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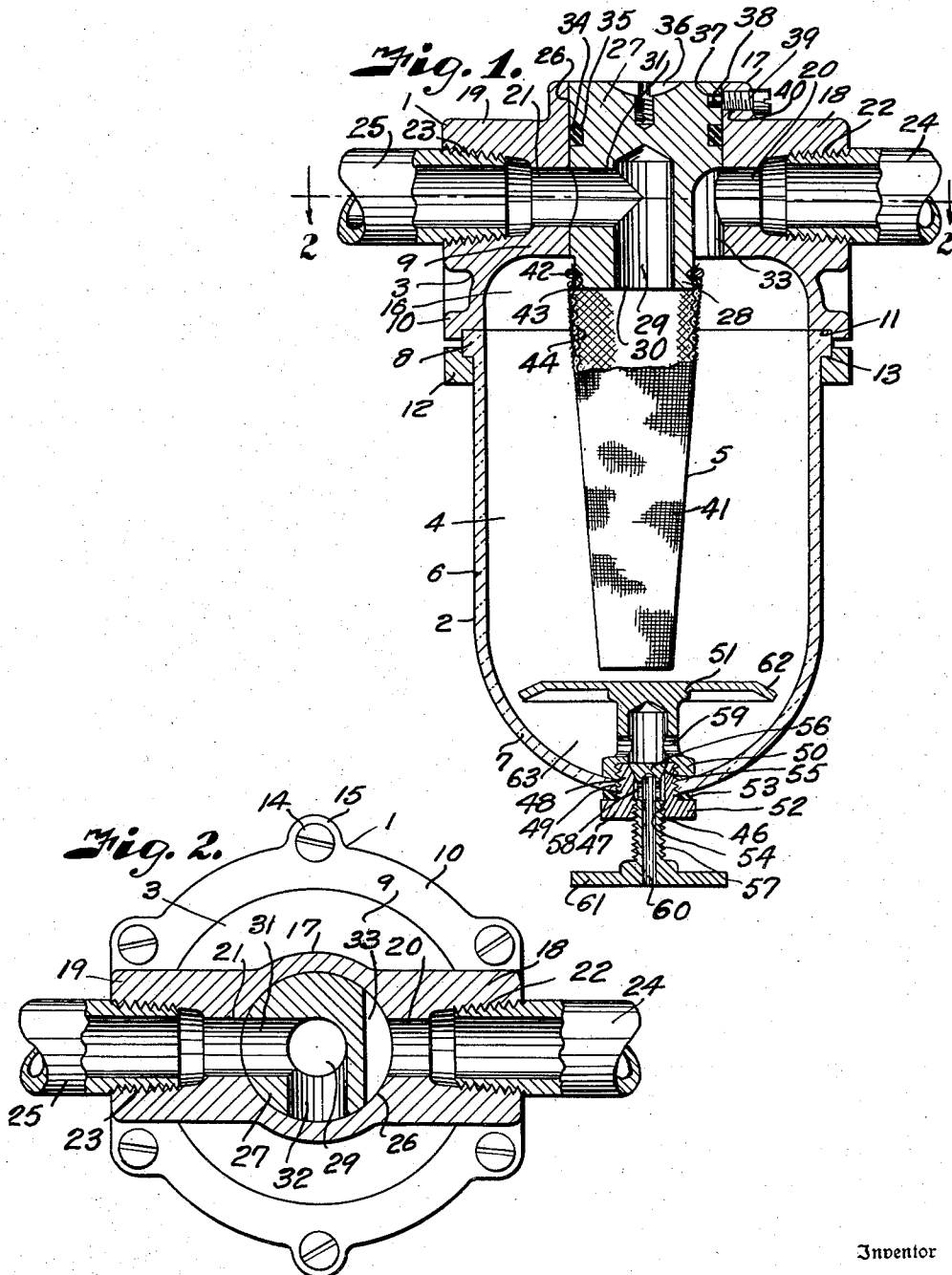
P. KETELSEN

2,565,690

AIR CLEANER

Filed July 29, 1948

2 Sheets-Sheet 1



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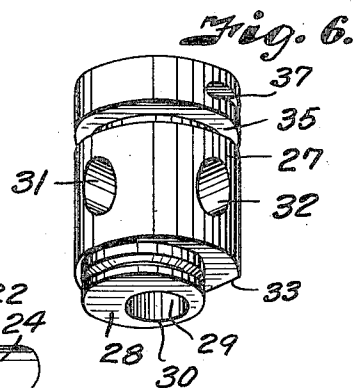
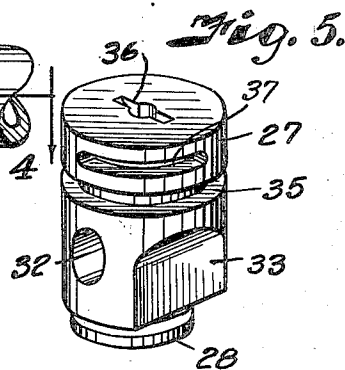
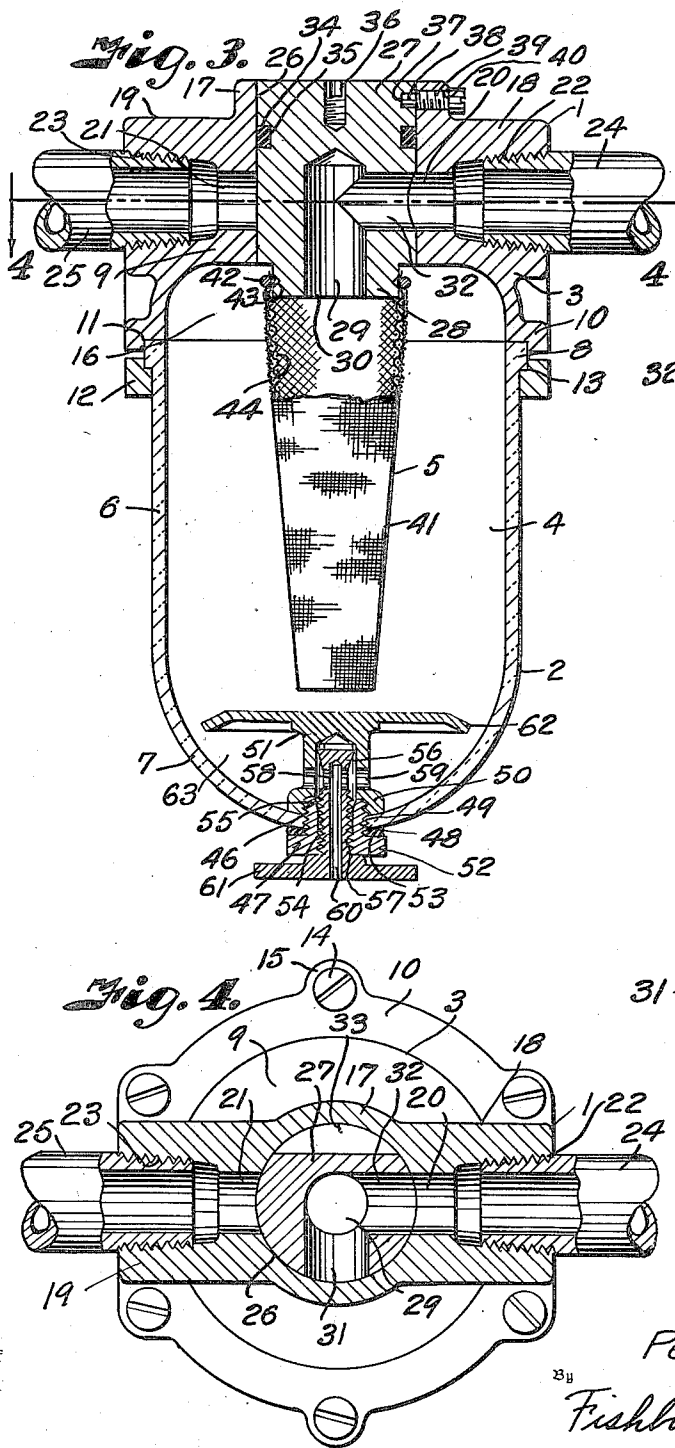
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UNITED STATES PATENT OFFICE

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AIR CLEANER

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5 Claims. (Cl. 183-57)

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This invention relates to air cleaners adapted for connection in air supply ducts to remove foreign particles prior to delivery of air to various pneumatic machines and has for its principal object to provide a device of this character with a strainer element that is readily cleaned of foreign material by reversal of air flow there-through.

Other objects of the invention are to provide a simple and efficient air cleaner structure; to provide an air cleaner wherein particles dislodged from the strainer element are readily discharged without necessitating removal of the cleaner from the air lines to which it is connected; and to provide an air cleaner with means for trapping particles which have been dislodged from the strainer element and prevent their agitation resulting in pressure pulsations in the cleaner.

In accomplishing these and other objects of the invention, I have provided improved structure, the preferred form of which is illustrated in the accompanying drawing wherein:

Fig. 1 is a vertical section through an air cleaner constructed in accordance with the present invention and showing the valve plug in position to pass air through the strainer element for removing foreign material that may be entrained therewith.

Fig. 2 is a horizontal section on the line 2-2 of Fig. 1.

Fig. 3 is a section similar to Fig. 1 but showing the valve in position for reversing flow of air through the strainer element.

Fig. 4 is a horizontal section on the line 4-4 of Fig. 3.

Fig. 5 is a perspective view of the valve plug.

Fig. 6 is a similar view of the valve plug as viewed from the opposite side.

Referring more in detail to the drawings:

1 designates an air cleaner constructed in accordance with the present invention and which includes a bowl member 2 and a head member 3 cooperating therewith in forming a receptacle having a collecting chamber 4 for containing a strainer element 5. The bowl member 2 may be formed of a transparent material and has a cylindrical side wall 6 joining in a rounded bottom 7. The upper edge of the wall 6 terminates in a laterally extending flange 8 by which the bowl member 2 is clamped to the head member 3 as later described. The head member 3 may be formed of any suitable material and includes a substantially dome-shaped body 9 having a laterally extending marginal flange 10 that is provided on the underside with a shouldered groove

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11 to seat the end face of the flange 8 of the bowl member 2.

The bowl member 2 is retained in seated position by a clamping ring 12 encircling the cylindrical wall 6 and which has its upper face provided with an annular shoulder 13 to engage the underside of the flange 8 as best shown in Figs. 1 and 3. The clamping ring 12 is secured to the flange 10 by fastening devices such as cap screws 14 that extend through apertured ears 15 projecting from the flange and clamping ring.

The underportion of the dome-shaped body 9 forms a recess 16 to cooperate with the interior of the bowl member in providing the collecting chamber 4. Extending transversely of the dome-shaped body on the respective sides of an axial boss 17 are lateral bosses 18 and 19 having inlet and outlet ports 20 and 21 respectively. The lateral bosses are provided at their outer ends with internally threaded counterbores 22 and 23 for connecting adjacent sections 24 and 25 of an air duct which leads from the source of compressed air supply to one or more pneumatically operated machines (not shown).

The boss 17 has an axial bore 26 intersecting the inlet and outlet ports 20 and 21 and rotatably mounted therein is a substantially cylindrical valve plug 27 having its upper end flush with the boss 17 and its opposite end provided with an eccentric boss 28 which projects slightly within the collecting chamber as best shown in Figs. 1 and 2.

The valve plug includes an axial channel 29 opening through a port 30 in the eccentric boss and which terminates slightly above the inlet and outlet ports to connect with radial ports 31 and 32. The radial ports are arranged at right angles to each other so that when the valve plug is in one position the port 31 registers with the outlet port 21 and port 32 is closed as shown in Fig. 2 and when the valve plug is in another position as shown in Fig. 4, the port 32 connects with the inlet port 20 and the port 31 is closed.

The side of the valve plug opposite the port 31 has a notch-like recess 33 for connecting the inlet port 20 with the collecting chamber 4 when the valve plug is in the position shown in Fig. 2. A seal is provided about the valve plug by a sealing ring 34 inserted in a circumferential groove 35 at a point above the inlet and outlet ports. The ring effects a positive sealing contact with the wall of the bore 26, but allows free turning of the valve upon insertion of a key (not shown) within a slot 36 formed in the head of the valve plug as best shown in Figs. 1 and 5.

To retain the valve in position and allow turning of the valve plug from the position shown in Fig. 2 to that shown in Fig. 3, the side thereof above the sealing ring 34 is provided with an arcuate recess or groove 37 to engage a pin-like terminal 38 on a screw 39 that is threaded into an opening 40 of the axial boss as shown in Fig. 1. The ends of the arcuate groove form stops to retain the valve plug in its respective positions, that is, where the port 31 connects with the outlet port 21 or the port 32 connects with the inlet port 20.

The strainer element 5 is of tubular form and comprises a substantially frusto-conical foraminated or perforated wall 41 with the larger end sleeved over the eccentric boss and retained thereon by a wire clamp 42 which presses the foraminated material of the wall into a groove 43 of the eccentric boss as best shown in Figs. 1 and 2. The lower end of the foraminated wall is closed so that the port 30 is closed from the chamber 4 except through the apertures provided by the foraminated wall of the strainer element.

It is obvious that the strainer must be constructed of fine wire to give the desired fineness of mesh. Consequently, the walls thereof are strengthened by an insert 44 that is formed by a similar shaped wire form of stronger construction that is placed therein as shown in Figs. 1 and 3.

With the structure thus far described and assuming that the valve plug is turned to the position shown in Figs. 1 and 2, the notch-like recess 33 connects with the inlet port 20 and the radial port 31 connects with the outlet port 21. The compressed air from the source of supply then passes through the port 20, recess 33 into the collecting chamber for discharge through the wall of the strainer element and through the ports 29, 31 and 21 to the pneumatic machine to be operated.

It is thus obvious that any foreign material that may be entrained with the air is stopped on the exterior side of the foraminated wall 41 of the strainer and gravitates to the bottom of the collecting chamber so that only clean air is delivered to the outlet port 21.

During operation of the cleaner, the strainer element tends to clog because of the removed material collecting thereon. This material is dislodged without disconnecting the cleaner from the pipe line by inserting the key (not shown) within the slot-like recess 36 of the valve plug and turning the valve plug to the position shown in Figs. 3 and 4 so that the port 32 registers with the inlet port 20 and the notch-like recess 33 and port 31 are out of registry with the inlet and outlet ports. The compressed air is then discharged through the radial port 32 and directly through the channel 29 and port 30 into the inside of the strainer element 5 where the air is discharged through the foraminated wall 41 thereof to dislodge the collected material.

To facilitate dislodgment of the material and removal thereof from the collecting chamber, the bottom of the bowl member is provided with a blow-off valve 46 which includes a fitting 47 having a threaded body portion 48 projecting through an opening 49 at the bottom of the bowl member and which threadedly engages a collar 50 on a guard member 51. The fitting has an annular flange 52 for seating a gasket ring 53 to provide a leak-tight seal about the opening 49. The fitting 47 has an internally threaded bore 54 terminating in a conical valve seat 55 for seating the cone-shaped head 56 on the end of the valve stem 57. The valve stem 57 is internally thread-

ed to engage in the internal threads of the fitting 47 so that when the stem is rotated in one direction the head 56 of the valve is unseated and the lateral ports 58 therein are exposed to the interior of the collecting chamber through ports 59 in the collar 50 so that the material is blown out through the ports and an axial channel 60 in the valve stem. To facilitate turning of the valve stem the outer end thereof may be provided with a suitable handle or cross bar 61.

When the air is flowing to the collecting chamber any pulsations therein may cause the strained out material to become agitated within the collecting chamber. To prevent this difficulty, the guard member 51 is preferably of disk-like form and has a downwardly directed circumferential flange 62 terminating slightly short of the bottom of the bowl member to cooperate therewith in forming a trapping chamber 63 in which separated particles are caused to gravitate and collect about the collar 50 ready for discharge through the openings 59 therein when the blow-off valve is opened as previously described.

When desired the valve plug and strainer may be removed for inspection or replacement upon the loosening of the screw 39 so that the pin 38 is disengaged from the arcuate groove 37 of the valve plug. The valve plug may then be lifted out of the bore 26, the strainer element being carried therewith.

From the foregoing it is obvious I have provided an air cleaner having a strainer element that is readily cleaned without removal from the air line in which it is connected, merely by adjusting the valve plug to reverse the flow through the strainer and opening the blow-off valve to dislodge the material and effect discharge from the collecting chamber. It is also obvious that I have provided a cleaner that is of simple and inexpensive construction and which may be readily installed in any duct or supply pipe leading from a source of air supply to protect the pneumatic machines from clogging or abrasion by any solid particles carried by the air.

What I claim and desire to secure by Letters Patent is:

1. An air cleaner comprising a bowl member, a head member cooperating with the bowl member for forming a chamber to collect foreign material and having an inlet and an outlet adapted for connection into an air line, said head member having a transverse bore interconnecting the inlet and outlet, a valve plug oscillatable in said bore and having an axial port, a tubular strainer element suspended from the valve plug and separating said port from the collecting chamber, said valve plug also having radial ports connected with the axial port adapted for alternate connection with the inlet and outlet and having a port adapted for connection with the inlet when one of said radial ports is connected with the outlet, to effect flow through the strainer element from the collecting chamber to said outlet in one position of the valve plug, said ports being arranged so that when said other radial port is in connection with the inlet the other of said ports are closed from said outlet to discharge material from the strainer into the collecting chamber.

2. An air cleaner comprising a bowl member, a head member cooperating with the bowl member for forming a chamber to collect foreign material and having an inlet and an outlet adapted for connection into an air line, said head member having a transverse bore interconnecting the in-

let and outlet, a valve plug oscillatable in said bore and having an axial port, a tubular strainer element suspended from the valve plug and separating said port from the collecting chamber, said valve plug also having radial ports connected with the axial port adapted for alternate connection with the inlet and outlet and having a port adapted for connection with the inlet when one of said radial ports is connected with the outlet to effect flow through the strainer element from the collecting chamber to said outlet in one position of the valve plug, said ports being arranged so that in another position of the valve plug the other radial port is in connection with the inlet and the other ports are closed from said outlet to effect a reverse flow through the strainer element, a blow-off valve connected with the lower portion of the bowl member for discharging material dislodged from the strainer element when the valve plug is in said other position, and a guard supported in the collecting chamber over said blow-off valve.

3. An air cleaner comprising a closed receptacle forming a chamber for collecting foreign material having inlet and outlet connections for an air line and provided with a valve chamber which intersects inlet and outlet ports in communication with the inlet and outlet connections, a tubular screening element projecting into the collecting chamber and having a closed lower end, a valving member movable within the receptacle and having a passageway connected with an upper portion of the collecting chamber on the exterior side of the screening element and having a passageway connecting the interior of the screening element with the outlet connection in one position of the valving member whereby foreign material discharged through the inlet connection is screened out on the exterior side of the screening element to drop into the collecting chamber, said valving member having a portion for closing said outlet connection and having a passageway adapted to connect the inlet connection with the interior side of the screening element in another position of the valving member to effect discharge of any foreign material adhering to the outer side of the screen by the air admitted to the interior side of the screening element, and means in the bottom of the receptacle for discharging said screened out material.

4. An air cleaner comprising a closed receptacle forming a chamber for collecting foreign material having inlet and outlet connections for an air line and provided with a valve chamber which intersects inlet and outlet ports in communication with the inlet and outlet connections, a tubular screening element projecting into the collecting chamber and having a closed lower end, a valving member movable within the receptacle and having a passageway connected with an upper portion of the collecting chamber on the exterior side of the screening element and having a passageway connecting the interior of the screening element with the outlet connection in one position of the valving member

whereby foreign material discharged through the inlet connection is screened out on the exterior side of the screening element to drop into the collecting chamber, said valving member having a portion for closing said outlet connection and having a passageway adapted to connect the inlet connection with the interior side of the screening element in another position of the valving member to effect discharge of any foreign material adhering to the outer side of the screen by the air admitted to the interior side of the screening element, means in the bottom of the receptacle for discharging said screened out material, and a guard supported in the collecting chamber between the screening element and the discharging means.

5. An air cleaner comprising a closed receptacle forming a chamber for collecting foreign material having inlet and outlet connections for an air line and provided with a valve chamber which intersects inlet and outlet ports in communication with the inlet and outlet connections, a tubular screening element projecting into the collecting chamber and having a closed lower end, a valving member movable within the receptacle and having a portion suspending the screening element in the collecting chamber in spaced relation with said bottom, said valving member having a passageway connected with an upper portion of the collecting chamber on the exterior side of the screening element and having a passageway connecting the interior of the screening element with the outlet connection in one position of the valving member whereby foreign material discharged through the inlet connection is screened out on the exterior side of the screening element to drop into the collecting chamber, said valving member having a portion for closing said outlet connection and having a passageway adapted to connect the inlet connection with the interior side of the screening element in another position of the valving member to effect discharge of any foreign material adhering to the outer side of the screen by the air admitted to the interior side of the screening element, and means in the bottom of the receptacle for discharging said screened out material.

PETER KETELSEN.

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