

Oct. 20, 1936.

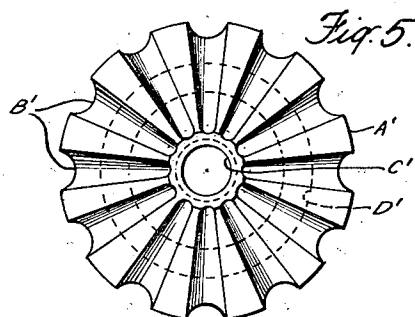
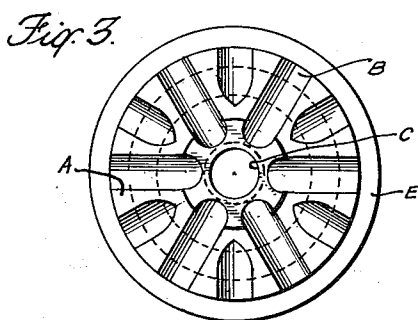
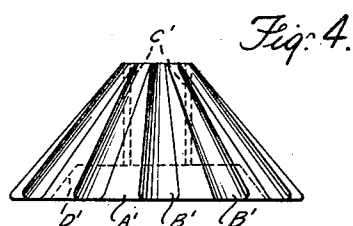
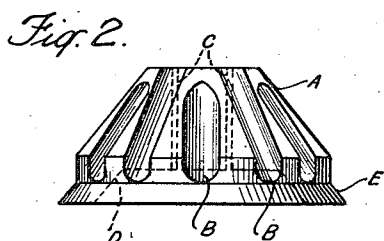
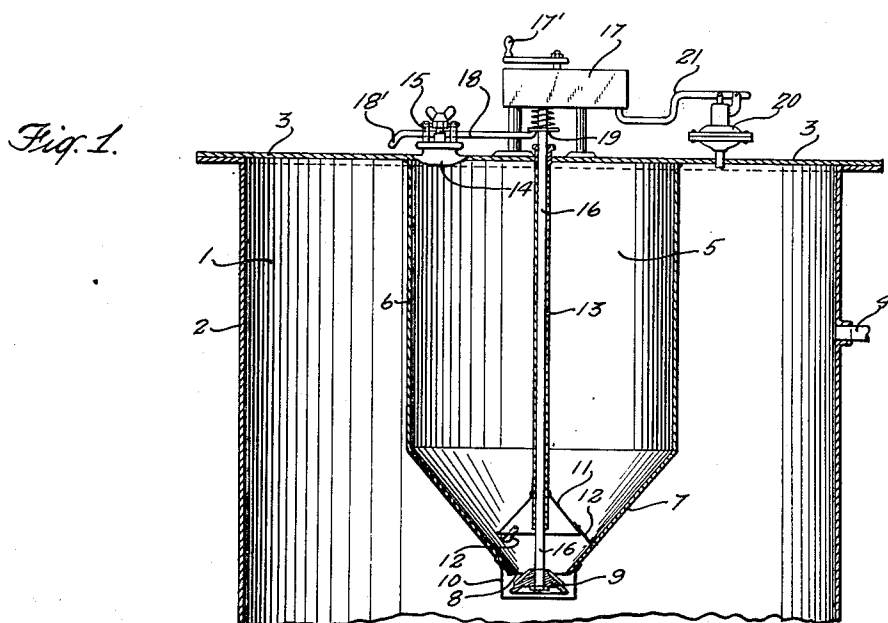
M. P. DE MOTTE

2,057,768

FEED VALVE

Filed Nov. 1, 1930

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

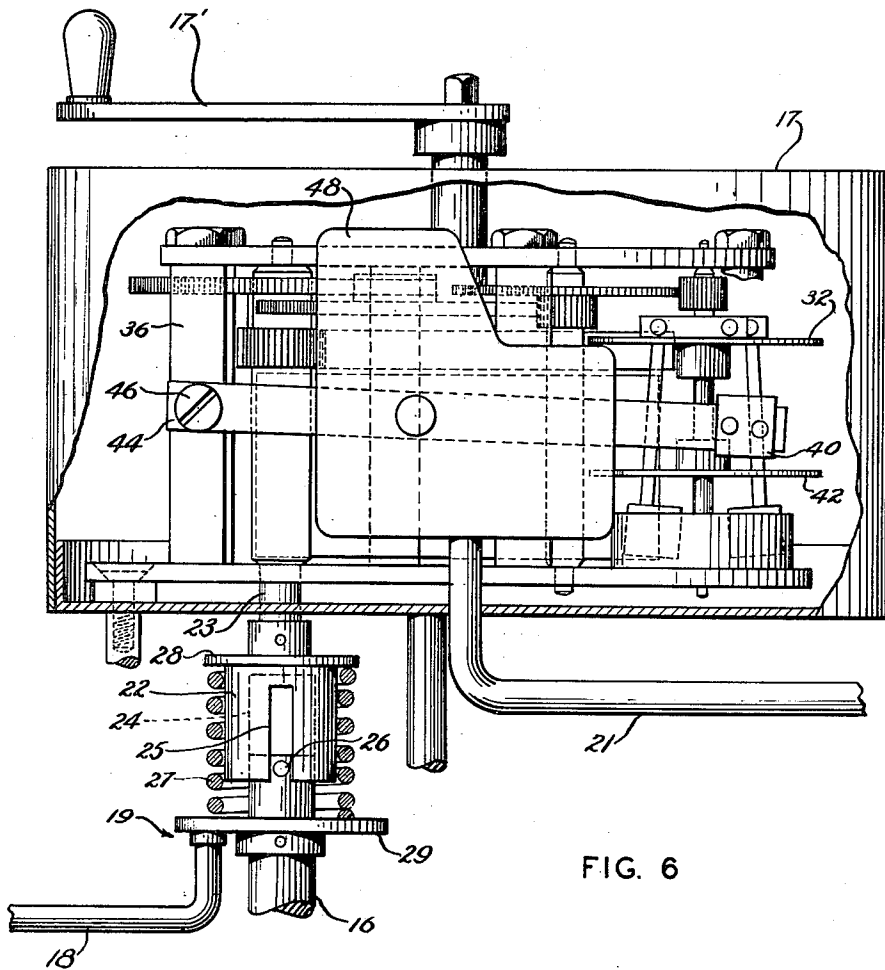


FIG. 6

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UNITED STATES PATENT OFFICE

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FEED VALVE

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8 Claims. (Cl. 48—53)

This invention relates to valves for feeding granular or pulverulent material from a hopper or other container, and more particularly to an improved valve and mechanism especially adapted for use in acetylene generators for feeding granular calcium carbide from a hopper into water to generate acetylene.

The smooth conical surface of the type of valve heretofore generally used for feeding calcium carbide in acetylene generators tends to cause an irregular feeding of carbide when the valve is rotated, which results in objectionable fluctuations in the pressure of the generated gas. At times the smooth valve surface, when the valve is being rotated and should feed carbide, merely slides in contact with the lower part of the carbide mass in the hopper and tends to pack the carbide adjacent the hopper outlet instead of properly feeding it into the water. As a result there is a decrease in gas pressure until the valve revolves sufficiently to release the carbide bridged across the valve opening and resume the feeding of carbide into the generating chamber, which sometimes results in overfeeding, causing excessive production of gas and an abnormal pressure; whereupon the feed valve will cease to rotate until the pressure is again reduced to a point where additional carbide should be fed into the generating chamber. Since numerous valve rotations are ineffective to feed carbide, the motor that rotates the valve runs down rapidly and must be rewound or reset too often, especially when the generator is called upon to deliver a considerably increased volume of gas.

Therefore, the principal object of this invention is to provide a feed valve capable of maintaining continuous and positive agitation of the material in the vicinity of the outlet with which it cooperates, and which is capable of securely closing such an outlet. Accordingly, in an acetylene generator, the calcium carbide may be fed uniformly and at an increased rate, with substantial elimination of undesirable pressure fluctuations between feeding intervals, as well as lost rotation such as is commonly encountered with the simple conical valves now in general use. In addition, this improved valve, by securely closing the outlet, prevents water from splashing into the carbide hopper when the generator is being transported. Furthermore, by insuring positive agitation of the carbide and eliminating lost rotation, the valve of this invention lessens the load upon the actuating means employed for rotation.

These and other objects and the novel features of this invention will be apparent from the

following description taken with the drawings, in which:

Fig. 1 is a vertical section through the upper portion of an acetylene generator embodying a feed valve constructed in accordance with this invention;

Fig. 2 is a side view and Fig. 3 is a plan view of a preferred form of feed valve embodying this invention;

Figs. 4 and 5 are side and top plan views, respectively, of another embodiment of this invention; and

Fig. 6 is a front view of the motor shown in Fig. 1, with portions broken away to show the interior structure and the connection between the motor and other portions of the generator.

Referring to the drawings, Fig. 1 shows the upper portion of the tank 1 of a typical acetylene generator having a cylindrical wall 2, a top 3, and an outlet 4 for the gas generated therein. Within the tank 1 suspended from the top 3 is a carbide hopper 5, having a cylindrical wall 6, a conical bottom 7 and a central circular outlet opening 8, with which the feed valve 9 constructed in accordance with this invention cooperates. Depending from the conical bottom 7 and surrounding the opening 8, is a circular flange 10 which protects the outlet 8 and the carbide adjacent thereto from moisture. Within the hopper 5 immediately above and concentric with the opening 8, is a conical baffle 11 suitably supported by brackets 12 and by a tube 13 extending vertically through the hopper 5 from the baffle 11 to the top 3. The top 3 has an opening 14, provided with a suitable closure 15, whereby calcium carbide may be charged into the hopper 5.

The feed valve 9 is mounted on a rotatable shaft 16 extending axially through the hopper 5 within the tube 13. The shaft 16 is connected to suitable actuating means, such as a spring motor, water motor, weight motor or the equivalent, to cause its rotation. The drawings illustrate a spring motor 17 and control mechanism, which may be of the type disclosed in Patent No. 1,860,225 issued May 24, 1932 in the name of R. A. Boley. The motor or actuating means 17 may be manually rewound by means of a crank 17' and may be set in motion by a manually operable control lever 18 which releases a spring pressed friction brake 19 on the shaft 16. The control handle 18' is supported through the closure means 15 of the carbide opening 14, and is adapted to be locked in an "off" position when the generator is being transported, and is further secured in an "off" position when the closure means 15 is opened

for the purpose of charging carbide through the opening 14. Operation of the brake 19 also acts to impart vertical movement to the shaft 16 and thus raise and lower the feed valve 9 in the opening 8.

When the actuating means 17 is set in motion, the speed of rotation of the shaft 16 and valve 9 is governed by the pressure responsive means 20 which communicates with the interior of the tank 1 and is controlled by the gas pressure therein. The pressure responsive means 20 is operatively connected to the actuating means 17 by a lever linkage 21. The motor 17 may be of the spring operated type essentially the same as that shown in the patent to Boley already identified. The telescoping drive connection between the motor 17 and the shaft 16 may comprise a suitable coupling 22 rigidly secured to the lower end of a suitable shaft 23 of the motor. This coupling may be provided with a suitable supporting recess 24 in which the upper end of shaft 16 is movably disposed, and also with a suitable driving slot 25 in which a cooperating transverse driving pin 26 in the upper end of shaft 16 is disposed, so that the driven shaft 16 may be moved vertically with respect to the coupling 22 and motor shaft 23. To resiliently hold the shaft 16 in its lower position in which the carbide valve is open, a suitable spring 27 may be secured in partially compressed condition between a collar 28 integral with the coupling 22 above the coupling joint and a similar collar 29 rigidly secured to shaft 16 below the coupling joint.

The position of shaft 16 and also the operation of the motor 17 may be controlled by the pressure of the manually operable control lever 18 upon the lower surface of the collar 29. The pressure exerted by the arm 18 may be sufficient to raise the shaft 16 and close the carbide valve and also stop the rotation of the motor.

The pressure responsive means 20 may also control the operation of the motor 17 by moving a friction element 40 with respect to a disc 42 rigidly secured to the centrifugal governor shaft of the motor. The friction element 40 may be carried by a suitable arm 44 which may be pivoted upon a suitable bearing 46 secured to the side of post 36. The arm 44 may be provided with a suitable weight 48 to move the friction element 40 into engagement with disc 42 and provide sufficient contact pressure to stop the motor. The position of the friction element 40 with respect to the disc 42 may be controlled by the lever 21 which passes upwardly through suitable openings in the outer casing into operative engagement with the weight 48, so that an upward movement of the arm 21 raises the weight 48 and moves the friction element 40 out of engagement with disc 42, and a downward movement of the arm 21 allows the weight 48 to move the friction element 40 into engagement with disc 42.

The valve 9, which is preferably formed of aluminum, comprises a conical or frusto-conical body A having a plurality of channels or flutes B in its outer surface. These channels are separate from one another, extend lengthwise of the surface, and preferably parallel to surface elements of the conical body A. As shown, in Figs. 2 and 3, the channels may be concave in transverse section, and alternate channels may be longer than the others and extend to the top of the valve. The body A has a central threaded bore C to engage a correspondingly threaded portion of the shaft 16. In the base of the conical body A is

a recess D to accommodate auxiliary securing means, such as a cotter pin or lock nut.

At the periphery of the lower or larger diameter of the body A there may be provided a smooth conical seating surface E, of slightly larger diameter than the fluted portion, to permit the valve 9 to snugly seat itself against the mouth of the hopper outlet 3, thus securely closing the hopper 5 when the shaft 16 is raised and preventing the entry of water into the hopper when the generator is moved and the water therein is splashed about.

The form of feed valve shown in Figs. 2 and 3 is generally preferred, but in some instances the seating surface E may be omitted and all channels B' may extend lengthwise of the conical outer surface from its larger to its smaller end, as in the valve A' shown in Figs. 4 and 5. The valve A' has a threaded bore C' and a recess D' and is otherwise identical, in its application and use, to the one shown in Figs. 1, 2 and 3.

In operation, the control lever 18 is turned by its handle 18' to release the brake 19, which in turn lowers the valve 9 and sets the actuating means in motion, causing the shaft 16 to rotate the feed valve 9. The calcium carbide to be fed out of the hopper 5 descends around the baffle 11, which relieves the valve 9 from supporting the weight of a large mass of material. The fluted surface of the feed valve 9 serves to constantly agitate the carbide, and cause it to be fed in a uniform stream into the water in the lower portion of the generator tank (not shown). The rate at which the carbide is fed from the hopper 5 depends, initially on the distance the valve 9 is lowered away from the hopper outlet 3, thereafter it is dependent upon the rate of rotation of the shaft 16 and valve 9 which is governed by the pressure of the gas generated acting upon the pressure responsive means 20, which, by means of the lever linkage 21, exerts a regulatory force upon the actuating means 17. The gas within the tank 1, having a substantially constant pressure, is distributed to the point of consumption by suitable means connected to the gas outlet 4.

The advantages of the improved feed valve will be evident from the foregoing description. It will be readily seen that any packing of carbide at the hopper outlet is eliminated, since the edges of the flutes will scrape against the carbide and loosen it and, since carbide will flow down each of the channels, it will be distributed more evenly over the surface of the water as the valve rotates. Hence, more uniform feeding of material at an increased rate is made possible, gas may be generated at an increased rate with much less fluctuation in pressure, and relatively less rotation of the valve and restoring of its actuating means is required to maintain constant and positive feeding of the carbide.

While the improved feed valve has been disclosed in conjunction with an acetylene generator, it will be understood that the invention is applicable to other devices, and that various changes may be made in the details of construction as shown without departing from the spirit of the invention.

I claim:

1. Mechanism for feeding granular material, comprising a hopper adapted to contain the said material and having an outlet in its lower end, a conical closure member for the said outlet, the said closure member being mounted for vertical movement and for rotation and having radial

grooves in its conical surface, means for moving the said closure member to close the said outlet and, alternatively, to open it, and means for rotating the said closure member, only when the closure member is in open position.

2. Mechanism for maintaining a constant feed of granular material, comprising a hopper adapted to contain the said material and having an outlet in its lower end, a conical closure member for the said outlet, the said closure member being mounted for vertical movement and for rotation and having radial grooves in its conical surface, means for moving the said closure member into position to close the said outlet and, alternatively, to open it, means for rotating the said closure member only when the closure member is open, and means responsive to pressure variations at a remote point and adapted to vary the rate of rotation of the said member when the latter is thus operable.

3. Mechanism for feeding granular material, comprising a hopper adapted to contain the said material and having an outlet in its lower end, a conical closure member for the said outlet, the said closure member being mounted for vertical movement and for rotation and having radial grooves in its conical surface extending to a point near the lower peripheral margin, and having the latter marginal portion adapted to cooperate with the adjacent margins of the said outlet when the said member is in its uppermost position for providing a fluid-tight seal, means for moving the said closure member into position to close the said outlet and, alternatively, to open it, means for rotating the said closure member only when the closure member is in open position, and means responsive to pressure variations at a remote point and adapted to vary the rate of rotation of the said member when the latter is thus operable.

4. The combination of a gas-tight container, a hopper adapted to contain granular or pulverulent material and having a circular outlet communicating with said container; mechanism for controlling the feed of said material from the hopper to said container comprising a conical valve body having its conical surface facing upwardly and provided with longitudinal channels in the said surface, means for vertically adjusting said body relatively to said outlet, means for

rotating said body about its vertical axis in at least one open position of vertical adjustment, and means responsive to a condition within said container for controlling the last-named means.

5. Carbide feeding mechanism for an acetylene generator having a carbide hopper with an outlet at the lower end thereof; a conical carbide valve provided with radial grooves in its conical surface and operably mounted for both vertical and rotary movement with respect to said outlet; means for rotating said valve at a variable speed according to the pressure in said generator when said valve is open; and manually operable means for simultaneously closing said valve and rendering said rotating means inoperative.

6. Carbide feeding mechanism for an acetylene generator having a carbide hopper with an outlet at the lower end thereof; a conical carbide valve provided with radial grooves in the conical surface thereof and operably mounted for both vertical and rotary movement with respect to said outlet; means for rotating said valve at a variable speed according to the pressure within said generator while said valve is open; a brake in operative relation with said valve for rendering said valve rotating means inoperative; and manually operable means for closing said valve and at the same time operating said brake to stop the rotary movement of said valve.

7. Mechanism for feeding granular material comprising a hopper to contain said material and having a circular outlet at its lower end, a shaft extending through said outlet and being mounted for rotation and for longitudinal movement, a conical closure member for said outlet carried by said shaft and moving therewith, means for rotating said shaft, a friction brake on said shaft, and movable control means cooperating with said brake to decrease the speed of said rotation upon initial movements of said control means and to move said shaft and said closure member to close said outlet upon extreme movement of said control means.

8. A device as claimed in claim 7, in which said conical closure member is provided with a smooth marginal portion for engaging said outlet and radial grooves in its conical surface extending towards said marginal portion.

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