March 31, 1959 C. W. VOGT 2,879,922

EQUIPMENT FOR COMPACTING COMMINUTED MATERIALS OR THE LIKE

Filed Nov. 26, 1956 2 Sheets-Sheet 1

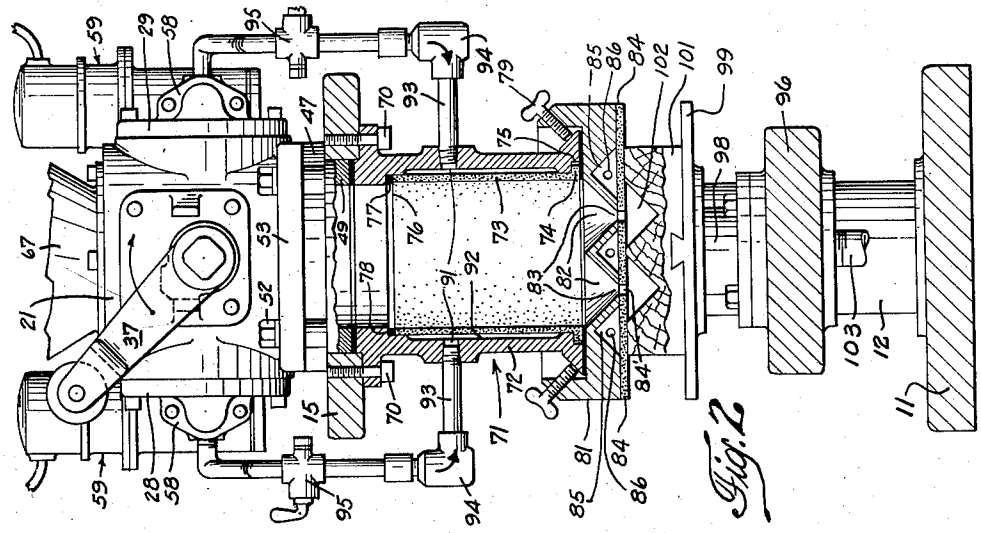


Fig. 2

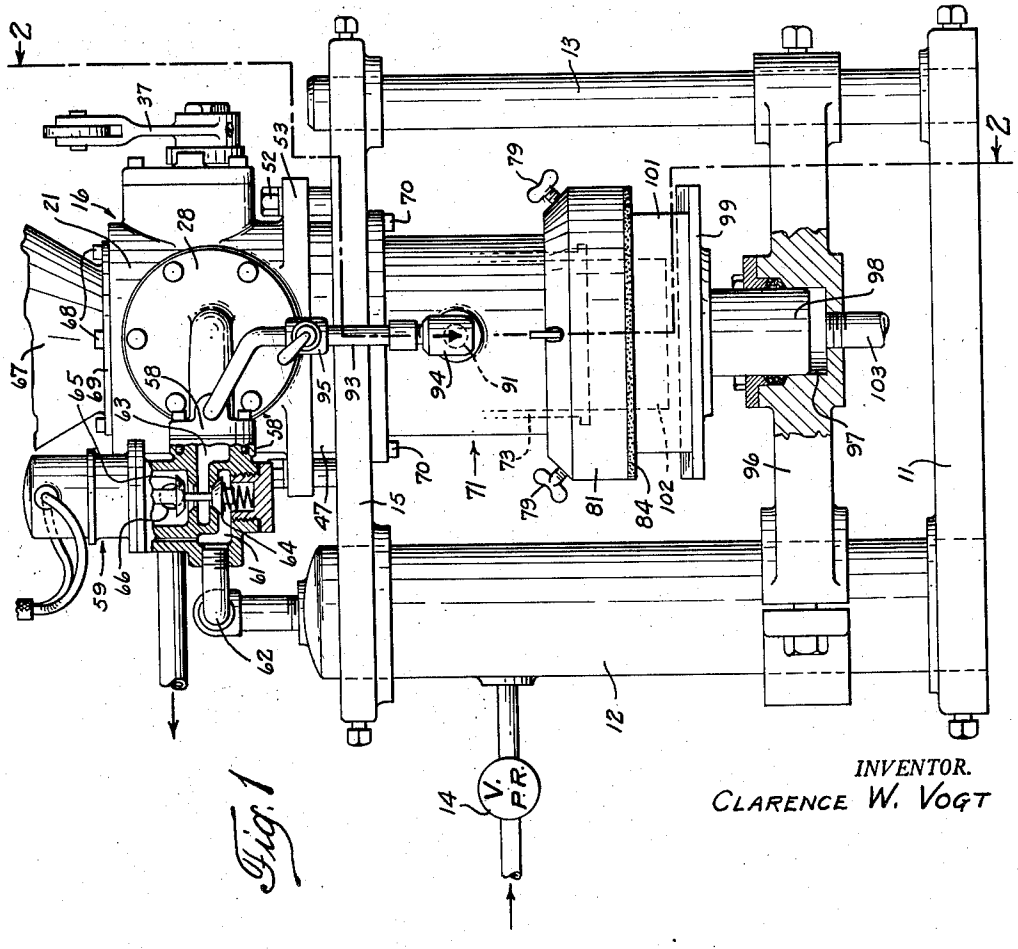


Fig. 1

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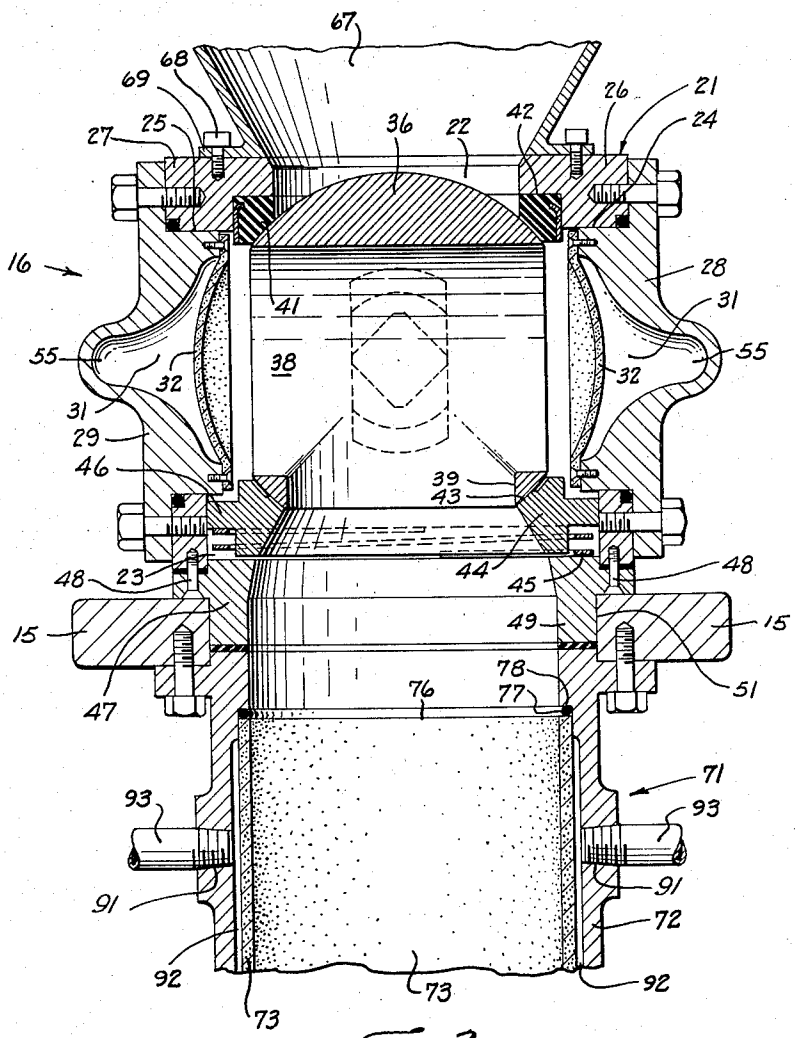


Fig. 3

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EQUIPMENT FOR COMPACTING COMMINUTED MATERIALS OR THE LIKE

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Application November 26, 1956, Serial No. 624,421

10 Claims. (Cl. 222—189)

This invention relates to equipment for compacting finely divided or comminuted materials or the like, and more particularly to a magazine for such material to be used in conjunction with a blowing head for forcing the material from such magazine.

Where comminuted material is forced into a suitable receptable by the application of gas under pressure from the outlet at the bottom of a magazine charged with such material, where the gas channels through the material and discharges through such outlet into the receptacle, the material will not be effectively compacted in the receptable.

It is accordingly among the objects of the invention to provide a magazine that may be used in conjunction with a blowing head, which magazine is relatively simple in construction, has no moving parts and minimizes the channeling of gas therethrough to provide effective compacting of the material in a receptacle.

According to the invention, these objects are accomplished by the arrangement and combination of elements hereinafter described and particularly recited in the claims.

In the accompanying drawings in which is shown one or more of various possible embodiments of the several features of the invention,

Fig. 1 is a front elevational view of the equipment,

Fig. 2 is a sectional view, taken along line 2—2 of Fig. 1, and

Fig. 3 is a fragmentary sectional view of the blowing head and magazine.

Referring now to the drawings, the equipment desirably comprises a base plate 11 which has a pair of supports or standards 12 and 13, the former being a hollow cylinder defining a gas reservoir which may be charged from any suitable source through a valve 14.

Extending transversely between standards 12 and 13 and slidably mounted thereon, is a vertically adjustable support 15 which mounts a blowing head 16, preferably of the type shown in co-pending application for Blowing Head For Packaging Apparatus, Serial No. 620,531, filed November 5, 1956.

As shown in Fig. 3, the blowing head comprises a casing 21 having an inlet 22 in its top wall and an outlet 23 in its bottom wall. Generally circular openings 24, 25 are formed in the opposed sides 26, 27 of the casing 21 over which are mounted generally disc-like cover plates 28, 29, each having a cavity 31 therein covered by a circular filter plate 32 which is concave on its inner surface, said plates preferably being of porous material such as sintered metal which has substantially no individual pores extending completely through the filter wall.

Positioned in the casing 21 is a ball valve 36 which may be rotated by a lever 37. The ball valve 36 is provided with a diametrically extending passageway or bore 38 and an intersecting passageway or bore 39 forming a generally T-shaped cavity therein.

A sealing ring for the ball valve member 36 such as a rubber ring 41 is mounted in a recess 42 formed in the undersurface of the top wall of the casing around inlet 22. The ring 41 provides an effective seal but permits rotation of said ball valve member. The lower portion of the ball valve 36 is engaged by the curved seat 43 of a supporting ring 44 formed of metal or other rigid material. The ring 44 is slidably mounted in the outlet 23 and is normally raised upwardly by means of a spring 45 interposed between a flange 46 on the ring 44 and a retaining ring 47 detachably mounted on the bottom of the casing 21 as by screw 48.

The ring 47 has an annular extension 49 which extends into a complementary opening 51 in the support 15 and screws 52 which extend through flanges 53 at opposite sides of the casing 21 secure the latter to the support 15.

Each of the cover plates 28, 29 has a passageway 55 leading from the associated cavity 31 to a coupling 58 to which is connected the complementary coupling 58' of a solenoid valve unit 59 described more particularly in copending applications Serial Nos. 594,152 and 611,231. Each of the units 59 has an inlet port 61 connected by common line 62 to reservoir 12 and a control port 63 connected to the associated coupling 58'. In addition each unit 59 has a normally closed valve 64 which controls flow of gas under pressure from reservoir 12 to control port 63 and a normally open valve 65 which controls discharge of gas from the control port 63 to exhaust port 66 of the valve unit.

Mounted on the top of the casing 21 over the inlet 22 is a supply hopper 67 secured in position as by screws 68 which extend through a flange 69 at the bottom of the hopper.

The material in the hopper flows therefrom in the manner to be described, into a magazine 71 mounted beneath the outlet 23 of the blowing head and secured in position as by screws 70.

As shown in Fig. 2, the magazine 71 comprises an outer casing 72 which has a filter liner 73 therein slightly spaced from the adjacent wall of the casing. The liner may also be of porous material such as sintered metal, and illustratively is a sleeve which has an annular flange 74 at its lower end seated in an annular recess 75 in the lower end of the casing 72. The upper end 76 of the liner 73 is retained against a sealing ring 77 positioned against an annular shoulder 78 near the top of casing 72.

Releasably secured to the lower end of the casing 72 as by screws 79 is a cup shaped member 81 which illustratively has two parallel recesses 82 herein, each with a discharge port 83 at its bottom. Secured to the underside of member 81 is a filter member 84, illustratively a plate of sintered metal which has openings 84' therethrough aligned with the ports 83 and which extends over cavities 85 in the undersurface of member 81 adjacent the ports 83, said cavities 85 being vented to the atmosphere through ports 86.

The casing 72 has a plurality of ports 91 leading into the space 92 between the casing 72 and the liner 73 and said ports are connected by lines 93 through one way valves 94 and manually operated flow regulating valves 95 to an associated coupling 58'.

The standards 12 and 13 also slidably mount a support 96 which has a circular recess 97 therein in which a piston 98 is slidably mounted. Secured to the upper end of the piston is a plate 99 on which a core box 101 may be positioned, said core box having recesses 102 therein which may be aligned with the ports 83 of the magazine.

Desirably a pressure line 103 is connected to the lower end of recess 97 to raise the piston 98 so that the core

box 101 may be clamped against the porous plate 84 when the recesses 102 are to be charged.

In the operation of the unit, the ball valve 36 is rotated by lever 37 so that the diametric passageway 38 is disposed vertically to permit material to flow from the hopper 67 through the valve to charge the magazine 71.

After the magazine is charged, the ball valve 36 is rotated to the position shown in Fig. 3 in which the diametric passageway 38 is aligned with porous plates 32 and the radial passageway 39 is vertically aligned with the magazine 71.

Thereupon the solenoid units 59 are energized to open valves 64 and close valves 65. Consequently gas under pressure will flow from reservoir 12 through line 62, ports 61 of units 59, open valves 64, control ports 63 and passageways 55 through porous plates 32 to react against the material at each end of the diametric passageway 38, thereby forcing the body of material in the T-shaped cavity in the valve in a generally downward direction. The application of such source of gas under pressure against the material in the ball valve, which is above the magazine, will cause the material in the magazine also to move in a generally downward direction to eject such material through the ports 83 into the recesses 102 in the core box 101 to fill such recesses 102 with a compacted charge of material.

By reason of the porous plate 84 and the vented cavities 85 in member 81, gas from the recesses 102 will be discharged to the atmosphere to insure effective compacting of material in the recesses 102, the porous plate 84 restraining passage of any material therethrough.

Simultaneously with the application of gas under pressure to the ends of the diametric passageway 38 in the valve 36, gas under pressure will also be applied from coupling 58 through line 93, and valves 95 and 94 into ports 91 of magazine 71. The gas entering such ports will be dispersed through the porous liner 73 to react against the side wall of the column of material in the magazine.

As a result of the lateral pressure effected by the gas entering ports 91, the column of material in the magazine will be compacted laterally, thereby preventing or at least greatly minimizing any channeling action by the gas under pressure reacting against such column of material to urge it generally downwardly for ejection through ports 83.

In addition, by reason of the film of gas encompassing the column of material in the magazine, its downward movement will be aided for more rapid discharge through ports 83.

By reason of the porous liner 73, the gas under pressure passing therethrough will be dispersed over a large area. Hence there will be no concentrated gas stream which might cause lateral channeling in such material and introduction of relatively large quantities of such gas into the material forced into the recesses in the core box with resultant ineffective compaction of such material.

By reason of the flow control valves 95, the quantity of gas entering the ports 91 in a given period may be regulated with respect to the quantity of air in a given period reacting against the material through the ends of the diametric passageway 38. Thus the valves 95 are regulated so that the gas entering ports 91 will be sufficient to compact the material laterally to prevent vertical channeling of gas, yet not sufficient to prevent downward movement of the column of material in the magazine for discharge through ports 83.

After the flow cycle is completed and the recesses in the core box 101 are filled, the solenoid units 59 are deenergized to close valves 64 and open valves 65. By reason of the check valves 94, no gas will flow through line 93 and the gas in the magazine and in the valve 38 will discharge through open valve 65 and exhaust port 66, the upward movement of such gas agitating the material in the magazine to prevent lumping thereof.

Thereupon the gas pressure to recess 97 is cut off so that the piston 98 will fall by gravity, permitting removal of the charged core box.

With some materials it may be found that there is too much breaking up of the material remaining in the magazine after the blowing cycle if all the gas in the magazine is permitted to escape upwardly through the magazine. This might interfere with effective compacting and in such case the check valve may be eliminated so that some of the gas will escape laterally to provide some lumping effect.

With the equipment above described, as a minimum of channeling of gas will occur, highly effective compacting may be secured in the recesses of the core box, of the material contained in the magazine.

As many changes could be made in the above construction and many apparently widely different embodiments of this invention could be made without departing from the scope of the claims, it is intended that all matter contained in the above description, or shown in the accompanying drawings, shall be interpreted as illustrative and not in a limiting sense.

Having thus described my invention what I claim as new and desire to secure by Letters Patent of the United States is:

1. A magazine for comminuted material, said magazine having a casing with an inlet and an outlet, a filter member of porous material in said casing adjacent the wall thereof, said filter member being of the type having substantially no individual pores extending completely through the wall thereof, means to apply a source of gas under pressure against the contents of said magazine to effect movement of such contents through said outlet, and means to apply the source of gas under pressure through said filter member to apply pressure against the contents of said magazine in direction substantially at right angles to the direction of movement of such contents.

2. A magazine for comminuted material, said magazine having a casing with an inlet and an outlet, a filter member of sintered metal in said casing adjacent the wall thereof, means to apply a source of gas under pressure against the contents of said magazine to effect movement of such contents through said outlet, means to apply the source of gas under pressure through said filter member to apply pressure against the contents of said magazine in direction substantially at right angles to the direction of movement of such contents, and means to regulate the quantity of gas per unit time fed through the filter member with respect to that fed against the contents of said magazine.

3. Equipment of the character described, comprising a casing having an inlet and an outlet, a ball valve in said casing having a passageway diametricly therethrough and a passageway intersecting said diametric passageway, means to rotate said ball to a first position such that the diametric passageway provides a communication between said inlet and said outlet and to a second position such that the intersecting passageway is in communication with said outlet and the inlet is cut off, a magazine having a casing in communication with the outlet of said ball valve casing and an outlet, a filter member in said magazine casing adjacent the wall thereof, means to apply a source of gas under pressure against the ends of said diametric passageway to effect movement of the contents of the magazine through the outlet thereof and means to apply a source of gas under pressure through said filter member to apply pressure against the contents of said magazine in direction substantially at right angles to the direction of movement of such contents.

4. The combination set forth in claim 3 in which means are provided to regulate the quantity of gas per unit time fed through the filter member with respect to that fed against the ends of the diametric passageway.

5. The combination set forth in claim 3 in which the casing of said magazine has a port to which the source of gas under pressure is connected and a one-way valve is operatively connected to said port to permit flow of gas in direction only toward said port.

6. The combination set forth in claim 3 in which the casing of said magazine has a port and said valve casing has a filter member therein, said diametric passageway in said ball valve is adapted to be aligned with said filter member when said ball valve is in said second position, said valve casing has a passageway in communication with the outer surface of said filter member, to which the source of gas under pressure may be connected, and a line is in communication at one end with said passageway and at its other end with the port in said magazine.

7. The combination set forth in claim 6 in which a flow valve is connected in said line.

8. The combination set forth in claim 6 in which a one way valve is connected in said line.

9. The combination set forth in claim 6 in which a flow valve is connected in said line and a one way valve is also connected in said line between said flow valve and said port, said one way valve permitting flow in direction only toward said port.

10. The combination set forth in claim 6 in which a valve unit is provided having an inlet port adapted to be connected to a source of gas under pressure, a control port connected to said casing passageway and an exhaust port, said valve unit having a normally closed valve between said inlet port and said control port, and a normally open valve between said control port and said exhaust port, said valves being ganged to operate in unison.

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