movable members and having a lost-motion connection with the other, and means associated with each movable member for regulating the supply of one of the gases as the movable member is moved.

8. In a welding or cutting torch adapted to burn a mixture of gases, two movable members, a control member rigid with one of said movable members and having a lost-motion connection with the other, means associated with each movable member for regulating the supply of one of the gases as the movable member is moved, and additional means associated with one of said movable members for moving it.

9. In a welding or cutting torch adapted to burn a mixture of gases, two movable members rotatably mounted on the torch, a control member rigid with one of said movable members and having a lost-motion connection with the other, and means associated with each movable member for regulating the supply of one of the gases as the movable member is moved.

10. In a welding or cutting torch, a valve for controlling the oxygen supply, a valve

for controlling the fuel gas supply, a single control ring for operating both of said valves, said ring being adapted to be successively rotated to open said fuel gas valve, to open said oxygen gas valve, to adjust said fuel gas valve independently of said oxygen valve, to close said fuel gas valve, and to lastly close said oxygen valve.

11. In a welding or cutting torch, a flexible tube for supplying a fuel gas to said torch to be burned, a flexible tube for supplying oxygen to said torch to support combustion, a separate means for pinching each of said tubes to control both of said gases, a common means to successively operate each of said pinching means to turn on the fuel gas, to turn on the oxygen, to regulate the fuel gas, to shut off the fuel gas and to shut off the oxygen in the order named.

12. In a welding or cutting torch adapted to burn a mixture of gases, said torch having a hollow handle, tubes of yielding material extending through said handle for conducting the gases, a single control ring rotatably mounted on said handle, a bridge between said tubes and means within said handle operated by rotation of said control ring for pinching said tubes against said bridge to control the flow of gas through said tubes.

13. In a torch, the combination with a fuel gas conduit and an oxygen conduit, of separate adjustable devices for controlling the gas flow through said conduits, and a single adjustable operating member for both of said devices adapted to first permit the flow of fuel gas and thereafter to permit the flow of oxygen and, when interrupting such flow, to first shut off the flow of fuel gas and thereafter to shut off the flow of oxygen.

14. In a torch, the combination with a fuel gas conduit and an oxygen conduit, of separate adjustable devices for controlling the gas flow through said conduits, and a single operating member being movable in one direction to first permit the flow of fuel gas and thereafter to permit the flow of oxygen, and being movable in the reverse direction to first shut off the flow of fuel gas and thereafter to shut off the flow of oxygen.

15. In a torch, the combination with a fuel gas conduit and an oxygen conduit, of independently adjustable devices for controlling the flow of gas through said conduits, and a single operating member for both of said devices; said member being adjustable to vary the flow of gas through one of said conduits either while gas is flowing through the other conduit or while the gas flow through such other conduit is interrupted.

16. In a torch, the combination with a fuel gas conduit and an oxygen conduit, of separately adjustable devices for controlling the gas flow through said conduits, and a single adjustable member adapted to operate said devices to: first, permit the flow of fuel gas;

secondly, permit the flow of oxygen; thirdly, vary the flow of fuel gas; fourthly, shut off the fuel gas; and fifthly, shut off the oxygen.

17. In a torch, the combination with a fuel gas conduit and an oxygen conduit, of separately adjustable devices for controlling the gas flow through said conduits, and a single operating member for both of said devices; said member being adjustable to vary the flow of gas through one of said conduits while the flow of gas through the other of the conduits is maintained uniform or to concomitantly vary the flow of gas through both of said conduits.

In testimony whereof, I affix my signature.
GERALD G. SPENCER.

In testimony whereof, I affix my signature.
CHESTER MOTT.

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