

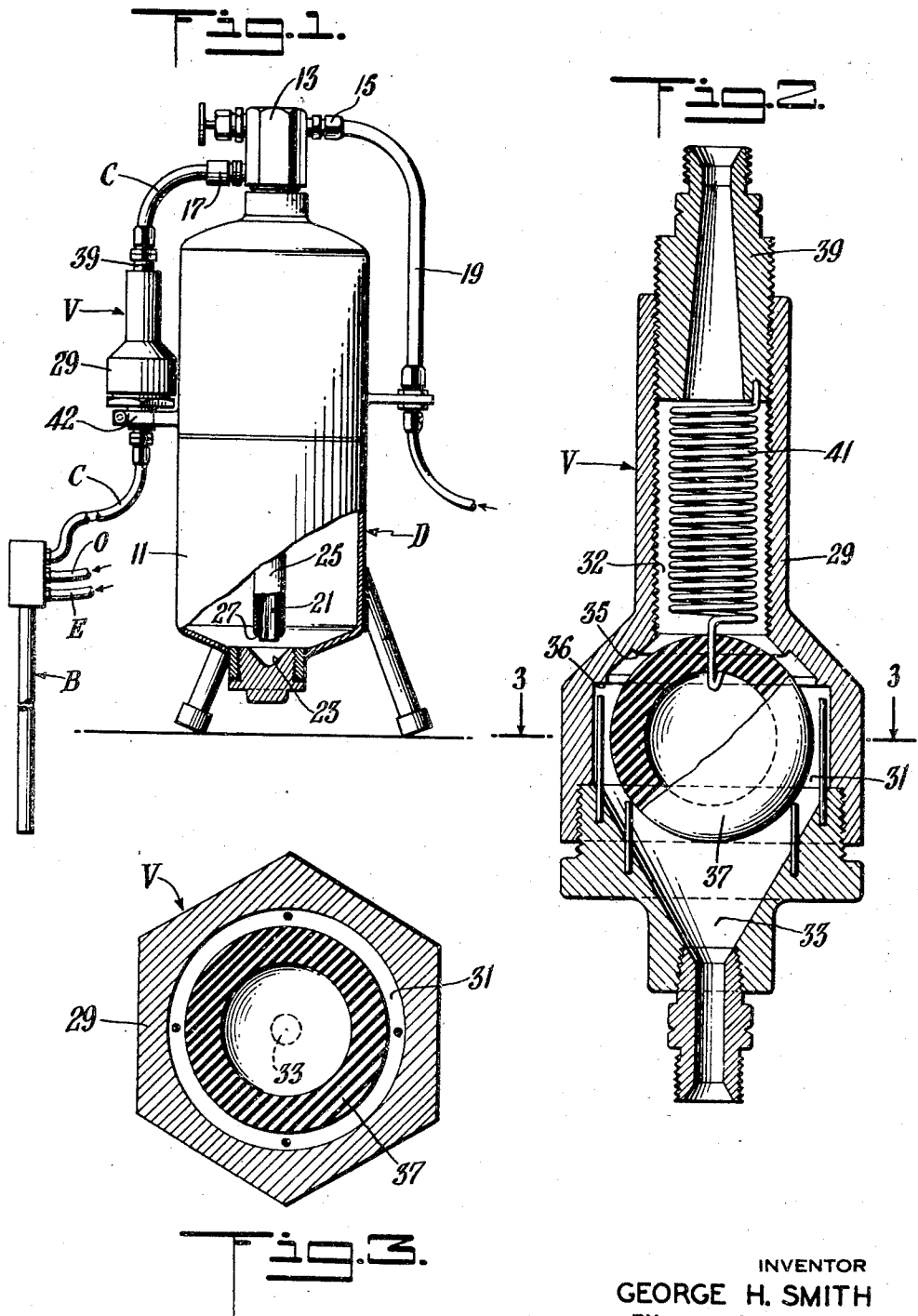
April 1, 1947.

G. H. SMITH

2,418,200

MINERAL WORKING APPARATUS

Original Filed July 20, 1939



INVENTOR
GEORGE H. SMITH
BY *E. H. Meadows*
ATTORNEY

UNITED STATES PATENT OFFICE

2,418,200

MINERAL WORKING APPARATUS

George H. Smith, Kenmore, N. Y., assignor to
The Linde Air Products Company, a corporation of Ohio

Original application July 20, 1939, Serial No. 285,557, now Patent No. 2,286,841, dated June 16, 1942. Divided and this application June 13, 1942, Serial No. 446,952

2 Claims. (Cl. 158—27.4)

1

This invention relates to thermal mineral working apparatus, and more particularly to such apparatus which is adequately protected against the hazards incident to the reverse flow of gas, or gas-powder mixtures. This application is a division of my application Serial No. 285,557, filed July 20, 1939, now Patent 2,286,841, issued June 16, 1942.

When thermally piercing holes in rock with a blowtorch it is often necessary to conduct a suspension of finely-divided solid material in a gas to the blowtorch, for example a suspension of aluminum in a fuel gas such as acetylene. It is usual to provide a closed powder dispenser in which the gas picks up powder for conduction to the blowtorch through a hose or other conduit. Upon the development of back pressure in such apparatus quantities of oxygen may be forced back through the torch with the powder-laden gas. Such reverse flow may occur as the result of the plugging of a hole being pierced which results in an increase in the gas pressure in the hole to a value exceeding the pressure of the powder-laden gas in its conduit.

A reverse flow of the powder-laden gas to the powder dispenser may cause powder to fall out of suspension and clog the passages of the dispenser. Moreover, if the oxygen reaches the powder dispenser, an explosive gas mixture may be formed in the powder container, and a dangerous explosion may follow. Of course, if the powder dispenser is arranged in the oxygen conduit, the problem then is to prevent the fuel gas from penetrating back through the oxygen conduit of the dispenser.

According to the present invention rock piercing and cutting apparatus is provided which is protected against the undesirable effects resulting from the reverse flow of gas in a conduit leading to a rock piercing blowpipe, particularly when the gas carries in suspension a finely-divided combustible powder which is supplied from a closed powder dispensing device. This result is achieved by providing means for interrupting the back flow of gas and powder before they reach the closed powder dispenser, but so constructed and arranged as to permit substantially unrestricted flow of powder-laden gas from the powder dispensing device through the conduit to the blowpipe.

Among the more important objects of the invention are: to provide novel rock piercing and cutting apparatus, including a gas operated powder dispenser, which is adequately protected against the hazards ordinarily incident to the

2

back flow of gas; and the provision of such apparatus wherein the back flow of gas from a blowtorch to a powder dispenser will be arrested before it reaches the powder dispenser.

The above and other objects will be readily apparent from the following description taken in connection with the accompanying drawings in which—

Fig. 1 is an elevational view of rock piercing and cutting apparatus according to my invention, parts being shown in section;

Fig. 2 is an enlarged vertical mid-sectional view, partly in elevation, of a part of the apparatus shown in Fig. 1; and

Fig. 3 is a cross sectional view taken along the line 3—3 of Fig. 2, looking in the direction of the arrows.

Fig. 1 shows a powder dispenser D constituting mixing means adapted to produce and dispense a gas-powder mixture before the gas is supplied to a blowtorch, the gas usually being a fuel gas such as acetylene which is discharged from dispenser D into a single conduit C having a vertical portion in which is interposed a device such as a check valve V for arresting back flow. The conduit C is connected at the discharge end thereof to a rock piercing blowtorch B separate from dispenser D, which also is connected to an oxygen supply conduit O, and a supply conduit E for a fluid such as water or compressed air. The blowtorch B has discharging means adapted to discharge powder-laden fuel gas and combustion supporting gas such as oxygen to provide a flame for piercing or cutting a solid mineral composition, as well as a plurality of air or water streams for the ejection of detritus. Various types of such blowpipes are disclosed and claimed in Patents 2,286,191 of June 16, 1942, issued to R. B. Aitchison, C. J. Burch, and C. W. Swartout; and 2,286,192, issued June 16, 1942, to R. B. Aitchison, G. H. Smith, and C. W. Swartout.

The powder dispenser D is fully described and claimed in Patent 2,286,776, issued June 16, 1942, to V. C. Williams et al. Briefly, however, it comprises a closed container 11 adapted to contain a supply of powdered metal or other material to be dispensed. A valve block 13 at the top of the container has an inlet 15 for gas arranged for connection to a source of gas separate from the blow torch, and an outlet 17 for the powder-laden gas. The inlet 15 is supplied with gas, such as acetylene, through a hose or conduit 19; and the outlet 17 is connected to the conduit C which constitutes the sole means establishing communication between the dispenser and blowtorch for

supplying the powder-laden gas to the blowtorch B.

A tube 21, supplied with gas from the inlet 15, extends downwardly from the valve block 13 and terminates at its lower end, a short distance above a hollow conical deflector 23 at the bottom of the container 11. The deflector 23 is adapted to deflect upwardly therefrom a stream of gas discharged from the tube 21. A second tube 25, which also extends downwardly from the valve block 13, surrounds the tube 21 in spaced relation thereto and terminates at its lower end, a short distance above the lower end of the central tube 21. An annular passage 27 thus is provided between the tubes 21 and 25 for receiving the gas deflected from the deflector 23, together with the powder picked up from the supply in the container 11, and for conducting the powder-laden gas upwardly to the outlet 17.

As shown in Figs. 2 and 3, one form of check valve V suitable for the apparatus of the invention comprises a hollow tubular housing 29 having a chamber 31 therein, a substantially vertical inlet passage 32 opening into the top of the chamber 31, and an outlet passage 33 axially aligned with the inlet passage 32 and leading off of the bottom of the chamber 31. An annular downwardly facing primary valve seat 35 at the top of the chamber 31 surrounds the lower end of inlet passage 32; and an annular downwardly facing secondary valve seat 36 of greater diameter than the seat 35 is arranged a short distance below the primary seat and coaxial therewith.

A resilient deformable rubber ball valve 37 is disposed in the chamber 31 and suspended below the seats 35 and 36 from an adaptor 39 by a coil spring 41 in the inlet passage 32. The valve 37 is automatically operable to move vertically upwardly into contact initially with the primary seat 35 when actuated by back pressure in the chamber 31, and is deformable by back-pressure thereafter to bring a new portion of its surface into contact with secondary seat 36. This construction permits powder to fall away from the secondary seat 36 after the initial seal is formed, thus leaving a clean secondary seat which the ball valve 37 may engage to form a perfect seal closing conduit C and preventing a reverse flow of gas and powder from the blowtorch into the powder dispenser and into the source of gas.

The check valve V is mounted in vertical position on the outside of the powder dispenser by a bracket 42 projecting from the side of the container 11. It is thus made certain that the check valve is held in fixed position with the primary and secondary valve seats 35 and 36 facing downwardly above the ball valve 37 so that the valve ball seats upwardly against the valve seats when the ball closes conduit C.

A specific embodiment of the apparatus of the invention has been described by way of illustration only and not by way of limitation. It is to be understood that changes in construction and organization may be made by those skilled in the

art within the spirit of the invention as defined by the appended claims.

I claim:

1. In combination, a blowtorch having discharging means for discharging powder-laden gas; mixing means separate from said blowtorch for mixing powdered material with a gas before such gas is supplied to said blowtorch, said mixing means having a gas inlet arranged for connection to a source of gas separate from said blowtorch, and an outlet for powder-laden gas; a single conduit constituting the sole means establishing communication between said mixing means and said blowtorch and connected to said outlet, said conduit having a vertical portion; and a device within said conduit constructed and arranged to permit substantially unrestricted flow of such powder-laden gas from within said mixing means through said conduit to the discharging means of said blowtorch but automatically operable by back pressure of gas in said conduit to close said conduit and prevent a reverse flow of gas and powder from said blowtorch into said mixing means and into said source of gas, said device including downwardly facing seat means within such vertical portion, and a valve member movable vertically within such vertical portion into contact with said seat means, so that said valve member seats upwardly against said seat means when said valve member closes said conduit.

2. In thermal mineral working apparatus, in combination, a blowtorch for discharging a fuel gas and a combustion-supporting gas, and adapted to provide a flame for working a solid mineral composition; a powder dispenser having both a gas inlet and an outlet for powder-laden gas; a conduit establishing communication between said outlet and said blowtorch; and a check valve arranged in said conduit for arresting a reverse flow of gas from said blowtorch into said container, said check valve permitting substantially unrestricted flow of powder-laden gas through said conduit and comprising valve seat means and a valve member movable toward and away from said valve seat means, said check valve being secured to the powder dispenser in a substantially vertical position with said valve seat means facing downwardly so that said valve member seats upwardly thereupon when closing.

GEORGE H. SMITH.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,303,123	Smith et al.	May 6, 1919
1,930,107	Rang	Oct. 10, 1933
1,228,038	Marlin	May 29, 1917
2,003,167	Alexander	May 28, 1935
2,327,482	Aitchison et al.	Aug. 24, 1943
968,350	Harrison	Aug. 23, 1910
1,178,551	Stolle et al.	Apr. 11, 1916