

Sept. 20, 1960

B. H. ACOMB

2,953,411

APPARATUS FOR GAS BORNE POWDER DISTRIBUTION

Filed Sept. 4, 1956

Fig. 1.

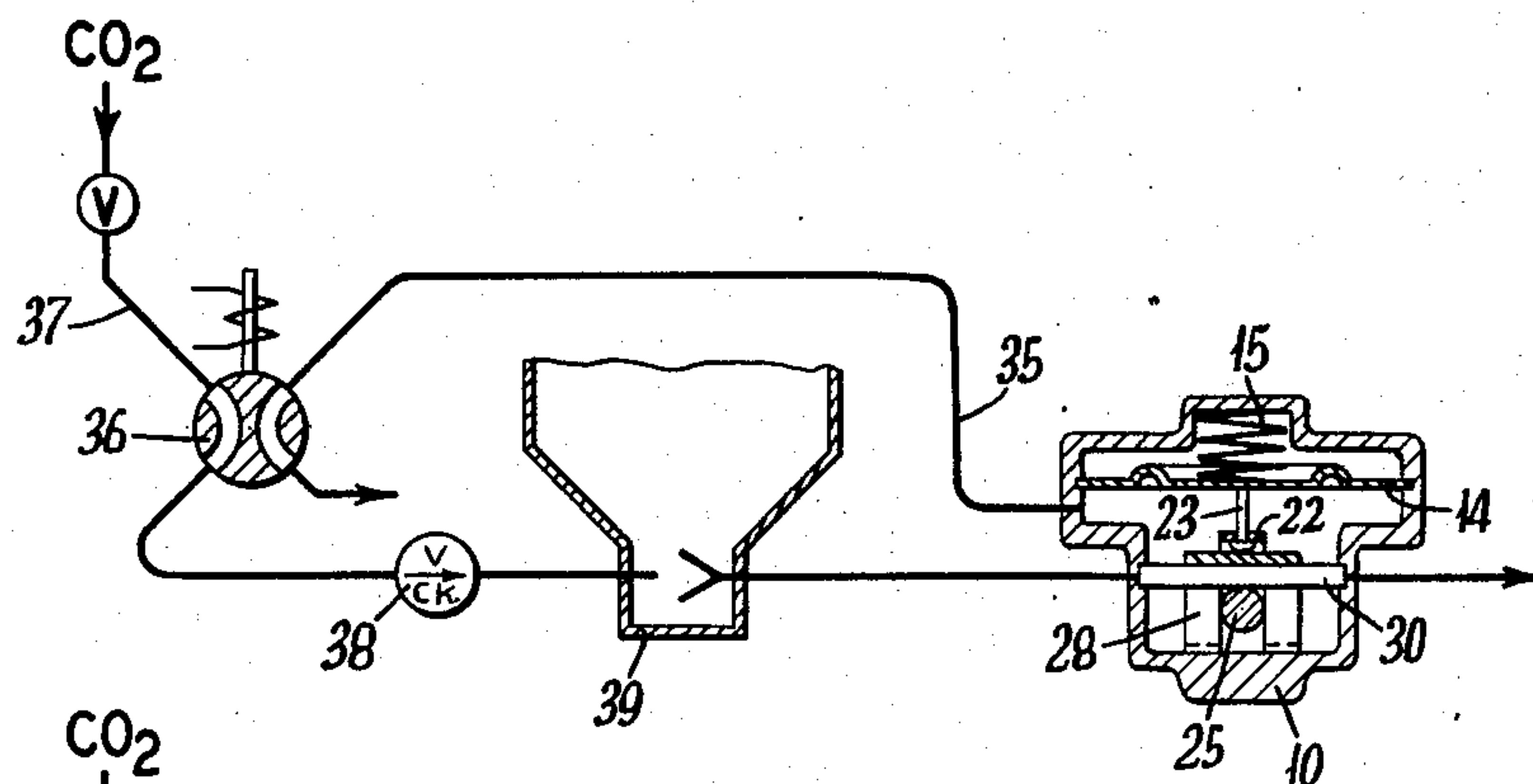
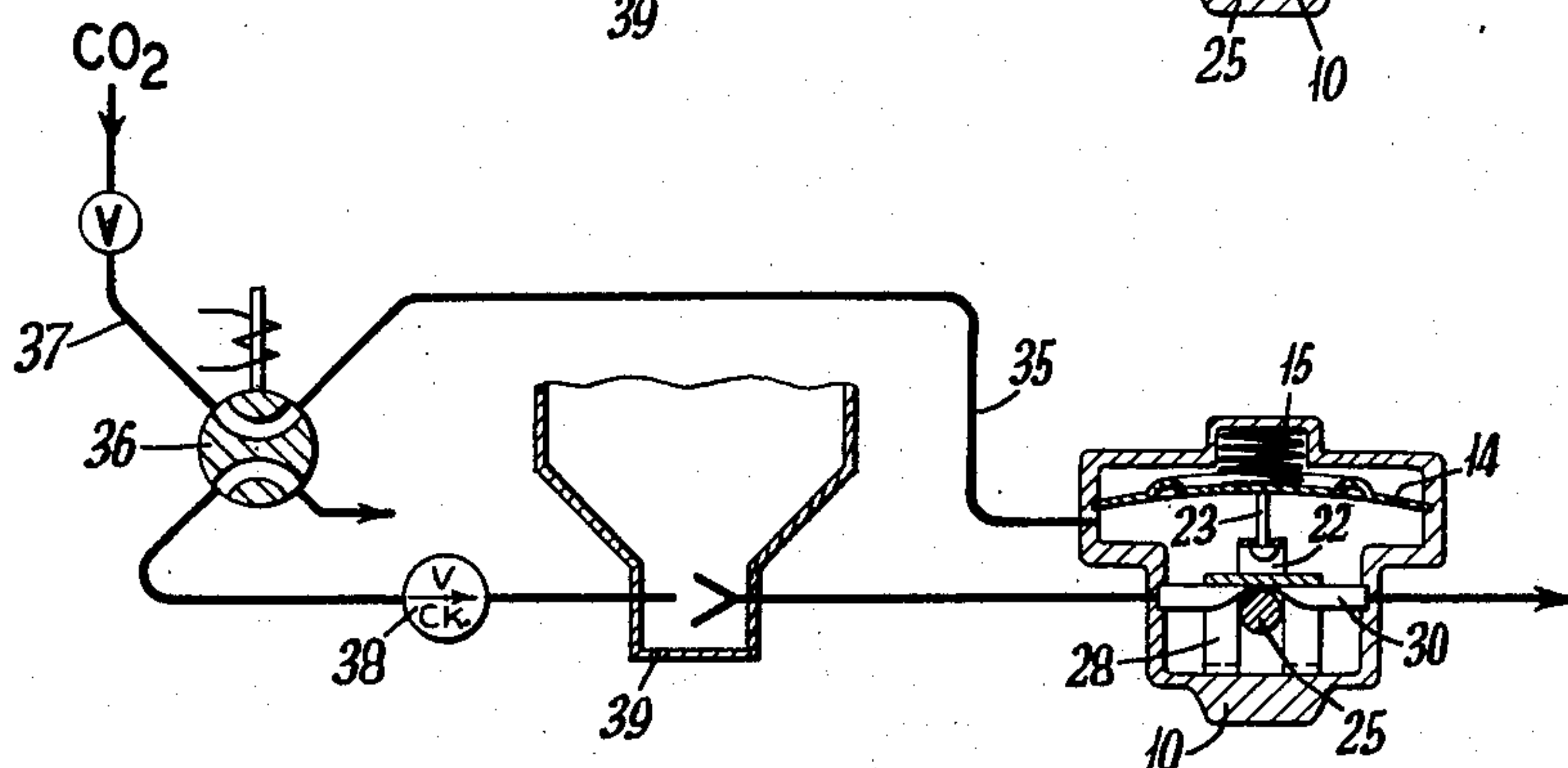


Fig. 2.



INVENTOR.
BYRON H. ACOMB

BY
Richard S. Shreve, Jr.

ATTORNEY

1

2,953,411

APPARATUS FOR GAS BORNE POWDER DISTRIBUTION

Byron H. Acomb, Watchung, N.J., assignor to Union Carbide Corporation, a corporation of New York

Filed Sept. 4, 1956, Ser. No. 607,656

4 Claims. (Cl. 302-17)

This invention relates to apparatus for gas borne powder distribution employing pinch valves, and more particularly employing diaphragm operated valves of this character for turning on and off the flow of powder-laden gas used, for example, in electric welding and in the thermochemical removal or deposition of metal.

The main objects of the present invention are to provide apparatus employing a valve of this character which can be operated by the conveying gas, thereby eliminating the necessity of a separate gas source, and to maintain a pressure differential between the chamber and conveying tube so that the tube can withstand pressures in excess of the bursting limit of the material thereof.

Other objects are to provide apparatus employing a valve of this character to turn on the flow of carrier gas before turning on the flow of powder, and for turning off the flow of powder while continuing the flow of carrier gas. According to the present invention, a stream of gas is passed along a first circumferentially confined path, powder is aspirated into said path to form a gas borne powder stream which is passed along a flexibly confined further path. The stream of compressed gas is diverted from ahead of said aspiration step to a confined zone surrounding said confined path, and the pressure of said diverted compressed gas in said confined zone is utilized to pinch said flexibly confined path and cut off the flow of said gas borne powder therethrough.

In the drawings:

Fig. 1 is a diagram or flow sheet for the method of powder distribution according to the present invention, showing the injector and by-pass, with the pinch valve open; and

Fig. 2 is a similar diagram with the pinch valve closed.

As shown in the drawing, a stream of compressed gas is passed along a first circumferentially confined path 37. Powder is aspirated into this path at 39 to form a gas borne powder stream. The gas borne powder stream is passed along a flexibly circumferentially confined further path 30. The stream of compressed gas is diverted at 36 from said first path 37 ahead of the aspiration step at 39 to a confined zone 10 surrounding the flexibly confined path 30. The pressure of the diverted gas is utilized in the confined zone 10 to pinch the path 30 and cut off the flow of gas borne powder therethrough.

The body 10 is provided with a by-pass 35 for pressurizing the chamber under the diaphragm 14 and surrounding the pinch tube 30. As shown in Figs. 1 and 2 the by-pass 35 is connected to a two-way valve 36, preferably solenoid operated. The valve 36 is connected to a supply line 37, and through a check valve 38 and injector 39 to the pinch tube 30.

When the pinch valve is in its normally open position shown in Fig. 1, the loading of the spring 15 on the diaphragm 14 depresses the pinching arm 22 so that the pinch tube 30 is wide open. The carrier gas from the supply line 37 passes through the valve 36 and check valve 38 to the injector 39 where it picks up the powder and carries it through the open pinch tube 30 for delivery and use.

2

To close off the pinch valve 30, the valve 36 is turned to the position shown in Fig. 2. The carrier gas from the supply 37 passes through the valve 36 and 35 to the pinch valve chamber in the body 10. The gas pressure against the diaphragm 14 is sufficient to overcome the loading of the spring 15 and the pinching arm is raised, thus compressing the pinch tube 30 between the roller 25 and the yoke 28.

What is claimed is:

1. Apparatus for gas borne powder distribution which comprises a supply conduit for a stream of compressed gas, a two-way valve in said conduit operable in one position for passing said stream through an injector to entrain powder therein, an outlet conduit from said injector for passing said gas borne powder stream through a pinch tube, a diaphragm having means connected thereto for pinching said tube, a second conduit forming a by-pass from said two-way valve to said diaphragm, said valve being operable in a second position for cutting off said stream of compressed gas to prevent it going through said injector, but instead directing it through said second conduit to said diaphragm to cause said pinching means connected thereto to pinch said tube and cut off the flow of said gas borne powder.

2. Apparatus for gas borne powder distribution which comprises means for passing carrier gas from a supply line to a powder injector to entrain powder therein, means for passing the gas borne powder stream through a pinch tube to a delivery line, means for by-passing carrier gas from said supply line ahead of said injector to a pressure chamber, and means for pinching said tube in response to pressure in said chamber to decrease the flow in said gas borne powder delivery line.

3. Apparatus for gas-borne powder distribution which comprises means for passing a non-powder laden stream of compressed gas from a supply line along a predetermined path and through an injector to entrain powder therein, means for passing the gas-borne powder stream from said injector through the tube of a diaphragm-operated pinch valve, means for discontinuing the flow of said non-powder laden compressed gas from said supply line to said injector at a point ahead of said injector before said compressed gas can become powder entrained, means for simultaneously diverting said stream of non-powder laden compressed gas from said supply line along a different path away from said injector, and means for re-continuing said stream of non-powder entrained gas from said supply line along said different path and directing it to the diaphragm of said pinch valve to cut off the flow of said gas-borne powder.

4. Apparatus for gas-borne powder distribution which comprises means for passing carrier gas from a supply line to a powder injector to entrain powder therein, means for passing said carrier gas from said injector through a pinch tube to a delivery line, means for by-passing carrier gas from one of said lines to a pressure chamber, and means for pinching said tube in response to pressure in said chamber to decrease the flow in said delivery line.

References Cited in the file of this patent

UNITED STATES PATENTS

1,123,155	Woodley	Dec. 29, 1914
1,223,586	Johnson	Apr. 24, 1917
2,183,835	Foulke	Dec. 19, 1939
2,588,212	Custer	Mar. 4, 1952
2,590,215	Sausa	Mar. 25, 1952
2,590,396	Garretson	Mar. 25, 1952
2,649,340	Weinrich	Aug. 18, 1953
2,816,803	Clark	Dec. 17, 1957

FOREIGN PATENTS

208,807	Switzerland	1940
---------	-------------	------