Jan. 5, 1965 K. L. WESTLIN 3,164,455

AIR CLEANING APPARATUS

Filed June 29, 1961 4 Sheets-Sheet 1

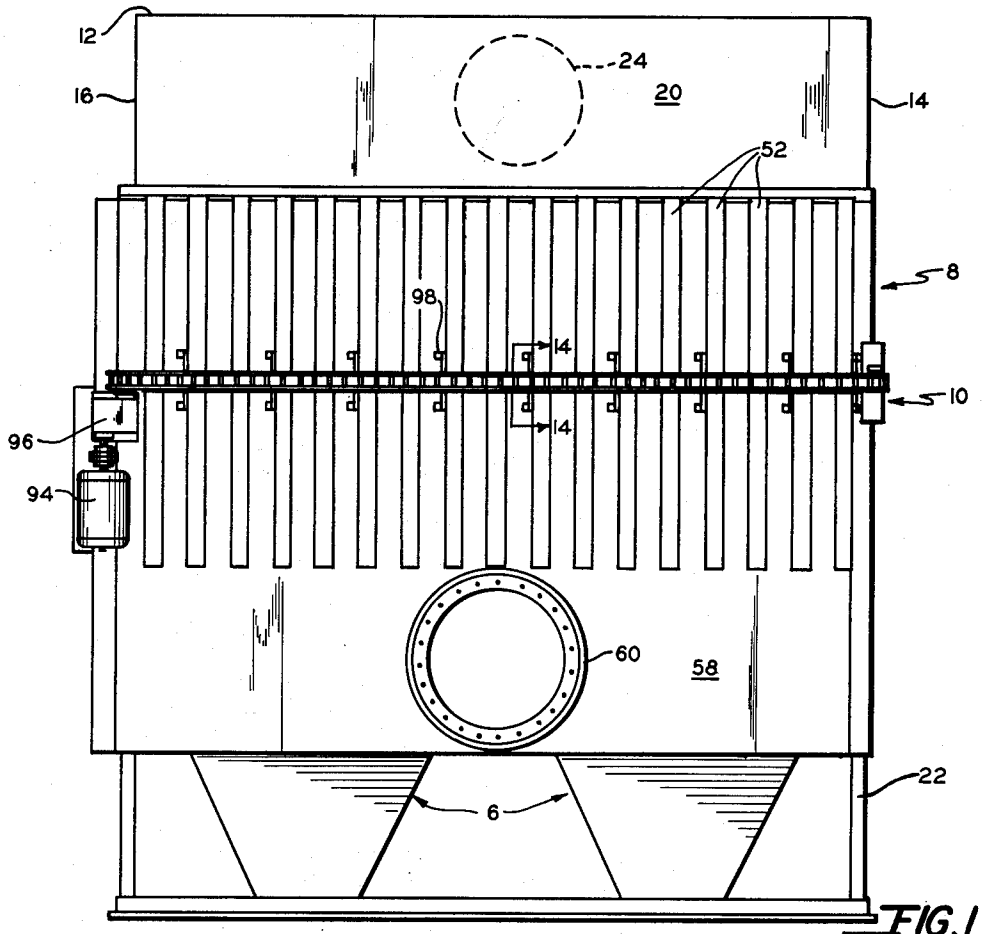


FIG. 1

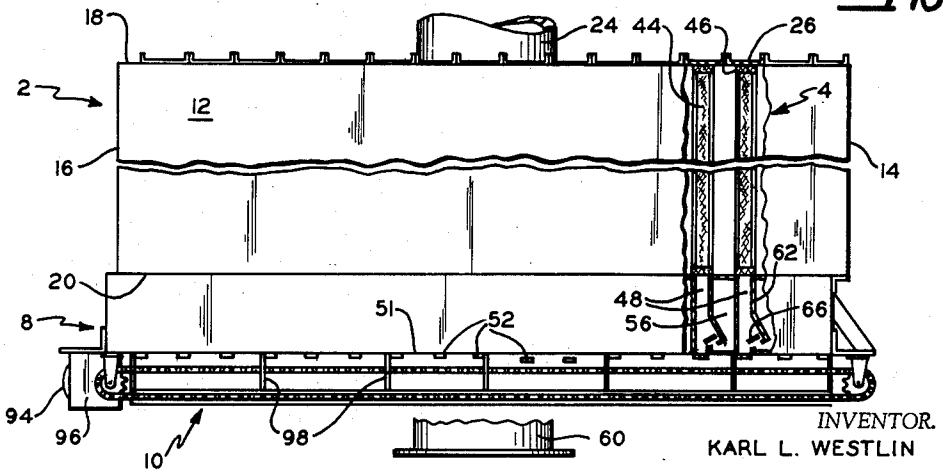


FIG. 3

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Jan. 5, 1965 K. L. WESTLIN 3,164,455

AIR CLEANING APPARATUS

Filed June 29, 1961 4 Sheets-Sheet 2

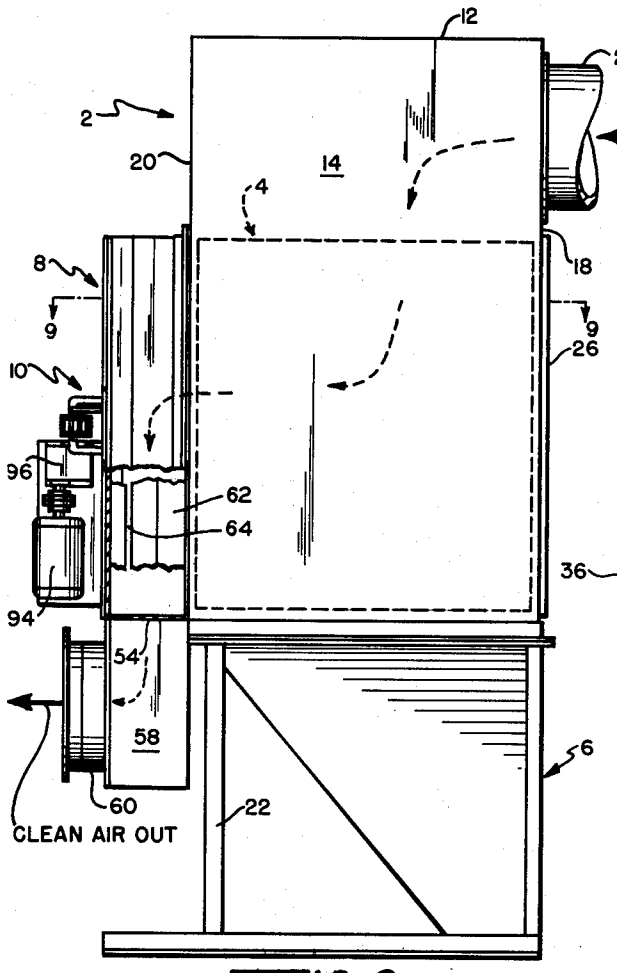


FIG. 2

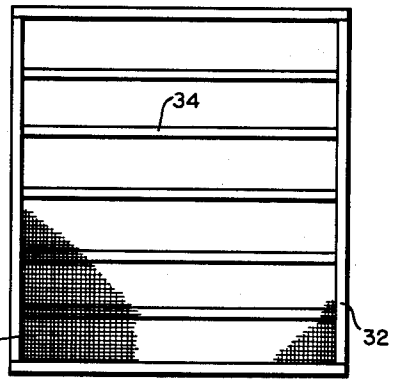


FIG. 4



FIG. 5

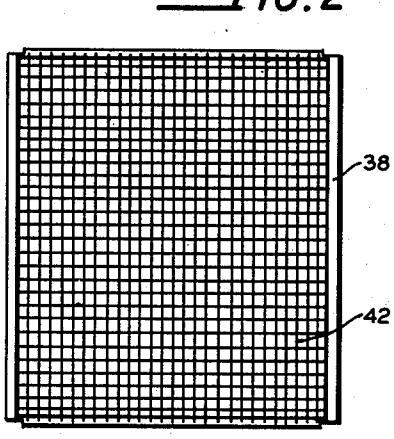


FIG. 6

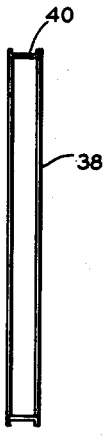


FIG. 7

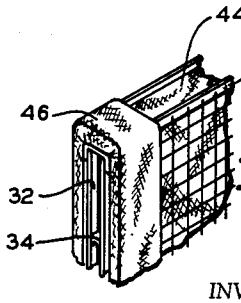


FIG. 8

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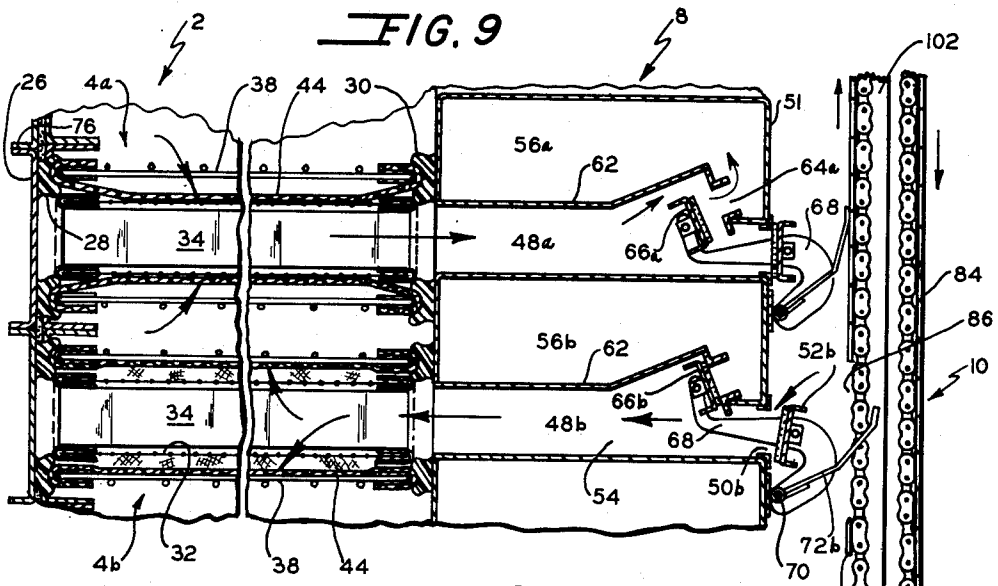
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Jan. 5, 1965 K. L. WESTLIN 3,164,455

AIR CLEANING APPARATUS

Filed June 29, 1961 4 Sheets-Sheet 3

FIG. 9



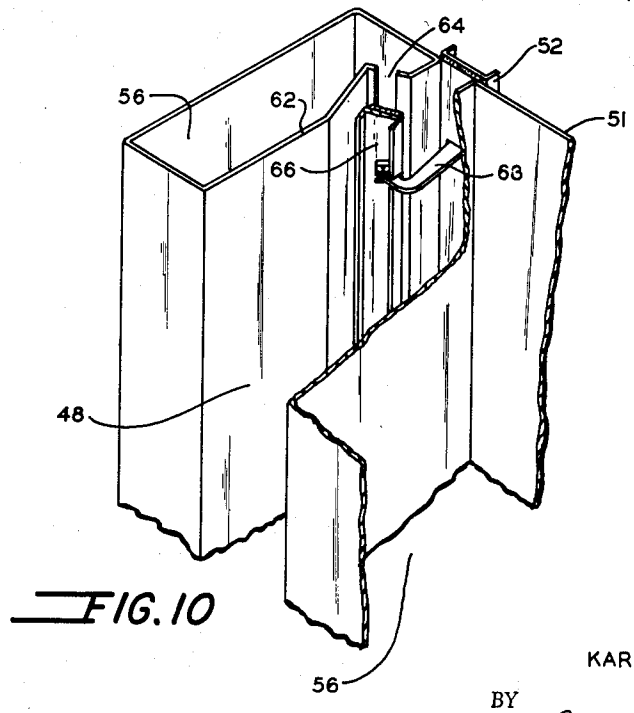


FIG. 10

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Jan. 5, 1965 K. L. WESTLIN 3,164,455

AIR CLEANING APPARATUS

Filed June 29, 1961 4 Sheets-Sheet 4

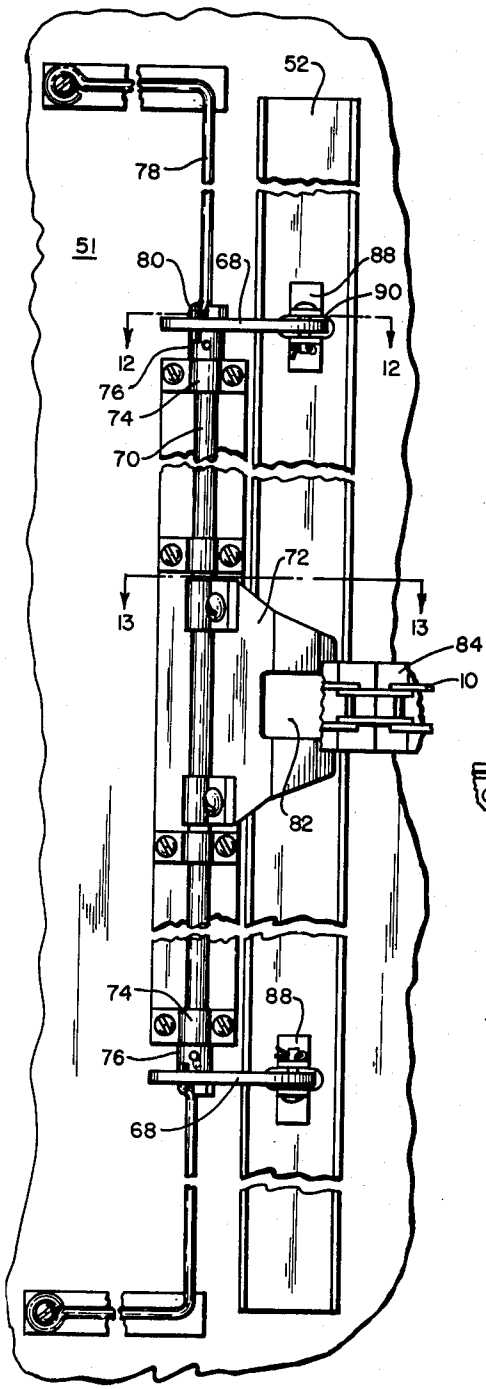


FIG. 11

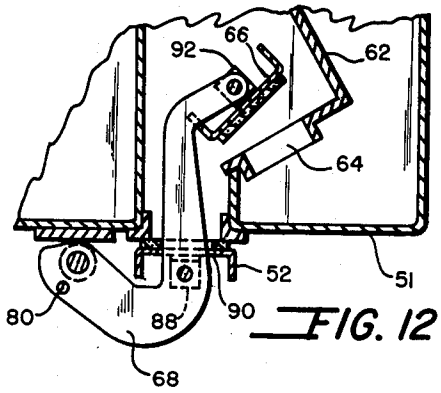


FIG. 12

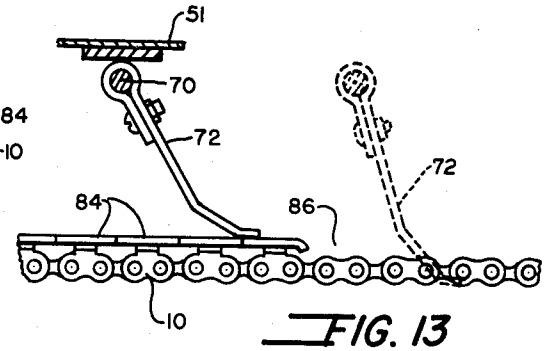


FIG. 13

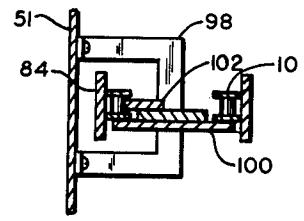


FIG. 14

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United States Patent Office 3,164,455 Patented Jan. 5, 1965

3,164,455

AIR CLEANING APPARATUS

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Filed June 29, 1961, Ser. No. 120,716
7 Claims. (Cl. 55—273)

This invention relates to an improved pocket type air cleaner of the character which utilizes reverse air flow to effect cleaning of the pockets.

The pocket type air cleaner or dust collector to which the invention relates generally comprises: a dust chamber or box into which dust laden air is introduced; a clean air chamber provided with a suction source; a series of filter pockets mounted in the dust chamber to provide a filtering surface between the two chambers with the interior of the pockets under normal air flow conditions in communication with the clean air chamber, and under reverse air flow conditions for cleaning the pockets in communication with a reverse air source; and means for reversing the air flow through a portion of the pockets in sequential fashion.

Various arrangements have been devised to reverse the air flow through those pockets to be cleaned, and to prevent the dust dislodged during pocket cleaning from being redeposited on adjacent pockets. One well known arrangement moves an air discharging traveler, connected to a separate blower, along the open ends of successive pockets to provide the reverse air flow, and blanks off one or more pockets adjacent to the pocket being cleaned. The pockets which are blanked off reduce the capacity of the cleaner. The provision of a traveler which must seal tightly against the open ends of the pockets presents substantial mechanical problems. Other deficiencies of such an arrangement will also be appreciated from a consideration of the apparatus required therefor.

Thus among the objects of the invention is the provision of a pocket type air cleaner: which utilizes atmospheric air in connection with a particular valve arrangement, instead of an air discharging traveler, for effecting a reverse air flow for pocket cleaning purposes; which includes means for operating the valve arrangement in a manner causing an abrupt reversal in air flow for pocket cleaning purposes and a contrasting slow reversal in air flow after the pocket has been cleaned; which does not require auxiliary or secondary blower means to provide the reverse air; and in which no pockets are blanked off from air flow so that as the cleaning of successive pockets is initiated, the maximum energy available for snapping or popping the pockets is utilized.

In accordance with the invention, the interior or clean side of each pocket is connected to a chamber through which clean air flows in one direction while the pocket is filtering air, and through which atmospheric air flows in the opposite or reverse direction when the pocket itself is being cleaned. To effect this, each chamber has a normally closed atmospheric air inlet, and a normally open clean air outlet in communication with the suction source. Both the atmospheric inlet and clean air outlet have interconnected valve members arranged so that when the atmospheric air inlet is open, the clean air outlet is closed, and vice versa. A traveling endless band controls the positions of the valves in a sequence wherein successive pairs of adjacent chambers are opened to atmospheric air and closed to the suction source to obtain the reversal of air flow through those chambers. This reversal of air flow to the two pockets connected to the particular chambers occurs while the pockets on both sides of the pair continue to receive normal air flow therethrough. The valves and control means are arranged to move the valves

to effect the reverse air flow very abruptly and to restore normal air flow in a gradual movement.

Other features and details of the invention will be appreciated from the following description taken in connection with the accompanying drawing illustrating one form of apparatus embodying the principles of the invention by way of example, and wherein:

FIGURE 1 is a front view, with some detail deleted, of an air cleaner embodying the invention;

FIGURE 2 is a partly broken side view of the air cleaner of FIGURE 1;

FIGURE 3 is a partly broken top view of the air cleaner of FIGURE 1;

FIGURE 4 is a face view of an inner retainer for supporting one of the pockets or sleeves from collapsing during normal air flow;

FIGURE 5 is an edge view of the retainer of FIGURE 4;

FIGURE 6 is a face view of an outer retainer for supporting one of the pockets during reverse air flow therethrough;

FIGURE 7 is an edge view of the retainer of FIGURE 6;

FIGURE 8 is a fragmentary isometric view of one corner of a pocket assembly;

FIGURE 9 is a partly diagrammatic fragmentary horizontal sectional view corresponding to one taken along the line 9—9 of FIGURE 2, this view showing one pocket being subjected to normal air flow and an adjacent pocket being subjected to reverse air flow;

FIGURE 10 is a fragmentary, partly broken, isometric view illustrating the general structural arrangement of several chambers of the air flow control box;

FIGURE 11 is a partly broken, face view of a valve and certain associated parts for the atmospheric air inlet of a chamber;

FIGURE 12 is a fragmentary horizontal sectional view corresponding to one taken along line 12—12 of FIGURE 11 with certain details omitted for clarity;

FIGURE 13 is a horizontal sectional view corresponding to one taken along line 13—13 of FIGURE 11 illustrating a valve controlling cam follower in solid lines in a position holding the outer valve closed, and an adjacent valve controlling cam follower in dotted lines in a position which permits opening of the outer valve; and

FIGURE 14 is a fragmentary vertical section corresponding to one taken along the line 14—14 of FIGURE 1 illustrating a bracket and support means for the endless band.

The air cleaner (FIGURES 1–3) basically comprises: a dust chamber or box generally designated 2 into the upper part of which dust laden gas or air is introduced; a series of filter pocket assemblies 4 (shown in dotted line outline form in FIGURE 2) mounted in spaced side-by-side relation across the lower part of the dust box with their front ends being open and aligned in the plane of the front wall of the dust box; dust hoppers 6 in the form of inverted pyramids underlying the dust box; an air flow control structure 8 (hereinafter called control box) mounted on the front of the dust box, the control box comprising two sets of vertically extending chambers, one set of chambers registering with and being connected to the front open ends of the pockets and the other set of chambers (alternating with the first set) being connected to a suction source, the control box including a valve arrangement operable to place individual chambers of the first set in communication with companion individual chambers of the second set, or alternatively to close the two sets of chambers to each other and to open the first set to atmosphere; and a traveling endless band arrangement 10 mounted on the control box front and operating the valve arrangement in a manner that successive

pairs of pockets are subjected to reverse air flow for cleaning purposes while the remaining pockets receive normal air flow.

With this general arrangement, and for the moment excepting those pockets being cleaned by reverse air flow, the direction of air flow through the apparatus is as shown by the dotted arrows of FIGURE 2. Dust laden air drawn into the upper portion of the dust box passes downwardly into the spaces between the adjacent pockets, through the pocket fabric to the interior of the pockets (causing the dirt to be deposited on the outside of the pocket fabric), then into and through the control box first chambers (i.e., those chambers in registry with the front open ends of the pockets), and through the control box second chambers connected by a clean air manifold to the suction source (not shown).

As to those pockets being cleaned, the valve arrangement closes the openings between the first and second chambers and opens the first chambers to atmosphere. Thus the suction source induces a reverse flow of air through the first chambers from atmosphere and through the pocket fabric from inside to outside, this reverse air then passing to a pocket undergoing normal air flow and to the suction source. The reversal of air flow is abruptly effected by means to be hereinafter detailed so that the pocket is popped or slapped smartly against an outer support retainer to dislodge the dirt accumulated on the outer face of the pocket fabric.

The pockets are subjected to reverse air flow cleaning in pairs so that the dirt dislodged from the opposing inner faces of a pair of pockets is not redeposited on another pocket but falls down through the space between the adjacent pockets being cleaned into the dust hopper. The actuation of the valve arrangement to effect reverse flow cleaning of successive pairs of pockets is accomplished by movement of the endless band past the actuating means of the valve arrangement, the endless band holding the valve arrangement in a normal air flow position for the chambers for all pockets except a pair. Since the valve arrangement for each first chamber is independent of the valve arrangement for other chambers, movement of the endless band causes reverse flow to one pocket to end at about the same time that reverse flow begins in the second pocket ahead in the direction of movement of the endless band. That is, the interval of time during which each pocket is subjected to reverse air flow overlaps, or coincides in part at least, with the intervals of time during which the immediately preceding and succeeding pockets are subjected to reverse air flow so that the second pocket of one pair to receive reverse air flow continues to receive reverse air flow as the first pocket of the next successive pair is subjected to reverse air flow. Thus as the cleaning of pairs of pockets progresses, that dirt dislodged from the leading face of a pocket as it first receives reverse air flow and which is then normally redeposited to a degree on the opposing face of the next successive pocket (which is undergoing normal air flow) will be dislodged and fall into the hopper when that next successive pocket receives reverse air flow with the preceding pocket also continuing to receive reverse air flow. Stating it in another way, it may be considered that in a pair of pockets undergoing reverse air flow there are four filtering faces and that of the four faces one is a leading face, one a trailing face, and two are opposed inner faces. Then the dirt dislodged from the leading face will be redeposited to some degree on the opposing face of the next successive pocket, the dirt dislodged from the pair of opposing inner faces will fall downwardly into the hopper, and the trailing face will have had its dirt load previously dislodged when it was in the position of an opposing inner face.

Referring now in some detail to the structure of the apparatus, the dust box 2 includes: a top wall 12; side walls 14 and 16; a rear wall 18 having a series of vertically extending openings through which the pocket assemblies are inserted and removed; an upper front wall 20, the lower portion of the front of the dust box having the control box mounted thereon; an open bottom which the dust hoppers 6 underlie; and legs 22 which support the dust box. An inlet duct 24 is connected to admit dust laden air into the upper portion of the dust box above the space occupied by the filter pockets.

Each of the filter pocket assemblies 4 includes, in assembled form, an inner frame, an outer frame, and an open ended dust filter pocket or envelope held therebetween. The pocket assemblies are mounted in spaced face-to-face relation across the lower portion of the dust box in upstanding positions parallel to the opposite side walls 14 and 16. The vertically extending front and rear open ends of the pockets are aligned along the front and rear of the dust box. The rear open ends of the pockets are closed by individual vertically disposed channels 26 (best seen in FIGURES 3 and 9) secured to the rear wall 18 to close the vertical openings in the rear wall through which access to the individual pocket assemblies is had. As shown in FIGURE 9, the inner faces of the channels 26 carry gaskets 28 which seal the rear open ends of the pockets. The periphery of the front open end of each pocket assembly seats against a rectangular gasket 30 which frames the control box openings which are in registry with the front open ends of the pockets.

Turning now to the details of the pocket assemblies (FIGURES 4–8), the inner retainer for each pocket is a rectangular, open-face, open-edge structure comprising a pair of screen covered frames 32 spaced apart by a series of vertically spaced channels 34 extending horizontally from the front to the rear edges of the retainer. The screen 36 covering the opposite open faces and the top and bottom edges may be ½" mesh hardware cloth or the like. The front and rear vertical ends of the retainer are not covered by the screen 36.

The outer retainers (FIGURES 6–7) are generally similar to the inner retainers insofar as they comprise a pair of spaced apart perimetric frames 38 and have open faces and edges. The frames are held apart at their corners by spacers 40. It is noted however that the screen 42 covering the opposite faces of the outer retainer has openings which preferably are considerably larger than the openings of the inner retainer grid, and that the outer retainer is considerably thicker than the inner ones and does not include the channel spacers. Thus when the inner retainer is received within the outer retainer with the fabric envelope or sleeve between the retainers, there will be a space of say ½" between one face of the inner retainer and the opposing face of the outer retainer. This space between the opposing faces of the inner and outer retainers permits apprecable displacement of the filtering surface when reverse air flow to the pocket begins so that dirt may be knocked off as well as blown off.

The filtering medium for each pocket assembly is selected to provide a suitable filtering surface for the type of dust to be encountered. The selected material is made into a sleeve 44 (FIGURES 3 and 8) having opposite open ends. The sleeve length is sufficiently in excess of the length of the inner and outer retainers that the opposite ends of the sleeves may be turned backwardly to form short hems 46 overlying the front and rear edges of the outer retainer. The circumferential dimension of the sleeve is slightly larger than the interior of the outer frame so that the ends of the sleeve may be stretched to form the hems and so that there is sufficient material to accommodate the displacement of the filtering surface between the openwork faces of the retainers as the direction of air flow reverses.

Passing now to the construction of the control box 8, as noted previously it basically comprises two sets of vertically extending chambers alternating with each other and provided with valve means for controlling the communication between the chambers and atmosphere. As perhaps best shown in FIGURES 3 and 9, the chambers 48 of the first set (which register with the pocket assemblies) are open at their rear to the interiors of the pockets,

and each chamber 48 is provided with a vertically extending slot 50 in the front vertical wall 51 of the control box. This slot 50 is adapted to be closed under normal air flow conditions by an outer valve 52 in the form of a long shallow vertically extending channel. All except two of these outer valves are shown in FIGURE 3 in a flush position against the control box front wall 51, thereby indicating a closed position of these valves. The two valves 52 shown spaced slightly from the front wall 51 are intended to represent open outer valves associated with the two pockets being cleaned. The bottom of the first set compartments or chambers are closed by bottom wall 54 (FIGURES 2 and 9) at the level of the pocket assembly bottom.

The chambers 56 (FIGURES 2, 3, 9) of the second set extend below the bottom wall 54 of the first set chambers to communicate with the suction manifold 58 in the control box lower portion, which is in turn connected through clean air outlet duct 60 to the suction source. The vertical wall 62 between each first chamber 48 and its companion second chamber 56 is bent along a vertical line so that it angles into the second chamber as shown in FIGURE 9 and terminates in a vertical right angle member defining one side of the vertical slot opening 64 between each of the companion chambers. An inner valve 66 which is also a long shallow channel, closes this slot opening 64 at the same time that outer valve 52 opens slot 50 in the control box front wall 51 when the reverse air flow is initiated.

The valve arrangement (FIGURES 9–13) for each first chamber and its companion second chamber includes the inner and outer valves 66 and 52, a pair of vertically spaced cranks or levers 68 to which both valves are pivotally secured, a vertical shaft 70 rotatably carried on the exterior of the control box front wall and to which the levers 68 are rigidly secured, spring means biasing the shaft and levers toward a position in which the inner valve 66 is closed and the outer valve 52 is open, and cam follower means in the form of member 72 rigidly secured to and projecting from the shaft 70 with its outer end riding against the endless band arrangement 10 so that the valve assembly is normally held in a position opposite its biased position.

As shown in some detail in FIGURE 11, each shaft 70 is carried for limited rotation by a series of vertically spaced bearings 74 secured to the front wall 51 of the control box. Both the upper and lower levers 68 have collars 76 welded thereto which receive the ends of the shaft 70 and are suitably secured thereto by means of an Allen screw or the like. The bias means for the valve assembly includes upper and lower torsion springs 78 having one end secured to the control box front wall and the opposite offset end 80 projecting into a hole in the lever 68 adjacent the collar 76.

The chain follower 72 is rigidly secured to the middle of the shaft 70 and has a free outer end provided with a central notch 82. The forked outer end normally bears against a series of small plates 84 secured to the outside face of the endless chain 10 so that outer valve 52 is held closed and inner valve 66 held open. However, the plates 84 are omitted from a number of chain links to provide the gap 86 corresponding to the width of two first and two companion second chambers. The gap in the plates permits the followers to move outwardly under the force of the torsion spring 78 with the central notch 82 straddling the chain and results in the inner valve 66 closing and the outer valve 52 opening. It will be noted that, as shown in FIGURES 9 and 13, the followers are bent along several vertical lines toward their outer ends so that when the follower end is engaged by the first plate 84 following a gap, the movement of the valve assembly to the position closing the outer valve 52 and opening the inner valve 66 will be effected easily and gradually. However, the opposite movement of the valve assembly, occurring when the follower springs outwardly into a gap after sliding off the trailing edge of the last plate preceding the gap, will be abrupt.

As previously noted, the valves 52 and 66 for each chamber are both pivotally connected to the levers 68 so that they operate together. The bight of the outer valve 52 is connected to the levers by upper and lower swivel connections 88 (FIGURE 12), the levers then extending through horizontal slots 90 in the bight to similar swivel connections 92 on the inner valve. Each inner and outer valve is provided with gasket material, such as felt, on its seating face, the felt on the outer valve serving also to seal around the slots 90 through which the levers pass.

The endless chain 10 extends horizontally across the front of the control box (FIGURE 3) and is driven at a suitable speed by an electric motor 94 through a gear reducer 96, both mounted at one end of the front of the control box. To insure that the chain 10 does not sag, and is not displaced outwardly by the chain follower force bearing against the inner flight of the chain, a series of U-shaped brackets 98 are spaced along the front of the control box to carry a chain guide plate 100 (FIGURE 14) underlying both flights of the chain, and a bar 102 extending along the outer face of the inner flight as illustrated.

A summary explanation of the operation of the air cleaner, and of the control box and valve arrangement in particular, is perhaps best understood in connection with FIGURE 9 wherein one first chamber and its companion second chamber are designated 48*a* and 56*a* respectively, and the other first chamber and its companion second chamber are designated 48*b* and 56*b* respectively. Air flow through the upper pocket 4*a* of FIGURE 9 is in a normal direction in the sense that it is passing through the pocket from outside to inside with the filtering surface pressed against the inner retainer screens as illustrated. The dirt taken out of the air is of course lodged on the exterior surface of the pocket. The cleaned air then flows through first chamber 48*a* in a direction indicated by the arrows and into companion chamber 56*a* through opening 64*a*. The cleaned air flows downwardly through companion chamber 56*a* to the suction manifold and thence to the suction source for discharge. The flow of air through all pockets associated with control box chambers having the valves in the position shown for chamber 48*a* will be the same.

Now as to the lower pocket, i.e., the one associated with chamber 48*b*, in this case the gap 86 in the plates on the chain has permitted the follower 72*b* to move outwardly so that outer valve 52*b* has moved to an open position and inner valve 66*b* has moved to a closed position. As a result atmospheric air is drawn through opening 50*b* and through first chamber 48*b* in a reverse direction to the interior of the pocket where it causes the filtering surfaces to slap outwardly against the outer retainer where it is held as illustrated. It will be appreciated that while only pocket 4*b* is shown as undergoing reverse air flow in FIGURE 9, an adjacent pocket is also undergoing reverse air flow since the gap 86 in the chain plates is of length to encompass two followers at any one time. The dirt dislodged from that face of the pocket 4*b* next to pocket 4*a* (undergoing normal air flow) will, depending upon the nature of the dirt, be redeposited to an extent on pocket 4*a*, but the dirt dislodged from the other face of pocket 4*b* will fall to the hopper.

The change from normal air flow to reverse air flow occurs in successive pockets as the gap in the chain moves along, an additional pocket being subjected to reverse air flow as soon as the second preceding pocket is restored to normal air flow. The timing for each cleaning cycle is determined in accordance with the dust load encountered. This may be readily controlled in one way by the rate of chain travel, in another way by providing more gaps in the total chain length, and further ways will occur to those skilled in the art.

Several features of the invention are believed worthy

of some emphasis. The preferred valve arrangement described results in movement of the valves from a normal air flow position to a reverse air flow position very abruptly as the follower 72 springs outwardly, but the return movement of the valves to their normal air flow position is relatively gradual. Since there is space between the faces of the inner and outer retainers for displacement of the filtering surface, it is forcibly slapped outwardly by the reverse air flow with the dirt dislodged from the exterior of the surface in an effective manner. However, since the fabric is displaced inwardly against the inner retainer in a gradual manner, the possibility of any dirt still on the fabric being shaken through the fabric and carried into the clean air stream is minimized.

The provision of separate chambers and a separate valve arrangement for each pocket permits an operation wherein all of the pockets function to clean the air or else are undergoing cleaning themselves. That is, none of the pockets are blanked off. While this in itself is advantageous from a capacity standpoint, it also results in a higher negative static pressure in the pockets when their cleaning is to start than if the pockets had been blanked off. Therefore, there is a more forceful inrush of air and a sharper slap of the filter surface against the outer retainer than if the pockets had been blanked off from the suction source and had, as a result, a static pressure substantially equivalent to that existing on the dirty air side of the pockets.

Since the described apparatus uses atmospheric air as a source of reverse air, it does not require a separate forced draft of secondary air to clean the pockets. It thus avoids the problems inherent in providing an air discharging traveler which should tightly seal against successive pocket ends for satisfactory operation.

In a consideration of the merits of the invention, it should also be pointed out that while the term "reverse air flow cleaning" more or less accurately describes the means by which the cleaning of the pockets is effected, the factor which is perhaps most important in the pocket cleaning operation is the forcefulness of the slap of the filtering surface when reverse air flow is initiated since the dirt is dislodged more by being knocked off than by being blown off. It will thus be appreciated that the provision of support means for the filtering surface which permits measurable displacement thereof upon reverse flow initiation is of appreciable significance in the apparatus.

The provision of an arrangement wherein the pockets have their rear ends against the rear wall prevents passage of dislodged dirt around the rear end of a pocket and its redeposit upon some pocket undergoing normal air flow. Re-entrainment below the bottom edges of the pockets may be minimized by baffles depending from the lower edges of the pocket assemblies. Re-entrainment over the tops of the pockets is of course prevented by the general downward flow of air through the dust box.

In a modification of the invention, the gap 86 in the chain mounted plates 84 is divided into a leading and a trailing gap by an intermediate plate 84*a* shown in FIGURE 9. In such an arrangement, the plate immediately preceding the leading gap, the intermediate plate between the leading and trailing gaps, and the first plate following the trailing gap are so spaced that, as the chain moves along, the intermediate plate and the first plate following the trailing gap will concurrently engage the cam followers associated with the pair of pockets undergoing reverse air flow to restore the respective valve arrangement to a normal air flow position while the plate immediately preceding the leading gap holds that particular valve arrangement in a normal air flow position. Then as the chain moves farther along, the pair of adjacent cam followers engaged by the plate immediately preceding the leading gap and the intermediate plate disengage therefrom and spring outwardly into the leading and trailing gaps respectively to subject the corresponding pockets to reverse air flow. The primary benefit of this modified arrangement, i.e., the split gap arrangement, is that each pocket is subjected to two reverse air flow slaps during each passage of the gap portion of the chain therepast since normal air flow is restored to the leading pocket of a pair undergoing reverse air flow before it subsequently occupies the position of a trailing pocket undergoing reverse air flow. Thus an alternating condition is set up wherein the reverse air flow to the successive pairs of adjacent pockets alternates with normal air flow to all pockets.

Having described the invention, I claim:

1. In an air clearner: a dust box into which dust laden air is admitted; a series of air filter pockets disposed in spaced face-to-face relation in said dust box to filter said dust laden air as the air flows from the outside to the inside of said pockets, each pocket having an open front end; an air control box on the front side of said dust box having a set of first chambers in registry with and connected to said open front ends of said pockets and a set of companion second chambers alternating with said first set, said second chambers being connected in common with a suction source; valve means for each first chamber operable, in a first position to open each first chamber to its companion second chamber and to close each first chamber to atmosphere, and in an alternate position to close each first chamber to its companion second chamber and to open each first chamber to atmosphere; and means for operating the valve means of each successive first chamber to said alternate position for a time interval overlapping at least a part of the time intervals during which the valve means of the immediately preceding and succeeding adjacent first chambers are in said alternate positions whereby a reverse flow of air is induced through those successive pairs of filters pockets connected with said first chambers having valve means in said alternate position.

2. In the air cleaner specified in claim 1: said valve operating means include means for moving said valve means from said first position to said alternate position in an abrupt movement, and for restoring said valve means to said first position in a substantially slower movement.

3. An air cleaner as specified in claim 1 wherein: said dust laden air is admitted into the upper portion of said dust box; said filter pockets are disposed in the lower portion of said dust box so that a substantially unobstructed space is provided thereabove; and means are provided for sealing the rear end of each of said filter pockets with the rear wall of said dust box to prevent air flow therearound during said reversal of air flow.

4. An air cleaner as specified in claim 2 including: support means for the filtering medium of said filter pockets including an inner and outer retainer providing opposing openwork faces between which at least a portion of said medium is held, said opposing openwork faces being sufficiently spaced apart to permit appreciable displacement of said portion of said medium between said faces upon said reversal of air flow.

5. Air cleaning apparatus comprising: means forming a main casing having an inlet for the admission of air to be cleaned and a series of separate outlets on one side of said casing; a corresponding series of filter envelopes between said inlet and said outlets for filtering air passing therethrough from outside to inside, each having one open end connected to an outlet opening; auxiliary casing means mounted on said one side of said main casing and forming a series of alternating chambers including a set of first chambers registering with said outlet openings, and a set of second chambers in common communication with a suction source, each first chamber having a companion second chamber; means defining a first opening in the wall between each first chamber and its companion second chamber; means defining a second opening in the wall between each first chamber and atmos-

phere; valve means for said first and second openings; and means for periodically operating the valve means of successive pairs of adjacent first chambers from a first position wherein said first opening is open and said second opening is closed to an opposite position wherein said first opening is closed and said second opening is open whereby said successive pairs of adjacent first chambers receive a reverse flow of air from atmosphere while the remaining first chambers are in communication with their companion second chambers.

6. In an air cleaner: a dust box into which dust laden air is admitted into the upper portion thereof and flows downwardly: a series of upstanding filter sleeves disposed in spaced side-by-side relation across the lower portion of said dust box, each sleeve having an open end at the front side of said box and a closed end sealed with the rear side of said box; an air control box having a series of separate alternating chambers on the front side of said dust box including a set of first chambers registering with and connected to the front open ends of said sleeves, and a set of alternating companion second chambers in communication with a suction source and normally open to said first chambers; and means for periodically opening successive pairs of adjacent first chambers to atmosphere and closing them to their companion second chambers to induce a reverse flow of air from atmosphere through the connected sleeves, while simultaneously maintaining the remaining first chambers and companion second chambers open to each other and closed to atmosphere, the time interval during which each first chamber is open to atmosphere overlapping the time intervals during which the immediately preceding and succeeding adjacent first chambers are open to atmosphere.

7. In an air cleaner: means forming a main casing into which dust laden air is admitted, and an auxiliary casing having a set of first chambers alternating with a set of companion second chambers, said first chambers being in communication with the interior of said main casing and said second chambers being in communication with a suction source; a series of horizontally spaced, vertically disposed filter envelopes having one open end arranged in said main casing so that each of said envelopes has its interior in communication with a corresponding first chamber; valve means for each first chamber operable, in a first position to open each first chamber to its companion second chamber and to close each first chamber to atmosphere, and in an alternate position to close each first chamber to its companion second chamber and to open each first chamber to atmosphere; and means for operating said valve means for each successive first chamber from said first to said alternate to said first position concurrently with the operation of the valve means of the immediately preceding first chamber in the same sequence, and then from said first to said alternate to said first position concurrently with operation of the valve means of the immediately succeeding first chamber in that same sequence.

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