Oct. 1, 1940. F. L. BALKWILL 2,216,106

GRAPHITE FEEDER

Filed July 1, 1939

Fig. 1

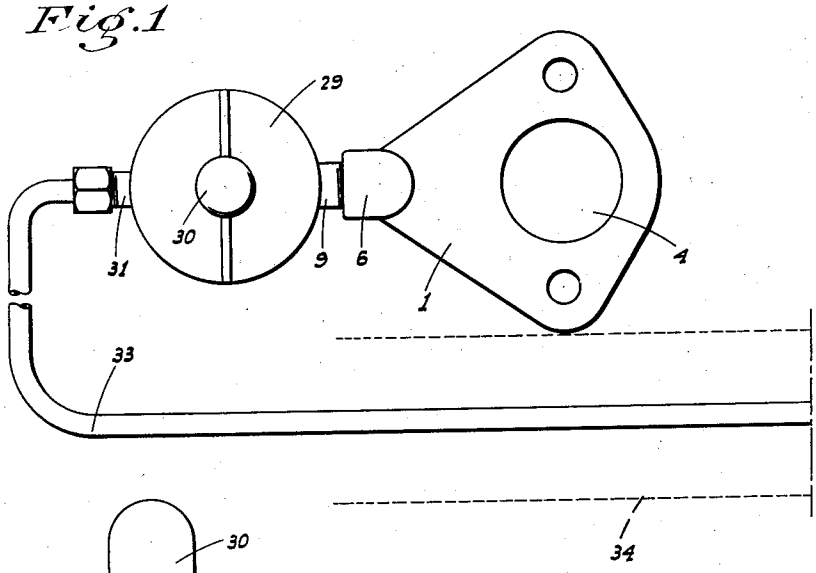


Fig. 2

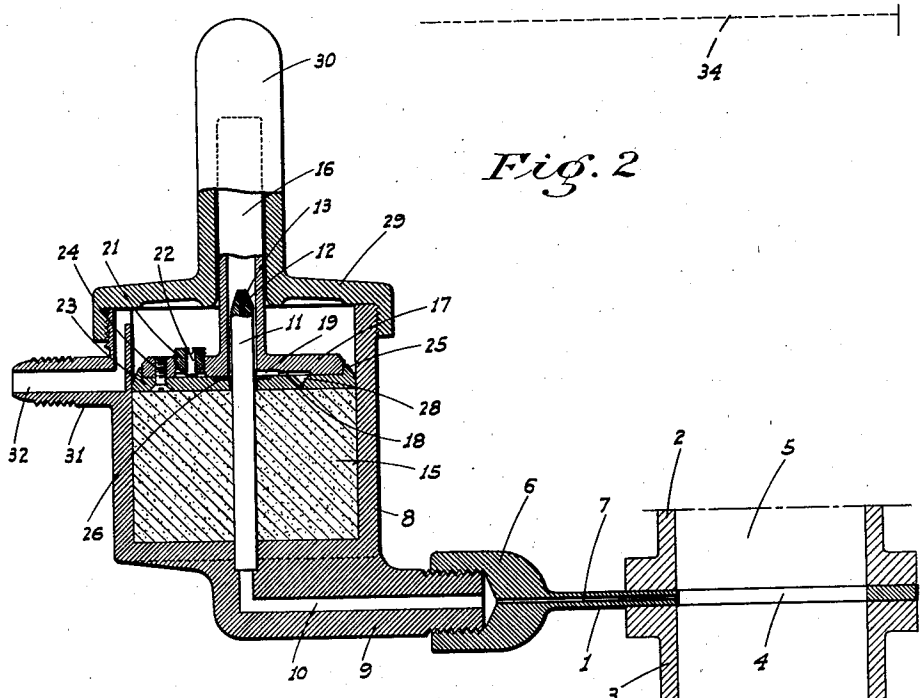


Fig. 3

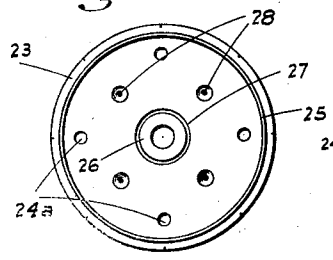
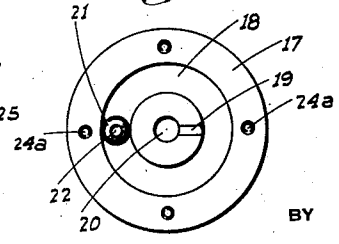


Fig. 4



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GRAPHITE FEEDER

Frank L. Balkwill, Stockton, Calif.

Application July 1, 1939, Serial No. 282,450

11 Claims. (Cl. 123—196)

This invention relates in general to a dry graphite feeder, and in particular the invention is directed to, and it is my principal object to provide, a dry graphite feeder especially adapted for use in connection with internal combustion engines, compressors, and the like; the dry graphite being fed from a source of supply by means of the suction created in the intake manifold of the machine.

A further object of the invention is to provide a dry graphite feeder, for the purpose described, which includes novel mechanism to control the amount of graphite fed from the supply bowl or receptacle, and to assure that such feed is constant at all times.

A further object of the invention is to produce a simple and inexpensive device and yet one which will be exceedingly effective for the purpose for which it is designed.

These objects I accomplish by means of such structure and relative arrangement of parts as will fully appear by a perusal of the following specification and claims.

In the drawing similar characters of reference indicate corresponding parts in the several views:

Figure 1 is a top plan view of the device.

Figure 2 is an enlarged sectional elevation of the device.

Figure 3 is a plan view of the inner face of the removable bottom disc of the follower.

Figure 4 is a bottom plan view of the follower with the bottom disc removed.

Referring now more particularly to the characters of reference on the drawing, the device comprises an adapter plate 1 arranged to be secured between adjacent ends of an engine manifold 2 and carburetor 3; such plate having an orifice 4 of the same diameter as and which registers with the passage 5 through said ends of the manifold and carburetor. This adapter plate is formed at its edge with an enlarged and tapped fitting 6; there being a small diameter bore 7 between said fitting and the orifice 4.

An upstanding, initially open topped bowl or receptacle 8 is disposed adjacent the adapter plate 1 and supported by an integral horizontal boss 9 which projects outward from the bottom of the bowl, and which boss is threaded at its outer end into fitting 6. The bowl is machined internally, much the same as a cylinder is machined for the reception of a piston; the boss 9 having a passage 10 extending from its outer end into the bowl axially thereof. A relatively long upstanding jet 11 is disposed axially in the bowl and with its lower end secured in the bottom of said bowl and in communication with passage 10. The jet passage 12 is relatively small and the upper or tip end 13 of the jet is disposed in substantially the same horizontal plane as the upper edge of the bowl.

A piston or follower unit is disposed in the bowl as shown in Fig. 2 and rests atop a supply of dry powdered graphite 15 in said bowl; such follower unit comprising the following:

A vertical sleeve 16 engages about the jet 11 with a loose fit, the sleeve being substantially as long as the jet and closed at its upper end. An annular head 17 is formed integrally and radially on the lower end of the sleeve 16 and this head is of a smaller diameter than the bore of the bowl. The lower face of head 17 is formed with an annular, relatively shallow groove 18; a radial channel 19 connecting said groove and the lower open end 20 of the sleeve. A set screw 21 is threaded through head 17 from face to face and into groove 18, and such screw is bored axially to provide an air passage 22 therethrough.

A disc 23 is secured in facing engagement with the lower face of head 17 by means of machine screws 24, which extend through holes 24a. This disc engages the walls of the bowl with a close running fit, and adjacent its periphery includes an upstanding annular sealing flange 25 which engages the outer edge of head 17 with a machine fit. A washer or sealing gasket 26 engages jet 11 with a snug fit and is seated in an oversize annular recess 27 in disc 23. A series of symmetrically spaced openings 28 are formed through disc 23 and in the plane of groove 18 in head 17; such openings being of extremely small diameter at their lower end portions and thence increasing to a substantial diameter at their upper ends.

A cap 29 is removably threaded on the upper end of the bowl, and includes an upstanding axial thimble 30 into which the sleeve 16 projects with a loose fit whereby the follower unit may lower as the supply of graphite diminishes. A threaded boss 31 projects from the bowl immediately below the cap and the passage 32 in said boss leads into the chamber wall and thence upwardly to an internal opening above the head 17. A length of metal tubing 33, which serves as an air intake, is connected at one end with boss 31 and thence extends along and engages the exhaust manifold 34 in order that all air passing therethrough will be adequately dehydrated.

In operation, suction from the manifold passage 5 draws air downwardly through passage 12 in jet 11 and through passage 10 and bore 7 into orifice 4. This creates suction within sleeve 16 and which in turn produces a suction through radial channel 19 and in annular groove 18 in the head 17. When suction is created in such groove 18, powdered graphite is drawn in relatively small quantity through openings 28 into groove 18 and this graphite then passes through channel 19 up within the sleeve 16 about the jet and into the jet passage 12 whence it is carried directly into the manifold passage 5 through passage 10 and bore 7.

In order to control the amount of graphite passing from supply 15 I provide the bored set

screw 21 which may be adjusted up or down to vary the space between the inner end of such set screw and the adjacent surface of disc 23. By varying this space, the amount of air drawn into annular groove 18 from above the head 17 is regulated and this regulation effectively controls the suction at openings 28 and the amount of graphite which will be fed therethrough. The air in the bowl above the head 17 is of course supplied through boss 31 and pipe 33; such air being dehydrated as previously explained.

The structure which is the subject of this invention makes possible the effective and yet controlled feeding of dry graphite into an internal combustion engine or the like at a minimum of cost and yet with a maximum of beneficial results. The advantages of graphite in an internal combustion engine are of course well known and include smoother operation, less wear, better seal between moving parts, and increased fuel mileage.

From the foregoing description it will be readily seen that I have produced such a device as substantially fulfills the objects of the invention as set forth herein.

While this specification sets forth in detail the present and preferred construction of the device, still in practice such deviations from such detail may be resorted to as do not form a departure from the spirit of the invention, as defined by the appended claims.

Having thus described my invention, what I claim as new and useful and desire to secure by Letters Patent is:

1. A graphite feeder comprising a receptacle for a supply of graphite, said receptacle being open to the atmosphere above said supply of graphite, means forming a passage leading from the receptacle above the supply of graphite to an exterior point for connection with a source of suction, and other means, including a follower resting on top the supply of graphite, disposed in the receptacle and forming a passage between said supply of graphite and the receptacle end of the first named passage forming means.

2. A graphite feeder comprising an upstanding receptacle for a supply of graphite, said receptacle being open to the atmosphere above the supply of graphite, a jet extending upward from the bottom of the receptacle and terminating at its upper end above the supply of graphite, means forming a passage connected to and leading away from the lower end of the jet to an exterior point for connection with a source of suction whereby to draw through the jet from its upper end, and other means in the receptacle forming an enclosed passage between the upper end of the jet and the supply of graphite.

3. A device as in claim 2 in which said other means comprises a follower surrounding and slidable along said jet; such follower resting on top of the supply of graphite.

4. A graphite feeder comprising an upstanding receptacle for a supply of graphite, said receptacle being open to the atmosphere above the supply of graphite, a jet extending axially and upward from the bottom of the receptacle and terminating at its upper end above the supply of graphite, means forming a passage leading from the lower end of the jet to an exterior point for connection with a source of suction, and a follower unit associated with said jet in relatively longitudinal slidable relation, and forming an enclosed passage between the upper end of the jet and the surface of the supply of graphite; said unit including a closed top sleeve engaging over the jet from above and a substantially radial head on the lower end of the sleeve.

5. A graphite feeder comprising an upstanding receptacle for a supply of graphite, said receptacle being open to the atmosphere above the supply of graphite, a jet extending axially and upward from the bottom of the receptacle and terminating at its upper end above the supply of graphite, means forming a passage leading from the lower end of the jet to an exterior point for connection with a source of suction, and a follower unit associated with said jet in relatively longitudinal slidable relation, and forming an enclosed passage between the upper end of the jet and the surface of the supply of graphite; said unit including a closed sleeve engaging over the jet from above, a substantially radial head on the lower end of the sleeve, and a disc secured in face to face engagement with the lower surface of said head; said disc having a graphite feed opening therethrough, and there being a channel formed between the head and disc and establishing communication between the feed opening and the interior of said sleeve.

6. A device as in claim 5 including an adjustable air entry valve through the head into said channel whereby to feed air thereinto from above said head.

7. A device as in claim 5 including a plurality of feed openings through the disc, and in which said channel includes an annular groove with which said feed openings register and a radial groove between said annular groove and the interior of said sleeve.

8. A device as in claim 5 in which the receptacle includes a cylindrical bore; the periphery of said disc engaging said bore with a close running fit.

9. A graphite feeder comprising an upstanding receptacle for a supply of graphite, said receptacle being open to the atmosphere above the supply of graphite, a jet extending axially and upward from the bottom of the receptacle and terminating at its upper end above the supply of graphite, means forming a passage leading from the lower end of the jet to an exterior point for connection with a source of suction, and a follower unit associated with said jet in relatively longitudinal slidable relation, and forming an enclosed passage between the upper end of the jet and the surface of the supply of graphite; said unit including a closed sleeve engaging over the jet from above, and a head unit on the lower end of the sleeve, and means forming a graphite feed opening between the lower surface of the head unit and the interior of said sleeve.

10. A device as in claim 9, in which the receptacle is initially open at the top; there being a removable cap on the receptacle, and said cap including an axial and upstanding thimble surrounding said sleeve.

11. In combination with an internal combustion engine including an intake manifold and an exhaust manifold; a dry graphite feeder including a feed outlet and an air intake, a suction conduit extending from the feed outlet and connected with the intake manifold, and an air supply conduit connected with the air intake, said air supply conduit being disposed for a substantial portion of its length in engagement with the exhaust manifold whereby to reduce the relative humidity of the air passing therethrough.

FRANK L. BALKWILL.